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City of Bremerton Wastewater Comprehensive Plan Update

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City of Bremerton
345 6th Street
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H PSIC Memorandum
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J SEPA Determination Letter and Checklist
K Spill Response Plan
L Sea Level Rise Policy

List of Abbreviations

AAF	Average Annual Flow
AAL	Average Annual Load
AB	Aeration Basin
ADWF	Average Dry Weather Flow
AECOM	Architecture, Engineering, Construction, and Management
BASF	Badische Anilin- und Sodafabrik
BNR	Biological Nutrient Removal
BOD	Biochemical Oxygen Demand
BRVA	Business Risk and Vulnerability Assessment
BTU	British Thermal Unit
CBFM	Central Bremerton Force Main
CBOD	Carbonaceous Biochemical Oxygen Demand
CE	Central Effluent
CFR	Code of Federal Regulations
CIP	Capital Improvement Plan
COD	Chemical Oxygen Demand
CoF	Consequence of Failure
COVID	Coronavirus Disease
CPP	Countywide Planning Policies
CSO	Combined Sewer Overflow
CTP	Crosstown Pipeline
CW	Callow Avenue Basin
CWA	Clean Water Act
DCD	Department of Community Development
DMR	Discharge Monitoring Report
DO	Dissolved Oxygen
DWF	Dry Weather Flow
EB	East Bremerton
EBBM	East Bremerton Beach Main
EPA	Environmental Protection Agency
EQ	Exceptional Quality
ERU	Equivalent Residential Unit
ESTP	Eastside Treatment Plant
FIRM	Flood Insurance Rate Map
GAC	granulated activated carbon
GMA	Growth Management Act
gpd	Gallons per Day
gpm	Gallons per Minute
HDPE	High-Density Polyethylene
HDR	Henningson, Durham, and Richardson, Inc.
HGL	Hydraulic Grade Line
HRT	Hydraulic Retention Time
I&I	Inflow and Infiltration
KCSD	Kitsap County Sewer District
KJ	Kennedy/Jenks Consultants, Inc.
lbs/sf/day	Pounds per Square Feet per Day
MCC	Motor Control Center
MCRT	Mean Cell Retention Time
MG	Million Gallons
MGD	Million Gallons per Day
mg N/L	Milligrams of Nitrogen per Liter
Mg P/L	Milligrams of Phosphorus per Liter
mg/L	Milligrams per Liter
MLK	Martin Luther King
MLSS	mixed liquor suspended solids
MLVSS	mixed liquor volatile suspended solids
MMF	Maximum Month Flow
MML	Maximum Month Load
MWL	Maximum Week Load
NAAQS	National Ambient Air Quality Standards

NPDES	National Pollutant Discharge Elimination System
OCS	Odor Control Stations
OF	Overflow
OFM	Washington State Office of Financial Management
PC	Primary Clarifier
PD	Peak Day
PDF	Peak Day Flow
PDL	Peak Day Load
PE	Primary Effluent
PEC	Pathogen Equivalency Committee
PF	Peaking Factor
PFRP	Process to Further Reduce Pathogens
PHF	Peak Hour Flow
ppd	Pounds per Day
ppdc	Pounds per Day per Capita
ppm	Parts Per Million
PSCAA	Puget Sound Clean Air Agency
PSIC	Puget Sound Industrial Center
PSNGP	Puget Sound Nutrient General Permit
PSNS	Puget Sound Naval Shipyard
PSRP	Process to Significantly Reduce Pathogens
PVC	Polyvinyl Chloride
RAS	Return Activated Sludge
RCW	Revised Code of Washington
RDT	Rotary Drum Thickener
SB	Sewer Basin
SCADA	Supervisory Control And Data Acquisition
SCFH	Standard Cubic Feet per Hour
SEPA	State Environmental Policy Act
sf	Square Feet
SLR	Solids Loading Rate
SOR	Surface Overflow Rate
SOTE	Sludge Settleable Overflow Rate
SRT	Solids Retention Time
SVI	sludge volume index
TAZ	Traffic Analysis Zones
TKN	Total Kjeldahl nitrogen
TMDL	Total Maximum Daily Load
TP	Total Phosphorus
TSS	Total Suspended Solids
TWAS	Thickened Waste Activated Sludge
UGA	Urban Growth Area
USFWS	U.S. Fish and Wildlife Service
VFD	Variable Frequency Drive
VS	Volatile Solids
VSS	Volatile Suspended Solids
WAC	Washington Administrative Code
WEM	Work Execution Management
WAS	Waste Activated Sludge
WB	West Bremerton
WDFW	Washington Department of Fish and Wildlife
WRIA	Water Resource Inventory Area
WTP	Water Treatment Plant
WWCP	Wastewater Comprehensive Plan
WWF	Wet Weather Flow
WWTP	Wastewater Treatment Plant

Section 1: Executive Summary

1.1 Introduction

The Bremerton Department of Public Works and Utilities (Bremerton) is responsible for providing wastewater services to the City of Bremerton and its surrounding areas. This update to the Wastewater Comprehensive Plan (WWCP) was developed to assess the capacity of the existing and future wastewater system and to outline necessary improvements. Commonly referred to as a "general sewer plan," the WWCP meets the requirements of Washington Administrative Code (WAC) 173-240-020 and the minimum content standards specified in WAC 173-240-050.

The previous WWCP was completed in October 2014 and adopted by the City Council through Ordinance No. 5268 in December 2014. This 2024 WWCP updates the previous WWCP and establishes a 20-year planning horizon from 2024 to 2044. Periodic reviews and revisions may be required to address regulatory changes in system conditions.

1.2 Service Area and System Description

Sections 2 and 3 of the WWCP Update provide an overview of the service area and existing wastewater system. Bremerton, situated in Kitsap County and approximately 15 miles west of Seattle across the Puget Sound, owns, maintains, and operates a comprehensive sanitary sewer collection and treatment system. This system serves West Bremerton, East Bremerton, and the surrounding areas of unincorporated Kitsap County. The system also accepts sanitary sewer flows from the U.S. Navy Puget Sound Naval Shipyard (PSNS), other U.S. Navy Facilities, and Kitsap County Sewer District No. 1 (KCSD No. 1) in West Bremerton. However, apart from the U.S. Navy, the system does not provide sewer service for significant industrial dischargers.

The City's sewer infrastructure comprises several key components:

- **Sewer Basins:** Twenty-two (22) sewer basins; six (6) in East Bremerton with a sewered area of 1,660 acres, and sixteen (16) in West Bremerton with a sewered area of 5,360 acres.
- **Pipelines:** Approximately 176 miles of gravity and pressure pipelines, ranging in size from six to 42 inches in diameter. Materials include polyvinyl chloride (PVC), high density polyethylene (HDPE), asbestos-cement, clay, cast iron, concrete cylinder pipe, and ductile iron (DI) pipe.
- **Pump Stations:** Forty (40) sewer pump stations including the two Kitsap County pump stations, WB-1 and WB-2.
- **Odor Control Stations:** Two (2) odor control stations are located in the collection system at surge chambers where pressure sewers transition to gravity sewers. Additionally, five (5) pump stations have dedicated odor control systems at the pump station wet wells.

- **Combined Sewer Overflow (CSO) Outfalls:** Fourteen (14) CSO outfalls which allow discharge of untreated combined sewer flows into Puget Sound during extreme wet weather events.
- **Westside Treatment Plant (WWTP):** One conventional wastewater treatment plant for treating dry weather flows and the majority of wet weather flows. This plant treats all flows generated in the City and service area.
- **Eastside Treatment Plant (ESTP):** One high-rate clarification and UV disinfection treatment plant for treating excess combined sewer flows generated in East Bremerton during some heavy wet weather conditions

1.3 Business Risk and Vulnerability Assessment

Section 4 describes the development process of the Business Risk and Vulnerability Assessment (BRVA) and the scoring outputs from the analysis. The intent of the BRVA is to identify the most vulnerable unit processes that might impact the ultimate performance of the City's facilities and systems The risk score was developed with consideration to the process area's consequence of failure (CoF) against business vulnerabilities (BV), helping to identifying assets that are more susceptible to failure.

The City's WWCP BRVA preparation kicked off with a workshop series where City staff gathered to discuss their various systems, operational risks, potential modes of failure, and opportunities for improvement. During these workshops, CoF and BV criteria matrices were developed and process areas were scored. City staff from operations and maintenance (O&M), engineering, and management were included in these conversations. Subsequent field investigations and desktop analyses confirmed many of the findings from the BRVA interviews.

Of the more than 40 assets scored in the BRVA, the following assets were identified as highly critical.

- Port Washington Narrows Siphon
- Electrical system
- Crosstown Pipeline
- Central Bremerton Force Main
- Final Effluent Channel/Outfall
- Anaerobic Digesters
- Oyster Bay Basin Collections System

The complete BRVA findings are available in Section 4.

1.4 Historical and Projected Flow and Loads

Section 5 describes the historical flows and loads entering the wastewater treatment plant, and also projects the sewer flows and loads to be leveraged in both future wastewater treatment

plant and collection system analyses to identify capacity-related capital improvement opportunities.

1.4.1 Historical Flows and Loads

The discharge monitoring reports (DMRs) for the influent flows and loads were provided for the period January 2018 through December 2023. This range includes periods for pre-COVID 19 pandemic years (2018-2019). Flow averages for this time period are summarized below in Table 1-1.

Table 1-1: Historical WWTP Flow Summary (2018-2023)

Parameter	2018 (MGD)	2019 (MGD)	2020 (MGD)	2021 (MGD)	2022[(1)] (MGD)	2023[(1)] (MGD)
Average Dry Weather Flow (ADWF)	4.2	3.7	3.6	3.6	3.5	3.2
Annual Average Flow (AAF)	5.1	4.4	4.8	5.2	4.6	4.2
Maximum Month DWF (MM DWF)	4.6	4.0	4.0	3.9	4.3	3.6
Peak Day DWF (PD DWF)	6.2	8.7	10.4	7.3	6.9	5.8
Maximum Month Wet Weather Flow (MM WWF)	9.3	7.2	9.5	10.7	9.9	8.7
Peak Day WWF (PD WWF)	19.3	22.3	18.4	22.4	26.0	26.0

(1) Due to issues with influent measurement, effluent flow has been recorded as influent flow in the DMR since 2022.

Average day and maximum month loads for Biological Oxygen Demand (BOD) and Total Suspended Solids (TSS) between 2018 and 2023 are summarized in Table 1-2 below.

Table 1-2: WWTP Historical Influent Loads

Parameter	2018 (ppd)	2019 (ppd)	2020 (ppd)	2021 (ppd)	2022 (ppd)	2023 (ppd)
Average Annual Load (AAL) for CBOD	8,100	7,100	6,200	6,500	7,100	5,900
Maximum Month Load (MML) for CBOD	9,900	8,400	8,300	7,700	14,000	7,500
Peak Day Load (PDL) for CBOD	15,700	12,200	17,400	13,200	21,300	10,700
AAL for TSS	9,300	9,100	8,400	7,500	8,900	7,000
MML for TSS	12,100	10,000	10,600	9,400	17,700	8,500

1.4.2 Projected Flows and Loads

Traffic Analysis Zone (TAZ) data provided by Kitsap County to the City of Bremerton was analyzed to determine the increase in residential and employment population through 2044, and subsequent increases to sewer flows and loads across the planning horizon.

According to the City of Bremerton Water Utility's 2020 Water Use Efficiency Plan, water consumption per Equivalent Residential Unit (ERU) was estimated to be 143 gallons per day (gpd) between 2013 and 2019. Based on an average household size of 2.33 persons per ERU, residential water usage was calculated at 61 gallons per capita per day (gpcd). The water consumption rate for employment-related use remained consistent with the 42 gpcd value established in the 2014 WWCP Update.

In the 2014 WWCP Update, the sewer generation factor was derived by applying a reduction to the water consumption factor to align estimated sewer generation with the 2012 Average Dry Weather Flow (ADWF). This same approach was utilized to determine the reduction from the updated residential water consumption rate and the 2014 employment water consumption rate to the corresponding sewer generation factor. A 20% reduction from water consumption to sewer generation was applied to align with historical ADWF data from 2020 through 2023, yielding an average variance of 2%. The reduced residential and employment per capita per day usage rates were calculated as 49 gpcd and 34 gpcd respectively.

The ADWF projections were developed using sewer generation factors applied to the projected sewered population as summarized in Table 1-3.

Table 1-3: Average Dry Weather Flow (ADWF) Projection

	Sewered Population		Base Flow ADWF Projection		
Year	**Residential**	**Employment**	**Residential**	**Employment**	**ADWF**
2024	42,100	44,617	2.1	1.5	3.6
2034	51,241	47,795	2.5	1.6	4.1
2044	62,161	51,279	3.1	1.7	4.8

To establish other design flow baselines, historical peaking factors of AAF to ADWF, and those of peak day (PD) and maximum month (MM) flows to AAF were estimated from DMR data over the past six years for both wet weather flow (WWF) and dry weather flow (DWF). The average of the six peaking factors (PFs) was used to project all flows except for the MM WWF, where the highest PF among the six historical PFs was used. These additional projected design flows are listed in Table 1-4.

Table 1-4: Additional Design Flow Projections (MGD)

Year	ADWF	AAF	MM DWF	PD DWF	MM WWF
2024	3.6	4.6	4.0	7.4	10.1
2034	4.1	5.3	4.6	8.6	11.7
2044	4.8	6.2	5.3	9.9	13.5
Peaking Factors	0.77	1.00	0.86	1.61	2.18

The projected 2044 peak hour flows are summarized in Table 1-5 below.

Table 1-5: Peak Wet Weather Flow Projection (MGD)

Year	ADWF	Current I/I	New Area I/I	PD WWF	PHF
2024	3.6	22.8	0	26.4	46.9
2034	4.1	22.8	2.8	29.7	52.9
2044	4.8	22.8	5.6(2)	33.2	59.0

Notes:

(1) PHF = PD WWF x 1.78 (calculated as the average of six historical peaking factors: PHF/PD WWF).

(2) Additional I/I for assumed new area estimated at 2,400 gal/day/acre for 2,321 acres, following the method from the 2014 WWCP Update.

To estimate loading for residential and employment areas, the City used King County's 2014 WWCP Update loading factors for treatment plant flow and waste-load projections. Although the City is not part of King County and lacks specific local data, these figures were adopted based on their assumed regional applicability. Historical data confirmed that these assumptions closely matched local conditions, with average differences of less than 2% in influent BOD and TSS loads from 2020 to 2022. The average annual load (AAL) projections were then calculated using these factors and applied to the projected sewered population, as summarized in Table 1-6.

Table 1-6: Average Annual Load Projections

Year	Sewered Population		AAL for BOD (ppd)	AAL for TSS (ppd)
	Residential	Employment		
2024	42,100	44,617	8,100	8,500
2034	51,241	47,795	9,600	10,100
2044	62,161	51,279	11,400	12,000

To establish additional design loads, historical peaking factors for maximum month load (MML), maximum week load (MWL), and peak day load (PDL) relative to annual average load (AAL) were estimated using six years of DMR data. The average of five peaking factors, after excluding an outlier from 2022, was used to project both MWL and PDL. For the MML, the highest peaking factor among the remaining five historical values was applied to the projected AAL to estimate the MML. Table 1-7 summarizes the projected BOD and TSS design loads.

Table 1-7: BOD and TSS Load Projection

	BOD Projection			TSS Projection	
Year	**AAL**	**MML**	**PDL**	**AAL**	**MML**
2024	8,100	10,900	16,800	8,500	11,100
2034	9,600	13,000	19,900	10,100	13,100
2044	11,400	15,400	23,600	12,000	15,600
Peaking Factors	1.00	1.35	2.07	1.00	1.30

1.5 Collection System Evaluation

Section 6 describes collection system hydraulic model development, calibration, and analysis at dry weather and wet weather steady state scenarios to identify areas of concern as the population grows across the planning area. The section also includes the results of a focused collection system field inspection effort to assess condition of several assets identified by City staff.

A hydraulic model was developed for the WWCP from GIS data, as-built drawings, and other information provided by the City. The model was calibrated using rainfall data from a storm in 2023 to simulate the flow response in the model. Settings in the model were calibrated to match the modeled flow response with flow monitoring data from pump stations and Westside

Wastewater Treatment Plant DMR data. The projected 2044 peak hour flow established in the model totaled 56.5 MGD, within 4% of the projected peak hour flow based on DMR data.

The model was then used to simulate a flow response due to population growth across each basin per County-provided TAZ data. The collection system evaluation, along with the focused field inspection effort, estimated the impact to each structure and recommended alternatives for improvement where necessary.

Results of the evaluation indicate the current wastewater facilities generally have sufficient capacity to accommodate existing flows, with the exception of some localized capacity limitations in certain segments of the collection system, including the Sinclair Park, Callow Basin, Anderson Cove, and Kitsap Sewer District No. 1 basins. Projecting to 2044, the main trunklines in these areas, along with those in the Callow Basin, Kitsap Sewer District No. 1, Pacific Avenue Basin, and Anderson Cove, are anticipated to face capacity constraints, as indicated by the future WWF scenarios. These deficiencies can be addressed through upsizing sewer lines and mitigating Inflow and Infiltration (I&I) issues. The most critical concerns resulting from the field inspections include wet well degradation at numerous pump stations, pipe corrosion, and the need for arc flash testing. Since these recommendations do not relate to a single pump station in particular, a programmatic approach to addressing these concerns is proposed.

1.6 Treatment Facilities Evaluation

The treatment system evaluation, described fully in Section 7, was conducted to assess the WWTP's current capacity and performance under projected 2044 conditions in accordance with the Ecology's Criteria for Sewage Works Design (Orange Book) and the design and construction standards outlined in WAC 173-240. This evaluation ensured that the facility would maintain compliance with regulatory requirements while meeting future demands. The assessment utilized three primary methods:

Plant Hydraulic Analysis: A plant-wide hydraulic model was developed to evaluate the plant's overall hydraulic capacity. The goal of this assessment was to verify that the existing facilities can handle the design flows without overtopping the structures' walls and to confirm the proper operation of the flow split structure. The hydraulic profile was established from the headworks to the Sinclair Inlet. Field measurement data was collected by plant operators on March 30 and May 20, 2024 and used to evaluate the current hydraulic conditions.

Process Modeling Analysis: A process model was created to simulate the existing WWTP processes. Plant daily monitoring data from January 2018 through September 2023, along with additional sampling data collected between October 16 and December 18, 2023 were used to develop the detailed influent wastewater characteristics for the model.

Desktop Calculations: The capacity of the remaining major process units was evaluated through desktop calculations, comparing key design and operational parameters with typical values recommended and ranges from Wastewater Engineering: Treatment and Resource Recovery (5th Edition, 2014, by Metcalf & Eddy), as well as the requirements outlined in the WA Orange Book.

Key outcomes from the analyses and calculations include:

- The WWTP is expected to be unable to handle the 2044 projected peak hour flow at the record high tide in many locations across the plant, including overtopping in the secondary processes and the chlorine contact chamber. Other process areas will face submerged conditions.
- The outfall system limits the plant's capacity and causes constraints in upstream processes in multiple modelled scenarios. The submerged outfall conditions have been field confirmed with manhole overtopping upstream of the outfall.
- Process modelling scenarios helped to confirm that additional secondary treatment capacity is adversely affected by undersized primary treatment processes, and therefore improvements to primary processes can improve secondary treatment capacity.
- The aerations basins are running at or above their estimated capacity.
- The secondary clarifiers are undersized for max month wet weather flow and depend on operational parameter adjustments to meet average annual flow conditions.
- Solids stream pumping capacity and anaerobic digestion capacity was found to be adequate to handle the anticipated increase in solids handling across the planning horizon. However, there is currently no redundant digester capacity.
- Grit migration beyond the headworks is adversely affecting downstream treatment process performance and capacity, including the anaerobic digesters.
- The disinfection system requires additional capacity to achieve required detention time under peak flow conditions.

1.7 Capital Improvement Plan

Section 8 describes the capital improvement projects identified as the culminating effort between field inspections, hydraulic and process model analyses, and operator and engineering staff interviews. A financial plan to meet the 20-year CIP goals is also proposed in this section.

The following types of capital improvement projects are included in the Capital Improvement Plan (CIP):

- **Collection System Improvements:** Replacement or repair of existing pipelines to correct existing conveyance deficiencies or to convey future flows. This includes the Puget Sound Industrial Center (PSIC) and Crosstown Pipeline (CTP) improvements as well.
- **Facilities and Equipment:** Rehabilitation, replacement, or upgrades to building, equipment, and facilities.
- **Wastewater Treatment Plant:** Rehabilitation, replacement, or upgrades to the WWTP infrastructure.
- **Operations and Maintenance Improvements:** Annual programs for substandard main replacement, main cleaning, miscellaneous equipment improvements, and controls upgrades. This also includes additional projects that improve the operation and maintenance of the sewer system. A detailed list of the recommended CIP projects is provided in Section 8.

In total, the 20-year CIP was estimated to cost approximately $279 million dollars in present worth. Major improvement projects include those shown in Table 1-8.

Table 1-8: CIP Summary

	Schedule of Improvements (2025 $1,000)							
Improvement Type	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2025-2030**	**2031-2044**
Collection System Improvements (C)	$17,870	$3,942	$4,700	$3,500	$1,600	$2,700	$34,312	$97,950
Facilities and Equipment (F)	$100	$100	$100	$100	$100	$100	$600	
Wastewater Treatment Plant (T)	$2,491	$11,040	$2,510	$100	$100	$700	$16,941	$108,630
Operations and Maintenance Improvements (M)	$900	$900	$900	$2,400	$900	$900	$6,900	$13,600
Total CIP	$21,400	$16,000	$8,200	$6,100	$2,700	$4,400	$59,000	$220,000

1.8 Operations and Maintenance

Section 9 describes roles and responsibilities within the County's wastewater/utilities organization and the staff levels required to successfully manage and operate the system. The operations and maintenance responsibilities are divided between the Wastewater Manager and the Utilities Operations Manager, both of whom report directly to the Director. The Wastewater Manager is responsible for overseeing the Wastewater Division, which includes the operation and maintenance of sewer pump stations, odor control stations, and wastewater treatment facilities and directs 20 full-time employees (FTEs). The Utility Operations Manager oversees the collection system and directs 12 FTEs.

To account for expanding new and expanding facilities and programs such as PSIC improvements and the pump station improvements program, the City should anticipate adding a minimum of three (3) FTEs. Actual FTE needs should be assessed as programs expand and improvements are made.

1.9 Implementation

Section 10 describes the general strategies for adopting and implementing the WWCP.

This WWCP addresses system additions and improvements that will be required to fully develop the service area. It is recommended that Bremerton periodically review progress it has made in implementing the WWCP before the next WWCP is developed.

Bremerton should continue to deliver on its CIP and meet the identified O&M goals. Bremerton should also continue to assess financial expenditures yearly to confirm rate increases as projected are necessary. Current population, population projections, and current and future financial resources should be reviewed and adjusted as necessary to reflect actual conditions and accommodate future project implementation.

Section 2: Introduction

The City of Bremerton Department of Public Works and Utilities (City) provides wastewater services to Bremerton and its neighboring areas. To ensure both existing and future wastewater capacity of the Bremerton community is met, the City has prepared this update to the Wastewater Comprehensive Plan (WWCP). This plan, often referred to as the "general sewer plan," adheres to the requirements outlined in WAC 173-240-020 and WAC 173-240-050.

The most recent WWCP update was completed in October 2014 (2014 WWCP Update) and adopted through Ordinance No. 5268 by the City Council in December 2014. The current 2024 WWCP builds upon its predecessor, utilizing a 20-year planning horizon from 2024 to 2044. Periodic review and revisions to the WWCP may be necessary to address changes in regulations or system conditions.

2.1 Regulatory Requirements

The WWCP addresses relevant federal, state, county, and local regulatory requirements. The following sections summarize these regulations applicable to this WWCP.

2.1.1 Federal Regulations

The Federal Water Pollution Control Act of 1972 (PL 92-500), as amended by the Clean Water Act of 1977 (PL 95-217) and the Water Quality Act of 1987 (PL-100-4), commonly referred to as the Clean Water Act (CWA), are the federal laws that provide the overall regulatory construct for the development of federal rules to protect surface water quality in the Unites States. The CWA gave the United States Environmental Protection Agency (EPA) authority to implement pollution control programs and regulations associated with wastewater and effluent discharges into surface waters. The EPA has the authority to delegate enforcement to the states, when state regulations are at least as strict as the federal regulations. In the State of Washington, the Washington Department of Ecology (Ecology) has primacy from the EPA to administer and enforce the CWA. In response, the DOE has promulgated several regulations to protect human health and the environment from wastewater treatment and effluent discharge to surface water in Washington.

Federal regulations for biosolids treatment and disposal are outlined in Title 40 Part 503 of the Code of Federal Regulations (CFR). The EPA's Part 503 regulations classify biosolids as Class A or Class B based on pathogen density achieved through treatment. Biosolids beneficially used must meet one of these classifications.

Class B biosolids are produced using a Process to Significantly Reduce Pathogens (PSRP), including aerobic/anaerobic digestion, composting, lime stabilization, and drying. Restrictions apply to food crop harvesting, animal grazing, and public access to land treated with Class B biosolids. Class A biosolids, achieved through a Process to Further Reduce Pathogens (PFRP), such as composting, heat drying, and pasteurization, offer greater flexibility for use and sale due to fewer restrictions. To classify biosolids as Class A using anaerobic digestion, the process

must meet time-temperature criteria or obtain PFRP equivalency from the EPA's Pathogen Equivalency Committee (PEC).

Part 503 regulations also cover pollutant concentrations, vector attraction reduction, and management practices. Effective industrial pretreatment generally results in low pollutant levels. Biosolids that meet Class A pathogen levels, low pollutant concentrations, and vector attraction reduction criteria may qualify as Exceptional Quality (EQ).

The EPA has established guidance for states to use in enacting regulations for wastewater reuse and reclamation (i.e., reclaimed water).

2.1.2 Washington State Regulations

States are required under Section 303(d) of the CWA to identify water bodies that are impaired by pollution and to establish a priority ranking of these impaired waters. States must establish a total maximum daily load (TMDL) of pollutants for each of these water bodies including identification of sources and develop and submit an implementation plan to meet the TMDL. The primary driver for the State's TMDL program is a 1997 Memorandum of Agreement between EPA and Ecology regarding Section 303(d) implementation.

Discharges of excess nutrients to the Puget Sound from domestic wastewater treatment plants are controlled by the Puget Sound Nutrient General Permit (PSNGP). The first PSNGP was issued in December 2021 and is effective until December 2026.

In addition to the general nutrient-control responsibilities under the PSNGP, Ecology is advancing a broader regional nutrient-reduction strategy focused on mitigating both dissolved oxygen (DO) impairment and excessive nutrient loads in Puget Sound. In February 2025 the Pollution Control Hearings Board (PCHB) invalidated the PSNGP insofar as it was mandatory and remanded the permit back to Ecology for further action. As a result, Ecology is proposing to reissue the general permit in a voluntary format in which wastewater treatment facilities may opt into the general permit or alternatively be subject to nutrient-control requirements through their individual NPDES permits. Concurrently, Ecology is developing a comprehensive Nutrient Reduction Plan that uses modeling such as the Salish Sea Model to set reduction scenarios for nutrients and the associated DO improvements across the Sound.

The governing Washington State laws for the planning and designing of wastewater facilities are the Revised Code of Washington (RCW) 90.48.110. Washington Administrative Code (WAC) Section 173-240 implements the "plans and specifications" from RCW 90.48.110 and includes the requirements for engineering reports, plans and specifications, and general sewer plans. WAC 173-240 includes the following regarding planning requirements and review procedures:

- Plan contents,
- Requirements for engineering reports for specific projects, ownerships, operation and maintenance, and
- Public notification procedures for construction of wastewater facilities.

Title 90.46 of the RCW establishes Washington State law governing the use of reclaimed wastewater including treatment requirements according to types of use. WAC 173-308 is the state regulation that governs the management, beneficial use, and disposal of biosolids generated by wastewater treatment processes.

Combined sewer overflow (CSO) regulations are addressed in RCW 90.48.480 and WAC 173-245. These regulations call for "the greatest reasonable reduction in CSOs at the earliest possible date." The WAC 173-245 regulations developed from this law allow only one CSO per year per CSO site. The City of Bremerton is allowed to meet this requirement based on a 20-year rolling average. The CSO regulations have been addressed in the City of Bremerton's CSO Reduction Plan, October 2000 (addendum July 2003). Ecology determined in February 2011 the City had fulfilled the obligations of the CSO Reduction Plan. Overall reduction by volume and frequency of events is 99% and compliance has been obtained at all sites. The City has continued to minimize CSO events by addressing sanitary sewer discharges as they are identified, enhancing the collection system with cured-in-place pipelining for aging mains, and eliminating sewer lateral connections and decommissioning sewers in marine areas. Each year, the City submits a CSO Annual Report to the Ecology, detailing ongoing monitoring, the volume, location, and duration of CSO events, and the activities performed to further reduce such occurrences.

2.2 Growth Management Act

The State of Washington's Growth Management Act (GMA) was enacted by the 1990 Legislature and its administrative regulations were adopted by Ecology in 1992. The GMA regulations are contained in WAC 365-195 and require all counties and cities with specified populations and growth rates to meet the requirements of the Act. One of the requirements of the GMA is development of a comprehensive plan. Wastewater Comprehensive Plans must include maps and descriptive text covering the objectives, principles, and standards used to develop the plan. One of the required elements of the comprehensive plan, which relates to the planning for and construction of wastewater collection and treatment facilities, is the capital facilities plan element. The capital facilities plan element must meet the requirements of RCW 36.70A.070. These requirements include:

- An inventory of existing capital facilities owned by public entities, including the locations and capacities of these facilities,
- A forecast of the future needs for the capital facilities,
- The proposed locations and capacities of expanded or new capital facilities,
- At least a six-year plan that will finance such capital facilities within projected funding capacities and clearly identifies sources of public money for such purposes, and
- A requirement to reassess the land use element if the probable funding falls short of meeting existing needs.

2.3 Compliance Status

The City's WWTP continues to operate under the National Pollutant Discharge Elimination System (NPDES) Permit (WA-002928-9), issued by the Ecology, which administers the Clean Water Act regulations.

The plant has consistently met weekly and monthly effluent biochemical oxygen demand (BOD) and total suspended solids (TSS) permit standards since 2005. It has received the Department of Ecology's Outstanding Performance Award for operational excellence every year from 2005 through 2023 (the award was not received in 2014, 2015, and 2019). This recognition underscores the facility's ongoing commitment to compliance and water quality management. Table 2-1 provides a summary of the requirements under the current NPDES permit. Copies of the NPDES permit and fact sheet are included in Appendix A.

Table 2-1: NPDES Permit Requirements

Parameter	Units[(1)]	Design Quantity	
		May – September	October – April
Influent Limitations			
Maximum Month Flow	MGD	11.0	15.5
Maximum Month Influent BOD_5 Loading	ppd	18,100	
Maximum Month Influent TSS Loading	ppd	22,600	
Effluent Limitations			
Average Monthly Carbonaceous BOD_5 ($CBOD_5$)	mg/L	25	
	ppd	2,294	3,232
		85% removal of influent $CBOD_5$	65% removal of influent $CBOD_5$
Average Monthly TSS	mg/L	30	30
	ppd	2,752	3,878
		85% removal of influent TSS	65% removal of influent TSS
Monthly Geometric Mean Fecal Coliform	# Colonies	200 per 100 mL	
pH		Between 6.0 and 9.0	

Notes:
(1) MGD – million gallons per day
ppd – pounds per day
mg/L – milligrams per liter

The City has also successfully reduced its combined sewer overflows (CSOs) by over 99%, as required by the City's CSO Reduction Plan, leading to the reopening of shellfish harvesting areas in Dyes Inlet. This reduction was instrumental in the termination of the Federal Consent Decree in 2011, which resulted from the 1992 lawsuit filed by the Puget Soundkeeper Alliance. All projects listed in the 1993 Ecology Order on Consent were completed by February 2011.

2.4 Planning Information Sources

Information sources used in preparation of the following WWCP elements include:

Population:

United States Census Bureau, 2020 census data.

Land Use:

City of Bremerton Comprehensive Plan, December 2014.
City of Bremerton Wastewater Treatment Comprehensive Plan, December 2005.
City of Bremerton Zoning Ordinance, May 18, 2016.

Other Reports:

City of Bremerton Wastewater Comprehensive Plan (2005, CDM).
City of Bremerton Wastewater Comprehensive Plan (2014, HDR).
WWTP Rerating Study (2008, MWH).
Nitrogen Removal Planning Study (2021, HDR).
Nitrogen Optimization Plan and Report (2023, HDR).
CSO Reduction Plan Update (2000, HDR)
Sewer UGA Planning (2008, HDR)
Sewer Planning Reports for Marine Drive, SKIA, East Bremerton and West Hills (2008, HDR)
Outfall Evaluation (2018, Cosmopolitan Engineering for WWTP only).

2.5 WWCP Organization

The objective of the WWCP is to provide a comprehensive summary of planning strategies, policies, and regulatory compliance efforts for the City's wastewater utility. The WWCP outlines long-term planning and service criteria, and assesses the capacity, condition, and regulatory compliance of the City's wastewater utility facilities in alignment with the Washington State Growth Management Act and the City's Comprehensive Plan.

Specific plan components include the following Sections:

Section 1: Executive Summary

Section 2: Introduction – Provides a summary of relevant background information, describes the existing system, including applicable regulatory and other requirements, and identifies related documents and sources of planning information.

Section 3: Service Area and System Description – Details the characteristics of the surrounding vicinity, the sewer service area, and the existing infrastructure.

Section 4: Business Risk and Vulnerability Analysis - Baselines unit process and system performance, vulnerabilities, and failure modes based on input from stakeholders. Institutional knowledge is collected from City staff along with record data to review performance objectives and identify known functional failures and risks.

Section 5: Historical and Projected Flows and Loads – Documents current and projected future population, land use, sewer flows, loads, and their impacts on the utility within the sewer service area.

Section 6: WWTP Collection System Evaluation – Evaluates necessary improvements to the sanitary sewer system based on the proposed expansion of the City's sewer service area to incorporate new service zones.

Section 7: Wastewater Treatment Facilities Evaluation – Establishes planning and design criteria, assesses the effects of anticipated sewage flows on treatment processes and facilities, and identifies necessary improvements to accommodate expected waste flows and loadings, including those required for effective use and disposal of effluents and solids.

Section 8: Capital Improvement Program – Summarizes, schedules, and prioritizes the improvements identified in the WWCP, including implementation timelines, cost estimates, and the financial plan.

Section 9: Operation and Maintenance – Outlines the wastewater utility's organizational structure and details the operations, maintenance procedures, and programs in place.

Section 10: Implementation – Discusses the coordination process for implementing the WWCP, as well as the environmental impacts associated with the implementation of current and future WWCPs.

Section 11: References

Section 3: Service Area and System Description

3.1 Introduction

Bremerton, situated in Kitsap County and approximately 15 miles west of Seattle across the Puget Sound, owns, maintains, and operates a comprehensive sanitary sewer collection and treatment system. This system serves West Bremerton, East Bremerton, and the surrounding areas of unincorporated Kitsap County as depicted in the vicinity map (Figure 3-1) and the sewer service area map (Figure 3-2). The system also accepts sanitary sewer flows from the U.S. Navy PSNS, other U.S. Navy Facilities, and KCSD No. 1 in West Bremerton. However, apart from the U.S. Navy, the system does not provide sewer service for significant industrial dischargers.

The City's sewer infrastructure comprises several key components including sewer mains (combined sanitary, storm, gravity, gravity-pressure, siphon, and force/pressure), combined sewer overflow structures, pump stations, odor control stations, pressure-to-gravity surge chambers, a CSO treatment plant, a conventional wastewater treatment plant, and low-pressure sewer systems (grinder pump systems and low-pressure sewer mains). The City's engineering design and construction standards can be found at https://www.bremertonwa.gov/413/Design-Construction-Standards.



Figure 3-1: Site Location

The City currently operates two wastewater treatment facilities. The WWTP, located in West Bremerton, provides secondary wastewater treatment for the entire system's wastewater service area and discharges treated wastewater into Sinclair Inlet. The Eastside CSO Treatment Plant, located in East Bremerton and sometimes referred to as the ESTP, treats combined sewer flows generated during heavy storm events in East Bremerton and discharges effluent to the Port Washington Narrows, the marine body of water that connects Dyes Inlet and Sinclair Inlet. The network connecting these treatment facilities and the service area includes gravity sewers (separated and combined), pump stations, and force mains.

In East Bremerton, flow generated in the sewer basins eventually enters the East Bremerton Beach Main (EBBM). The flow is conveyed to West Bremerton via two inverted siphons that cross under the Port Washington Narrows, entering Pump Station CE-1. CE-1 pumps into the CTP, a nearly 4-mile-long pipeline which carries flows to the WWTP. The West Bremerton area also delivers wastewater to the WWTP via gravity sewers, pump stations and force mains. Flow sources include conventional wastewater, groundwater infiltration, and stormwater inflow.

The hydraulic capacity of the municipal combined sanitary sewer collection system and its associated components is deemed sufficient for the conveyance of dry weather wastewater flows to the WWTP for treatment. However, under conditions of extreme wet weather storm events, the combined sewer flows may surpass the hydraulic capacity of the existing combined sanitary sewer conveyance system and the WWTP/ESTP infrastructure. In such instances, historical data indicates that excess untreated combined sanitary sewer flows have led to overflow events at CSO outfalls.

3.2 Surrounding Vicinity Characteristics

This section provides a description of the surrounding vicinity, the sewer service area, and the existing sewer infrastructure.

3.2.1 City of Bremerton

Situated on the western shore of Puget Sound, the City of Bremerton is bordered by two major waterways: Sinclair Inlet and Dyes Inlet. The Port Washington Narrows, which connects these inlets, divides Bremerton into two distinct areas: East Bremerton to the northeast and West Bremerton to the southwest. Figure 3-1 provides an illustration of the City and its surrounding features.

3.2.2 Topography

Kitsap County lies in a structural downfold, referred to as the Puget Trough or Puget Sound Lowland, between two mountain ranges. The county occupies a long, narrow, and irregularly shaped section of the Kitsap Peninsula, characterized by numerous bays and smaller inlets that create an extensive, irregular coastline. Except for the southern boundary, the county is surrounded by the waters of Puget Sound. The terrain features gently rolling lowlands with moderate elevation changes.

3.2.3 Geology and Soils

Bremerton lies within the Puget Lowland and is part of a large glacial drift plain. This plain is characterized by low, gently rolling ridges that run north to south, separated by valleys and marine embayment. The area is covered by glacial tills, which is underlain by older glacial and interglacial deposits. The depth of the till ranges from a few feet to over 100 feet and typically consists of cobbles and coarse gravel embedded in clays, silts, and sands, forming a very dense material.

Beneath the till, from Bainbridge Island to Bremerton, are the sediments of the Blakely Formation. These sediments are made up of massive to moderately bedded, dark reddish-brown cobble to boulder conglomerates within a well-cemented matrix of coarse, poorly sorted sandstone. The sandstone and conglomerate contain a mix of subangular to well-rounded fragments of basalt, andesite, basaltic sandstone, dark gray siltstone, along with occasional quartzite and metamorphic rock fragments. Interbedded within the formation are thin layers of lighter gray-brown clay mudstone, carbonaceous siltstone, and coal. To the west of Bremerton, there is a significant outcrop of Eocene Crescent volcanic rocks.

3.2.4 Climate and Air Quality

A cool maritime climate prevails within the service area because of its proximity to the Pacific Ocean and the influence of Puget Sound. In addition to marine influences, the regional climate is affected by the Cascade and Olympic Mountain ranges, located east and west of Bremerton, respectively. Bremerton experiences relatively short, cool, dry summers and prolonged, mild, wet winters. Falls and winters are generally accompanied by prevailing southwesterly winds, while the winds in the spring and summer are generally from the northwest. Annual precipitation in the county ranges from about 30 inches in the northern parts to around 70 inches in other areas, with some southwestern parts receiving up to 70 inches. Around 80% of Bremerton's precipitation occurs between October and March. Snowfall remains infrequent and light, with depths typically between 3 to 6 inches in lower elevations. Snowmelt continues to occur within 24 hours following a snowstorm.

The Puget Sound Clean Air Agency (PSCAA) is the regional air quality management agency for Kitsap County. PSCAA represents the EPA, and monitors and manages air quality in the Puget Sound Region. Under the authority of the Clean Air Act, EPA established the National Ambient Air Quality Standards (NAAQS), which specify maximum concentrations for a set of "Criteria Pollutants". These pollutants include carbon monoxide, particulate matter (PM-10), ozone, sulfur dioxide, lead, and nitrogen dioxide. Areas of the country where air pollution levels persistently exceed the national ambient air quality standards may be designated by the EPA as "Non-attainment" areas. The planning area is not located in a designated non-attainment area for any of the federal criteria pollutants.

The City is aware of the effects of climate change as they relate to sea level rise in its system. Please refer to Appendix L for the City's administrative policy on sea level rise, which is a consideration in all future capital improvements to the City's system.

3.2.5 Water Resources

Freshwater and marine resources in this area of Water Resource Inventory Area (WRIA) 15 include Sinclair Inlet, Dyes Inlet, the Port Washington Narrows, and the associated watersheds that flow into these marine systems. Both Fresh and Marine water are classified under the following system and earn these designations by meeting or exceeding established criteria related to watershed use and water quality. These designations are determined by the State of Washington and described in WAC 173-201A.

FRESH WATER

Sinclair Inlet Watershed

The Sinclair Inlet Watershed is located south of Bremerton in central Kitsap County. Surface waters flowing into the Sinclair Inlet are primary contacts as designated by the State of Washington (WAC 173-201A). The following freshwater bodies are within the Sinclair Inlet Watershed:

- Anderson Creek
- Annapolis Creek
- Beaver Creek
- Blackjack Creek
- Gorst Creek
- Karcher Creek
- Ross Creek
- Ruby Creek
- Sacco Creek
- Wright Creek

Dyes Inlet Watershed

The Dyes Inlet Watershed is located north and west of Bremerton in central Kitsap County. Surface waters of this watershed are primary contact as designated by the State of Washington (WAC 173-201). The following freshwater bodies are within the Dyes Inlet Watershed:

- Barker Creek
- Chico Creek
- Clear Creek
- Dickerson Creek
- Kitsap Creek
- Mosher Creek
- Ostrich Bay Creek
- Pahrmann Creek
- Ridgetop Creek
- Strawberry Creek
- Steele Creek

MARINE WATER

Sinclair Inlet

The Sinclair Inlet is a shallow estuary with a smooth, muddy bottom. This water body is characterized by weak tidal currents that result in a low flushing rate for the inlet; thus, contaminants entering the inlet are not always flushed out and can remain and degrade water and habitat quality. The Sinclair Inlet supports shellfish harvest, has been classified as being of

excellent quality for Aquatic Life Uses, and is a primary contact for recreational uses according to the State of Washington (WAC 173-201A).

Dyes Inlet and Port Washington Narrows

The Port Washington Narrows flows between Dyes and Sinclair Inlets. Strong currents, associated with the tidal cycles, characterize the movement of water through Port Washington Narrows. Dyes Inlet is a shallow estuary with a muddy bottom. This water body is characterized by weak tidal currents that result in a low flushing rate for the inlet, thus contaminants entering the inlet are not always flushed out and can remain and degrade the water and habitat quality. Dyes Inlet and Port Washington Narrows are classified as being of excellent quality for aquatic life uses, support shellfish harvest, and are significant contacts for recreational uses according to the State of Washington (WAC 173-201A).

Other Water Resources

The waters within Bremerton's service area have differing water quality due to natural conditions and historical practices. Based on a review of past water quality studies and planning documents, a general assessment of the water quality trends of major water resources is provided in Table 3-1.

Table 3-1: Major Water Resources

Water Body	Current Water Quality
Kitsap Lake (1)(2)	Good
Sinclair Inlet (1)(3)	Excellent
Dyes Inlet (1)(3)	Excellent
Anderson Creek	Excellent
Union River	Excellent

Notes:
Source: Kitsap Co. Health Dist. (SSWM) 2023 Water Quality Monitoring Report.
(1) Water body is 303(d) listed for fecal coliform bacteria.
(2) Water body is 303(d) listed for phosphorus.
(3) Water body is 303(d) listed for heavy metal, organic, and/or inorganic parameters.

Kitsap Lake often faces challenges related to high phosphorus levels, which can lead to harmful algal blooms. Currently, elevated levels of fecal coliform bacteria have been detected, especially after rain events, indicating potential contamination from stormwater runoff or failing septic systems.

Wetlands, Floodplains, and Coastal Zones

Known wetlands exist within the study area. Adjacent coastal zones include Port Washington Narrows, Sinclair Inlet (adjacent to Callow Avenue Basin), and Port Orchard Bay (adjacent to Trenton Avenue Basin). The Flood Insurance Rate Map (FIRM) published by the U.S.

Department of Housing and Urban Development breaks the City down into three flood zones. FIRM zones and areas include:

The Department of Housing and Urban Development classifies the City into three flood zones based on the Flood Insurance Rate Map (FIRM). These zones are as follows:

- Zone A1: Identified as areas subject to a 100-year flood event, with base flood elevations and flood hazard factors determined. This includes the entire city coastline and the shoreline of Kitsap Lake (elevation 159 feet).
- Zone B: Areas situated between the limits of the 100-year and 500-year flood zones. It also includes areas prone to 100-year flooding with average depths of less than one foot or where the contributing drainage area is less than one square mile, or those protected by levees. A small 5 to 6 block area south of Kitsap Way (a low-lying region) falls under Zone B.
- Zone C: This zone is defined as areas with minimal flooding risk and covers the remainder of Bremerton.

The City is aware that sea level rise could affect existing sewer facilities, especially in low-lying areas, including some pump stations, sewers in or adjacent to marine waterbodies, CSO outfalls, the WWTP, and ESTP. This WWCP update does not address the impacts of sea level rise on the City's infrastructure.

3.2.6 Wildlife and Endangered Species

The following threatened, endangered, proposed, or candidate species listed in Table 3-2 have been identified by the U.S. Fish and Wildlife Service (USFWS), and the Washington Department of Fish and Wildlife (WDFW) as species that may occur in the planning area.

Table 3-2: Species of Concern Identified by USFWS and NMFS in the Project Area

Common Name	Scientific Name	Federal Status	State Status
USFWS			
Bull trout (coastal-Puget sound DPS)	*Salvelinus confluentus*	Species Threatened	Candidate
Marbled murrelet	*Brachyramphus Marmoratus marmoratus*	Species Threatened	Threatened
Chinook salmon	*Oncorhynchus tshawytscha*	Species Threatened	Threatened
Steelhead	*Oncorhynchus mykiss*	Species Threatened	None

Source: WDFW 2019

3.3 Sewer Service Area

Bremerton's sewer service area and City contours (50-foot Intervals) is depicted in Figure 3-2. Bremerton's service area includes Urban Growth Areas (UGAs). Along with providing retail sewer service in these regions, the City also accepts sewer flows from the U.S. Navy's PSNS and KCSD No. 1. The figure also highlights new service areas, which primarily consist of unsewered regions where the City plans to extend sewer services in the future. Detailed planning documents have been created to outline these areas.

Within the existing sewer service area, there are two locations not included within a UGA boundary. One is situated north of Kitsap Lake, and the other is located southwest of the lake. Both areas currently have sewer facilities serving existing customers. The City has halted new service sales in these regions while awaiting modifications to the UGA boundaries, which will be assessed during Kitsap County's 2024 Comprehensive Plan Update process.

3.3.1 Service Agreements

The City has Negotiated Sewer Services Contracts with the U.S. Navy and KCSD No. 1. The U.S. Navy agreement was updated in 2008 and the KCSD No. 1 agreement from 1992 remains in effect. Copies of the agreements are included in Appendix E.

U.S. Navy

The U.S. Navy Contract with the City includes metered discharges from PSNS, Jackson Park Navy Family Housing (currently known as The Landings Family Housing), Naval Hospital Bremerton, and Camp McKean located on the west side of Kitsap Lake. Charges for service are based on water meter readings. The U.S. Navy Contract states that Bremerton will convey, treat, and dispose of sewage discharges from these facilities. However, the U.S. Navy owns and maintains the pump stations and sewage collection system at the facilities and discharges to Bremerton's system at designated discharge locations. The discharge locations and discharge limitations are detailed in the Negotiated Sewer Service Contract. At PSNS, the Navy's contracted peak discharge is 2,500 gallons per minute (gpm) at Cambrian Avenue, which discharges to the City Sewer Pump Station WB-3, and 500 gpm at First Street, which pumps to the City Sewer Pump Station CE-4.

Kitsap County Sewer District No. 1

KCSD No.1 is located directly northeast and southwest of the WWTP. KCSD No. 1 discharges to Bremerton through two pump stations (WB-1 and WB-2) and by gravity discharge. The Contract was established in 1992, and allows KCSD No. 1 to discharge up to 400,000 gallons per day (gpd) from the three discharge locations. The City is responsible for conveyance, treatment, and disposal of these contracted discharges from the connection point to the City's system to the City's WWTP. The pump stations and gravity collection system within the KCSD boundary are owned, operated, and maintained by Kitsap County.

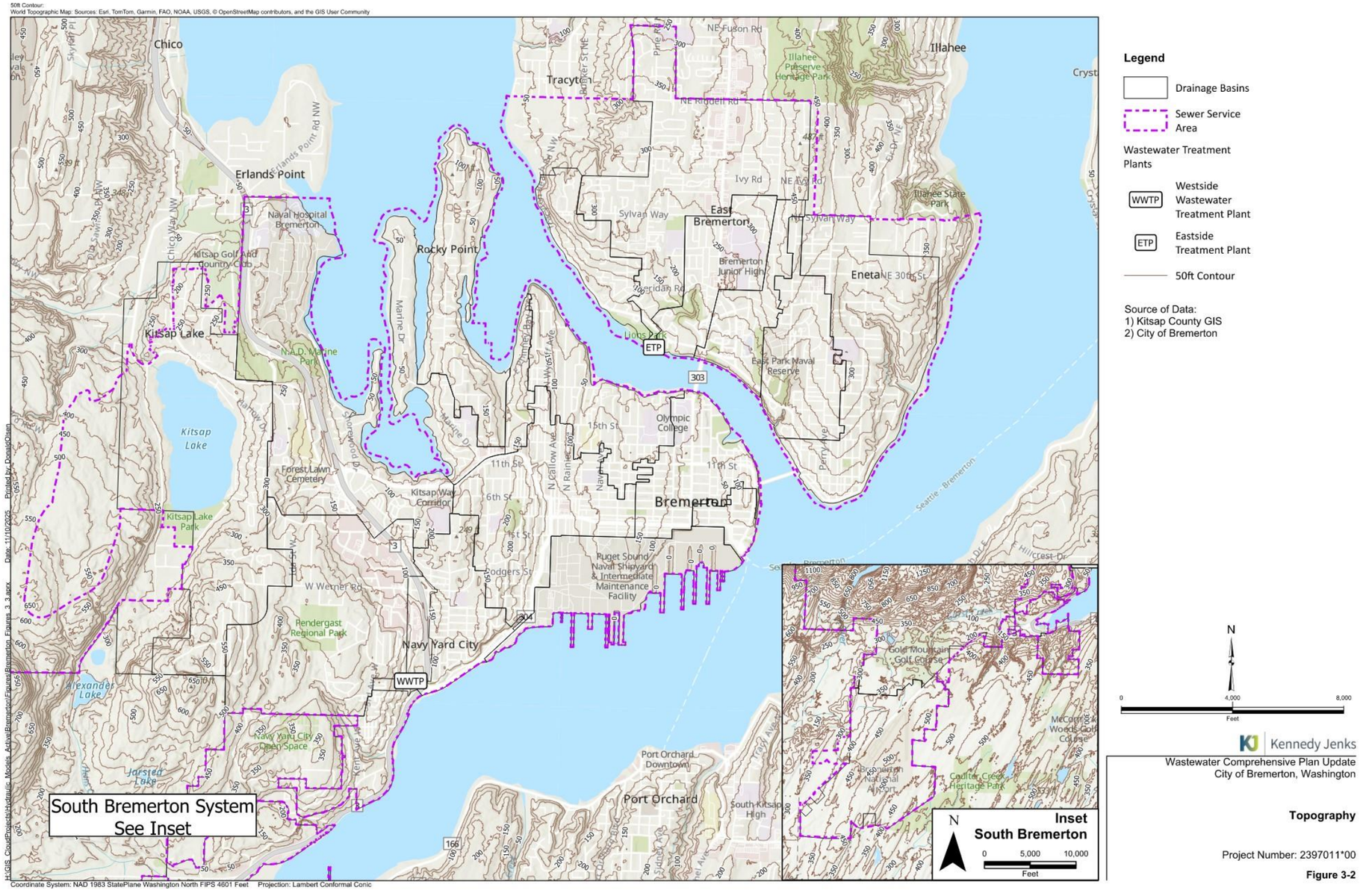


Figure 3-2: Topography

3.4 Infrastructure Description

3.4.1 Overview

The City's sewer system is composed of several components, which are listed below and shown in Figure 3-3 and Figure 3-4.

- **Sewer Basins:** Twenty-two (22) sewer basins; six (6) in East Bremerton with a sewered area of 1,660 acres, and sixteen (16) in West Bremerton with a sewered area of 5,360 acres.

- **Pipelines:** Approximately 176 miles of gravity and pressure pipelines, ranging in size from six to 42 inches in diameter. Materials include polyvinyl chloride (PVC), high density polyethylene (HDPE), asbestos-cement, clay, cast iron, concrete cylinder pipe, and ductile iron (DI) pipe.

- **Pump Stations:** Forty (40) sewer pump stations including the two Kitsap County pump stations, WB-1 and WB-2.

- **Odor Control Stations:** Two (2) odor control stations are located in the collection system at surge chambers where pressure sewers transition to gravity sewers. Additionally, five (5) pump stations have dedicated odor control systems at the pump station wet wells.

- **CSO Outfalls:** Fourteen (14) CSO outfalls (OF) for discharging untreated combined sewer flows into Puget Sound during extreme wet weather events. OF-12 was eliminated in 2020 with the upgrade to CW-4. The City intends to eliminate OF-4 in 2026 upon decommissioning of the beach sewer between E. 16th Street and Pump Station EB-2.

- **Westside Treatment Plant:** One conventional wastewater treatment plant for treating dry weather flows and the majority of wet weather flows. This plant treats all flows generated in the City and service area.

- **Eastside Treatment Plant:** One high-rate clarification and UV disinfection treatment plant for treating excess combined sewer flows generated in East Bremerton during some heavy wet weather conditions.

3.4.2 Sewer Basins and Flow Routing

West Bremerton

There are sixteen (16) sewer basins in West Bremerton, listed in Table 3-3 below. Two of those basins are the contract customers – KCSD No. 1 and PSNS. Four basins are combined that are partially separated with storm water collection and conveyance installed within the right-of-way. The other ten basins have dedicated separate sanitary sewers, and stormwater is conveyed and

handled separately. The total area of the West Bremerton sewer basins is 10,100 acres with an estimated sewered area of 5,359 acres.

Table 3-3: West Bremerton Sewer Basins

Basin Name	Basin Area[(1)] (Acres)	Percent Developed[(2)]	Percent of Developed that are Sewered[(3)]	Sewered Area [(4)] (Acres)	Combined/ Separated/ Contract
Anderson Cove	385	97%	98%	366	Combined
Callow Basin	644	95%	93%	569	Combined
Kitsap Lake	996	57%	71%	403	Separate
Oyster Bay	958	90%	86%	741	Separate
Pacific Avenue	78	93%	83%	60	Combined
Warren Avenue	309	96%	92%	273	Combined
Anderson Hill Road	470	67%	18%	57	Separate
Gorst	333	48%	57%	91	Separate
Marine Drive	244	92%	22%	49	Separate
Phinney Bay	86	90%	94%	73	Separate
PSNS	385	100%	98%	377	Contract
KCSD No. 1	275	85%	71%	166	Contract
Rocky Point	423	86%	0%	0	Separate
Sherman Heights	209	54%	44%	50	Separate
Sinclair Park	875	54%	75%	354	Separate
PSIC	3,430	52%	97%	1,730	Separate
Total	10,100			5,359	

(1) Excludes parcel area designated as water bodies.
(2) Total area of developed parcels divided by total Basin Area less Right of Way area.
(3) Total area of developed parcels with available sewer service divided by total developed parcel area. The parcel area designated as right of way or undeveloped are excluded.
(4) Sewered Area = Basin Area * % Developed * % Sewered.

The CTP receives flow from Pacific Avenue, Warren Avenue, Anderson Cove, and Callow Avenue Basins, all of the East Bremerton service area, as well as from PSNS and KCSD No. 1, The CTP begins at Pump Station CE-1, which receives flow from the Warren Avenue Basin, part of the Pacific Avenue Basin via CE-6, and all of East Bremerton.

Sewer flow generated in the Pacific Avenue Basin goes to Pump Stations CE-4 and CE-6. Flow from the east half of PSNS is pumped via PSNS Lift Station No. 1 to the City's Pump Station CE-4 located at the Bremerton waterfront. Pump Station CE-4 also receives gravity sewer flow from the Pacific Avenue Basin and pumps into the 8,000-foot long Central Bremerton Force Main (CBFM), which discharges into the CTP at 1st Street and Montgomery Avenue. CE-6 pumps to a force main which runs along Park Avenue, eventually discharging into the Warren Avenue Basin gravity sewer near Dr. MLK Way (formerly 7th Street) and flowing by gravity sewer (referred to as the Park Avenue Sewer) along Park Avenue to CE-1.

In the Anderson Cove Basin, flows are split into five (5) sub-basins, with four (4) sub-basins flowing to Pump Station CW-1, which pumps into the Crosstown Pipeline at 13th Street and

Naval Avenue via the 12-inch Naval Avenue Force Main. Flows from the CW-2 sub-basin are directed to the Callow Avenue Basin, but during low flow, can be diverted to CW-1 via valving at 19th Street and Snyder Avenue. Pump Station CW-4, which is located at the waterfront on the end of Ohio Avenue, can be directed (via the valve cluster at 17th Street and Ohio Avenue) to pump into the CTP at 13th Street and Ohio Avenue, or into the approximately 2,000 feet of beach sewer which runs from the end of High Avenue to CW-1. During wet weather months, CW-4 discharge is directed into the CTP, reducing the flow impact (approx. 600 gpm) to the beach sewer and the potential for CSO events. In dry weather months, flow is directed into the beach sewer to increase flow and velocity for scouring purposes.

In the Callow Avenue Basin, combined sewer flows, along with discharges from the west half of PSNS via PSNS Lift Station No. 9, are directed to City Pump Station WB-3, which then discharges into the CTP. The basin also receives flows from the Phinney Bay Basin at 15th and Cambrian, and from CW-2. To reduce CSO events, Bremerton constructed wet-weather Pump Station WB-6 near WB-3. During high flow events, flow will back up to WB-6, which pumps to the CTP. When WB-6 cannot keep up with excess combined sewer flow in the Warren Avenue Basin, a CSO event will occur at OF-17 (the most recent event was in 2021).

Sanitary sewer flows from the Oyster Bay and Kitsap Lake Basins are routed through a series of pump stations that ultimately discharge into the Sinclair Park Basin and then flow by gravity to the WWTP. Flows from the Gorst, Anderson Hill Road, and most of Sherman Heights Basins pump to the WWTP through a series of force mains via Pump Stations SB-1, SB-2, SB-3, and SB-4.

East Bremerton

There are six (6) sewer basins in East Bremerton, listed in Table 3-4 below. These are all combined sewer basins that are partially separated with stormwater collection and conveyance installed within the right-of-way. The total basin area is 2,645 acres with an estimated sewered area of 1,660 acres.

Table 3-4: East Bremerton Sewer Basins

Basin Name	Basin Area[1] (Acres)	Percent Developed[2]	Percent of Developed that are Sewered[3]	Sewered Area[4] (Acres)	Combined/Separated
Cherry Avenue	214	95%	82%	168	Combined
East Park	346	81%	88%	247	Combined
Pine Road	871	86%	82%	614	Combined
Stephenson Canyon	299	98%	96%	281	Combined
Tracyton Beach	187	76%	80%	114	Combined
Trenton Avenue	728	82%	39%	233	Combined
Total	2,645			1,665	

[1] Excludes parcel area designated as water bodies.
[2] Total area of developed parcels divided by total Basin Area less Right of Way area.
[3] Total area of developed parcels with available sewer service divided by total developed parcel area. The parcel area designated as right of way or undeveloped are excluded.
[4] Sewered Area = Basin Area * % Developed * % Sewered.

Flows from Tracyton Beach Basin go to Pump station EB-6, in the Pine Rd Basin, that also receives combined sewage from the Pine Rd Basin storm drainage. EB-6 pumps into an 8-inch force main that discharges to the gravity sewer on Lebo Blvd at the edge of Stephenson Canyon Basin. From there, sewer will flow via gravity into the 24-inch EBBM. CSO events will occur at OF-6 if the basin flow exceeds the EB-6 pumping and basin storage capacity. Similarly, in the Trenton Avenue Basin, combined flows enter the gravity beach sewers and eventually enter Pump Station EB-2, which pumps into the EBBM at the base of the Manette Bridge. EB-2 has small pumps (approximately 400 gpm) that operate during dry weather and most conditions, and high flow pumps (max. design flow approximately 4,000 gpm) which will operate during heavy weather conditions when the hydraulic grade line (HGL) in the EBBM increases and diverts the flow to the high flow pumps. CSO events will occur at OF-7 if the flow in the Trenton Avenue Basin exceeds the pumping and storage capacity of that basin. Flows from the Stephenson Canyon Basin are directed to the EBBM via piping at Lent Landing Park, where OF-2 is located. Combined sewage from the Cherry Avenue Basin flows into the EBBM via the OF-3 structure and rock trap manhole. The higher elevation of this site relative to the other CSO sites that discharge to the beach main reduces the potential for a CSO and drives flow to CE-1 during dry weather flow or to the ESTP during large rain events.

During periods of high flow, the EBBM can surcharge and become pressurized. As the HGL rises, flow will back up and divert to ESTP. The sewer along Lebo Blvd is designed to allow flow to drain back to the ESTP before an overflow can occur at OF-2. The sewer piping along Lebo Boulevard and the storage basin at the ESTP provide approximately 200,000 gallons of storage capacity (100,000 gallons at the ESTP and 100,000 +/- in the conveyance system). When the storage capacity is exceeded, flow will enter the ESTP for treatment. The effluent discharges to the Port Washington Narrows. When the capacity of the ESTP is exceeded, flow will be relieved at OF-1, which is built into the ESTP storage basin.

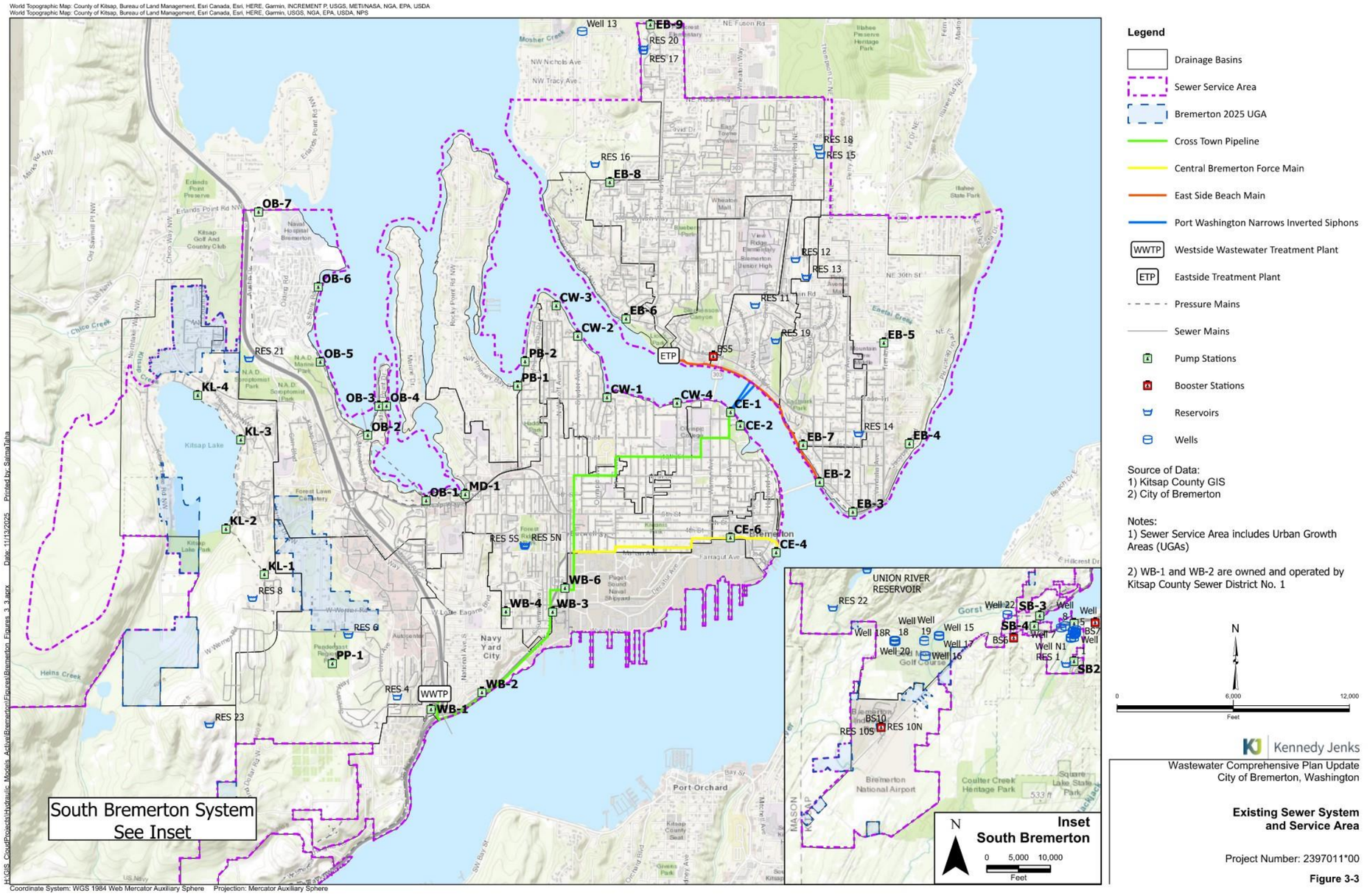


Figure 3-3: Existing Sewer System and Service Area

Figure 3-4 is excerpted from City of Bremerton 2024 Wastewater Comprehensive Plan Update

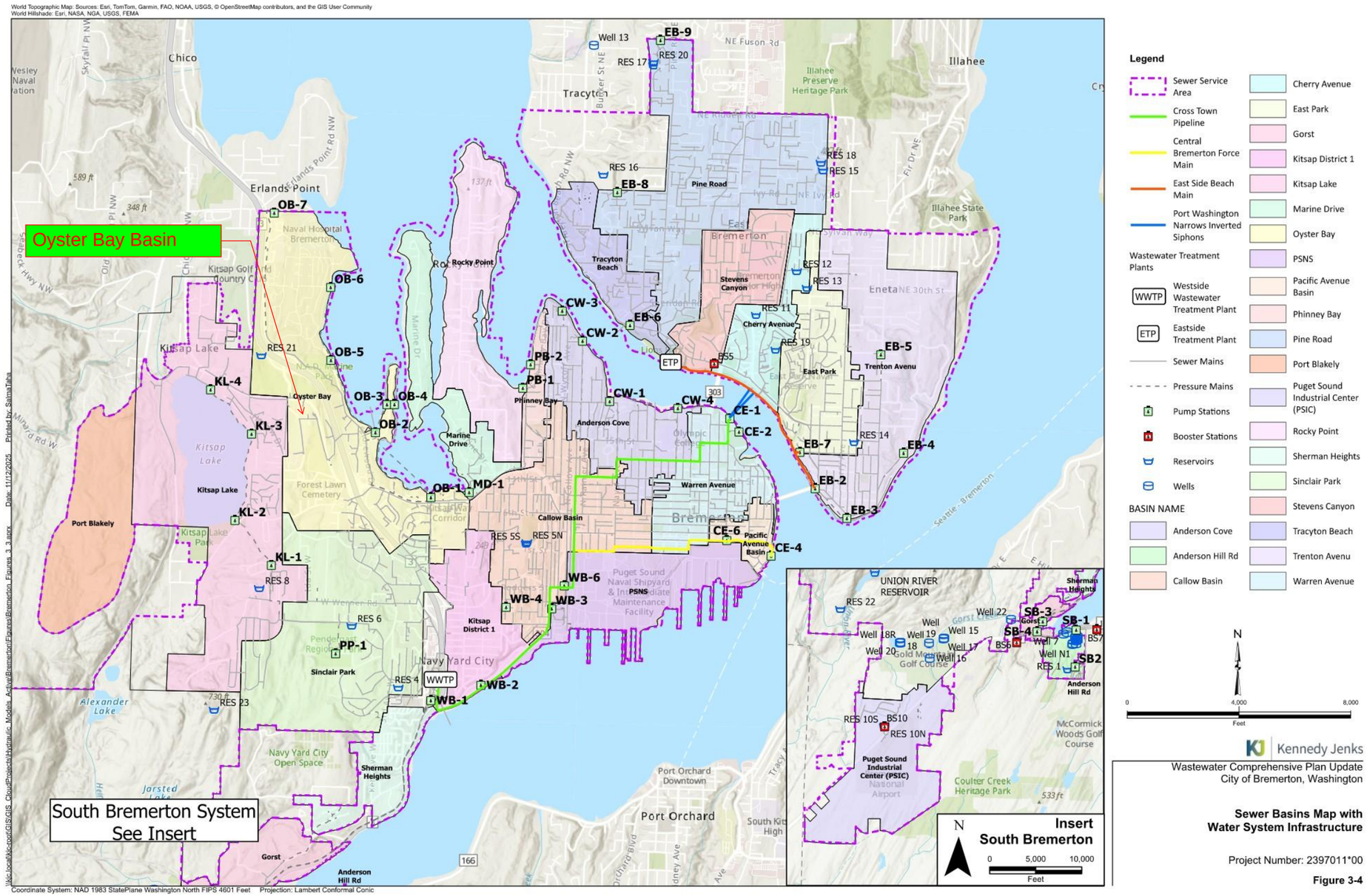


Figure 3-4: Sewer Basins Map with Water System Infrastructure

3.4.3 Pump Stations

Bremerton operates 40 pump stations, with pumps ranging from five (5) to 400 horsepower and capacities varying from tens to thousands of gpm. Most pump stations are equipped with variable frequency drives (VFDs) and emergency power backup to ensure continued operation during power outages. Additionally, some of the stations are equipped with odor control equipment and surge tanks.

Numerous individual grinder pumps are installed in areas where gravity sewer connections are not feasible. The City owns and maintains approximately 280 grinder pump stations and the number of these stations increases every year. These stations are installed by private developers when a gravity sewer connection is not feasible. They are also installed by contractors on City capital projects when a beach sewer is being decommissioned and the sewer connection must be redirected to an upland sewer system. They are typically installed at single family residences; however, they have also been used at condominiums, apartments, small businesses, and in the City right-of-way. Typical installation is a single (simplex) 1 hp grinder pump installed in a tank with sufficient storage for 1 to 2 days during a power outage. Larger installations require multiple pumps (duplex and triplex) with larger storage tanks. Service lines on private property are owned and maintained by the owner, and the service line in the right-of-way is owned by the City. The Owners are required to sign a Grinder Pump Service Agreement with the City which clearly defines the ownership and maintenance requirements. The pumps themselves are maintained by the City through a third-party maintenance contract (currently Correct Equipment). The property owners pay a fee on top of their regular sewer bill to cover the cost for maintaining the grinder pumps. The grinder pump stations that are part of this agreement must be manufactured by Environment One (E-One) Corporation.

There are a number of legacy grinder pump stations that were installed prior to the current City policy. Those stations are owned and maintained by the individual property owners. Current policy requires these homeowners to enter into service contracts with third-party entities responsible for maintenance. Table 3-5 provides a summary of the pump stations, and a detailed tabulation of this information is provided in Appendix C.

Table 3-5: Pump Stations

Pump Station	Description	Year Constructed	Pump	VFDs? (Y/N)	Maximum Capacity (gpm)	Backup Power	Basin / Upstream Station	CSO Outfalls	Discharge Location
CE-1	Dry Well, 32ft diameter segmented caisson	1985	Sulzer, 2 Dry-pit Submersible, 128 hp	Y	10,000	Yes	Warren Ave Basin, East Bremerton	OF-13	Start of CTP
			Flygt, 2 Dry-pit Submersible, 385 hp	Y					
CE-2	Dry Well, S&LL Package Pump Station	1973	S&LL, 2 Dry-Pit, 3 hp	N	-	Portable	Warren Ave Basin	-	Park Ave Sewer to CE-1
CE-4	Dry Well	1989	Flygt, 2 Dry-pit Submersible, 160 hp	Y	1,940	Yes	Pacific Avenue Basin, PSNS	-	Central Bremerton FM to CTP
CE-6	Dry Well, Metal, Significant upgrades in 2006	1989	Flygt, 3 Dry-pit Submersible, 12 hp	Y	1,600	Yes	Pacific Avenue Basin	OF-16	Gravity Sewer @ 7th & Park
CW-1	Dry Well, Significant upgrades in 2004/2007	1984	ABS, 3 Dry-pit Submersible, 201 hp	Y	3,500	Yes	Anderson Cove Basin	OF-8, OF-9, OF-10A, OF-11	Naval Ave Force Main to CTP
CW-2	Wet Well	1999	Flygt, 3 Submersible, 75 hp	Y	1,260	Yes	Anderson Cove Basin	OF-8	Callow Ave Sewers, with intertie to CW-1

Pump Station	Description	Year Constructed	Pump	VFDs? (Y/N)	Maximum Capacity (gpm)	Backup Power	Basin / Upstream Station	CSO Outfalls	Discharge Location
CW-3	Wet Well	~1970	Zoeller, 2 Submersible, 2 hp	N	50	Portable	Anderson Cove Basin	-	Gravity sewer on 26th, flows to CW-2
CW-4	Wet Well	2020	Flygt, 2 Submersible	Y	450	Portable	Anderson Cove Basin	-	End of High Ave into beach sewer, intertie to CTP at 13th/Ohio
KL-1	Wet Well, Converted Wet Well, Significant upgrades in 2013 (Conversion)	~1970	Flygt, 2 Submersible, 30 hp	N	950	Yes	Kitsap Lake Basin, KL-2	-	Gravity Sewer Near Pendergast Field to WWTP
KL-2	Dry Well	~1970	Flygt, 2 Dry-pit Submersible, 85 hp	Y	1,150	Yes	Kitsap Lake Basin, KL-3	-	KL-1
KL-3	Dry Well	~1970	Fairbanks Morse, 2 Dry-pit Submersible, 5 hp	N	450	Yes	Kitsap Lake Basin, KL-4	-	KL-2
KL-4	Dry Well	~1970	Fairbanks Morse, 2 Dry-pit Submersible, 5 hp	N	475	Yes	Kitsap Lake Basin	-	KL-3
MD-1	Wet Well	1994	Essco, 2 Submersible, 40 hp	N	950	Portable	Marine Drive Basin	-	Kitsap Way gravity sewer, flows to OB-1

Pump Station	Description	Year Constructed	Pump	VFDs? (Y/N)	Maximum Capacity (gpm)	Backup Power	Basin / Upstream Station	CSO Outfalls	Discharge Location
OB-1	Dry Well	1966	Flygt, 3 Dry-pit Submersible, 65 hp	Y	-	Yes	OB Basin, MD-1, OB-2	-	Gravity Sewer at Bremerton Blvd & Arsenal Way
OB-2	Dry Well	1966	Flygt, 2 Dry-pit Submersible, 15 hp	Y	-	Yes	OB Basin, OB-3, OB-5	-	OB-1
OB-3	Dry Well	1970	Fairbanks, 2 Dry-pit Submersible, 5 hp	N	-	Portable	Madrona Point, OB-4	-	OB-2
OB-4	Dry Well	1971	Fairbanks, 2 Dry-pit Submersible, 5 hP	N	-	Portable	Madrona Point	-	OB-3
OB-5	Dry Well, May be upgraded in near future	1966	Flygt, 1 Dry-pit Submersible, 12 hp	Y	500	Portable	Oyster Bay Basin, OB-6	-	OB-2
		-	Flygt, 1 Dry-pit Submersible, 15 hp	Y	-	-	-	-	-
OB-6	Dry Well	1966	Flygt, 2 Dry-pit Submersible, 15 hP	N	-	Portable	Oyster Bay Basin	-	OB-5
OB-7	Wet Well	~1970	Essco, 2 Submersible, 50 hp	N	-	No	Erland Point Apartment	-	Gravity Sewer on Austin Dr 600’ NW of Olding Rd
PB-1	Dry Well, S&LI Package Pump Station	~1970	Flygt, 2 Dry-pit Submersible, 20 hp	N	-	Portable	Phinney Bay Basin	-	Callow Avenue gravity sewer

Pump Station	Description	Year Constructed	Pump	VFDs? (Y/N)	Maximum Capacity (gpm)	Backup Power	Basin / Upstream Station	CSO Outfalls	Discharge Location
PB-2	Dry Well, S&LI Package Pump Station	~1970	Fairbank-Morse, 2 Dry-pit	N	350	Portable	Phinney Bay Basin		PB-1
PP-1 (PG)	Wet Well	~1990	Essco, 2 Submersible, 8 hp	N	140	Portable	Services Pendergast ONLY	-	KL-1 discharge gravity sewer, south of Francis St.
SB-1	Wet Well	-	Flygt, 2 Submersible, 105 hp	Y	-	Yes	-	-	SW Bremerton Force Main
SB-2	Wet Well	-	Flygt, 2 Submersible, 11 hp	Y	-	Yes	-	-	SB-1
SB-3	Wet Well	-	Flygt, 2 Submersible, 23 hp	Y	-	Yes	-	-	SW Bremerton Force Main
SB-4	Wet Well	-	Flygt, 2 Submersible, 24 hp	Y	-	Yes	-	-	SW Bremerton Force Main
WB-1	Wet Well, Maintained by KCSD#1	1989	2 Submersible	-	-	No	Sinclair Park, Beachfront	-	Crosstown Pipeline
WB-2	Dry Well, Maintained by KCSD#1	1989	-	-	-	No	KCSD #1	-	Crosstown Pipeline

Pump Station	Description	Year Constructed	Pump	VFDs? (Y/N)	Maximum Capacity (gpm)	Backup Power	Basin / Upstream Station	CSO Outfalls	Discharge Location
WB-3	Dry Well	2002/2003	Flygt, 2 Dry-pit Submersible, 20 hp	Y	10,000	Yes	Callow Ave, PSNS, Phinney Bay, Anderson Cove	OF-17	Crosstown Pipeline
			Fairbanks, 3 Dry-pit Submersible, 238 hp	Y	-	-	-	-	-
WB-4	Dry Well, S&LI Package Pump Station	1971	Smith & Loveless, 2 Dry-pit, 5 hp	N	-	Portable	Callow Ave Basin	-	Farragut St gravity sewer that goes to WB-3
WB-6	Wet Well, CSO Flow Only	2003	Flo-Serve, 3 Submersible, 200 hp	Y		Yes	WB-3 Overflow	OF-17	Crosstown Pipeline
EB-2	High Flow (Wet Well), Active for high flow, Significant upgrades in 2003	1973	Flowserve, 3 Submersible, 75 hp	Y	4,100	Yes	Trenton Ave Basin	OF-7	Eastside Bremerton
	Normal Flow (Wet Well), Active for low flow	-	Flygt, 2 Submersible, 5 hp	N	-	-	-	-	Gravity sewer on E. 10th, flows to EB-2

Pump Station	Description	Year Constructed	Pump	VFDs? (Y/N)	Maximum Capacity (gpm)	Backup Power	Basin / Upstream Station	CSO Outfalls	Discharge Location
EB-3	Dry Well, Significant upgrades in 1984, 2005.	1972	Flygt, 2 Dry-pit Submersible, 30 hp	Y	1,400	Yes	Trenton Ave Basin	OF-7	Gravity sewer on Jacobsen Blvd by Trenton Ave
EB-4	Wet Well, Converted Wet Well	~1940	Flygt, 2 Submersible, 7.5 hp	N	-	Portable	Trenton Ave Basin	-	Trenton Ave at Holman St gravity sewer
EB-5	Wet Well, Converted to Wet Well, Significant upgrades in 1995	~1970	Zoeller, 2 Submersible, 2 hp	N	-	Portable	Trenton Ave Basin	-	Trenton Ave at Holman St gravity sewer
EB-6	Wet Well, Significant upgrades in 2004	1947	Flygt, 3 Submersible, 45 hp	Y	1,200	Yes	Tracyton Beach Basin	OF-6	Gravity sewer at Lebo Blvd and Hefner St
EB-7	Pending (2025)								
EB-8	Dry Well, S&LI Package Pump Station	1971	Smith & Loveless, 2 Dry-pit, 10 hp	N	-	Portable	Pine Road Basin	-	Gravity sewer at Sugar Pine Dr and Pinecone Dr

Pump Station	Description	Year Constructed	Pump	VFDs? (Y/N)	Maximum Capacity (gpm)	Backup Power	Basin / Upstream Station	CSO Outfalls	Discharge Location
EB-9	Wet Well	~1970	Flygt, 2 Submersible, 10 hp	N	-	Portable	Pine Road Basin	-	Gravity sewer on NE Pinecrest Dr

3.4.4 Sewer Pipelines

The City's sewer collection system main diameters range from 6 to 42 inches for gravity mains and 4 to 36 inches for force mains. These sewers are constructed from various materials, including clay, concrete, PVC, asbestos cement, cast iron, DI, and HDPE, with some sections dating back to 1910-1920. Major conveyance, overflow, treatment facilities, and wholesale connection points are illustrated in Figure 3-3. Three of the major pipelines are discussed in this section. The Central Bremerton Force Main, another major pipeline from CE-4 to the CTP, is also mentioned in this section.

Crosstown Pipeline

The Crosstown Pipeline conveys flows from all of East Bremerton and much of West Bremerton to the WWTP. The CTP originates at Pump Station CE-1. CE-1 receives flows from all of East Bremerton through 16-inch and 24-inch siphons under Port Washington Narrows, the Warren Avenue Basin gravity sewers, and the Pacific Avenue Basin via CE-6. Pump Station CW-1 in the Anderson Cove Basin discharges to CTP through the Naval Avenue Force Main at 13th Street and Naval Avenue. The Central Bremerton Force Main, an 8,000-foot-long pressure sewer which originates at Pump Station CE-4 at the Bremerton waterfront, discharges to the CTP at First Street and Montgomery Avenue. Pump Stations WB-3, WB-6, WB-2, and pump stations from Kitsap County Sewer District No. 1, discharge directly into the CTP as it approaches the WWTP. All flow from PSNS eventually discharges to the CTP, since PSNS discharges to either CE-4 or WB-3. Pump Stations SB-1, SB-3, and SB-4 discharge into the Southwest Bremerton Sewer, which subsequently feeds into the CTP as it enters the south end of the WWTP property.

The CTP's alignment is approximately 19,300 feet in length. The pipe materials include prestressed concrete cylinder pipe (PCCP), HDPE, polyethylene-lined DI, CIPP-lined DI, and cement-lined DI. The initial section from Pump Station CE-1 (located at the north end of Park Avenue) is a 24-inch DI force main which discharges into the HDPE surge chamber at 13th Street and Naval Avenue. Both the Naval Avenue Force Main (from CW-1) and the CTP converge at this surge chamber. From this location to the WWTP, the CTP operates as a gravity-pressure main with an inverted siphon configuration. The section of the CTP from this location to the intersection of 9th Street and Montgomery Avenue was replaced and/or rehabilitated in 2013 using HDPE pipe and CIPP-lining of existing 30-inch DI pipe. At 9th and Montgomery, the pipe transitions to 30" PCCP, then transition to 36" PCCP near WB-3.

East Bremerton Beach Main

The East Bremerton Beach Main conveys wastewater from the East Bremerton sewer basins to the inverted siphons and/or the ESTP entry points to the beach main and the associated CSO outfalls include adjacent to the ESTP (OF-1), Lent Landing Park (OF-2), Riptide Condominiums, Lower Wheaton Way (OF-3), East 16th Street (OF-4), and Pump Station EB-2 next to the Manette Bridge (OF-7 at Trenton and Shore Drive). The EBBM main is approximately 7,500 feet in length with diameters varying in size from 18-inch to 24-inch. Materials include HDPE and DI. A 3,000-foot-long section of 20-inch asbestos cement pipe between the ESTP and the siphons was replaced with 24-inch HDPE in 2013. The 20-inch AC pipe remains buried in the beach and was abandoned in-place.

Port Washington Narrows Inverted Siphons

Two inverted siphon pipelines convey combined sanitary sewer flows from East Bremerton across the Port Washington Narrows to Pump Station CE-1 in West Bremerton. These pipelines are 16-inch cast iron (constructed in 1946) and a 24-inch concrete-lined DI (constructed in 1983.) The connections of the EBBM to the siphons were replaced in 2005 and include isolation valves and pigging ports.

In 2011, Bremerton installed stainless steel knife gate valves on the discharge side of the siphons at Pump Station CE-1. These valves enhance regulatory compliance by allowing the City to prevent East Bremerton flows from causing overflows at OF-13 (CE-1). During major storm events, excess flows from East Bremerton can be treated and discharged at the ESTP, freeing capacity in the Crosstown Pipeline for West Bremerton flows.

3.4.5 Combined Sewer Overflow Outfalls

The City's wastewater collection system contains 14 CSO outfall sites, which typically consist of an overflow weir, equipment to measure flow and duration of flow over the weir, and the outfall piping. The outfalls considered for this comprehensive plan project are listed in the Table 3-6 below. OF-12 is not included in this list since this CSO outfall was decommissioned as part of the CW-4 Upgrade project in 2020, which will be reflected in the City's next NDPES wastewater permit issued by Ecology. The City also anticipates abandoning OF-4 upon completion of decommissioning the 8-inch beach sewer between E. 16th Street and EB-2 in 2026.

Table 3-6: CSO Outfalls

Outfall Number	Basin	Receiving Water Body
OF-1	Pine Road	Port Washington Narrows
OF-2	Stephenson Canyon	Port Washington Narrows
OF-3	Cherry Avenue	Port Washington Narrows
OF-4	East Park	Port Washington Narrows
OF-6	Tracyton	Port Washington Narrows
OF-7A	Trenton Avenue	Port Washington Narrows/Port Orchard Bay
OF-7B	Trenton Avenue	Port Washington Narrows/Port Orchard Bay
OF-8	Anderson Cove	Port Washington Narrows
OF-9	Anderson Cove	Port Washington Narrows
OF-10	Anderson Cove	Port Washington Narrows
OF-11	Warren Avenue	Port Washington Narrows
OF-13	Warren Avenue	Port Washington Narrows
OF-16	Pacific Avenue	Sinclair Inlet
OF-17	Callow Basin	Sinclair Inlet

The following four bullets are in reference to the City's 2023 CSO Annual Report (submitted to Ecology on May 30, 2024),

- **Compliance:** The City is still in compliance with CSO reduction requirements at 13 of the 14 sites. To be in compliance, the City must achieve a rolling 20-year average of less than one

CSO event per year at each outfall site. At OF-11, the rolling average was 1.05. The City is programming a capital project at this outfall to upsize the stormwater outfall that is causing the CSO events to occur.

- **Reduction of Overflow Volume and Frequency:** The City has successfully reduced the volume of overflow by 99% and the frequency of CSO events by 99% as well.
- **Precipitation Events:** The City has continued to experience significant rainfall events which generally correlate with CSO events.
- **Public Education:** The City has maintained its public education and assistance program, which involves citizens in CSO reduction and educates them on water pollution prevention.

3.4.6 Collection System Odor Control Stations

Bremerton operates seven odor control stations to manage odors in the collection system, as detailed in Table 3-7. Odor Control Stations OCS -1, -2, and -3 are packed tower scrubbers utilizing sodium hypochlorite and caustic soda; tanks are refilled about three times annually. OCS-4 through OCS-7 consist of granulated activated carbon (GAC). OCS-1 and OCS-2 are installed in the collection system near the surge chambers where pressure sewer transitions to gravity sewer, whereas OCS-3 through OCS-7 are installed at pump station wet wells.

Table 3-7: Collection System Odor Control Stations

Station Name	Location	Type of Facility	Chemical Storage Tank Size and Type	Pump Station or Area Served	Year Built
OCS-1	2100 12th Street	Packed tower scrubber with sodium hypochlorite and caustic injection	500-gallon storage tanks for sodium hypochlorite and caustic soda	Convergence of Crosstown Pipeline from CE-1 and Naval Avenue Force Main from CW-1. Transitions from pressure to gravity sewer at this location	1996
OCS-2	200 High Ave.	Carbon tower scrubber	GAC Tower	Transition from pressure to gravity sewer for Central Bremerton Force Main from CE-4	1996
OCS-3	1740 Park Ave.	Packed tower scrubber with sodium hypochlorite and caustic injection	500-gallon storage tanks for sodium hypochlorite and caustic soda	CE-1	1996
OCS-4	2304 19th Street	Carbon tower scrubber	GAC Tower	CW-1	1996
OCS-5	416 S. Cambrian	Carbon tower scrubber	GAC Tower	WB-3	1996
OCS-6	100 2nd Street	Carbon tower scrubber	GAC Tower	CE-4	1996
OCS-7	622 Burwell Street	Carbon tower scrubber	GAC Tower	CE-6	1996

3.4.7 Wastewater Treatment Facilities

The City owns, operates, and maintains two wastewater treatment facilities, namely the WWTP and the ESTP. Both sites are located outside the boundaries of established floodplains and shorelines and do not contain any onsite environmentally sensitive areas or wetlands.

Westside Wastewater Treatment Plant

The WWTP provides secondary treatment for the entire service area, with a peak hydraulic capacity of 65 million gallons per day (MGD). It uses a conventional activated sludge secondary treatment process. The plant is located in West Bremerton and discharges treated effluent into

Sinclair Inlet. The treatment process flow diagram is shown in Figure 3-5 and the treatment site plan is shown in Figure 3-6.

The WWTP collects wastewater sludges, which are anaerobically digested, treated to Class B standards, dewatered, and reused at Bremerton's silviculture site.

Odor control measures and facilities at the WWTP include:

- Odor containment enclosures and covers for major facilities.
- Foul air conveyed to packed tower scrubbers for treatment.
- Two-stage packed tower treatment for facilities such as screenings, grit removal, primary clarifiers, old headworks, overflow chambers, gravity thickener, digester vents, centrifuge area, and sludge loading facility.
- Enclosures for the grit removal system.
- Single stage packed towers for Biofilter wet well, aeration basin headworks, return activated sludge (RAS) wet well, and secondary clarifier scum pits.

The WWTP outfall was constructed in 1971 and consists of 36-inch reinforced concrete pipe that was jacked through a casing under the Burlington Northern railroad track and laid along the bottom of Sinclair Inlet. The outfall is approximately 570 feet in length and the pipe was installed in 12-foot sections with bell and spigot joints. The joints are restrained using stainless steel all-thread rod at the springline connected to lugs. The diffuser has 22 ports and lays at approximately -40 feet mean lower low water (MLLW). The outfall was last inspected in November 2018 by Cosmopolitan Engineering. An outfall evaluation report was prepared and is included in the Appendix F. The report concluded that the outfall and diffuser are in good condition and operating as intended.

Eastside Treatment Plant (ESTP)

The Eastside Treatment Plant was constructed in 2001 to reduce CSO discharges by treating wet weather combined sewer generated in East Bremerton when the EBBM surcharges. The ESTP has a peak hydraulic capacity of 20 MGD and utilizes high-rate clarification followed by ultraviolet (UV) disinfection to meet secondary water quality standards. The ESTP is located in the Pine Road Basin and discharges into the Port Washington Narrows. The plant's process diagram is shown in Figure 3-7. A capital project scheduled for 2026 is intended to replace the UV disinfection components.

The ESTP outfall system was originally constructed in 1947 as part of the Manette Primary Treatment Plant. The outfall was reconstructed in 2018 and consists of sixty (60) feet of original cast iron pipe lined using cure-in-place-pipe (CIPP) technology, 373 feet of mechanically restrained 36-inch reinforced concrete pipe, and a single port 36-inch elastomeric diffuser check valve (Redflex duck bill). The total outfall length is approximately 450 feet. The invert of the diffuser is -25 feet MLLW.

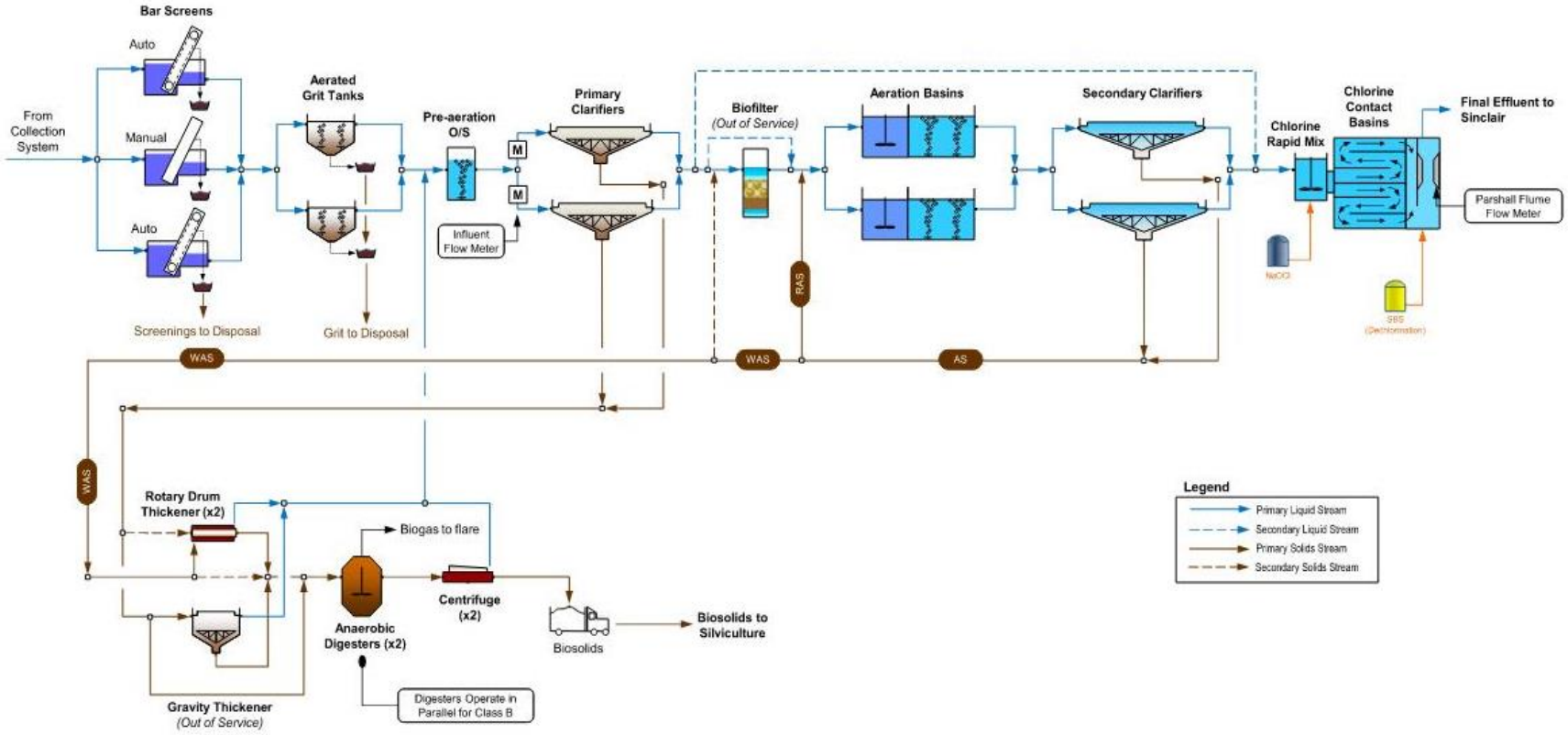


Figure 3-5: Westside Wastewater Treatment Process Schematic

Source: 2023 Nitrogen Optimization Plan and Report, HDR

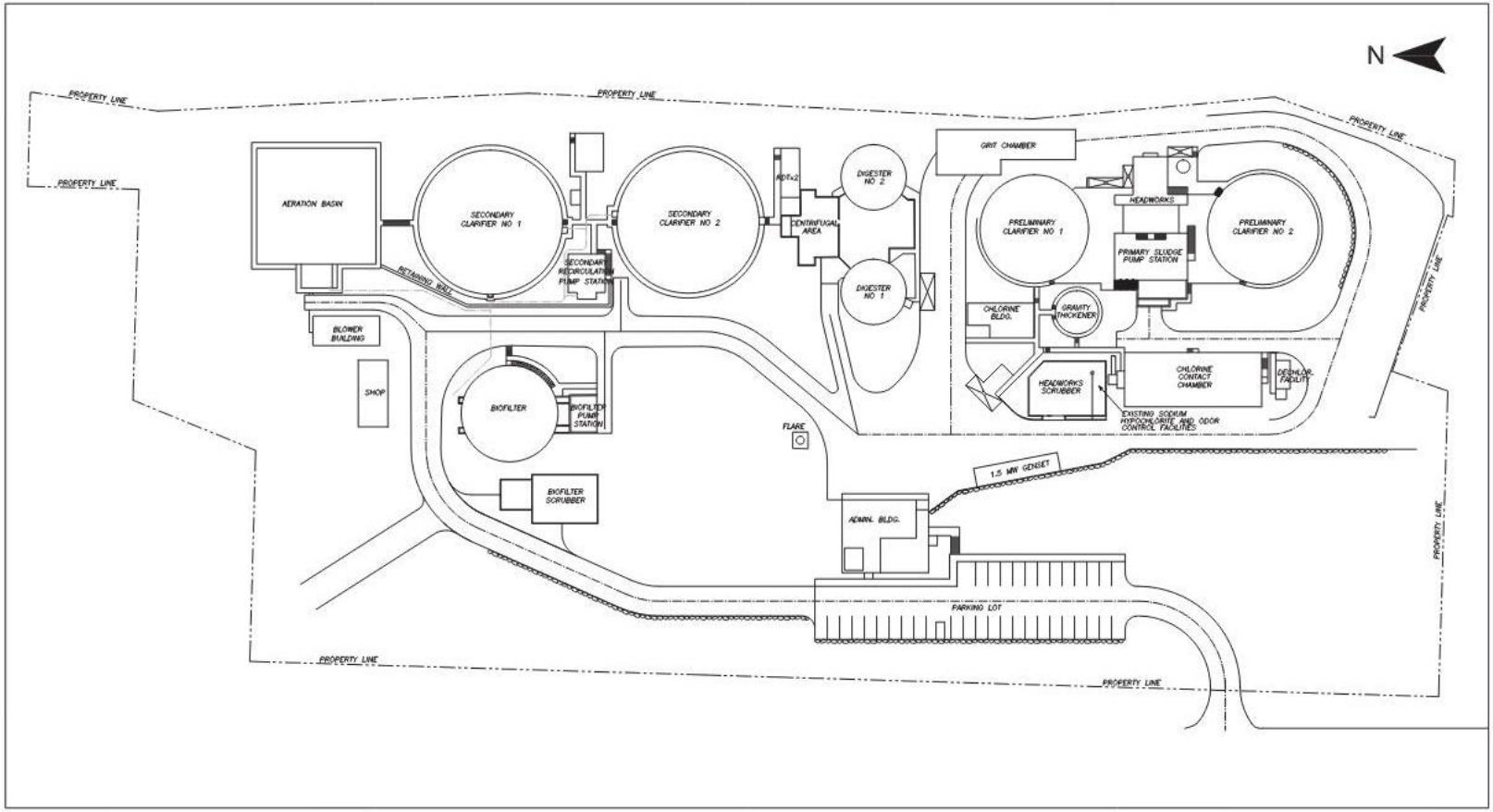


Figure 3-6: Westside Wastewater Plant

Source: 2014 Wastewater Comprehensive Plan Report, HDR

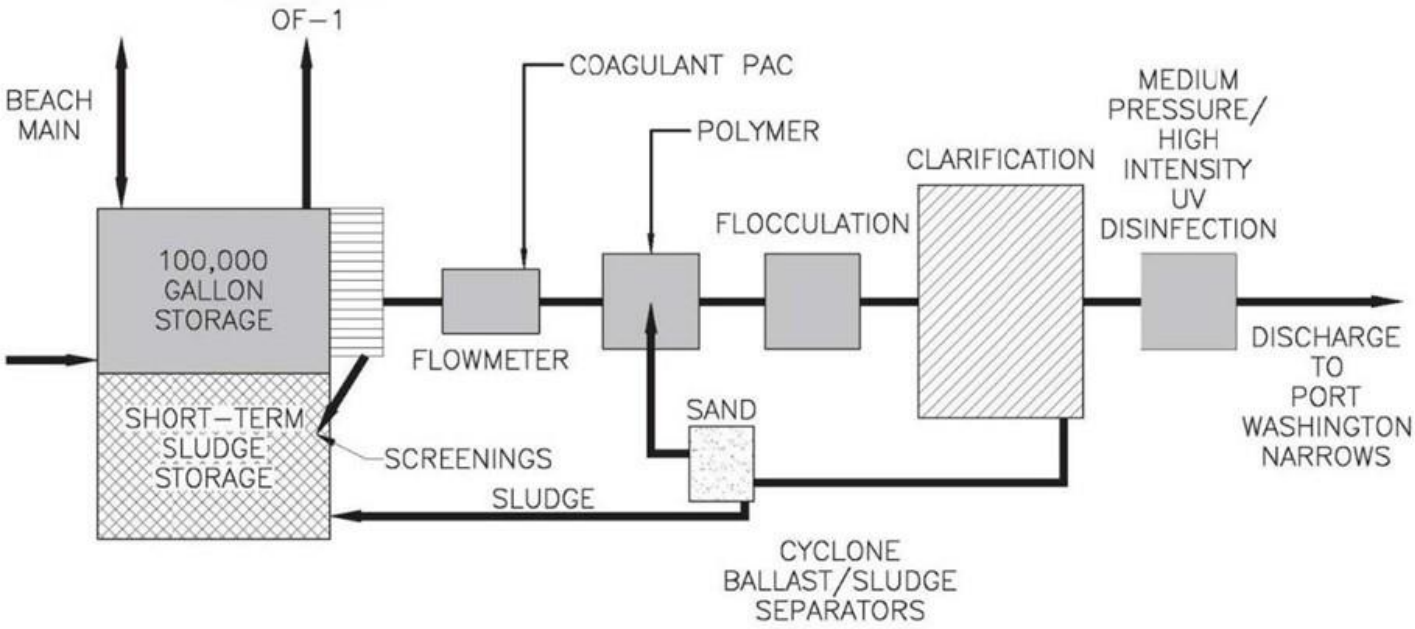


Figure 3-7: Eastside Treatment Process Diagram

Source: 2014 Wastewater Comprehensive Plan Report, HDR

Section 4: Business Risk and Vulnerability Assessment

The City's WWCP preparation kicked off with a Business Risk and Vulnerability Assessment (BRVA) workshop series where City staff gathered to discuss their various systems, operational risks, potential modes of failure, and opportunities for improvement. A follow-up BRVA session was later held to capture Collection System Assets. City staff from operations and maintenance (O&M), engineering, and management were included in these conversations. This gathering of City stakeholders ensured a comprehensive analysis of the City's risks by discussing potential failures and their impact on the City's business plan. The BRVA creates a baseline for unit process and system performance, vulnerabilities, and failure modes based on input from stakeholders. Institutional knowledge is collected from City staff along with record data to review performance objectives and identify known functional failures and risks.

The BRVA outcomes prioritize needs using a relative risk score and profile to direct attention to the most critical systems. Unit processes are prioritized based on consequential ranks, asset vulnerabilities, organizational vulnerabilities, and opportunities for improvement.

4.1 BRVA Workshop Series

4.1.1 BRVA Approach

The BRVA approach is intended to bring City management, engineering, and O&M staff together to identify the nexus between business risk, capital improvements, and asset performance to identify the opportune area(s) to manage City assets most effectively. Each staffing outlet offers unique insight into vulnerabilities within the system. Providing an opportunity for each of these groups to openly discuss system concerns establishes a foundation for effective management of assets.

This high-level assessment directs attention to the most critical City wastewater facilities and systems based on consensus from workshop participants. Figure 4-1 illustrates a generic example of how BRVA outcomes are presented to prioritize decision making. System components are ranked from high to low risk based on a combination of the Consequence of Failure score and the Business Vulnerability score. The Consequence of Failure is a relative measure of the potential impact an agency will face when a unit process or asset experiences functional failure. Business Vulnerability addresses how an agency's business practices affect staff's ability to optimize the long-term operation and maintenance of a asset. These scores are generated using weighted metrics and then multiplied together to create the relative risk score.

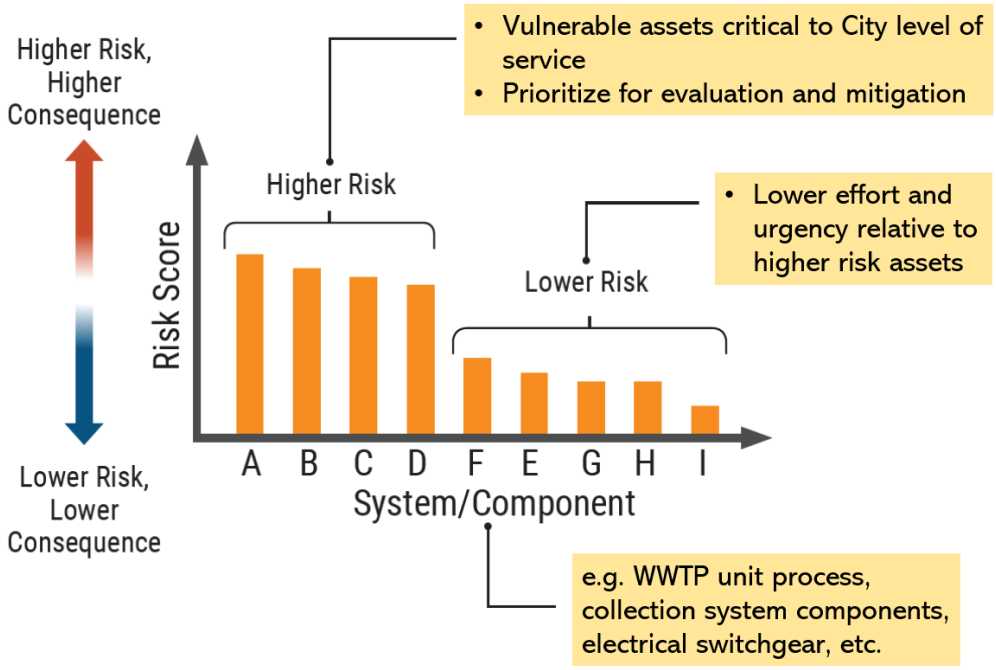


Figure 4-1: Example of Relative Risk Score and Profile

The BRVA workshops were designed to capture an objective opinion of the City's risk, based on a consequential and vulnerability risk assessment of the wastewater facilities, systems, and assets. This was completed by evaluating the desired function, ability to meet performance objectives, and existing O&M business processes for each system. While a complete profile of every asset is ideal for a comprehensive risk evaluation, for the purposes of this series, assets were allocated into major asset categories, and sub-system assets. The major asset categories is referred to herein as system unit processes, including systems within the WWTP and major systems of the collection system. These 17 major system unit processes are outlined below:

Headworks	Secondary Clarification	Odor Control
• **Grit Removal**	• Disinfection	• Electrical System
• **Pre-Aeration**	• Final Effluent Channel/Outfall	• Collection System Subbasins
• **Primary Clarification**	• Solids Stream	• Siphons Mains
• **Biofilter**	• Digestion	• Crosstown Pipeline & Central Bremerton Force Main
• **Aeration**	• Biosolids Land Application	

Organizing the City's wastewater assets into these unit processes was done based on a review of existing flow diagrams and schematics. From these 17 system unit processes, the assets are further broken down into 43 sub-system assets. A full list of all 43 assets is depicted in the results generated in Figure 4-3 and Figure 4-4.

There are four major elements of the BRVA:

1. The **first element** is to establish functional performance through general knowledge of the system by inquiring about the function of the system, performance criteria expected by the system, the key process indicators that the operator measures to meet system functional performance, and whether a failure event is evident to the operator.

2. The **second element** is to identify the impact of failure on safety, environment, service quality, public perception, and financial impact/fiscal sustainability.

3. The **third element** is to establish vulnerability of how the business operates, maintains and manages City facilities and systems. This is done by determining the condition of each unit processes relative to physical condition, the degree of potential safety risks, operating procedures, O&M training programs, management of change processes, and maintenance management systems.

4. The **fourth element** of the BRVA is to collaboratively identify improvement opportunities, from a high level. Business system improvements, including any O&M procedural improvements, replacement of critical assets, or re-engineering of the systems is considered to reduce the overall risk score. This element is the culmination of risk assessment and is completed at the end of all evaluations to generate the prioritize CIP program.

For each system and asset, the BRVA participants defined the system and assessed the consequence of failure and collective vulnerability of the system by carefully asking a series of strategic questions and applying the scoring approach defined in Section 6.5. The steps outlined in the following table describe the BRVA approach covered during the workshop series and align with the first three elements described above. The outcome of the asset evaluation is to identify business system improvements, as described by the fourth element above, and is completed after the workshop series.

Table 4-1: BRVA Workshop Steps (Elements 1 to 3)

Steps	Evaluation Criteria	Outcome
Define Asset Functional Attributes	- Functional Statement - Performance Objectives - Failure Modes and Detectability - Potential Improvement/ Mitigation	Compiled notes for each asset according to knowledge collected from City Staff
Assess Consequence of Failure	- Public/Staff health and Safety - Environmental and Regulatory Impact - Quality of Service/Continuity - Public Perception - Financial Impact/Fiscal Sustainability	Each criteria scored 1 to 5 Each criteria assigned a weighted multiplier
Assess Collective Business Vulnerability of Asset	- Work Execution Management - Asset Condition - Workforce Reliability & Training - Workface Safety Features & Culture - Process Resiliency - Engineering for maintenance Reliability & Asset Performance Tracking	Each criteria scored 1 to 5 Each criteria assigned a weighted multiplier

The following section provides a describes the evaluation criteria used to develop an arithmetic mean and determine the vulnerability rating for each unit process as it relates to the condition of each business element. This process establishes a uniform scoring metric to be used system wide prior to individual assets being discussed to maintain continuity and avoid initial bias.

Record documents were collected by KJ to generate a basic asset hierarchy of unit processes within the WWTP and collection system. Using this asset hierarchy, the framework and agendas for the BRVA workshop series were compiled and approved by the City. The BRVA leverages institutional knowledge through workshops and interviews with experienced O&M staff to determine and uncover reasonable system failure modes and effects, dominant failure mechanisms, operational targets, equipment history, system criticality, business vulnerabilities, likelihood of failure, and corrective actions. Various stakeholders from management and O&M from treatment, collections, electrical, and instrumentation and controls (I&C) were invited to all meetings allowing KJ to record institutional knowledge and notable areas of concern. Each staffing outlet offers unique insight into vulnerabilities within the system. Providing an opportunity for each of these groups to openly discuss system concerns establishes a foundation for effective management of assets. Attendance for these workshops included the following:

City Engineering: Ned Lever, William David, David Powell, and Cole Arthur

Wastewater O&M (WWTP and Pump Stations): Eric Burris, Kevin Golnik, Travis Olson, William Wendling, Dana Nystrom

Utility O&M (Collection System): Chance Berthiaume and Darrell Clauson

Facilitated by KJ Staff: Andrew Perez, Mackenzie Capaci, Gwen Gyldenege, Swati Maurya, Michael Lubovich, and Benjamin Schriber.

The BRVA workshop series agenda is outlined in Table 4-2 below:

Table 4-2: BRVA Workshop Agenda

10/17/2023	Service Levels, Corporate Risk Matrix Development	City's Vision & Mission, Agency Performance Objectives, Consequence of Failure Identification & Impact Scale, System Condition Scale, and BRVA Workshop Outline & Approval
10/18/2023	Workshop 1	Review Elements of the BRVA Tool, general flow path overview and initial concerns, Headworks, Grit Removal
10/19/2023	Workshop 2	Pre-aeration, Primary Clarification, Biofilters
10/25/2023	Workshop 3	Aeration, Secondary Clarification, Disinfection
10/26/2023	Workshop 4	Final Effluent Channel/Outfall, Solids Stream, Digestion
11/14/2023	Workshop 5	Biosolids Effluent, Electrical Systems, general overview of collections system (to be continued after future analysis)
09/24/2024	Workshop 6	Review Elements of the BRVA Tool, Collection System Subbasins
10/8/2024	Workshop 7	Remaining Subbasins, Siphons, Crosstown Pipeline & Central Bremerton Force Main

Not all staff referenced were in attendance for each workshop.

4.1.2 Levels of Service

The kickoff meeting focused on service levels and the development of a corporate risk matrix based on the City's goals and unique ability to manage and respond to different types of risks. KJ facilitated a conversation to develop a vision statement for Wastewater and Sewer Utility Operations that aligned with the established City Public Works and Utilities Mission.

Mission: Providing expert, efficient stewardship of Bremerton's infrastructure and natural resources; ensuring responsive and professional customer service.

Vision: To resiliently, reliably and efficiently stewards Bremerton's essential infrastructure and natural resources, while protecting public safety and the environment through innovative, sustainable, efficient, and cost-effective practices

Conducting risk analyses are inherently subjective, so the risk matrix serves as a tool to transform the subjective discussion into objective outcomes. The risk matrix helps achieve this by identifying functional failure, business impacts when failure occurs, and using the risk outcomes to streamline prioritization of City needs. City staff were given the opportunity to develop, refine, review and comment on the risk matrix before it was used during the BRVA workshops to confirm group consensus on the consequences and scoring criteria.

The risk matrix developed for the City is a 5 by 5 matrix that includes condition rating and probability of failure on the vertical access and various levels of consequence along the horizontal access. The risk matrix as shown in Figure 4-2 provides a color-coded illustration of the potential risk as it relates to the system condition rating and consequential criteria.

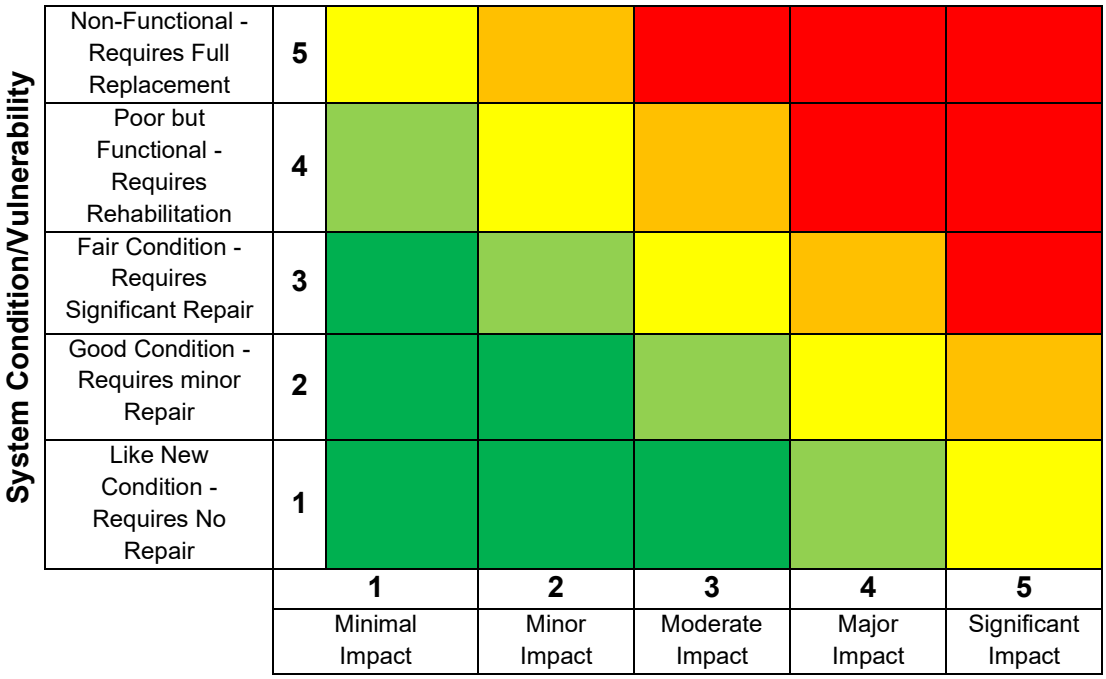


Figure 4-2: City Risk Matrix and Scoring

This matrix was used to develop the risk scores for the BRVA group workshops. In terms of the risk matrix anatomy, the red shaded sections indicate the exposure to risk is high as it relates to likelihood of a threat impacting the asset due to vulnerable condition and significant consequence of failure. The green shaded sections indicate assets in good condition with a low probability and/or minimal consequence of failure. Scoring descriptions and guidance are provided in the following sections. The system level consequential risk determined by the analysis is essentially the product of vulnerability and consequence that results from a failure event.

The service levels meeting, and subsequent workshop series was planned and implemented to gather key City staff in a single room with the purpose of collecting information on the current state of major assets to determine necessary improvements, while relating it to agreed upon parameters of operating conditions. The group focused on reviewing equipment conditions, maintenance practices, documentation, and staff concerns that characterize process reliability. Although each facility comes with unique challenges, including maintenance accessibility issues, asset age, design issues, and influent loading changes due to community water conservation measures, they all share common problems relative to reliable documentation control and a history of plant operations and maintenance practices.

4.1.3 Consequence of Failure/Criticality

The Consequence of Failure (CoF) addresses how the failure of an asset to meet its function will impact the ability of an agency to meet their mission, vision, and/or goals. It is a relative measure of the outcome when a unit process experiences functional failure and impedes intended engineered function of the unit process. These elements were based on the following categories: Public & Staff Health and Safety, Environmental and Regulatory Impact, Quality of Service and Continuity, Public Image/Perception, and Fiscal Impact. Each of these criteria are defined in Table 4-3 below:

Table 4-3: Consequence of Failure Definitions

Public & Staff Health and Safety	Relative impact a failure will have on the risk of accidents and injuries, and ability to create a safe working environment to protect the safety of life and property.
Environmental and Regulatory Impact	Relative impact a failure will have on the environment, as well as the potential legal implications based on existing environmental regulations and permit requirements with which the City will need to comply.
Quality of Service and Continuity	Relative impact a failure will have on the ability to maintain service levels after a disruptive event or disaster. Service continuity is important for ensuring that essential functions continue to operate.
Public Perception	Relative impact a failure will have on the collective opinion, attitude, and understanding that the residents of the City hold about their local government, its wastewater services, policies, and overall performance.
Financial Impact/Fiscal Sustainability	Relative impact a failure will have on available City funds and available financial resources necessary to support restoration efforts, including potential construction costs, bypassing, equipment/rentals, ongoing operational expenses (maintenance, utilities, staffing), and any permit violation fees.

The specific criteria and relative weight of these categories were reviewed with the City and structured around their business objectives. Table 4-4 displays the criticality scoring matrix developed with the City.

Table 4-4: Consequence of Failure (CoF) Scoring

Impacts to City	Weight	Score: 1 Minimal Impact	Score: 2 Minor Impact	Score: 3 Moderate Impact	Score: 4 Major Impact	Score: 5 Significant Impact
Public & Staff Health & Safety	30%	No injury or minor injury – contusions & lacerations, first aid, non-recordable or near miss	Minor to moderate Injury – contusions & lacerations w/out lost time - recorded	Moderate injury/lost time or restricted duty – OSHA triggered action	Major serious health issues (acute & chronic) & long-term injuries – disabling	Fatalities
Environmental & Regulatory Impact	25%	No negative impacts on environment, public health, or regulatory compliance. 100% Permit Compliance.	No negative impacts on environment or public health; One-off Permit violation – No Action from DOE	No negative impacts on environment or public health; Multiple Permit violations within 6-12 months – No Action from DOE	Minor negative impact to the environment and/or public health Permit Violation – Action from DOE	Moderate/Significant negative impact to the environment and/or public health; major permit violation
Quality of Service and Continuity	15%	No impacts on service delivery or customers	Localized community impact / minor disruption.	Moderate localized long-term impact. Community short-term service disruption. Capacity limitations. Delays/Restrictions to developers (<6 months).	Community wide impacts with potential long-term service disruption. Capacity limitations. Delays/Restrictions to developers (>6 months).	Service area wide impacts or highly acute localized impacts that have long-term service outages. Capacity limitations. Inability to provide for new development.
Public Perception	10%	No Impact, odor complaint, or complaint to staff. No significant social media	Social media activity but no local media coverage. Response handled by staff. Potential complaints to City Council, but no action required.	Social media activity and maybe minor local media coverage. City Council may receive complaints to be responded to by staff.	Local media coverage with Board of Directors potentially involved in response. Potential long-term impact to community confidence in City.	Lead story in local media and/or possible national or industry coverage. Significant impact to community confidence in the City.
Financial Impact/Fiscal Sustainability	20%	$100 < X < $10,000 Minor cost impacted that can be covered within an operational or CIP budget authorization	$10,000 < X < $25,000 Costs can be covered by reallocating authorized funding in operational or CIP budgets. Requires Director sign-off but does not need to go to Council.	$25,000 < X < $100,000 Non-emergency Requires City Manager sign-off, may require supplemental budget approval through Council.	$100,000 < X < $350,000 Emergency repair triggered. Requires Council to appropriate additional funding in an amount that affects the next FY CIP.	X > $350,000 Emergency repair triggered. Requires Council to appropriate additional funding in an amount that affects funding availability in multiple future fiscal years.

4.1.4 Business Vulnerability

Business Vulnerability (BV) addresses how an agency's business practices affect staff's ability to optimize the long-term operation and maintenance of an asset. This metric was based on six criteria including Work Execution Management (WEM), asset condition, workforce reliability and training, workforce safety features and culture, process resiliency, and engineering for maintenance reliability and asset performance tracking. This condition rates the various business systems and assets that support the operations, maintenance and engineering management that directly impact potential vulnerabilities within the system architecture. When the support systems and assets are in excellent condition, the vulnerability of the business is minimized. However, when the systems and assets are in poor condition, then the vulnerability of the business is greater. Each of these criteria are defined in Table 4-5 below:

Table 4-5: Business Vulnerability Criteria Definitions

Work Execution Management (WEM)	How efficient is the lifecycle of a work order; including identification of an issue, confirmation, documentation, resource planning, work execution, functional review, and close out?
Asset Condition	How functional is the asset in the current state? A measure of an asset's health and physical state at a given time is a key factor in determining how long an asset will remain useful and can help predict when it will need to be repaired, renewed, or replaced.
Workforce Reliability & Training	How functional is your staff resources, skills training, and knowledge transfer? A variety of activities that help employees and businesses develop and improve skills, and meet employment needs, including day-to-day skills training, mandatory trainings, documented training and materials, formal standard operating procedures (SOPs), abnormal operating procedures (AOPs), emergency response plans (ERPs), labor forecasting, knowledge transfer, etc.
Workforce Safety Features and Culture	How safe does your staff feel when working on or around assets? Appropriate safety policy and safety signs, labels, guarding, and clearances to help prevent injury, illness, or property damage.
Process Resiliency	How efficient and available are resources required to respond in the event of a failure or emergency event? The consistent ability of a defined process to produce the desired outcome with minimal errors, as outlined in the detailed steps and guidelines within the SOP, AOPs, and ERPs, essentially signifying how dependable and predictable the process is when followed accurately, even when under stress.
Engineering for Maintenance Reliability and Asset Performance Tracking	How intentional are engineering practices to improve the longevity and performance of physical assets by documenting system functions at the unit process level, leveraging a formal risk methodology, and using root cause analysis processes for key engineering tools which can 1) support O&M, 2) leverage reliability principles during the development of capital improvement strategies and design projects, and 3) formalize a management of change process?

The condition ratings listed in Table 4-6 for each business vulnerability criteria were used to develop the City's risk matrix.

Table 4-6: Business Vulnerability (BV) Scoring Criteria

Impacts to City	Weight	Score: 1 Excellent Condition	Score: 2 Good Condition	Score: 3 Fair Condition	Score: 4 Needs Attention	Score: 5 Very Poor
Work Executive Management (WEM)	15%	No identification of failure	Non-Functional - Requires Full Replacement	No training	O&M do not feel safe conducting work. No safety equipment/protocols. Hazardous Environment. PPE Required.	No tools, knowledge, spares or other resources to respond to failure.
Asset Condition	20%	Not identified during routine inspection, but ability to be seen from O&M Long period of time prior to maintenance	Poor but Functional - Requires Rehabilitation	Minimal, undocumented training. Based on institutional knowledge	O&M do not feel safe conducting work. Non-functioning or failed safety equipment. Hazardous Environment. PPE Required.	Limited ability to respond to failure.
Workforce Reliability & Training	10%	Not identified during routine inspection, but ability to be seen from O&M Mid-range response time to final execution	Fair Condition - Requires Significant Repair	Minimal, but documented training. Mostly based on institutional knowledge. Basic standard operating procedures (SOPs)	Controlled hazardous environmer PPE Required.	City has some knowledge and/or spares to respond to failure.
Workforce Safety Features and Culture	30%	Routine inspection/maintenance route. Mid-range response time to final execution	Good Condition - Requires Minor Repair	Required formal documented training protocols. SOPs, emergency response plans (ERPs)	O&M feels safe operating. PPE provided and known. Signage posted. Minimal, well controlled hazard.	City has ability to respond to failure with emergency contract and/or local spare parts.
Process Resiliency	20%	Routine inspection/maintenance route. Rapid response time to final execution	Like New Condition - Requires No Repair	Required formal documented training program. SOP, abnormal operating procedures (AOPs), ERPs exercised regularly. Validating relevancy.	O&M feels safe operating. No hazard.	City has multiple staff trained, all the necessary tools and spare parts, to respond to a failure.
Engineering for Maintenance Reliability and Asset Performance Tracking	5%	No identification of failure	Non-Functional - Requires Full Replacement	No training	O&M do not feel safe conducting work. No safety equipment/protocols. Hazardous Environment. PPE Required.	No tools, knowledge, spares or other resources to respond to failure.

4.1.5 BRVA Key Observations

4.1.5.1 CoF/Criticality

Understanding the business impact of failures is essential in prioritizing how and where to act when emergencies or unexpected events occur. For example, is this piece of equipment or infrastructure *critical* to bring my process back online? CoF/Criticality is not a measurement of how well the piece of equipment or infrastructure is working, but instead evaluates the repercussions that would result from a potential failure and how that loss of function will impact the ability of the City to meets their mission, vision, and goals. These consequences are broken down below with observations made during the BRVA workshops:

4.1.5.1.1 Public & Staff Health and Safety:

Public and Staff Health and Safety measures the relative impact a failure of an asset will have on the risk of accidents and injuries, and the ability to create and maintain a safe working environment protecting the safety of life, property, and the environment. The health and safety of City staff, its residents, and its businesses is crucial to its overall success and is held paramount to other risk attributes. The most notable assets that presented concerns around the health and safety of staff and/or the public revealed during the BRVA include the whole electrical system and the anaerobic digesters. These assets and few others noted by City staff are described below:

- **Electrical System:** The electrical system has no known arc flash ratings and no signage indicating the last arc flash testing event, throughout the WWTP and collection system and select panels should be further evaluated if they fall under Class 1 Division 1 room classifications.

- **Anaerobic Digesters:** The anaerobic digesters present an inherent risk due to the nature of gas build up within them. If the dome were to rupture in any way, personnel working either on or around the digesters could be inundated and exposed to hazardous sludge and gases. Staff also discussed concerns around the explosion potential and boiler system being in poor condition, which could result in hydrogen sulfide gas not going through a proper safety system.

- **RAS System:** While not as likely, if the return activated sludge (RAS) system were to flood the basement, there could be improved measures installed to ensure staff safety from both the electrical and slip/trips/falls and potential inundation that could take place.

- **Odor Control Facilities:** There also should be secondary, redundant, or more frequently monitored ventilation in place around the odor control facilities at the WWTP and satellite facilities.

- **Primary Effluent System:** Pump removal for the Primary Effluent system is also extremely difficult and is a potential threat to staff safety since they do not have the ability to utilize a boom truck and use a forklift. Alternative methods for removal should

be evaluated to create a safer working environment for staff to preform maintenance on these pumps.

4.1.5.1.2 Environmental & Regulatory Impact:

The environmental and regulatory impact measures the relative effect a failure will have on the environment, as well as the potential legal implications based on existing environmental regulations and permit requirements that the City needs to comply with. The largest concerns to environmental impact are the electrical system doing down, since it was more than likely create an ongoing permit violation, a failure along any part of the Crosstown Pipeline or Central Bremerton Force Main could cause up to a 7-day beach closure, flooding in the streets, and impact to the Narrows. Similarly, a failure of the Port Washington Narrows siphon mains could discharge sewage into that body of water for a few days without notice.

4.1.5.1.3 Quality of Service & Continuity:

Quality of service and continuity measures the relative impact a failure will have on the ability to maintain service levels after a disruptive event or disaster. Service continuity is important for ensuring that essential functions continue to operate. From the risk assessment, the major assets identified as high consequence for this delivery were the Crosstown Pipeline and Central Bremerton Force Main, since these could impact the Navy shipyard operations by needing to temporarily redirect or bypass the Navy's sewer discharge to the City's system. Additionally, any bypass operation associated with the repair of the Crosstown Pipeline or CBFM, both of which pass through densely populated areas of Bremerton, could significantly impact the general public, vehicular traffic and Bremerton businesses due to the scale of bypass pumping operation.

4.1.5.1.4 Public Perception

Public Image is a measure of the relative impact a failure will have on the collective opinion, attitude, and understanding that the residents of the City hold about their local government, its wastewater services, policies, and overall performance. How the public views and trusts the City's system is vital to ensuring continued growth and investment into needed and desired projects. The City rated the Crosstown Pipeline and Central Bremerton Force Main and the Port Washington Narrows Siphon the most highly critical and publicized failures. The WWTP odor control at the headworks scrubber was also ranked highly, due to the WWTP's close proximity to a major highway, local businesses, and residential districts.

4.1.5.1.5 Financial Impact/Fiscal Sustainability

The financial impact/fiscal sustainability measures the relative effect a failure will have on available City funds and available financial resources necessary to support restoration efforts, including potential construction costs, bypassing, equipment/rentals, ongoing operational expenses (maintenance, utilities, staffing), and any permit violation fees.

In the event of a failure, the following systems were deemed of highest consequence, potentially exceeding $350,000 in rehabilitation:

- Crosstown Own Pipeline and Central Bremerton Force Main
- Port Narrows/Port Washington Narrows Siphon
- Electrical system
- Anaerobic digesters
- Oyster Bay Basin (OB-1, OB-2, OB-3)
- Primary clarifiers
- Primary sludge systems

The following systems fall within the potential $100,000 to $350,000 range for repairs:

- WWTP screening
- Aeration basins
- RAS/WAS systems
- Primary effluent
- Dewatering
- Lagoons

Major pieces of infrastructure like these will not only increase the cost of long-term repair but also the cost of emergency response services for potential bypassing and cleanup during the failure. It is vital to keep these under preventative maintenance inspection to avoid premature failure.

4.1.5.2 Business Vulnerability

The BV is measured by how well an agency's business practices affect their staff's ability to optimize the long-term operation and maintenance of all their assets. When discussing Business Vulnerability, it is important to understand how an organization functions; how well different departments communicate, where resources are sourced and allocated, and how performance metrics are determined and tracked for both. When assessing an O&M program, identifying the constraints placed on the O&M staff is a top priority. O&M constraints, which is often staff/resource limitations, can negatively impact how a facility is operated, maintained, and managed. City management must strive to achieve a delicate balance between risk, costs, and performance/compliance. Anything that constrains system functionality can significantly impact this delicate balance and should be addressed to prevent forcing O&M staff into a reactive state of operating and maintaining the facility. These constraints are largely exacerbated when there are not adequate business processes/practices in place, which are necessary to sustain system performance. Inadequate business processes/practices could leave the City vulnerable to increased exposure to business risk(s), threat likelihood(s) and/or system functional failure(s). Such business practices are listed below with observations made during the BRVA workshops:

4.1.5.2.1 Work Execution Management

The BRVA provided insight into how work is executed at City facilities. WEM is the lifecycle of a work order which includes the identification of an issue, confirmation, documentation, resource planning, work execution, functional review, and close out. It was discussed that O&M staff feel comfortable with the level of staff they have available to address major concerns, but with the personnel resources they have available and work order backlogs, their ability to ensure all

operational routine duties (ORDs) such as regular cleanings or equipment lubrications is limited. Most of the equipment at the WWTP and throughout the collection system is tied to the Supervisory Control and Data Acquisition (SCADA) and identification of failures is sufficiently relayed to staff, however hidden failures identified in the Crosstown Pipeline and all City Siphons could have major negative impacts on the ability to service the City. The thickening system and aerated grit system were identified as hidden failures that could take up to a week before staff may be made aware of a failure. The major concerns noted for WEM relate to long lead times for equipment and the inability to close out work orders. Providing more spare parts, resource pooling from nearby agencies, or staff increases may help alleviate this constraint.

4.1.5.2.2 Asset Condition

The asset condition is measure of an asset's health and physical state at a given time. It is a key factor in determining how long an asset will remain useful and can help predict when it will need to be repaired, renewed, or replaced. There was known rehabilitation needed for the anaerobic digesters, and the outfall was recently inspected with a diver who denoted visible separation. Most equipment within the WWTP was deemed in fair condition to good condition. The collection system is in worse condition since pump station piping, valves and equipment is constantly exposed to saltwater and there is a significant amount of aging gravity sewer piping, some installed as far back as the 1940s. Many wet wells have deteriorating concrete walls and liners. City staff will oftentimes perform ultrasonic pipe thickness testing of piping at the pump stations to ensure adequate wall thickness, since these pipes are continuously exposed to corrosive salt water. Notable observations from field inspections will be discussed in Sections 6 and 7.

4.1.5.2.3 Workforce Reliability & Training:

Workforce Reliability and Training is key to every asset management program because it connects the physical asset to the human asset. If one wants an asset to perform its expected function, then that asset must be operated and maintained correctly. This is only achieved by ensuring that comprehensive competency-based training is offered by the City. Workforce reliability and training is a measure of the variety of activities that help employees and businesses develop and improve skills, and meet employment needs. For example, this includes day-to-day skills training, mandatory trainings, documented training and materials, labor forecasting, knowledge transfer. Major concerns noted from the BRVA include training or knowledge of how to address issues that occur in the siphons. There is also limited personnel who have the knowledge to operate and troubleshoot the digesters. Staff also lacked confidence in their ability to address failures in the WWTP final effluent channel/outfall; stating they have the skillset to fix equipment, but not training on how to approach it, given its limited accessibility. There is only one certificated technician and two instrument technicians to maintain the electrical and controls system, and there is limited institutional knowledge on motor control center (MCC) and electrical layout and connections within the plant. Overall, most training is based on institutional knowledge transfer and there is limited to no formal training or emergency preparedness training plans for both the WWTP and the collection system.

4.1.5.2.4 Workforce Safety Features and Culture

The Workforce safety features and culture are a gauge for the appropriateness and effectiveness of the safety policies that are in place, including but not limited to, signage, labels, guarding, clearances, Safety Data Sheets, The City maintains strong safety policies and encourages staff to be accountable while performing work. The BRVA identified that while safety practices are in place, and that staff feel adequately safe while working, there are opportunities for greater implementation of physical safety controls (including but not limited to signage, striping, and guarding). Specifically, signage and striping around electrical hazards and appropriate clearances should be implemented. The BRVA also identified that working on much of the collection system and the WWTP outfall would require significant traffic control and hiring 3rd party services. The most impactful and urgent safety concern noted was about the need for arc flash testing throughout the WWTP and collection system.

4.1.5.2.5 Process Resiliency

Process Resiliency is a measure of the consistent ability of a defined process to produce the desired outcome with minimal errors. This is outlined in the detailed steps and guidelines within the standard operating procedure (SOP), essentially signifying how dependable and predictable the process is when followed accurately. The O&M staff stated they do not have a complete list of documented procedures for various major assets SOPs, limited abnormal operating plans (AOPs), and little to no emergency response plans (ERPs) documented. There should also be more standard procedures for routine and planned inspections for major assets at the WWTP, such as the Digesters, final effluent channel/outfall, thickening tanks, and chlorine contact basins. There are also asset reliability issues including lacking a robust spare parts program and instances where equipment that should be run in a lead-lag setting is not operated as such. This operational strategy impacts the reliability of equipment and may affect the rate of component level wear and tear. If certain assets are operated with equal run times, the anticipated timing for repairs or replacement may coincide, potentially leaving the City exposed to limited or no redundancy if a failure were to occur.

4.1.6 Engineering for Maintenance Reliability and Asset Performance

Maintenance reliability uses engineering practices to improve the reliability and performance of physical assets by documenting system functions at the unit process level, leveraging a formal risk methodology, and using root cause analysis processes for key engineering tools. These can support O&M, leverage reliability principles during the development of capital improvement strategies and design projects and formalize a management of change process. During staff interviews it was noted that O&M would like more tools available to them such as CCTV footage of underground pipes, specifically highly critical areas like the Crosstown Pipeline, WWTP channels, and siphons, and the ability to track this overtime. Additionally, a consistently updated hydraulic model of the system would allow City staff to determine what areas of the system might have capacity concerns as flows increase over time. For the siphons, and in particular the Port Washington Narrows Siphon, there was cathodic protection installed along the rock wall next to CE-1, but it has not been used in almost a decade: cathodic protection is vital in identifying and adequately preventing corrosion. For assets that have limited ability to be inspected, such as the siphons, utilizing the technology the City already has installed, should be

of a high priority. There is a need for a unifying framework for strategic asset management programming that allows the integration of capital improvement planning, longer term design planning, and annual budget planning activities across the various facilities and systems. A goal of this WWCP is to provide a strategic approach and framework to bridge organizational policies and business activities (e.g., Capital Improvement Projects [CIP] and Maintenance Projects [MP]) for sustaining the City's service level obligations.

4.1.6.1 BRVA Findings

The intent of the BRVA is to identify the most vulnerable unit processes that might impact the performance of the City's facilities and systems; systems that might put the City at risk regarding safety, public regulation, service, image, and economic categories. After the BRVA was completed, risk ranking for each unit process was calculated by taking the weighted arithmetic mean of the criticality scores and multiplying it by the arithmetic mean of the vulnerability scores. Figure 4-3 illustrates the preliminary risk scores for City assets.

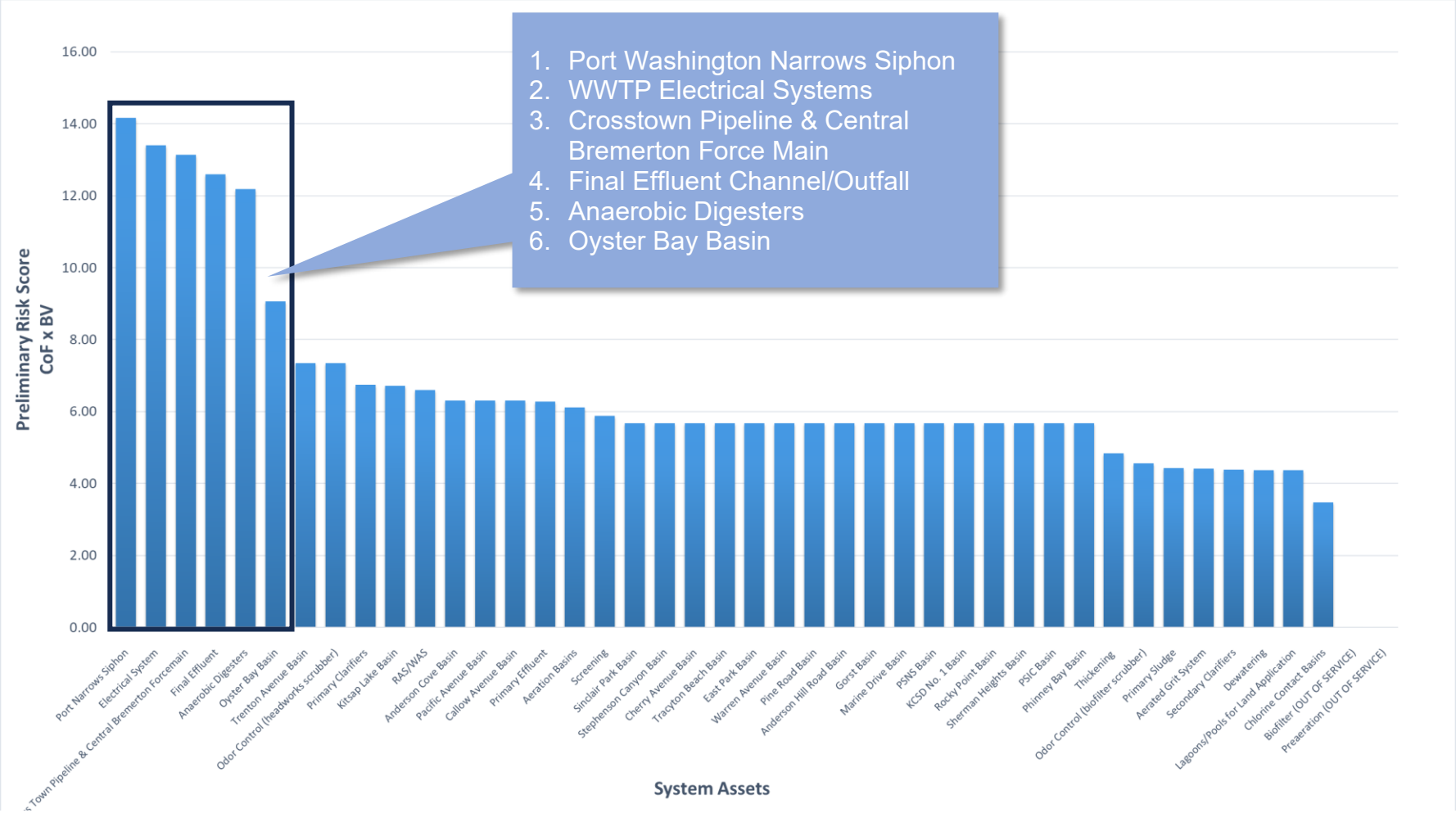
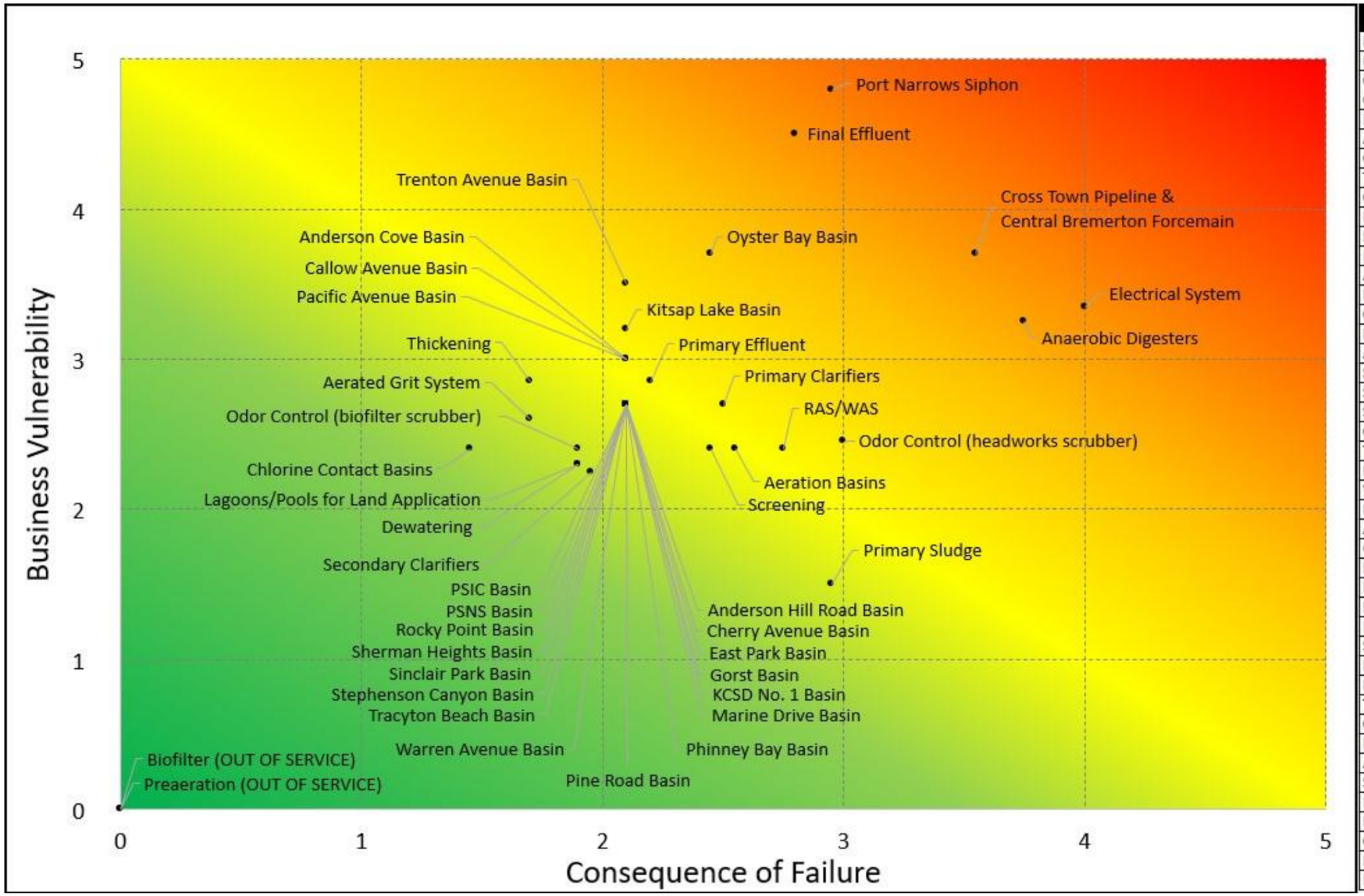


Figure 4-3: Preliminary Risk Score

Based on the feedback from City staff, the assets considered highly critical and in need of attention are listed below, with scores ranging from 14.2 to 9.1.

- Port Washington Narrows Siphon
- Electrical system
- Crosstown Pipeline
- Central Bremerton Force Main
- Final Effluent Channel/Outfall
- Anaerobic Digesters
- Oyster Bay Basin Collections System

Figure 4-4 illustrates the risk score results on a scatter plot for the 43 assets evaluated. Assets shown in the upper right red area indicate higher risks from a criticality and vulnerability perspective than those shown in the yellow or green areas. This data visually shows that 13 of the 43 assets are listed as either needing improvements or of high concern to the City, 21 are in fair condition or moderate concern to the City, and 7 are considered to be in good condition or little concern to the City, not including two which were denoted as “Out of Service” and they were not scored.



Unit Process	Risk Score
Port Narrows Siphon	14.16
Electrical System	13.40
Cross Town Pipeline & Central Bremerton Forcemain	13.14
Final Effluent	12.60
Anaerobic Digesters	12.19
Oyster Bay Basin	9.07
Trenton Avenue Basin	7.35
Odor Control (headworks scrubber)	7.35
Primary Clarifiers	6.75
Kitsap Lake Basin	6.72
RAS/WAS	6.60
Anderson Cove Basin	6.30
Pacific Avenue Basin	6.30
Callow Avenue Basin	6.30
Primary Effluent	6.27
Aeration Basins	6.12
Screening	5.88
Sinclair Park Basin	5.67
Stephenson Canyon Basin	5.67
Cherry Avenue Basin	5.67
Tracyton Beach Basin	5.67
East Park Basin	5.67
Warren Avenue Basin	5.67
Pine Road Basin	5.67
Anderson Hill Road Basin	5.67
Gorst Basin	5.67
Marine Drive Basin	5.67
PSNS Basin	5.67
KCSD No. 1 Basin	5.67
Rocky Point Basin	5.67
Sherman Heights Basin	5.67
PSIC Basin	5.67
Phinney Bay Basin	5.67
Thickening	4.85
Odor Control (biofilter scrubber)	4.56
Primary Sludge	4.43
Aerated Grit System	4.42
Secondary Clarifiers	4.39
Dewatering	4.37
Lagoons/Pools for Land Application	4.37
Chlorine Contact Basins	3.48
Preaeration (OUT OF SERVICE)	0.00
Biofilter (OUT OF SERVICE)	0.00

Figure 4-4: Preliminary Risk Score – BRVA Heat Map

4.1.7 Risk Score Validation & Calibration

Following the BRVA, both desktop and field evaluations were completed and further discussed in Sections 6 and 7. The field investigations confirmed many of the findings from the BRVA interviews however some asset scores were recalibrated to reflect existing conditions more accurately. Adjustments to the preliminary risk score are made where appropriate after these evaluations to achieve the final risk profile. Typically, these adjustments are done for Asset Condition and Workforce Safety Features and Culture, however some extenuating circumstances can lead to modifications to other scoring metrics as needed.

4.1.8 Likelihood of Failure

The estimated likelihood of failure is directly related to the condition evaluation. These estimates are a useful indicator of expected functional performance that may initiate root cause analyses, a tool to assist with proactive maintenance strategies, and in some cases life expectancies of fixed asset classes. The estimated probability of failure provides a convenient way to view the information from an alternative perspective. Although the probability of failure is a variable that is typically included with a risk analysis, we did not apply this variable to develop the initial risk score during the BRVA because we focused our analyses at a system level and not at the asset or component level. Probability of failure was implemented after the condition assessments, WWTP analysis, and collection system hydraulic modeling.

Section 5: Historical and Projected Flows and Loads

5.1 Introduction

The purpose of this chapter is to provide information on existing hydraulic conditions within the City's collection system, and hydraulic, organic, and solids loading to the City's existing WWTP and to present projections of future flows and loads through the 20-year planning period. Quantifying the existing loads to the WWTP is necessary to determine the level at which the existing wastewater treatment systems are operating relative to their current capacities, and to project performance under future flows and loads.

5.2 Historical WWTP Flows and Loads

The discharge monitoring reports (DMRs) for the influent flows and loads were provided for the period January 2018 through December 2023. This period includes periods for pre-COVID 19 pandemic years (2018-2019).

The high flows observed during the winter months have necessitated the seasonal characterization of the waste stream. The flows for the two designated seasons are described as follows:

- **Dry Weather/Summer Season:** Lasting from May 1 to September 30, the primary contributors during this period are residential and commercial sanitary sewage, along with contract flows.
- **Wet Weather/Winter Season:** Spanning from October 1 to April 30.
- **Average Annual:** This reflects the average flow or loading condition calculated over the entire year.

For each of these periods, flows are further classified according to the following parameters, which are based on standard plant design criteria and help assess plant performance under various operating conditions:

- **Average Dry Weather:** The average of the total daily influent flow during the dry/summer season.
- **Maximum Month:** The highest 30-day rolling average of total daily influent flow during the specified period.
- **Peak Day:** The maximum total influent flow recorded over a single day during the specified period.

Historical data from 2018 through 2023 were analyzed to determine the average daily and maximum month influent flows, as well as $CBOD_5$ and TSS loads, for the whole-year and seasonal conditions. The results are summarized in Table 5-1 and Table 5-2, respectively.

Table 5-1: Historical WWTP Flow Summary (2018-2023)

Parameter	2018 (MGD)	2019 (MGD)	2020 (MGD)	2021 (MGD)	2022[(1)] (MGD)	2023[(1)] (MGD)
Average Dry Weather Flow (ADWF)	4.2	3.7	3.6	3.6	3.5	3.2
Annual Average Flow (AAF)	5.1	4.4	4.8	5.2	4.6	4.2
Maximum Month DWF (MM DWF)	4.6	4.0	4.0	3.9	4.3	3.6
Peak Day DWF (PD DWF)	6.2	8.7	10.4	7.3	6.9	5.8
Maximum Month Wet Weather Flow (MM WWF)	9.3	7.2	9.5	10.7	9.9	8.7
Peak Day WWF (PD WWF)	19.3	22.3	18.4	22.4	26.0	26.0

(1) Due to issues with influent measurement, effluent flow has been recorded as influent flow in the DMR since 2022.

Table 5-2: WWTP Historical Influent Loads

Parameter	2018 (ppd)	2019 (ppd)	2020 (ppd)	2021 (ppd)	2022 (ppd)	2023 (ppd)
Average Annual Load (AAL) for $CBOD_5$	8,100	7,100	6,200	6,500	7,100	5,900
Maximum Month Load (MML) for $CBOD_5$	9,900	8,400	8,300	7,700	14,000	7,500
Peak Day Load (PDL) for $CBOD_5$	15,700	12,200	17,400	13,200	21,300	10,700
AAL for TSS	9,300	9,100	8,400	7,500	8,900	7,000
MML for TSS	12,100	10,000	10,600	9,400	17,700	8,500

The average dry weather flow (ADWF) at the WWTP has remained relatively constant between 2019 and 2022, although it was reduced somewhat in 2023. The average annual $CBOD_5$ load remained relatively stable, ranging between 6,000 and 7,000, with a slight decline observed in 2023. In contrast, both the maximum month $CBOD_5$ and TSS loads saw substantial increases in 2022, with $CBOD_5$ nearly doubling and TSS increasing by approximately 50%. Aside from 2022, maximum month loads have remained at consistent levels. Through discussions with the City held in June 2024, this event was identified as an outlier and excluded from the peaking factor settings for the load projection.

Figures were created to depict both the annual average and the 30-day rolling average for influent flows (Figure 5-1), as well as $CBOD_5$ (Figure 5-2) and TSS loads (Figure 5-3). These visualizations allow for the identification of any emerging trends or patterns over time, helping to detect seasonal variations or long-term shifts in influent characteristics.

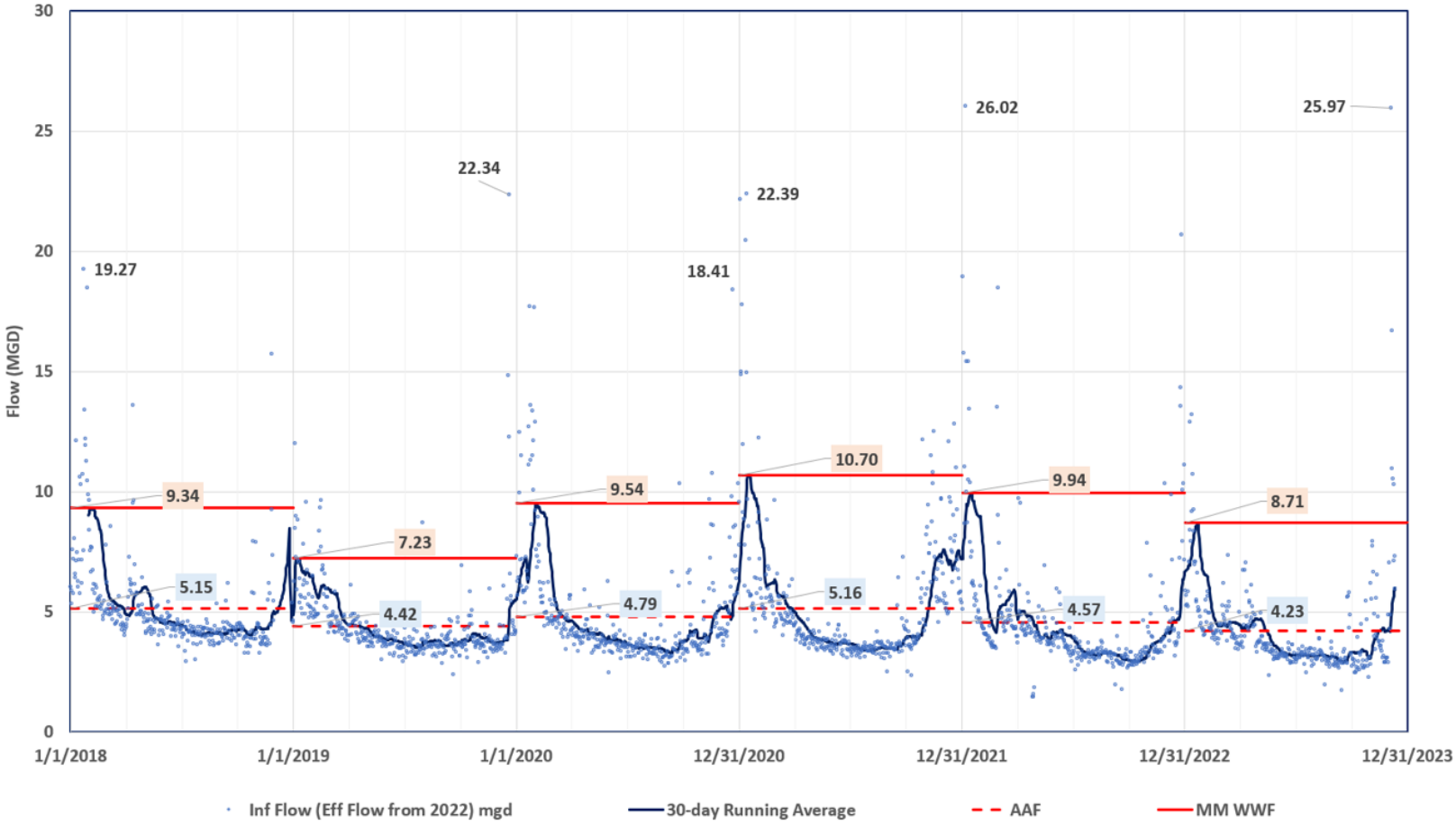


Figure 5-1: Influent Flow in MGD (2018-2023)

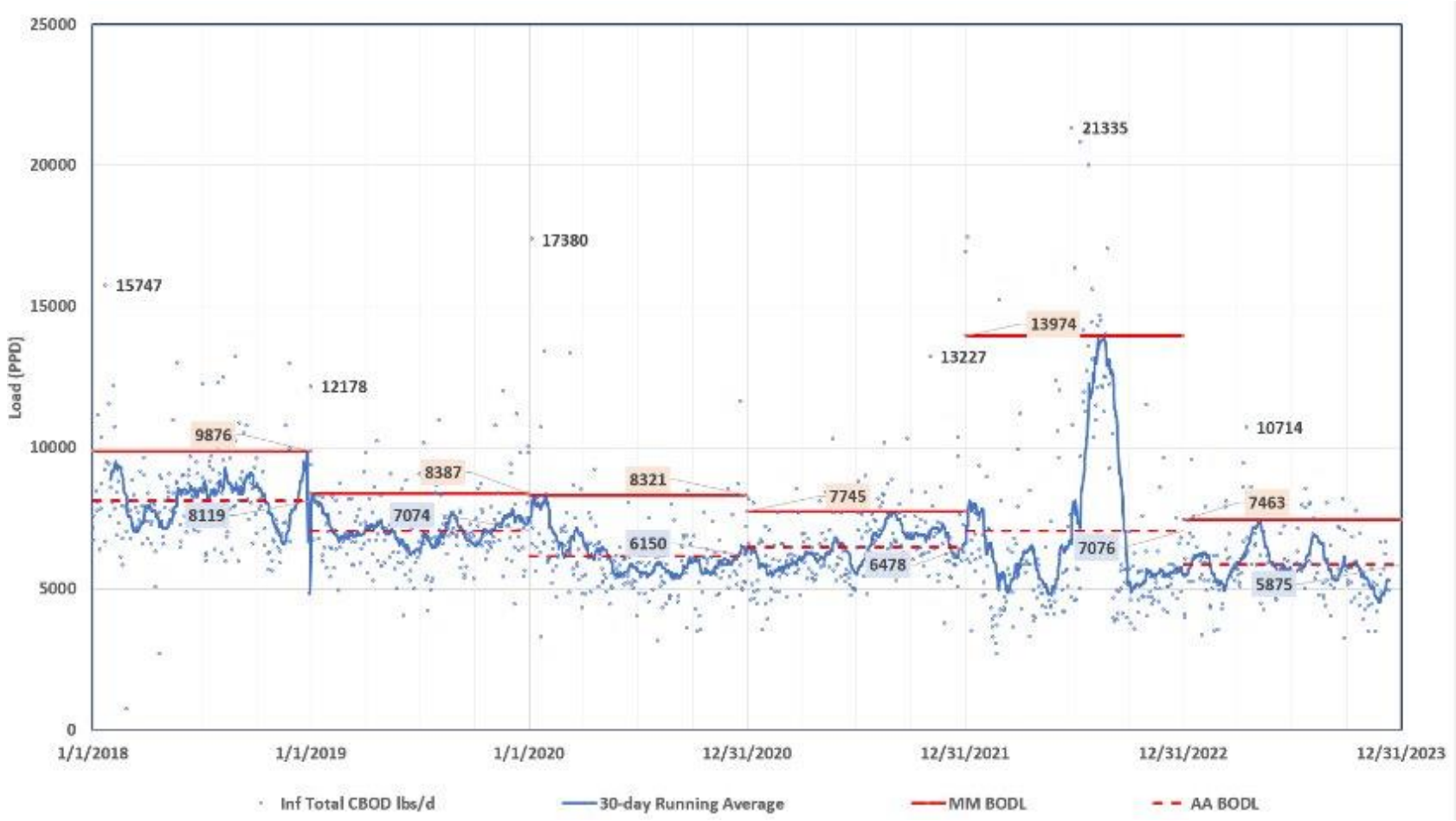


Figure 5-2: Influent $CBOD_5$ Load in ppd (2018-2023)

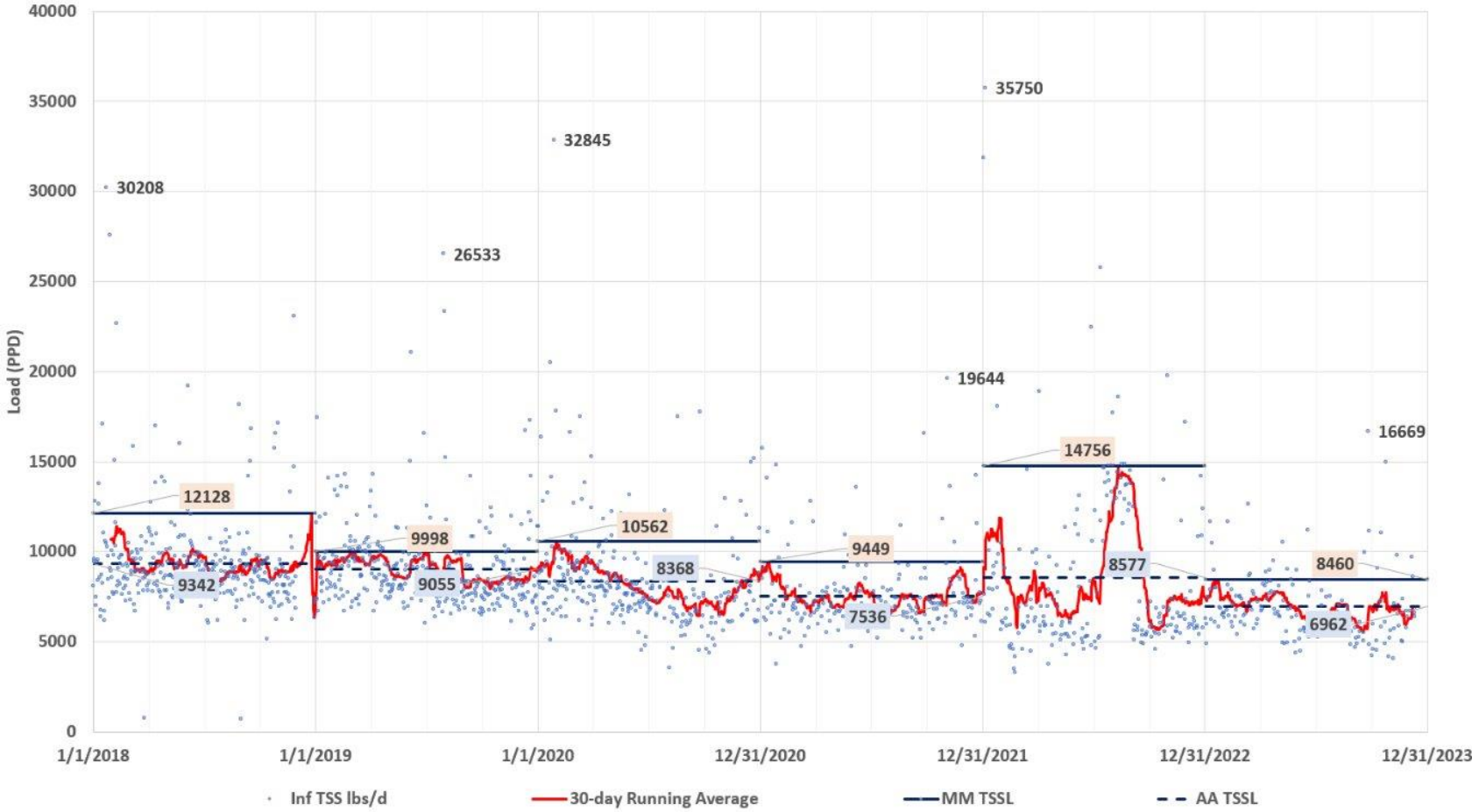


Figure 5-3: Influent TSS Load in ppd (2018-2023)

The figures show that maximum month flow typically occurs between December and February, aligning with the wet season, and the 30-day rolling average follows a consistent, repetitive trend. However, the maximum month load has been observed at various times throughout the year rather than at a fixed period.

Peaking factors for flow and load were calculated each year from historical influent flow, $CBOD_5$, and TSS load data, using ratios of various flow and load conditions, such as MM WWF/AAF and PDL/AAL. These peaking factors, summarized in Table 5-3 were used to establish additional design flows and loads based on the baseline values in the following sections.

Table 5-3: Influent Flow and Load Peaking Factors 2018-2023

Parameter (Dimensionless)	2018	2019	2020	2021	2022	2023	Average
ADWF/AAF	0.83	0.84	0.75	0.69	0.77	0.75	0.77
MM DWF/AAF	0.90	0.91	0.83	0.76	0.93	0.84	0.86
PD DWF/AAF	1.20	1.97	2.16	1.41	1.52	1.37	1.61
MM WWF/AAF	1.81	1.64	1.99	2.07	2.18	2.06	1.96
MML/AAL for $CBOD_5$	1.22	1.19	1.35	1.20	1.97	1.27	1.24
PDL/AAL for $CBOD_5$	1.94	1.72	2.83	2.04	3.02	1.82	2.07
MML/AAL for TSS	1.30	1.10	1.26	1.25	2.00	1.22	1.23

Notes:

(1) The 2022 anomaly was excluded from the determination of peaking factors.

(2) The highest value among the five peaking factors was selected as the design peaking factor for projecting maximum monthly loads.

5.3 Projected Wastewater Flows and Loads

This section presents the projected populations, wastewater flows, and loads for the WWTP service area. The population, flow and loading estimates are determined for the base year (2023) through the year 2044 for a planning period of 20 years beginning in 2024.

5.3.1 Sewered Population Projections

The projections use demographic data prepared by Kitsap County as part of its Countywide Planning Policies (CPP), amended and adopted in October 2021, along with additional data developed by the Department of Community Development (DCD) for its service area using Traffic Analysis Zones (TAZs). Kitsap County's CPP includes population data for 2020 and projected population figures for 2044, reflecting anticipated growth during the planning period from 2020 to 2044 for both the City and the Bremerton Urban Growth Area (UGA). The DCD provides data exclusively for the City, covering a planning period from 2024 to 2044. These two sets of demographic data and projections develop population estimates for 2024 to 2044 for the areas served by the WWTP, excluding the population associated with the PSIC area.

The sewered population is estimated with the following assumptions and steps:

- 2024 Residential and Employment Populations for the City and UGA:
    - The 2024 residential population for the City is based on the estimate provided by the Washington State Office of Financial Management (OFM).
    - The 2024 City employment population, as well as the UGA residential and employment populations, are interpolated using projections from the Kitsap County CPP, assuming a constant growth rate over the 24-year planning horizon.
    - The growth projected by the TAZ data from the DCD is applied to the residential and employment populations for the City for the planning period of 2024 to 2044.
    - The growth projected in the Kitsap County CPP is adjusted to start in 2024 for the residential and employment populations in the UGA.
- Adjustments for excluding PSIC Area:
    - The PSIC's residential and employment populations of 515 and 872 for 2023, as provided in the TAZ map, are subtracted from the 2024 City's residential and employment populations.
    - The projected employment growth for the PSIC area, totaling 9,639, is subtracted from the City's employment growth figures.
    - No residential growth is projected for the PSIC area, and the adjusted figures from the Kitsap CPP for the planning period starting in 2024 remain unchanged.
    - A constant growth rate is assumed, and the 2034 milestone growth has been estimated using the calculated constant growth rate for each population category.
- Sewered Portion of the Population:
    - The sewered portions of the current residential and employment populations are assumed to be 76% and 95%, respectively, as outlined in the 2014 WWCP Update for the planning horizon from 2013 through 2033. These assumptions were

discussed with the City and accepted for use during the flow and load projection review meeting held on June 14, 2024, for the current population.

- For new growth, 100% of the City growth and 25% of the UGA growth are assumed to be sewered, according to the direction of the City.

The projection of the sewered population, starting with 2024 as the base year and including the milestone years 2034 and 2044, is provided in Table 5-4.

Table 5-4: City of Bremerton Sewered Population Projection

Residential Population Projection				
Year	**City**	**UGA**	**City Growth**	**UGA Growth**
2024	44,875 (1)	10,520	0	0
2034	53,736	11,635	8,862	1,114
2044	64,349	12,867	19,474(2)	2,347
Employment Population Projection				
Year	**City**	**UGA**	**City Growth**	**UGA Growth**
2024	45,308(3)	1,657	0	0
2034	48,270	2,521	2,962	864
2044	51,426	3,835	6,118(4)	2,178
Residential Sewered Population Projection(5)				
Year	**2024 City and UGA**	**City Growth**	**UGA Growth**	**Residential Sewered**
2024	42,100	0	0	42,100
2034	42,100	8,862	279	51,241
2044	42,100	19,474	587	62,161
Employment Sewered Population Projection(6)				
Year	**2024 City and UGA**	**City Growth**	**UGA Growth**	**Employment Sewered**
2024	44,617	0	0	44,617
2034	44,617	2,962	216	47,795
2044	44,617	6,118	544	51,279

Notes:

(1) The residential population in 2023 for PSIC areas was estimated to be 515 by multiplying 242 dwelling units by 2.13 capita per multi-dwelling unit, based on the demographic data provided by the DCD. This number was subtracted from the City's 2024 residential population of 45,390, which is the estimate provided by the Washington State's OFM.

(2) The growth is assumed to be the same as the growth estimate provided by the DCD from 2023 to 2044.

(3) The employment population in 2023 for PSIC areas of 872 was subtracted from the City's 2024 employment population of 46,180, which was interpolated for 2024 from the projection provided in Kitsap's CPPs.

(4) The employment growth estimate for PSIC of 9,639 was subtracted from the employment growth estimate of 15,757 by the DCD from 2023 to 2044.

(5) Residential sewered population = 76% x 2024 City and UGA population + 100% x City Growth + 25% x UGA Growth

(6) Employment sewered population = 95% x 2024 City and UGA population + 100% x City Growth + 25% x UGA Growth

5.3.2 Sewer Flow and Waste Load Projections

According to the 2020 Water System Plan by the City of Bremerton Water Utility, water consumption per Equivalent Residential Unit (ERU) was estimated at 143 gallons per day (gpd) from 2013 through 2019. Assuming an average of 2.33 people per ERU, residential water consumption was estimated at 61 gallons per day per capita (gpcd). The employment water consumption rate was assumed to remain the same as the 42 gpdc estimated in the 2014 WWCP Update.

In the 2014 WWCP Update, the sewer generation factor was calculated by assuming a reduction from the water consumption factor to align the estimated sewer generation with the 2012 Average Dry Weather Flow (ADWF). This same methodology was used to determine the reduction from the updated residential water consumption rate and the 2014 employment water consumption rate to the corresponding sewer generation factor. A 20% reduction from water to sewer was assumed to match the calculated sewer generation with each historical ADWF from 2020 through 2023, with an average difference of 2% overall.

With the 20% reduction, the following sewer generation factors were assumed for each sector:

- Residential sector: 49 gpdc
- Employment sector: 34 gpdc

The ADWF projections were developed using sewer generation factors applied to the projected sewered population as summarized in Table 5-5.

Table 5-5: Average Dry Weather Flow (ADWF) Projection

	Sewered Population		Base Flow ADWF Projection (MGD)		
Year	**Residential**	**Employment**	**Residential**	**Employment**	**ADWF**
2024	42,100	44,617	2.1	1.5	3.6
2034	51,241	47,795	2.5	1.6	4.1
2044	62,161	51,279	3.1	1.7	4.8

To establish other design flow baselines, historical peaking factors of AAF to ADWF, and those of peak day (PD) and maximum month (MM) flows to AAF were estimated from DMR data over the past six years for both wet weather flow (WWF) and dry weather flow (DWF). The average of the six peaking factors (PFs) was used to project all flows except for the MM WWF, where the highest PF among the six historical PFs was used. These additional projected design flows are listed in Table 5-6.

Table 5-6: Additional Design Flow Projections (MGD)

Year	ADWF	AAF	MM DWF	PD DWF	MM WWF
2024	3.6	4.6	4.0	7.4	10.1
2034	4.1	5.3	4.6	8.6	11.7
2044	4.8	6.2	5.3	9.9	13.5
Peaking Factors	0.77	1.00	0.86	1.61	2.18

The projection for peak day flow adhered to the methodology from the 2014 WWCP Update, where a peak day flow was estimated by adding a constant inflow/infiltration (I/I) of 23 MGD—derived from a 2012 storm event—to the projected ADWF. Recent five-year data for primary influent flow showed that the difference between the PDF and ADWF was estimated to be 22.8 MGD, nearly matching the previous I/I figure.

An additional I/I for a new service area of 2,321 acres defined in Table 4-8 of the 2014 WWCP Update was added, separate from the final PDF projected over the planning horizon. Based on the sanitary sewer flow projections provided in Chapter 4.2.3 of the 2014 WWCP Update, this new service area encompasses eight sub-areas: Marine Drive, Port Blakely, Rocky Point, West Hills, State Route 304 (Sherman Heights), Trenton, Tracyton, and Tracyton Beach. As the City has no confirmed plans for the development of these new service areas or the extension of the sewer collection system, the previous planning figures from 2014 WWCP Update were assumed for the projection. It was further assumed that the new service area would be added evenly over the planning horizon.

The peak hour flow (PHF) was estimated using a multiplier of 1.78, derived from the average of six historical peaking factors (PHF/PDF) to the projected PDF. Table 5-7 provides a summary of the flow projections.

Table 5-7: Peak Wet Weather Flow Projection (MGD)

Year	ADWF	Current I/I	New Area I/I	PD WWF	PHF
2024	3.6	22.8	0	26.4	46.9
2034	4.1	22.8	2.8	29.7	52.9
2044	4.8	22.8	5.6(2)	33.2	59.0

Notes:

(3) PHF = PD WWF x 1.78 (calculated as the average of six historical peaking factors: PHF/PD WWF).

(4) Additional I/I for assumed new area estimated at 2,400 gal/day/acre for 2,321 acres, following the method from the 2014 WWCP Update.

To project the loading associated with residential and employment areas, the loading factors estimated by King County for their three WWTPs in the 2014 WWCP Update for treatment plant flow and waste load projections were used. Although the City is not part of King County and neither the City nor its county has specific loading data available, King County's figures were adopted, with the assumption that they would be comparable for this region. The use of these values was further supported by checking the assumptions against historical data, which demonstrated that they align closely with local conditions. According to the report, the average

BOD loading factors for residential and commercial areas were 0.15 and 0.04 pounds per day per capita (ppdc), respectively, and the average TSS loading factors were 0.16 and 0.04 ppdc, respectively. Using these assumptions, the total BOD and TSS loads were estimated to be close to the historical influent BOD and TSS loads in 2020, 2021, and 2022, with an average difference of less than 2%. The average annual load (AAL) projections were developed by applying these BOD and TSS load generation factors to the projected sewered residential and employment population and summarized in Table 5-8.

Table 5-8: Average Annual Load Projections

Year	Sewered Population		AAL for BOD (ppd)	AAL for TSS (ppd)
	Residential	Employment		
2024	42,100	44,617	8,100	8,500
2034	51,241	47,795	9,600	10,100
2044	62,161	51,279	11,400	12,000

To establish additional design loads, historical peaking factors for maximum month load (MML), maximum week load (MWL), and peak day load (PDL) relative to annual average load (AAL) were estimated using six years of DMR data. The average of five peaking factors, after excluding an outlier from 2022, was used to project both MWL and PDL. For the MML, the highest peaking factor among the remaining five historical values was applied to the projected AAL to estimate the MML. Table 5-9 summarizes the projected BOD and TSS design loads.

Table 5-9: BOD and TSS Load Projection

	BOD Projection (ppd)			TSS Projection (ppd)	
Year	**AAL**	**MML**	**PDL**	**AAL**	**MML**
2024	8,100	10,900	16,800	8,500	11,100
2034	9,600	13,000	19,900	10,100	13,100
2044	11,400	15,400	23,600	12,000	15,600
Peaking Factors	1.00	1.35	2.07	1.00	1.30

All projected MM DWF, MM WWF, MM BOD, and TSS loads were below the limits currently allowed in the permit. These projected flows and loads were utilized to evaluate the current facility's capacity and identify any potential shortages. For the processes identified with capacity shortages, improvements will be developed based on the flows and loads permitted under the current Permit, with projected values adjusted to correspond to the Permit's maximum monthly flows and loads.

5.4 Sewer Basin Existing and Projected Flows

Kitsap County Planning Policies informed the flow projections across the entire Bremerton service area in Section 5.3. For sewer basin-specific existing and projected flows that can be leveraged for modelling analysis in Section 5, the following information was leveraged

- City water metering data for the 2023 year

- Select pump station flow data for the 2023 year
- Traffic Analysis Zone (TAZ) projections developed by Kitsap County over the planning period of 2024- 2044.

It should be noted that basins analyzed in the following sections account for all of the flow within the City's collection system.

5.4.1 Sewer Basin Average Dry Weather Flows

The existing and projected ADWF across Bremerton's service area broken down by basin are summarized in Table 5-10.

Table 5-10: Existing and Projected ADWF – Basin Specific

	Existing Flows (2024)		Projected Growth Flows (2024-2044)		Projected Flows (2044)	
Basin	**ADWF (gpm)**	**ADWF (MGD)**	**ADWF (gpm)**	**ADWF (MGD)**	**ADWF (gpm)**	**ADWF (MGD)**
East Bremerton(1)	-	-	-	-	-	-
Oyster Bay	355	0.51	24	0.04	380	0.55
Kitsap Lake	60	0.09	53	0.08	113	0.16
Anderson Cove	166	0.24	4	0.01	170	0.24
Warren Avenue	889	1.28	507	0.73	1396	2.01
Callow Basin	681	0.98	16	0.02	697	1.00
Pacific Avenue	105	0.15	106	0.15	211	0.30
Sinclair Park(2)	244	0.35	270	0.39	514	0.74
Kitsap Sewer District No. 1(2)						
Southwest Bremerton(2)						
Total	**2,500**	**3.60**	**981**	**1.41**	**3,481**	**5.01**

Notes:
(1) During dry weather, all East Bremerton basins flow into Warren Avenue via CE-1.
(2) 2023 Pump station data unavailable. Basins combined for analysis.

5.4.2 Sewer Basin Average Dry Weather Flows Methodology

To define the existing basin-specific ADWF, City water meter data from 2023 was leveraged with an assumed 96% sewer generation rate. In GIS, the sewer basin boundaries were overlain on the water meters attribute, and a report was generated. During the initial basin-specific analysis, the total ADWF calculated was 3.04 MGD. A 18% global adjustment was applied to match the WWTP influent data per Table 5-5.

To define the projected growth in ADWF across the planning horizon of 2024-2044, KJ performed basin-specific analyses based on the County-provided Traffic Analysis Zone data. The demographic projections from the County and City are allocated to small geographic areas called Traffic Analysis Zones (TAZs). TAZs for the City are developed by Kitsap County to

estimate population and employment growth throughout the County. The TAZ boundaries are independent of Bremerton's sewer service areas. Therefore, GIS analysis was used to determine which portions of the TAZ fall within Bremerton's sewer service area. The TAZ data was overlain onto the City's service area and a report was generated, factoring in the sewer generation rates. Ultimately, the calculated ADWF at the end of the planning horizon (2044) was calculated to be 5.01 MGD (see table above), 4.4% higher than the projected WWTP 2044 influent ADWF per Table 5-5. The disagreement is likely due to the application of the sewer generation factors related to UGA vs. non-UGA growth, which the populations TAZ-based population growth forecasts do not include. The difference is considered minor, and basin-specific flows are considered acceptable in utilization for later analyses.

5.4.3 Sewer Basin Peak Hour Flows

The existing and projected wet weather PHF across Bremerton's service area broken down by basin are summarized in Table 5-11.

Table 5-11: Existing and Projected PHF – Basin Specific

	Existing Flows (2024)		Projected Flow Increase (2024-2044)		Projected Flows (2044)	
Basin	**PHF (gpm)**	**PHF (MGD)**	**PHF (gpm)**	**PHF (MGD)**	**PHF (gpm)**	**PHF (MGD)**
East Bremerton(1)	-	-	-	-	-	-
Oyster Bay	2,188	3.2	133	0.2	2,321	3.4
Kitsap Lake	749	1.1	649	0.9	1,405	2.0
Anderson Cove	5,144	7.4	995	1.4	6,139	8.8
Warren Avenue	6,774	9.8	3,507	5.0	10,281	14.8
Callow Basin	12,968	18.7	459	0.7	13,427	19.3
Pacific Avenue	1,458	2.1	1,474	2.1	2,932	4.2
Sinclair Park(2)						
Kitsap Sewer District No. 1(2)	2,336	3.4	1,021	1.5	3,357	4.8
Southwest Bremerton(2)						
Total	**31,617**	**45.7**	**8,238**	**11.8**	**39,855**	**57.5**

Notes:

(1) During dry weather, all East Bremerton basins flow into Warren Avenue via CE-1.

(2) 2023 Pump station data unavailable. Basins combined for analysis. For projected growth flows and 2044 projected flows, nominal peaking factor applied.

5.4.4 Sewer Basin Peak Hour Flows Methodology

5.4.4.1 Existing Flows (2024)

Analyzing select pump station data for the 2023 year provided by the City, the peak hour flow was identified and correlated to its associated basin. These maximum values in the data sets

provided were compared to the augmented ADWF in 2024 for each basin as described in Table 5-10 to yield peaking factors. The peaking factors were then applied to the collection system model to yield the peak hourly flows as shown in Table 5-11. The validation of this methodology is explained further in Section 6 of the report. For sewer basins where no pump station data was available, a nominal peaking factor of 8.5 was applied.

The total peak hour flow calculated, 45.7 MGD is within 2% of the total projected flow determined at the WWTP per Table 5-7.

5.4.4.2 Projected Flow Increases (2024- 2044)

The same approach leveraging TAZ data as explained in Section 5.4.2 was utilized to determine the ADWF increase for each basin analyzed. The same peaking factors determined in Section 5.4.4.1 were applied to the ADWFs.

5.4.4.3 Projected Flows (2044)

The existing flows and projected growth flows were combined to determine the projected peak hour flows. The total peak hour flow calculated, 57.5 MGD is within 2% of the total projected flow determined at the WWTP per Table 5-7.

5.5 Design Criteria

Table 5-12 summarizes both the projected 2044 conditions and the influent conditions allowed under the current permit. The projected 2044 conditions were used as the basis for assessing WWTP capacity, while the permit conditions and other influent conditions extended in relation to the permit conditions, were assumed as the design criteria for developing improvement alternatives.

Table 5-12: Summary of Design Criteria

Parameter	Projected 2044	NPDES Permit	Design Criteria
Average Dry Weather Flow (ADWF), MGD	4.8	-	5.5
Average Annual Flow (AAF), MGD	6.2	-	7.1
Maximum Month Dry Weather Flow (MM DWF), MGD	5.3	11.0	11.0
Peak Day Dry Weather Flow (PD DWF), MGD	9.9	-	11.4
Maximum Month Wet Weather Flow (MM WWF), MGD	13.5	15.5	15.5
Peak Day Wet Weather Flow (PD WWF), MGD	33.2	-	33.9
Peak Hour Flow (PHF), MGD	59.0	-	60.3
Average Annual BOD Load (AA BODL), ppd	11,400	-	13,400
Maximum Month BOD Load (MM BODL), ppd	15,400	18,100	18,100
Maximum Day BOD Load (MD BODL), ppd	23,600	-	27,700
Average Annual TSS Load (AA TSSL), ppd	12,000	-	17,400
Maximum Month TSS Load (MM TSSL), ppd	15,600	22,600	22,600

The existing and projected flows and loads are leveraged for collection system evaluation and WWTP evaluation in Sections 6 and 7 respectively.

Section 6: Collection System Evaluation

6.1 Collection System Development

A key element of understanding the capacity of the City's collection system under existing and future sewer flows involved the development of the collection system hydraulic model. AquaTwin Sewer Modelling software was used to develop the hydraulic model. The development of the hydraulic model involved several steps including importing the City's existing GIS sewer geodatabase, reviewing model connectivity, calculating and assigning existing and future flows to the model, and calibrating the model using flow meter data. This section provides an overview of the hydraulic model development, model calibration process, comprehensive capacity analysis, and modeling results.

6.2 Hydraulic Model Development

The City's hydraulic modeling needs were assessed to help define the software and approach needed in the development of the hydraulic model. The wastewater collection system model was developed in AquaTwin Sewer Version 15.0. The hydraulic model horizontal datum is based on the Washington State Plane Coordinate System, North American Datum (NAD 83).

The preferred approach was to develop a trunk model that includes all pipes with diameters greater than or equal to 10-inches within the existing collection system. A trunk model is a skeletal model which is less detailed than a full pipe model. These types of hydraulic models are used for high level decision-making and system planning. This approach was selected based on the level of detail and analysis required for this WWCP.

The model uses Manning's equation to calculate friction losses throughout the system with a Manning's roughness coefficient of 0.013. The model does not include cleanouts and fittings included in the City's GIS sewer geodatabase. Portions of the 8-inch pipes were added to the model to assure proper connectivity and stability for running the model.

6.2.1 Model Approach, Assumptions and Update

During model development, the physical network of sewers, manholes, and pump stations was established based on the City's GIS database, specifically the physical information contained therein for the existing collection system. A review of the existing collection system, parcel, and land use information in the GIS database was completed prior to model development which provides quality enhancements to the sanitary GIS data. The data review was undertaken in GIS in both ESRI ArcMap and hydraulic modeling software utilizing built-in AquaTwin Sewer analysis tools.

A review was conducted of the hydraulic continuity and suitability of physical sewer data in terms of profile connectivity. The following approach was taken where information, such as diameters and inverts, were not available for conduits:

- When inverts were missing in intermediate gravity sections where upstream and downstream information was known, the inverts were interpolated using the known inverts as well as the length of the conduit with missing invert information.
- When only downstream inverts were available, the upstream inverts were calculated using the known downstream invert, the length of the conduit, and an assumed constant slope.
- When connectivity information was completely missing, appropriate assumptions were made based on engineering judgement and consultation with the City's staff to build the network.
- For manholes for which information was unknown, a rim elevation was taken from Google Earth and verified using the latest topographic data available from United States Geological Survey (USGS).
- For manholes for which rim elevation was populated based on NGVD 29 and the former City of Bremerton datum; approximately 112 feet was subtracted to covert to NAVD 88.
- South Bremerton has been defined for this WWCP to include the Gorst, Anderson Hill Road, and PSIC basins as shown in the inset in Figure 6-1.

Figure 6-1 shows the collection system basin boundaries, and the locations of the pump stations that were included in the hydraulic model analysis.

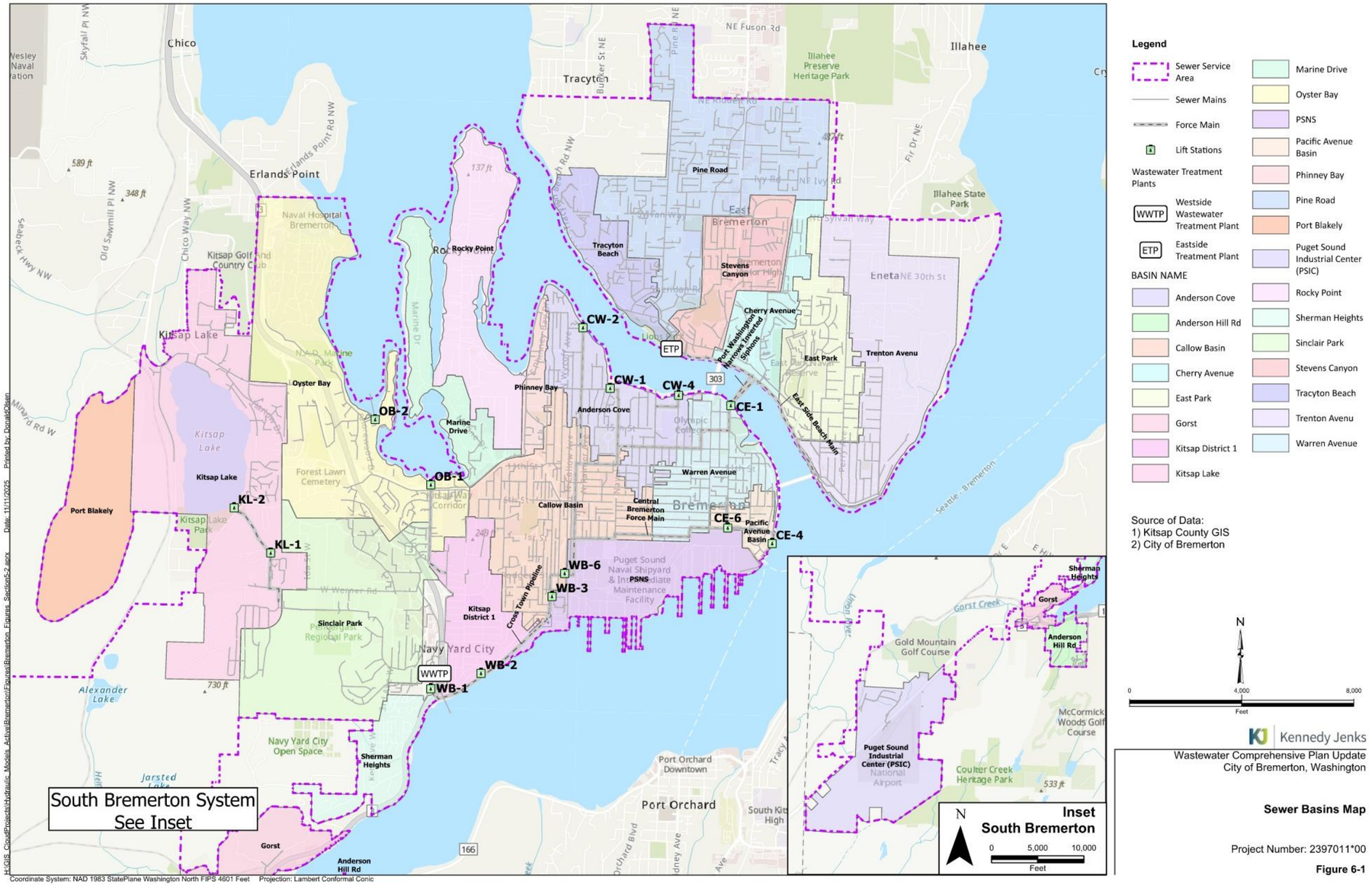


Figure 6-1: Sewer Basin Map

6.2.2 Sewer Inflow Allocation

This section explains the methods used to allocate both the average existing and future sewer flows to the hydraulic model.

6.2.2.1 Existing Sewer Average Daily Flows Calculation from Water Billing Data

Sewer flows are not directly metered at each individual customer and must be estimated based on the customer's corresponding water demand. The billed water demand was calculated based on one year of complete water billing data from 2023. Table 6-1 shows both the total billed water and sewer demand by usage type. Customers that use water for irrigation have no return flow, as the water is fully consumed and does not return to the sewer collection system. Regarding water demand, 45% of it is comprised of residential customers, 18% multifamily residential, and 13% commercial. Sewer only usage from various classes, such as the U.S. Navy, hospital sewer, and others, comprises 24%.

Sewer annual and winter average flows were calculated for each water customer usage type. The calculation was accomplished by dividing the total flow between meter readings by the number of days between meter readings. Sewer return flow ratios were then developed for each water customer usage type to calculate average sewer demand for each customer. The sewer return flow ratio represents what portion of the water demand being consumed by a water customer is then returned to the collection system as waste. The estimated billed water demand is 3.16 MGD, with a 96% sewer generation rate, resulting in an average annual sewer flow of 3.04 MGD.

Table 6-1: Annual (2023) Billed Water and Sewer Demand by Usage Type

Land Use	Total Water Use (Hundred Cubic Feet)	Total Water Use (gpm)	Total Water Use (MGD)	Sewer Return Flow Ratios (%)	Average Sewer Demand (MGD)
COMM I	109,000	155	0.22	95	0.21
COMM II	58,012	83	0.12	95	0.11
COMM III	31,030	44	0.06	95	0.06
RESIDENTIAL	691,583	984	1.42	95	1.35
MULTI-FAMILY	273,668	389	0.56	95	0.53
VARIOUS CLASS	378,365	538	0.78	100	0.78
TOTAL	**1,544,835**	**2,198**	**3.16**		**3.04**

As described in Section 5.3.2, calculated sewer generation with each historical ADWF from 2020 through 2023 shows an ADWF of 3.60 MGD. The calculated average sewer demand in Table 6-1 shows a value of 3.04, therefore an 18% global adjustment was applied to align with the WWTP influent data, which is considered the more consistent data source, spanning several years.

6.2.2.2 Existing Sewer Inflow Allocation

Sewer inflow allocation consists of assigning sewer flow to the appropriate manholes (nodes) in the model. The goal is to distribute the flow throughout the model to best represent actual system response.

The base flow component is comprised of sanitary flow (i.e., residential, commercial, and industrial sewage) and groundwater infiltration during dry periods. This component was developed based on the methodology described in the previous section, using 2023 water billing records. The water billing data was geolocated within GIS based on parcel number and address information. Using GIS, each customer account was geocoded and spatially joined within the existing sewer collection system. AquaTwin Sewer inflow allocation tool was then used to load the hydraulic model with the calculated sewer demands, using the “nearest pipe” allocation method**.** The sewer demand was assigned to the next upstream manhole. This process was the first step, prior to the manual adjustments made as detailed below:

- **Location 1:** East Bremerton flow was assigned incorrectly to locations like CW-4 and CE-4. After manual adjustments, all flow from East Bremerton was redirected to the manhole upstream of Pump Station CE-1, as it is conveyed to CE-1 via the inverted siphons and then pumped into the WWTP through the Crosstown Pipeline.

- **Location 2:** For South Bremerton, a portion of the inflow was redirected to the manhole upstream of Pump Station SB-3, as this portion is discharged into the Southwest Bremerton Sewer Force Main and directly conveyed to the WWTP. The remaining portion was assigned to South of Sinclair Inlet.

6.2.2.3 Future Sewer Demand Allocation

A buildout model was developed to assess the future infrastructure needs of the City’s collection system as development progresses. In this context, "buildout" refers to the scenario in which all areas designated for service by the collection system are fully developed according to the densities specified in the current land use plan.

To project future demands on the system, the model accounts for expected increases in water usage and sewer flows driven by new developments. These projections are based on the 2044 Traffic Analysis Zone projections provided by Kitsap County, as discussed in Section 5.4.2.

This growth, however, is not evenly distributed across the City. The basins in the East Bremerton and South Bremerton areas are expected to see the largest increases, each contributing approximately 28% of the total projected growth in demand. These projections provide a foundation for determining the appropriate sizing of the collection system infrastructure to meet both existing and future flows.

The future average dry sewer demand of 1.4 MGD associated with these areas was allocated in the hydraulic model using the allocation method described earlier. The specific locations of these demands are illustrated in Figure 6-2, which shows how the projected growth is distributed across the various basins. This allocation ensures that the infrastructure is

appropriately sized to handle the anticipated growth and maintain system efficiency as development continues.

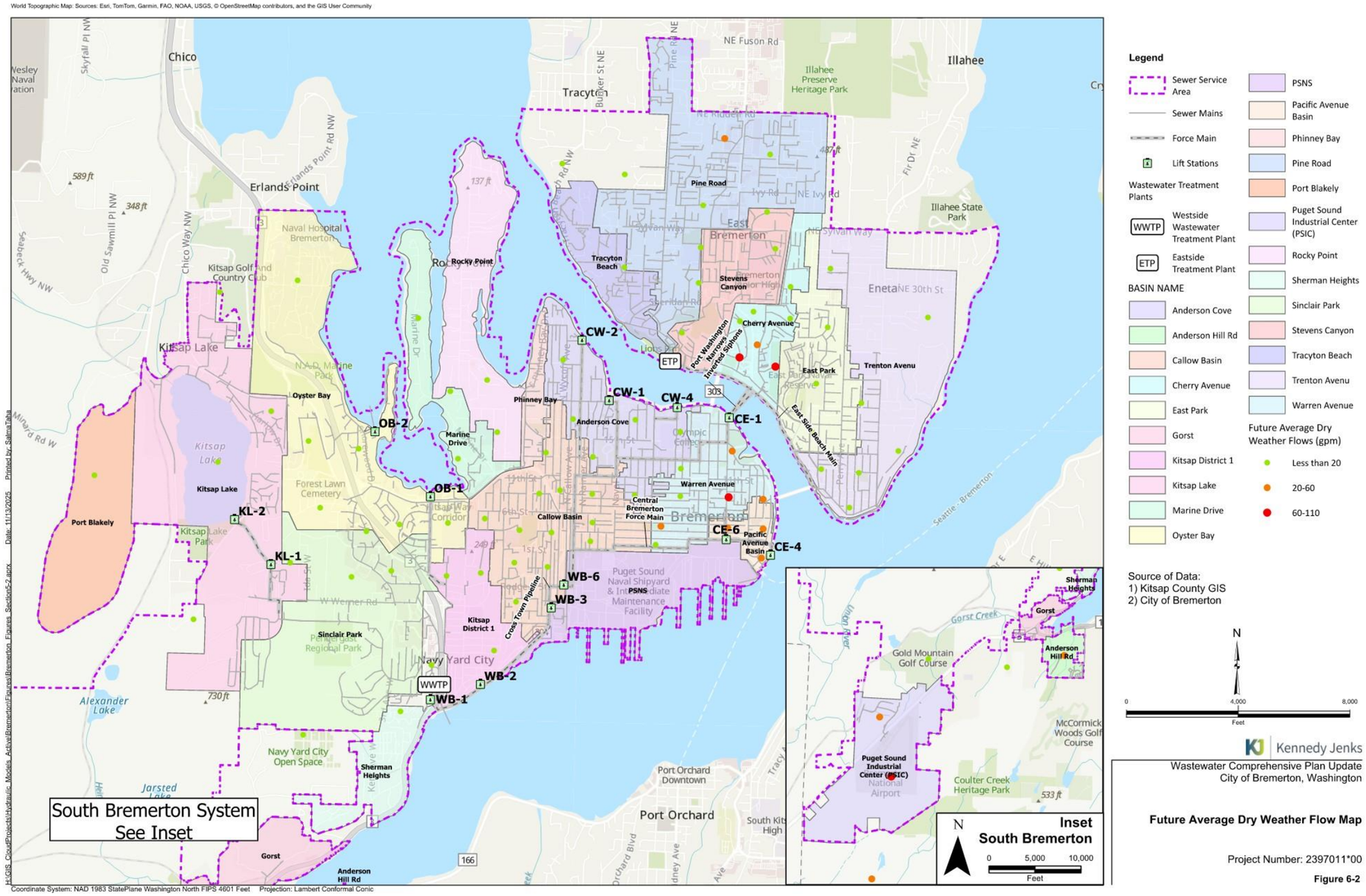


Figure 6-2: Future Average Dry Weather Flow Map

6.2.3 Flow Meter Data Collection

Due to lack of good flow metering data throughout the City's collection system, the City provided total volume data for the one-year period from January 1, 2023 to January 1, 2024 which was based on the permanent flow meters located at several City pump stations. A schematic showing the observed ADWF at each of the pump stations during the dry season months (June through September) resulting in a total flow of 3.15 MGD is shown in Figure 6-3.

The Kitsap Lake Basin consists of several pump stations, with KL-1 being the primary station in the area. All other pumps within this basin are tributary to KL-1. The KL-2 pump station, which is a large facility, discharges into KL-1. KL-3 discharges to KL-2, and KL-4 discharges to KL-3.

The Anderson Cove Basin includes CW-4. Discharge from CW-4 can be redirected depending on the season. During wet weather months, CW-4 pumps into the Crosstown Pipeline in order to minimize overflows at OF-11. During the dry weather months, it pumps into the beach main at the end of High Avenue, which discharges to CW-1 to ensure that flushing velocities are maintained in the beach main during periods of low flow. CW-1 discharges into the Crosstown Pipeline at 13th and Naval Avenue. Lift station CW-2 discharge can also be redirected seasonally. CW-2 normally pumps to the Callow Basin, making it tributary to WB-3. During dry weather, flow from CW-2 can be directed (via valving at 19th Street and Snyder Avenue) to CW-1 to minimize the wet well retention time during dry weather low flows to reduce odors. Recently WW staff decided to direct the CW-2 flow to the Callow Basin at all times, though the option still exists to redirect to CW-1 as needed.

The Pacific Avenue Basin is served by two main pump stations. CE-4 receives all the wastewater flow from the downtown waterfront area and the east end of the shipyard, and it pumps this flow into the Central Bremerton Force Main. CE-6, which receives flow from streets west of Pacific Avenue, east of Warren Avenue, and bounded on the north by MLK Way, pumps into a force main along Park Avenue, enters the gravity sewer near MLK Way, then flows to CE-1.

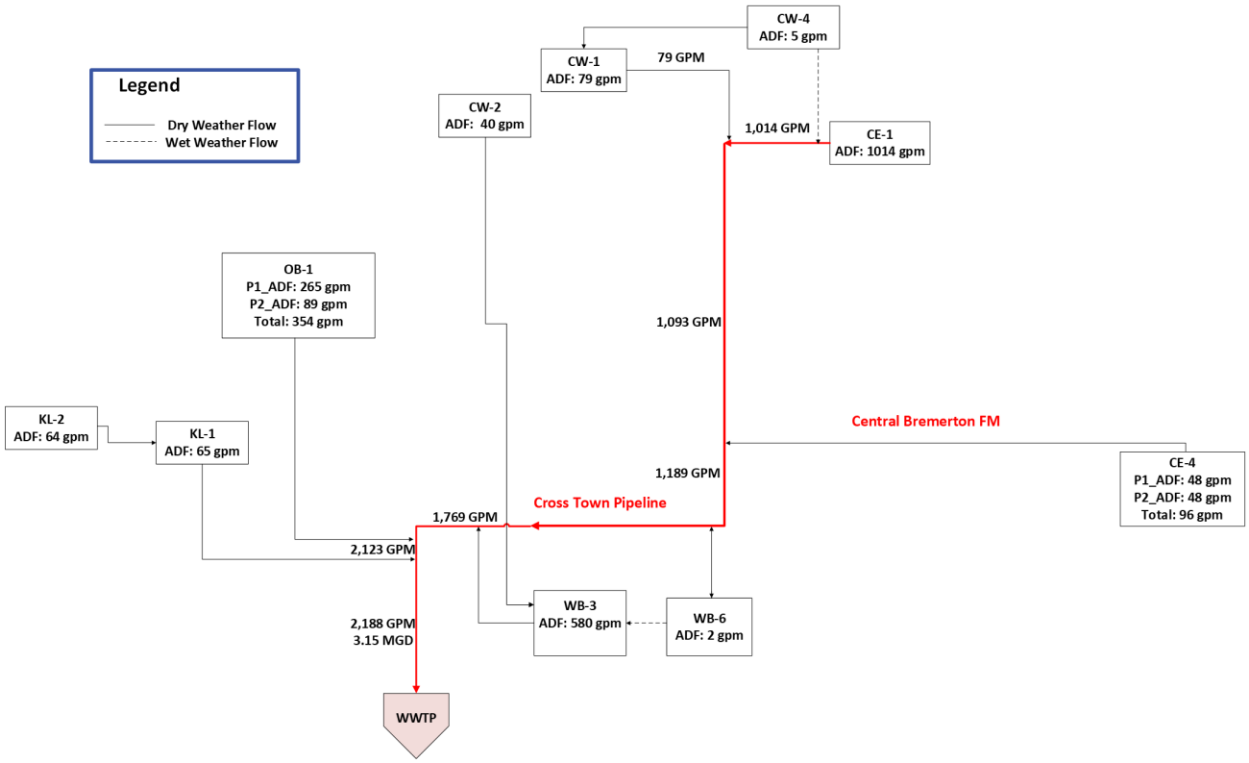


Figure 6-3: ADWF Schematic from PS Flow Meters

6.2.4 Model Calibration Methodology

In this calibration effort, the discrepancy of total ADWF from flow meters, water billing data and historical influent data from WWTP was considered. Due to limited availability of data sets that occurred during a similar interval of time, an average daily wastewater flow generated from water billing was imported into the model as a basis of our ADWF calibration.

Following the data import, the 2023 water billing were adjusted to align with the WWTP influent data set, which, as discussed earlier, covers the period from 2018 to 2023. Given that 2023 was a dry year with minimal rainfall and that the ADWF at the WWTP remained stable from 2019 to 2022, a global adjustment of 18% was applied to the calculated sewer generation based off the 2023 water billing data. This adjustment was made to adopt a conservative approach and ensure consistency with the broader dataset.

The calibration of the WWF involved reviewing rainfall data and flow data from the collection system to establish the relationship between rainfall and system flow, both across the entire system and at the WWTP. The storm chosen for calibration occurred on November 4, 2023, which saw the highest peak rainfall of 2.3 inches. Additionally, according to the previous annual CSO report, two CSO events took place in November 2023, coinciding with this storm event.

A peaking factor was applied to approximate peak WWF conditions, allowing a preliminary assessment of system performance under peak conditions. While this approach provided

insights into peak flow locations, it is important to acknowledge the steady-state simulation may not fully capture the dynamic nature of the collection system. Future data collection efforts should aim to include ongoing flow monitoring meters at various points of the collection system to generate detailed flow patterns to enhance the calibration process and improve model accuracy.

6.2.5 Rainfall Data

The City provided rainfall data for two City rain gauges which were monitored at fifteen-minute intervals from 3/2/2023 to 12/31/2023. During this period, 38 rainfall events were recorded. The meter data was reviewed to identify suitable storms for calibration. The storm selected for calibration occurred on November 4, 2023, which had the highest peak rainfall of 2.3 inches. Although the storm on December 4, 2023, lasted longer, its peak rainfall was only 0.47 inches. Table 6-2 presents the rainfall summary statistics (event, date, time, duration, and peak rainfall) for events with rainfall of at least 0.25 inches.

Table 6-2: Rainfall Event Summary

Event	Date	Duration (h)	Maximum Rainfall (in)
1	3/11/2023 12:00	7.25	1.003
2	3/12/2023 20:45	16.25	0.28
3	3/31/2023 18:30	7.75	0.262
4	4/2/2023 16:00	7.25	1.329
5	4/3/2023 13:15	7.25	0.352
6	4/6/2023 13:45	7.25	0.251
7	4/10/2023 17:30	7.25	0.2795
8	4/16/2023 21:30	7.25	0.271
9	4/17/2023 18:30	7.25	0.2515
10	4/19/2023 13:45	7.25	0.6195
11	5/3/2023 20:15	7.5	0.6375
12	6/18/2023 12:30	11	1.083
13	6/19/2023 16:45	7.5	0.49
14	9/19/2023 23:00	8.75	0.321
15	9/24/2023 19:45	12.25	0.2865
16	9/25/2023 16:00	7.75	2.157
17	9/26/2023 11:00	8.25	0.8885
18	9/27/2023 4:45	15.5	0.43
19	9/28/2023 11:30	7.25	0.3205
20	10/10/2023 7:45	7.25	0.27
21	10/11/2023 1:45	7.25	0.2875
22	10/16/2023 7:00	7.5	0.409
23	10/24/2023 18:45	23	0.332
24	11/1/2023 21:30	17	0.423
25	11/3/2023 20:00	20.25	2.318
26	11/5/2023 5:30	20.75	0.8275
27	11/6/2023 14:00	13.5	0.34
28	11/9/2023 14:15	7.25	0.282
29	11/11/2023 4:30	7.25	0.2815
30	11/12/2023 13:15	8.5	0.3175
31	12/1/2023 3:15	9.25	0.3105
32	12/1/2023 21:30	11	0.459
33	12/4/2023 6:30	30	0.4695
34	12/5/2023 19:00	7.25	0.2605
35	12/7/2023 0:15	13.5	0.6005
36	12/22/2023 8:15	7.75	0.288
37	12/25/2023 10:00	7.25	0.36
38	12/27/2023 21:15	8	0.4705

6.2.6 Calibration Statistics

When evaluating calibration results, it is crucial to define the acceptable tolerance between actual and measured data. For this calibration, best practice model calibration criteria, as obtained from the Wastewater Planning Users Group's (WaPUG) Code of Practice for Hydraulic Modelling of Sewers were adopted.

Additionally, the Chartered Institution of Water and Environmental Management (CIWEM) Code of Practice for the Hydraulic Modeling of Urban Drainage Systems (2017) provides the same criteria for assessing simulated peak flows during both dry- and wet-weather events. The following calibration statistics criteria listed in Table 6-3 were used to guide the calibration process.

Table 6-3: Calibration Statistics Criteria

Criteria	Recommended Range
Dry Weather Peak Flow	-10% to +20%
Wet Weather Peak Flow	-10% to +25%

6.2.7 Dry Weather Flow Calibration

The initial step in determining the Dry Weather Flow (DWF) component of the flow data involved identifying dry and wet days. By analyzing the rainfall data graph, the DWF period was selected during the dry season months (June to September). No flow data was available from pump stations located at Sinclair Park, Kitsap Sewer District No. 1 or South Bremerton.

Peak flow from the Average Dry Weather Flow (ADWF) scenario was recorded at the pipe upstream of each of the pump stations. The dry weather flows predicted by the model were compared with the afield-measured flow data from the 9 permanent flow meters. Table 6-4 presents the results of the dry weather flow calibration.

Table 6-4: Existing DWF Calibration Results

Pump Names	Basin Name	ADWF FROM PS DATA (gpm)	Conduit Model ID	Peak Flow Error	ADWF_Model Results (gpm)
CE-1	Warren Avenue	1,014	2610	13%	887
CE-4-P1	Pacific Avenue	48	3636	-10%	105
CE-4-P2		48			
CW-1& CW-4	Anderson Cove	79	4309	-72%	136
CW-2[(1)]		40	711	26%	30
KL-1	Kitsap Lake	65	1411	8%	60
OB-P1	Oyster Bay	265	1951	-1%	356
OB-P2		89			
OB-P3		Assumed it doesn't need to operate, only P1 & P2			
WB-3	Callow Basin	580	C152	-17%	680
No pump info received	Sinclair Park & Kitsap Sewer District No. 1 & South Bremerton	None	3892	N/A	244
Total (gpm)		**2,228**			**2,498**
Total (MGD)		**3.15**			**3.60**

Notes:
[(1)] CW-2 normally pumps to the Callow Basin, making it tributary to WB-3

Overall, the model calibration results for peak flow during dry weather conditions aligned with the criteria outlined in Section 6.2.6, with the exception of the Callow Basin (WB-3) and Anderson Cove (CW-1), which receives flow from CW-4 under dry weather flow conditions.

6.2.8 Wet Weather Flow Calibration

As previously mentioned, the calibration of Wet Weather Flow (WWF) involved reviewing rainfall data and peak hourly flow measurements gathered at pump stations during the November 4, 2023 storm event. The flow data from this event was utilized to estimate peaking factors for the different basins within the collection system. These factors were adjusted to represent the impact of a storm event that would yield a total peak flow rate of approximately 47 MGD, corresponding to the total peak hourly flow projection for 2024, as described in Section 5.4.3.

No pump station data was available for the Sinclair Park, Kitsap Sewer District No. 1, and South Bremerton basins, a peaking factor of 8.5 was assumed for these areas, based on the peaking factors calculated for the other basins.

Table 6-5 summarizes the results of the wet weather flow calibration and the corresponding peaking factors applied in the collection system model.

Table 6-5: Existing WWF Calibration Results

Pump Names	Basin Name	PHF from PS DATA (gpm)	Total PHF from PS DATA (gpm)	Calculated PF	PHF_Model Results (gpm)	Percentage Error
CE-1	Warren Avenue	6,774	6,774	7.3	6,748	0.39%
CE-4-P1	Pacific Avenue	729	1,458	13.9	1,462	-0.27%
CE-4-P2		729				
CW-4	Anderson Cove	254	5,398	30.6	254	-0.17%
CW-1		3,921			3,516	10.32%
CW-2		1,223		41.1	1,224	-0.11%
KL-1	Kitsap Lake	749	749	12.5	748	0.15%
OB-P1	Oyster Bay	1,325	2,188	6.1	2,172	0.73%
OB-P2		863				
OB-P3		Assumed it doesn't need to operate, only P1 & P2				
WB-6	Callow Basin	5,635	12,968	19.1	13,069	-0.78%
WB-3		7,333				
No pump info received	Sinclair Park & Kitsap Sewer District No. 1 & South Bremerton	None		8.5[(1)]	2,693	N/A
Total (gpm)		**29,535**	**29,535**		**31,887**	
Total (MGD)		**42.53**	**42.53**		**45.92**	

Notes:
[(1)] Assumed peaking factor in relation to other basins

The calibration results for peak flow during wet weather conditions were consistent with the criteria outlined in Section 6.2.6. However, due to the limited availability of data sets from similar time periods and the peaking factor derived from the 2024 projected peak hourly flow, future monitoring efforts should focus on collecting ongoing flow data at various points within the system. This will allow for a more detailed understanding of flow patterns, which will improve the calibration process and enhance the overall accuracy of the model.

6.2.9 Future Flow Results

Two scenarios, based on the TAZ 2044 projections developed by Kitsap County, were assessed for future growth. To represent the projected flow, a growth projection of 1.4 MGD was applied, reflecting anticipated localized growth within each basin, which accounted for future dry weather flow conditions.

A proportional inflow and infiltration (I/I) rate was assumed, consistent with the existing peak wet weather flow, to model the impact of a storm event resulting in a total peak flow rate of approximately 57 MGD. This aligns with the peak hourly flow projections for 2044, as outlined in Section 5.4.3. Consequently, the same peaking factors derived from the existing wet weather flow (WWF) were applied to the future WWF scenario. Table 6-6 summarizes the results for the peak wet weather flow projections.

Table 6-6: Future Peak Hourly Flow Results

Pump Names	Basin Name	Added 2044 Future Demands (gpm)	PHF_Future Model Results (gpm)
CE-1	Warren Avenue	507	9,098
CE-4-P1	Pacific Avenue	106	2,932
CE-4-P2			
CW-4	Anderson Cove	4	254
CW-1			3,889
CW-2			1,251
KL-1	Kitsap Lake	53	1,405
OB-P1	Oyster Bay	24	2,321
OB-P2			
OB-P3		Assumed it doesn't need to operate, only P1 & P2	
WB3 & WB6	Callow Basin	16	13,358
No pump info received	Sinclair Park & Kitsap Sewer District No. 1 & South Bremerton	270	4,844
Total (gpm)		**981**	**39,350**
Total (MGD)		**1.4**	**56.7**

6.2.10 Hydraulic Model Capacity Evaluation

This section describes the capacity analyses performed using the calibrated sewer system model as well as the hydraulic model findings.

6.2.10.1 Existing Flow Conditions

6.2.10.1.1 d/D Capacity Analysis

The capacity requirements for the wastewater collection system vary between the combined and separated sewer basins. In the combined basins, combined sewer overflows (CSOs) are allowed no more than once per year per outfall. In the separated basins, sanitary sewer overflows (SSOs) are not permitted. Existing facilities must meet these capacity requirements.

One of the key performance indicators (KPIs) of a sewer collection system is limiting the occurrence of sanitary sewer overflows (SSOs). This objective hinges on the ability of each pipe within the collection system to convey accumulated upstream sewer flows without exceeding full pipe capacity. When a gravity sewer pipe transitions from gravity to pressurized flow, known as surcharging, the risk of an SSO drastically increases.

Flow depth has long been a key design parameter in sewer design, exemplified by the flow depth-to-diameter (d/D) ratio. This ratio is calculated as d/D, where 'd' represents the flow depth in inches, and 'D' is the sewer diameter in inches. Gravity sewers are typically designed with some reserve capacity, the degree of which can vary based on various design recommendations. For instance, the American Society of Civil Engineers (ASCE) and the Water Environment Federation (WEF) recommend that sewers up to 15 inches in diameter maintain

dry weather d/D ratios below 50%, and larger sewers keep these ratios under 75%. Sewers are not intended to operate under surcharge conditions, hence wet weather d/D ratios should ideally remain below 100%.

In the scenario analysis, pipes were categorized based on their flow depth-to-diameter ratio into five groups: less than 20%, 20%-40%, 40%-60%, 60%-80%, and greater than 80% full. Pipes with a d/D ratio greater than 80% were flagged for capacity improvements and marked in red on the model output. Figure 6-4 shows the results of the existing flow DWF d/D capacity analysis. Figure 6-5 shows the results of the existing flow WWF d/D capacity analysis.

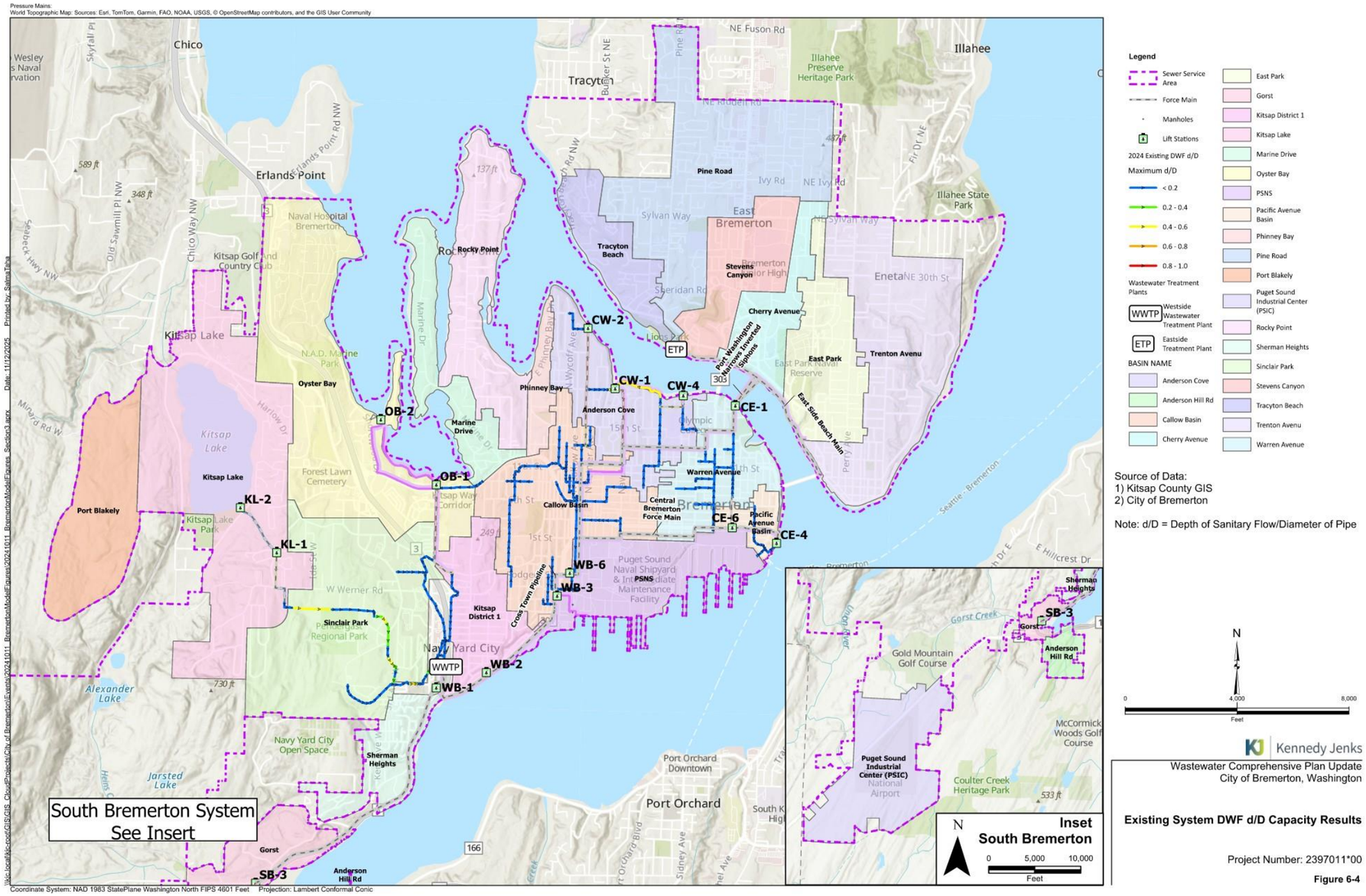
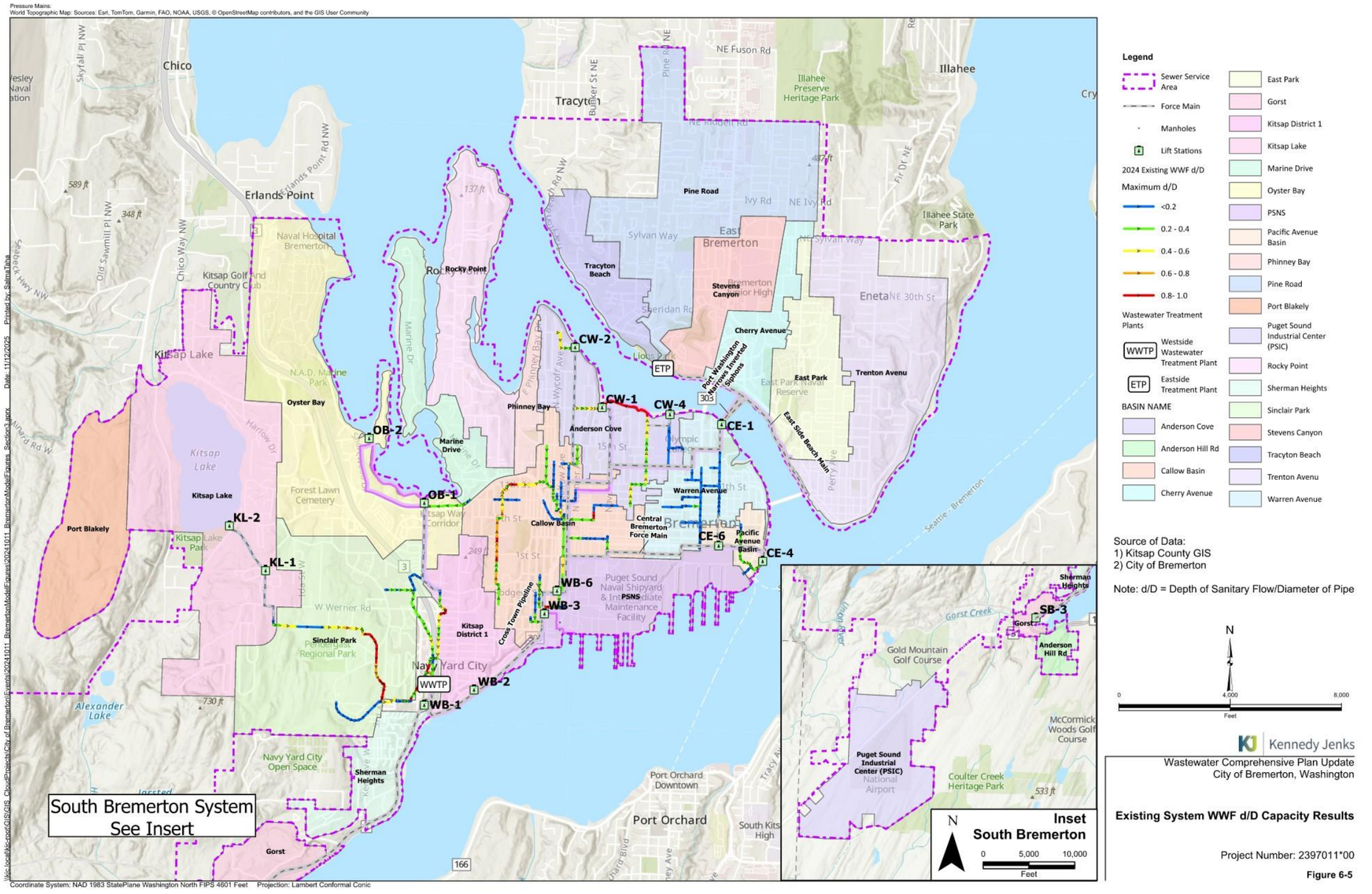


Figure 6-4: Existing System DWF d/D Capacity Results

The output from the existing WWF scenarios indicates localized capacity limitations in several segments of the collection system, including the Sinclair Park, Callow Basin, Anderson Cove and Kitsap Sewer District No. 1 Basins. These deficiencies are primarily observed in 8-inch, 10-inch and 12-inch pipes, which can be addressed by upsizing the sewer lines to 10-inch, 12-inch and 14-inch, respectively. Additionally, in the Kitsap Sewer District No. 1 Basin, the 24-inch main along Bayview Drive to the Westside WWTP also shows capacity deficiencies.



Legend

- Sewer Service Area
- Force Main
- Manholes
- Lift Stations

2024 Existing WWF d/D
Maximum d/D

- <0.2
- 0.2 - 0.4
- 0.4 - 0.6
- 0.6 - 0.8
- 0.8- 1.0

Wastewater Treatment Plants

- WWTP — Westside Wastewater Treatment Plant
- ETP — Eastside Treatment Plant

BASIN NAME

- Anderson Cove
- Anderson Hill Rd
- Callow Basin
- Cherry Avenue
- East Park
- Gorst
- Kitsap District 1
- Kitsap Lake
- Marine Drive
- Oyster Bay
- PSNS
- Pacific Avenue Basin
- Phinney Bay
- Pine Road
- Port Blakely
- Puget Sound Industrial Center (PSIC)
- Rocky Point
- Sherman Heights
- Sinclair Park
- Stevens Canyon
- Tracyton Beach
- Trenton Avenu
- Warren Avenue

Source of Data:
1) Kitsap County GIS
2) City of Bremerton

Note: d/D = Depth of Sanitary Flow/Diameter of Pipe

N
0 4,000 8,000
Feet

Kennedy Jenks
Wastewater Comprehensive Plan Update
City of Bremerton, Washington

Existing System WWF d/D Capacity Results

Project Number: 2397011*00

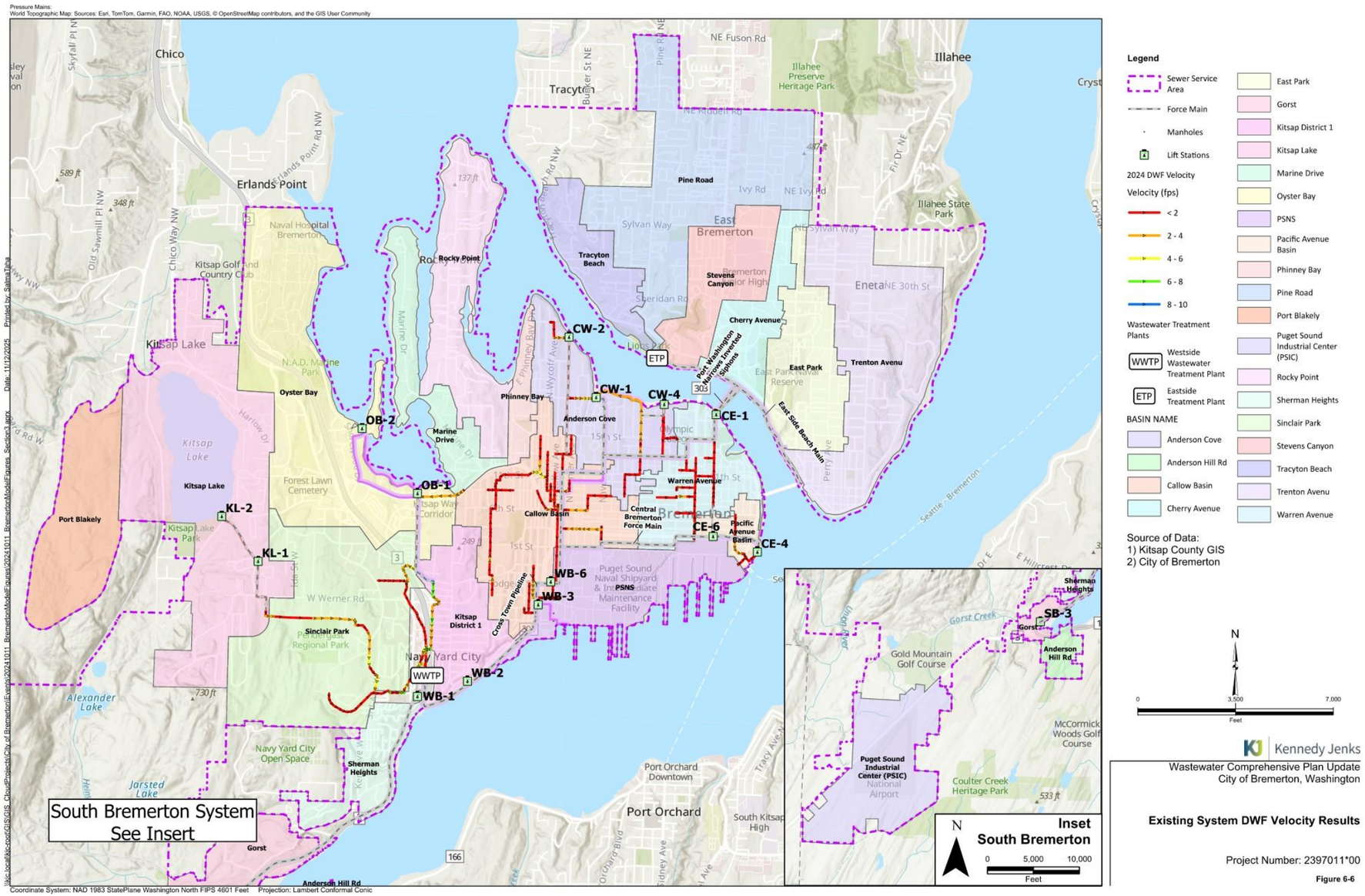
Figure 6-5

Figure 6-5: Existing System WWF d/D Capacity Results

6.2.10.1.2 Pipe Velocity Analysis

The other main KPI for collection systems is the range of sewer flow velocities. Pipe velocity is driven by pipe diameter, pipe slope, and sewer flow rates. Pipe velocities should be high enough to prevent debris and solids from settling and collecting at the bottom of the pipe, but low enough to avoid significant flow turbulence/hydraulic jumps, which releases more corrosive gasses that could lead to manhole corrosion and/or odor complaint issues. The calibrated hydraulic model was used to evaluate system pipe velocities to identify any potential areas not achieving the City's design velocity criteria. According to the Department of Ecology's Criteria for Sewage Works Design, sewer mains must uphold a minimum velocity of 2 feet per second (fps) and a maximum of 15 fps, adhering to a minimum pipe slope of 0.4%.

The primary goal under ADWF conditions is to maintain a minimum velocity to achieve effective scouring. Scour velocity is crucial in addressing issues related to impacts of Fats, Oils, and Greases (FOGs) as well as sanitary products, such as baby wipes. The typical industry standard for minimum sewer velocity is 2 fps. Even using this less conservative minimum velocity criterion, the hydraulic evaluations reveal that under ADWF, 66% of collectors and 71% of trunk sewers did not meet the 2 fps criterion. Consequently, these areas with low velocities may require more maintenance to maintain system efficiency and reliability. This goal will improve both the effectiveness of wastewater management and the longevity of the sewer infrastructure. Figure 6-6 shows the results of the analysis.



Legend

- Sewer Service Area
- Force Main
- Manholes
- Lift Stations

2024 DWF Velocity

Velocity (fps)

- < 2
- 2 - 4
- 4 - 6
- 6 - 8
- 8 - 10

Wastewater Treatment Plants

- WWTP — Westside Wastewater Treatment Plant
- ETP — Eastside Treatment Plant

BASIN NAME

- Anderson Cove
- Anderson Hill Rd
- Callow Basin
- Cherry Avenue
- East Park
- Gorst
- Kitsap District 1
- Kitsap Lake
- Marine Drive
- Oyster Bay
- PSNS
- Pacific Avenue Basin
- Phinney Bay
- Pine Road
- Port Blakely
- Puget Sound Industrial Center (PSIC)
- Rocky Point
- Sherman Heights
- Sinclair Park
- Stevens Canyon
- Tracyton Beach
- Trenton Avenu
- Warren Avenue

Source of Data:
1) Kitsap County GIS
2) City of Bremerton

Kennedy Jenks

Wastewater Comprehensive Plan Update
City of Bremerton, Washington

Existing System DWF Velocity Results

Project Number: 2397011*00

Figure 6-6

Figure 6-6: Existing System DWF Velocity Results

6.2.10.2 Future Flow Conditions

6.2.10.2.1 d/D Capacity Analysis

An identical d/D capacity analysis was performed for the future sewer flow conditions. Figure 6-7 illustrates the results of the future flow DWF d/D capacity analysis. Figure 6-8 illustrates the results of the future flow PWWF d/D capacity analysis.

The growth projection model discussed in Section 6.2.9. indicates that a significant proportion of the projected growth is anticipated to occur within Sinclair Park & South Bremerton. The existing WWF scenario indicates that infrastructure within the Sinclair Park, Callow Basin, Anderson Cove, and Kitsap Sewer District No. 1 are already at capacity. When considering the future growth, these basins, along with the Pacific Avenue Basin, are projected to experience capacity limitations. These deficiencies are most easily addressed by upsizing sewer lines and correcting notable I/I concern.

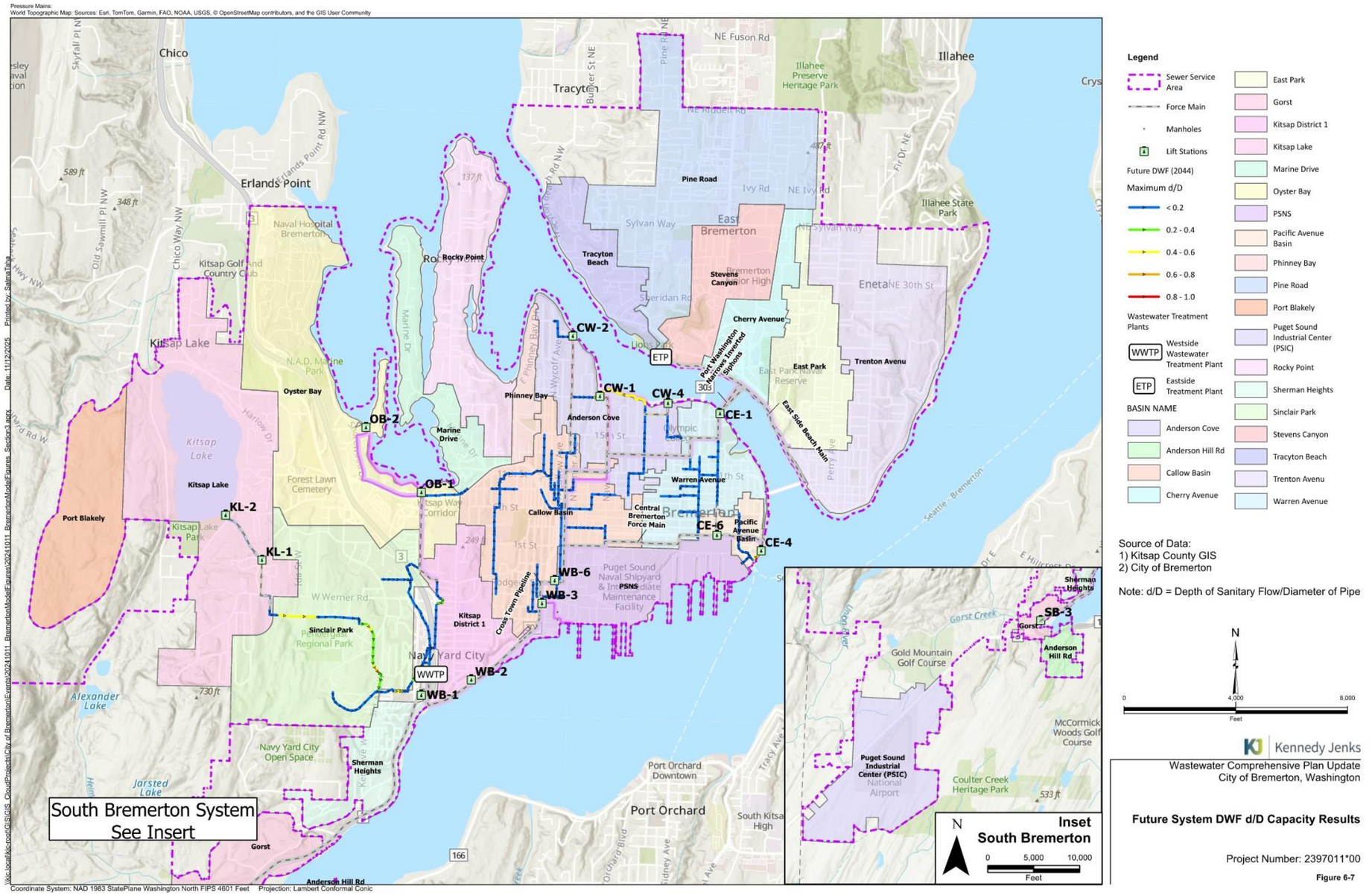


Figure 6-7: Future Flow DWF d/D Capacity Results

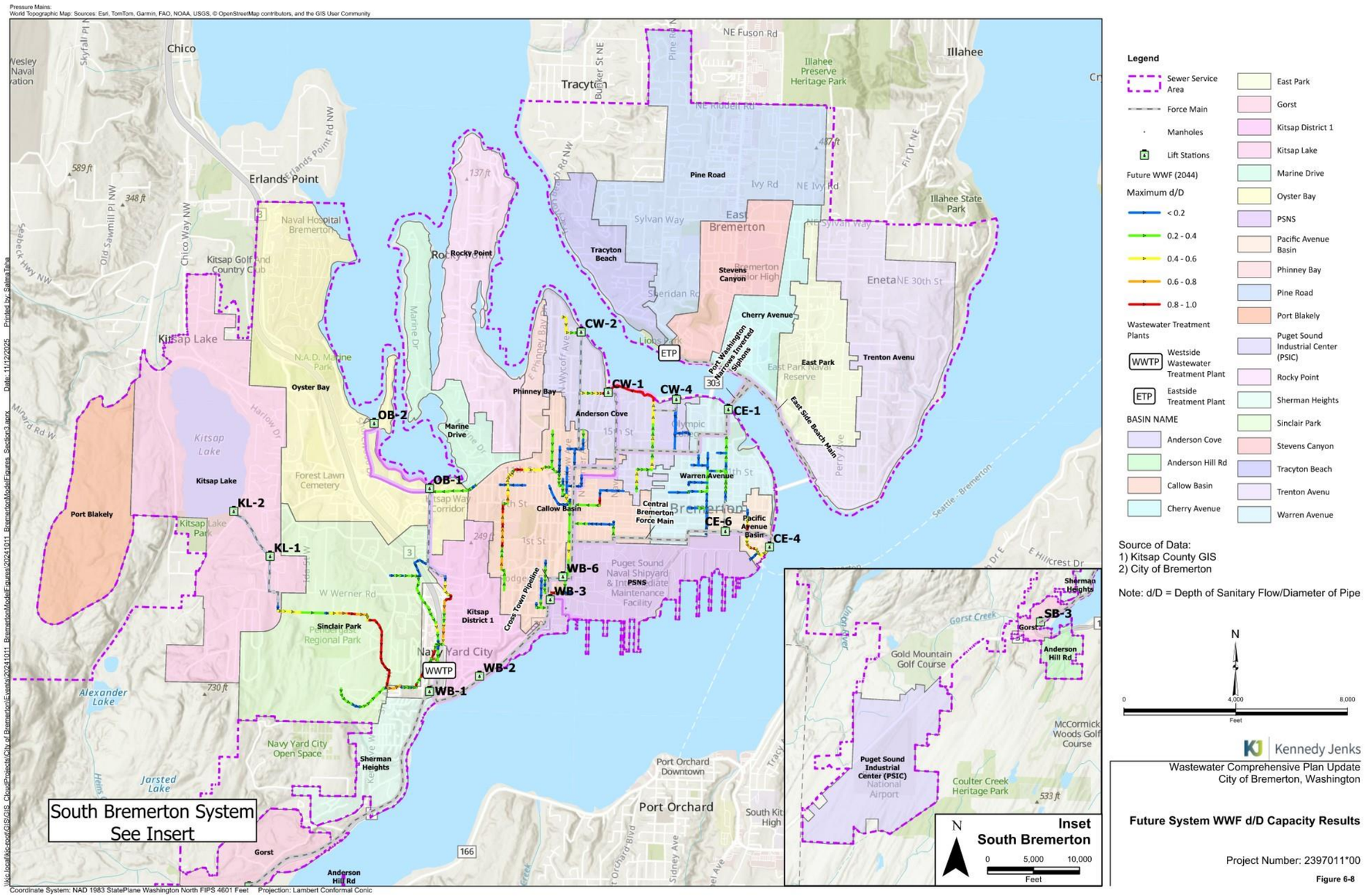


Figure 6-8: Future Flow WWF d/D Capacity Results

6.2.10.2.2 Pipe Velocity Analysis

An identical pipe velocity analysis was performed for the future sewer flow conditions. Figure 6-9 illustrates the results of the future pipe velocity analysis.

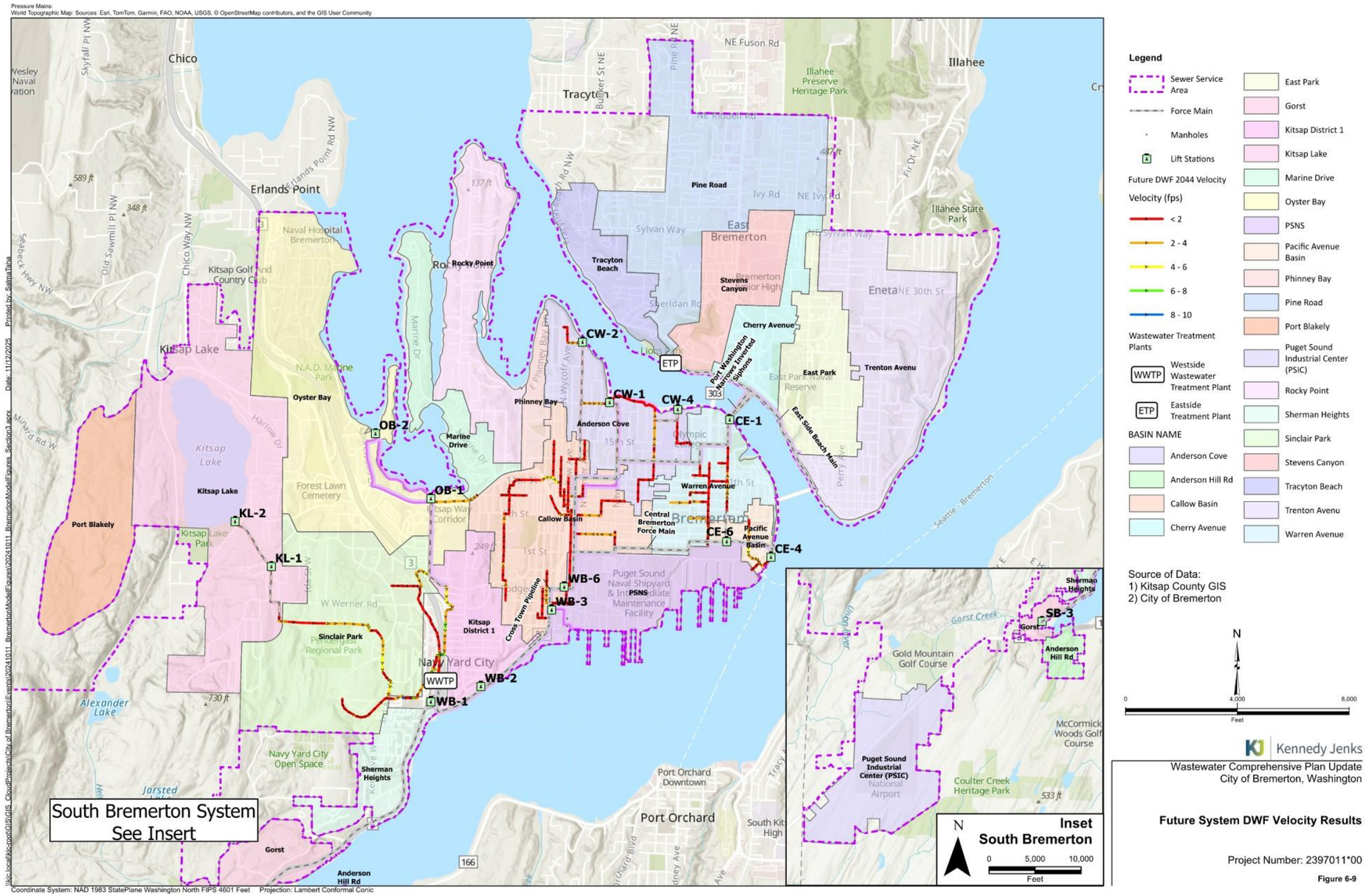


Figure 6-9: Future Flow DWF Velocity Results

6.2.11 Inflow & Infiltration Analysis

I&I refers to the entry of groundwater (infiltration) and stormwater (inflow) into a sewer system. When a collection system is compelled to handle a flow greater than for what it was designed, I&I can result in pipeline surcharging and downstream impacts to pumping and/or wastewater treatment facilities. This increased effluent not only poses challenges for wastewater treatment facilities but also escalates costs since the stormwater and groundwater mix with sewage and the entire volume must be processed at the treatment plant.

I&I can constitute a significant portion of annual flow to treatment plants; this excess burden can overwhelm the collection system and lead to several adverse consequences.

- Uncontrolled SSOs: I&I can exceed the capacity of pipelines, pumping stations, or treatment plants, causing raw sewage to overflow and pollute the environment.
- Pipe Failures: Excess flow due to I&I, can stress and damage pipes, increasing the risk of leaks and breaks.
- Soil Subsidence and Sinkholes: I&I can undermine the supporting soil around pipes, potentially leading to ground collapse and sinkholes.

These issues highlight the importance of addressing I&I effectively to safeguard public health, environmental quality, and infrastructure integrity.

Calculating I&I involves flow monitoring, where wastewater flow in the system is measured over time and compared with a baseline flow estimate. These measurements are crucial for determining the extent of I&I in the sewer system. Flow monitoring not only aids in identifying and prioritizing areas for further inspection but also serves as a basis for visual inspection methods to assess the severity of I&I in a given area.

6.2.11.1 Graphical Identification of I&I

Inflow is usually recognized graphically by large-magnitude, short-duration spikes immediately following a rain event. Infiltration is often recognized graphically by a gradual increase in flow after a wet-weather event. The increased flow typically sustains for a period after rainfall has stopped and then gradually drops off as soil becomes less saturated and as groundwater levels recede to normal levels.

Figure 6-10 illustrates rainfall and wastewater flow data for CE-1 collected between March and December 2023. The storm event used for I&I analysis was November 4, 2023 storm as the calibration period. The wet-weather flow hydrograph represents the total inflow volume, while it is overlaid with the dry-weather flow hydrograph, which includes sanitary flow and infiltration from the days preceding the storm. The difference between these two-time series represents the volume of I&I entering the collection system. Figure 6-11 provides a visualization from a portion of flow meter data for CE-1. The total I&I volume serves as an indicator of the combined inflow and infiltration, which was calculated for all basins using available flow meter data to identify the basins with the highest levels of I&I.

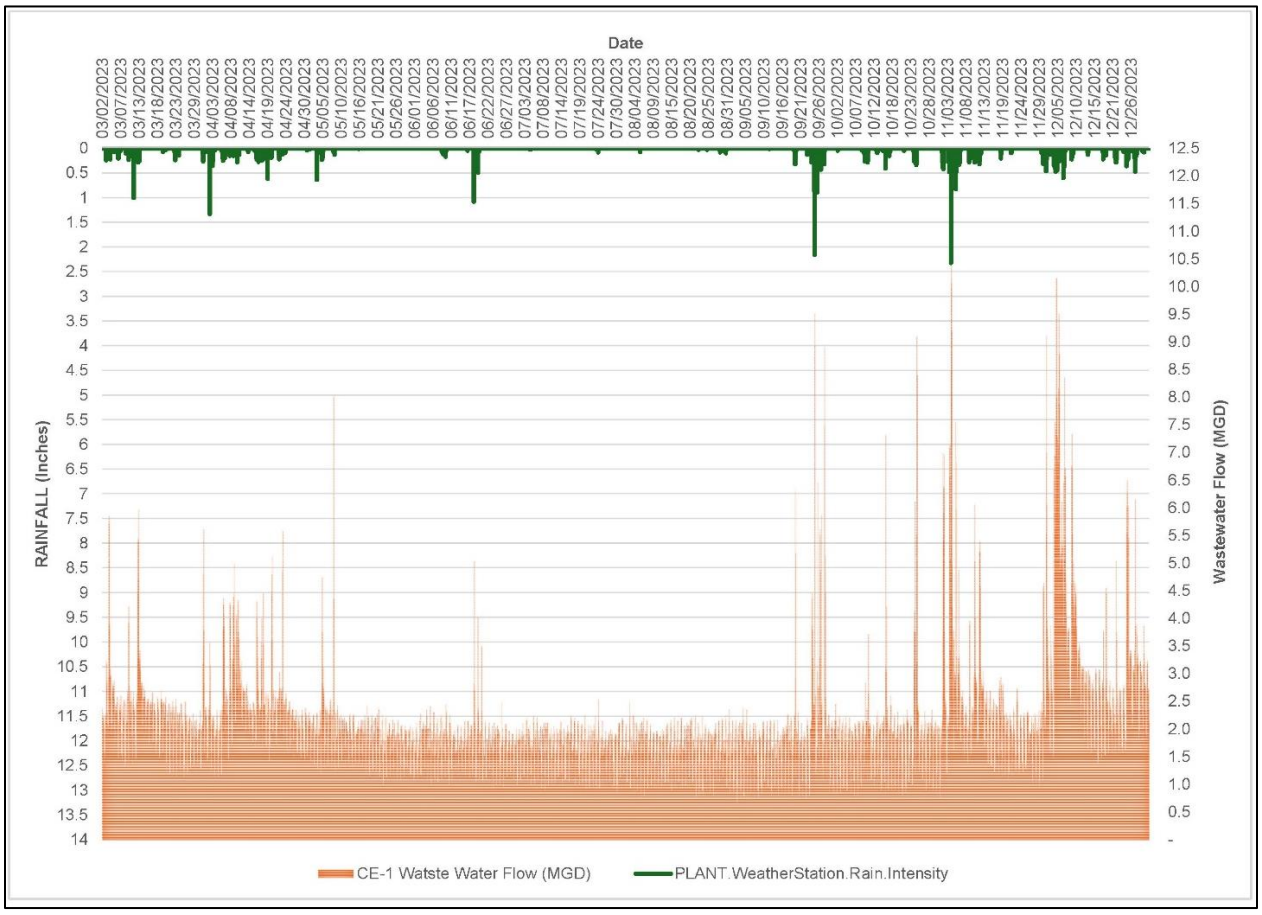


Figure 6-10: CE-1 Wastewater & Rainfall Hyetograph

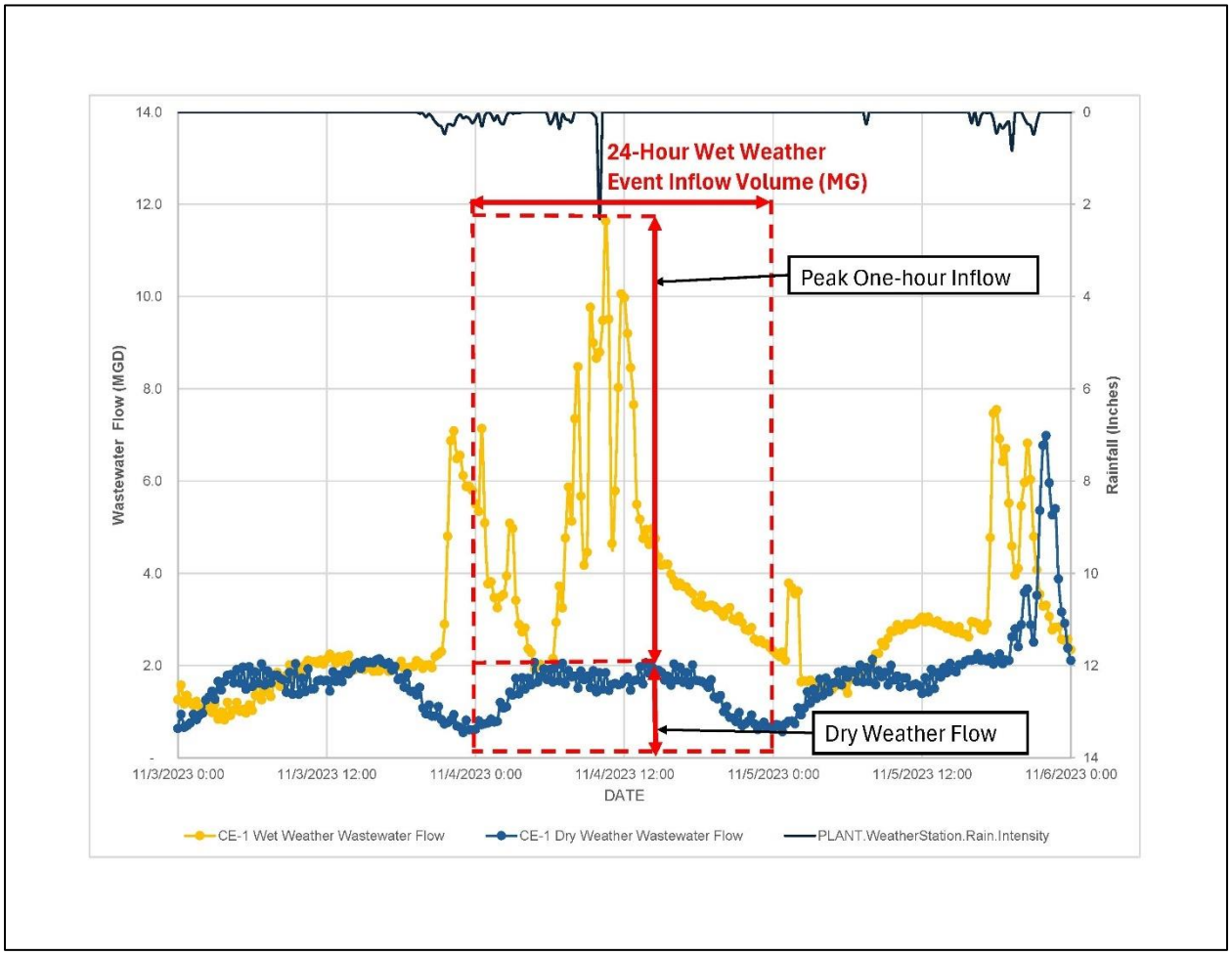


Figure 6-11: Overlay of Wet and Dry Weather Events for CE-1

6.2.11.2 I&I Results Analysis

To compare I&I levels across different basins, several methods can be used to normalize the analysis metrics. One common approach is to report as gallons per day per inch-diameter mile (gpd/idm). This unit accounts for both pipe diameter and length, allowing for meaningful comparisons even when basins have different layouts.

Using gpd/idm, basins can be ranked based on their highest I&I rates. This ranking helps prioritize areas with the most severe I&I problems. Table 6-7 summarizes the calculations and rankings for the basins based on highest I&I rate using this unit.

Table 6-7: I&I Analysis – November 2023, 24-Hour Storm

Ranking[1]	Basins	Average Pipe Diameter (Inch)	Total Length (Feet)	Inch-Diameter Mile (idm)	Design Storm Total Inflow Volume (Gallons)	Design Storm Total Inflow Rate (Gpd/idm)	% Total I&I[2]
1	Callow Basin	9.9	114,280	214	2,368,704	11,059	34%
2	Anderson Cove	8.8	62,939	105	952,668	9,090	14%
3	Oyster Bay	7.9	46,234	69	483,638	6,990	7%
4	Warren Ave & East Bremerton	9.2	379,401	662	3,035,922	4,588	43%
5	Kitsap Lake	8.0	50,517	77	155,418	2,027	2%
6	Pacific Avenue	10.4	14,374	28	52,012	1,839	1%
7	**Kitsap Sewer District No. 1	10.7	3,713	8	0	0	N/A
8	**Sinclair Park	8.9	56,181	94	0	0	N/A
	TOTAL		**727,639**		**7,048,362**		**100%**

Notes:
[1] Ranking based on Highest I&I Rate (gpd/idm)
[2] Sinclair Park and Kitsap Sewer District No. 1 not included in analysis because of missing flow data.

KJ brought two teams to perform prioritized, as-needed condition and performance assessments at the WWTP and collection system PSs for assets identified as risks during the BRVA. Selection of these assets was based on first the overall risk score, and subsequently assets that received scores of 4 and 5 for either their physical condition or safety condition. Assessments focused on rotating and fixed mechanical equipment and structural visual, non-destructive evaluations. Field investigations included condition assessments at the WWTP and throughout the collection system.

6.2.12 Field Inspections

Eight of the City's PSs and one odor control station were evaluated to identify major equipment needing to be replaced or rehabilitated. The team assessed: CE-4, CW-1, EB-2, EB-3, KL-1, KL-2, OB-1, WB-3, and OCS-1. Notable observations are described below.

- **CE-4:** There is excessive corrosion on piping and the painting/coating systems are in poor condition. The knife gate valves are difficult to close. Consider actuated valves which staff would access without entering confined space. Excessive corrosion was noted in the wet well, most likely due to its proximity to the shoreline. The City should consider ultrasonic testing (UT) on pipe within the wet well. Arc Flash testing should be conducted as soon as possible.
- **CW-1:** The wet well lining is the biggest issue, staff indicated that the wet well was recently recoated, but with there is still visible evidence behind the coating showing heavy spalling and scaling. Unless the poor concrete underneath is addressed, new relining will only continue to serve as a short-term remedy. Additionally, level floats should be added at this station to provide backup control; when the transducer goes out,

all three pumps turn on in idle mode and need to be manually turned off. This causes unnecessary stress on pump motors. Smaller observations include dry rot on pipe gaskets, CV-1's weighted spring mechanism was removed and not replaced, and the motor for the HVAC system on the roof is chirping, indicating minor bearing issues. There are no safety alarms at this site, and Arc Flash testing should be conducted as soon as possible.

- **EB-2:** There is excessive corrosions on piping and the painting/coating systems are in poor condition. The wet well has excessive corrosion, most likely due to its proximity to the shoreline. The wet well concrete shows significant signs of spalling, efflorescence, delamination, scaling and cracking. Vault will fill with water from high tides which is evident from corroding pies and severely damaged seals. Consider UT on all exposed pipe. There are sink holes around the site due to tidal influence, there is a link seal bulge in the high-water check valve vault, and the DLC valve vault will backflow at high water levels, which O&M noted has historically caused the manhole lid to pop. O&M also indicated significant ragging at this site. Arc Flash testing should be conducted as soon as possible.
- **EB-3:** The wet well hatch was bolted down for odor control and could not be assessed as part of this evaluation. There is also an odor control 55-gallon drum buried behind the building that was not able to be assessed. There is a new generator onsite. Overall, the drywell is in good to fair condition, with no excessive signs of corrosion, leaks, vibration, or noise from piping and pumping equipment and all alarms are functional.
- **KL-1:** The concrete wet well has spalling, scaling, delamination, and the coating is in failure The concrete wet well has spalling, scaling, delamination, and the coating is in failure, which O&M indicated to inspectors was original (1970s). Most notably, issues within the wet well are located at the base were 14-inch holes were drilled to convert the original wet well/dry well into a single wet well. This causes unequal water levels due to ragging and plugging of the core-drill holes and the pumps to work harder. Consider further rehabilitation to fully convert this into a more functional wet well that is not inhibited by clogging and intern, excess maintenance. Corrosion was also noted on piping. At the time of inspection, Pump No. 2 had failed and not all electrical systems were functioning so much of the equipment was not able to be observed in operation. Arc Flash testing should be conducted as soon as possible.
- **KL-2:** Overall, this site was in good condition. The drywell, piping and mechanical equipment and structure all look new and in good condition. Wet well observations were limited so consider future inspections when the well is able to be physically entered for a more comprehensive evaluation. O&M staff indicated they would like bigger pumps so as to bypass KL-1 and have this PS flow directly to the force main. Arc Flash testing should be conducted as soon as possible.
- **OB-1:** The concrete wet well has spalling, scaling, and delamination. Staff indicated that the wet well was recently recoated, but with there is still visible evidence behind the coating showing not just heavy spalling and scaling, but large chunks of concrete missing and noticeable structural deformities. Unless the poor concrete underneath is addressed, new relining will only continue to serve as a short term remedy. There was moderate corrosion on joints, and pipes should be recoated and UT should be performed. The corrosion is so extensive in the wet well, an entire section of pipe was broken off and observed in the base of the well. The pumps cycle every few minutes; with this low capacity, a surge tank should be considered to relieve pressure. Staff also

pointed out difficulties in removing the pumps from service for maintenance. Consider alternative methods. Arc Flash testing should be conducted as soon as possible.

- **WB-3:** The concrete in the wet well was in good to fair condition. There is notable corrosion, poor paint/coating, and minor leaks along the piping system and pumps. The connecting pipes are in a configuration inhibiting proper operations. Staff noted capacity issues and there was evidence of leaking. Staff indicated to inspectors they are actively working on a bypass project to avoid these connections. Arc Flash testing should be conducted as soon as possible.
- **OCS-1:** The station walls, floors, doors, electrical switches and conduit, among other equipment, showed significant corrosion; the concrete was spalling and scaling, and major deterioration was noted to the building envelope. Considerable chemical deposits were built up in the containment area. Ventilation louvers where also physically blocked with packing material and taped over. Staff indicated this act is something they do in the winter to keep the room well insulated, however the time of the inspections indicate that this packing was in place through the spring, summer, and now fall. Without the ability to well ventilate the station, and by locking in added heat and humidity that would come during the spring and summer months, corrosion is only exacerbated and increases safety hazards for staff.

6.2.13 Conclusion

In conclusion, the current wastewater facilities generally have sufficient capacity to accommodate existing flows, with the exception of some localized capacity limitations in certain segments of the collection system, including the Sinclair Park, Callow Basin, Anderson Cove, and Kitsap Sewer District No. 1 Basins. The growth projection model predicts significant growth in East Bremerton, Sinclair Park and South Bremerton. South Bremerton has been defined for this WWCP to include the Gorst and PSIC basins. The main trunklines in these areas, along with those in the Callow Basin, Kitsap Sewer District No. 1, Pacific Avenue Basin, and Anderson Cove, are already facing capacity constraints, as indicated by the future WWF scenarios. These deficiencies can be addressed through upsizing sewer lines and mitigating I&I issues.

Based on the highest rankings from the combined I&I analysis, which accounts for the total volume (in gallons) of both inflow and rainfall-dependent infiltration during the November 4, 2023 storm event, the top-ranked basins with the highest normalized combined I/I are Callow Basin and Anderson Cove. It is recommended that future flow metering efforts prioritize these basins within the collection system to better understand and manage excessive I/I. This may lead to the need for improvements to the existing conveyance system to accommodate projected flows. Additionally, flow monitoring should be considered for the Sinclair Park and Kitsap Sewer District No. 1 basins, as they are currently facing capacity limitations. Although these areas were not included in the calibration or I/I analysis due to a lack of data, monitoring will help evaluate the potential impacts of future growth and inform necessary improvements.

Based on results from the field inspections, and among other observations noted, the most critical concerns revolve around pump station wet well degradation, pipe corrosion, and arc flash testing. Long term restoration efforts should be considered to increase the reliability of these assets. Some of the pump stations have limited accessibility, are near bodies of water, and/or would be difficult to have long-term bypassing effort in the event of a failure. Many observed wet wells have severely degraded concrete and placing a liner or simple coating over

this concrete will not address the underlying issues. UT should also be considered at all pump station locations, particularly sites noted above that have severe corrosion and known leaking or broken pipes. Additionally, system wide arch flash testing should be completed to maintain a safe working environment and meet WAC requirements. Proactive rehabilitation efforts to restore these pump stations now before a failure would lower the City's risk and increase safety. Since these recommendations do not relate to a single station, a programmatic approach to addressing these concerns should be considered.

Section 7: Treatment Facilities Evaluation

7.1 WWTP Treatment Facilities

The WWTP is one of two wastewater treatment plants owned and operated by the City to treat wastewater collected within its sewer service area. Located in West Bremerton along State Route 3, the facility provides year-round secondary wastewater treatment and discharges the treated effluent through an outfall into Sinclair Inlet.

The secondary treatment process was originally designed with a biofilter followed by an activated sludge system. However, the biofilter was placed offline due to the perceived lack of benefit and significant odor concerns. The City has no plans to return it to service without further evaluation at this time. Currently, wastewater undergoes screening, grit removal, and primary clarification, followed by processing in aeration basins and secondary clarifiers. The secondary effluent is then disinfected with sodium hypochlorite, dechlorinated, and discharged into Sinclair Inlet.

Primary sludge and thickened wasted activated sludge (WAS) are treated through anaerobic digestion and dewatered using centrifuges to produce Class B biosolids. The biosolids are transported and land applied on a City-owned silvicultural site.

7.1.1 References

All process components and system configurations referenced herein were gathered from staff interviews during the BRVA workshops and document review. The following documents were included in this review:

- 1985 Schedule A & B Wastewater Treatment Plant drawings
- 1986 Designer's Operations Memorandum
- 1995 Wastewater Treatment Plant Odor Control Project drawings
- 2005 Wastewater Comprehensive Plan Update
- 2008 Wet Weather Facilities Upgrade Project Drawings
- 2009 Major Facilities Upgrade
- 2010 Mixing Zone Study Update
- 2014 Wastewater Comprehensive Plan Update

7.1.2 Liquid Stream Processes

7.1.2.1 Headworks Screens

Influent at the City's WWTP first enters the headworks system equipped with three, 15 mm mechanical bar screens manufactured by Parkson. These screens operate automatically, responding to influent flow signals. Screen #3, installed in 2008 as the middle screen, is always open to assist with flow management, while screens #1 and #2, installed in 1995, transition to

high flow mode when influent flow exceeds 20 MGD to handle the increased influent. The design criteria for the headworks screens are provided in Table 7-1 below:

Table 7-1: Design Criteria for Headworks Screens

Headworks Screens #1 and #2	
Quantity	2
Type	Mechanical Bar Screens
Screen Channel Width	3 ft
Screen Opening Size	15 mm
Capacity, each	15 MGD
Motor	2 hp
Year Installed	1995
Screen #3	
Quantity	1
Screen Channel Width	4 ft
Opening Size	15 mm
Capacity	18 MGD
Motor	2 hp
Year Installed	2008

All three chambers have sluice gates to isolate them horizontally and vertically. City staff have noted that biosolids are generally clean, however, there was a significant amount of debris that was disposed of during a recent digester cleaning, indicative of moderate to below-average screening performance. The effluent from the three screens is collected in a common effluent channel, which then divides into two open channels that direct flow into two grit chambers.

7.1.2.2 Grit Removal

Raw wastewater from the headworks is conveyed into the aerated grit removal chambers. The operational set up includes two grit tanks and two Roots© blowers, configured for continuous operation without flow pacing. The system employs coarse air diffusers on manifolds positioned behind walls for optimized air distribution.

Grit removal is facilitated by a sloped floor directing debris to buckets on a chain, constructed from mild steel coated in polyurethane, with recent replacements ensuring functionality. Both chains operate simultaneously, allowing for maintenance on one during low flow periods. Design criteria for the grit removal chamber are provided in Table 7-2 below:

Table 7-2: Design Criteria for Grit Removal Chambers

Grit Removal Chamber	
Quantity	2
Type	Aerated Grit tank
Installed	1995
Volume, each	5,264 cu ft/each
Capacity	15 MGD/each

The grit removal system may not be functioning efficiently, as evidenced by periodic digester inspections revealing significant grit accumulation that necessitates approximately 60 vactor truck loads for removal every seven years. Operational strategies involve recycling the center well and hopper from the primary to the front of the screens to maximize grit capture, supplemented by grinders upstream to increase the service life of the sludge pumps.

The structure's integrity, particularly susceptible to hydrogen sulfide degradation above the waterline, should prompt consideration for recoating. Plans include bundling structural maintenance with the plant's CIP schedule.

7.1.2.3 Primary Clarifiers

The effluent from the grit process flows into the two primary clarifiers before flowing into aeration basins. The primary clarifiers are circular in design and equipped with aluminum covers. Adjacent to the north side of the weir lies the pre-aeration tank which is currently non-operational. Design criteria for the primary clarifiers are provided in Table 7-3 below:

Table 7-3: Design Criteria for Primary Clarifiers

Primary Clarifiers	
Number of Basins	2
Diameter	80 ft
Surface Area, each	5027 sq ft
Side Water Depth	10 ft
Installed	1986

The primary clarifiers consist of the influent line, dual flumes, paired tanks, odor control suction conduits, rakes, motors, and weirs, each contributing to the operational framework. New gear boxes were installed in 2016. Recoating of the rake outs was conducted in 2018, with periodic monitoring of overtorque via alarm systems linked to the SCADA interface. Operational features include spray nozzles for scum layer manipulation, fiberglass baffles and v-notch weirs subject to annual cleaning due to delamination and breakage. Aluminum covers, each equipped with a separate P-trap drainage system remain in good condition. The primary clarifiers are not pressure washed, and instead are washed manually by hose on an annual basis.

7.1.2.4 Primary Effluent Pumps

Effluent from the primary clarifiers flows into a wet well at the biofilter, where it is transferred to the aeration basins by gravity. There are five primary effluent pumps, each with a capacity of 7,600 gpm at 50 feet of head (upgraded in 2013), that handle typical flows of 4 to 5 MGD under normal conditions and up to 30 MGD during storm events. During peak flows, three pumps are operational, and while the system is capable of running four pumps, it is avoided to protect the pipe. Three pumps running at full speed achieve 33 MGD, which is the hydraulic capacity of the plant, and secondary bypass begins when flows reach 32.5 MGD.

The primary effluent pumps are FLYGT dry pit/submersible units, located in a ventilated and well-lit basement accessible by stairs. They include level control mechanisms, flow meters, transducers, and backup transducers to ensure efficient operation. Design specifications for these pumps are detailed in Table 7-4 below:

Table 7-4: Design Criteria for Primary Effluent Pumps

Primary Effluent Pumps	
Type	Dry pit/submersible from FLYGT
Installed	2013
Capacity, each	7,600 gpm at 50 ft head
Wet Well Surface Area	507 sq ft
Wet Well Volume	26,548 gallons

Flow meters are installed to measure the flow, with backup transducers available to ensure continuous monitoring. Pump fail alarms are integrated into the system to promptly alert operators in case of malfunction. Furthermore, a secondary bypass alarm diverts flows into the contact chamber in the event of an overflow, enhancing system resilience. Standard operating procedure dictates that during normal flows, one pump is utilized, with occasional activation of the second pump as dictated by demand. Activation of a second and third pump is automatic, while that of fourth and fifth is manual to protect the conveyance pipes before introducing higher flow rates.

7.1.2.5 Aeration Basins

The primary effluent pumps transfer the primary effluent flow to the biofilter wet well, where the effluent then flows by gravity to the aeration basins. Air is supplied by Aerostrip diffusers, installed in 2001, a substantial portion of which underwent replacement in 2020. A divider wall was constructed in 2001 in each aeration basin to create an upstream anaerobic selector zone aimed at improving sludge settleability, and a floating mixer was installed at the same time to enhance mixing. Operating under the purview of a four-blower arrangement, the system was initially equipped with three, 200 hp Hoffman blowers, installed in 1985. Currently, one is in use as a backup. Two, 100 hp Neuros Turbo blowers (2014) and a 75 hp Roots blower (2015) have been added. Augmenting the structural integrity of the system, zinc-based cathodic protection mechanisms are integrated within the tank infrastructure. Design criteria for the aeration basins are provided in Table 7-5 below:

Table 7-5: Design Criteria for Aeration Basins

Aeration Basins	
Quantity	2
Volume, each	55,600 cu ft
Installed	1986
Anaerobic Length (assumed)	16 ft
Anaerobic Area	1,500 sq ft
Aerobic Area	6,700 sq ft
Side Water Depth	13.5 ft
Anaerobic Zone Mixer	
Quantity	2
Motor Size	3 hp
Blowers	
Quantity	4
Positive Displacement Blowers (Hoffman)	One, 200 hp, 2,655 cfm at 7.1 psi
Turbo Blowers (added 2001)	Two, 100 hp, 2,500 cfm at 8.5 psi
Roots Blowers (added 2001)	One, 75 hp
Diffusers	
Type	Strip Aerators
Total Diffuser Area	674 sq ft
Specific Air Rate	1.43 scfm/sq ft

7.1.2.6 Secondary Clarifiers

The mixed liquor from the aeration basins flows into a secondary clarifier influent splitter box, where it is divided between two flumes, which then feed into the connected secondary clarifiers. The secondary clarifiers are equipped with circular rake arms and sludge withdrawal pipes, also known as organ pipes. The settled activated sludge is drawn up through the organ pipes and conveyed to the center RAS (Return Activated Sludge) collection box, then flows by gravity to an individual inlet box attached to the common RAS wet well at the Secondary Recirculation Pump Station. Both the splitter box and the RAS wet well contain a reserved channel and box for connecting an additional secondary clarifier in the future. Design criteria for the secondary clarifiers are provided in Table 7-6 below:

Table 7-6: Design Criteria for Secondary Clarifiers

Secondary Clarifiers	
Number of Basins	2
Diameter	110 ft
Basin Surface Area, each	9,503 sq ft
Side Water Depth	14 ft
Installed	1985

The organ pipes require daily flushing and manual operation via T-handles, necessitating maximal RAS flow for effective cleaning. Recent upgrades include drives and gearboxes

installed in 2017, complementing the original 1985 rake arms, which were recoated in 2018. The scum removal system mirrors that of the primary clarifiers, with overtorque alarms providing additional safety measures. Occasionally, one clarifier may be taken offline during the summer months for maintenance in order to avoid the disruption of the sludge blanket caused by storm-induced large inflows.

7.1.2.7 RAS System

The settled activated sludge in the secondary clarifiers is drawn up through the organ pipes and conveyed to the RAS collection box, then flows by gravity to an individual inlet box attached to the common RAS wet well at the secondary recirculation pump station. The RAS system is responsible for returning a portion of the sludge from the secondary treatment process back to the aeration basin to maintain desired biomass population for biological treatment. The sludge is directed through organ-like pipes into an individual inlet box attached to a common wet well. When one secondary unit is taken offline, the system functions similarly to a splitter box, redirecting flow accordingly. Design criteria for the RAS pump are provided in Table 7-7 below:

Table 7-7: Design Criteria for RAS Pump

RAS Pump	
Type	Dry pit/ submersible pump
Quantity	2
Capacity, each	3,900 gpm
Motor	35 hp
Installed	2019

Two centrifugal pumps, installed in 2019, handle the flow within the RAS system. These pumps, which have a motor control center located in a dry pit, are vital to the operation. One pump typically runs with a VFD to control its speed, while the other pump serves as a backup. Based on the DMR data, RAS flow ranges between 1.7 to 5.7 MGD. The sludge is returned to the aeration basin through a single line that has a tee and two valves. This allows the flow to be directed either to the aeration basin splitter box or to a biofilter wet well. The biofilter is currently out of service. Maintenance of the pumps is largely handled in-house, with routine inspections focusing on components like impellers, which are pulled annually to ensure they are in good condition. The system is integrated into the plant's SCADA system, which alerts staff to any operational changes, such as fluctuations in power use, allowing them to address issues promptly.

7.1.2.8 Chlorine Disinfection Contact Chambers

The chlorine disinfection system uses sodium hypochlorite. Pump speed regulation is automated to maintain optimal performance. Chlorination is facilitated by a dedicated day tank containing hypochlorite solution, with dosing rates dynamically adjusted based on flow conditions, utilizing a flow-based dose approach. Chemical delivery logistics are managed by a reliable contractor, ensuring timely and reliable supply, with contingencies in place such as backup suppliers in Tacoma to mitigate potential supply chain disruptions.

Dechlorination follows the chlorination process and involves the utilization of sodium bisulfite. Initially stored in large fiberglass tanks, chemical storage has since transitioned to the use of plastic for hypochlorite while retaining fiberglass for sodium bisulfite. Hypochlorite is injected at the mixing box, while sodium bisulfite is injected at the final effluent weir. Design criteria for the disinfection chambers and equipment are provided in Table 7-8 below:

Table 7-8: Design Criteria for Chlorine Disinfection Contact Chambers

Chlorine Disinfection Contact Chambers	
Channels	2
Volume, each	28,000 cu ft
Side Water Depth	15 ft
Chlorination System	
Injection Pumps, each	2 pumps 31.8 GPH
Sodium Hypochlorite Tank Volume, each	6,000 gallons
Installed	1996
Dechlorination System	
Injection Pumps, each	2 pumps 8.5 GPH
Sodium Bisulfite Tank Volume, each	1,500 gallons

7.1.3 Solids Stream Processes

7.1.3.1 Primary Sludge Pumping

Primary sludge is pumped continuously as a thin sludge from the primary clarifiers directly to the anaerobic digesters. Two primary sludge pumps, each 4-inch, 35 gpm diaphragm pumps, are located in the primary sludge pump station in the primary clarifier building; both are equipped with grinders. The system operates on timed cycles with simultaneous utilization of both primary sludge pumps. The primary scum pumps are used as backups for the primary sludge pumps. During maintenance or downtime, the scum pumps are exclusively activated to provide redundancy and ensure continued operation. These pumps are calibrated to deliver sludge with a solids concentration ranging from 4-5%, obviating the need for additional thickening measures as a 3% concentration is targeted within the digesters. Gauging of system performance is facilitated by torque arm readings, typically falling within the 0-5 range. Situated in the primary effluent basement for accessibility, routine maintenance focuses on the wet ends, with built-driven mechanisms ensuring operational efficiency. Recent enhancements include upgraded pressure tanks for scum handling. Daily checks encompass flow and pressure monitoring, supported by a comprehensive check-sheet regimen and routine sample collection performed on-site three times weekly. Design criteria for the primary sludge pumps are provided in Table 7-9 below:

Table 7-9: Design Criteria for Primary Sludge Pump

Primary Sludge Pumps	
Type	Diaphragm Pump (equipped with grinders)
Quantity	2
Capacity, each	35 gpm
TDH	25 psig
Motor	5 hp
Installed	2010
Primary Scum Pumps	
Type	Diaphragm Pump
Quantity	2
Capacity, each	35 gpm
TDH	25 psig
Installed	2007

7.1.3.2 Waste Activated Sludge System

The WAS system is located inside the secondary recirculation pump station and is thickened using the rotary drum thickeners prior to anaerobic digestion. The system was installed in 2008 and equipped with VFD technology. It operates under the guidance of laboratory test results, conducted three times weekly to assess sludge thickness, with a target of 0.8-1% solids concentration serving as the basis for waste determination. The system includes centrifugal pumps with dry pit configurations and mechanical seals to facilitate sludge transfer. Operational procedures entail continuous adjustments to avoid adverse effects on the activated sludge process. The system's operational parameters, including flow rates and wastage, are remotely monitored and controlled via the SCADA system. The system can sustain operations for approximately four days without wastage. Design criteria for the WAS system are provided in Table 7-10 below:

Table 7-10: Design Criteria for WAS System

WAS Pump	
Type	Vertical Non-Clog pump
Quantity	2
Capacity, each	225 gpm
TDH	16 ft
Motor	2 hp
Installed	2008

7.1.3.3 Thickening Process

The thickening process was updated in 2008, with a new thickening room added on the roof of the existing sludge thickener tank to accommodate two rotary drum thickeners (RDTs). The RDTs are operated to achieve solids concentrations in the range of 4-7% for the thickened WAS (TWAS). Polymer addition is facilitated through a dry poly-batch system. The mixing apparatus,

likely original or replaced in the 1990s, is comprised of PVC components, including a 1,000-gallon mixing tank and a corresponding 1,000-gallon day tank, with polymer batches automatically initiated when levels are low. Utilized on a daily basis, the RDT represents a transition from a dissolved air floatation thickener (DAFT) system in 2008. As a precautionary measure, system redundancy is ensured through monthly rotation of backup equipment. Design criteria for the RDTs is provided in Table 7-11 below:

Table 7-11: Design Criteria for Thickening Process

Thickening process	
Type	Rotary Drum Thickeners
Number	2
Capacity	225 gpm
Motor, each	20 hp
Installed	2008
TWAS Pumps	
Capacity	36.97 gpm
Motor	7.5 hp
Installed	2009

Polymer procurement has not posed any significant challenges, with a typical pallet lasting approximately 1.5 months and two contractors supplying dry and liquid polymer variants, namely Polydyne and BASF, respectively. Operational oversight involves adjustments to feed and polymer rates, with periodic inspections supplemented by routine lead-driven assessments. The system is primarily automated, although occasional repairs to motors, mixers, and sprayers are undertaken, with particular attention directed towards belt and bearing maintenance. To mitigate odor concerns, a louver and exhaust fan are used, operating continuously, and modulated based on temperature conditions.

7.1.3.4 Anaerobic Digesters

The plant utilizes two anaerobic digesters to treat both the primary sludge and the TWAS; digesters are equipped with floating lids. Mixing within the digesters is accomplished using recycle pumps. Both digesters operate in parallel and treat to Class B biosolids standards. Gas generated during digestion is flared using a candlestick system, with the resulting digester gas utilized for heating the boilers without the use of scrubbers, maximizing gas utilization. Cleaning of digesters occurs approximately every seven years, triggered by grit level accumulation. A preferred hydraulic retention time (HRT) of 30-35 days is targeted, with shortened HRTs leading to odor issues. The gas system includes compressors directed towards boiler heating, with spare compressors available for immediate replacement if needed. Monitoring and maintenance of the gas system are conducted regularly to ensure operational compliance. Foaming issues are managed through drainage systems and daily checks. Design criteria for the anerobic digesters are provided in Table 7-12 below:

Table 7-12: Design Criteria for Anaerobic Digesters

Anaerobic Digesters	
Number of Units	2
Active Digestion Volume, Each	39,200 ft3
Sludge Storage Volume, Each	11,800 ft3
Total, Each	51,000 ft3
Diameter	50 ft
Maximum Side Water Depth	26 ft
Side Wall Depth	34.33 ft
Effective Gas Storage Volume	21,000 ft3
Installed	1986
Recirculation Pumps	
Capacity	350 gpm
Motor	4 hp
Installed	2019
Boiler	
Capacity	50 hp
Installed	2009
Heat Exchanger	
Type	Serpentine Heat Exchangers
Capacity	1,000,000 BTU(1)/hr
Installed	2014
Gas Burner	
Capacity	66 SCFH(2)
Installed	2009

(1) BTU – British Thermal Unit
(2) SCFH – Standard cubic feet per hour

7.1.3.5 Sludge Dewatering

The sludge dewatering system operates on a centrifuge-based setup, consisting of one centrifuge, two feed pumps, two cake pumps, and a polymer addition system. Liquid polymer, sourced from totes, is used for optimal processing efficiency. The centrifuge has a capacity of 150 gpm, producing an average cake concentration of 22-23%. Typically, one polymer tote is in use while a second is kept in reserve.

The centrifuge system is elevated on a pad to mitigate flooding risks and is powered by an adjacent Motor Control Center (MCC). The system receives sludge through piping connected to two basement pumps, each equipped with suction grinders. Operating hours generally span six hours per day, with flexibility to increase as flow rates rise. Regular maintenance and alarm monitoring are performed to ensure smooth operation. Contingency plans include maintaining an inventory of spare parts and monitoring for potential issues, such as pipeline bursts, which could impact operations. Discharge procedures route dewatered sludge to a wet cake pump which discharges to a dumpster before being loaded into trucks for designated disposal at City-owned forestlands. Since late 1992, 100% of the Class B biosolids produced at the WWTP have

been beneficially utilized on forestlands owned by the Bremerton Water Utility. The biosolids are stored in three storage ponds located in the permitted application area and application occurs an average of 3-5 days a month depending on quantity. The City Forestry division manages applications and the associated infrastructure including the three storage ponds, two applicator vehicles, and one front end loader.

Design criteria for sludge dewatering equipment are provided in Table 7-13 below:

Table 7-13: Design Criteria for Sludge Dewatering

Centrifuge Feed Pump	
Capacity	200 gpm at 39 psig
Motor	40 hp
Installed	2009
Centrifuge	
Type	Centrifuge
Capacity	150 gpm
Motor	100 hp
Installed	2009
Cake pump	
Capacity	50 gpm at 66 psig
Motor	3.72 hp
Installed	2009

7.1.4 Other Processes

The WWTP has two separate odor control systems: one for the Headworks and another for the Biofilter.

7.1.4.1 Headworks Odor Control System

The headworks odor control system is a two-stage wet scrubber designed to handle hydrogen sulfide at concentrations up to 150 parts per million (ppm), targeting a 99% removal efficiency. The system utilizes 12.5% sodium hypochlorite and 50% caustic solution as the primary chemical agents for neutralizing odors. The first stage achieves 80% removal, with the second stage serving as a polishing step to achieve the removal efficiency.

The scrubber uses plastic media, last replaced approximately in 2019. Media flushing is performed annually, and inspections include diffuser checks and monthly odor measurements using handheld devices. The performance remains consistent with minimal improvements after cleaning, and the media lifespan is estimated at around two years. The scrubber operates with two 6,000-gallon hypochlorite tanks, which require delivery every 1.5 weeks in the summer, and two 1,500-gallon caustic tanks, which last about 2-3 months during the summer and all winter on a single tank. Additionally, there is a 250-gallon acid tote used for cleaning the media. Probes monitor the system's pH, with a set point of pH 10.0, and keep track of abnormal sodium

hypochlorite usage, which could indicate leaks affecting the primary system or causing issues downstream.

7.1.4.2 Biofilter Odor Control System

The biofilter odor control system consists of a single-stage wet scrubber, designed for 1 ppm hydrogen sulfide removal with a 99% efficiency target. This system draws suction from the lid of the biofilter and underdrains, as well as the splitter box, which directs primary effluent into the aeration basins. Similar to the headworks system, the scrubber relies on sodium hypochlorite and caustic chemicals for odor treatment. Chemical storage includes two 1,000-gallon sodium hypochlorite tanks and a 500-gallon caustic tank.

The wet scrubber employs plastic media that was replaced in 2014.The media is flushed annually, with no signs of plastic degradation observed. Like the headworks scrubber, this system undergoes annual inspections and monthly odor checks.

7.2 WWTP System Analysis Overview

The following sections assess the plant's current capacity and performance under 2044 projected conditions in accordance with the with the Ecology‘s Criteria for Sewage Works Design (Orange Book), and ensure compliance with or exceed the design and construction standards referenced in WAC 173-240. This assessment was carried out using the following three primary methods:

- Plant Hydraulic Analysis: A hydraulic model was developed to assess the plant’s hydraulic profile and overall capacity.
- Process Modeling Analysis: A process model was created to simulate the performance of the secondary biological process. Desktop calculations were performed to validate the model results and evaluate the capacity of other processes and major equipment directly related to the secondary process.
- Desktop Calculations: The remaining unit processes and major equipment were analyzed using desktop calculations, with their performance compared against design criteria from literature and regulatory guidelines.

Each method and its results are explained in detail in the following sections.

7.3 WWTP Hydraulic Capacity

A hydraulic model was developed using Visual Hydraulics Version 5.1 software by Innovative Hydraulics to evaluate the plant's overall hydraulic capacity. The goal of this assessment was to verify that the existing facilities can handle the design flows without overtopping the structures' walls and to confirm the proper operation of the flow split structure. The hydraulic profile was established from the headworks to the Sinclair Inlet. Field measurement data was collected by

plant operators on March 30 and May 20, 2024 and used to evaluate the current hydraulic conditions.

The hydraulic model of the existing WWTP was created based on record drawings provided by the City. Model results were then compared to field measurements. Water elevation estimates, calculated from freeboard height, were matched against the model-predicted water levels. The modeled water levels closely aligned with the field-measured data, except the following areas:

1. **Primary Clarifier (PC) Effluent Boxes:** The measured water level was 20 to 24 inches higher in PC1 and 8 to 12 inches higher in PC2. Additionally, the primary influent flow rates recorded in the DMR were unbalanced, with 47% going to PC1 and 53% to PC2. Uneven flow entry and mixing through the old screen channels may contribute to this imbalance, resulting in lower flow rates in PC1 and more severe grit accumulation along its flow path, further worsening the disparity. The outlet pipe from the PC effluent box to the primary effluent (PE) pump station wet well is also 27 feet longer on the PC1 side, which increases the likelihood of grit fouling in the outlet pipe. This fouling may further explain the greater difference between the modeled and measured water levels in PC1, highlighting potential operational issues not captured by the model.
2. **Biofilter Pump Station Wet Well:** The measured water level was 6 to 8 inches higher than the modeled level. The effluent box in this area is inaccessible, so no downstream measurements were available. Combined PE and RAS flow enters the wet well, passes through three submerged openings at the bottom of the divider wall, and exits through the effluent channel to the 42-inch aeration basin influent line. The first submerged opening is located near the pipe entrance and exit, which could cause higher headloss across the divider wall by allowing more flow through that opening. If any fine grit accumulates here, it could block the passage and increase headloss, leading to the higher water levels measured in this location.
3. **Aeration Basin Outlet Box**: The measured water level was 18 to 28 inches higher than the modeled level. The turbulent water movement and presence of air in the deep outlet box may have contributed to some of this discrepancy in measurements. Additionally, the flow velocity in the outlet pipe slows to around 1 fps under typical conditions, which could lead to grit accumulation in the pipe. This buildup might increase headloss and contribute to the higher water levels observed.
4. **Chlorine Contact Chamber Effluent Weir:** The measured water level was 7 to 11 inches higher than the modeled level. Since the effluent flow is clean, fouling on the exposed weir is not a concern. The difference may be due to elevation discrepancies from the record drawings.

Changes in elevation from the original design may have contributed to some discrepancies. To address this, it is recommended to survey key elevations and update the plant's hydraulic profile. Grit accumulation, especially in uneven structural areas, is also likely a major factor. Improvements should focus on redesigning these flow distribution areas for more balanced flow.

The model has not been calibrated for these differences yet, as these differences may be attributed to several factors:

- Higher water levels were measured in areas with sufficient remaining freeboard.
- Headloss issues may be resolved through inspection and cleaning.
- The availability of limited high-flow measurement data has precluded precise calibration.

These factors will be revisited as more data becomes available. However, the uneven flow distribution between the two primary clarifiers was simulated under future flow conditions to estimate the hydraulic conditions through PC2 at a higher proportion of the flow. The following scenarios listed in were checked to identify hydraulic bottlenecks in the plant hydraulic profile.

Table 7-14: Hydraulic Scenarios for Plant's Flow Capacity Assessment

Scenario	Summary of Operating Conditions	Purpose of Scenario
S1	• 2044 PHF = 59 MGD • Primary influent flow to PC2 = 33.6 MGD • Primary effluent flow pumped = 30 MGD • Record high tide at 127.96 ft	Assess the plant's hydraulic profile at projected PHF
S2	• Primary influent flow to PC2 = 57% of influent flow • Primary effluent flow pumped = influent flow if influent flow < 30 MGD, if not 30 MGD. • Effluent flume under submerged condition • At least 6-inch free board at chlorine contact chamber • Record high tide at 127.96 ft	Estimate the maximum flow capacity under record high tide and defined hydraulic conditions.
S3	• Primary influent flow to PC2 = 57% of influent flow • Primary effluent flow pumped = influent flow if influent flow < 30 MGD, if not 30 MGD. • Effluent flume under non-submerged condition • Record high tide at 127.96 ft	
S4	• Primary influent flow to PC2 = 57% of influent flow • Primary effluent flow pumped = influent flow if influent flow < 30 MGD, if not 30 MGD. • No overtopping or pressurized conditions through outfall pipes and manholes • Record high tide at 127.96 ft	
S5	• Primary influent flow to PC2 = 57% of influent flow • Primary effluent flow pumped = influent flow if influent flow < 30 MGD, if not 30 MGD. • Effluent flume under non-submerged condition • 22 nozzles at outfall pipe • Mean high water at 124.13 ft	Compare with the 32.4 MGD estimate from the 2008 Rerating Study where assumed: • Effluent flume under non-submerged condition • 20 nozzles at outfall pipe • Previous record high tide of 124.8 ft and 20 nozzles at the outfall pipe.

The key results of the simulated scenarios are summarized below:

- Scenario 1, the WWTP is expected to be unable to handle the projected 2044 Peak Hour Flow (PHF) at the record high tide due to:
  - Water levels overtopping walls or finish grade in secondary processes, the chlorine contact chamber, and outfall manholes/pipes.
  - Submerged conditions at the influent flumes of the primary clarifiers.
  - Approximately 1 foot of freeboard remained at the screen channels in the headworks.
- Maximum Flow Capacities Under Different Scenarios:
  - Scenario 2: 34.0 MGD to maintain at least a 6-inch freeboard at the chlorine contact chamber.
  - Scenario 3: 30.5 MGD to keep the effluent flume in non-submerged conditions.
  - Scenario 4: 23.5 MGD to prevent overtopping or pressurizing the outfall pipes and manholes.
- Scenario 5: Validates the 2008 Rerating Study findings, with the plant's maximum flow capacity estimated at 34 MGD, aligning closely with the 32.4 MGD estimated in the 2008 study.
- Outfall System as a Hydraulic Bottleneck:
  - The outfall system limits hydraulic capacity and causes constraints in upstream processes.
  - Instances of high flow exceeding rated capacities (23.5 MGD, 30.5 MGD, 34 MGD) occurred 210, 66, and 41 times, respectively, between February 2019 and December 2023.
- Operational Observations:
  - The plant's O&M team resealed manhole covers following recent storm events, highlighting the need for further investigation and repair of the outfall system to address potential leaks or pressure-related issues..
  - These storm events caused manhole covers to lift off, indicating pressurized flow or elevated water levels in the outfall piping. If pressure release points are absent, hydraulic issues could transfer upstream, potentially causing the effluent flume to become submerged.

Based on these findings, the effluent outfall is the primary hydraulic bottleneck limiting the plant’s capacity. Recommendations include:

- Conducting a thorough investigation and repair of the outfall system to address leaks and pressurization, particularly in the section between the southeast corner of the facilities and the manholes located between State Highway 3 and the State Highway 204 ramp. This includes the section from the Onsite Manhole through Manhole 1 to Manhole 2, as well as from Manhole 2 to Manhole 4.
- Implementing measures to enhance the hydraulic capacity of the outfall and improve overall WWTP performance.

The original design peak flow was 29.5 MGD, as indicated by 1986 record drawings. The 2008 Rerating Study also identified the outfall system and effluent flume as capacity bottlenecks. Historical data suggest that previous flow exceedances likely occurred during times of lower water levels in Sinclair Inlet, minimizing apparent impacts.

Given the frequency of high flow events, coupled with potential risks from severe storm conditions, addressing the hydraulic constraints in the outfall system is critical for long-term WWTP operation.

7.4 WWTP Secondary Process Performance and Capacity

A biological process simulation was performed to assess the performance of the plant's secondary process, supported by desktop calculations. A plant process model was created using BioWin Simulator Version 6.2, developed by Envirosim. The BioWin model leverages complex biological interactions to predict material transformations and pollutant removal across various processes within a plant, offering detailed insights into wastewater characteristics at each stage of treatment.

7.4.1 Process Model Calibration

The process model was configured to represent the existing WWTP processes, as shown in the Figure 7-1. Following the City's decision to remove the biofilter, which was out of use for over 10 years due to odor and performance issues, the biofilter was excluded from the secondary process capacity evaluation. Plant daily monitoring data from January 2018 through September 2023, along with additional sampling data collected between October 16 and December 18, 2023, were used to develop the detailed influent wastewater characteristics for the model.

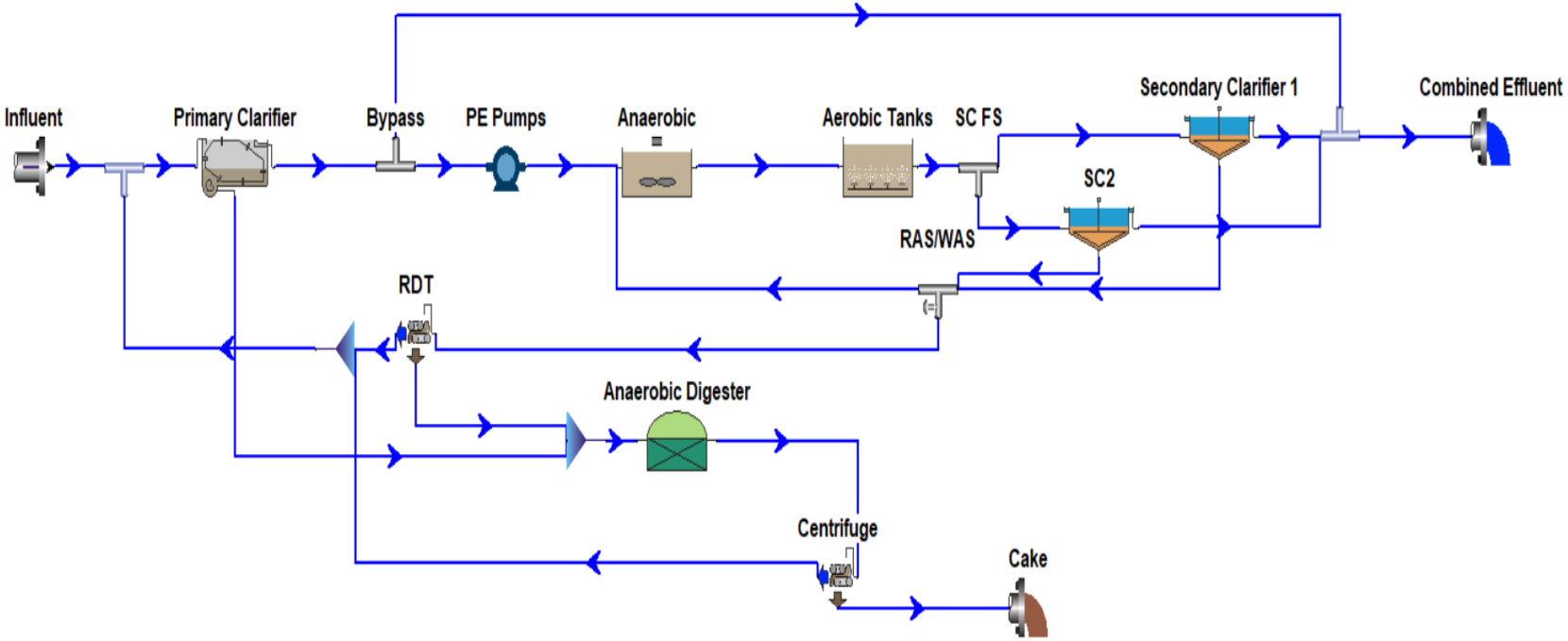


Figure 7-1: BioWin Simulator Layout for Bremerton WWTP

7.4.1.1 Existing Wastewater Characterization

An existing wastewater characterization was conducted to improve the accuracy of the biological process modeling. Additional water quality samples were collected from the plant influent from October 16 through December 18, 2023. Total Kjeldahl nitrogen (TKN) was also measured from grab samples collected from the centrate, from the centrifuge five times during the same period.

The following parameters were provided for the plant influent:

- Chemical oxygen demand (COD)
- Filtered COD (fCOD)
- 5-day carbonaceous biochemical oxygen demand ($CBOD_5$)
- Total suspended solids (TSS)
- Volatiles suspended solids (VSS)
- Total Kjeldahl nitrogen (TKN)
- Ammonia nitrogen (NH_3-N)
- Total phosphorus (TP)
- Oil and grease
- Alkalinity as calcium carbonate ($CaCO_3$).

The analytical results were used to establish ratios between normally monitored influent and effluent parameters, such as $CBOD_5$, and parameters that are not routinely monitored, but required as the inputs in process modeling, such as COD. Table 7-15 contains a list of the wastewater characteristics ratios which are used as the modeling inputs. Table 7-16 contains a summary of results from the sampling and analysis.

Table 7-15: Ratios Used to Establish BioWin Modeling Input Parameters

Parameter	Value	Source	Sampling Average	Typical
COD to $CBOD_5$	1.90[1]	Calibrated	1.75	1.9 - 2.2[2]
fCOD/COD	0.32[1]	Calibrated	0.28	0.3 - 0.5[2]
VSS/TSS	0.76	Sampling	0.76	-
NH_3-N /TKN	0.67	Sampling	0.67	0.5 - 0.8[2]
TKN/$CBOD_5$	0.20[3]	Historical	0.21	0.17 - 0.20[4]
TP/$CBOD_5$	0.022	Sampling	0.022	0.027 - 0.036[4]
Alkalinity, mg/L as $CaCO_3$	280	Sampling	280[5]	-

Notes:

(1) Adjusted to the selected value during calibration to match the biomass yield for the historical data.
(2) Typical range provided in Influent Specifier Template for raw wastewater provided by EnviroSim.
(3) Average from 2019 through 2022 historical data.
(4) Typical range estimated for raw wastewater (Table 3-18 and Table 3-21 in Metcalf & Eddy / AECOM Wastewater Engineering Treatment and Resource Recovery, 5th Ed, 2014).
(5) Average of the supplemental samples after removing the lowest and highest value.

Table 7-16: Water Quality Characteristics for Influent and Centrate from Supplemental Sampling

Influent Parameter	COD	fCOD	$CBOD_5$	TKN	NH_3-N	TP	TSS	VSS	Alkalinity
10/16/2023	-	-	-	-	23.9	-	-	-	-
10/23/2023	-	-	-	-	34.3	-	-	-	-
10/30/2023	-	-	-	-	29.8	-	-	-	-
11/6/2023	260	46	107	25	18.6	2.6	174	139	5.5
11/7/2023	230	ND	104	31	-	3.2	171	125	6.4
11/9/2023	280	58	-	34	-	3.6	-	-	10.3
11/13/2023	-	-	-	-	21.4	-	-	-	-
11/14/2023	260	32	164	33	-	3.4	185	133	11.1
11/15/2023	320	100	-	33	-	4.1	-	-	7.8
11/19/2023	-	-	124	-	-	-	181	137	-
11/20/2023	-	-	161	-	30	-	192	140	-
11/26/2023	430	100	216	40	-	4.1	262	212	17.6
11/27/2023	280	78	257	38	22.9	4.1	223	186	12.7
11/28/2023	280	70	188	42	-	4.5	247	197	20.8
12/3/2023	120	75	159	28	-	2.7	187	131	13.9
12/4/2023	-	-	-	-	18.1	-	-	-	-
12/6/2023	100	ND	68	15	-	1.8	106	73	6.2
12/10/2023	-	-	-	-	21.2	-	-	-	-
12/18/2023	-	-	-	-	22.6	-	-	-	-
Centrate	11/6/2023	11/7/2023	11/9/2023	11/14/2023	11/15/2023				
TKN	1,200	1,300	1,400	1,400	1,500				

(Unit: mg/L)

7.4.1.2 Calibration and Validation Results

The WWTP BioWin model was calibrated for the average conditions observed between April 16 and May 15, 2022. Model validation was performed by applying the calibrated model for the average conditions for November 16 and December 15, 2022 and comparing the model results to measured values. Table 7-17 summarizes a list of key calibration and validation modeling inputs and outputs.

Table 7-17: Secondary Process Modeling Calibration Results

		Calibration for April 16 to May 15, 2022			Validation for November 16 to December 15 2022		
Parameters	**Unit**	**Model**	**DMR[1]**	**% Diff.[2]**	**Model**	**DMR[1]**	**% Diff.[2]**
Model Input Parameters							
Influent Wastewater							
Flow	MGD	4.04	4.04	0.0	4.64	4.64	0.1
COD	mg/L	308	NA	-	323	NA	-
$CBOD_5$	mg/L	162	162	0.0	170	170	0.0
TSS	mg/L	211	210	0.4	211	211	0.1
VSS	mg/L	160	NA	-	190	NA	-
TKN	mg N/L	40.5	NA	-	32.0	32	0.0
Ammonia	mg N/L	27.3	27	0.0	28.5	28	0.1
TP	mg P/L	3.6	NA	-	3.8	NA	-
Alkalinity	mg/L as $CaCO_3$	280	NA	-	280	NA	-
Process							
Primary Clarifier Area	sf	10,053	10,053	0	10,053	10,053	0
Aeration Basin Volume	MG	0.83	0.83	0	0.83	0.83	0
Secondary Clarifier Area	sf	19,007	19,007	0	19,007	19,007	0
Anaerobic Digester Volume	MG	0.65	0.65	0	0.68	0.68	0
Model Operating Parameters							
Temperature	°C	14.4	14.4	0.2	13.7	13.7	0.1
AB SOTE[3]	%	26%	NA	-	26%	NA	-
RAS Flow	MGD	3.02	3.02	0.0	2.96	2.96	0.1
Aeration DO	mg/L	4.1	4.10	0.0	4.9	4.92	0.1
Model Output Parameters							
Primary Clarification							
Primary Sludge Flow	gpd	15,500	14491	7.0	14,200	13,835	2.6
TSS Removal Rate[4]	%	71%	NA	-	67%	NA	-
$CBOD_5$ Removal Rate	%	41%	NA	-	38%	NA	-
TKN Removal Rate	%	13%	NA	-	7%	NA	-
TSS	mg/L	61.3	NA	-	69.2	NA	-
$CBOD_5$	mg/L	96.4	NA	-	105.9	NA	-
TKN	mg/L	40.7	NA	-	33.0	NA	-
Aeration Basins							
SRT[5]	days	3.9	NA[5]	-	3.3	NA[5]	-
HRT	hours	4.9	NA	-	4.3	NA	-
MLSS	mg/L	1,196	1,228	2.6	1,338	1,261	6.0
MLVSS	mg/L	983	NA	-	1,127	NA	-
MLVSS/MLSS	-	0.82	0.84	2.0	0.84	0.82	2.9

Parameters	Unit	Calibration for April 16 to May 15, 2022 Model	DMR[1]	% Diff.[2]	Validation for November 16 to December 15 2022 Model	DMR[1]	% Diff. [2]
Aeration Basin DO	mg/L	4.1	4.10	0.0	4.9	4.92	0.1
Airflow[6]	scfm	1,218	NA	-	1,699	NA	-
Other Operating Parameters							
RAS TSS	mg/L	2,781	NA	-	3,418	NA	-
WAS Flow	MGD	0.09	0.09	0.6	0.099	0.09	7.6
WAS TSS	ppd	2,111	NA	-	2,822	NA	-
Secondary Effluent							
$CBOD_5$	mg/L	8.0	9.0	11.5	8.1	8.0	1.9
TSS	mg/L	12.6	11.6	8.3	12.1	12.2	1.4
pH		7.1	7.2	0.9	7.1	7.3	3.4
Ammonia		33.7	33.1	1.8	25.9	30.0	13.6
TKN		36.1	NA	-	27.8	NA	-
NO_3-N		0.0	NA	-	0.0	NA	-
Alkalinity	mg/L as $CaCO_3$	304.0	NA	-	273.2	NA	-
RDT[7]							
Thickened TSS (TS)	%	7.5%	(7.4%)	-	7.0%	(7.5%)	-
Thickened TSS	ppd	1,938	NA	-	2,622	NA	-
Thickened VSS	ppd	1,579	NA	-	2,191	NA	-
Anaerobic Digestion							
SRT (HRT)	days	35.6	NA	-	36.3	NA	-
TSS (TS)	%	2.8%	(2.5%)	-	3.3%	(3.0%)	-
VSS	%	1.5%	NA	-	1.7%	NA	-
VSS/TSS (VS/TS)	%	51.7%	(65.5%)	-	52.1%	(65.7%)	-
Gas	scfd	39,561	NA	-	50,930	NA	-
Gas/VS Fed	scf/lbs	7.3	NA	-	8.0	NA	-
VSS destruction	%	58%	NA	-	58%	NA	-
Centrifuge[8]							
Dewatered TSS (TS)	%	22%	(22%)	-	22%	(22%)	-
Cake Dry TSS	ppd	3,672	(3,229)	-	4,206	(4,829)	-
Centrate TKN	ppd	1,536	NA[9]	-	973	NA[9]	-
Centrate Flow		16,700	NA	-	16,400	NA	-

Notes:

(1) Average of the operating data for the selected period, unless otherwise noted.

(2) % Difference = (Measured Value - Modeled Value) / Measured Value x 100

(3) SOTE was assumed to be 2%/feet water depth with 13 ft submergence. SOTE provided in the product submittal by Sanitaire in 2001 indicated that the SOTE of the Type T3 strip aerators was 35.6%, assuming 13.5 ft of submergence.

(4) Historical TSS removal rate was recorded only from 3 January 2019 through 5 July 2020 and varied from 29% to 75%. In the calibration and validation, the TSS removal rates were adjusted to get a good match for MLSS, MLVSS/MLSS in the aeration basins and TS and VS/TS in the anaerobic digestion.

(5) Estimated MCRTs are provided in DMR and the average was 1.5 in 2022, calculated using the following formula: MCRT = AB MLSS inventory/(Final effluent TSS + WAS TS). Typical WAS TS can be ranged from 4,000 mg/L to 12000 mg/L and is much greater than WAS TSS per typical ranges provided for untreated activated sludge (Table 13-5 in Metcalf & Eddy / AECOM Wastewater Engineering Treatment and Resource Recovery, 5th Ed, 2014). Using WAS TSS could result in a much shorter MCRT.

(6) Typically, the plant has run two blowers. Severe air leakage was observed during the site visit for condition assessment.

(7) TSS capture rate is assumed to be 95% for RDTs.

(8) TSS capture rate is assumed to be 97% for centrifuge.

(9) TKN ranged from 1,200 to 1,500 mg/L from additional sampling grab samples

The objective of model calibration is to minimize the error between the simulator predictions and a selected data set with minimal change to model input, kinetic, and stoichiometric parameters. An acceptable calibration is achieved when simulation results are within 20% of actual values from two different data sets at steady state operating conditions. Using this criterion, an acceptable calibration was achieved using the April through May 2022 data sets. The calibration was validated against average operating conditions for separate period of November and December 2022. The calibrated parameters were used in the modeling for secondary process capacity estimation.

7.4.1.3 Limitations of BioWin Modeling

Certain aspects of biological process design are beyond the predictive capabilities of a biological process simulator, and it is not feasible to fully examine performance of a wastewater treatment facility using biological simulation alone. It should be noted that this evaluation and the process simulations may not fully account for:

- Potential for changes in sludge quality and secondary clarifier performance with changing process mean cell residence time (MCRT) and food to microorganism ratio.
- Potential for hydraulic limitations of infrastructure and capacity limitations of equipment.
- Potential for changes to digester performance due to changes in loading.
- Potential for complex chemical and biological interactions that may occur in a full-scale system, such as foaming, solids bulking, mixing limitations, tank geometry, short circuiting, poor solids distribution, and impacts to microbiology by inhibitors.

These potential impacts are beyond the scope of this evaluation or beyond the ability to predict using a biological process simulator.

7.4.2 Process Modeling and Capacity Assessment

The primary role of the secondary process at the WWTP is to remove $CBOD_5$ and TSS. Table 7-18 summarizes the average monthly effluent quality goals based on the current NPDES permit limitations on these parameters.

Table 7-18: Effluent Quality Goal

Design Criteria	Units*	NPDES Permit Requirements
$CBOD_5$ Average Monthly	mg/L	25
TSS Average Monthly	mg/L	30
pH Average Monthly		6.0 to 9.0

The current NPDES permit doesn't include any limits on nitrogen or phosphorus, but the City has made an effort to optimize nitrogen removal and planning activities required by the Puget

Sound Nutrient General Permit (PSNGP), which went into effect on January 1, 2022. The current planning doesn't include any direct improvements on the secondary process but monitoring and investigating the side-stream nitrogen load and its reduction as potential methods to reduce the total inorganic nitrogen load in the final effluent. An anaerobic selector zone was added to the existing aeration basins to improve sludge settleability. Therefore, it is recommended that the plant maintain an optimal solids retention time (SRT) range of 4 to 5 days that is sufficient for $CBOD_5$ removal while avoiding excessively long SRTs that could inhibit nitrification.

The treatment capacity of the secondary process was assessed based on the design SRT required to meet the effluent $CBOD_5$ goals. Additionally, the typical secondary clarifier operation parameters were considered to meet the TSS goal. Table 7-19 summarizes the key operation criteria used for the assessment.

Table 7-19: Operation Criteria for Secondary Process Capacity Assessment

Design Criteria	Unit	Value
Aeration Basins		
Total SRT	days	4 to 5(1)
Targeted DO Concentration in Aerobic Zone	mg/L	2 (1)(2)
Anaerobic Selector Zone Volume%		20%(3)
Process MLSS	mg/L	1,500 or 2,500(4)
Current RAS Pumping Capacity	MGD	1.7 to 5.7(5)
Secondary Clarifier		
Side Water Depth of Current Clarifiers	ft	14
Sludge Volume Index	mL/g	250(6)
Solids Loading Rate- Average	lbs/sf/day	19 to 28(7)
Solids Loading Rate- Peak	lbs/sf/day	48(7)
Surface Overflow Rate - Average	gal/sf/d	400 to 600(7)
Surface Overflow Rate – Peak	gal/sf/d	1,000 to 1,200(7)

Notes:

(1) For BOD removal, a typical SRT of 3 to 5 days is recommended, depending on the process temperature. At temperatures around 10°C, an SRT of 5 to 6 days is recommended for BOD removal only. The original SRT of the aeration basins was estimated to be 2 to 3 days when the process was designed as a contact basin following the biofilter. The equivalent SRT of the biofilter in the original design was estimated to be about 1.3 days, based on the correlation curve provided for BOD loading versus equivalent SRT for trickling filters, sourced from "Wastewater Engineering: Treatment and Resource Recovery" (5th Edition, 2014, by Metcalf & Eddy).

(2) Minimum DO at 1 mg/L is assumed to be maintained under peak day BOD loading conditions.

(3) No record drawing is available for the anaerobic zone, and the volume is assumed to be 20% of the aeration basin by roughly estimating the horizontal length of the anaerobic basin using Google Maps.

(4) Due to poor settleability, the maximum MLSS in the aeration basins is currently limited to 1,500 mg/L, which is the limit that plant operations staff currently consider feasible given high SVI. The assessment was provided for two MLSS concentrations: one for the current limit and the other at 2,500 mg/L. Typical MLSS concentration could be 3,000 to 4,000 mg/L for the Anaerobic/Oxic (A/O) process, according to Metcalf & Eddy .

(5) Historical RAS pumping rates from the recent DMR.

(6) In the last two years, the annual average SVI and the maximum monthly average SVI at the plant were 250 and 440 milliliters per gram (mL/g), respectively. The annual average SVI was assumed to assess the secondary clarifier capacity.

(7) Typical design ranges for the activated sludge process are provided. A higher range is recommended for the activated sludge process with a properly functioning selector.

Table 7-20 summarizes the operating scenarios evaluated through process modeling, along with additional scenarios used in desktop calculations to assess aeration and clarification capacity.

Table 7-20: Operating Scenarios for Modeling and Desktop Calculations

Scenario	Summary of Operating Conditions	Purpose of Scenario
Assess Existing Aeration Basin Capacity (Modeling and Desktop Calculations)		
S1	2044 MML – Most Conservative Monthly Average • Two aeration basins and two secondary clarifiers in service • Primary clarification – 46% TSS and 25% CBOD removal assumed • Lowest monthly average temperature=11.5°C • Aeration basin max MLSS at 2,500 • Desktop calculations only for S1b with MLSS at 1,300 mg/L	Determine if the SRT can reach the target of 5 days under the most conservative monthly loading condition and the lowest monthly average temperature.
S2	2044 AAL – Typical Condition • All aeration tanks in service • Annual average temperature=17°C • Aeration basin max MLSS at 2,500 mg/L • Desktop calculations only for S2b with MLSS at 1,300 mg/L	Investigate whether the SRT can be maintained at 4 days under average annual wastewater load and temperature.
S3	2044 AAL – Maintenance • One aeration basin offline • Annual average temperature=17°C • Aeration basin max MLSS at 2,500 mg/L • Desktop calculations only for S3b with MLSS at 1,300 mg/L	Assess if one aeration basin can be taken offline during maintenance while still maintaining an SRT of 4 days.
Assessment of Aeration Capacity (Desktop Calculations Only)		
S4	2044 MML • Aerobic tank DO at 2.0 mg/L • Maximum average monthly temperature=22°C	Estimate the aeration demand under MML during dry months.
S5	2044 PDL and PD DWF • Aerobic tank DO at 1.0 mg/L • Maximum average monthly temperature=22°C	Estimate the aeration demand under PDL during dry months.

Scenario	Summary of Operating Conditions	Purpose of Scenario
S6	2044 PDL and PD WWF • Aerobic tank DO at 1.0 mg/L • Average annual temperature=17°C • PE flow to secondary limited at 22.8 MGD	Estimate the aeration demand under PDL during wet months.
Assessment of Secondary Clarifier Capacity (Desktop Calculations and State Point Analysis)		
S7	2044 MM WWF • All secondary clarifiers online • MLSS = 2,500 mg/L • RAS = 5.7 MGD • SVI = 250 mL/g	Verify that the clarifiers operate within the typical operational ranges recommended for average conditions under 2044 MM WWF.
S8	2044 AAF - Maintenance • One secondary clarifier offline • MLSS = 2,500 mg/L • RAS rate = 75% of AAF • SVI = 250 mL/g	Confirm that the clarifiers operate within typical operational ranges during maintenance.
S9	22.8 MGD (Limit recommended from 2008 Rerating Study) • All secondary clarifiers online • PE flow to aeration basins = 22.8 MGD • MLSS = 1,500 mg/L • RAS = 5.7 MGD • SVI = 175 mL/g	Validate the capacity assessed in the previous study with the assumed conditions.
S10	MMF and PHF Capacity assuming • All secondary clarifiers online • MLSS = 2,500 mg/L • RAS = 5.7 MGD • SVI = 250 mL/g	Estimate the peak flow that the secondary clarifiers can handle under assumed conditions.
S11	MMF and PHF Capacity assuming • All secondary clarifiers online • MLSS = 1,300 mg/L • RAS = 5.7 MGD • SVI = 250 mL/g	Estimate the peak flow that the secondary clarifiers can handle under assumed conditions.

The results for secondary treatment capacity depend on the performance of primary clarification. Therefore, the estimated flow capacity can be increased if additional treatment capacity is added to the primary treatment. For the existing capacity assessment, no expansion was assumed for the primary clarifier. The performance of the primary clarifier was estimated based on the effluent TSS concentrations reported in DMR's for 2019 and 2020. A trace line between hydraulic retention time and primary TSS removal rates was used to determine the primary clarifier TSS and the corresponding $CBOD_5$ removal rates for each scenario. The following section summarizes the results of the secondary capacity assessment based on these scenarios.

7.4.3 Aeration Basin Capacity Assessment

Table 7-21 summarizes the results of the aeration tank capacity assessment and predicted operating and effluent conditions from the modeling. The detailed modeling results are provided in Appendix D.

Table 7-21: Summary of Aeration Basin Capacity Assessment

Parameter	Unit	S1 Design MML	S2 Design AAL	S3 Maintenance
Aeration Basin Volume, in Service	gallons	828,200	828,200	414,100
Total Design SRT	days	5.0	4.0	4.0
Anaerobic SRT	days	1.0	0.8	0.8
Aerobic SRT	days	4.0	3.2	3.2
Secondary Process HRT	hours	1.5	3.3	1.7
Estimated Observed Yield	lbs MLSS /lbs PE BOD	0.77	0.70	0.70
Max MLSS Concentration	mg/L	2,500	2,500	2,500
PE $CBOD_5$ Load Capacity at Max MLSS	lbs BOD/day	4,500	6,200	3,100
PE $CBOD_5$ Load	lbs BOD/day	9,500	6,400	6,400
PE $CBOD_5$ Concentration	mg/L	87	127	127
Corresponding Design Flow	MGD	6.2	5.8	2.9
Corresponding AAF at Capacity	MGD	2.8[(1)]	5.8	2.9
If Capacity ≥ Design Load?		No	Maybe	No
Key Outputs from Process Model[(2)]				
MLSS Concentration	mg/L	2,500	2,500	2,500
Simulated Total SRT	days	2.4	4.0	2.0
Is Modeled SRT ≥ Design SRT?		No	Yes	No
Secondary Process HRT	hours	1.5	3.2	1.6
Total Airflow Demand	scfm	2,000	1,700	1,400
Secondary Effluent CBOD	mg/L	14	12	17
Secondary Effluent Soluble CBOD	mg/L	4	2	4
Secondary Effluent TSS	mg/L	20	24	24
Secondary Effluent NH_3-N	mg/L	18	29	29
Secondary Effluent pH	-	7.0	7.1	7.1
Additional Scenarios	**Unit**	**S1b Design MML**	**S2b Design AAL**	**S3b Maintenance**
Max MLSS Concentration	mg/L	1,300	1,300	1,300
PE $CBOD_5$ Load Capacity at Max MLSS	lbs BOD/day	2,300	3,200	1,600
Corresponding Design Flow	MGD	3.2	3.0	1.5
Corresponding AAF at Capacity	MGD	1.5[(1)]	3.0	1.5
If Load Capacity at Design Load or Larger?		No	No	No

Notes:

(1) Corresponding AAF = Design MMF/(PF of MMF/AAF)

(2) Simulated for the maximum MLSS allowed.

The following summarizes the aeration basin capacity assessment:

- The existing two aeration basins will be capable of handling the design AAL if the MLSS in the basins can be increased to 2,500 mg/L, but not if MLSS is limited to 1,500 mg/L.

- The existing aeration basins can't handle the design MML or AAL during a maintenance period, even if the MLSS in the process is increased to 2,500 mg/L. The limited $CBOD_5$ treatment capacity was estimated to be 4,500 ppd at the lowest monthly average temperature and an influent MMF of 6.2 MGD, which can occur when the AAF reaches 2.8 MGD.

The assessment shows the typical SRT can't be met under AAL conditions if the MLSS is limited to 1,500 mg/L. In recent years, the aeration basins have been operated around 4 to 5 days SRT under typical load conditions and at 3 days SRT for a month or two at about 1,300 mg/L of MLSS. Therefore, they can be considered already running at treatment capacity, particularly during months with higher monthly average loads. With the plant operation team's efforts, there have been no violations in terms of $CBOD_5$, but it is becoming more challenging to adjust operational parameters to consistently meet permit requirements. Therefore, some earlier action is required to address the capacity shortage.

7.4.4 Aeration Capacity Assessment

To assess the required upgrades for the aeration system, the maximum aeration demands in the existing basins were calculated for both the design MML and PDL conditions. Aeration demand escalates with increasing water temperature, as the dissolved oxygen (DO) saturation concentration diminishes with rising temperatures. Additionally, the demand varies depending on the minimum DO concentration maintained in the aeration basins, which is dictated by the targeted SRT and water temperature. Table 7-22 summarizes the estimated aeration demand for the three selected scenarios summarized in Table 7-21 taking these factors into account.

Table 7-22: Summary of Aeration Demand Assessment

Parameter	Unit	S4 Design MML	S5 Design PDL	S6 Design PDL
Temperature	°C	22	22	17
DO in Aeration Basins	mg/L	2.0	1.0	1.0
Air Demand(1)	scfm	3,690	4,750	2,690
Aeration Capacity of Turbo Blower	cfm/each	2,655 at 7.1 psig, 2 each		
Aeration Capacity of Centrifugal Blower	cfm/each	2,500 at 8.5 psig, 1 each		
Is Existing Aeration Capacity Sufficient?		Maybe if no increase in back pressure		
Diffuser Aeration Capacity(1)	scfm/sq ft	1.43 to 7		
Airflow per Basin(2)	scfm/each	964 to 4,700		

Notes:

(1) Calculations assume a 13 ft submergence with a 2% SOTE per foot.

(2) Estimates from the Aeration System Evaluation, based on the diffuser specifications, assume a 13.5 ft submergence and a total SOTE of 35.6%.

In all three evaluated scenarios, the air demand was less than the capacity of two turbo blowers, assuming a back pressure of 7.1 psig. The plant also has an old centrifugal blower from the

1986 design. The city's aeration system evaluation indicates that supplying 964 scfm of air to one basin results in an air pressure of 6.7 psig at the top of the dropleg. Based on information from the operation team, one turbo blower is typically run at a reduced speed to maintain the DO demand in the aeration basin, switching to the centrifugal blower during storm periods or for cleaning the diffusers on the aeration tank floor. Generally, the turbo blower will trip if back pressure rises above its capacity, and the centrifugal blower can provide the same amount of air at a higher back pressure.

At the plant, a back pressure rise is expected in the following situations:

- The buried air pipe from the blower building to the aeration basin is experiencing significant air leakage, as evidenced by bubbles observed rising from water puddles during the site visit. This air loss can increase air demand, leading to a rise in back pressure.

- During storm periods, the service blower is often switched from the turbo blower to the centrifugal blower to meet the increased air demand. The rise in water levels in the aeration basin due to increased flow or reduced primary $CBOD_5$ removal can lead to an increase in air demand, resulting in higher back pressure.

- Maintenance for inspecting and cleaning the diffusers is typically recommended once a year. Instead of taking one aeration basin offline, the operation team has used the centrifugal blower to increase airflow to the aeration basin to clean the diffusers occasionally. Operators have reported that using the centrifugal blower to clean the diffusers causes the MLSS in the aeration basin to increase by about 300 mg/L, suggesting that fine grit may be causing diffuser fouling, which becomes another factor increasing back pressure in the air pipes.

- Over time, the oxygen transfer efficiency of the diffusers decreases, leading to an increased airflow requirement to meet the oxygen demand.

Resolving these issues may reduce the back pressure demand and allow the two turbo blowers to run together and meet the high demand. The final recommendations for improvement will depend on the selected upgrades for the aeration basins. Since the basins are already running at or above the estimated capacity, if new basins are added to address the capacity issues, that should be considered in determining the final improvements for air distribution and blower selection.

7.4.5 Secondary Clarifier Capacity Assessment

The capacity of the secondary clarifiers was assessed for a MMF, a maintenance scenario at AAF and a peak flow scenario. The capacity of the secondary clarifier was evaluated by comparing the SOR and SLR with the typical design limits used for an activated sludge system in secondary treatment. Additionally, a state point analysis was performed to assess how the capacity changes, especially when considering the sludge volume index (SVI).

SVI affects the treatment capacity of a secondary clarifier by indicating the settleability of the sludge. A higher SVI suggests poor settling, leading to slower sludge settling rates and potentially overloading the clarifier, reducing its capacity. Conversely, a lower SVI indicates better settling, which can improve the clarifier's capacity to handle higher flow rates or solids loading without compromising performance. State point analysis helps assess the clarifier capacity by graphically comparing the hydraulic and solids loading rates with the settling characteristics of the sludge, which are influenced by the SVI. A higher SVI indicates poorer sludge settling, shifting the settling curve down and potentially limiting the clarifier's capacity, as it may struggle to separate solids efficiently.

In the last two years, the annual average SVI and the maximum monthly average SVI at the plant were 250 and 440 mL/g, respectively, which are much higher than 175 mL/g assumed in 2008 Rerating Study to determine the capacity of the two secondary clarifiers and therefore the recommended maximum primary effluent pumped flow to the secondary process. The annual average SVI of 250 mL/g was assumed to assess the secondary clarifier capacity, but calculations were developed to confirm the rerated capacity from 2008 rerating study for validation of the calculations. The assessment results for the design conditions and validation run for 2008 Rerating Study are summarized in Table 7-23.

Table 7-23: Summary of Secondary Clarifier Capacity Assessment

Parameter	Unit	S7 Design MM WWF	S8 Design AAF	S9 2008 Rerating Study
Secondary Clarifiers, in Service	each	2	1	2
Total Surface Area	sf	19,007	9,503	19,007
Secondary Effluent Flow	MGD	13.5	6.2	22.8
RAS Flow	MGD	5.7	4.6	5.7
RAS TSS Concentration	mg/L	8,400	5,800	7,500
MLSS in Mixed Liquor	mg/L	2,500	2,500	1,500
SOR	gal/d/sf	710	650	1,200
SLR	ppd/sf	21	24	19
Is SOR within typical?		No	No	Yes
Is SLR within typical?		Yes	Yes	Yes
State point position relative to gravity flux line		Above	Touching	Below

Parameter	Unit	S10 MLSS at 2,500 mg/L		S11 MLSS at 1,300 mg/L	
Secondary Clarifiers, in Service	each	2		1	
Total Surface Area	sf	19,007		9,503	
RAS Flow	MGD	5.7		5.7	
Flow Condition	MGD	MMF	PHF	MMF	PHF
Max Capacity	MGD	10.4	10.4	13.5	24.0
RAS TSS Concentration	mg/L	7,100	7,100	4,400	6,800
SOR	gal/d/sf	550	550	710	1.260
SLR	ppd/sf	18	18	11	17
Is SOR within typical?		Yes	Yes	No	No
Is SLR within typical?		Yes	Yes	Yes	Yes
State point position relative to gravity flux line		Touching	Touching	Below	Touching

The existing two secondary clarifiers are unable to handle the design MM WWF conditions. They can only manage AAF conditions under a maintenance scenario, assuming an MLSS of 2,500 mg/L from the aeration basins and an SVI of 250 mL/g. Lowering the MLSS to 1,300 mg/L allows the clarifiers to handle 13 MGD of MMF and 24 MGD of PHF, respectively. However, reducing MLSS to increase clarifier capacity decreases the treatment capacity of the aeration basins.

The treatment capacity of the secondary clarifiers can be improved through three main strategies: adding new clarifiers, increasing RAS capacity (which has limited impact), or enhancing sludge settleability. Among these, improving sludge settleability is the most viable solution. Despite the 2009 construction of an anaerobic selector intended to improve sludge settleability, recent data indicate that settleability has deteriorated.

The anaerobic selector was designed by adding a divider wall in the aeration basin, directing wastewater from the anaerobic to the aerated zone via a weir wall. A surface-floating mixer circulates DO to the bottom, preventing true anaerobic conditions and promoting bacteria associated with sludge bulking. Additionally, high loading and reduced SRT in the aeration basin hinder the maintenance of anaerobic conditions, further impairing sludge settleability. Research shows that properly functioning anaerobic selectors can reduce SVI to 60–90 mL/g.

The key findings and recommendations are summarized as follows:

- The current secondary clarifiers are insufficient for design MM WWF conditions and depend on MLSS and SVI adjustments for AAF conditions.
- Enhancing sludge settleability is the most practical solution for increasing clarifier capacity.
- Modifications to the existing anaerobic selector should focus on achieving true anaerobic conditions by addressing DO recirculation issues.
- Future aeration basins should incorporate properly functioning anaerobic selectors to enhance sludge settleability and overall performance.

7.5 WWTP Unit Process Capacity

The capacity of the remaining major process units was evaluated through desktop calculations, comparing key design and operational parameters with typical values recommended and ranges from Wastewater Engineering: Treatment and Resource Recovery (5th Edition, 2014, by Metcalf & Eddy), as well as the requirements outlined in the WA Orange Book. The results of this assessment are provided in the following sections.

7.5.1 Headworks Screening

The WWTP currently utilizes three mechanical bar screens and two grit chambers at its headworks facility, thereby meeting the requirements for Reliability Class I according to the Orange Book. The total capacity of the three screens was designed for 48 MGD. However, this capacity must be increased to handle the 2044 PHF of 58.7 MGD to maintain the desired freeboard at the headworks and prevent overtopping. While increasing capacity is the immediate priority, addressing I/I issues in the service areas could help reduce peak flow impacts over time. However, reducing I/I will require significant time and cost, making capacity improvements the main focus at this stage.

The City is currently evaluating the replacement of two screens that are approaching 30 years of service, having been installed in 1995. The replacement project should also consider increasing the screening capacity or maximizing the capacity within the existing channel size to meet future flow demands effectively.

7.5.2 Grit Removal

The current design capacity of the grit removal system is reported to be 30 MGD under PHF conditions, as outlined in the 2008 Rerating Study. Due to grit accumulation in the anaerobic digesters and discrepancies observed in the plant's hydraulic analysis that may be attributed to

grit, the facility should consider either adding additional capacity or replacing the current system with an alternative. For wastewater mixed with CSO, grit production can range from 0.5 to 27 cf/MG, which can be up to five times higher than that of separated sewer systems. Therefore, replacing the existing system with one that offers higher grit removal efficiency for a wider range of particle sizes, even at high flow rates, could be a viable option. The estimated retention time in the existing grit chambers will be reduced further in the design PDF and PHF as summarized in Table 7-24. The cells highlighted indicate processes that surpass the existing design capacity or fall short of the typical design standards as outlined in Metcalf & Eddy or Orange Book.

Table 7-24: Grit Removal Capacity Assessment

Grit Removal Criteria	Capacity		
Type and Number	2 Aerated grit tanks		
Total Volume, cf	10,528		
Flow Condition	30 MGD[(1)]	2044 PD WWF	2044 PH WWF
Detention Time, minutes	3.8	3.4	1.9
Typical Range in Orange Book	3-5 at PDF		

Notes:

(1) Peak day flow capacity rated in 2008 Study.

7.5.3 Primary Clarifier

According to the requirements of the Orange Book, the remaining primary clarifier must be able to handle 50% of the total design flow when the largest primary clarifier is out of service. Both the SOR under this maintenance scenario at the design MMF and at the design PD WWF will be increased above the acceptable operation range provided in the Orange Book. Therefore, additional primary removal capacity needs to be added. Table 7-25 the primary removal capacity assessment.

Table 7-25: Primary Removal Capacity Assessment

Primary Removal Criteria		Capacity	
Flow Condition	20 MGD[(1)]	2044 MM WWF	2044 PD WWF
Number in Service, each		2	
Total Surface Area in Service, sf		10,053	
SOR, gal/d/sf	1,990	1,300	3,300
Typical Range in Orange Book		800-1,200 at Average 2,000-3,000 at Peak	

Notes:

(1) Maximum month flow capacity rated in 2008 Study.

7.5.4 Disinfection

According to the requirements of the Orange Book, the remaining chlorine contact chamber must be capable of handling 50% of the total design flow when the other chamber is out of service. Additionally, the contact chamber must be sized to provide a minimum detention time of 1 hour at the average design flow or 20 minutes at the peak daily flow, whichever is greater. Redundancy is also required for chlorine feed equipment.

The WWTP disinfection system meets the redundancy requirements. However, additional capacity is necessary to achieve the required detention time under peak flow conditions. Furthermore, the chemical feed pumping capacity must be expanded to meet the maximum daily demand estimated for the design PD WWF. The storage duration will be maintained at more than 2 weeks under AAF conditions but reduced to about 2 weeks under MM WWF conditions. Table 7-26 the disinfection system capacity assessment.

Table 7-26: Disinfection System Capacity Assessment

Disinfection Criteria	Capacity		
Chlorine Contact Chamber Assessment			
Flow Condition	30 MGD[1]	2044 AAF	2044 PD WWF
CCC Detention Time, min	20	101	18
Min Required in Orange Book	20	60	20
Chemical Feed System Assessment			
Flow Condition	2044 AAF	2044 MM WWF	2044 PD WWF
Chlorine Dose Assumed, mg/L	4[2]	4[2]	8.6[2,3]
Chlorine Demand, ppd	210	450	2,380
Chlorine Demand, gpd	200	430	2,290
Current Max Injection Pump Rate, gpd		760	
Demand Assumed for Odor Control System, gpd		350[4]	
Active Chlorine Storage Tank Volume Assumed, gallons		9,920[5]	
Storage Duration, days	18	13	NA
$NaHSO_3$:Cl_2 Assumed		1.6[6]	
$NaHSO_3$ Demand, ppd	330	720	3,830
$NaHSO_3$ Demand, gpd	80	180	930
Current Max Injection Pump Rate, gpd		204	
Active $NaHSO_3$ Storage Tank Volume Assumed, gallons		2,400[5]	
Storage Duration, days	30	14	NA

Notes:

(1) Peak day flow capacity rated in 2018 Study

(2) The typical chlorine dosage for secondary effluent, as stated in the Orange Book, ranges from 2 to 8 mg/L. Therefore, a dosage of 4 mg/L is assumed for estimating chlorine requirements under AAF and MMF conditions.

(3) Under the design PD WWF, only 22.8 MGD is assumed to flow to the aeration basins, while the remaining 11.1 MGD bypasses the secondary process. According to the Orange Book, the typical chlorine dosage for primary effluent ranges from 5 to 10 mg/L. The chlorine dosage for the combined flow of 22.8 MGD of secondary effluent and 11.1 MGD of primary effluent is estimated by assuming a dosage of 8 mg/L for the primary effluent.

(4) The plant typically orders 5,200 gallons of sodium hypochlorite solution every 10 days. The chlorine demand for the odor control system is estimated by subtracting the chlorine demand required for the disinfection of the historical AAF of 5.16 MGD.

(5) 80% of the total tank volume is assumed to be utilized as active storage volume.

(6) Assumed to be 10% greater than the theoretical does of 1.46 mg/L required to neutralize 1 mg/L of chlorine.

7.5.5 Solids Stream Handing Processes

The Orange Book does not prescribe specific redundancy requirements for solids stream processes, but all pumps that perform separate functions must meet the pumping redundancy requirements. The WWTP utilizes two pieces of equipment for the primary sludge pumps, WAS pumps, RDTs, and TWAS pumps, which meet the redundancy requirements. The current capacity of this equipment is sufficient to handle the anticipated production under the design loads, as summarized in Table 7-27.

Table 7-27: Solids Stream Handling System Capacity Assessment

Solids Stream Criteria	Capacity	
Load Conditions	2044 MML	2044 AAL
Primary TSS Removal Assumed, %	46%(1)	59%(1)
Primary Sludge TSS, ppd	9,400	8,800
Primary Sludge Flow, gpd	22,400(2)	21,000(2)
Primary Sludge Pump Capacity, gpd/each	50,400	
WAS TSS Production Estimated, ppd	7,500(3)	4,600(3)
WAS Flow, gpd	128,000(4)	78,000(4)
WAS Pump Capacity, gpd/each	324,000	
RDT Flow Capacity, gpd/each	324,000	
TWAS TSS Production Estimated, ppd	7,000(5)	4,200(5)
TWAS Flow, gpd	16,700(6)	10,200(6)
TWAS Pump Capacity, gpd/each	53,200	

Notes:

(1) Historical primary TSS removal rates were analyzed in relation to hydraulic retention time, and the assumed TSS removal rates were determined using the regression line derived from this correlation.
(2) The primary TSS concentration is assumed to be 5%.
(3) The estimate is calculated as the product of PE $CBOD_5$ load and the observed yield from Table 7-21.
(4) The WAS TSS concentration is assumed to be 7,000 mg/L.
(5) The TSS capture rated is assumed to be 93%.
(6) The TWAS TSS concentration is assumed to be 5%.

7.5.6 Anaerobic Digestion

The anaerobic digestion capacity is evaluated using typical design parameters from Metcalf & Eddy, as the Orange Book does not specify requirements for this process. The anaerobic digesters appear capable of handling sludge production under 2044 loading conditions, with the HRT remaining above 15 days and the volatile solids (VS) loading rate staying below the typical limits recommended for mesophilic digestion, as summarized in Table 7-28. While the existing centrifuge capacity is adequate to process the digested sludge, adding a redundant unit is recommended to enhance process reliability.

Table 7-28: Anaerobic Digestion Process Capacity Assessment

Digestion Process Criteria	Capacity	
Load Conditions	2044 MML	2044 AAL
Primary Sludge + TWAS Flow, gpd	39,100	31,200
HRT, days	20	25
Typical HRT, days	15	
Primary Sludge VS Load, ppd	6,600(1)	6,100(1)
TWAS VS Load, ppd	5,200(2)	3,400(2)
VS Loading Rate, ppd/cu.ft	0.11	0.09
Typical VS Loading Rate, ppd/cu.ft	0.15 @ 5% TS and 15 days HRT	
VS Destruction Rate	56%(3)	
Digested Sludge TS, ppd	9,700	7,700
Centrifuge Feed Flow, gpd	39,100	31,200
Centrifuge & Feed Pump Capacity, gpd	288,800	
Dewatered Biosolids TS, ppd	8,000(4)	6,300(4)

Notes:

(1) The VS to TS ratio in the primary sludge is assumed to be 0.7.

(2) The VS to TS ratio in the TWAS is assumed to match the values estimated for WAS sludge from the process modeling: 0.82 at MML and 0.79 at AAL.

(3) Typical VS destruction rate at the typical VS roading rate at 15 days of SRT, according to Metcalf & Eddy.

(4) The current TS capture rate is assumed to be 82% per process calibration modeling.

Section 8: Capital Improvement Program

This section describes the Capital Improvement Program (CIP) for the WWTP and the wastewater collection system, including recommended improvements, cost estimates developments for the CIP, and funding sources.

8.1 Basin Plans

Basin plans encompassing basin descriptions, facility information, and recommended CIP improvements are available in Appendix B. Originally created in 2014, these basin plans have been modified and updated for the current iteration and projection period of this WWCP. Since being developed as part of the 2014 WWCP update, very few of the growth-related projects in the basin plans have been completed; however, for completeness and preservation of previous project concepts that may be valuable in the future, descriptions, un-escalated project costs stemming from original analysis, and project locations are included in this WWCP in Section 8.2.5, Figure 8-1, and Appendix B respectively.

8.2 Recommended System Improvements

Improvements are presented in multiple categories below with the respective naming convention:

C = Collection System
F = Facilities and Equipment
T = Wastewater Treatment Plant
M = Operations and Maintenance
NS = New Service Areas

New Service Area: Improvements related to New Service Areas (called NS projects) were not examined as part of this 2024 WWCP update. Very few of the NS projects identified in the 2014 WWCP update have been completed and were consequently excluded from the 2024 CIP. It is anticipated that any NS projects will be financed through grants or developer contributions, ensuring no impact on the City's existing financial framework as presented in Section 8.4. The NS projects identified in the 2014 WWCP have been included for completeness in this 2024 WWCP.

8.2.1 WWTP Improvements

T1 – Centrifuge Addition

The project scope will include the installation of a secondary centrifuge unit to enhance capacity for anticipated future growth and to provide redundancy during equipment downtime. Since 2019, the treatment plant has operated with a single centrifuge unit, leading to a cessation of dewatering processes during scheduled or emergency maintenance, thereby incurring increased sludge hauling costs. Additionally, the project will incorporate a solids cake pump to

facilitate the transfer of thickened solids to the dumpster. This project is listed as WW00087.01 in the Wastewater CIP.

T2 – Boiler System Reliability Improvements

The project will entail addition of a second boiler along with a gas scrubbing system to improve the life of the boilers. A separate room will be created in the existing shop space in the digester complex to accommodate the second boiler. Additions and modifications to the existing gas piping system will need to be made for the new boiler location and the gas treatment system. This project is listed as WW00087.05 in the Wastewater CIP.

T3 – Primary Clarifier Recycle Pumps Replacement

The treatment plant uses two pumps to recycle primary clarifier contents back to headworks, drain the clarifiers, and pump down the septage receiving wet well. These pumps have been in operation since the plant's original construction in 1985 and have reached the end of their service life. T3 will involve replacing the pumps with ones of similar capacity, maintaining the vortex-style impeller to handle heavy grit contents, but transitioning from a belt-drive to a direct-drive pump/motor combination.

T4 – Headworks Screen Improvements

The project will include a structural effort to introduce finer screens and increase the size of the headworks channels for screens 1 and 2. Additionally, there will be improvements to the I&C and electrical. A washer/compactor system is included in this scope to improve the condition of the screenings being hauled away. This project is listed as WW00087.10 in the Wastewater CIP.

T5 – Odor Control Stack Reinstallation

The project will be an installation of a single, 48-inch diameter, free standing exhaust stack that will connect to the existing fans. The City has reported noticeable odors near the plant at times, and there is belief that reinstalling the discharge stacks will solve the problem by discharging the treated air at a higher elevation and facilitating dilution of any residual odors. This project is listed as WW00087.13 in the Wastewater CIP.

T6 – Primary Effluent Line Rehabilitation

The existing primary effluent line dates from the original plant construction and the material, concrete cylinder pipe, is prone to failure. This project will replace the section of piping between the primary clarifiers and the PE pumps.

T7 – Headworks Odor Control System Upgrades

At the time of this project in the 20-year CIP, the existing odor control system for the headworks will have reached the end of its useful and will need to be replaced.

T8 – Digester Improvements

The project will consist of demolition of the existing mixing system and its replacement with a new pumped mixing system. Additionally, this project also includes replacing the existing floating covers on the two digesters with fixed covers which will result in reduced odors. The existing floating covers are from the original construction and have reached the end of their useful life. This project listed as WW00020 in the Wastewater CIP.

T9 – Third Digester – Study

A study will be conducted in order to understand the impacts from installation of a third anaerobic digester. Some of the considerations in this study will address redundancy concerns, capacity and future growth, hydraulic and solids loading, process efficiency, and operational and energy considerations.

T10 – Aeration Basin Supply Piping Replacement and Improvements for Selector

This improvement will replace the existing carbon steel air piping with stainless steel pipe of the same diameter (14-inch). The existing pipe is damaged and leaking air. The piping to be replaced is located between the blower room discharge header and the connection at the gooseneck at each aeration basin. Additionally, to improve the process efficiency, the configuration of anaerobic selectors will be modified by raising up divider walls with wooden planks and demolishing one side of the divider wall. This project is listed as WW00087.02 in the Wastewater CIP.

T11 – New Aeration Basins

This improvement will consist of installation of two, new 4-stage Biological Nutrient Removal (BNR) aeration basins. It is anticipated this project will be required to meet compliance requirements due to the Nutrient General Permit.

T12 – Additional Secondary Clarifier – Study

Installation of a third secondary clarifier will be studied under this improvement project. A third clarifier was a recommendation from the hydraulic modeling of the WWTP completed with the current WWCP Update in 2024.

T13 – Grit System Upgrades

This project will include the demolition of the existing aerated grit chambers and installation of new grit chambers with new classifiers for each chamber. Modifications to the old headworks and the raw sewer line are also included. The existing lack of performance of grit chamber is resulting in overloading of grit to primary clarifiers and digester. The project will include an evaluation leading to the desired alternative, design, and construction.

T14 – Outfall Inspection

This project is study to inspect the existing WWTP outfall conditions. The outfall is original construction from the mid-1980s. The inspection results will support the City’s evaluation to replace or upgrade the existing outfall system at the Westside WWTP.

T15 – Mixing Study

This pre-design study aims to evaluate the key design parameters influencing the mixing of outfall discharge with the surrounding receiving waters at Sinclair Inlet. The findings will guide necessary outfall improvements by determining the optimal location, quantity, and size of the discharge ports.

T16 – WWTP Outfall Improvements – New Parallel Pipe to MH-4

This improvement involves potential improvements to the City's outfall system and will consist of new parallel pipe from the chlorine contact chambers effluent pipe to what is known as MH 4 in order to prevent a surcharging at upstream unit processes. The scope and feasibility of this project will depend on the findings from Project T14 (Outfall Inspection). Based on those results, the City will conduct further evaluations and studies to identify appropriate next steps. The current cost estimate is a planning-level (Class 5) estimate and is intended to support financial planning only. Additional project details will be further developed in a future phase.

T17 – WWTP Outfall Improvements – New Outfall

This project will include installation of a new deepwater outfall to replace or parallel the existing outfall. The new outfall pipe will allow discharge of larger volumes of treated wastewater. This project is expected to involve multiple technical and regulatory components, and implementation could be complex and span a longer timeframe. The scope and feasibility of this project will depend on the findings from Project T14 (Outfall Inspection). Based on those results, the City will conduct further evaluations and studies to identify appropriate next steps. The current cost estimate is a planning-level (Class 5) estimate and is intended to support financial planning only. Additional project details will be further developed in a future phase.

T18 – WWTP Disinfection System Improvements

This improvement project involves installing an additional chlorine contact chamber (CCC) for the disinfection process, along with modifications to the inlet and outlet channels. However, based on further discussions with city operations staff, converting to a UV disinfection system is the preferred approach versus adding an additional CCC due to costs and availability concerns of chemical. The costs outlined in the CIP are based on the installation of an additional CCC.

T19 – Primary Filtration Feasibility Study

This study will evaluate and make recommendations to improve the efficiency of the existing primary clarification process.

T20 – Arc Flash Testing

Arc flash testing will be done for the electrical equipment system at the treatment plant to evaluate the potential hazards from equipment arc flash and to evaluate the safety and performance of the personal protective equipment (PPE) when exposed to the intense energy of an arc flash event.

T21 – Nutrient General Permit Improvements Program

This program is an annual retainer for on-call consultant services to assist the City in navigating upcoming changes at the WWTP due to the Puget Sound Nutrient General Permit. This is listed as project WW00053 in the Wastewater CIP.

8.2.2 Collection System Improvement Projects

The locations of collection system improvement projects are shown on Figure 8-2. Additional information of these projects is available in Appendix B.

C1 – North PSIC Wastewater Improvements

Improvements in North PSIC will consist of the design and construction of new pump stations and conveyance infrastructure sized for 20-year projected build-out flows. The flow from PSIC will be pumped to existing pump station SB-3 in Gorst. The City anticipates that private or grant funding would be required for the construction of this infrastructure. A separate analysis of several alternatives for PSIC was performed and is available in Appendix H.

C2 – South PSIC Wastewater Improvements

Improvements in South PSIC will consist of the design and construction of new pumping and conveyance infrastructure to send flows generated from this area to North PSIC and Mason County. An agreement with Mason County will be required to send flow to Mason County. The City anticipates that private or grant funding would be required in the near term for the construction of this infrastructure. A separate analysis of several alternatives for PSIC was performed and is available in Appendix H.

C3 – Crosstown Pipeline Improvements – Phase 1

Improvements on the Crosstown Pipeline will consist of installing a new pipeline to the WWTP beginning near the intersection of 9th Street and Montgomery Avenue. This new pipeline will increase the overall capacity of the Crosstown Pipeline and allow for additional redundancy. Loan or grant funding would be required for the construction of this new pipeline. A separate analysis of two (2) conceptual alternatives for the new pipeline was performed and is available in Appendix G.

C4 – Crosstown Pipeline Improvements – Phase 2

After construction of Phase 1 is complete, the new pipeline will be placed online while the existing pipeline will be taken offline to undergo rehabilitation. Loan or grant funding would be required for the construction of this project. A separate analysis of two (2) conceptual alternatives for the new pipeline and rehabilitation of the existing pipeline was performed and is available in Appendix G.

C5 – Oyster Bay Sewer Basin Upgrades

This upgrade includes design and construction of low-pressure sewer systems for properties along Shorewood Drive and part of Madrona Point Drive that front Ostrich Bay which will allow the City to decommission beach sewers or convert them to dedicated force mains with no lateral connections. The properties are between pump stations OB-5 and OB-2 and OB-3 and OB-2.

Upgrading OB-2 is also part of this project and will allow the City to pump into the upland 4,000 foot, 12-inch HDPE force main installed in 2022 and abandon the existing 12-inch force main located along the bottom of Oyster Bay. The City anticipates loan funding for this work. Additionally, the City is considering extending the beach sewer decommissioning further north to OB-6 (on Navy property), which would require loan or grant funding. These projects are currently listed as individual projects in the Wastewater CIP (WW00011, W00012, and WW00065). A detailed technical memorandum is attached in Appendix I.

C6 – Central Bremerton Force Main Improvements

Sections of the Central Bremerton Force Main (CBFM) were determined to be failing in December 2023. This critical force main conveys sewage from downtown Bremerton and the east half of the Navy shipyard. This project will replace approximately 3,100 LF of the CBFM from Montgomery Avenue to the surge chamber at Gregory Way and High Avenue. The construction is funded by a grant and is listed as project WW00091 in the Wastewater CIP.

C7 – EB Beach Main Replacement (OF-4 to OF-3)

The existing beach sewer between OF-3 and OF-4 is made of 18-inch ductile and located in an intertidal zone. Metallic pipe in this type of environment is more prone to failure from corrosion. The project will replace the existing 2500 feet of metallic pipe with a plastic pipe (e.g. HDPE) to increase the longevity and reduce the potential for a sanitary sewer discharge in the marine environment. It is anticipated that this project will be loan funded and is project WW00051 in the Wastewater CIP.

C8 – EB-2 Seawall

The existing seawall supporting the EB-2 wet well and an adjacent stormwater outfall is undermining and has cracked due to wave action. This project will design and replace the wall. This is project is WW00090 in the Wastewater CIP.

C9 – Decommission Beach Sewer in Manette (OF-4 to EB-2)

The existing 1,500 LF of 8-inch sanitary sewer buried along the beach between E. 16th Street and EB-2 (next to the Manette Bridge) is very difficult to access for maintenance and the City desires to remove sanitary sewers from the marine environment when feasible. The project will construct a municipal pump station at E. 16th Street and an upland low pressure sewer system for the properties that discharge to this sewer in order to decommission this beach sewer. The design and construction of this project is loan funded and is project WW00004 in the Wastewater CIP.

C10 – Force Main Corrosion Testing

This project will assess the condition of the force mains to identify corrosion risks, including the two critical siphon mains that are located along the bottom of Port Washington Narrows between East and West Bremerton. This is project WW00006 in the Wastewater CIP.

C11 – Sewer Main Replacement and Rehab Program

This is an annually funded program for replacement or rehabilitation of sewer mains that are determined to be failing or near failure. The work may be done by City staff or a contractor. This is project WW00014 in the Wastewater CIP.

C12 – Sewer Main Replacement with Pavement Reconstruction

This is an annually funded program for replacement or rehabilitation of sewer mains determined to be failing or near failure. The work is typically done in anticipation of a future road reconstruction project or the work will require significant roadway repair. The work may be done by City staff or a contractor. This is project WW00015 in the Wastewater CIP.

C13 – Tracyton Beach Main Conversion

In order to avoid surcharging, the existing gravity sewer along Tracyton Beach Road must be maintained nearly weekly by City staff due to poor velocity and flow through the pipe. The City will convert the existing gravity sewer along this road between NW Carter Farms Ct and Gerard Place to a standard force main with two pump stations and some gravity sewer. This is project WW00036 in the Wastewater CIP and is loan-funded.

C14 – CIPP Rehabilitation Project

This is an annual program for rehabilitating sewer mains using the cure-in-place-pipe method. The work is done by a contractor and also includes video and inspection of additional mains to program for future rehabilitation projects. Typically 6,000 to 8,000 feet of pipe is rehabilitated each summer. This is project WW00003 in the Wastewater CIP.

8.2.3 Operations and Maintenance

M1 – PE Pump Room Controls Relocation/Improvements

Improvements related to the controls in primary effluent pump room are included in this project. The existing control panel is located in the same below-grade room as the PE pumps and could be exposed to flooding by sewage in the event of pump failure or a pipe break. The project will relocate the controls to a more secure location. This is project WW00072 in the Wastewater CIP.

M2 – Machinery/Equipment – Utility Operations Manager

This is an annual program for any machinery or equipment for operations and maintenance to be installed between the years 2025-2030.

M3 – Pump Station SCADA and Controls Upgrade

This is an annual program to continually improve and upgrade the SCADA system and controls at the pump stations.

M4 – Installation of Emergency Generator Program

This is an annual program to provide emergency power generation at the pump stations for resiliency.

M5 – Pump Station Improvements Program

This is an annual program to continually upgrade and improve pump stations, including pumps, electrical systems, piping, and facilities.

M6 – I&I Reduction Program

This is an annual program to reduce the I&I in the City's sewer collection through disconnection of downspouts and catch basins, lateral lining, main lining, and manhole lining. Reducing I&I will reduce flow to pump stations and the treatment plant and reduce potential for surcharges in the sewer system.

M7 – Collection System Capacity Improvements

This is an annual program and includes collection system capacity improvements due to growth for the 20-year horizon.

8.2.4 Facilities and Equipment

F1 – Installation of Emergency Generator Program

This is an annual program to provide emergency power generation at the pump stations for resiliency during power outages.

8.2.5 New Service Area Improvements

All New Service Area (NS) Improvements will be funded by developer, grant or LID. The costs of these projects have been taken from the previous 2014 comprehensive plan update (un-escalated), and do not impact the financial analysis. Due to the minimal number of NS projects completed since the adoption of the 2014 WWCP, sewer collection system or treatment plant impacts from NS projects have not been factored into their respective analyses throughout this WWCP. For clarity, these project locations are included in Appendix B.

NS-1 – NS-8 – East and West Bremerton UGA Sewerage – ULID

Kitsap County ULID funding would be used for the expansion of sewer service to the East and West Bremerton UGA areas (Marine Drive, Rocky Point, SR 304, West Hills, Trenton, Tracyton, Tracyton Beach, and Port Blakely).

NS-1 – Marine Drive

Marine Drive is a residential area that is within the City adjacent to Ostrich, Oyster, and Mud Bay. The area is mostly built-out but not served by City sewer lines. The improvements described in the plan are sub-divided into two projects described below:

NS-1A – Sewer Collection – Sub-Basin MD-1

Install approximately 6,450 LF of 6-inch low pressure main along Marine Drive and approximately 1,200 LF of 3-inch low-pressure main along South Marine Drive. Both mains would connect to approximately 450 LF of 8-inch gravity sewer to convey flow to the proposed pump station MD-2 (project NS-2C "Pump Station MD-3").

NS-1B – Sewer Collection – Sub-Basin MD-2

Install approximately 2,420 LF of 8-inch gravity sewer along Marine Drive from Dora Avenue to the proposed pump station MD-2 (project NS-2C "Pump Station MD-3"). Install approximately 1,380 of 3-inch low-pressure main along Lower Marine Drive to the 8-inch gravity sewer.

NS-2 – Rocky Point

Rocky Point is an unsewered area north of the City and is part of the West Bremerton Urban Growth Area (UGA) which could become part of the City in the future. The improvements described in the plan are sub-divided into eight projects described below:

NS-2A – Phinney Bay Extension (Sub-Basin RP-3)

Install approximately 4,600 LF of 8-inch sewer main along NW Phinney Bay Drive, Jackson Drive, Cloward Way, and Cartier Drive. This project would extend sewer service and eliminate failing septic systems to meet total maximum daily load (TMDL) compliance. The PB-1 pump station capacity should be evaluated based on the additional flows from this project and project NS-2F "Jackson Drive to Corbet Drive (Sub-Basin RP-3)".

NS-2B – Pump Station MD-2

Construct pump station MD-2 near Marine Drive and Kelly Road to convey flows from the Marine Drive and Rocky Point service areas east to the Callow Basin via approximately 6,000 LF of 12-inch force main. One potential discharge location is into an existing 30-inch sewer main at 11th Street and Meade Avenue. A preliminary estimate of the pump station capacity is 1,620 gpm based on projected flows in the service area. An estimated 6,100-gallon wet well volume would be needed.

NS-2C – Pump Station MD-3

Construct pump station MD-3 along Rocky Point Road near Holly Beach Court to convey sewer flow from sub-basins RP-1 and RP-2 south to MD-2 via approximately 2,400 LF of 10-inch force main. A preliminary estimate for the pump station capacity is 1,050 gpm at 120-feet of TDH based on projected flows in the sub-basins. An estimated 4,000-gallon wet well volume would be needed.

NS-2D – Sewer Collection in Sub-Basin RP-1

Install approximately 2,800 LF of 10-inch gravity main along Rocky Point Road from Brygman Street to Chrey Lane to collect sewer flows from sub-basin RP-1. This project would connect to a proposed gravity main installed in project NS-2F "Jackson Drive to Corbet Drive (Sub-Basin RP-3)".

NS-2E – Sewer Collection – Sub-Basin RP-2

Install approximately 2,200 LF of 12-inch gravity main along Rocky Point Road from Chrey Lane to proposed pump station MD-3 and approximately 2,800 LF of 8-inch gravity sewer along Rocky Point Road from 19th Street to MD-3 to convey sewer flows from sub-basins RP-1 and RP-2. Construct in conjunction with project NS-2C "Pump Station MD-3".

NS-2F – Jackson Drive to Corbet Drive (Sub-Basin RP-3)

Install approximately 2,200 LF of 8-inch gravity sewer from Jackson Drive to Corbet Drive along an easement. The central part of sub-basin RP-6 will flow by low pressure sewer (LPS) to the City's existing sewers along Corbet Drive or proposed gravity sewers along Morgan Road to pump station PB-1.

NS-2G – Sewer Collection – Sub-Basin RP-4

Install approximately 900 LF of 8-inch gravity sewer along Shamrock Road and 1,000 LF of 12-inch gravity sewer along Kelly Road to the proposed pump station MD-2 to convey sewer flow from sub-basins RP-3 and RP-4. Pump station MD-3 pumps through a 10-inch force main which discharges to a 12-inch gravity sewer conveying flow to the proposed pump station MD-2. Construct in conjunction with project NS-2B "Pump Station MD-2".

NS-2H – Sewer Collection – Sub-Basin RP-5

Approximately 4,500 LF of 8-inch gravity sewers would be installed along 18th Street, Bertha Avenue, and Rocky Point Road to the 8-inch gravity sewer along Marine Drive that would be installed in project NS-1B "Sewer Collection – Sub-Basin MD-2".

NS-3 – SR 304 Area

A portion of the SR 304 service area is currently sewered and referred to as Sewer District 1. This project would expand sewer service to the remainder of the SR 304 service area utilizing the existing 12-inch gravity sewer main parallel to SR 3. Approximately 9,420 LF of 8-inch gravity sewer would be installed along Sherman Heights Road, Kent Avenue, and Viking Street to extend sewer service. Grinder pumps and low-pressure sewer mains could be implemented where gravity conveyance is not possible.

NS-4 – West Hills – Ostrich Bay Extension

The West Hills service area is located in the West Bremerton UGA just west of KCSD No. 1 between Dyes and Sinclair Inlet.

NS-4A – Ostrich Bay Extension

The Ostrich Bay Extension project would extend sewer service to an area within West Hills between Harlow Drive and Werner Road and would eliminate failing septic systems to meet TMDL compliance. This project would allow for sewer conveyance, as described in the West Hills service area plan, by installing approximately 2,900 LF of 18-inch gravity sewer along Harlow Drive from Price Road to Sunnyhill Road and 5,800 LF of 8-inch gravity sewer south of Harlow Drive along Sunnyhill Road, Ida Street, and Broad Street.

NS-4B – North Extension

This project would allow for sewer conveyance, as described in the West Hills service area plan, by installing approximately 3,350 LF of 8-inch sewer along Price Road to connect to the existing sewer main on 6th Street.

NS-5 – Trenton

The Trenton service area is within the East Bremerton UGA. The improvements described in the plan have been sub-divided into nine projects.

NS-5A – Pump Station TA-1

Construct pump station TA-1 at the northern end of Bahia Vista Drive to convey sewer flow from sub-basin TRT-2 to Sylvan Way and Olympus Drive via approximately 6,400 LF of 6-inch force main. A preliminary estimate of the pump station capacity is 350 gpm at 500-feet of TDH based on projected flows in the sub-basins. An estimated 1,350-gallon wet well volume would be needed.

NS-5B – Pump Station TA-2

Construct pump station TA-2 in the vicinity of Helm Street and Trenton Avenue to convey sewer flow from sub-basin TRT-4, 5, and 6. A preliminary estimate of the pump station capacity is 1,350 gpm at 210-feet of TDH based on the projected flows in the sub-basins. An estimated 5,000-gallon wet well volume would be needed. Install approximately 3,900 LF of 10-inch force main along Sheridan Road to discharge into the Cherry Avenue Basin in the vicinity of Schley Boulevard and Sheridan Road. Install a new gravity sewer along Sheridan Avenue, Cherry Avenue, Callahan Drive, and Wheaton Way with approximately 4,800 LF of 18-inch gravity main to provide conveyance for flows from TA-2 through the Cherry Avenue Basin to the East Bremerton beach main.

NS-5C – Pump Station TA-3

Construct pump station TA-3 along Enetai Beach Drive to convey sewer flow from sub-basin TRT-1. A preliminary estimate of the pump station capacity is 900 gpm at 230-feet of TDH based on the projected flows in the sub-basins. An estimated 3,300-gallon wet well volume would be needed. Install approximately 3,900 LF of 8-inch force main along Enetai Beach Road and Holman Street to convey flow to Perry Avenue.

NS-5D – Pump Station TA-4

Construct pump station TA-4 in the vicinity of Forest Drive and Ivy Road to convey sewer flow from sub-basin TRT-7. A preliminary estimate of the pump station capacity is 350 gpm at 35-feet of TDH based on the projected flows in the sub-basins. An estimated 500-gallon wet well volume would be needed. Install approximately 700 LF of 4-inch force main along Ivy Road to convey flow to a new gravity main on Olympus Drive.

NS-5E – Sewer Collection – Sub-Basin TRT-1

Install approximately 4,200 LF of 8-inch gravity sewer from 30th Street along Enetai Beach Drive to proposed pump station TA-3 and along Holman from Trenton Avenue to Enetai Beach Road. Construct in conjunction with project NS-5C “Pump Station TA-3”.

NS-5F – Sewer Collection – Sub-Basin TRT-2

Install approximately 8,200 LF of 8-inch gravity sewer in sub-basin TRT-2 along 30th Street, Ridgeview Drive, and Bahia Vista Drive to convey flow to proposed pump station TA-1. Construct in conjunction with project NS-5A “Pump Station TA-1”.

NS-5G – Sewer Collection – Sub-Basin TRT-4

Install approximately 4,400 LF of 8-inch gravity sewer along 30th Street from Hillside Drive to Trenton Avenue and between Trenton Avenue and Perry Avenue from Franklin Street to Helms Street. Install approximately 3,400 LF of 10-inch gravity sewer along Trenton Avenue from Sylvan Way to the proposed pump station TA-2. Construct in conjunction with project NS-5B “Pump Station TA-2”.

NS-5H – Sewer Collection – Sub-Basin TRT-6

Install approximately 5,400 LF of 8-inch gravity sewer along Forest Drive from Ivy Road to Warner Street and along Olympus Drive from Ivy Road to Warner Street. Install approximately 4,500 LF of 10-inch gravity sewer along Perry Avenue from Sylvan Way to TA-2.

NS-5I – Sewer Collection – Sub-Basin TRT-7

Install approximately 3,900 LF of 8-inch gravity sewer along Olympus Drive and Clemens Street to Forest Drive and along Forest Drive from Riddell Road to Ivy Road and connect to TA-4. Construct in conjunction with project NS-5D “Pump Station TA-4”.

NS-5J – Sewer Collection – Sub-Basin TRT-8

Install approximately 4,500 LF of 8-inch gravity sewer along Windermere Drive, Clemens Street, and Ivy Road to convey flow into the existing sewer collection system west of Petersville Road and along Olympus Drive to convey flow to a new gravity sewer along Sylvan Way.

NS-6 – Tracyton

The Tracyton service area is within the East Bremerton UGA. The improvements described in the plan have been sub-divided into four projects.

NS-6A – Pump Station TB-1

Construct pump station TB-1 in the vicinity of Riddell Road and Naomi Avenue to convey sewer flow from sub-basins TRC-3 and TRC-4. TRC-4 is a low-pressure sewer area that would utilize grinder pumps to convey flow into the proposed pump station TB-1. Install approximately 1,400 LF of 6-inch force main along Riddell Road from Naomi Avenue to Tracyton Beach Road and connect to a proposed 10-inch gravity sewer as part of project NS-6D “Sewer Collection- Sub-Basin TRC-2”. A preliminary estimate of the pump station capacity is 350 gpm at 130-feet of TDH based on the projected flows in the sub-basins. An estimated 1,350-gallon wet well volume would be needed.

NS-6B – Pump Station TB-2

Construct pump station TB-2 along Tracyton Beach Road to convey sewer flow from sub-basinsTRC-2, 3 and 4. A preliminary estimate of the pump station capacity would be 700 gpm at 95-feet of TDH based on the projected flows in the sub-basins. An estimated 2,650 gallons wet well volume would be needed.

Install approximately 1,200 LF of 8-inch force main from the proposed pump station to the existing 8-inch ductile iron pressure gravity main on Tracyton Beach Road that would be converted into a force main. The additional flows from TB-2 are projected to exceed the capacity of pump station EB-6 and pumping upgrades to the pump station may be considered if and when needed.

NS-6C – Tracyton Beach Road Main Conversion

The existing 8-inch ductile iron main along Tracyton Beach Road would be converted to a force main for the TB-2 pump station. Gravity connections to the existing main would be disconnected. A small package pump station would be installed to convey flow from services along Sulphur Springs Lane to pump station TB-2 and from services north of Sheridan Road to EB-6. Grinder pump stations for private properties may also be installed once the existing sewer main is converted to a force main.

NS-6D – Sewer Collection – Sub-Basin TRC-2

Install approximately 3,100 LF of 10-inch gravity sewer along Tracyton Beach Road from Riddell Road to the proposed pump station TB-2 (project NS-6B “Pump Station TB-2”). Install approximately 5,200 LF of 8-inch gravity sewer along Riddell Road from Pine Road to Tracyton Beach Road and along Essex Road to Tracyton Beach Road. This project would extend gravity sewer to sub-basin TRC-2.

NS-6E – Sewer Collection – Sub-Basin TRC-4

Approximately 1,900 LF of 8-inch gravity sewer would be installed along Pinecone Drive to extend gravity sewer to a residential area that is not currently sewered.

NS-7 – Tracyton Beach

The Tracyton Beach service area is within the East Bremerton UGA. Sewer service would be extended to the remaining unsewered portion of the service area by installing approximately 1,200 LF of 8-inch gravity sewer along Alta Drive.

NS-8 – Port Blakely Connection

A proposed development in the Port Blakely service area would require additional sewer conveyance facilities to provide sewer service. A pump station within the development and force main would be installed to convey flow south of Kitsap Lake to KL-2. The capacity of the Kitsap Lake main is limited in capacity and pumping flow directly to KL-2 would avoid upgrades to KL-3, KL-4, and the lake main. This project would be developer funded. No cost estimate is developed at this time because there is no defined plan for development at the property. This project is a placeholder.

Figure 8-1 below shows the opinion of probable project cost for the NS projects described above. As previously mentioned, NS project funding is anticipated from sources other than funding or loans serviced by the City, and subsequently the below costs have no impact on the CIP funding analysis described in Section 8.4.

Project Number	Location	Project	Opinion of Probable Project Cost	2035	2036	2037	2038	2039	2040	Beyond 2040
NS-1- NS- 8		East & West Bremerton UGA Sewerage – ULID (5)	$ 4,050,000		$ 50,000	$ 2,000,000	$ 2,000,000			$ -
NS-1A	Marine Drive	Sewer Collection - Sub Basin MD-1	$ 2,550,000							$ 2,550,000
NS-1B		Sewer Collection - Sub Basin MD-2	$ 1,320,000							$ 1,320,000
NS-2A	Rocky Point	Phinney Bay Extension (Sub Basin RP-3)	$ 1,960,000		$ 290,000	$ 1,670,000				$ -
NS-2B		Pump Station MD-2	$ 4,730,000							$ 4,730,000
NS-2C		Pump Station MD-3	$ 2,830,000							$ 2,830,000
NS-2D		Sewer Collection - Sub Basin RP-1	$ 1,220,000							$ 1,220,000
NS-2E		Sewer Collection - Sub Basin RP-2	$ 2,180,000							$ 2,180,000
NS-2F		Jackson to Corbet Drive (Sub Basin RP-3)	$ 830,000			$ 120,000	$ 710,000			$ -
NS-2G		Sewer Collection - Sub Basin RP-4	$ 820,000							$ 820,000
NS-2H		Sewer Collection - Sub Basin RP-5	$ 1,910,000				$ 290,000	$ 810,000	$ 810,000	$ -
NS-3	SR 304	SR 304 Sewer Collection	$ 4,280,000							$ 4,280,000
NS-4A	West Hills	Ostrich Bay Extension	$ 3,720,000				$ 560,000	$ 1,580,000	$ 3,720,000	$ -
NS-4B		North Extension	$ 1,450,000							$ 1,450,000
NS-5A	Trenton	Pump Station TA-1	$ 6,100,000							$ 6,100,000
NS-5B		Pump Station TA-2	$ 9,480,000							$ 9,480,000
NS-5C		Pump Station TA-3	$ 6,000,000							$ 6,000,000
NS-5D		Pump Station TA-4	$ 2,760,000							$ 2,760,000
NS-5E		Sewer Collection - Sub Basin TRT-1	$ 1,630,000							$ 1,630,000
NS-5F		Sewer Collection - Sub Basin TRT-2	$ 3,290,000							$ 3,290,000
NS-5G		Sewer Collection - Sub Basin TRT-4	$ 3,370,000							$ 3,370,000
NS-5H		Sewer Collection - Sub Basin TRT-6	$ 4,200,000							$ 4,200,000
NS-5I		Sewer Collection - Sub Basin TRT-7	$ 1,520,000							$ 1,520,000
NS-5J		Sewer Collection - Sub Basin TRT-8	$ 1,840,000							$ 1,840,000
NS-6A	Tracyton	Pump Station TB-1	$ 3,620,000							$ 3,620,000
NS-6B		Pump Station TB-2	$ 4,690,000		$ 460,000	$ 1,280,000	$ 1,280,000			$ 1,670,000
NS-6C		Tracyton Beach Rd Main Conversion	$ 1,580,000		$ 240,000	$ 670,000	$ 670,000			$ -
NS-6D		Sewer Collection - Sub Basin TRC-2	$ 3,500,000							$ 3,500,000
NS-6E		Sewer Collection - Sub Basin TRC-4	$ 740,000							$ 740,000
NS-7	Tracyton Beach	Tracyton Beach Sewer Collection	$ 580,000							$ 580,000
NS-8	Port Blakely	Port Blakely Connection	$ 2,730,000							$ 2,730,000

Figure 8-1: New Service Area Improvements

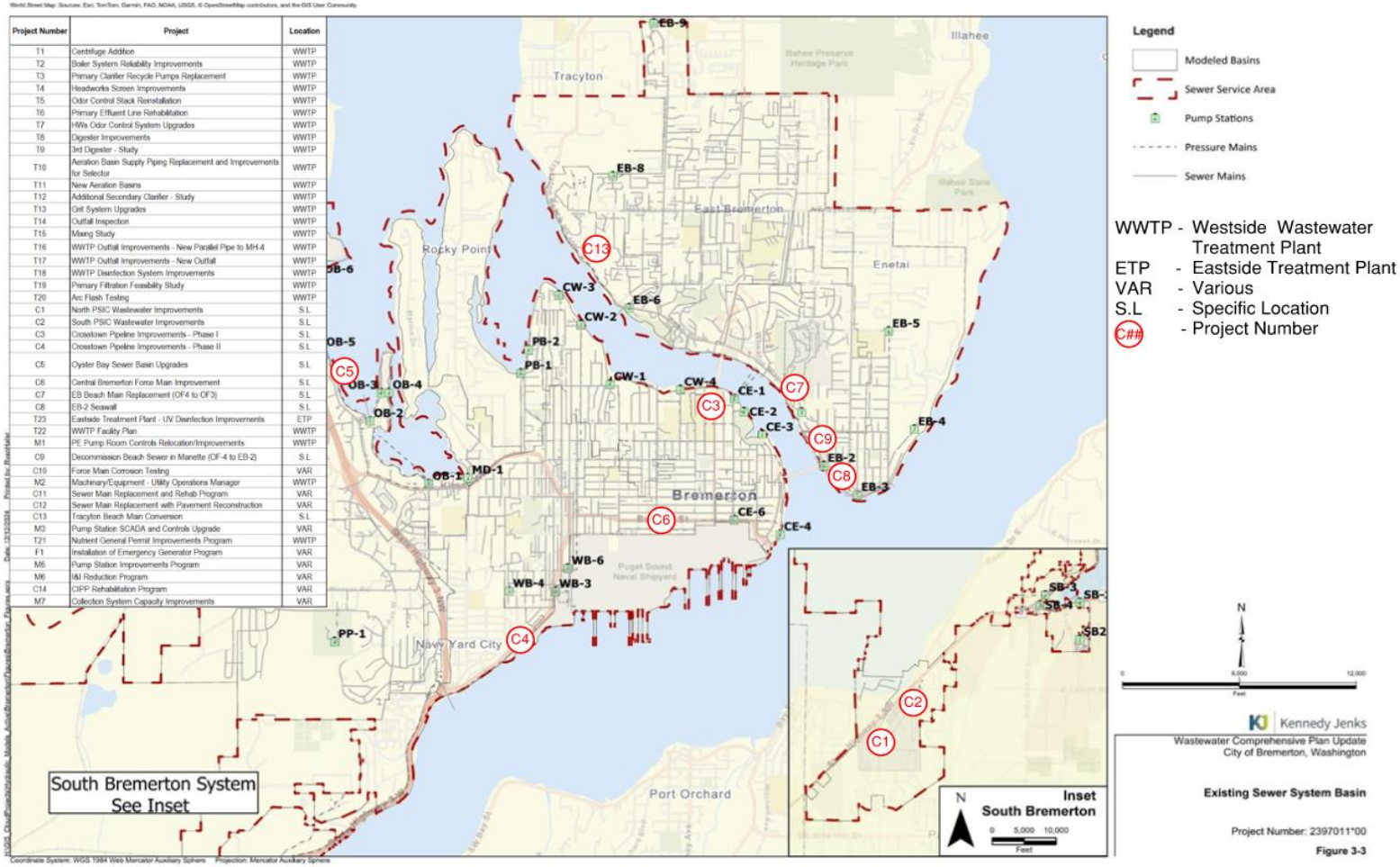


Figure 8-2: Collection System Improvement Projects

8.3 Project Prioritization

The risk scores developed as described in Chapter 4 of this WWCP update were leveraged in part to guide the prioritization of recommended improvements. The correlation between developed risk scores and identified areas for improvement can be seen in Figure 8-3. Some program-based recommendations are apparent through the entire collection system and are not assigned a specific asset area, including C11-C13, and M1-M7.

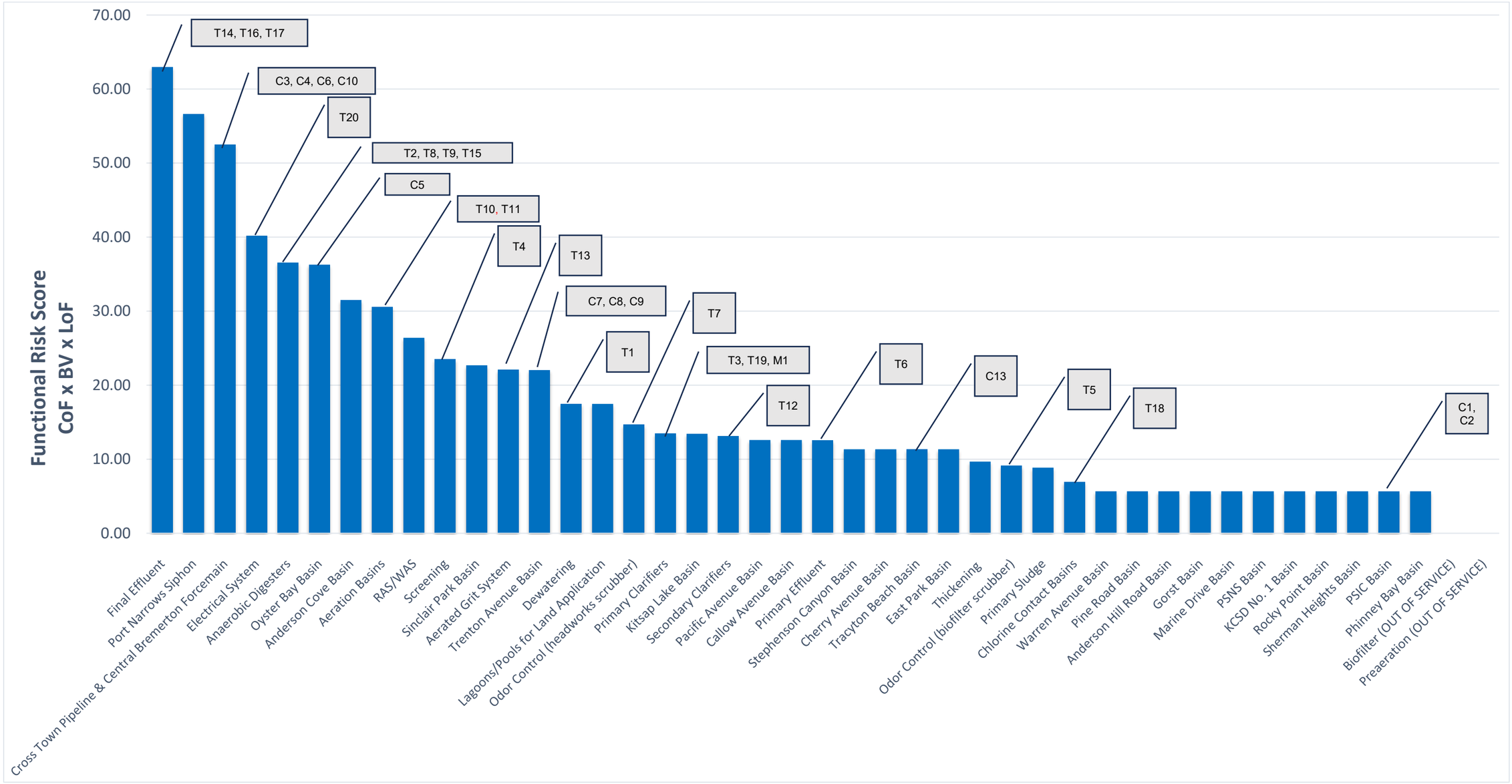


Figure 8-3: System Risk Evaluation and Identified CIP Improvements

8.4 CIP Development and Cost Estimates

The 20-year CIP schedule summary shown in Figure 8-4 below was developed to address infrastructure needs to meet growth, environmental regulations, and improvements in existing operations and reliability. Costs for each project are based on engineering estimates and actual costs from similar engineering and construction work. Costs include a construction contingency of 30% as well as allowances for engineering, construction management, owner's administration (where applicable), permitting, startup, taxes, administrative fees, and contractor overhead & profit. Estimated costs are in 2024 dollars and based on Engineering News Record (ENR) material and building cost indexes.

Analogous Project - 2025-2030 City CIP	Project Number	Project	Location	Replacement	Upgrade	New	Opinion of Probable Project Cost[1]	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044
WW00087.01	T1	Centrifuge Addition	WWTP		☑		$ 1,400,000		$ 1,400,000																		
WW00087.05	T2	Boiler System Reliability Improvements	WWTP		☑		$ 2,478,000		$ 2,478,000																		
	T3	Primary Clarifier Recycle Pumps Replacement	WWTP	☑			$ 476,000							$ 476,000													
WW00087.10	T4	Headworks Screen Improvements	WWTP		☑		$ 2,410,000			$ 2,410,000																	
WW00087.13	T5	Odor Control Stack Reinstallation	WWTP	☑			$ 391,000	$ 391,000																			
	T6	Primary Effluent Line Rehabilitation	WWTP	☑			$ 1,000,000		$ 1,000,000																		
	T7	HWs Odor Control System Upgrades	WWTP			☑	$ 2,344,000															$ 1,172,000	$ 1,172,000				
WW00020	T8	Digester Improvements	WWTP		☑		$ 7,993,000															$ 1,789,000	$ 3,000,000	$ 3,204,000			
	T9	3rd Digester - Study	WWTP			☑	$ 300,000														$ 300,000						
WW00087.02	T10	Aeration Basin Supply Piping Replacement and Improvements for Selector	WWTP	☑			$ 413,000		$ 413,000																		
	T11	New Aeration Basins	WWTP			☑	$ 60,459,000									$ 4,000,000	$ 18,820,000	$ 18,820,000	$ 18,819,000								
	T12	Additional Secondary Clarifier - Study	WWTP			☑	$ 200,000														$ 200,000						
WW00087.09	T13	Grit System Upgrades	WWTP		☑		$ 8,707,000										$ 2,902,000	$ 2,902,000	$ 2,903,000								
	T14	Outfall Inspection	WWTP				$ 250,000	$ 250,000																			
	T15	Mixing Study	WWTP				$ 250,000	$ 250,000																			
	T16	WWTP Outfall Improvements - New Parallel Pipe to MH-4	WWTP		☑		$ 2,649,000		$ 2,649,000																		
	T17	WWTP Outfall Improvements - New Outfall	WWTP			☑	$ 20,924,000							$ 6,975,000	$ 6,975,000	$ 6,974,000											
	T18	WWTP Disinfection System Improvements	WWTP		☑		$ 7,027,000																	$ 2,342,000	$ 2,342,000	$ 2,343,000	
	T19	Primary Filtration Feasibility Study	WWTP		☑		$ 200,000																			$ 200,000	
	T20	Arc Flash Testing	WWTP		☑		$ 700,000						$ 700,000														
	C1	North PSIC Wastewater Improvements	S.L				$ 50,000,000													$ 5,000,000	$ 15,000,000	$ 15,000,000	$ 15,000,000				
	C2	South PSIC Wastewater Improvements	S.L			☑	$ 16,600,000	$ 500,000	$ 1,100,000										$ 2,000,000	$ 6,500,000	$ 6,500,000						
	C3	Crosstown Pipeline Improvements - Phase I	S.L			☑	$ 13,000,000							$ 6,500,000	$ 6,500,000												
	C4	Crosstown Pipeline Improvements - Phase II	S.L		☑		$ 7,000,000								$ 3,500,000	$ 3,500,000											
WW00011 + WW00012 + WW00065	C5	Oyster Bay Sewer Basin Upgrades	S.L		☑		$ 5,500,000	$ 100,000	$ 300,000	$ 3,100,000	$ 2,000,000																
WW00091	C6	Central Bremerton Force Main Improvement	S.L		☑		$ 7,200,000	$ 7,200,000																			
WW00055	C7	EB Beach Main Replacement (OF4 to OF3)	S.L				$ 1,700,000					$ 300,000	$ 1,400,000														
WW00090	C8	EB-2 Seawall	S.L		☑		$ 700,000		$ 200,000	$ 300,000	$ 200,000																
	T23	Eastside Treatment Plant - UV Disinfection Improvements	ETP		☑		$ 4,000,000	$ 1,000,000	$ 3,000,000																		
	T22	WWTP Facility Plan	WWTP			☑	$ 500,000	$ 500,000																			
WW00072	M1	PE Pump Room Controls Relocation/Improvements	WWTP		☑		$ 1,500,000				$ 1,500,000																
WW00004	C9	Decommission Beach Sewer in Manette (OF-4 to EB-2)	S.L		☑		$ 5,212,000	$ 4,170,000	$ 1,042,000																		
WW00006	C10	Force Main Corrosion Testing	VAR			☑	$ 200,000	$ 200,000																			
WW00009	M2	Machinary/Equipment - Utility Operations Manager	WWTP			☑	$ 300,000	$ 50,000	$ 50,000	$ 50,000	$ 50,000	$ 50,000	$ 50,000														
WW00014	C11	Sewer Main Replacement and Rehab Program	VAR	☑			$ 5,000,000	$ 250,000	$ 250,000	$ 250,000	$ 250,000	$ 250,000	$ 250,000	$ 250,000	$ 250,000	$ 250,000	$ 250,000	$ 250,000	$ 250,000	$ 250,000	$ 250,000	$ 250,000	$ 250,000	$ 250,000	$ 250,000	$ 250,000	$ 250,000
WW00015	C12	Sewer Main Replacement with Pavement Reconstruction	VAR	☑			$ 6,000,000	$ 300,000	$ 300,000	$ 300,000	$ 300,000	$ 300,000	$ 300,000	$ 300,000	$ 300,000	$ 300,000	$ 300,000	$ 300,000	$ 300,000	$ 300,000	$ 300,000	$ 300,000	$ 300,000	$ 300,000	$ 300,000	$ 300,000	$ 300,000
WW00036	C13	Tracyton Beach Main Conversion	S.L	☑			$ 4,400,000	$ 4,400,000																			
WW00029	M3	Pump Station SCADA and Controls Upgrade	VAR		☑		$ 3,300,000	$ 300,000	$ 300,000	$ 300,000	$ 300,000	$ 300,000	$ 300,000	$ 300,000	$ 300,000	$ 300,000	$ 300,000	$ 300,000	$ 300,000	$ 300,000	$ 300,000	$ 300,000	$ 300,000	$ 300,000	$ 300,000	$ 300,000	$ 300,000
WW00053	T21	Nutrient General Permit Improvements Program	WWTP			☑	$ 500,000	$ 100,000	$ 100,000	$ 100,000	$ 100,000	$ 100,000															
WW00077	F1	Installation of Emergency Generator Program	VAR			☑	$ 600,000	$ 100,000	$ 100,000	$ 100,000	$ 100,000	$ 100,000	$ 100,000														
WW00042	M5	Pump Station Improvements Program	VAR		☑		$ 6,000,000	$ 300,000	$ 300,000	$ 300,000	$ 300,000	$ 300,000	$ 300,000	$ 300,000	$ 300,000	$ 300,000	$ 300,000	$ 300,000	$ 300,000	$ 300,000	$ 300,000	$ 300,000	$ 300,000	$ 300,000	$ 300,000	$ 300,000	$ 300,000
	M6	I&I Reduction Program	VAR	☑			$ 5,000,000	$ 250,000	$ 250,000	$ 250,000	$ 250,000	$ 250,000	$ 250,000	$ 250,000	$ 250,000	$ 250,000	$ 250,000	$ 250,000	$ 250,000	$ 250,000	$ 250,000	$ 250,000	$ 250,000	$ 250,000	$ 250,000	$ 250,000	$ 250,000
WW00003	C14	CIPP Rehabilitation Program	VAR	☑			$ 9,750,000	$ 750,000	$ 750,000	$ 750,000	$ 750,000	$ 750,000	$ 750,000	$ 600,000	$ 600,000	$ 600,000	$ 600,000	$ 600,000	$ 250,000	$ 250,000	$ 250,000	$ 250,000	$ 250,000	$ 250,000	$ 250,000	$ 250,000	$ 250,000
	M7	Collection System Capacity Improvements	VAR		☑		$ 4,400,000										$ 400,000	$ 400,000	$ 400,000	$ 400,000	$ 400,000	$ 400,000	$ 400,000	$ 400,000	$ 400,000	$ 400,000	$ 400,000
		Totals					$ 278,933,000	$ 21,361,000	$ 15,982,000	$ 8,210,000	$ 6,100,000	$ 2,700,000	$ 4,400,000	$ 15,951,000	$ 18,975,000	$ 16,474,000	$ 24,122,000	$ 24,122,000	$ 25,472,000	$ 13,250,000	$ 23,750,000	$ 19,711,000	$ 20,922,000	$ 7,296,000	$ 4,092,000	$ 4,293,000	$ 1,750,000

Figure 8-4: 20-Year CIP Schedule

8.5 Financial Plan

This section was prepared by FCS to provide a financial program that allows the City of Bremerton wastewater utility to remain financially viable during the planning period. This financial viability analysis considers the historical financial condition, current and identified future financial and policy obligations, operation and maintenance needs, and the financial impacts of the capital projects identified in this Wastewater Comprehensive Plan. Furthermore, this chapter provides a review of the wastewater utility's current rate structure with respect to rate adequacy and customer affordability.

8.5.1 Past Financial Performance

This section includes a historical summary of financial performance as reported by the City, including fund resources and uses arising from cash transactions.

8.5.1.1 Comparative Financial Statements

The City legally owns and operates a wastewater utility. Transactions shows a summary of wastewater fund resources and uses arising from cash transactions for the 6-year period of 2017 through 2022. The 2023 and 2024 financial statements were not available at the time the chapter was developed. Table 8-2 shows a summary of assets and liabilities, with the difference between the two reported as "net position". Increases and decreases in net position are useful indicators of the financial position of the City's utility. Noteworthy findings and trends for the historical performance and condition of the City's wastewater utility are then discussed.

Table 8-1: Summary of Historical Fund Resources and Uses Arising from Cash Transactions

Description	2017	2018	2019	2020	2021	2022
OPERATING REVENUES						
Charges for Services	$ 14,879,928	$ 15,544,747	$ 15,266,217	$ 15,963,782	$ 16,454,900	$ 17,913,394
Other Operating Revenues	17,636	17,079	15,829	6,889	-	29,088
Total Operating Revenues	$ 14,897,564	$ 15,561,826	$ 15,282,046	$ 15,970,671	$ 16,454,900	$ 17,942,482
OPERATING EXPENSES						
Operations and Maintenance	$ 9,306,135	$ 10,743,147	$ 10,761,240	$ 10,078,565	$ 10,783,182	$ 11,629,604
Customer Service and Marketing	160,259	175,447	206,800	198,885	301,952	390,093
General Administration	73,393	138,470	198,985	726,266	157,941	218,661
Depreciation and Amortization	3,694,103	3,626,201	4,125,945	4,202,688	4,376,318	4,407,876
Total Operating Expenses	$ 13,233,890	$ 14,683,265	$ 15,292,970	$ 15,206,404	$ 15,619,393	$ 16,646,234
Operating Income (Loss)	$ 1,663,674	$ 878,561	$ (10,924)	$ 764,267	$ 835,507	$ 1,296,248
NONOPERATING REVENUES (EXPENSES)						
Interest and Investment Revenue	$ 92,723	$ 231,648	$ 241,156	$ 54,704	$ 3,167	$ (49,917)
Interest Expense	(514,674)	(405,010)	(353,208)	(310,470)	(261,045)	(305,640)
Gain (loss) on Capital Asset Disposal	(147,218)	(17,880)	(12,838)	(15,273)	-	-
Other Nonoperating Revenue/Expense	141,656	89,990	365,312	78,133	102,543	5,148
Total Nonoperating Revenues (Expenses)	$ (427,513)	$ (101,252)	$ 240,422	$ (192,906)	$ (155,335)	$ (350,409)
Income (Loss) Before Contributions and Transfers	$ 1,236,161	$ 777,309	$ 229,498	$ 571,361	$ 680,172	$ 945,839
Capital Contributions	1,614,984	2,144,398	95,062	1,454,741	2,000,664	1,328,946
Transfers From Other Funds	-	114,543	-	-	-	-
Change In Net Position	$ 2,851,145	$ 3,036,250	$ 324,560	$ 2,026,102	$ 2,680,836	$ 2,274,785
Total Net Position - Beginning	87,578,789	90,429,934	93,466,184	93,790,745	97,640,845	100,488,922
Prior Period Adjustment	-	-	-	1,824,000	167,242	-
Total Net Position - Ending	$ 90,429,934	$ 93,466,184	$ 93,790,744	$ 97,640,847	$100,488,923	$102,763,707
O&M Coverage Ratio	112.6%	106.0%	99.9%	105.0%	105.3%	107.8%
Net Operating Income as a % of Operating Revenue	11.2%	5.6%	-0.1%	4.8%	5.1%	7.2%
Debt Service Coverage Ratio	2.30	2.09	1.92	2.79	4.58	3.98

Note: Table may include minor differences from statements due to rounding.

8.5.1.2 Table 8-1 Findings and Trends

- The City's sewer charges for services increased from $14.9M in 2017 to $17.9M in 2022. The average annual increase was approximately 3.8 percent per year, with a total increase of 20.4 percent from 2017 to 2022. Charges for service increased each year, except for 2019 where revenues fell by 1.8 percent. Operating expenditures increased by $3.4M across the six years with an average annual increase of 4.7 percent. Expenditures increased each year except for 2020 where expenses fell by 0.6 percent. While the growth in operating expenses has outpaced growth in operating revenues, the operating income has been positive in five of the last six years, with 2019 being the exception, where the utility posted an operating loss of $11,000.

- The O&M coverage ratio (total operating revenues divided by total operating expenses) was 112.6 percent in 2017. With relatively stable revenues and expenses, this metric has maintained its stability, ending 2022 at 107.8 percent. A ratio of 100.0 percent or greater shows that operating revenue will successfully cover operating expenses, and

the utility has remained above this ratio for 5 of the last 6 years. With 2019 being the exception when the ratio decreased to 99.9 percent.

- Net operating income as a percentage of operating revenue was 11.2 percent in 2017, decreasing to negative 0.1 percent in 2019, before recovering back to 7.2 percent by 2022. Similar to the O&M coverage ratio, these trends show how successfully operating revenue actually covered operating expenses, with higher positive numbers being the best and negative numbers showing a need for improvement. In addition, these trends demonstrate the ability of the utility to invest in capital, whether through direct cash transfers or the issuance and servicing of debt.

- The debt service coverage ratio measures the amount of cash flow available to meet principal and interest payments. Typically, revenue bond debt service coverage requires a minimum factor of 1.25 during the life of the loans. This ratio is calculated by dividing cash or net operating income (operating revenues less operating expenses) by annual revenue bond debt service. The City's annual reports did not separate the debt service between revenue bond debt and junior lien debt; therefore, the coverage ratios were calculated on total debt, which is a more conservative comparison. The total debt service coverage ratio for all outstanding debt ended 2017 at 2.3, decreased to 1.9 in 2019 as operating revenues decreased and operating expenses increased before rebuilding to 4.0 in 2022. The fact that this ratio has sustained levels higher than the minimum target of 1.25 indicates a stable capacity for new debt and will likely result in favorable terms when entering the bond market.

Table 8-2: Summary of Historical Comparative Statements of Net Position

Description	2017	2018	2019	2020	2021	2022
ASSETS AND DEFERRED OUTFLOWS						
Current Assets:						
Cash and Cash Equivalents	$ 5,609,732	$ 4,798,123	$ 2,981,649	$ 3,360,451	$ 2,912,178	$ 4,939,491
Restricted Cash	641,128	678,214	307,478	384,329	378,416	131,966
Investments	6,566,614	6,551,413	3,126,643	2,528,042	1,392,100	3,555,558
Restricted Investments	898,543	886,389	799,332	683,720	554,332	659,093
External Receivables	2,730,833	2,613,478	2,745,349	2,694,635	2,238,938	2,162,103
Interest Receivables	19,722	23,821	17,072	12,589	4,856	19,108
Due From Other Funds	430,916	53,320	318,439	2,982,127	5,621,471	3,510,952
Inventories	582,295	577,021	577,710	587,758	629,782	662,540
Total Current Assets	$ 17,479,783	$ 16,181,779	$ 10,873,672	$ 13,233,651	$ 13,732,073	$ 15,640,811
Noncurrent Assets:						
Net Pension Asset	$ -	$ -	$ -	$ -	$ 1,736,303	$ 658,724
Capital Assets Not Being Depreciated	-	-	8,466,819	3,150,523	7,500,113	11,379,780
Capital Assets Net of Depreciation	94,061,888	96,522,265	92,126,926	96,065,525	93,213,617	92,704,550
Total Noncurrent Assets	$ 94,061,888	$ 96,522,265	$100,593,745	$ 99,216,048	$102,450,033	$104,743,054
Total Assets	$111,541,671	$112,704,044	$111,467,417	$112,449,699	$116,182,106	$120,383,865
Deferred Outflows of Resources	$ 168,046	$ 190,330	$ 253,900	$ 261,796	$ 232,171	$ 693,638
Total Assets and Deferred Outflows	$111,709,717	$112,894,374	$111,721,317	$112,711,495	$116,414,277	$121,077,503
LIABILITIES AND DEFERRED INFLOWS						
Current Liabilities:						
Accounts/Contract Payable	$ 280,677	$ 930,317	$ 1,483,081	$ 616,828	$ 468,842	$ 483,508
Due to Other Funds	348,620	446,195	514,601	574,100	837,923	206,017
Employee Wages Payable	195,547	220,543	129,463	121,678	128,376	118,646
Other Accrued Liabilities	72,078	61,631	129,111	111,026	90,233	147,350
Current Portion of Long-Term Debt	2,327,106	2,156,563	2,142,795	1,778,608	1,137,512	1,434,378
Custodial Accounts	-	30,292	-	36,235	34,310	34,310
Other Current Liabilities	-	-	58,170	5,611	13,990	55,270
Total Current Liabilities	$ 3,224,028	$ 3,845,541	$ 4,457,221	$ 3,244,086	$ 2,711,186	$ 2,479,479
Noncurrent Liabilities:						
Bonds, Notes and Loans Payable	$ 16,614,318	$ 14,419,022	$ 12,236,698	$ 10,791,514	$ 11,150,085	$ 14,710,616
Net Pension Liability	1,071,868	585,488	659,063	715,402	173,138	367,851
Compensated Absences	155,423	150,187	114,421	101,889	86,450	76,376
Total Noncurrent Liabilities	$ 17,841,609	$ 15,154,697	$ 13,010,182	$ 11,608,805	$ 11,409,673	$ 15,163,622
Total Liabilities	$ 21,065,637	$ 19,000,238	$ 17,467,403	$ 14,852,891	$ 14,120,859	$ 17,643,101
Deferred Inflows of Resources	$ 214,146	$ 427,952	$ 463,170	$ 217,759	$ 1,804,496	$ 670,695
Total Liabilities and Deferred Inflows	$ 21,279,783	$ 19,428,190	$ 17,930,573	$ 15,070,650	$ 15,925,355	$ 18,313,796
NET POSITION						
Net Investment in Capital Assets	$ 75,847,117	$ 79,946,680	$ 86,214,252	$ 86,645,925	$ 88,426,133	$ 87,930,545
Restricted for Capital Assets	726,654	-	-	-	-	-
Restricted for Debt Service	1,541,784	1,476,711	1,507,371	1,068,049	932,748	791,059
Restricted for Pension	-	-	-	-	316,955	697,172
Unrestricted	12,314,379	12,042,793	6,069,122	9,926,872	10,813,086	13,344,931
Total Net Position	$ 90,429,934	$ 93,466,184	$ 93,790,745	$ 97,640,846	$100,488,922	$102,763,707
Current Ratio	5.42	4.21	2.44	4.08	5.06	6.31
Debt to Net Position Ratio	0.21	0.18	0.15	0.13	0.12	0.16
Debt to Noncurrent Capital Asset Ratio	0.20	0.17	0.14	0.13	0.12	0.16

Note: Table may include minor differences from statements due to rounding.

8.5.1.3 Table 8-2 Findings and Trends

- The current ratio is calculated by dividing unrestricted current assets by current liabilities and measures an entity's ability to pay short-term obligations. This ratio ranges from a low of 2.4 in 2019 to a high of 6.3 in 2022. Anything above 2.0 for this liquidity ratio is good.

- The Debt to Net Position Ratio compares total debt to total net position, which is the difference between total assets and liabilities. This ratio ranged from a high of 0.21 or 21 percent in 2017 to a low of 0.12 or 12 percent in 2021. For utilities, a ratio of 40 to 60 percent helps to moderate rate impacts by spreading costs over a longer period of time. Based on these results, the City may consider utilizing debt service for future capital investments, especially if it benefits system expansion. At 40 to 60 percent the wastewater utility's total borrowing would range between $38 million to $59 million based on historical metrics.

- The Debt to Noncurrent Capital Asset Ratio compares total debt to noncurrent capital assets, which are also known as property, plant and equipment. This ratio begins at 0.20 or 20 percent debt to 80 percent noncurrent assets in 2017. Noncurrent capital assets increase by $10.0 million throughout the six-year history while debt decreased by $1.9 million, and the ratio decreased to 16 percent by 2022. Similar to the debt to net position ratio, these results indicate the utility has ample borrowing capacity and may consider utilizing debt service for future capital investments, especially if it benefits system expansion. A ratio of 40 percent debt to 60 percent equity or below is a general industry target. At 40 percent the wastewater utility's total borrowing would be approximately $38 million based on historical metrics.

8.5.2 Financial Plan

The wastewater utility is responsible for generating sufficient revenue to meet all of its costs. The primary source of funding is derived from ongoing monthly service charges, with additional revenue coming from miscellaneous non-rate revenues and interest earnings. The City controls the level of user charges and, with City Council approval, can adjust user charges as needed to meet financial objectives.

The financial plan can only confirm financial feasibility if it considers the total system costs of providing wastewater services, both operating and capital. To meet these objectives, the following elements have been completed.

1. **Capital Funding Plan**. Identifies the total capital improvement plan (CIP) obligations of the planning period. The plan defines a strategy for funding the CIP, including an analysis of available resources from rate revenues, existing reserves, connection charge revenues, debt financing, and any special resources that may be readily available (e.g., grants, developer contributions, etc.). The capital funding plan impacts the financial plan through the use of debt financing (resulting in annual debt service) and the assumed rate revenue made available for capital funding.

2. **Financial Forecast**. Identifies future annual non-capital costs associated with the operation, maintenance, and administration of the wastewater system. Included in the financial plan is a reserve analysis that forecasts cash flow and fund balance activity, along with testing for satisfaction of actual or recommended minimum fund balance policies. The financial plan ultimately evaluates the sufficiency of utility revenues in meeting all obligations, including cash uses such as operating expenses, debt service, capital outlays, and reserve contributions, as well as any coverage requirements associated with long-term debt. The plan also identifies the future adjustments required to fully fund all utility obligations in the planning period.

8.5.2.1 Capital Funding Plan

To properly evaluate future capital funding needs, capital costs were escalated by 4.00 percent annually to the year of planned spending. The CIP developed for this WWCP identifies $178.1M in escalated project costs over the 2024 budget year and 10-year planning horizon from 2025-2034. The budget year and 20-year period, through 2044, includes $429.3M in total escalated project costs.

A summary of the 2024 budget year and 10-year and 20-year CIPs are shown in Table 8-3. As shown, each year has varied capital cost obligations depending on construction schedules and infrastructure planning needs.

Table 8-3: Budget and 10-Year and 20-Year CIPs

Year	2024 $	Escalated $
2024	$ 7,246,253	$ 7,246,253
2025	21,361,000	22,215,440
2026	15,982,000	17,286,131
2027	8,210,000	9,235,133
2028	6,100,000	7,136,137
2029	2,700,000	3,284,963
2030	4,400,000	5,567,404
2031	15,951,000	20,990,428
2032	18,975,000	25,968,598
2033	16,474,000	23,447,639
2034	24,122,000	35,706,453
Total	**$ 141,521,253**	**$ 178,084,578**
2035-2044	144,658,000	251,171,346
Total	**$ 286,179,253**	**$ 429,255,925**

Table 8-4Error! Reference source not found. provides more detail for the 2024 budget year and 10-year CIP.

Table 8-4: Budget Year and 10-Year CIP

Year	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
Centrifuge Addition			$ 1,514,240								
Boiler System Reliability Improvements			2,680,205								
Primary Clarifier Recycle Pumps Replacement								626,384			
Headworks Screen Improvements				2,710,922							
Odor Control Stack Reinstallation		406,640									
Primary Effluent Line Rehabilitation			1,081,600								
Aeration Basin Supply Piping Replacement and Improvements for Selector			446,701								
New Aeration Basins										5,693,247	27,858,197
Grit System Upgrades											4,295,669
Outfall Inspection		260,000									
Mixing Study		260,000									
WWTP Outfall Improvements - New Parallel Pipe to MH-4			2,865,158								
WWTP Outfall Improvements - New Outfall								9,178,624	9,545,769	9,926,177	
Arc Flash Testing							885,723				
South PSIC Wastewater Improvements		520,000	1,189,760								
Crosstown Pipeline Improvements - Phase I								8,553,557	8,895,699		
Crosstown Pipeline Improvements - Phase II									4,789,992	4,981,591	
Oyster Bay Sewer Basin Upgrades		104,000	324,480	3,487,078	2,339,717						
Central Bremerton Force Main Improvement	800,000	7,488,000									
EB Beach Main Replacement (OF4 to OF3)						364,996	1,771,447				
EB-2 Seawall			216,320	337,459	233,972						
Eastside Treatment Plant - UV Disinfection Improvements		1,040,000	3,244,800								
WWTP Facility Plan		520,000									
PE Pump Room Controls Relocation/Improvements					1,754,788						
Decommission Beach Sewer in Manette (OF-4 to EB-2)	500,000	4,336,800	1,127,027								
Force Main Corrosion Testing	200,000	208,000									
Machinary/Equipment - Utility Operations Manager	50,000	52,000	54,080	56,243	58,493	60,833	63,266				
Sewer Main Replacement and Rehab Program	340,000	260,000	270,400	281,216	292,465	304,163	316,330	328,983	342,142	355,828	370,061
Sewer Main Replacement with Pavement Reconstruction	210,000	312,000	324,480	337,459	350,958	364,996	379,596	394,780	410,571	426,994	444,073
Tracyton Beach Main Conversion	500,000	4,576,000									
Pump Station SCADA and Controls Upgrade	400,000	312,000	324,480	337,459	350,958	364,996	379,596	394,780	410,571	426,994	444,073
Nutrient General Permit Improvements Program	150,000	104,000	108,160	112,486	116,986	121,665					
Installation of Emergency Generator Program	100,000	104,000	108,160	112,486	116,986	121,665	126,532				
Pump Station Improvements Program	300,000	312,000	324,480	337,459	350,958	364,996	379,596	394,780	410,571	426,994	444,073
I&I Reduction Program		260,000	270,400	281,216	292,465	304,163	316,330	328,983	342,142	355,828	370,061
CIPP Rehabilitation Program	900,000	780,000	811,200	843,648	877,394	912,490	948,989	789,559	821,141	853,987	888,147
Collection System Capacity Improvements											592,098
Salinity Impact Study	45,330										
Wastewater Comp Plan	635,910										
Eastside Treatment Plant UV Replacement	500,000										
Non-Potable Pump Replacements	106,531										
West Side Treatment Plant Upgrade	730,644										
PSIC Sewer Design & Construction	25,000										
E11th Street and Perry Avenue Reconstruction	247,887										
Quincy Square on 4th Street	75,000										
6th Street Phase III	195,275										
Washington Avenue Roundabout	164,706										
View Ridge Elementary (Almira SRTS) Phase 1	19,970										
Naval Avenue Road Diet	50,000										
Total Escalated	**$ 7,246,253**	**$22,215,440**	**$17,286,131**	**$ 9,235,133**	**$ 7,136,137**	**$ 3,284,963**	**$ 5,567,404**	**$20,990,428**	**$25,968,598**	**$23,447,639**	**$35,706,453**

8.5.3 Available Funding Assistance and Financing Resources

8.5.3.1 City Resources

Resources appropriate for funding capital needs include accumulated cash in the capital fund, rate revenues designated for capital spending purposes, developer contributions, and capital-related charges such as general facilities charges. The first two resources will be discussed in the **Fiscal Policies** section of the **Financial Forecast**. Capital-related charges are discussed below.

8.5.3.1.1 General Facilities Charges

A connection charge such as the City's general facilities charge (GFC) refers to a one-time charge imposed on new customers as a condition of connecting to the wastewater system. The purpose of the GFC is two-fold: 1) to promote equity between new and existing customers; and 2) to provide a source of revenue to fund capital projects necessary for meeting growth. This revenue can only be used to fund utility capital projects or to pay debt service incurred to finance those projects. In the absence of a connection charge, growth-related capital costs would be borne in large part by existing customers. In 2024, the City charged all new customers a GFC of $8,103 per meter capacity equivalent (MCE) and has adopted a charge of $8,411 for 2025. MCEs are defined by the American Water Works Association and represent the maximum safe operating flow capacity in gallons per minute, relative to the base meter size.

8.5.3.1.2 Local Facilities Charges

While a connection charge is the manner in which new customers pay their share of system investment costs, local facilities charge funding is used to pay the costs of local facilities that connect each property to the system's infrastructure. Local facilities funding is often overlooked in rate forecasting because it is funded upfront by either connecting customers and developers, or through an assessment to properties, but never from rates.

A number of mechanisms can be considered toward funding local facilities. One of the following scenarios typically occurs: (a) the utility charges a connection fee based on the cost of the local facilities (under the same authority as the facilities assessment fee); (b) a developer funds an extension of the system to its development and turns those facilities over to the utility (contributed capital); or (c) a local assessment is set up called a Utility Local Improvement District (ULID/LID) or a Local Utility District (LUD), which collects tax revenue from benefited properties.

A local facilities charge (LFC) is a variation of the connection charge. It is a city-imposed charge to recover the cost related to service extension to local properties. Often called a front-footage charge and imposed on the basis of footage of the main "fronting" a particular property, it is usually implemented as a reimbursement mechanism to a city for the cost of a local facility that directly serves a property. It is a form of a connection charge and thus can accumulate up to 10 years of interest. It typically applies in instances when no developer-installed facilities are needed through developer extension due to the prior existence of available mains already serving the developing property.

The developer extension is a requirement that a developer install on-site and sometimes off-site improvements as a condition of extending service. These are in addition to the connection charge required and must be built to City standards. Part of the agreement between the City and the developer planning to extend service might include a latecomer agreement (also called reimbursement agreements), resulting in a latecomer charge to new connections for the developer extension.

Latecomer charges are a variation of developer extensions, whereby new customers connecting to a developer-installed improvement make a payment to the City based on their share of the developer's cost. The City passes this charge on to the developer who installed the facilities. As part of the developer extension process, this defines the allocation of costs and records latecomer obligations on the title of affected properties. No interest is allowed, and the reimbursement agreement cannot exceed 20 years in duration.

ULID/LID is another mechanism for funding infrastructure that assesses benefited properties based on the special benefit received by the construction of specific facilities. Most often used for local facilities, some ULIDs also recover related general facilities costs. Substantial legal and procedural requirements can make this a relatively expensive process, and there are mechanisms by which a ULID can be rejected.

8.5.3.2 Outside Resources

This section outlines various grant, loan, and bond opportunities available to the City through federal and state agencies to fund the CIP identified in the WWCP.

8.5.3.2.1 Grants and Low-Cost Loans

Historically, federal and state grant programs were available to local utilities for capital funding assistance. However, these assistance programs have been mostly eliminated, substantially reduced in scope and amount, or replaced by loan programs. Remaining grant programs are generally lightly funded and heavily subscribed. Nonetheless, the benefit of low-interest loans makes the effort of applying worthwhile.

The State of Washington's Department of Commerce maintains a document currently entitled "*Funding Programs for Drinking Water and Wastewater Projects; Updated 9-17-2024*", which contains details on government programs, eligibility requirements, and contact information, should the City wish to inquire about program offerings and eligibility requirements.

8.5.3.2.2 Bond Financing

General Obligation Bonds – General obligation (G.O.) bonds are bonds secured by the full faith and credit of the issuing agency, committing all available tax and revenue resources to debt repayment. With this high level of commitment, G.O. bonds have relatively low interest rates and few financial restrictions. However, the authority to issue G.O. bonds is restricted in terms of the amount and use of the funds, as defined by the Washington constitution and statute. Specifically, the amount of debt that can be issued is linked to assessed valuation.

The Revised Code of Washington (RCW) 39.36.020 states:

(2)(a)(ii) Counties, cities, and towns are limited to an indebtedness amount not exceeding one- and one-half percent of the value of the taxable property in such counties, cities, or towns without the assent of three-fifths of the voters therein voting at an election held for that purpose.

(b) In cases requiring such assent counties, cities, towns, and public hospital districts are limited to a total indebtedness of two and one-half percent of the value of the taxable property therein.

While bonding capacity can limit the availability of G.O. bonds for utility purposes, these can sometimes play a valuable role in project financing. A utility rate savings may be realized through two avenues: the lower interest rate and related bond costs, and the extension of repayment obligation to all tax-paying properties (not just developed properties) through the authorization of an ad valorem property tax levy.

Revenue Bonds – Revenue bonds are commonly used to fund utility capital improvements. The debt is secured by the revenues of the issuing utility. With this limited commitment, revenue bonds typically bear higher interest rates than G.O. bonds and require security conditions related to the maintenance of dedicated reserves (a bond reserve) and financial performance (added bond debt service coverage). The City agrees to satisfy these requirements by resolution as a condition of bond sale.

Revenue bonds can be issued in Washington without a public vote. There is no bonding limit, except perhaps the practical limit of the utility's ability to generate sufficient revenue to repay the debt and provide coverage. In some cases, poor credit might make issuing revenue bonds problematic.

8.5.3.2.3 Capital Financing Strategy

An ideal capital financing strategy would include the use of grants and low-cost loans when debt issuance is required. However, these resources are very limited and competitive in nature and do not provide a reliable source of funding for planning purposes. It is recommended that the City pursue these funding avenues but assume revenue bond financing to meet the needs which can't be met by available cash resources. The capital financing strategy developed to fund the CIP identified in this WWCP assumes the following funding resources:

- Accumulated cash reserves,
- Transfers of excess cash (over minimum balance targets) from the Operating Fund,
- General facilities charge revenue,
- Interest earned on Capital Fund balances,
- Contributions in aid of construction such as grants and / or developer donations,
- Low interest loan financing, and
- Revenue bond financing.

The cash resources described above are anticipated to fund 52.1 percent of the budget year and 10-year CIP and 57.4 percent of the budget year and 20-year CIP. The remaining funding is assumed to be from new debt obligations of $85.3M in the budget year and next 10-year planning period and an additional $97.5M between 2035-2043. Table 8-5 presents the budget year and 10-year and 20-year capital financing strategy.

Table 8-5: Budget Year and 10-Year and 20-Year Capital Financing Strategy

Year	Capital (Escalated)	GFC Revenue	Low Interest Loans	CIAC	Revenue Bonds	Cash / Reserves	Total Financing
2024	$ 7,246,253	$ 1,056,859	$ 1,844,305			$ 4,345,089	$ 7,246,253
2025	22,215,440	1,208,518	9,986,620	7,804,000		3,216,302	22,215,440
2026	17,286,131	1,272,731	7,934,593	1,424,480		6,654,327	17,286,131
2027	9,235,133	1,340,355	3,504,000	3,487,078		903,700	9,235,133
2028	7,136,137	546,420	4,250,000	2,339,717			7,136,137
2029	3,284,963	534,963	2,750,000				3,284,963
2030	5,567,404	3,382,325				2,185,079	5,567,404
2031	20,990,428	1,648,744		8,553,557	10,000,000	788,127	20,990,428
2032	25,968,598	1,736,347		13,685,691		10,546,560	25,968,598
2033	23,447,639	1,828,605		4,981,591	16,637,442		23,447,639
2034	35,706,453	1,925,765			28,362,558	5,418,130	35,706,453
Total	**$178,084,578**	**$ 16,481,634**	**$ 30,269,518**	**$ 42,276,114**	**$ 55,000,000**	**$ 34,057,312**	**$178,084,578**
2035-2044	251,171,346	26,163,226		114,690,325	97,500,000	12,817,795	251,171,346
Total	**$429,255,925**	**$ 42,644,861**	**$ 30,269,518**	**$156,966,439**	**$152,500,000**	**$ 46,875,107**	**$429,255,925**

8.5.4 Financial Forecast

The financial forecast, or revenue requirement analysis, forecasts the amount of annual revenue that needs to be generated by user rates. The analysis incorporates operating revenues, O&M expenses, debt service payments, rate-funded capital needs, and any other identified revenues or expenses related to operations. The objective of the financial forecast is to evaluate the sufficiency of the current level of rates. In addition to annual operating costs, the revenue needs also include debt covenant requirements and specific fiscal policies and financial goals of the City.

For this analysis, two revenue sufficiency tests have been developed to reflect the financial goals and constraints of the City: cash needs must be met; and debt coverage requirements must be realized. In order to operate successfully with respect to these goals, both tests of revenue sufficiency must be met.

Cash Test – The cash flow test identifies all known cash requirements for the City in each year of the planning period. Typically, these include O&M expenses, debt service payments, rate-funded system reinvestment funding or directly funded capital outlays, and any additions to specified reserve balances. The total annual cash needs of the City are then compared to projected cash revenues using the current rate structure. Any projected revenue shortfalls are identified, and the rate increases necessary to make up the shortfalls are established.

Coverage Test – The coverage test is based on a commitment made by the City when issuing revenue bonds and some other forms of long-term debt. For the purposes of this analysis,

revenue bond debt is assumed for any needed debt issuance starting in 2030, outside of the City's internally planned low interest loan assumptions for 2024 through 2029. As a security condition of issuance, the City would be required per covenant to agree that the revenue bond debt would have a higher priority for payment (a senior lien) compared to most other expenditures; the only outlays with a higher lien are O&M expenses. Debt service coverage is expressed as a multiplier of the annual revenue bond debt service payment. For example, a 1.00 coverage factor would imply that no additional cushion is required. A 1.25 coverage factor means revenue must be sufficient to pay O&M expenses, annual revenue bond debt service payments, and an additional 25.0 percent of annual revenue bond debt service payments. The excess cash flow derived from the added coverage, if any, can be used for any purpose, including funding capital projects. Targeting a higher coverage factor can help the City achieve a better credit rating and provide lower interest rates for future debt issues.

8.5.4.1 Current Financial Structure

The City maintains a fund structure and implements financial policies that target management of a financially viable and fiscally responsible wastewater system.

8.5.4.1.1 Fiscal Policies

A summary of the key financial policies employed by the City, as well as those recommended and incorporated in the financial program, are discussed below.

Operating Reserve – Operating reserves are designed to provide a liquidity cushion to ensure that adequate cash working capital will be maintained to deal with significant cash balance fluctuations, such as seasonal fluctuations in billings and receipts, unanticipated cash expenses, or lower than expected revenue collections. Like other types of reserves, operating reserves also serve another purpose: they help smooth rate increases over time. Target funding levels for an operating reserve are generally expressed as a certain number of days of O&M expenses, with the minimum requirement varying with the expected revenue volatility. Industry practice for utility operating reserves ranges from 30 days (8.0 percent) to 120 days (33.0 percent) of O&M expenses, with the lower end more appropriate for utilities with stable revenue streams and the higher end more appropriate for utilities with significant seasonal or consumption-based fluctuations. The City's current goal is to maintain a minimum balance in the Operating Fund equal to 12 percent of O&M expenses (approximately 44 days).

Capital Reserve – A capital contingency reserve is an amount of cash set aside in case of an emergency should a piece of equipment or a portion of the utility's infrastructure fail unexpectedly. The reserve also could be used for other unanticipated capital needs, including capital project cost overruns. Industry practices range from maintaining a balance equal to 1.0 to 2.0 percent of fixed assets, an amount equal to a 5-year rolling average of CIP costs, or an amount determined sufficient to fund equipment failure (other than catastrophic failure). The final target level should balance industry practices with the risk level of the City.

The City does not have a formal policy for a Capital Reserve target. Referencing industry practices in conjunction with historic City practice, this analysis utilized a target of 2.0 percent of fixed assets.

System Reinvestment – System reinvestment funding promotes system integrity through ongoing repair and replacement of system infrastructure. Ideally, a detailed asset management plan would guide the level of rate funded system reinvestment, however, in absence of this level of effort, annual depreciation expense is commonly used as a measure of the decline in asset value associated with routine use of the system. Particularly for utilities that do not already have an explicit system reinvestment policy in place, implementing a funding level based on full depreciation expense could significantly impact rates. An alternative benchmark is annual depreciation expense net of debt principal payments on outstanding debt. This approach recognizes that customers are still paying for certain assets through the debt component of their rate and intends to avoid simultaneously charging customers for an asset and its future replacement. The specific benchmark used to set system reinvestment funding targets is a matter of policy that must balance various objectives, including managing rate impacts, keeping long-term costs down, and promoting "generational equity" (i.e., not excessively burdening current customers with paying for facilities that will serve a larger group of customers in the future).

The City does not currently have a policy in place for system reinvestment funding. No dedicated system reinvestment funding is assumed in this financial plan; however, current practice is to transfer cash above the minimum operating target balance to the capital fund as cash-funded capital. On average, the study assumed an annual transfer of approximately $2.7 million per year within the budget and 10-year planning period.

Debt Management – It is prudent to consider policies related to debt management as part of a broader utility financial policy structure. Debt management policies should be evaluated and formalized, including the level of acceptable outstanding debt, debt repayment, bond coverage, and total debt coverage targets. The City has two outstanding wastewater revenue bonds, four Public Works Trust fund loans, and fifteen other low interest loans. The City's existing bond covenants require a 1.25 debt coverage target.

Because the City intends to continue using revenue bonds as a significant source of capital funding, the City's policy and this financial plan targets coverage at a minimum of 1.50. Targeting a higher than required coverage factor helps the City maintain its credit rating and may provide lower interest.

8.5.4.1.2 Financial Forecast

The financial forecast is primarily based upon the City's budgets for 2024, 2025 and 2026 and takes into consideration other key factors and assumptions needed to develop a complete portrait of the City's annual wastewater utility financial obligations. The following is a list of the key revenue and expense factors and assumptions used to develop the financial forecast.

- **Growth** – Rate revenue is escalated utilizing a 1.3 percent average annual growth rate developed based on the forecasted sewer flow projections identified in this WWCP.

- **Revenue** – The City has two general revenue sources: 1) wastewater service charges (rate revenue); and 2) miscellaneous (non-rate) revenue. In the event of a forecasted annual shortfall, rate revenue can be increased to meet the annual revenue requirement. For the purpose of this financial forecast, rate revenues are tied to budget for 2024

through 2026 and are forecasted to increase with growth starting in 2027. Non-rate revenues are forecast to increase with general cost inflation or growth with the exception of interest earnings which are calculated based on projected balances and assumed investment rates.

- **General Facilities Charges Revenue** – based on existing City practice, the general facilities charges are escalated annually by an accredited construction cost inflation index. The analysis assumes the 2025 adopted charges of $8,411 per meter capacity equivalent are increased by 4.0 percent per year and are applied to the projected new meter capacity equivalent connections to forecast the future revenue. General facilities charge revenues are forecast to generate an average of $1.5 million annually from 2024 through 2034. This equates to an average of 150 new meter capacity equivalents per year. General facilities charge revenue is directed towards annual capital needs.

- **Expenses** – O&M expense projections are based on the City's budgets through 2026 with general cost inflation increases of 3.5 percent, labor cost inflation of 3.0 percent and benefit cost inflation increases of 10.0 percent per year thereafter.

- **Taxes** – Budget figures were used for taxes in 2024 through 2026. Future taxes are calculated based on forecasted revenues and prevailing tax rates. Taxes are assessed utilizing a 3.85 percent state excise tax rate applicable to the collection share of rate revenue, approximately 17.0 percent, and 1.75 percent business and occupation tax rate applicable to the treatment and transmission share of rate revenue, approximately 87.0 percent, non-rate revenues and general facilities charges revenues. In addition, the City assesses a utility tax on the wastewater rate and non-rate revenues of 20.0 percent.

- **Existing Debt** – The wastewater utility has twenty-one (21) outstanding debt issues: two (2) revenue bonds, four (4) Public Works Trust Fund (PWTF) loans and fifteen (15) other low interest loans. Total annual existing debt service obligations begin 2024 at $1.7 million, decreasing to $1.0 million by 2034 as sixteen (16) of the twenty-one (21) loans are fully repaid.

- **Future Debt** – The capital financial strategy developed for this WWCP forecasts the need for $89.2M in new debt proceeds in eleven (11) separate instances throughout the budget year and 10-year forecast period. Based on discussion with the City, the analysis assumes nine (9) of the new debt issuances will utilize low interest loan financing, such as, the Clean Water State Revolving Fund (CWSRF) program, or equivalent. The remaining debt issuances will be through revenue bond financing. Annual debt service obligations are forecasted to begin in 2024 at $22,100, increasing to $6.7 million by 2034.

- **Transfers to Capital** - Operating fund balance above the minimum requirement is assumed to be available to fund capital projects and projected to be transferred to the Capital Fund each year, if needed. In total, the utility is forecast to fund $30.1 million in capital projects from excess operating fund cash within the budget year and 10-year forecast period.

Although the financial plan is completed through 2044, the rate strategy focuses on the shorter-term planning period of 2024 through 2034. It is recommended that the City revisit the proposed rates every 3 to 4 years to ensure that the rate projections developed remain adequate. Any significant changes should be incorporated into the financial plan and future rates should be adjusted as needed.

Table 8-6, following, summarizes the annual revenue requirements based on the forecast of revenues, expenditures, fund balances, and fiscal policies.

Table 8-6: Budget Year and 10-Year Financial Forecast

Revenue Requirement	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
Revenues											
Rate Revenues Under Existing Rates	$ 19,500,000	$ 19,000,000	$ 19,000,000	$ 19,239,935	$ 19,482,900	$ 19,728,933	$ 19,978,073	$ 20,230,359	$ 20,485,831	$ 20,744,529	$ 21,006,494
Non-Rate Revenues	487,459	388,000	360,000	288,236	274,433	260,760	246,563	211,211	225,284	230,663	276,136
Total Revenues	**$ 19,987,459**	**$ 19,388,000**	**$ 19,360,000**	**$ 19,528,171**	**$ 19,757,333**	**$ 19,989,693**	**$ 20,224,635**	**$ 20,441,570**	**$ 20,711,114**	**$ 20,975,192**	**$ 21,282,630**
Expenses											
Cash Operating Expenses	$ 15,217,323	$ 16,942,066	$ 16,978,380	$ 17,398,430	$ 17,990,693	$ 18,611,536	$ 19,262,870	$ 19,946,420	$ 20,665,683	$ 21,422,096	$ 22,219,181
Existing Debt Service	1,717,104	1,523,536	1,496,160	1,429,100	1,181,270	1,143,160	1,100,145	1,021,397	1,024,153	1,017,858	1,019,010
New Debt Service	22,132	446,599	846,787	1,301,607	1,527,178	1,771,800	1,901,790	2,772,202	2,755,718	6,730,267	6,713,783
Total Expenses	**$ 16,956,558**	**$ 18,912,201**	**$ 19,321,328**	**$ 20,129,137**	**$ 20,699,141**	**$ 21,526,496**	**$ 22,264,805**	**$ 23,740,019**	**$ 24,445,553**	**$ 29,170,220**	**$ 29,951,975**
Net Surplus (Deficiency)	**$ 3,030,901**	**$ 475,799**	**$ 38,672**	**$ (600,966)**	**$ (941,808)**	**$ (1,536,803)**	**$ (2,040,170)**	**$ (3,298,449)**	**$ (3,734,439)**	**$ (8,195,028)**	**$ (8,669,345)**
Annual Rate Adjustment	**0.00%**	**3.50%**	**3.50%**	**3.50%**	**3.50%**	**3.50%**	**8.40%**	**8.40%**	**8.40%**	**8.40%**	**8.40%**
Cumulative Annual Rate Adjustment	**0.00%**	**3.50%**	**7.12%**	**10.87%**	**14.75%**	**18.77%**	**28.75%**	**39.56%**	**51.28%**	**63.99%**	**77.77%**
Rate Revenues After Rate Increase	$ 19,500,000	$ 19,665,000	$ 20,353,275	$ 21,331,660	$ 22,357,075	$ 23,431,783	$ 25,720,809	$ 28,233,446	$ 30,991,541	$ 34,019,071	$ 37,342,357
Additional Taxes from Rate Increase	-	147,012	299,169	462,418	635,394	818,589	1,269,547	1,769,243	2,322,497	2,934,603	3,611,369
Net Cash Flow After Rate Increase	**$ 3,030,901**	**$ 993,787**	**$ 1,092,779**	**$ 1,028,341**	**$ 1,296,974**	**$ 1,347,458**	**$ 2,433,020**	**$ 2,935,396**	**$ 4,448,774**	**$ 2,144,911**	**$ 4,055,149**
Coverage After Rate Increases	17.21	14.56	15.74	15.87	16.35	17.05	19.37	8.56	9.67	2.93	3.36

The financial forecast indicates that at existing rate levels the utility will become deficient in 2027 by $601,000 as growth in expenses outpaces growth in revenues and new debt is issues to meet capital needs. The deficiency is projected to increase up to $8.7 million by 2034 as the utility begins to incur additional new debt to help fund the capital improvement plan contained in this WWCP and keep up with inflationary pressures from operating and maintenance expenses. The City has adopted a 3.50 percent rate increase for 2025 and is anticipating additional 3.50 percent annual rate increases through 2029. In order to address the remaining projected deficiencies, an annual increase of 8.4 percent is projected from 2030 through 2034. The higher increases starting in 2030 may be conservative utilizing revenue bond financing, assuming no low interest loans will be available. Historically, the City has been successful in acquiring a combination of grants and low interest loans and should revisit the rate strategy as better information becomes available.

8.5.4.1.1 City Funds and Reserves

Table 8-7 shows a summary of the projected Operating Fund and Capital Fund ending balances through 2034 based on the rate forecasts presented above. The Operating Fund is maintained at a minimum of 12 percent, or 44 days, of O&M expenses, and the Capital Fund balance

continues to meet or exceed the minimum targeted of 2.00 percent of fixed assets in every year of the forecast.

Table 8-7: Ending Cash Balance Summary

Ending Fund Balances	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
Operating Fund	$ 1,834,417	$ 2,042,331	$ 2,046,709	$ 2,097,345	$ 2,168,741	$ 2,243,582	$ 2,322,099	$ 2,404,500	$ 2,491,206	$ 2,582,390	$ 2,678,477
Capital Fund	13,429,165	11,299,237	6,185,780	6,476,788	8,762,322	11,206,108	9,783,390	11,946,593	5,882,067	36,357,673	6,900,124
Total	**$15,263,582**	**$13,341,568**	**$ 8,232,489**	**$ 8,574,133**	**$10,931,063**	**$13,449,691**	**$12,105,490**	**$14,351,093**	**$ 8,373,273**	**$38,940,063**	**$ 9,578,601**
Combined Target	*$ 5,115,454*	*$ 5,767,677*	*$ 6,117,778*	*$ 6,353,116*	*$ 6,567,235*	*$ 6,707,776*	*$ 6,897,641*	*$ 7,399,850*	*$ 8,005,928*	*$ 8,566,064*	*$ 9,376,280*

8.5.5 Current and Projected Rates

8.5.5.1 Current Rates

The existing wastewater rates consist of a monthly fixed rate and a commodity charge per hundred cubic feet (HCF). Fixed charges vary by class of service and apply on a per account basis, with the exception of duplex and multi-family accounts, where the charges apply on a per unit basis. Commodity charges also vary by class of service, increasing with the assumed concentration of influent for commercial classes of service. A low-income senior and low-income disabled citizen discount of 40.0 percent is available. Customers located outside the City limits pay a rate that is 1.50 times the in-City rate based on class of service.

Table 8-8 provides the existing wastewater rate schedule.

Table 8-8: Existing Schedule of Rates

Description	2024 Inside City
Single Family	
Base Charge (per acc.)	$ 39.98
Commodity Charge (per HCF)	5.37
Duplex on 1 Meter or 2 Bldgs. On 1 Meter	
Base Charge (per unit)	$ 31.66
Commodity Charge (per HCF)	5.37
Mulit-Family	
Base Charge (per unit)	$ 31.66
Commodity Charge (per HCF)	5.37
Low-Income Senior and Low Income Disabled Citizen	
Base Charge (per acc.)	$ 23.99
Commodity Charge (per HCF)	3.22
Commercial I	
Base Charge (per acc.)	$ 59.10
Commodity Charge (per HCF)	5.53
Commercial II	
Base Charge (per acc.)	$ 59.53
Commodity Charge (per HCF)	7.08
Commercial III	
Base Charge (per acc.)	$ 60.12
Commodity Charge (per HCF)	8.64
Commercial IV	
Base Charge (per acc.)	$ 60.71
Commodity Charge (per HCF)	10.22
Commercial V	
Base Charge (per acc.)	$ 66.78
Commodity Charge (per HCF)	12.77
Commercial VI	
Base Charge (per acc.)	$ 73.45
Commodity Charge (per HCF)	15.95
Commercial VII	
Base Charge (per acc.)	$ 80.80
Commodity Charge (per HCF)	18.63
Commercial Special	
Base Charge (per acc.)	$ 88.88
Commodity Charge (per HCF)	24.93
Beverage Production	
Base Charge (per acc.)	$ 60.12
Commodity Charge (per HCF)	5.62
Commercial Fountains - Separately Metered	
Base Charge (per acc.)	$ 59.10
Commodity Charge (per HCF)	1.82
Septage Disposal	
Per gallon of tank capacity	$ 0.30
Individual Residential Grinder Pumps	
Standard	$ 12.89
Low-Income Senior and Low Income Disabled Citizen	7.73

***Note** : a 1.50 multiplier applies to customers Outside City limits.*

8.5.5.2 Projected Rates

The financial forecast discussed above indicates the need for annual rate adjustments in order to satisfy all forecasted financial obligations. The City has adopted a 3.50 percent rate increase for 2025 and is anticipating additional 3.50 percent annual increases through 2029. Additional increases of 8.4 percent annually are forecasted from 2030 through 2034. Table 8-9 shows the projected rates with increases applied uniformly to the wastewater fixed and commodity components of all classes, where applicable.

Table 8-9: Proposed Schedule of Rates

Description	Inside City									
	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
Single Family										
Base Charge (per acc.)	$ 41.38	$ 42.83	$ 44.33	$ 45.88	$ 47.49	$ 51.48	$ 55.80	$ 60.49	$ 65.57	$ 71.08
Commodity Charge (per HCF)	5.56	5.75	5.95	6.16	6.38	6.92	7.50	8.13	8.81	9.55
Duplex on 1 Meter or 2 Bldgs. On 1 Meter										
Base Charge (per unit)	$ 32.77	$ 33.92	$ 35.11	$ 36.34	$ 37.61	$ 40.77	$ 44.19	$ 47.90	$ 51.92	$ 56.28
Commodity Charge (per HCF)	5.56	5.75	5.95	6.16	6.38	6.92	7.50	8.13	8.81	9.55
Mulit-Family										
Base Charge (per unit)	$ 32.77	$ 33.92	$ 35.11	$ 36.34	$ 37.61	$ 40.77	$ 44.19	$ 47.90	$ 51.92	$ 56.28
Commodity Charge (per HCF)	5.56	5.75	5.95	6.16	6.38	6.92	7.50	8.13	8.81	9.55
Low-Income Senior and Low Income Disabled Citizen										
Base Charge (per acc.)	$ 24.83	$ 25.70	$ 26.60	$ 27.53	$ 28.49	$ 30.88	$ 33.47	$ 36.28	$ 39.33	$ 42.63
Commodity Charge (per HCF)	3.34	3.46	3.58	3.71	3.84	4.16	4.51	4.89	5.30	5.75
Commercial I										
Base Charge (per acc.)	$ 61.17	$ 63.31	$ 65.53	$ 67.82	$ 70.19	$ 76.09	$ 82.48	$ 89.41	$ 96.92	$ 105.06
Commodity Charge (per HCF)	5.72	5.92	6.13	6.34	6.56	7.11	7.71	8.36	9.06	9.82
Commercial II										
Base Charge (per acc.)	$ 61.61	$ 63.77	$ 66.00	$ 68.31	$ 70.70	$ 76.64	$ 83.08	$ 90.06	$ 97.63	$ 105.83
Commodity Charge (per HCF)	7.33	7.59	7.86	8.14	8.42	9.13	9.90	10.73	11.63	12.61
Commercial III										
Base Charge (per acc.)	$ 62.22	$ 64.40	$ 66.65	$ 68.98	$ 71.39	$ 77.39	$ 83.89	$ 90.94	$ 98.58	$ 106.86
Commodity Charge (per HCF)	8.97	9.28	9.60	9.94	10.29	11.15	12.09	13.11	14.21	15.40
Commercial IV										
Base Charge (per acc.)	$ 62.83	$ 65.03	$ 67.31	$ 69.67	$ 72.11	$ 78.17	$ 84.74	$ 91.86	$ 99.58	$ 107.94
Commodity Charge (per HCF)	10.58	10.95	11.33	11.73	12.14	13.16	14.27	15.47	16.77	18.18
Commercial V										
Base Charge (per acc.)	$ 69.12	$ 71.54	$ 74.04	$ 76.63	$ 79.31	$ 85.97	$ 93.19	$ 101.02	$ 109.51	$ 118.71
Commodity Charge (per HCF)	13.22	13.68	14.16	14.66	15.17	16.44	17.82	19.32	20.94	22.70
Commercial VI										
Base Charge (per acc.)	$ 76.02	$ 78.68	$ 81.43	$ 84.28	$ 87.23	$ 94.56	$ 102.50	$ 111.11	$ 120.44	$ 130.56
Commodity Charge (per HCF)	16.51	17.09	17.69	18.31	18.95	20.54	22.27	24.14	26.17	28.37
Commercial VII										
Base Charge (per acc.)	$ 83.63	$ 86.56	$ 89.59	$ 92.73	$ 95.98	$ 104.04	$ 112.78	$ 122.25	$ 132.52	$ 143.65
Commodity Charge (per HCF)	19.28	19.95	20.65	21.37	22.12	23.98	25.99	28.17	30.54	33.11
Commercial Special										
Base Charge (per acc.)	$ 91.99	$ 95.21	$ 98.54	$ 101.99	$ 105.56	$ 114.43	$ 124.04	$ 134.46	$ 145.75	$ 157.99
Commodity Charge (per HCF)	25.80	26.70	27.63	28.60	29.60	32.09	34.79	37.71	40.88	44.31
Beverage Production										
Base Charge (per acc.)	$ 62.22	$ 64.40	$ 66.65	$ 68.98	$ 71.39	$ 77.39	$ 83.89	$ 90.94	$ 98.58	$ 106.86
Commodity Charge (per HCF)	5.82	6.02	6.23	6.45	6.68	7.24	7.85	8.51	9.22	9.99
Commercial Fountains - Separately Metered										
Base Charge (per acc.)	$ 61.17	$ 63.31	$ 65.53	$ 67.82	$ 70.19	$ 76.09	$ 82.48	$ 89.41	$ 96.92	$ 105.06
Commodity Charge (per HCF)	1.88	1.95	2.02	2.09	2.16	2.34	2.54	2.75	2.98	3.23
Septage Disposal										
Per gallon of tank capacity	$ 0.31	$ 0.32	$ 0.33	$ 0.34	$ 0.35	$ 0.38	$ 0.41	$ 0.44	$ 0.48	$ 0.52
Individual Residential Grinder Pumps										
Standard	$ 13.34	$ 13.81	$ 14.29	$ 14.79	$ 15.31	$ 16.60	$ 17.99	$ 19.50	$ 21.14	$ 22.92
Low-Income Senior and Low Income Disabled Citizen	8.00	8.28	8.57	8.87	9.18	9.95	10.79	11.70	12.68	13.75

***Note** : a 1.50 multiplier applies to customers Outside City limits.*

8.5.6 Affordability

A common affordability metric used by the Environmental Protection Agency (EPA) to measure the relative financial impact wastewater rates have on a community as a whole considers whether rates exceed 2.50 percent of a community's median household income. The average median household income for the City was $74,399 between 2013 and 2023, expressed in 2023 dollars, according to the U.S. Census Bureau. The 2023 value is escalated based on the actual rate of inflation in 2024 (January through November month to month average based on data available) of 2.96 percent and the 3.50 percent inflation rate used in the financial forecast to project the median household income in future years. Table 8-10 presents the City's monthly wastewater bill projected to 2034 and tested against the 2.50 percent monthly affordability threshold.

Table 8-10: Community Affordability Test

Year	Inflation	Median HH Income	2.5% Monthly Threshold	Projected Monthly Bill	% of Median HH Income
2023		$ 74,399			
2024	2.96%	76,599	159.58	$ 72.20	1.13%
2025	3.50%	79,280	165.17	74.74	1.13%
2026	3.50%	82,055	170.95	77.33	1.13%
2027	3.50%	84,927	176.93	80.03	1.13%
2028	3.50%	87,900	183.12	82.84	1.13%
2029	3.50%	90,976	189.53	85.77	1.13%
2030	3.50%	94,160	196.17	93.00	1.19%
2031	3.50%	97,456	203.03	100.80	1.24%
2032	3.50%	100,867	210.14	109.27	1.30%
2033	3.50%	104,397	217.49	118.43	1.36%
2034	3.50%	108,051	225.11	128.38	1.43%

Applying the 2.50 percent monthly affordability test, the City's rates are forecasted to remain within the indicated affordability range through 2034.

8.5.7 Conclusion

The results of this analysis indicate that at existing rate levels the utility will be deficient beginning in 2027. The City has adopted a 3.50 percent rate increase for 2025 and is anticipating additional 3.50 percent annual rate increases through 2029. In order to address the remaining projected deficiencies, an annual increase of 8.4 percent is projected from 2030 through 2034. The higher increases starting in 2030 may be conservative utilizing revenue bond financing, assuming no low interest loans will be available. Historically, the City has been successful in acquiring a combination of grants and low interest loans and should revisit the rate strategy as better information becomes available. It is recommended that the City regularly review and update the key underlying assumptions that compose the multi-year financial plan to ensure that adequate revenues are collected to meet the City's total financial obligations.

Section 9: Operation and Maintenance

This chapter focuses on the operation and maintenance aspects of the City's wastewater collection and treatment systems. It covers key components such as sewer gravity pipelines, pump stations, force mains, odor control facilities, and wastewater treatment plants. Topics addressed include responsibility and authority, standard system operations, routine and preventive maintenance, current and future staffing requirements, new construction, safety measures, and emergency response protocols.

9.1 Responsibility and Authority

The Wastewater Utility operates under the authority of the Director of Public Works and Utilities (Director). The operations and maintenance responsibilities are divided between the Wastewater Manager and the Utilities Operations Manager, both of whom report directly to the Director.

The Wastewater Manager is responsible for overseeing the Wastewater Division, which includes the operation and maintenance of sewer pump stations, odor control stations, and wastewater treatment facilities. Meanwhile, the Utilities Operations Manager supervises the Utilities Operations Division, which manages the operation and maintenance of the water distribution system, stormwater systems, and wastewater transmission and collection systems.

The responsibility for the infrastructure is defined in Table 9-1 below:

Table 9-1: Operations and Maintenance Responsibilities

Title	Certification
Sewer Gravity and Force Mains	Utility Operations Division
Manholes	Utility Operations Division
Sewer Laterals	Utility Operations Division
Combination Valves	Utility Operations Division
Pump Stations	Wastewater Division
Odor Control Stations	Wastewater Division
WWTP	Wastewater Division
ESTP	Wastewater Division
CSO Outfalls	Wastewater Division

Numerous individual grinder pumps are installed in areas where gravity sewer connections are not feasible. The City owns and maintains approximately 280 of these grinder pump stations and the number of these stations increases every year. These stations are installed by private developers when a gravity sewer connection is not feasible. They are also installed by contractors on City capital projects when a beach sewer is being decommissioned and the sewer connection must be redirected to an upland sewer system. They are typically installed at single family residences; however, they have also been used at condominiums, apartments, small businesses, and in the City right-of-way. Typical installation is a single (simplex) 1 hp grinder pump installed in a tank with sufficient storage for 1 to 2 days during a power outage.

Larger installations require multiple pumps (duplex and triplex) with larger storage tanks. Service lines on private property are owned and maintained by the owner, and the service line in the right-of-way is owned by the City. The Owners are required to sign a Grinder Pump Service Agreement with the City which clearly defines the ownership and maintenance requirements. The pumps themselves are maintained by the City through a third-party maintenance contract (currently Correct Equipment). The property owners pay a fee on top of their regular sewer bill to cover the cost for maintaining the grinder pumps. The grinder pump stations that are part of this agreement must be manufactured by Environment One (E-One) Corporation.

9.2 Utility Organization

The Director has the responsibility for the Wastewater Utility which includes planning, financing, operations, maintenance, the capital improvement program, and personnel.

An organizational chart of the Department of Public Works and Utilities is shown in Figure 9-1. Figure 9-2 provides a more detailed breakdown about the Utility Operations Division. Figure 9-3 provides a more detailed breakdown of the Wastewater Division.

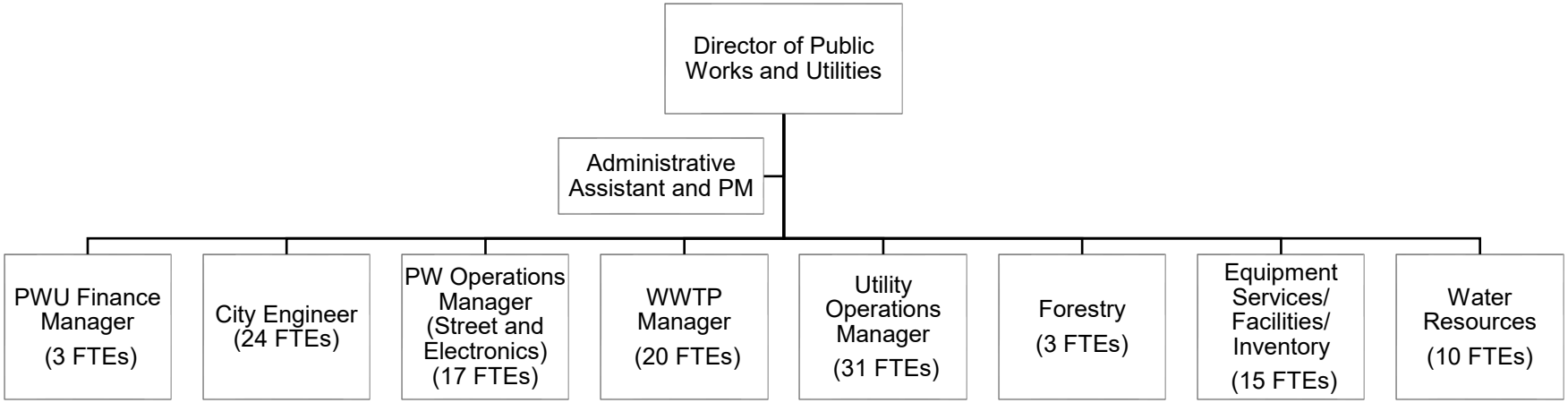


Figure 9-1: Department of Public Works and Utilities organizational chart

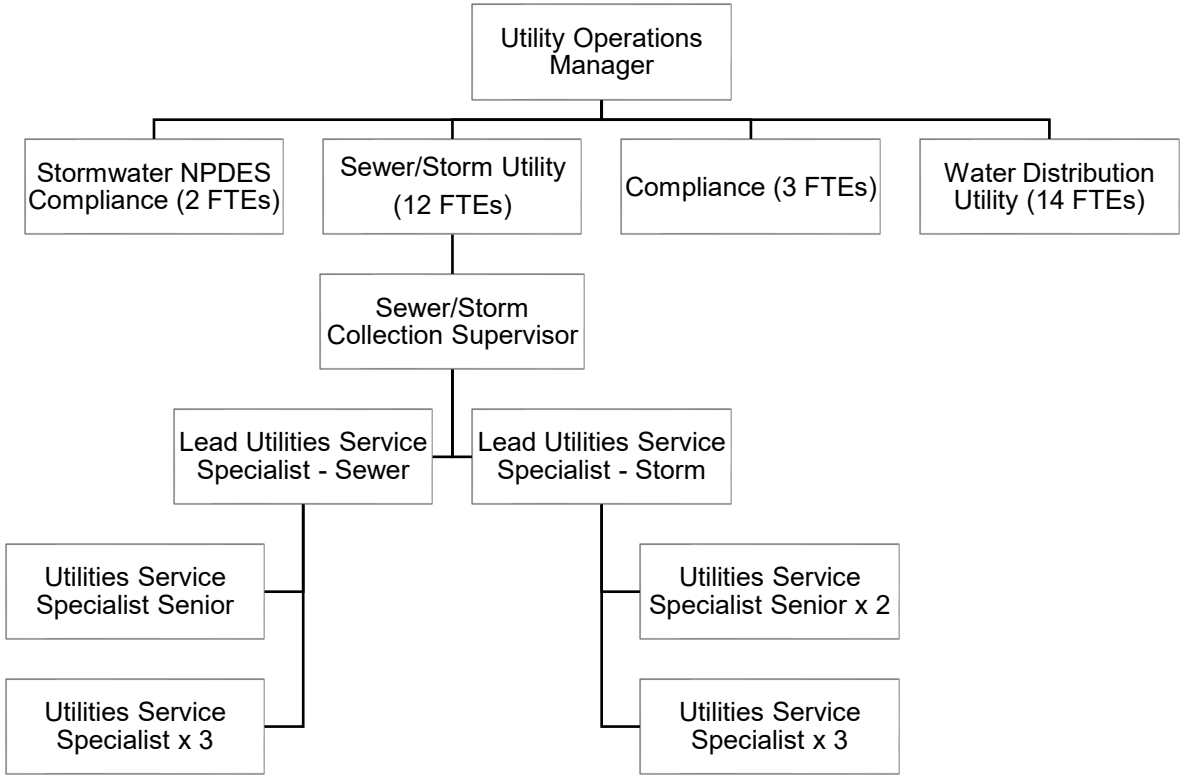


Figure 9-2: Utility Operations Division

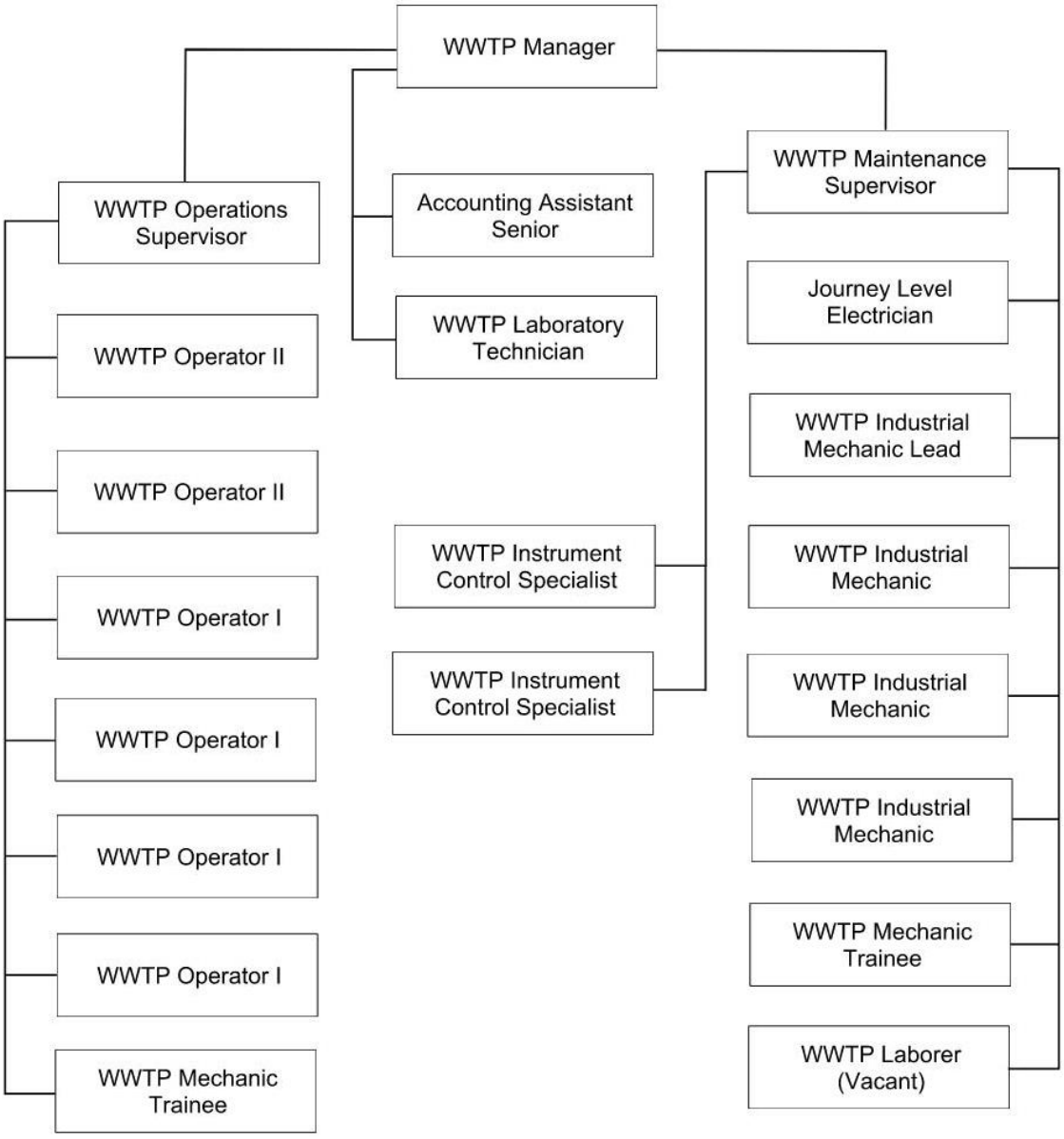


Figure 9-3: Wastewater Division

9.2.1 WWTP Personnel

There are 20 personnel that work under the supervision of the Wastewater Manager. There are currently 8 employees, who are responsible for plant operations, and 8 employees who are responsible for pump station and plant maintenance, 2 instrumentation/control specialists, a lab technician, and two administrative staff. Currently, there is 1 vacant laborer position on the plant operations side. The Washington State Department of Ecology, under WAC 173-230, requires every operator in charge of a wastewater treatment plant to be certified at a level equal to or higher than the classification rating of the facility. A summary of staff minimum required certifications is outlined in the following table.

Table 9-2: WWTP Staff Minimum Required Certifications

Title	Minimum Certification
WW Manager	WWTPO Group IV
Lab Technician	WWTPO Group II
Operations Supervisor	WWTPO Group III
Operator II – Lead	WWTPO Group III
Operator I	WWTPO Group II
Operator Trainee	Operator-in-training

At the time of publication of this report, the City is fully compliant with and surpassing all minimum certification requirements. The standard progression pathway involves beginning as an Operator Trainee, subsequently qualifying for the WWPTO Group II certification, and advancing to Operator I.

9.2.2 Collection System Personnel

Under the Utility Operations Manager's supervision, a team of 12 personnel manages the maintenance of both the wastewater and stormwater collection systems. The team's efforts are equally divided between the two utilities, with 2 full-time equivalents (FTEs) currently dedicated to street sweeping 3 days a week, and storm maintenance and improvement on other days. Consequently, approximately 4 FTEs are allocated annually to maintenance activities and capital improvements for the wastewater collection system.

9.3 Existing Operation and Maintenance Activities

The operation and maintenance of the wastewater system is generally performed by City staff utilizing City-owned equipment. The City of Bremerton maintains and operates the required equipment to support both routine system functions and emergency response needs. Specialized or non-standard repairs may be carried out by external contractors.

9.3.1 Collection System

The Utility Operations Division is responsible for the operation and maintenance of both the wastewater and stormwater collection systems. Monitoring of CSO sites falls under the purview of the Wastewater Division. Core responsibilities of the Utility Operations Division include video inspections, street sweeping, responding to citizen complaints, cleaning catch basins and manholes, investigating collection system issues, repairing failing facilities, and supporting capital construction projects. This support encompasses design assistance, utility locates, constructability reviews, potholing, and construction of collection system extensions. The division also assists other departments with operations, maintenance, and construction tasks.

The City has implemented a program for comprehensive video inspection of the wastewater collection system. Video inspection is conducted on a case-by-case basis to support the CIPP program, requiring inspection prior to implementation. A significant portion of the work is subcontracted, with the CIPP program focusing on rehabilitating sewer service laterals from the right-of-way (ROW) to the main sewer line. The program currently covers approximately 8,000 to 9,000 linear feet per year. Inspection videos are stored on a server and are integrated with the GIS mapping system for ease of access. This program requires an annual commitment of 1.5 FTEs.

The sewer collection system is cleaned continuously, with the goal of maintaining a complete cleaning cycle every two years. Problematic areas prone to clogging, root intrusion, and grease accumulation are jetted on a routine schedule to ensure unobstructed flow. This activity requires a yearly allocation of 2.25 to 2.5 FTEs.

The Utility Operations Division also maintains the stormwater collection system, dedicating 2 FTEs annually to system cleaning. The support during traffic control for manhole lining by contractor require approximately 0.5 FTEs per year.

9.3.2 Treatment Facilities and Pump Stations

Since the completion of the 2014 WWCP, the City now operates a total of 40 pump stations. Maintenance staff typically inspect each pump station weekly, with larger pump stations receiving daily visits. This effort requires 2 FTEs annually. Issues encountered during routine inspections are documented in the City's Cartegraph work order system where corrective maintenance can be planned and executed. This effort requires 2 FTEs annually, one for the west side and one for the east side of the City.

Data Collection and Management

Most operations data is collected by programmable logic control (PLC) systems that measure, calculate, and execute prescribed functions for many in-plant and pump station functions. The information generated within the treatment facilities and pump stations is automatically stored/archived in an electronic format at the WWTP. Other operations data, such as laboratory results, operator inspection results, and process performance(s), is logged into the electronic archive system.

WWTP and pump station maintenance data is managed by the Cartegraph system. The software allows for documentation and management of preventative maintenance, corrective maintenance, predictive maintenance, inventory management, and purchase orders. The software resides on the WWTP intranet system and is backed up automatically on a daily basis. Back up is done through two mirror drive servers.

Collection system maintenance data and customer complaints are also tracked using Cartegraph software. The Cartegraph system is stored on a fault protected server using a redundant array of independent disks (RAID) which is backed up nightly.

SCADA System

The WWTP SCADA network operates within the City's internal network but is securely segmented from it, with access limited to designated computers and authorized personnel. The SCADA network does not have direct internet connectivity, except in one or two controlled cases. Firewall configurations are designed and maintained in coordination with the City's IT Department to ensure only essential ports required for SCADA operations remain open. Multiple servers exchange information within the network under strict authentication protocols; communication between servers is encrypted end-to-end and requires secure keys for authentication and decryption.

Offsite access to the SCADA system is available only through a Virtual Private Network (VPN) utilizing multi-factor authentication, with separate credentials for VPN access and system login. Alarm notifications are transmitted through a landline modem and cellular modems, which are isolated from servers interfacing directly with the control system. All SCADA software and associated security patches are regularly updated to maintain system integrity and prevent unauthorized access.

Sanitary Sewer Overflow Response Procedures

The City maintains written policies and procedures for responding to SSOs, detailed in its Spill Response Plan (Appendix K). Field crews are trained to immediately contain and mitigate spills, identify the cause, and initiate cleanup to prevent discharge to surface waters, stormwater systems, or public areas. Upon discovery or notification of a spill, staff notify the Wastewater Division supervisor and Ecology's Northwest Regional Office in accordance with state reporting requirements. If an overflow reaches surface water or poses a risk to wellhead protection zones, or storm drains, notifications are also made to the City's Environmental Programs office, local health district, and downstream jurisdictions as applicable. Public notifications are issued when overflows may impact public access areas. Documentation of the event, including estimated volume, cause, corrective actions, and follow-up measures, is recorded in accordance with Ecology and City recordkeeping requirements.

9.4 Staffing Needs Related to New and Expanded Facilities and Programs

- **Pump Station SCADA and Controls Upgrades** – All the improvements related to the SCADA system and controls will be a part of this project. The annual maintenance and operations of the SCADA system and controls upgrades typically requires 1 FTE.
- **Installation of Emergency Generator Program** – This program consists of the installation of an emergency generator at select City infrastructure in need of a generator or replacement generator. The installation of the emergency generator program typically requires 0.25 FTEs.
- **Pump Station Improvements Program** – Based on the pump station inspections, improvements will be made under this program. This program is expected to require 2 FTEs.
- **I&I Reduction Program** – This ongoing program includes efforts to reduce the I&I in the City's sewer system. The I&I Reduction Program typically requires 1.5 FTEs.
- **PSIC** – Staffing increases will be needed to operate and maintain collection system infrastructure in the PSIC region as development expands.
- **Westside WWTP** – As improvements are made to comply with more stringent nutrient permit limits, more staff additions may be necessary for operations and maintenance of additional process equipment.

Section 10: Implementation

The adoption of a WWCP must align with the requirements of Ecology and Kitsap County, while ensuring compliance with the State Environmental Policy Act (SEPA). The following sections outline the steps necessary for implementing the plan, as well as recommendations for future updates to the WWCP.

10.1 Plan Adoption

The preparation, review, and adoption of WWCPs are governed by established local and state procedures. WWCPs should be updated and produced on a five-year cycle. Once prepared, the plan is reviewed by Ecology. Other entities granted access to the WWCP include Kitsap County, neighboring sewer systems, water purveyors, local libraries, and other stakeholders. Adoption by the City Council is required prior to plan implementation.

10.2 Coordination with Kitsap County

Kitsap County maintains a county-wide comprehensive plan, which was most recently updated in December 2024. The City of Bremerton supports the objectives outlined in the County's Comprehensive Plan and maintains active participation through the Director of Public Works and Utilities in the County Utility Coordinating Committee. Bremerton recommends the following guidelines for the County's Comprehensive Plan:

- Ensure environmental impacts, regulatory concerns, and public health and safety are addressed and funded through a consistent and unified approach.
- Utilize sound engineering and economic principles to delineate service boundaries, forecast future usage and capacity, manage growth, and establish infrastructure and service standards.
- Develop an area-wide plan, inclusive of urban areas within the County.

10.3 Environmental Impact

Under SEPA (RCW 43.21C), environmental documentation is required for proposals related to legislation and other significant actions that may have a potential for adverse environmental impacts. Moving forward, it is expected that both the National Environmental Policy Act (NEPA) and SEPA requirements will be addressed on a project-specific basis. Additionally, it is anticipated that new developers will bear the costs of environmental impact studies as needed.

10.4 Financial Standing

It is recommended that as the City delivers capital improvements and meets identified O&M goals, it evaluates the need for rate increases and changes to capital improvement priorities. Performing an annual assessment of capital expenditures and ratepayer expenses is

recommended to help the City meet its near term and long-term improvement goals, and to help stay current in identifying grants and loans that can ease ratepayer burden.

10.5 Future Additions to the WWCP

It is recommended that Bremerton periodically review progress it has made in implementing the WWCP before the next WWCP is developed. Bremerton should assess the effectiveness of its improvements to biosolids production, CSO reduction, basin pump station and conveyance improvements, developments in wastewater reuse opportunities, and expansion of conveyance and plant capacities. Current population, population projections, and current and future financial resources should be reviewed and adjusted as necessary to reflect actual conditions and accommodate future project implementation.

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Appendix A: NPDES Permit and Fact Sheet

- Issuance Date: October 30, 2018
- Effective Date: December 1, 2018
- Expiration Date: November 30, 2023

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
Northwest Region Office
PO Box 330316, Shoreline, WA 98133-9716 • 206-594-0000

July 6, 2023

Eric Burris
City of Bremerton Public Works and Utilities
100 Oyster Bay Avenue N
Bremerton, WA 98312

Re: National Pollutant Discharge Elimination System (NPDES)
Permit No. WA0029289; City of Bremerton Wastewater Treatment Plant (WWTP)

Dear Eric Burris:

The Washington State Department of Ecology (Ecology) acknowledges receiving a NPDES permit renewal application for the City of Bremerton WWTP on May 25, 2023. The application has been reviewed and accepted as complete on July 6, 2023.

Your current NPDES permit has an expiration date of November 30, 2023. Renewal of the permit is in process; however, the permit may not be issued by the expiration date. In accordance with the Washington State Administrative Procedures Act (RCW 34.05.422(3)) and Washington Administrative Code 173-220-180(5), if your new permit is not issued and effective by the current permit's expiration date, then the current permit and its terms and conditions are administratively extended and will remain in effect and enforceable until Ecology issues a new permit and it becomes effective for your facility.

If you have any questions regarding the development of your renewal permit, please contact Madison Diaz at (425) 495-1777 or by email at madison.diaz@ecy.wa.gov.

Sincerely,

Tricia Miller
Permit Coordinator
Northwest Region Office

Sent Via Electronic Mail - eric.burris@ci.bremerton.wa.us

Ecc: Madison Diaz, Permit Manager, madison.diaz@ecy.wa.gov
PARIS: Bremerton STP; WA0029289

Issuance Date: October 30, 2018
Effective Date: December 1, 2018
Expiration Date: November 30, 2023

National Pollutant Discharge Elimination System
Waste Discharge Permit No. WA0029289

State of Washington
DEPARTMENT OF ECOLOGY
Northwest Regional Office
3190 160th Avenue SE
Bellevue, WA 98008-5452

In compliance with the provisions of
The State of Washington Water Pollution Control Law
Chapter 90.48 Revised Code of Washington
and
The Federal Water Pollution Control Act
(The Clean Water Act)
Title 33 United States Code, Section 1342 et seq.

City of Bremerton
345 6th Street, Suite 600
Bremerton, WA 98337-1867

is authorized to discharge in accordance with the Special and General Conditions that follow.

Plant Name	West Plant	East Plant
Plant Location	1600 Oyster Bay Avenue South Bremerton, WA 98312 Kitsap County	2475 Stephenson Avenue Bremerton, WA 98310 Kitsap County
Receiving Water	Sinclair Inlet, Puget Sound	Port Washington Narrows, Puget Sound
Treatment Type	Activated Sludge, Secondary Treatment Plant	High Rate (Ballasted Sand) Clarification

RECEIVED
OCT 17 2018
CITY OF BREMERTON
WASTEWATER TREATMENT PLANT

Rachel McCrea
Water Quality Section Manager
Northwest Regional Office
Washington State Department of Ecology

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Summary of Permit Report Submittals

Refer to the Special and General Conditions of this permit for additional submittal requirements.

Permit Section	Submittal	Frequency	First Submittal Date
S3.A	Discharge Monitoring Report (DMR)	Monthly	January 15, 2019
S3.A	Discharge Monitoring Report (DMR)	Quarterly	April 15, 2019
S3.A	Discharge Monitoring Report (DMR)	Annual	January 15, 2020
S3.A	Permit Renewal Application Monitoring Data	Annual	January 15, 2020
S3.A	DMR - Priority Pollutant Data - Single Sample Data	Annual	January 15, 2020
S3.F	Reporting Permit Violations	As necessary	
S4.B	Plans for Maintaining Adequate Capacity	As necessary	
S4.D	Notification of New or Altered Sources	As necessary	
S5.F	Bypass Notification	As necessary	
S5.G	Operations and Maintenance Manual Update or Review Confirmation Letter	1/permit cycle	June 30, 2021
S6.E	Industrial User Survey Submittal	1/permit cycle	February 28, 2023
S8.A	Sediment Sampling and Analysis Plan	1/permit cycle	March 31, 2019
S8.B	Sediment Data Report	1/permit cycle	March 31, 2021
S9.C	Combined Sewer Overflow Report	Annually	May 31, 2019
S11.C	Acute Toxicity: Compliance Monitoring Reports	4/year	April 15, 2019
S11.D	Acute Toxicity: Response to noncompliance reporting	As necessary	
S11.D	Acute Toxicity: TI/TRE Plan	As necessary	
S12.A	Chronic Toxicity Effluent Test Results	2/permit cycle	July 15, 2022 January 15, 2023
S13	Outfall Evaluation	1/permit cycle	March 31, 2023
S14	Application for Permit Renewal	1/permit cycle	May 31, 2023
G1	Notice of Change in Authorization	As necessary	
G4	Reporting Planned Changes	As necessary	
G5	Engineering Report for Construction or Modification Activities	As necessary	
G7	Notice of Permit Transfer	As necessary	
G10	Duty to Provide Information	As necessary	
G20	Compliance Schedules	As necessary	
G21	Contract Submittal	As necessary	

Special Conditions

S1. Discharge limits

S1.A. Effluent limits – West Plant

All discharges and activities authorized by this permit must comply with the terms and conditions of this permit. The discharge of any of the following pollutants more frequently than, or at a level in excess of, that identified and authorized by this permit violates the terms and conditions of this permit.

Beginning on the effective date of this permit, the Permittee may discharge treated domestic wastewater to Sinclair Inlet, Puget Sound at the permitted location subject to compliance with the following limits:

Effluent Limits: Outfall No. 001 **Latitude: 47.54633055 Longitude: -122.6696500**		
Parameter	**Average Monthly [a]**	**Average Weekly [b]**
Carbonaceous Biochemical Oxygen Demand (5-day) ($CBOD_5$) (May through September)	25 milligrams/liter (mg/L) 2,294 pounds/day (lbs/day) 85% removal of influent $CBOD_5$	40 mg/L 3,670 lbs/day
$CBOD_5$ (October through April)	25 mg/L, 3,232 lbs/day 65% removal of influent $CBOD_5$	40 mg/L 5,171 lbs/day
Total Suspended Solids (TSS) (May through September)	30 mg/L, 2,752 lbs/day 85% removal of influent TSS	45 mg/L 4,128 lbs/day
TSS (October through April)	30 mg/L, 3,878 lbs/day 65% removal of influent TSS	45 mg/L 5,817 lbs/day
Parameter	**Minimum**	**Maximum**
pH	6.0 standard units	9.0 standard units
Parameter	**Monthly Geometric Mean**	**Weekly Geometric Mean**
Fecal Coliform Bacteria [c]	200/100 milliliter (mL)	400/100 mL
Parameter	**Average Monthly**	**Maximum Daily [d]**
Total Residual Chlorine	0.1 mg/L	0.3 mg/L
Parameter	**Limit**	
Acute Toxicity	No acute toxicity detected in a test concentration representing the acute critical effluent concentration (ACEC). The ACEC means the maximum concentration of effluent during critical conditions at the boundary of the acute mixing zone, defined in section S1.C of this permit. The ACEC equals 2.7% effluent (May through September) and 5% effluent (October through April). See Permit Condition S11 for more information.	

a	Average monthly effluent limit means the highest allowable average of daily discharges over a calendar month. To calculate the discharge value to compare to the limit, you add the value of each daily discharge measured during a calendar month and divide this sum by the total number of daily discharges measured. See footnote c for fecal coliform calculations.
b	Average weekly discharge limit means the highest allowable average of daily discharges over a calendar week, calculated as the sum of all daily discharges measured during a calendar week divided by the number of daily discharges measured during that week. See footnote c for fecal coliform calculations.
c	Ecology provides directions to calculate the monthly and the weekly geometric mean in publication No. 04-10-020, Information Manual for Treatment Plant Operators available at: https://fortress.wa.gov/ecy/publications/SummaryPages/0410020.html
d	Maximum daily effluent limit is the highest allowable daily discharge. The daily discharge is the average discharge of a pollutant measured during a calendar day. For pollutants with limits expressed in units of mass, calculate the daily discharge as the total mass of the pollutant discharged over the day. This does not apply to pH or temperature.

S1.B. Effluent limits – East Plant

All discharges and activities authorized by this permit must comply with the terms and conditions of this permit. The discharge of any of the following pollutants more frequently than, or at a level in excess of, that identified and authorized by this permit violates the terms and conditions of this permit.

Beginning on the effective date of this permit, the Permittee may discharge treated domestic wastewater to Port Washington Narrows, Puget Sound at the permitted location subject to compliance with the following limits:

Effluent Limits: Outfall No. 002 Latitude: 47.58108385 Longitude: -122.639268		
Parameter	**Annual Average [a]**	
TSS Removal Efficiency [b]	Equal to or greater than 50% removal of influent TSS	
Settleable Solids	0.3 mL/L/hr	
Parameter	**Minimum**	**Maximum**
pH [c]	6.0 standard units	9.0 standard units
Parameter	**Monthly Geometric Mean**	
Fecal Coliform Bacteria	400/100 mL	
Parameter	**Monthly**	
Number of Discharge Events	Report	
Discharge Volume	Report	

[a] The annual average shall be based on a calendar year and calculated using per-discharge event data points. A discharge event is defined as the combined discharge(s) from the treatment plant that are separated by less than 24 hours. The annual average of TSS removal efficiency and effluent settleable solids shall be reported no later than May 31 of the following year in the Annual CSO Report to be submitted as required in Special Condition S9.C.

[b] The TSS removal efficiency shall be calculated on a mass balance basis as the percent of solids removed at the plant.

[c] Report the minimum and maximum pH for the monitoring period.

S1.C. Mixing zone authorization

Mixing zone for Outfall 001 (West Plant)

The following paragraphs define the maximum boundaries of the mixing zones:

Chronic mixing zone

The allowable chronic mixing zone is 678 feet (206 meters) by 458 feet (140 meters). The mixing zone extends from the bottom to the top of the water column. The concentration of pollutants at the edge of the chronic zone must meet chronic aquatic life criteria and human health criteria.

Acute mixing zone

The allowable acute mixing zone is 165.8 feet (50.5 meters) by 45.8 feet (14 meters). The mixing zone extends from the bottom to the top of the water column. The concentration of pollutants at the edge of the acute zone must meet acute aquatic life criteria.

Mixing zone for Outfall 002 (East Plant)

The following paragraphs define the maximum boundaries of the mixing zones:

Chronic mixing zone

The allowable chronic mixing zone is 548 feet (167 meters) by 448 feet (137 meters). The mixing zone extends from the bottom to the top of the water column. The concentration of pollutants at the edge of the chronic zone must meet chronic aquatic life criteria and human health criteria.

Acute mixing zone

The allowable acute mixing zone is 144.8 feet (44 meters) by 44.8 feet (13.7 meters). The mixing zone extends from the bottom to the top of the water column. The concentration of pollutants at the edge of the acute zone must meet acute aquatic life criteria.

Criteria	Available Dilution (Dilution Factor)		
	Outfall 001 (West Plant)		Outfall 002 (East Plant)
	May – Sep.	Oct. – Apr.	
Acute Aquatic Life Criteria	37	20	66
Chronic Aquatic Life Criteria	141	127	444
Human Health Criteria – Carcinogen	141	127	444
Human Health Criteria – Non-carcinogen	141	127	444

S2. Monitoring requirements

S2.A. Monitoring schedule – West Plant

The Permittee must monitor in accordance with the following schedule and the requirements specified in Appendix A.

Parameter	Units & Speciation	Minimum Sampling Frequency	Sample Type
(1) Wastewater influent			
Wastewater Influent means the raw sewage flow from the collection system into the treatment facility. Sample the wastewater entering the headworks of the treatment plant excluding any side-stream returns from inside the plant.			
Flow (Primary Clarifier Influent Flow) [k]	MGD	Continuous [a]	Metered/recorded
Biochemical Oxygen Demand (BOD_5)	mg/L	1/month	24-hour composite [b]
BOD_5	lbs/day	1/month	Calculated [c]
Carbonaceous Biochemical Oxygen Demand ($CBOD_5$)	mg/L	3/week	24-hour composite
$CBOD_5$	lbs/day	3/week	Calculated
Total Suspended Solids (TSS)	mg/L	3/week	24-hour composite
TSS	lbs/day	3/week	Calculated
(2) Final wastewater effluent			
Final Wastewater Effluent means wastewater exiting the last treatment process or operation. Typically, this is after or at the exit from the chlorine contact chamber or other disinfection process. The Permittee may take effluent samples for the BOD_5 and $CBOD_5$ analysis before or after the disinfection process. If taken after, the Permittee must dechlorinate and reseed the sample.			
Flow	MGD	Continuous [a]	Metered/recorded
$CBOD_5$ [d]	mg/L	3/week	24-hour composite
$CBOD_5$	lbs/day	3/week	Calculated

Parameter	Units & Speciation	Minimum Sampling Frequency	Sample Type
$CBOD_5$	% removal [e]	1/month	Calculated
TSS	mg/L	3/week	24-hour composite
TSS	lbs/day	3/week	Calculated
TSS	% removal	1/month	Calculated
pH [f]	Standard Units	1/day	Grab [g]
Fecal Coliform [h]	# /100 mL	5/week	Grab
Chlorine (Total Residual)	mg/L	1/day	Grab
Temperature [i]	Degrees centigrade (°C)	1/day	Grab
(3) Effluent characterization – final wastewater effluent			
Total Ammonia Nitrogen	mg/L as N	1/month	24-hour composite
Nitrate plus Nitrite Nitrogen	mg/L as N	1/month	24-hour composite
Total Kjeldahl Nitrogen (TKN)	mg/L as N	1/month	24-hour composite
Total Phosphorus	mg/L as P	1/month	24-hour composite
Soluble Reactive Phosphorus	mg/L as P	1/month	24-hour composite
(4) CSO-related secondary treatment bypass			
As specified in Special Condition S9.			
(5) Sediment study			
As specified in Special Condition S8.			
(6) Whole effluent toxicity testing – final wastewater effluent			
Acute Toxicity Testing	See S11	Quarterly	24-hour composite
Chronic Toxicity Testing	See S12	2/permit cycle (April-Jun 2022 & Oct.-Dec.2022)	24-hour composite
(7) Permit renewal application requirements – final wastewater effluent			
The Permittee must record and report the wastewater treatment plant flow discharged on the day it collects the sample for priority pollutant testing with the discharge monitoring report.			
Dissolved Oxygen	mg/L	1/year	Grab
Oil and Grease	mg/L	1/year	Grab
Total Dissolved Solids	mg/L	1/year	24-hour composite
Total Hardness	mg/L	1/year	24-hour composite
Cyanide	micrograms/liter (µg/L)	1/year	Grab
Total Phenolic Compounds	µg/L	1/year	Grab
Priority Pollutants (PP) – Total Metals	µg/L; nanograms (ng/L) for mercury	1/year	24-hour composite Grab for mercury
PP – Volatile Organic Compounds	µg/L	1/year	Grab
PP – Acid-extractable Compounds	µg/L	1/year	24-hour composite
PP – Base-neutral Compounds	µg/L	1/year	24-hour composite (except Bis(2-ethylhexyl phthalate)
PP – Pesticides/PCBs	µg/L or ng/L	1/year	24-hr composite
Bis(2-ethylhexyl) phthalate (117-81-7)	µg/L	Quarterly [j] (in 2021 and 2022)	Grab (glass containers only)
(8) Wet weather operations			
Flow Bypassed	MGD	Per Event [n]	Measurement/Calculation [l, m]
Volume Bypassed	Million Gallons (MG)	Per Event [n]	Measurement/Calculation [l, m]
Duration Bypassed	Hours	Per Event [n]	Measurement
Storm Duration	Hours	Per Event [n, o]	Measurement
Precipitation	Inches	Per Event [n]	Measurement/Calculation [m]

Parameter	Units & Speciation	Minimum Sampling Frequency	Sample Type
a	Continuous means uninterrupted except for brief lengths of time for calibration, power failure, or unanticipated equipment repair or maintenance. The Permittee must sample daily when continuous monitoring is not possible.		
b	24-hour composite means a series of individual samples collected over a 24-hour period into a single container, and analyzed as one sample.		
c	Calculated means figured concurrently with the respective sample, using the following formula: Concentration (in mg/L) X Flow (in MGD) X Conversion Factor (8.34) = lbs/day		
d	Take effluent samples for the $CBOD_5$ analysis before or after the disinfection process. If taken after, dechlorinate and reseed the sample.		
e	% removal = Influent concentration (mg/L) – Effluent concentration (mg/L) x 100 Influent concentration (mg/L) Calculate the percent (%) removal of $CBOD_5$ and TSS using the above equation.		
f	Report the daily pH and the minimum and maximum for the monitoring period.		
g	Grab means an individual sample collected over a fifteen (15) minute, or less, period.		
h	Report a numerical value for fecal coliforms following the procedures in Ecology's *Information Manual for Wastewater Treatment Plant Operators*, Publication Number 04-10-020 available at: https://fortress.wa.gov/ecy/publications/SummaryPages/0410020.html. Do not report a result as too numerous to count (TNTC).		
i	Temperature grab sampling must occur when the effluent is at or near its daily maximum temperature, which usually occurs in the late afternoon. If measuring temperature continuously, the Permittee must determine and report a daily maximum from half-hour measurements in a 24-hour period. Continuous monitoring instruments must achieve an accuracy of 0.2 degrees C and the Permittee must verify accuracy annually.		
j	Quarterly sampling periods are January through March, April through June, July through September, and October through December.		
k	Influent flow to the primary clarifiers shall be measured and reported as the wastewater influent flow to the plant.		
l	Flow measurement must be continuous, except for brief lengths of time for calibration, for power failure, or for unanticipated equipment repair or maintenance. During periods of interrupted service, a calculation may be used to estimate the bypass volume. An explanation must be provided in the monthly DMR for all disruptions in flow measurement.		
m	"Measurement/Calculation" means the total volume of the bypass or amount of precipitation event as estimated by direct measurement or indirectly by calculation (i.e. flow weirs, pressure transducers). Precipitation must be measured by the nearest possible precipitation-measuring device and actively monitored during the period of interest.		
n	"Per Event" means a unique flow event as defined in the Ecology's Permit Writer's Manual. Ecology defines the minimum inter-event period (MIET) as 24 hours. A bypass event is considered to have ended only after at least 24 hours has elapsed since the last measured occurrence of a bypass.		
o	Storm duration is the amount of total time when precipitation occurred that contributed to a bypass event. It is determined on a case-by-case basis.		

S2.B. Monitoring schedule – East Plant

The Permittee must monitor in accordance with the following schedule and the requirements specified in Appendix A.

Parameter	Units & Speciation	Minimum Sampling Frequency	Sample Type
(1) Wastewater influent			
Wastewater Influent means the combined sewage flow from the collection system into the treatment facility. Sample the wastewater entering the headworks of the treatment plant excluding any side-stream returns from inside the plant.			
Biochemical Oxygen Demand (BOD_5)	mg/L	Per Event [a]	Composite [b]
Total Suspended Solids (TSS)	mg/L	Per Event [a]	Composite [b]

Parameter	Units & Speciation	Minimum Sampling Frequency	Sample Type
(2) Final wastewater effluent			
Final Wastewater Effluent means wastewater exiting the last treatment process or operation. Typically, this is after or at the exit from the chlorine contact chamber or other disinfection process. The Permittee may take effluent samples for the BOD_5 and $CBOD_5$ analysis before or after the disinfection process. If taken after, the Permittee must dechlorinate and reseed the sample.			
Discharge Events	#	Per Event [a]	Measurement
Flow	MGD	Per Event [a]	Metered/recorded
Volume	MG	Per Event [a]	Calculated
Discharge Duration	Hours	Per Event [a]	Measurement
BOD_5	mg/L	Per Event [a]	Composite [b]
TSS	mg/L	Per Event [a]	Composite [b]
TSS	% removal	Per Event [a]	Calculated
Settleable Solids	mL/L/hr [f]	Per Event [a]	Composite [b]
pH	Standard Units	Per Event [a]	Grab [c]
Fecal Coliform [d]	# /100 mL	Per Event [a]	Grab [c]
(3) Ambient Monitoring			
Storm Duration	Hours	Per Event [a]	Measurement
Precipitation	Inches	Per Event [a]	Measurement at the nearest possible precipitation-measuring device
(4) Permit renewal application requirements – final wastewater effluent			
The final effluent must be analyzed for the following parameters during the permit cycle. The analysis results must be submitted with the next permit renewal application - EPA Form 3510-2A. The Permittee must record and report the wastewater treatment plant flow discharged on the day it collects the sample for priority pollutant testing with the discharge monitoring report.			
Total Ammonia Nitrogen	mg/L as N	1/year [e]	Composite [b]
Nitrate plus Nitrite Nitrogen	mg/L as N	1/year [e]	Composite [b]
Total Kjeldahl Nitrogen (TKN)	mg/L as N	1/year [e]	Composite [b]
Total Phosphorus	mg/L as P	1/year [e]	Composite [b]
Dissolved Oxygen	mg/L	1/year [e]	Grab [c]
Oil and Grease	mg/L	1/year [e]	Grab [c]
Total Dissolved Solids	mg/L	1/year [e]	Grab [c]
Temperature	Degrees centigrade (°C)	1/year [e]	Grab [c]
Cyanide	micrograms/liter (µg/L)	1/year [e]	Grab [c]
Total Phenolic Compounds	µg/L	1/year [e]	Grab [c]
Priority Pollutants (PP) – Total Metals	µg/L; nanograms(ng/L) for mercury	1/year [e]	Composite [b] or Grab [c] Grab [c] for mercury
PP – Volatile Organic Compounds	µg/L	1/year [e]	Grab [c]
PP – Acid-extractable Compounds	µg/L	1/year [e]	Composite [b] or Grab [c]
PP – Base-neutral Compounds	µg/L	1/year [e]	Composite [b] or Grab [c] (except Bis(2-ethylhexyl) phthalate, Grab [c], glass containers only)
PP – Pesticides/PCBs	µg/L or ng/L	1/year [e]	Composite [b] or Grab [c]

[a]	"Per Event" means a unique flow event as defined in the Ecology's *Permit Writer's Manual*, p. 138. Ecology defines the minimum inter-event period (MIET) as 24 hours. A CSO event is considered to have ended only after at least 24 hours has elapsed since the last measured occurrence of an overflow.
[b]	Composite means a series of individual samples collected over a flow period into a single container, and analyzed as one sample. The composite sample should represent the entire discharge event.
[c]	Grab means an individual sample collected over a fifteen (15)-minute, or less, period.

	Parameter	Units & Speciation	Minimum Sampling Frequency	Sample Type
d	Report a numerical value for fecal coliforms following the procedures in Ecology's *Information Manual for Wastewater Treatment Plant Operators*, Publication Number 04-10-020 available at: https://fortress.wa.gov/ecy/publications/SummaryPages/0410020.html. Do not report a result as too numerous to count (TNTC).			
e	A yearly sampling must be analyzed, provided there is at least one or more yearly treated CSO discharge events from East Plant. Each round of sampling must be from a separate, treated CSO discharge event.			
f	Per the analytical method of this parameter listed in the Appendix A, it is reported as mL/L.			

S2.C. Combined sewer overflow (CSO) monitoring schedule

The Permittee must monitor all discharges from CSO outfalls listed in Special Condition S9.A using the following monitoring schedule. The Permittee must report this monitoring data in the CSO Annual Report, to be submitted in accordance with Special Condition S9.C.

The Permittee must use automatic flow monitoring equipment to collect the information required below. Permittee must calibrate flow monitoring equipment according to requirements in Condition S2.E.

Parameter	Units	Minimum Sampling Frequency	Sample Type
CSO discharge is defined as any untreated CSO which will exit or has exited the CSO outfall.			
Volume Discharged	Gallons	Per Event [c]	Measurement/Calculation [a, b]
Discharge Duration	Hours	Per Event [c]	Measurement
Storm Duration	Hours	Per Event [d]	Measurement
Precipitation	Inches	Per Event [c]	Measurement/Calculation [b]

Footnotes for CSO Monitoring:

a	Flow measurement must be continuous, except for brief lengths of time for calibration, for power failure, or for unanticipated equipment repair or maintenance. During periods of interrupted service, a calculation may be used to estimate the discharge volume. An explanation must be provided in the monthly DMR for all disruptions in flow measurement.
b	"Measurement/Calculation" means the total volume of the discharge or amount of precipitation event as estimated by direct measurement or indirectly by calculation (i.e. flow weirs, pressure transducers, tipping bucket). Precipitation must be measured by the nearest possible precipitation-measuring device and actively monitored during the period of interest.
c	"Per Event" means a unique flow event as defined in the Ecology's *Permit Writer's Manual*, p. 138. Ecology defines the minimum inter-event period (MIET) as 24 hours. A CSO event is considered to have ended only after at least 24 hours has elapsed since the last measured occurrence of an overflow.
d	Storm duration is the amount of total time when precipitation occurred that contributed to a discharge event. It is determined on a case-by-case basis.

S2.D. Sampling and analytical procedures

Samples and measurements taken to meet the requirements of this permit must represent the volume and nature of the monitored parameters. The Permittee must conduct representative sampling of any unusual discharge or discharge condition, including bypasses, upsets, and maintenance-related conditions that may affect effluent quality.

Sampling and analytical methods used to meet the monitoring requirements specified in this permit must conform to the latest revision of the *Guidelines Establishing Test Procedures for the Analysis of Pollutants* contained in 40 CFR Part 136 (or as applicable in 40 CFR subchapters N [Parts 400–471] or O [Parts 501-503]) unless otherwise specified in this permit . Ecology may only specify alternative methods for parameters without permit limits and for those parameters without an EPA approved test method in 40 CFR Part 136.

S2.E. Flow measurement, field measurement, and continuous monitoring devices

The Permittee must:

1. Select and use appropriate flow measurement, field measurement, and continuous monitoring devices and methods consistent with accepted scientific practices.
2. Install, calibrate, and maintain these devices to ensure the accuracy of the measurements is consistent with the accepted industry standard, the manufacturer's recommendation, and approved O&M manual procedures for the device and the wastestream.
3. Calibrate continuous monitoring instruments weekly unless it can demonstrate a longer period is sufficient based on monitoring records. The Permittee:
    a. May calibrate apparatus for continuous monitoring of dissolved oxygen by air calibration.
    b. Must calibrate continuous pH measurement instruments using a grab sample analyzed in the lab with a pH meter calibrated with standard buffers and analyzed within 15 minutes of sampling.
    c. Must calibrate continuous chlorine measurement instruments using a grab sample analyzed in the laboratory within 15 minutes of sampling.
4. Use field measurement devices as directed by the manufacturer and do not use reagents beyond their expiration dates.
5. Calibrate flow-monitoring devices at a minimum frequency of at least one calibration per year.
6. Maintain calibration records for at least three years.

S2.F. Laboratory accreditation

The Permittee must ensure that all monitoring data required by Ecology for permit specified parameters is prepared by a laboratory registered or accredited under the provisions of chapter 173-50 WAC, *Accreditation of Environmental Laboratories*. Flow, temperature, settleable solids, conductivity, pH, and internal process control parameters are exempt from this requirement. The Permittee must obtain accreditation for conductivity and pH if it must receive accreditation or registration for other parameters.

S2.G. Request for reduction in monitoring

The Permittee may request a reduction of the sampling frequency after twelve (12) months of monitoring. Ecology will review each request and at its discretion grant the request when it reissues the permit or by a permit modification.

The Permittee must:

1. Provide a written request.
2. Clearly state the parameters for which it is requesting reduced monitoring.
3. Clearly state the justification for the reduction.

S3. Reporting and recording requirements

The Permittee must monitor and report in accordance with the following conditions. Falsification of information submitted to Ecology is a violation of the terms and conditions of this permit.

S3.A. Discharge monitoring reports

The first monitoring period begins on the effective date of the permit (unless otherwise specified). The Permittee must:

1. Summarize, report, and submit monitoring data obtained during each monitoring period on the electronic discharge monitoring report (DMR) form provided by Ecology within the Water Quality Permitting Portal. Include data for each of the parameters tabulated in Special Condition S2 and as required by the form. Report a value for each day sampling occurred (unless specifically exempted in the permit) and for the summary values (when applicable) included on the electronic form.
2. Ensure that DMRs are electronically submitted no later than the dates specified below, unless otherwise specified in this permit.
3. The Permittee must also submit an electronic copy of the laboratory report as an attachment using WQWebDMR. The contract laboratory reports must also include information on the chain of custody, QA/QC results, and documentation of accreditation for the parameter.
4. Submit DMRs for parameters with the monitoring frequencies specified in S2 (monthly, quarterly, annual, etc.) at the reporting schedule identified below. The Permittee must:
    a. Submit **monthly** DMRs by the 15th day of the following month. The first submittal is January 15, 2019.
    b. Submit **quarterly DMRs**, unless otherwise specified in the permit, by the 15th day of the month following the monitoring period. Quarterly sampling periods are January through March, April through June, July through September, and October through December. The first submittal is April 15, 2019.
    c. Submit **annual DMRs**, unless otherwise specified in the permit, by January 15 for the previous calendar year. The annual sampling period is the calendar year. The first submittal is January 15, 2020.

d. Submit permit renewal application monitoring data in WQWebDMR as required in Special Condition S2.

5. Enter the "No Discharge" reporting code for an entire DMR, for a specific monitoring point, or for a specific parameter as appropriate, if the Permittee did not discharge wastewater or a specific pollutant during a given monitoring period.

6. Report single analytical values below detection as "less than the detection level (DL)" by entering < followed by the numeric value of the detection level (e.g. < 2.0) on the DMR. If the method used did not meet the minimum DL and quantitation level (QL) identified in the permit, report the actual QL and DL in the comments or in the location provided.

7. Report single analytical values between the detection level (DL) and the quantitation level (QL) by entering the estimated value, the code for estimated value/below quantitation limit (j) and any additional information in the comments. Submit a copy of the laboratory report as an attachment using WQWebDMR.

8. **Not** report zero for bacteria monitoring. Report as required by the laboratory method.

9. Calculate and report an arithmetic average value for each day for bacteria if multiple samples were taken in one day.

10. Calculate the geometric mean values for bacteria (unless otherwise specified in the permit) using:

    a. The reported numeric value for all bacteria samples measured above the detection value except when it took multiple samples in one day. If the Permittee takes multiple samples in one day it must use the arithmetic average for the day in the geometric mean calculation.

    b. The detection value for those samples measured below detection.

11. Report the test method used for analysis in the comments if the laboratory used an alternative method not specified in the permit and as allowed in Appendix A.

12. Calculate average values and calculated total values (unless otherwise specified in the permit) using:

    a. The reported numeric value for all parameters measured between the detection value and the quantitation value for the sample analysis.

    b. One-half the detection value (for values reported below detection) if the lab detected the parameter in another sample from the same monitoring point for the reporting period.

    c. Zero (for values reported below detection) if the lab did not detect the parameter in another sample for the reporting period.

13. Report single-sample grouped parameters (for example: priority pollutants, PAHs, pulp and paper chlorophenolics, TTOs) on the WQWebDMR form and include sample date, concentration detected, detection limit (DL) (as necessary), and laboratory quantitation level (QL) (as necessary).

S3.B. Permit submittals and schedules

The Permittee must use the Water Quality Permitting Portal – Permit Submittals application (unless otherwise specified in the permit) to submit all other written permit-required reports by the date specified in the permit.

When another permit condition requires submittal of a paper (hard-copy) report, the Permittee must ensure that it is postmarked or received by Ecology no later than the dates specified by this permit. Send these paper reports to Ecology at:

Water Quality Permit Coordinator
Department of Ecology
Northwest Regional Office
3190 160th Avenue SE
Bellevue, WA 98008-5452

S3.C. Records retention

The Permittee must retain records of all monitoring information for a minimum of three (3) years. Such information must include all calibration and maintenance records and all original recordings for continuous monitoring instrumentation, copies of all reports required by this permit, and records of all data used to complete the application for this permit. The Permittee must extend this period of retention during the course of any unresolved litigation regarding the discharge of pollutants by the Permittee or when requested by Ecology.

S3.D. Recording of results

For each measurement or sample taken, the Permittee must record the following information:

1. The date, exact place, method, and time of sampling or measurement.
2. The individual who performed the sampling or measurement.
3. The dates the analyses were performed.
4. The individual who performed the analyses.
5. The analytical techniques or methods used.
6. The results of all analyses.

S3.E. Additional monitoring by the Permittee

If the Permittee monitors any pollutant more frequently than required by Special Condition S2 of this permit, then the Permittee must include the results of such monitoring in the calculation and reporting of the data submitted in the Permittee's DMR unless otherwise specified by Special Condition S2.

S3.F. Reporting permit violations

The Permittee must take the following actions when it violates or is unable to comply with any permit condition:

1. Immediately take action to stop, contain, and cleanup unauthorized discharges or otherwise stop the noncompliance and correct the problem.

2. If applicable, immediately repeat sampling and analysis. Submit the results of any repeat sampling to Ecology within thirty (30) days of sampling.

a. Immediate reporting

The Permittee must **immediately** report to Ecology and the Department of Health, Shellfish Program, and the Local Health Jurisdiction (at the numbers listed below), all:

- Failures of the disinfection system.
- Collection system overflows.
- Plant bypasses discharging to marine surface waters.
- Any other failures of the sewage system (pipe breaks, etc.)

Northwest Regional Office	**425-649-7000**
Department of Health, Shellfish Program	**360-236-3330 (business hours)** **360-789-8962 (after business hours)**
Kitsap Public Health District	**360-728-2235 (call 24/7, after business hours press 9)**

Additionally, for any sanitary sewer overflow (SSO) that discharges to a municipal separate storm sewer system (MS4), the Permittee must notify the appropriate MS4 owner or operator.

b. Twenty-four-hour reporting

The Permittee must report the following occurrences of noncompliance by telephone, to Ecology at the telephone numbers listed above, within 24 hours from the time the Permittee becomes aware of any of the following circumstances:

1. Any noncompliance that may endanger health or the environment, unless previously reported under immediate reporting requirements.
2. Any unanticipated bypass that causes an exceedance of an effluent limit in the permit (See Part S5.F, "Bypass Procedures").
3. Any upset that causes an exceedance of an effluent limit in the permit (See G.15, "Upset").
4. Any violation of a maximum daily or instantaneous maximum discharge limit for any of the pollutants in section S1.A of this permit.
5. Any overflow prior to the treatment works, whether or not such overflow endangers health or the environment or exceeds any effluent limit in the permit.

c. Report within five days

The Permittee must also submit a written report within five days of the time that the Permittee becomes aware of any reportable event under subparts a or b, above. The report must contain:

1. A description of the noncompliance and its cause.
2. The period of noncompliance, including exact dates and times.
3. The estimated time the Permittee expects the noncompliance to continue if not yet corrected.
4. Steps taken or planned to reduce, eliminate, and prevent recurrence of the noncompliance.
5. If the noncompliance involves an overflow prior to the treatment works, an estimate of the quantity (in gallons) of untreated overflow.

d. Waiver of written reports

Ecology may waive the written report required in subpart c, above, on a case-by-case basis upon request if the Permittee has submitted a timely oral report.

e. All other permit violation reporting

The Permittee must report all permit violations, which do not require immediate or within 24 hours reporting, when it submits monitoring reports for S3.A ("Reporting"). The reports must contain the information listed in subpart c, above. Compliance with these requirements does not relieve the Permittee from responsibility to maintain continuous compliance with the terms and conditions of this permit or the resulting liability for failure to comply.

S3.G. Other reporting

a. Spills of oil or hazardous materials

The Permittee must report a spill of oil or hazardous materials in accordance with the requirements of RCW 90.56.280 and chapter 173-303-145. You can obtain further instructions at the following website: https://ecology.wa.gov/About-us/Get-involved/Report-an-environmental-issue/Report-a-spill

b. Failure to submit relevant or correct facts

Where the Permittee becomes aware that it failed to submit any relevant facts in a permit application, or submitted incorrect information in a permit application, or in any report to Ecology, it must submit such facts or information promptly.

S3.H. Maintaining a copy of this permit

The Permittee must keep a copy of this permit at the facility and make it available upon request to Ecology inspectors.

S4. Facility loading

S4.A. Design criteria

The flows or waste loads for the permitted facility must not exceed the following design criteria:

Maximum Month Design Flow (MMDF)(May-September)	**11**	**MGD**
Maximum Month Design Flow (MMDF)(October-April)	**15.5**	**MGD**
BOD_5 Influent Loading for Maximum Month	**18,100**	**lbs/day**
TSS Influent Loading for Maximum Month	**22,600**	**lbs/day**

S4.B. Plans for maintaining adequate capacity

a. Conditions triggering plan submittal

The Permittee must submit a plan and a schedule for continuing to maintain capacity to Ecology when:

1. The actual flow or waste load reaches 85 percent of any one of the design criteria in S4.A for three consecutive months.
2. The projected plant flow or loading would reach design capacity within five years.

b. Plan and schedule content

The plan and schedule must identify the actions necessary to maintain adequate capacity for the expected population growth and to meet the limits and requirements of the permit. The Permittee must consider the following topics and actions in its plan.

1. Analysis of the present design and proposed process modifications.
2. Reduction or elimination of excessive infiltration and inflow of uncontaminated ground and surface water into the sewer system.
3. Limits on future sewer extensions or connections or additional waste loads.
4. Modification or expansion of facilities.
5. Reduction of industrial or commercial flows or waste loads.

Engineering documents associated with the plan must meet the requirements of WAC 173-240-060, "Engineering Report," and be approved by Ecology prior to any construction.

S4.C. Duty to mitigate

The Permittee must take all reasonable steps to minimize or prevent any discharge or sludge use or disposal in violation of this permit that has a reasonable likelihood of adversely affecting human health or the environment.

S4.D. Notification of new or altered sources

1. The Permittee must submit written notice to Ecology whenever any new discharge or a substantial change in volume or character of an existing discharge into the wastewater treatment plant is proposed which:
   a. Would interfere with the operation of, or exceed the design capacity of, any portion of the wastewater treatment plant.

b. Is not part of an approved general sewer plan or approved plans and specifications.

c. Is subject to pretreatment standards under 40 CFR Part 403 and section 307(b) of the Clean Water Act.

2. This notice must include an evaluation of the wastewater treatment plant's ability to adequately transport and treat the added flow and/or waste load, the quality and volume of effluent to be discharged to the treatment plant, and the anticipated impact on the Permittee's effluent [40 CFR 122.42(b)].

S5. Operation and maintenance

The Permittee must at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances), which are installed to achieve compliance with the terms and conditions of this permit. Proper operation and maintenance also includes keeping a daily operation logbook (paper or electronic), adequate laboratory controls, and appropriate quality assurance procedures. This provision of the permit requires the Permittee to operate backup or auxiliary facilities or similar systems only when the operation is necessary to achieve compliance with the conditions of this permit.

S5.A. Certified operator

This permitted facility must be operated by an operator certified by the state of Washington for at least a Class IV plant. This operator must be in responsible charge of the day-to-day operation of the wastewater treatment plant. An operator certified for at least a Class III plant must be in charge during all regularly scheduled shifts. The Permittee must notify Ecology when the operator in charge at the facility changes. It must provide the new operator's name and certification level and provide the name of the operator leaving the facility.

S5.B. Operation and maintenance program

The Permittee must:

1. Institute an adequate operation and maintenance program for the entire sewage system.

2. Keep maintenance records on all major electrical and mechanical components of the treatment plant, as well as the sewage system and pumping stations. Such records must clearly specify the frequency and type of maintenance recommended by the manufacturer and must show the frequency and type of maintenance performed.

3. Make maintenance records available for inspection at all times.

S5.C. Short-term reduction

The Permittee must schedule any facility maintenance, which might require interruption of wastewater treatment and degrade effluent quality, during non-critical water quality periods and carry this maintenance out according to the approved O&M manual or as otherwise approved by Ecology.

If a Permittee contemplates a reduction in the level of treatment that would cause a violation of permit discharge limits on a short-term basis for any reason, and such reduction cannot be avoided, the Permittee must:

1. Give written notification to Ecology, if possible, thirty (30) days prior to such activities.
2. Detail the reasons for, length of time of, and the potential effects of the reduced level of treatment.

This notification does not relieve the Permittee of its obligations under this permit.

S5.D. Electrical power failure

The Permittee must ensure that adequate safeguards prevent the discharge of untreated wastes or wastes not treated in accordance with the requirements of this permit during electrical power failure at the treatment plant and/or sewage lift stations. Adequate safeguards include, but are not limited to, alternate power sources, standby generator(s), or retention of inadequately treated wastes.

The Permittee must maintain Reliability Class II (EPA 430-99-74-001) at the wastewater treatment plant. Reliability Class II requires a backup power source sufficient to operate all vital components and critical lighting and ventilation during peak wastewater flow conditions. Vital components used to support the secondary processes (i.e., mechanical aerators or aeration basin air compressors) need not be operable to full levels of treatment, but must be sufficient to maintain the biota.

S5.E. Prevent connection of inflow

The Permittee must strictly enforce its sewer ordinances and not allow the connection of inflow (roof drains, foundation drains, etc.) to the sanitary sewer system.

S5.F. Bypass procedures

A bypass is the intentional diversion of waste streams from any portion of a treatment facility. This permit prohibits all bypasses except when the bypass is for essential maintenance, as authorized in Special Condition S5.F.1, or is approved by Ecology as an anticipated bypass following the procedures in S5.F.2.

1. Bypass for essential maintenance without the potential to cause violation of permit limits or conditions.

   This permit allows bypasses for essential maintenance of the treatment system when necessary to ensure efficient operation of the system. The Permittee may bypass the treatment system for essential maintenance only if doing so does not cause violations of effluent limits. The Permittee is not required to notify Ecology when bypassing for essential maintenance. However the Permittee must comply with the monitoring requirements specified in Special Condition S2.

2. Anticipated bypasses for non-essential maintenance

   Ecology may approve an anticipated bypass under the conditions listed below. This permit prohibits any anticipated bypass that is not approved through the following process.

   a. If a bypass is for non-essential maintenance, the Permittee must notify Ecology, if possible, at least ten (10) days before the planned date of bypass. The notice must contain:

      - A description of the bypass and the reason the bypass is necessary.
      - An analysis of all known alternatives which would eliminate, reduce, or mitigate the potential impacts from the proposed bypass.
      - A cost-effectiveness analysis of alternatives.
      - The minimum and maximum duration of bypass under each alternative.
      - A recommendation as to the preferred alternative for conducting the bypass.
      - The projected date of bypass initiation.
      - A statement of compliance with SEPA.
      - A request for modification of water quality standards as provided for in WAC 173-201A-410, if an exceedance of any water quality standard is anticipated.
      - Details of the steps taken or planned to reduce, eliminate, and prevent recurrence of the bypass.

   b. For probable construction bypasses, the Permittee must notify Ecology of the need to bypass as early in the planning process as possible. The Permittee must consider the analysis required above during the project planning and design process. The project-specific engineering report as well as the plans and specifications must include details of probable construction bypasses to the extent practical. In cases where the Permittee determines the probable need to bypass early, the Permittee must continue to analyze conditions up to and including the construction period in an effort to minimize or eliminate the bypass.

   c. Ecology will determine if the Permittee has met the conditions of Special Condition S5.F.2 a and b and consider the following prior to issuing a determination letter, an administrative order, or a permit modification as appropriate for an anticipated bypass:

      - If the Permittee planned and scheduled the bypass to minimize adverse effects on the public and the environment.
      - If the bypass is unavoidable to prevent loss of life, personal injury, or severe property damage. "Severe property damage" means substantial physical damage to property, damage to the treatment facilities which

would cause them to become inoperable, or substantial and permanent loss of natural resources which can reasonably be expected to occur in the absence of a bypass.

- If feasible alternatives to the bypass exist, such as:
  - The use of auxiliary treatment facilities.
  - Retention of untreated wastes.
  - Stopping production.
  - Maintenance during normal periods of equipment downtime, but not if the Permittee should have installed adequate backup equipment in the exercise of reasonable engineering judgment to prevent a bypass which occurred during normal periods of equipment downtime or preventative maintenance.
  - Transport of untreated wastes to another treatment facility.

S5.G. Operations and maintenance (O&M) manual

a. O&M manual submittal and requirements

The Permittee must:

1. Review the operations and maintenance (O&M) manual and confirm this review by submitting a letter to Ecology by June 30, 2021. When treatment processes or equipment have significant changes or upgrades the permittee shall update the O&M manual that meets the requirements of 173-240-080 WAC and submit it to Ecology for approval. The Permittee must submit a paper copy and an electronic copy (preferably as a PDF).
2. Keep the approved O&M Manual at the permitted facility.
3. Follow the instructions and procedures of this manual.

b. O&M manual components

In addition to the requirements of WAC 173-240-080(1) through (5), the O&M manual must be consistent with the guidance in Table G1-3 in the *Criteria for Sewage Works Design* (Orange Book), 2008. The O&M manual must include:

1. Emergency procedures for cleanup in the event of wastewater system upset or failure.
2. A review of system components which if failed could pollute surface water or could impact human health. Provide a procedure for a routine schedule of checking the function of these components.
3. Wastewater system maintenance procedures that contribute to the generation of process wastewater.
4. Reporting protocols for submitting reports to Ecology to comply with the reporting requirements in the discharge permit.

5. Any directions to maintenance staff when cleaning or maintaining other equipment or performing other tasks which are necessary to protect the operation of the wastewater system (for example, defining maximum allowable discharge rate for draining a tank, blocking all floor drains before beginning the overhaul of a stationary engine).
6. The treatment plant process control monitoring schedule.
7. Minimum staffing adequate to operate and maintain the treatment processes and carry out compliance monitoring required by the permit.

S6. Pretreatment

S6.A. General requirements

The Permittee must work with Ecology to ensure that all commercial and industrial users of the publicly owned treatment works (POTW) comply with the pretreatment regulations in 40 CFR Part 403 and any additional regulations that the Environmental Protection Agency (U.S. EPA) may promulgate under section 307(b) (pretreatment) and 308 (reporting) of the Federal Clean Water Act.

S6.B. Duty to enforce discharge prohibitions

1. Under federal regulations (40 CFR 403.5(a) and (b)), the Permittee must not authorize or knowingly allow the discharge of any pollutants into its POTW which may be reasonably expected to cause pass through or interference, or which otherwise violate general or specific discharge prohibitions contained in 40 CFR Part 403.5 or WAC 173-216-060.
2. The Permittee must not authorize or knowingly allow the introduction of any of the following into their treatment works:
   a. Pollutants which create a fire or explosion hazard in the POTW (including, but not limited to waste streams with a closed cup flashpoint of less than 140 degrees Fahrenheit or 60 degrees Centigrade using the test methods specified in 40 CFR 261.21).
   b. Pollutants which will cause corrosive structural damage to the POTW, but in no case discharges with pH lower than 5.0, or greater than 11.0 standard units, unless the works are specifically designed to accommodate such discharges.
   c. Solid or viscous pollutants in amounts that could cause obstruction to the flow in sewers or otherwise interfere with the operation of the POTW.
   d. Any pollutant, including oxygen-demanding pollutants, (BOD_5, etc.) released in a discharge at a flow rate and/or pollutant concentration which will cause interference with the POTW.
   e. Petroleum oil, non-biodegradable cutting oil, or products of mineral origin in amounts that will cause interference or pass through.

f. Pollutants which result in the presence of toxic gases, vapors, or fumes within the POTW in a quantity which may cause acute worker health and safety problems.

g. Heat in amounts that will inhibit biological activity in the POTW resulting in interference but in no case heat in such quantities such that the temperature at the POTW headworks exceeds 40 degrees Centigrade (104 degrees Fahrenheit) unless Ecology, upon request of the Permittee, approves, in writing, alternate temperature limits.

h. Any trucked or hauled pollutants, except at discharge points designated by the Permittee.

i. Wastewaters prohibited to be discharged to the POTW by the Dangerous Waste Regulations (chapter 173-303 WAC), unless authorized under the Domestic Sewage Exclusion (WAC 173-303-071).

3. The Permittee must also not allow the following discharges to the POTW unless approved in writing by Ecology:

   a. Noncontact cooling water in significant volumes.

   b. Stormwater and other direct inflow sources.

   c. Wastewaters significantly affecting system hydraulic loading, which do not require treatment, or would not be afforded a significant degree of treatment by the system.

4. The Permittee must notify Ecology if any industrial user violates the prohibitions listed in this section (S6.B), and initiate enforcement action to promptly curtail any such discharge.

S6.C. Wastewater discharge permit required

The Permittee must:

1. Establish a process for authorizing non-domestic wastewater discharges that ensures all SIUs in all tributary areas meet the applicable state waste discharge permit (SWDP) requirements in accordance with chapter 90.48 RCW and chapter 173-216 WAC.

2. Immediately notify Ecology of any proposed discharge of wastewater from a source, which may be a significant industrial user (SIU) [see fact sheet definitions or refer to 40 CFR 403.3(v)(i)(ii)].

3. Require all SIUs to obtain a SWDP from Ecology prior to accepting their non-domestic wastewater, or require proof that Ecology has determined they do not require a permit.

4. Require the documentation as described in S6.C.3 at the earliest practicable date as a condition of continuing to accept non-domestic wastewater discharges from a previously undiscovered, currently discharging and unpermitted SIU.

5. Require sources of non-domestic wastewater, which do not qualify as SIUs but merit a degree of oversight, to apply for a SWDP and provide it a copy of the application and any Ecology responses.
6. Keep all records documenting that its users have met the requirements of S6.C.

S6.D. Identification and reporting of existing, new, and proposed industrial users

1. The Permittee must take continuous, routine measures to identify all existing, new, and proposed SIUs and potential significant industrial users (PSIUs) discharging or proposing to discharge to the Permittee's sewer system (see **Appendix C** of the fact sheet for definitions).
2. Within 30 days of becoming aware of an unpermitted existing, new, or proposed industrial user who may be a significant industrial user (SIU), the Permittee must notify such user by registered mail that, if classified as an SIU, they must apply to Ecology and obtain a State Waste Discharge Permit. The Permittee must send a copy of this notification letter to Ecology within this same 30-day period.
3. The Permittee must also notify all Potential SIUs (PSIUs), as they are identified, that if their classification should change to an SIU, they must apply to Ecology for a State Waste Discharge Permit within 30 days of such change.

S6.E. Industrial user survey

The Permittee must complete an industrial user survey listing all SIUs and potential significant industrial users (PSIUs) discharging to the POTW. The Permittee must submit the survey to Ecology by February 28, 2023 (once per permit cycle). At a minimum, the Permittee must develop the list of SIUs and PSIUs by means of a telephone book search, a water utility billing records search, and a physical reconnaissance of the service area. Information on PSIUs must include, at a minimum, the business name, telephone number, address, description of the industrial process(s), and the known wastewater volumes and characteristics.

S7. Solid wastes

S7.A. Solid waste handling

The Permittee must handle and dispose of all solid waste material in such a manner as to prevent its entry into state ground or surface water.

S7.B. Leachate

The Permittee must not allow leachate from its solid waste material to enter state waters without providing all known, available, and reasonable methods of treatment, nor allow such leachate to cause violations of the State Surface Water Quality Standards, Chapter 173-201A WAC, or the State Ground Water Quality Standards, Chapter 173-200 WAC. The Permittee must apply for a permit or permit modification as may be required for such discharges to state ground or surface waters.

S8. Sediment monitoring

West Plant

S8.A. Sediment sampling and analysis plan

The Permittee must submit to Ecology for review and approval a sediment sampling and analysis plan for sediment monitoring by March 31, 2019. The purpose of the plan is to recharacterize sediment (the nature and extent of chemical contamination and biological toxicity) quality in the vicinity of the Permittee's discharge locations. The Permittee must follow the guidance provided in the *Sediment Cleanup Users Manual II, Appendix A: Sampling Guidance for NPDES Permits under the Sediment Management Standards* (Ecology, 2017) or the latest edition.

S8.B. Sediment data report

Following Ecology approval of the sediment sampling and analysis plan, the Permittee must collect sediments between August 15th and September 30th. The Permittee must submit to Ecology a sediment data report containing the results of the sediment sampling and analysis no later than March 31, 2021. The sediment data report must conform to the approved sediment sampling and analysis plan. In addition, the Permittee must follow the guidance provided in the *Sediment Cleanup User's Manual II, Appendix A: Sampling Guidance for NPDES Permits under the Sediment Management Standards* (Ecology, 2017) or the latest edition. The report must document when the data was successfully loaded into EIM as required below.

In addition to a sediment data report, submit the sediment chemical and biological data to Ecology's EIM database (https://fortress.wa.gov/ecy/eimreporting/default.aspx). Data must be submitted to EIM according to the instructions on the EIM website. The data submittal portion of the EIM website (https://ecology.wa.gov/Research-Data/Data-resources/Environmental-Information-Management-database/EIM-submit-data) provides information and help on formats and requirements for submitting tabular data.

In addition to the EIM data submittal, Ecology's MyEIM tools (https://ecology.wa.gov/Research-Data/Data-resources/Environmental-Information-Management-database/Using-MyEIM) must be used to confirm that the submitted data was accurately entered into EIM. Any differences between the MyEIM analytical results and sediment data report must be identified and explained.

S9. Combined sewer overflows

S9.A. Authorized combined sewer overflow (CSO) discharge locations

Beginning on the effective date of this permit, the Permittee may discharge domestic wastewater from the following list of combined sewer overflow (CSOs) outfalls which represent occasional point sources of pollutants as a result of overloading of the combined sewer system during precipitation events. The permit prohibits discharges not caused by precipitation. This permit does not authorize a discharge from a CSO that causes adverse impacts that threaten characteristic uses of the receiving water as identified in the water quality standards, chapter 173-201A WAC.

CSO Outfall No.	Basin	Receiving Water Body	Location	
			Latitude	Longitude
OF-1	Pine Road basin	Port Washington Narrows	47.581490°	-122.636958°
OF-2	Stevens Canyon Basin	Port Washington Narrows	47.580579°	-122.635489°
OF-3	Cherry Avenue Basin	Port Washington Narrows	47.578031°	-122.625189°
OF-4	East Park Basin	Port Washington Narrows	47.571662°	-122.619867°
OF-6	Tracyton Beach Basin	Port Washington Narrows	47.585558°	-122.646475°
OF-7A	Trenton Avenue Basin	Port Washington Narrows/Port Orchard Bay	47.568998°	-122.606821°
OF7B	Trenton Avenue Basin	Port Washington Narrows/Port Orchard Bay	47.568998°	-122.606821°
OF-8	Anderson Cove Basin	Port Washington Narrows	47.584747°	-122.650852°
OF-9	Anderson Cove Basin	Port Washington Narrows	47.580463°	-122.645788°
OF-10	Anderson Cove Basin	Port Washington Narrows	47.578889°	-122.640556°
OF-11	Anderson Cove Basin	Port Washington Narrows	47.578889°	-122.639444°
OF-12	Anderson Cove Basin	Port Washington Narrows	47.578611°	-122.636389°
OF-13	Warren Avenue Basin	Port Washington Narrows	47.578205°	-122.630167°
OF-16	Pacific Avenue Basin	Sinclair Inlet	47.561667°	-122.625278°
OF-17	Callow Avenue Basin	Sinclair Inlet	47.554167°	-122.651111°

S9.B. Nine minimum controls

In accordance with chapter 173-245 WAC and US EPA CSO control policy (59 FR 18688), the Permittee must implement and document the following nine minimum controls (NMC) for CSOs. The Permittee must document compliance with the NMC in the annual CSO report as required in Special Condition S9.C.

The Permittee must comply with the following technology-based requirements; the Permittee must:

1. Implement proper operation and maintenance programs for the sewer system and all CSO outfalls to reduce the magnitude, frequency, and duration of CSOs. The program must consider regular sewer inspections; sewer, catch basin, and regulator cleaning; equipment and sewer collection system repair or replacement, where necessary; and disconnection of illegal connections.
2. Implement procedures that will maximize use of the collection system for wastewater storage that can be accommodated by the storage capacity of the collection system in order to reduce the magnitude, frequency, and duration of CSOs.
3. Review and modify, as appropriate, its existing pretreatment program to minimize CSO impacts from the discharges from non-domestic users.
4. Operate the Permittee's wastewater treatment plant at maximum treatable flow during all wet weather flow conditions to reduce the magnitude, frequency, and duration of CSOs. The Permittee must deliver all flows to the treatment plant within the constraints of the treatment capacity of the POTW.

5. Not discharge (prohibited) overflows from CSO outfalls except as a result of precipitation events. The Permittee must report each dry weather overflow to the permitting authority immediately per Special Condition S3.E. When it detects a dry weather overflow, the Permittee must begin corrective action immediately and inspect the dry weather overflow each subsequent day until it has eliminated the overflow.
6. Implement measures to control solid and floatable materials in CSOs.
7. Implement a pollution prevention program focused on reducing the impact of CSOs on receiving waters.
8. Implement a public notification process to inform the citizens of when and where CSOs occur. The process must include (a) mechanism to alert persons of the occurrence of CSOs and (b) a system to determine the nature and duration of conditions that are potentially harmful for users of receiving waters due to CSOs.
9. Monitor CSO outfalls to characterize CSO impacts and the efficacy of CSO controls. This must include collection of data that it will use to document the existing baseline conditions, evaluate the efficacy of the technology-based controls, and determine the baseline conditions upon which it will base the long-term control plan. This data must include:
    a. Characteristics of the combined sewer system, including the population served by the combined portion of the system and locations of all CSO outfalls in the combined sewer system (CSS).
    b. Total number of CSO events, and the frequency and duration of CSOs for a representative number of events.
    c. Locations and designated uses of receiving water bodies.
    d. Water quality data for receiving water bodies.
    e. Water quality impacts directly related to CSO (e.g., beach closing, floatables, wash-up episodes, fish kills).

S9.C. Combined sewer overflow annual report

The Permittee must submit a CSO Annual Report to Ecology for review and approval by May 31st of each year. The CSO Annual Report must cover the previous calendar year. The report must comply with the requirements of WAC 173-245-090(1) and must include documentation of compliance with the Nine Minimum Controls for CSOs described in Special Condition S9.B. The CSO Annual report must include the following information:

1. A summary of the number and volume of untreated discharge events per outfall for that year.
2. A summary of the 20-year moving average number of untreated discharge events per outfall, calculated once annually.

3. For the reporting period, summarizing all data collected according to the monitoring schedule in Special Condition S2.B.
4. An explanation of the previous year's CSO reduction accomplishments.
5. A list of CSO reduction projects planned for the next year.

S9.D. Requirements for controlled combined sewer overflows

a. CSOs identified as controlled

Based on monitoring data, the CSO outfalls listed in Special Condition S9.A meet the requirement of "greatest reasonable reduction" as defined in chapter WAC 173-245-020(22). Frequency of overflow events at these CSO outfalls, as a result of precipitation events, must continue to meet the performance standard.

b. Performance standards for controlled CSO outfalls

The performance standard for each controlled CSO outfall is not more than one discharge event per outfall per year on average, due to precipitation. Ecology evaluates compliance with the performance standard annually based on a 20-year moving average. The Permittee must report the running 20-year average number of overflow events per year during this permit term from these CSO outfalls in the CSO Annual Report required in Special Condition S9.C.

c. CSO post construction monitoring

The Permittee must implement a post construction compliance monitoring program to verify the effectiveness of CSO controls and to demonstrate compliance with water quality standards and protection of designated uses.

d. CSO post construction monitoring plan

The Permittee must implement a post construction compliance monitoring program to verify the effectiveness of CSO controls and to demonstrate compliance with water quality standards and protection of designated uses.

e. CSO post construction monitoring data report

The Permittee must implement the CSO Post Construction Monitoring Plan. The Permittee must submit to Ecology the results of the monitoring and analysis in the CSO Annual Report required in Special Condition S9.C.

S10. Wet weather operation – West Plant

This permit authorizes CSO-related bypasses of the secondary treatment portion of the Bremerton WWTP - West Plant when the instantaneous flow rate to the WWTP exceeds 22.8 MGD as a result of precipitation events. Bypasses that occur when the instantaneous flow rate is less than 22.8 MGD are not authorized under this condition and are subject to the bypass provisions as stated in S5.F of the permit. In the event of a CSO-related bypass authorized under this condition, the Permittee must minimize the discharge of pollutants to the environment. At a minimum, CSO-related bypass flows must receive solids and floatables removal, primary clarification, and disinfection. The final discharge must at all times meet the effluent limits of this permit as listed in Special Condition S1.

The Permittee must maintain records of all CSO-related bypasses at the treatment plant. All occurrences of bypassing must be reported on a monthly and annual basis.

For each bypass event, the monthly discharge monitoring report (DMR) must include the date, the flow bypassed, volume bypassed, duration bypassed, storm duration, and the magnitude of the precipitation event. The Permittee must submit monthly DMRs by the 15th day of the following month.

The Permittee must monitor all wet weather bypass with the monitoring schedule according to requirements in section S2.A. Permittees must use automatic flow monitoring equipment to collect the information required below and calibrate flow monitoring equipment according to requirements in section S2.E.

All of the above information in summary format (wet weather annual report) should be included in the annual CSO report as required in Special Condition S9.C. The wet weather annual report must cover the previous calendar year.

S11. Acute toxicity

S11.A. Effluent limit for acute toxicity

The effluent limit for acute toxicity applies to discharge to Outfall 001 only.

The effluent limit for acute toxicity is:

No acute toxicity detected in a test concentration representing the acute critical effluent concentration (ACEC).

The ACEC means the maximum concentration of effluent during critical conditions at the boundary of the acute mixing zone, defined in section S1.C of this permit. The ACEC equals 2.7% effluent (May through September) and 5% (October through April).

S11.B. Compliance with the effluent limit for acute toxicity

Compliance with the effluent limit for acute toxicity means the results of the testing specified in section S11.C show no statistically significant difference in survival between the control and the ACEC.

If the test results show a statistically significant difference in survival between the control and the ACEC, and Ecology had not determined the test result to be anomalous under section S11.D, and the test is otherwise valid, the result is a violation of the effluent limit for acute toxicity. The Permittee must immediately conduct the additional testing described in section S11.D.

The Permittee must determine the statistical significance by conducting a hypothesis test at the 0.05 level of significance (Appendix H, EPA/600/4--89/001). If the difference in survival between the control and the ACEC is less than 10%, the Permittee must conduct the hypothesis test at the 0.01 level of significance.

S11.C. Compliance testing for acute toxicity

The Permittee must:

1. Perform the acute toxicity tests with 100% effluent, the ACEC, and a control, or with a full dilution series. The ACEC equals 2.7 % effluent (May through September) and 5% effluent (October through April).
2. Conduct quarterly acute toxicity testing on the final effluent. Testing must begin by January 1, 2019. The sampling of effluent must occur only while effluent is being discharged through Outfall 001. Quarters means January through March, April through June, July through September, and October through December.
3. Submit a written report to Ecology within 45 days of sampling and starting no later than April 15, 2019. Each subsequent report is due on July 15th, October 15th, January 15th, and April 15th of each year. Further instructions on testing conditions and test report content are in section 11.E below.
4. The Permittee must perform compliance tests using each of the species and protocols listed below **on a rotating basis according to the schedule below**:

Acute Toxicity Tests	Species	Method
Fathead minnow 96-hour static-renewal test	*Pimephales promelas*	EPA-821-R-02-012
Daphnid 48-hour static test	*Ceriodaphnia dubia, Daphnia pulex,* or *Daphnia magna*	EPA-821-R-02-012

S11.D. Response to noncompliance with the effluent limit for acute toxicity

If a toxicity test conducted under section S11.C determines a statistically significant difference in response between the ACEC and the control, using the statistical test described in section S11.B, the Permittee must begin additional testing within one week from the time of receiving the test results.
The Permittee must:

1. Conduct one additional test each week for four consecutive weeks, using the same test and species as the failed compliance test.
2. Test at least five effluent concentrations and a control to determine appropriate point estimates. One of these effluent concentrations must equal the ACEC. The results of the test at the ACEC will determine compliance with the effluent limit for acute toxicity as described in section S11.B.
3. Return to the original monitoring frequency in section S11.C after completion of the additional compliance monitoring.

Anomalous test results: If a toxicity test conducted under section S11.C indicates noncompliance with the acute toxicity limit and the Permittee believes that the test result is anomalous, the Permittee may notify Ecology that the compliance test result may be anomalous. The Permittee may take one additional sample for toxicity testing and wait for notification from Ecology before

completing the additional testing. The Permittee must submit the notification with the report of the compliance test result and identify the reason for considering the compliance test result to be anomalous.

If Ecology determines that the test result was not anomalous, the Permittee must complete all of the additional monitoring required in this section. Or,

If the one additional sample fails to comply with the effluent limit for acute toxicity, then the Permittee must complete all of the additional monitoring required in this section. Or,

If Ecology determines that the test result was anomalous, the one additional test result will replace the anomalous test result for the purpose of determining compliance with the acute toxicity limit.

If all of the additional testing in section S11.D.1 complies with the permit limit, the Permittee must submit a report to Ecology on possible causes and preventive measures for the transient toxicity event, which triggered the additional compliance monitoring. This report must include a search of all pertinent and recent facility records, including:

- Operating records
- Monitoring results
- Inspection records
- Spill reports
- Weather records
- Production records
- Raw material purchases
- Pretreatment records, etc.

If the additional testing in this section shows another violation of the acute toxicity limit, the Permittee must submit a Toxicity Identification/Reduction Evaluation (TI/RE) plan to Ecology within sixty (60) days after the sample date (WAC 173-205-100(2)).

S11.E. Sampling and reporting requirements

1. The Permittee must submit all reports for toxicity testing in accordance with the most recent version of Ecology Publication No. WQ-R-95-80, *Laboratory Guidance and Whole Effluent Toxicity Test Review Criteria*. Reports must contain toxicity data, bench sheets, and reference toxicant results for test methods. In addition, the Permittee must submit toxicity test data in electronic format (CETIS export file preferred) for entry into Ecology's database.

2. The Permittee must collect 24-hour composite effluent samples for toxicity testing. The Permittee must cool the samples to 0 - 6 degrees Celsius during collection and send them to the lab immediately upon completion. The lab must begin the toxicity testing as soon as possible but no later than 36 hours after sampling was completed.

3. The laboratory must conduct water quality measurements on all samples and test solutions for toxicity testing, as specified in the most recent version of Ecology Publication No. WQ-R-95-80, *Laboratory Guidance and Whole Effluent Toxicity Test Review Criteria.*
4. All toxicity tests must meet quality assurance criteria and test conditions specified in the most recent versions of the EPA methods listed in section S11.B and the Ecology Publication No. WQ-R-95-80, *Laboratory Guidance and Whole Effluent Toxicity Test Review Criteria.* If Ecology determines any test results to be invalid or anomalous, the Permittee must repeat the testing with freshly collected effluent.
5. The laboratory must use control water and dilution water meeting the requirements of the EPA methods listed in section A or pristine natural water of sufficient quality for good control performance.
6. The Permittee must conduct whole effluent toxicity tests on an unmodified sample of final effluent.
7. The Permittee may choose to conduct a full dilution series test during compliance testing in order to determine dose response. In this case, the series must have a minimum of five effluent concentrations and a control. The series of concentrations must include the acute critical effluent concentration (ACEC). The ACEC equals 2.7% effluent (May through September) and 5% effluent (October through April).
8. All whole effluent toxicity tests, effluent screening tests, and rapid screening tests that involve hypothesis testing must comply with the acute statistical power standard of 29% as defined in WAC 173-205-020. If the test does not meet the power standard, the Permittee must repeat the test on a fresh sample with an increased number of replicates to increase the power.

S12. Chronic toxicity

S12.A. Testing when there is no permit limit for chronic toxicity

The Permittee must:

1. Conduct chronic toxicity testing on final effluent once during the 2nd quarter of 2022, no later than June 1, 2022, and once in the 4th quarter of 2022, no later than December 1, 2022. The sampling of effluent must occur only while effluent is being discharged through Outfall 001.
2. Conduct chronic toxicity testing on a series of at least five concentrations of effluent and a control. This series of dilutions must include the acute critical effluent concentration (ACEC). The ACEC equals 2.7 % effluent (May through September) and 5% effluent (October through April). The series of dilutions should also contain the CCEC. The CCEC equals 0.7 % effluent (May through September) and 0.8% effluent (October through April).
3. Compare the ACEC to the control using hypothesis testing at the 0.05 level of significance as described in Appendix H, EPA/600/4-89/001.

4. Submit the results of the 2nd quarter 2022 tests to Ecology by July 15, 2022, and results for the 4th quarter 2022 tests by January 15, 2023.
5. Perform each chronic toxicity test with all of the following species and the most recent version of the following protocols:

Saltwater Chronic Test	Species	Method
Topsmelt survival and growth	*Atherinops affinis*	EPA/600/R-95/136
Mysid shrimp survival and growth	*Americamysis bahia* (formerly *Mysidopsis bahia*)	EPA-821-R-02-014

S12.B. Sampling and reporting requirements

1. The Permittee must submit all reports for toxicity testing in accordance with the most recent version of Ecology Publication No. WQ-R-95-80, *Laboratory Guidance and Whole Effluent Toxicity Test Review Criteria.* Reports must contain toxicity data, bench sheets, and reference toxicant results for test methods. In addition, the Permittee must submit toxicity test data in electronic format (CETIS export file preferred) for entry into Ecology's database.
2. The Permittee must collect 24-hour composite effluent samples for toxicity testing. The Permittee must cool the samples to 0 - 6 degrees Celsius during collection and send them to the lab immediately upon completion. The lab must begin the toxicity testing as soon as possible but no later than 36 hours after sampling was completed.
3. The laboratory must conduct water quality measurements on all samples and test solutions for toxicity testing, as specified in the most recent version of Ecology Publication No. WQ-R-95-80, *Laboratory Guidance and Whole Effluent Toxicity Test Review Criteria.*
4. All toxicity tests must meet quality assurance criteria and test conditions specified in the most recent versions of the EPA methods listed in section C and the Ecology Publication no. WQ-R-95-80, *Laboratory Guidance and Whole Effluent Toxicity Test Review Criteria.* If Ecology determines any test results to be invalid or anomalous, the Permittee must repeat the testing with freshly collected effluent.
5. The laboratory must use control water and dilution water meeting the requirements of the EPA methods listed in section S12.A or pristine natural water of sufficient quality for good control performance.
6. The Permittee must conduct whole effluent toxicity tests on an unmodified sample of final effluent.
7. The Permittee may choose to conduct a full dilution series test during compliance testing in order to determine dose response. In this case, the series must have a minimum of five effluent concentrations and a control. The series of concentrations must include the CCEC and the ACEC. The CCEC and the ACEC may either substitute for the effluent concentrations that are closest to them in the dilution series or be extra effluent concentrations.

The CCEC equals 0.7% effluent (May through September) and 0.8% effluent (October through April). The ACEC equals 2.7% effluent (May through September) and 5% effluent (October through April).

8. All whole effluent toxicity tests that involve hypothesis testing must comply with the chronic statistical power standard of 39% as defined in WAC 173-205-020. If the test does not meet the power standard, the Permittee must repeat the test on a fresh sample with an increased number of replicates to increase the power.

S13. Outfall evaluation

The Permittee must inspect (West Plant Outfall 001), once per permit cycle, the submerged portion of the outfall line and diffuser to document its integrity and continued function. If conditions allow for a photographic verification, the Permittee must include such verification in the report. By March 31, 2023, the Permittee must submit the inspection report to Ecology through the Water Quality Permitting Portal – Permit Submittals application. The Permittee must submit hard-copies of any video files to Ecology as required by Permit Condition S3.B. The Portal does not support submittal of video files.

The inspector must, at a minimum:

- Assess the physical condition of the outfall pipe, diffuser, and associated couplings.
- Determine the extent of sediment accumulation in the vicinity of the diffuser.
- Ensure diffuser ports are free of obstructions and are allowing uniform flow.
- Confirm physical location (latitude/longitude) and depth (at MLLW) of the each end of diffuser section of the outfall.
- Assess physical condition of the submarine line.
- Assess physical condition of anchors used to secure the submarine line.

S14. Application for permit renewal or modification for facility changes

The Permittee must submit an application for renewal of this permit by May 31, 2023. The Permittee must submit a paper copy and an electronic copy (preferably as a PDF).

The Permittee must also submit a new application or addendum at least one hundred eighty (180) days prior to commencement of discharges, resulting from the activities listed below, which may result in permit violations. These activities include any facility expansions, production increases, or other planned changes, such as process modifications, in the permitted facility.

General Conditions

G1. Signatory requirements

1. All applications submitted to Ecology must be signed and certified.

   a. In the case of corporations, by a responsible corporate officer. For the purpose of this section, a responsible corporate officer means:

      - A president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy or decision making functions for the corporation, or

      - The manager of one or more manufacturing, production, or operating facilities, provided, the manager is authorized to make management decisions which govern the operation of the regulated facility including having the explicit or implicit duty of making major capital investment recommendations, and initiating and directing other comprehensive measures to assure long-term environmental compliance with environmental laws and regulations; the manager can ensure that the necessary systems are established or actions taken to gather complete and accurate information for permit application requirements; and where authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures.

   b. In the case of a partnership, by a general partner.

   c. In the case of sole proprietorship, by the proprietor.

   d. In the case of a municipal, state, or other public facility, by either a principal executive officer or ranking elected official.

   Applications for permits for domestic wastewater facilities that are either owned or operated by, or under contract to, a public entity shall be submitted by the public entity.

2. All reports required by this permit and other information requested by Ecology must be signed by a person described above or by a duly authorized representative of that person. A person is a duly authorized representative only if:

   a. The authorization is made in writing by a person described above and submitted to Ecology.

   b. The authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility, such as the position of plant manager, superintendent, position of equivalent responsibility, or an individual or position having overall responsibility for environmental matters. (A duly authorized representative may thus be either a named individual or any individual occupying a named position.)

3. Changes to authorization. If an authorization under paragraph G1.2, above, is no longer accurate because a different individual or position has responsibility for the overall operation of the facility, a new authorization satisfying the requirements of paragraph G1.2, above, must be submitted to Ecology prior to or together with any reports, information, or applications to be signed by an authorized representative.

4. Certification. Any person signing a document under this section must make the following certification:

   "I certify under penalty of law, that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

G2. Right of inspection and entry

The Permittee must allow an authorized representative of Ecology, upon the presentation of credentials and such other documents as may be required by law:

1. To enter upon the premises where a discharge is located or where any records must be kept under the terms and conditions of this permit.
2. To have access to and copy, at reasonable times and at reasonable cost, any records required to be kept under the terms and conditions of this permit.
3. To inspect, at reasonable times, any facilities, equipment (including monitoring and control equipment), practices, methods, or operations regulated or required under this permit.
4. To sample or monitor, at reasonable times, any substances or parameters at any location for purposes of assuring permit compliance or as otherwise authorized by the Clean Water Act.

G3. Permit actions

This permit may be modified, revoked and reissued, or terminated either at the request of any interested person (including the Permittee) or upon Ecology's initiative. However, the permit may only be modified, revoked and reissued, or terminated for the reasons specified in 40 CFR 122.62, 40 CFR 122.64 or WAC 173-220-150 according to the procedures of 40 CFR 124.5.

1. The following are causes for terminating this permit during its term, or for denying a permit renewal application:
   a. Violation of any permit term or condition.
   b. Obtaining a permit by misrepresentation or failure to disclose all relevant facts.
   c. A material change in quantity or type of waste disposal.
   d. A determination that the permitted activity endangers human health or the environment, or contributes to water quality standards violations and can only be regulated to acceptable levels by permit modification or termination.

e. A change in any condition that requires either a temporary or permanent reduction, or elimination of any discharge or sludge use or disposal practice controlled by the permit.

f. Nonpayment of fees assessed pursuant to RCW 90.48.465.

g. Failure or refusal of the Permittee to allow entry as required in RCW 90.48.090.

2. The following are causes for modification but not revocation and reissuance except when the Permittee requests or agrees:

   a. A material change in the condition of the waters of the state.

   b. New information not available at the time of permit issuance that would have justified the application of different permit conditions.

   c. Material and substantial alterations or additions to the permitted facility or activities which occurred after this permit issuance.

   d. Promulgation of new or amended standards or regulations having a direct bearing upon permit conditions, or requiring permit revision.

   e. The Permittee has requested a modification based on other rationale meeting the criteria of 40 CFR Part 122.62.

   f. Ecology has determined that good cause exists for modification of a compliance schedule, and the modification will not violate statutory deadlines.

   g. Incorporation of an approved local pretreatment program into a municipality's permit.

3. The following are causes for modification or alternatively revocation and reissuance:

   a. When cause exists for termination for reasons listed in 1.a through 1.g of this section, and Ecology determines that modification or revocation and reissuance is appropriate.

   b. When Ecology has received notification of a proposed transfer of the permit. A permit may also be modified to reflect a transfer after the effective date of an automatic transfer (General Condition G7) but will not be revoked and reissued after the effective date of the transfer except upon the request of the new Permittee.

G4. Reporting planned changes

The Permittee must, as soon as possible, but no later than one hundred eighty (180) days prior to the proposed changes, give notice to Ecology of planned physical alterations or additions to the permitted facility, production increases, or process modification which will result in:

1. The permitted facility being determined to be a new source pursuant to 40 CFR 122.29(b).

2. A significant change in the nature or an increase in quantity of pollutants discharged.

3. A significant change in the Permittee's sludge use or disposal practices. Following such notice, and the submittal of a new application or supplement to the existing application, along with required engineering plans and reports, this permit may be modified, or revoked and reissued pursuant to 40 CFR 122.62(a) to specify and limit

any pollutants not previously limited. Until such modification is effective, any new or increased discharge in excess of permit limits or not specifically authorized by this permit constitutes a violation.

G5. Plan review required

Prior to constructing or modifying any wastewater control facilities, an engineering report and detailed plans and specifications must be submitted to Ecology for approval in accordance with chapter 173-240 WAC. Engineering reports, plans, and specifications must be submitted at least one hundred eighty (180) days prior to the planned start of construction unless a shorter time is approved by Ecology. Facilities must be constructed and operated in accordance with the approved plans.

G6. Compliance with other laws and statutes

Nothing in this permit excuses the Permittee from compliance with any applicable federal, state, or local statutes, ordinances, or regulations.

G7. Transfer of this permit

In the event of any change in control or ownership of facilities from which the authorized discharge emanate, the Permittee must notify the succeeding owner or controller of the existence of this permit by letter, a copy of which must be forwarded to Ecology.

1. Transfers by Modification

   Except as provided in paragraph (2) below, this permit may be transferred by the Permittee to a new owner or operator only if this permit has been modified or revoked and reissued under 40 CFR 122.62(b)(2), or a minor modification made under 40 CFR 122.63(d), to identify the new Permittee and incorporate such other requirements as may be necessary under the Clean Water Act.

2. Automatic Transfers

   This permit may be automatically transferred to a new Permittee if:

   a. The Permittee notifies Ecology at least thirty (30) days in advance of the proposed transfer date.

   b. The notice includes a written agreement between the existing and new Permittees containing a specific date transfer of permit responsibility, coverage, and liability between them.

   c. Ecology does not notify the existing Permittee and the proposed new Permittee of its intent to modify or revoke and reissue this permit. A modification under this subparagraph may also be minor modification under 40 CFR 122.63. If this notice is not received, the transfer is effective on the date specified in the written agreement.

G8. Reduced production for compliance

The Permittee, in order to maintain compliance with its permit, must control production and/or all discharges upon reduction, loss, failure, or bypass of the treatment facility until the facility is restored or an alternative method of treatment is provided. This requirement applies in the situation where, among other things, the primary source of power of the treatment facility is reduced, lost, or fails.

G9. Removed substances

Collected screenings, grit, solids, sludges, filter backwash, or other pollutants removed in the course of treatment or control of wastewaters must not be resuspended or reintroduced to the final effluent stream for discharge to state waters.

G10. Duty to provide information

The Permittee must submit to Ecology, within a reasonable time, all information which Ecology may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit or to determine compliance with this permit. The Permittee must also submit to Ecology upon request, copies of records required to be kept by this permit.

G11. Other requirements of 40 CFR

All other requirements of 40 CFR 122.41 and 122.42 are incorporated in this permit by reference.

G12. Additional monitoring

Ecology may establish specific monitoring requirements in addition to those contained in this permit by administrative order or permit modification.

G13. Payment of fees

The Permittee must submit payment of fees associated with this permit as assessed by Ecology.

G14. Penalties for violating permit conditions

Any person who is found guilty of willfully violating the terms and conditions of this permit is deemed guilty of a crime, and upon conviction thereof shall be punished by a fine of up to ten thousand dollars ($10,000) and costs of prosecution, or by imprisonment in the discretion of the court. Each day upon which a willful violation occurs may be deemed a separate and additional violation.

Any person who violates the terms and conditions of a waste discharge permit may incur, in addition to any other penalty as provided by law, a civil penalty in the amount of up to ten thousand dollars ($10,000) for every such violation. Each and every such violation is a separate and distinct offense, and in case of a continuing violation, every day's continuance is deemed to be a separate and distinct violation.

G15. Upset

Definition – "Upset" means an exceptional incident in which there is unintentional and temporary noncompliance with technology-based permit effluent limits because of factors beyond the reasonable control of the Permittee. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventive maintenance, or careless or improper operation.

An upset constitutes an affirmative defense to an action brought for noncompliance with such technology-based permit effluent limits if the requirements of the following paragraph are met.

A Permittee who wishes to establish the affirmative defense of upset must demonstrate, through properly signed, contemporaneous operating logs, or other relevant evidence that:

1. An upset occurred and that the Permittee can identify the cause(s) of the upset.
2. The permitted facility was being properly operated at the time of the upset.
3. The Permittee submitted notice of the upset as required in Special Condition S3.F.
4. The Permittee complied with any remedial measures required under S3.F of this permit.

In any enforcement action the Permittee seeking to establish the occurrence of an upset has the burden of proof.

G16. Property rights

This permit does not convey any property rights of any sort, or any exclusive privilege.

G17. Duty to comply

The Permittee must comply with all conditions of this permit. Any permit noncompliance constitutes a violation of the Clean Water Act and is grounds for enforcement action; for permit termination, revocation and reissuance, or modification; or denial of a permit renewal application.

G18. Toxic pollutants

The Permittee must comply with effluent standards or prohibitions established under section 307(a) of the Clean Water Act for toxic pollutants within the time provided in the regulations that establish those standards or prohibitions, even if this permit has not yet been modified to incorporate the requirement.

G19. Penalties for tampering

The Clean Water Act provides that any person who falsifies, tampers with, or knowingly renders inaccurate any monitoring device or method required to be maintained under this permit shall, upon conviction, be punished by a fine of not more than $10,000 per violation, or by imprisonment for not more than two (2) years per violation, or by both.

If a conviction of a person is for a violation committed after a first conviction of such person under this condition, punishment shall be a fine of not more than $20,000 per day of violation, or by imprisonment of not more than four (4) years, or by both.

G20. Compliance schedules

Reports of compliance or noncompliance with, or any progress reports on, interim and final requirements contained in any compliance schedule of this permit must be submitted no later than fourteen (14) days following each schedule date.

G21. Service agreement review

The Permittee must submit to Ecology any proposed service agreements and proposed revisions or updates to existing agreements for the operation of any wastewater treatment facility covered by this permit. The review is to ensure consistency with chapters 90.46 and 90.48 RCW as required by RCW 70.150.040(9). In the event that Ecology does not comment within a thirty-day (30) period, the Permittee may assume consistency and proceed with the service agreement or the revised/updated service agreement.

Appendix A

LIST OF POLLUTANTS WITH ANALYTICAL METHODS, DETECTION LIMITS AND QUANTITATION LEVELS

The Permittee must use the specified analytical methods, detection limits (DLs) and quantitation levels (QLs) in the following table for permit and application required monitoring unless:

- Another permit condition specifies other methods, detection levels, or quantitation levels.
- The method used produces measurable results in the sample and EPA has listed it as an EPA-approved method in 40 CFR Part 136.

If the Permittee uses an alternative method, not specified in the permit and as allowed above, it must report the test method, DL, and QL on the discharge monitoring report or in the required report.

If the Permittee is unable to obtain the required DL and QL in its effluent due to matrix effects, the Permittee must submit a matrix-specific detection limit (MDL) and a quantitation limit (QL) to Ecology with appropriate laboratory documentation.

When the permit requires the Permittee to measure the base neutral compounds in the list of priority pollutants, it must measure all of the base neutral pollutants listed in the table below. The list includes EPA required base neutral priority pollutants and several additional polynuclear aromatic hydrocarbons (PAHs). The Water Quality Program added several PAHs to the list of base neutrals below from Ecology's Persistent Bioaccumulative Toxics (PBT) List. It only added those PBT parameters of interest to Appendix A that did not increase the overall cost of analysis unreasonably.

Ecology added this appendix to the permit in order to reduce the number of analytical "non-detects" in permit-required monitoring and to measure effluent concentrations near or below criteria values where possible at a reasonable cost.

The lists below include conventional pollutants (as defined in CWA section 502(6) and 40 CFR Part 122.), toxic or priority pollutants as defined in CWA section 307(a)(1) and listed in 40 CFR Part 122 Appendix D, 40 CFR Part 401.15 and 40 CFR Part 423 Appendix A), and nonconventionals. 40 CFR Part 122 Appendix D (Table V) also identifies toxic pollutants and hazardous substances which are required to be reported by dischargers if expected to be present. This permit Appendix A list does not include those parameters.

CONVENTIONAL POLLUTANTS

Pollutant	CAS Number (if available)	Recommended Analytical Protocol	Detection (DL)[1] *µg/L unless specified*	Quantitation Level (QL)[2] *µg/L unless specified*
Biochemical Oxygen Demand		SM5210-B		2 mg/L
Biochemical Oxygen Demand, Soluble		SM5210-B [3]		2 mg/L
Fecal Coliform		SM 9221E,9222	N/A	Specified in method - sample aliquot dependent
Oil and Grease (HEM) (Hexane Extractable Material)		1664 A or B	1,400	5,000
pH		SM4500-H^+ B	N/A	N/A
Total Suspended Solids		SM2540-D		5 mg/L

NONCONVENTIONAL POLLUTANTS

Pollutant & CAS No. (if available)	CAS Number (if available)	Recommended Analytical Protocol	Detection (DL)[1] µg/L unless specified	Quantitation Level (QL)[2] µg/L unless specified
Alkalinity, Total		SM2320-B		5 mg/L as CaCO3
Aluminum, Total	7429-90-5	200.8	2.0	10
Ammonia, Total (as N)		SM4500-NH3-B and C/D/E/G/H		20
Barium Total	7440-39-3	200.8	0.5	2.0
BTEX (benzene +toluene + ethylbenzene + m,o,p xylenes)		EPA SW 846 8021/8260	1	2
Boron, Total	7440-42-8	200.8	2.0	10.0
Chemical Oxygen Demand		SM5220-D		10 mg/L
Chloride		SM4500-Cl B/C/D/E and SM4110 B		Sample and limit dependent
Chlorine, Total Residual		SM4500 Cl G		50.0
Cobalt, Total	7440-48-4	200.8	0.05	0.25
Color		SM2120 B/C/E		10 color units
Dissolved oxygen		SM4500-OC/OG		0.2 mg/L
Flow		Calibrated device		
Fluoride	16984-48-8	SM4500-F E	25	100
Hardness, Total		SM2340B		200 as CaCO3
Iron, Total	7439-89-6	200.7	12.5	50
Magnesium, Total	7439-95-4	200.7	10	50
Manganese, Total	7439-96-5	200.8	0.1	0.5
Molybdenum, Total	7439-98-7	200.8	0.1	0.5
Nitrate + Nitrite Nitrogen (as N)		SM4500-NO3- E/F/H		100
Nitrogen, Total Kjeldahl (as N)		SM4500-N_{org}B/C and SM4500NH_3-B/C/D/EF/G/H		300
NWTPH Dx [4]		Ecology NWTPH Dx	250	250
NWTPH Gx [5]		Ecology NWTPH Gx	250	250

NONCONVENTIONAL POLLUTANTS

Pollutant & CAS No. (if available)	CAS Number (if available)	Recommended Analytical Protocol	Detection (DL)[1] µg/L unless specified	Quantitation Level (QL)[2] µg/L unless specified
Phosphorus, Total (as P)		SM 4500 PB followed by SM4500-PE/PF	3	10
Salinity		SM2520-B		3 practical salinity units or scale (PSU or PSS)
Settleable Solids		SM2540 -F		Sample and limit dependent
Soluble Reactive Phosphorus (as P)		SM4500-P E/F/G	3	10
Sulfate (as mg/L SO_4)		SM4110-B		0.2 mg/L
Sulfide (as mg/L S)		SM4500-S^2F/D/E/G		0.2 mg/L
Sulfite (as mg/L SO_3)		SM4500-SO3B		2 mg/L
Temperature (max. 7-day avg.)		Analog recorder or use micro-recording devices known as thermistors		0.2° C
Tin, Total	7440-31-5	200.8	0.3	1.5
Titanium, Total	7440-32-6	200.8	0.5	2.5
Total Coliform		SM 9221B, 9222B, 9223B	N/A	Specified in method - sample aliquot dependent
Total Organic Carbon		SM5310-B/C/D		1 mg/L
Total dissolved solids		SM2540 C		20 mg/L

PRIORITY POLLUTANTS	PP #	CAS Number (if available)	Recommended Analytical Protocol	Detection (DL)[1] *µg/L unless specified*	Quantitation Level (QL)[2] *µg/L unless specified*
METALS, CYANIDE & TOTAL PHENOLS					
Antimony, Total	114	7440-36-0	200.8	0.3	1.0
Arsenic, Total	115	7440-38-2	200.8	0.1	0.5
Beryllium, Total	117	7440-41-7	200.8	0.1	0.5
Cadmium, Total	118	7440-43-9	200.8	0.05	0.25
Chromium (hex) dissolved	119	18540-29-9	SM3500-Cr C	0.3	1.2
Chromium, Total	119	7440-47-3	200.8	0.2	1.0
Copper, Total	120	7440-50-8	200.8	0.4	2.0
Lead, Total	122	7439-92-1	200.8	0.1	0.5
Mercury, Total	123	7439-97-6	1631E	0.0002	0.0005
Nickel, Total	124	7440-02-0	200.8	0.1	0.5
Selenium, Total	125	7782-49-2	200.8	1.0	1.0
Silver, Total	126	7440-22-4	200.8	0.04	0.2
Thallium, Total	127	7440-28-0	200.8	0.09	0.36
Zinc, Total	128	7440-66-6	200.8	0.5	2.5
Cyanide, Total	121	57-12-5	335.4	5	10
Cyanide, Weak Acid Dissociable	121		SM4500-CN I	5	10
Cyanide, Free Amenable to Chlorination (Available Cyanide)	121		SM4500-CN G	5	10
Phenols, Total	65		EPA 420.1		50

PRIORITY POLLUTANTS	PP #	CAS Number (if available)	Recommended Analytical Protocol	Detection (DL)[1] *µg/L unless specified*	Quantitation Level (QL)[2] *µg/L unless specified*
ACID COMPOUNDS					
2-Chlorophenol	24	95-57-8	625.1	3.3	9.9
2,4-Dichlorophenol	31	120-83-2	625.1	2.7	8.1
2,4-Dimethylphenol	34	105-67-9	625.1	2.7	8.1
4,6-dinitro-o-cresol (2-methyl-4,6,-dinitrophenol)	60	534-52-1	625.1/1625B	24	72
2,4 dinitrophenol	59	51-28-5	625.1	42	126
2-Nitrophenol	57	88-75-5	625.1	3.6	10.8
4-Nitrophenol	58	100-02-7	625.1	2.4	7.2
Parachlorometa cresol (4-chloro-3-methylphenol)	22	59-50-7	625.1	3.0	9.0
Pentachlorophenol	64	87-86-5	625.1	3.6	10.8
Phenol	65	108-95-2	625.1	1.5	4.5
2,4,6-Trichlorophenol	21	88-06-2	625.1	2.7	8.1

PRIORITY POLLUTANTS	PP #	CAS Number (if available)	Recommended Analytical Protocol	Detection (DL)[1] *µg/L unless specified*	Quantitation Level (QL)[2] *µg/L unless specified*
VOLATILE COMPOUNDS					
Acrolein	2	107-02-8	624	5	10
Acrylonitrile	3	107-13-1	624	1.0	2.0
Benzene	4	71-43-2	624.1	4.4	13.2
Bromoform	47	75-25-2	624.1	4.7	14.1
Carbon tetrachloride	6	56-23-5	624.1/601 or SM6230B	2.8	8.4
Chlorobenzene	7	108-90-7	624.1	6.0	18.0
Chloroethane	16	75-00-3	624/601	1.0	2.0
2-Chloroethylvinyl Ether	19	110-75-8	624	1.0	2.0
Chloroform	23	67-66-3	624.1 or SM6210B	1.6	4.8
Dibromochloromethane (chlordibromomethane)	51	124-48-1	624.1	3.1	9.3
1,2-Dichlorobenzene	25	95-50-1	624	1.9	7.6
1,3-Dichlorobenzene	26	541-73-1	624	1.9	7.6
1,4-Dichlorobenzene	27	106-46-7	624	4.4	17.6
Dichlorobromomethane	48	75-27-4	624.1	2.2	6.6
1,1-Dichloroethane	13	75-34-3	624.1	4.7	14.1
1,2-Dichloroethane	10	107-06-2	624.1	2.8	8.4
1,1-Dichloroethylene	29	75-35-4	624.1	2.8	8.4
1,2-Dichloropropane	32	78-87-5	624.1	6.0	18.0
1,3-dichloropropene (mixed isomers) (1,2-dichloropropylene)[6]	33	542-75-6	624.1	5.0	15.0
Ethylbenzene	38	100-41-4	624.1	7.2	21.6
Methyl bromide (Bromomethane)	46	74-83-9	624/601	5.0	10.0
Methyl chloride (Chloromethane)	45	74-87-3	624	1.0	2.0
Methylene chloride	44	75-09-2	624.1	2.8	8.4
1,1,2,2-Tetrachloroethane	15	79-34-5	624.1	6.9	20.7

PRIORITY POLLUTANTS	PP #	CAS Number (if available)	Recommended Analytical Protocol	Detection (DL)[1] *µg/L unless specified*	Quantitation Lev (QL)[2] *µg/L unless specified*
VOLATILE COMPOUNDS					
Tetrachloroethylene	85	127-18-4	624.1	4.1	12.3
Toluene	86	108-88-3	624.1	6.0	18.0
1,2-Trans-Dichloroethylene (Ethylene dichloride)	30	156-60-5	624.1	1.6	4.8
1,1,1-Trichloroethane	11	71-55-6	624.1	3.8	11.4
1,1,2-Trichloroethane	14	79-00-5	624.1	5.0	15.0
Trichloroethylene	87	79-01-6	624.1	1.9	5.7
Vinyl chloride	88	75-01-4	624/SM6200B	1.0	2.0

PRIORITY POLLUTANTS	PP #	CAS Number (if available)	Recommended Analytical Protocol	Detection (DL)[1] *µg/L unless specified*	Quantitation Level (QL)[2] *µg/L unless specified*
BASE/NEUTRAL COMPOUNDS (compounds in bold are Ecology PBTs)					
Acenaphthene	1	83-32-9	625.1	1.9	5.7
Acenaphthylene	77	208-96-8	625.1	3.5	10.5
Anthracene	78	120-12-7	625.1	1.9	5.7
Benzidine	5	92-87-5	625.1	44	132
Benzyl butyl phthalate	67	85-68-7	625.1	2.5	7.5
Benzo(*a*)anthracene	72	56-55-3	625.1	7.8	23.4
Benzo(b)fluoranthene (3,4-benzofluoranthene)[7]	74	205-99-2	610/625.1	4.8	14.4
Benzo(j)fluoranthene[7]		**205-82-3**	625	0.5	1.0
Benzo(k)fluoranthene (11,12-benzofluoranthene)[7]	75	207-08-9	610/625.1	2.5	7.5
Benzo(r,s,t)pentaphene		**189-55-9**	625	1.3	5.0
Benzo(*a*)pyrene	73	50-32-8	610/625.1	2.5	7.5
Benzo(*ghi*)Perylene	79	191-24-2	610/625.1	4.1	12.3
Bis(*2-chloroethoxy*)methane	43	111-91-1	625.1	5.3	15.9
Bis(*2-chloroethyl*)ether	18	111-44-4	611/625.1	5.7	17.1
Bis(*2-chloroisopropyl*)ether	42	39638-32-9	625	0.5	1.0
Bis(*2-ethylhexyl*)phthalate	66	117-81-7	625.1	2.5	7.5
4-Bromophenyl phenyl ether	41	101-55-3	625.1	1.9	5.7
2-Chloronaphthalene	20	91-58-7	625.1	1.9	5.7
4-Chlorophenyl phenyl ether	40	7005-72-3	625.1	4.2	12.6
Chrysene	76	218-01-9	610/625.1	2.5	7.5
Dibenzo (a,h)acridine		**226-36-8**	610M/625M	2.5	10.0
Dibenzo (a,j)acridine		**224-42-0**	610M/625M	2.5	10.0
Dibenzo(a-*h*)anthracene (1,2,5,6-dibenzanthracene)	82	53-70-3	625.1	2.5	7.5
Dibenzo(a,e)pyrene		192-65-4	610M/625M	2.5	10.0
Dibenzo(a,h)pyrene		189-64-0	625M	2.5	10.0
3,3-Dichlorobenzidine	28	91-94-1	605/625.1	16.5	49.5
Diethyl phthalate	70	84-66-2	625.1	1.9	5.7
Dimethyl phthalate	71	131-11-3	625.1	1.6	4.8
Di-n-butyl phthalate	68	84-74-2	625.1	2.5	7.5
2,4-dinitrotoluene	35	121-14-2	609/625.1	5.7	17.1
2,6-dinitrotoluene	36	606-20-2	609/625.1	1.9	5.7

PRIORITY POLLUTANTS	PP #	CAS Number (if available)	Recommended Analytical Protocol	Detection (DL)[1] *µg/L unless specified*	Quantitation Level (QL)[2] *µg/L unless specified*
BASE/NEUTRAL COMPOUNDS (compounds in bold are Ecology PBTs)					
Di-n-octyl phthalate	69	117-84-0	625.1	2.5	7.5
1,2-Diphenylhydrazine (*as Azobenzene*)	37	122-66-7	1625B	5.0	20
Fluoranthene	39	206-44-0	625.1	2.2	6.6
Fluorene	80	86-73-7	625.1	1.9	5.7
Hexachlorobenzene	9	118-74-1	612/625.1	1.9	5.7
Hexachlorobutadiene	52	87-68-3	625.1	0.9	2.7
Hexachlorocyclopentadiene	53	77-47-4	1625B/625	2.0	4.0
Hexachloroethane	12	67-72-1	625.1	1.6	4.8
Indeno(*1,2,3-cd*)Pyrene	83	193-39-5	610/625.1	3.7	11.1
Isophorone	54	78-59-1	625.1	2.2	6.6
3-Methyl cholanthrene		**56-49-5**	625	2.0	8.0
Naphthalene	55	91-20-3	625.1	1.6	4.8
Nitrobenzene	56	98-95-3	625.1	1.9	5.7
N-Nitrosodimethylamine	61	62-75-9	607/625	2.0	4.0
N-Nitrosodi-n-propylamine	63	621-64-7	607/625	0.5	1.0
N-Nitrosodiphenylamine	62	86-30-6	625	1.0	2.0
Perylene		**198-55-0**	625	1.9	7.6
Phenanthrene	81	85-01-8	625.1	5.4	16.2
Pyrene	84	129-00-0	625.1	1.9	5.7
?,4-Trichlorobenzene	8	120-82-1	625.1	1.9	5.7

PRIORITY POLLUTANT	PP #	CAS Number (if available)	Recommended Analytical Protocol	Detection (DL)[1] *µg/L unless specified*	Quantitation Level (QL)[2] *µg/L unless specified*
DIOXIN					
2,3,7,8-Tetra-Chlorodibenzo-P-Dioxin (2,3,7,8 TCDD)	129	1746-01-6	1613B	1.3 pg/L	5 pg/L

PRIORITY POLLUTANTS	PP #	CAS Number (if available)	Recommended Analytical Protocol	Detection (DL)[1] *µg/L unless specified*	Quantitation Level (QL)[2] *µg/L unless specified*
PESTICIDES/PCBs					
Aldrin	89	309-00-2	608.3	4.0 ng/L	12 ng/L
alpha-BHC	102	319-84-6	608.3	3.0 ng/L	9.0 ng/L
beta-BHC	103	319-85-7	608.3	6.0 ng/L	18 ng/L
gamma-BHC (Lindane)	104	58-89-9	608.3	4.0 ng/L	12 ng/L
delta-BHC	105	319-86-8	608.3	9.0 ng/L	27 ng/L
Chlordane [8]	91	57-74-9	608.3	14 ng/L	42 ng/L
4,4'-DDT	92	50-29-3	608.3	12 ng/L	36 ng/L
4,4'-DDE	93	72-55-9	608.3	4.0 ng/L	12 ng/L
4,4' DDD	94	72-54-8	608.3	11ng/L	33 ng/L
Dieldrin	90	60-57-1	608.3	2.0 ng/L	6.0 ng/L
alpha-Endosulfan	95	959-98-8	608.3	14 ng/L	42 ng/L
ta-Endosulfan	96	33213-65-9	608.3	4.0 ng/L	12 ng/L
Endosulfan Sulfate	97	1031-07-8	608.3	66 ng/L	198 ng/L
Endrin	98	72-20-8	608.3	6.0 ng/L	18 ng/L

PRIORITY POLLUTANTS	PP #	CAS Number (if available)	Recommended Analytical Protocol	Detection (DL)[1] *µg/L unless specified*	Quantitation Level (QL)[2] *µg/L unless specified*
PESTICIDES/PCBs					
Endrin Aldehyde	99	7421-93-4	608.3	23 ng/L	70 ng/L
Heptachlor	100	76-44-8	608.3	3.0 ng/L	9.0 ng/L
Heptachlor Epoxide	101	1024-57-3	608.3	83 ng/L	249 ng/L
PCB-1242 [9]	106	53469-21-9	608.3	0.065	0.195
PCB-1254	107	11097-69-1	608.3	0.065	0.195
PCB-1221	108	11104-28-2	608.3	0.065	0.195
PCB-1232	109	11141-16-5	608.3	0.065	0.195
PCB-1248	110	12672-29-6	608.3	0.065	0.195
PCB-1260	111	11096-82-5	608.3	0.065	0.195
PCB-1016 [9]	112	12674-11-2	608.3	0.065	0.195
Toxaphene	113	8001-35-2	608.3	240 ng/L	720 ng/L

1. Detection level (DL) or detection limit means the minimum concentration of an analyte (substance) that can be measured and reported with a 99% confidence that the analyte concentration is greater than zero as determined by the procedure given in 40 CFR part 136, Appendix B.

2. Quantitation Level (QL) also known as Minimum Level of Quantitation (ML) – The lowest level at which the entire analytical system must give a recognizable signal and acceptable calibration point for the analyte. It is equivalent to the concentration of the lowest calibration standard, assuming that the lab has used all method-specified sample weights, volumes, and cleanup procedures. The QL is calculated by multiplying the MDL by 3.18 and rounding the result to the number nearest to (1, 2, or 5) x 10^n, where n is an integer (64 FR 30417).
ALSO GIVEN AS:
The smallest detectable concentration of analyte greater than the Detection Limit (DL) where the accuracy (precision & bias) achieves the objectives of the intended purpose. (Report of the Federal Advisory Committee on Detection and Quantitation Approaches and Uses in Clean Water Act Programs Submitted to the US Environmental Protection Agency, December 2007).

3. Soluble Biochemical Oxygen Demand method note: First, filter the sample through a Millipore Nylon filter (or equivalent) - pore size of 0.45-0.50 um (prep all filters by filtering 250 mL of laboratory grade deionized water through the filter and discard). Then, analyze sample as per method 5210-B.

4. NWTPH Dx – Northwest Total Petroleum Hydrocarbons Diesel Extended Range – see https://fortress.wa.gov/ecy/publications/documents/97602.pdf

5. NWTPH Gx – Northwest Total Petroleum Hydrocarbons Gasoline Extended Range – see https://fortress.wa.gov/ecy/publications/documents/97602.pdf

6. 1, 3-dichloroproylene (mixed isomers) – You may report this parameter as two separate parameters: cis-1, 3-dichlorpropropene (10061-01-5) and trans-1, 3-dichloropropene (10061-02-6).

7. Total Benzofluoranthenes – Because Benzo(b)fluoranthene, Benzo(j)fluoranthene and Benzo(k)fluoranthene co-elute you may report these three isomers as total benzofluoranthenes.

8. Chlordane – You may report alpha-chlordane (5103-71-9) and gamma-chlordane (5103-74-2) in place of chlordane (57-74-9). If you report alpha and gamma-chlordane, the DL/PQLs that apply are 14/42 ng/L.

9. PCB 1016 & PCB 1242 – You may report these two PCB compounds as one parameter called PCB 1016/1242.

Fact Sheet for NPDES Permit No. WA0029289

Bremerton Wastewater Treatment Plant

Effective Date: December 1, 2018

Purpose of this fact sheet

This fact sheet explains and documents the decisions the Department of Ecology (Ecology) made in drafting the proposed National Pollutant Discharge Elimination System (NPDES) permit for Bremerton Wastewater Treatment Plant (WWTP).

This fact sheet complies with section 173-220-060 of the Washington Administrative Code (WAC), which requires Ecology to prepare a draft permit and accompanying fact sheet for public evaluation before issuing an NPDES permit.

Ecology makes the draft permit and fact sheet available for public review and comment at least thirty (30) days before issuing the final permit. Copies of the fact sheet and draft permit for Bremerton WWTP, NPDES Permit No. WA0029289, were available for public review and comment from September 12, 2018, until October 12, 2018. For more details on preparing and filing comments about these documents, please see **Appendix A - Public Involvement Information.**

The City of Bremerton reviewed the draft permit and fact sheet for factual accuracy. Ecology corrected any errors or omissions regarding the facility's location, history, wastewater discharges, or receiving water prior to publishing this draft fact sheet for public notice.

After the public comment period closed, Ecology summarized substantive comments and provided responses to them. Ecology included the summary and responses to comments in this fact sheet as **Appendix E - Response to Comments,** and published it when issuing the final NPDES permit. Ecology generally does not revise the rest of the fact sheet. The full document becomes part of the legal history contained in the facility's permit file.

Summary

The City of Bremerton owns, operates, and maintains the following two wastewater treatment plants: West Plant and East Combined Sewer Overflow (CSO) Treatment Plant. The West Plant is a secondary wastewater treatment plant that operates year round and treats wastewater from the entire City's sewer service area. During wet weather periods, the West Plant receives and treats combined sewage (sanitary sewage combined with storm water). The East Plant operates only during wet weather periods and treats combined sewage from East Bremerton. During wet weather periods, combined sewage from East Bremerton that exceeds the capacity of the conveyance system to the West Plant diverts to the East Plant.

Ecology issued the previous permit for this facility on June 21, 2013, and issued a permit modification of the previous permit on October 1, 2015, which changed from the 5-day biological oxygen demand (BOD5) effluent limit parameter to a carbonaceous biological oxygen demand (CBOD5) limit. The proposed permit contains the same effluent limits as for the previous modified permit for CBOD5, Total Suspended Solids (TSS), pH, Fecal Coliform Bacteria, Acute Whole Effluent Toxicity, and Total Residual Chlorine for West Plant. The proposed permit contains the same effluent limits as for the previous modified permit for TSS, Settleable Solids, pH, and Fecal Coliform Bacteria for East Plant.

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I. Introduction

The Federal Clean Water Act (FCWA, 1972, and later amendments in 1977, 1981, and 1987) established water quality goals for the navigable (surface) waters of the United States. One mechanism for achieving the goals of the Clean Water Act is the National Pollutant Discharge Elimination System (NPDES), administered by the federal Environmental Protection Agency (EPA). The EPA authorized the state of Washington to manage the NPDES permit program in our state. Our state legislature accepted the delegation and assigned the power and duty for conducting NPDES permitting and enforcement to Ecology. The Legislature defined Ecology's authority and obligations for the wastewater discharge permit program in 90.48 RCW (Revised Code of Washington).

The following regulations apply to domestic wastewater NPDES permits:

- Procedures Ecology follows for issuing NPDES permits (chapter 173-220 WAC).
- Technical criteria for discharges from municipal wastewater treatment facilities (chapter 173-221 WAC).
- Water quality criteria for surface waters (chapter 173-201A WAC).
- Water quality criteria for groundwaters (chapter 173-200 WAC).
- Whole effluent toxicity testing and limits (chapter 173-205 WAC).
- Sediment management standards (chapter 173-204 WAC).
- Submission of plans and reports for construction of wastewater facilities (chapter 173-240 WAC).

The following additional regulations apply to communities operating collection systems with Combined Sewer Overflows:

- Submission of plans and reports for construction and operation of combined sewer overflow reduction facilities (chapter 173-245 WAC).
- US EPA CSO control policy (59 FR 18688).

These rules require any treatment facility owner/operator to obtain an NPDES permit before discharging wastewater to state waters. They also help define the basis for limits on each discharge and for requirements imposed by the permit.

Under the NPDES permit program and in response to a complete and accepted permit application, Ecology must prepare a draft permit and accompanying fact sheet, and make them available for public review before final issuance. Ecology must also publish an announcement (public notice) telling people where they can read the draft permit, and where to send their comments, during a period of thirty days (WAC 173-220-050). (See **Appendix A - Public Involvement Information** for more detail about the public notice and comment procedures). After the public comment period ends, Ecology may make changes to the draft NPDES permit in response to comment(s). Ecology will summarize the responses to comments and any changes to the permit in **Appendix E**.

II. Background Information

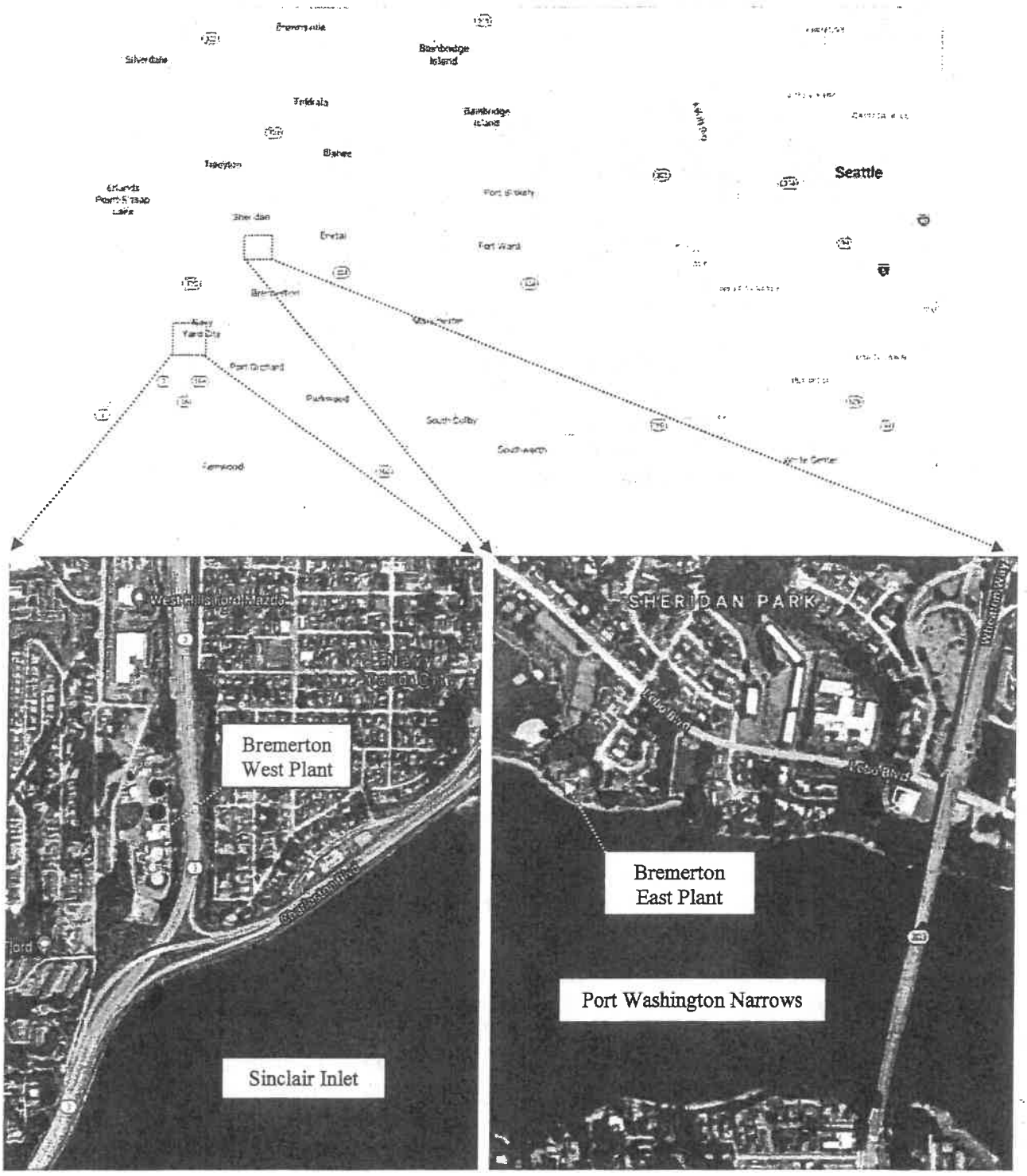
Table 1. General Facility Information

Facility Information		
Applicant	City of Bremerton	
Facility Name and Address	West Plant 1600 Oyster Bay Avenue South Bremerton, WA 98312	East Plant 2475 Stephenson Avenue Bremerton, WA 98310
Contact at Facility	Pat Coxon, Plant Manager Phone: 360-473-5448	
Responsible Official	Greg Wheeler, Mayor City of Bremerton 345 6th Street, Suite 600 Bremerton, WA 98337 Phone: 360-473-5266	
Type of Treatment	Activated Sludge	High Rate Clarification
Facility Location (NAD83/WGS84 reference datum)	Latitude: 47.550288° Longitude: -122.672677°	Latitude: 47.582537° Longitude: -122.638847°
Discharge Waterbody Name and Location (NAD83/WGS84 reference datum)	Sinclair Inlet, Puget Sound Latitude: 47.54633055° Longitude: -122.6696500°	Port Washington Narrows, Puget Sound Latitude: 47.58108385° Longitude: -122.639268°

Permit Status	
Issuance Date of Previous Permit	June 21, 2013 (October 1, 2015 Modification)
Application for Permit Renewal Submittal Date	February 1, 2018 (Due) December 7, 2017 (Received)
Date of Ecology Acceptance of Application	March 8, 2018

Inspection Status	
Date of Last Non-sampling Inspection Date	February 28, 2018

Figure 1. Facility Location Map



(Illustration only, not to scale)

A. Facility description

History

The City of Bremerton (City) has owned, operated, and maintained a secondary wastewater treatment plant (West Plant) in west Bremerton since June 1985. Approximately 60% of Bremerton's sewer system consists of a combined sewage system that conveys a mixture of sanitary sewage and stormwater to the West Plant for treatment. When the combined sewage flow exceeds the collection system capacity, untreated combined sewage discharges from combined sewer overflow (CSO) outfalls located along the Port Washington Narrows and Sinclair Inlet.

State regulations (WAC 173-245) require communities with combined systems to reduce the frequency of untreated CSO discharges to no more than one discharge per year, on average. In an effort to comply with this regulation, the City modified its collection system to increase conveyance of its combined sewage to the West Plant for treatment prior to discharge. The City upgraded the West Plant in 2009 to increase the amount of combined sewage it can treat and, in turn, further reduce the potential for CSO discharges.

The City's CSOs Reduction Program also included construction of a combined sewage treatment plant (East Plant) in East Bremerton. The East Plant operates intermittently when combined sewage flow from East Bremerton exceeds the capacity of the conveyance system to the West Plant. The East Plant operates only during wet weather periods and provides advanced primary treatment of combined sewage using a high rate clarification system.

Collection system status

The City constructed the wastewater collection system in various phases over the course of nearly 100 years in response to changing regulations, occasional rapid population growth, and new development. Approximately 60% of the system operates as a combined sewage and stormwater collection system; the remaining areas operate as a separate sanitary system. The system includes 40 sewer lift stations and 15 CSO outfalls. Gravity sewer lines range in size from 6 to 42 inches in diameter, and force mains range from 4 to 36 inches. The sewers were constructed with a variety of materials including clay, concrete, PVC, asbestos cement, cast iron, ductile iron, and HDPE.

Sewage in East Bremerton flows from six sewer basins through a series of pump stations, gravity pipelines, and pressure mains that discharge to the East Bremerton beach main. The beach main gravity sewer discharges through 16-inch and 24-inch siphons under the Port Washington Narrows to pump station CE-1. Pump station CE-1 pumps the sewage to the West Plant via the Cross-town Pipeline. During wet weather periods, East Bremerton combined sewage exceeding the capacity of the conveyance system to the West Plant diverts to the East Plant for enhanced primary treatment. Separate and combined sewage systems in East Bremerton flow from various basins into the central Cross-town Pipeline for conveyance to the West Plant.

A map of Bremerton CSO sites is shown in **Appendix D**.

Treatment processes

West Plant:

The West Plant receives domestic sewage from residential and light commercial activities in Bremerton. The plant also receives domestic and industrial wastewater from Puget Sound Naval Shipyard (PSNS). Domestic wastewater from PSNS includes wastewater from onshore chemical toilet facilities and saline wastewater from toilet facilities on ships. Industrial wastewater from PSNS includes pretreated wastewater from the industrial wastewater treatment facility. The Ecology regulates discharges from the PSNS wastewater treatment facility under State Waste Discharge Permit No. ST0007374. The West Plant receives and treats combined sewage during wet weather periods.

The West Plant operates as a conventional activated sludge secondary treatment system. The liquid stream treatment components include three mechanical bar screens, two aerated grit chambers, two Parshall flumes for flow measurement, two primary clarifiers, a biofilter, two aeration basins with fine bubble diffusers, two secondary clarifiers, two chlorine contact basins for disinfection with sodium hypochlorite solution, and a sodium bisulfite solution dechlorination system.

The solids stream treatment system includes two rotating drum thickeners (RDTs), two anaerobic digesters, and two centrifuges. The plant also has a gravity thickener that is currently not in use. Pumps transfer primary sludge from the primary clarifiers directly to the anaerobic digesters for stabilization. Waste activated sludge pumps direct secondary sludge to the RDTs for thickening. The thickened secondary sludge is then pumped to the anaerobic digesters. The centrifuge dewaters the digested sludge before it is shipped out as a Class B biosolids to city-owned forest lands for silviculture purposes. Water removed from solids by the RDT and the centrifuge, along with supernatant decanted from the digesters, return to the head of the plant for treatment. The facility uses vertical packed bed absorption towers to remove odors generated by various treatment units, including the headworks (bar screens and grit removal units), primary clarifiers, gravity thickener, digester complex, centrifuge area, biofilter, return activated sludge wet well and primary and secondary scum boxes.

Wet Weather Operation - West Plant:

Flows from Bremerton's combined sewer service areas can exceed the secondary treatment capacity of the West Plant during wet weather. The secondary treatment units at the West Plant are designed to treat flows up to 22.8 MGD peak hour flow. However, Bremerton generally provides treatment to flows up to 32.5 MGD peak hour flow. During severe wet weather conditions, flows to the treatment plant above the instantaneous flow of 22.8 MGD are given primary treatment and are then bypassed around the secondary treatment process through the plant's secondary diversion pipeline. The diverted flow is then blended together with the secondary treated flows prior to disinfection and discharge from the plant. Ecology approved the original facility plan for the West Plant in the mid-1980s with the understanding that the plant would bypass some primary-treated wastewater around secondary treatment components during wet weather. This strategy is recognized as a good engineering practice and an acceptable solution for treating a significant portion of the combined sewage flow that occurs in the system during periods of rainfall. The West Plant has operated in this manner since construction of the secondary treatment system in 1985.

EPA's 1994 Combined Sewer Overflow Control Policy allows NPDES permit writers to authorize a "CSO-related bypass" during wet weather under certain conditions, EPA's *Combined Sewer Overflow Guidance for Permit Writers* (EPA 1995) states that a "CSO-related bypass" at a wastewater treatment plant can only occur when there is no other feasible alternative. A permittee can meet the "no feasible alternative" criteria if the record demonstrates that they consistently operate and maintain the secondary treatment system properly, that the system design meets secondary limits for flows greater than the peak dry weather flow plus an appropriate wet weather flow; and that it is either technically or financially infeasible to provide secondary treatment for greater amounts of flow. Bremerton demonstrated technical and financially infeasibility to provide secondary treatment for greater amounts of flow, in a technical memorandum *Westside WWTP No Feasible Alternatives Treatment Analysis*, Parametrix, March 21, 2013.

Based on this analysis, Ecology has determined that Bremerton's West Plant meets the "no feasible alternative" criteria and that CSO-related bypass can be authorized as allowed under EPA's *Combined Sewer Overflow Guidance for Permit Writers.* The proposed permit Condition S9, *Wet Weather Operation – West Plant,* authorizes CSO-related bypass of the secondary treatment portion of the plant when the instantaneous influent flow rate during rain events exceeds 22.8 MGD. This condition also requires Bremerton to report all bypasses of secondary treatment on a monthly and annual basis.

Bremerton's West Plant process flow diagram is shown in **Appendix D**.

East Plant:

The East Plant operates intermittently during wet weather periods to treat combined sewage from East Bremerton that exceeds the capacity of the conveyance system to the West Plant. On average, the East Plant operates less than ten days a year. The treatment system consists of a High Rate Clarification (HRC) system that provides advanced primary treatment. Treatment components include a 100,000-gallon storage tank, a bar screen, a Parshall flume for influent flow measurement, a Ballasted Sand High Rate Clarification (HRC) system, and an ultraviolet (UV) light disinfection system.

Bremerton's East Plant process flow diagram is shown in **Appendix D**.

Solid wastes/Residual solids

West Plant:

The treatment plant removes solids during the treatment of the wastewater at the headworks (grit and screenings), and at the primary and secondary clarifiers, in addition to incidental solids (rags, scum, and other debris) removed as part of the routine maintenance of the equipment. Plant staff drain grit, rags, scum, and screenings prior to placing the material in a dumpster for disposal as solid waste.

As authorized by the Washington General Biosolids Permit and the Kitsap Public Health District, Bremerton applies Class B biosolids over city-owned forest lands for silviculture purposes.

East Plant:

Screenings and sludge removed at the East Plant are conveyed to the West Plant for treatment.

Discharge outfall

West Plant:

Bremerton discharges secondary treated and disinfected effluent from the West Plant to Sinclair Inlet, an arm of Puget Sound, at a location west of the Puget Sound Naval Shipyard (PSNS), through a 36-inch diameter outfall, which extends 568 feet offshore. The terminal portion of the outfall consists of a 20-port diffuser with 6.5-inch diameter openings at 6-foot spacing. The diffuser ports discharge horizontally in alternating directions at a depth of approximately 29 feet below Mean Lower Low Water (MLLW).

East Plant:

Bremerton intermittently discharges advanced primary treated and disinfected combined sewage effluent from the East plant to the Port Washington Narrows, a tidal strait connecting the Sinclair and Dyes Inlet arms of Puget Sound. The discharge outfall is approximately 480 feet long. The first 200 feet of the outfall consists of a 20-inch diameter cast iron pipe and the remaining outfall and diffuser consist of a 36-inch diameter reinforced concrete pipe. The diffuser portion of the outfall is equipped with twenty-six 5.75-inch diameter ports per a recent inspection (April 2017). The ports are located on alternating sides of the pipe at 4-foot spacing. Discharge into Port Washington Narrows is at a depth of approximately 24 feet below MLLW per a recent bathymetric survey (October 2016).

The permittee is currently planning an outfall improvements project. A section of the 20" pipe is undersized and will be replaced with a 36" pipe and the existing multi-port diffuser will be replaced with a new single-port diffuser.

Staff

In accordance with WAC 173-230-140, this is a Class IV plant. A Class IV operator must be in responsible charge of the plant, and the operator in charge of each shift must be certified at a level of Class III or higher. Staff include full-time certified operators (Group IV, Group II, and Group I). This facility is attended daily. On holidays and off-hours there is always someone on call.

B. Description of the receiving water

West Plant:

Treated effluent from the West Plant discharges to Sinclair Inlet, Puget Sound. Although the Port Orchard WWTP also discharges to Sinclair Inlet at a location approximately 3 miles to the southeast, no other point-source discharges are located close enough to Bremerton's West Plant to cause dilution zones to overlap.

The closest data available is from Ecology's EAP marine water monitoring location no. SIN001 (Sinclair Inlet – Naval Shipyards) (https://fortress.wa.gov/ecy/eap/marinewq/mwdataset.asp). The ambient background data used for this permit is listed below.

Table 2. Ambient Background Data (West Plant)

Parameter	Value Used
Temperature (highest annual 1-DADMax) Temperature (90th percentile)	18.9 °C 14.8 °C
pH (Minimum / Maximum / 90th percentile)	6.8 / 8.6 / 8.2 standard units
Fecal Coliform (90th percentile)	4/100 mL
Salinity (90th percentile)	29.8 psu

East Plant:

Treated effluent from the East Plant discharges to Port Washington Narrows, Puget Sound. There are no nearby outfalls with overlapping dilution zones.

The closest data available are from Ecology's EAP marine water monitoring location no. DYE004 (Dyes Inlet – NE of Chico Bay) and POD006 (Port Orchard – Liberty Bay/Virginia Point) (https://fortress.wa.gov/ecy/eap/marinewq/mwdataset.asp). The ambient background data used for this permit is listed below.

Table 3. Ambient Background Data (East Plant)

Parameter	Value Used
Temperature (highest annual 1-DADMax) Temperature (90th percentile) (Wet Weather Months Oct.-Apr.)	13.3 °C 11.2 °C
pH (Minimum / Maximum / 90th percentile)	8.0 / 8.3 / 8.2 standard units
Fecal Coliform (90th percentile)	3/100 mL
Salinity (90th percentile)	30.2 psu

C. Wastewater influent characterization

The City of Bremerton reported the concentration of influent pollutants in discharge monitoring reports. The tabulated data represents the quality of the wastewater influent from August 2013 to May 2018. The influent wastewater (West Plant) is characterized as follows:

Table 4. Wastewater Influent Characterization

Parameter	Units	Monthly Average Value	Max. Day Value
BOD_5	mg/L	215	365
BOD_5	lbs/day	8,721	17,070
$CBOD_5$	mg/L	174	442
$CBOD_5$	lbs/day	7,398	33,131
TSS	mg/L	206	549
TSS	lbs/day	8,759	75,455

Parameter	Units	Monthly Average Value	Maximum Day Value
Flow	MGD	5.5	28.6

During the previous permit term, the influent monitoring data of the East Plant were shown in **Appendix D**.

D. Wastewater effluent characterization

The City of Bremerton reported the concentration of pollutants in the discharge in the permit application and in discharge monitoring reports. The tabulated data represents the quality of the wastewater effluent discharged from August 2013 to May 2018. The wastewater effluent (West Plant) is characterized as follows:

Table 5. Wastewater Effluent Characterization

Parameter	Units	Monthly Average Value	Weekly Avg. Value
BOD_5	mg/L	12	20
BOD_5	lbs/day	475	783
$CBOD_5$	mg/L	9	11
$CBOD_5$	lbs/day	469	708
TSS	mg/L	7	9
TSS	lbs/day	372	585

Parameter	Units	Maximum Monthly Geometric Mean	Maximum Weekly Geometric Mean
Fecal Coliforms	#/100 mL	164	241

Parameter	Units	Minimum Value	Maximum Value
pH	Standard units	6.4	7.9

Parameter	Units	Monthly Average Value	Maximum Day Value
Ammonia	mg/L as N	30.7	39
Nitrate + Nitrite	mg/L as N	1.36	2.2
TKN	mg/L as N	33	36
TP	mg/L as P	2.73	3.9
SRP	mg/L as P	2.54	4.8

Parameter	Units	Average Value	Maximum Day Value
Temperature (Winter)	°C	13	14
Temperature (Summer)		21	22

Parameter	Units	Average Value	Maximum Day Value
Dissolved Oxygen	mg/L	9.84	11.3
Total Residual Chlorine	mg/L	0.03	0.28

During the previous permit term, the effluent monitoring data (West Plant and East Plant) of the priority pollutants were shown in **Appendix D**.

During the previous permit term, the effluent monitoring data of the East Plant were shown in **Appendix D**.

E. Summary of compliance with previous permit issued on June 21, 2013 (modified on October 1, 2015)

The previous permit placed effluent limits on BOD_5, $CBOD_5$, TSS, fecal coliform, pH and residual chlorine.

The Bremerton WWTP has mostly complied with the effluent limits and permit conditions throughout the duration of the permit issued on June 21, 2013 and modified on October 1, 2015. Ecology assessed compliance based on its review of the facility's information in the Ecology

Permitting and Reporting Information System (PARIS), discharge monitoring reports (DMRs), and on inspections.

Table 6. Permit Triggers

Date	Parameter	Unit	Value	Design Limit 100% (85%)	Category	Note
2/1/18	Influent BOD_5	Lbs/day	17,070	18,100 (15,385)	Permit Trigger	85% Design Criteria Warning

Table 7. Permit Violations

Date	Parameter	Unit	Value	Permit Limit	Category
3/1/15	Effluent BOD_5	mg/L	78*	45 (Weekly Avg.)	Permit Violation
4/1/15	Effluent BOD_5	mg/L	33*	30 (Monthly Avg.)	Permit Violation

* Possible unknown toxics in influent affecting BOD_5 analysis.

Submittal Name	Due Date	Received Date	Category	Note
2017 September DMR	October 15, 2017	October 16, 2017	Permit Violation	Late DMR

Table 8. Permit Submittals

Submittal Name	Due Date	Received Date
CSO Post Construction Monitoring Plan	October 1, 2014	July 31, 2014
CSO Post Construction Monitoring Data Report	February 1, 2018	January 30, 2018
CSO Annual Report (2013)	May 31, 2014	May 9, 2014
CSO Annual Report (2014)	May 31, 2015	April 30, 2015
CSO Annual Report (2015)	May 31, 2016	May 9, 2016
CSO Annual Report (2016)	May 31, 2017	May 3, 2017
CSO Annual Report (2017)	May 31, 2018	May 21, 2018
Sediment Sampling and Analysis Plan	October 1, 2014	July 23, 2014
Sediment Data Report	February 1, 2018	January 26, 2016
Industrial User Survey	February 1, 2018	December 7, 2017
Application for Permit Renewal	February 1, 2018	December 7, 2017

F. State environmental policy act (SEPA) compliance

State law exempts the issuance, reissuance or modification of any wastewater discharge permit from the SEPA process as long as the permit contains conditions that are no less stringent than federal and state rules and regulations (RCW 43.21C.0383). The exemption applies only to existing discharges, not to new discharges.

III. Proposed Permit Limits

Federal and state regulations require that effluent limits in an NPDES permit must be either technology- or water quality-based.

- Technology-based limits are based upon the treatment methods available to treat specific pollutants. Technology-based limits are set by the EPA and published as a regulation, or Ecology develops the limit on a case-by-case basis (40 CFR 125.3, and chapter 173-220 WAC).
- Water quality-based limits are calculated so that the effluent will comply with the Surface Water Quality Standards (chapter 173-201A WAC), Ground Water Standards (chapter 173-200 WAC), Sediment Quality Standards (chapter 173-204 WAC), or the National Toxics Rule (40 CFR 131.36).
- Ecology must apply the most stringent of these limits to each parameter of concern. These limits are described below.

The limits in this permit reflect information received in the application and from supporting reports (engineering, hydrogeology, etc.). Ecology evaluated the permit application and determined the limits needed to comply with the rules adopted by the state of Washington. Ecology does not develop effluent limits for all reported pollutants. Some pollutants are not treatable at the concentrations reported, are not controllable at the source, are not listed in regulation, and do not have a reasonable potential to cause a water quality violation.

Ecology does not usually develop limits for pollutants not reported in the permit application but may be present in the discharge. The permit does not authorize discharge of the non-reported pollutants. During the five-year permit term, the facility's effluent discharge conditions may change from those conditions reported in the permit application. The facility must notify Ecology if significant changes occur in any constituent [40 CFR 122.42(a)]. Until Ecology modifies the permit to reflect additional discharge of pollutants, a permitted facility could be violating its permit.

A. Design criteria

Under WAC 173-220-150 (1)(g), flows and waste loadings must not exceed approved design criteria. Ecology originally approved design criteria for the West Plant in the plans and specifications dated April 1983, prepared by CH2M Hill. Subsequently, Ecology approved higher flow design criteria for this plant in the *Westside Wastewater Treatment Plant Rerating Study* dated December 2009, prepared by Richwine Environmental. The table below includes design criteria from the referenced reports.

Table 9. Design Criteria for Bremerton WWTP (West Plant)

Parameter	Design Quantity
Maximum Month Design Flow (MMDF)(May-Sep.)	11.0 MGD
Maximum Month Design Flow (MMDF)(Oct.-Apr.)	15.5 MGD
BOD_5 Loading for Maximum Month	18,100 lbs/day
TSS Loading for Maximum Month	22,600 lbs/day

B. Technology-based effluent limits (West Plant)

Federal and state regulations define technology-based effluent limits for domestic wastewater treatment plants. These effluent limits are given in 40 CFR Part 133 (federal) and in chapter 173-221 WAC (state). These regulations are performance standards that constitute all known, available, and reasonable methods of prevention, control, and treatment (AKART) for domestic wastewater.

The federal CSO Control Policy (59 FR 18688) also requires entities with Combined Sewer Overflows to implement "Nine Minimum Controls" as technology-based performance standards for CSO discharges. The Nine Minimum Controls are discussed in more detail in section V of this fact sheet, which includes more details on CSO requirements.

The table below identifies technology-based limits for pH, fecal coliform, $CBOD_5$, and TSS, as listed in chapter 173-221 WAC. The technology limits apply only to discharges of treated effluent from the wastewater treatment plant. Section III.H of this fact sheet describes the potential for water quality-based limits.

Table 10. Technology-based Limits (West Plant)

Parameter	Average Monthly Limit	Average Weekly Limit
$CBOD_5$ (concentration)	25 mg/L	40 mg/L
$CBOD_5$ (concentration)	In addition, the $CBOD_5$ effluent concentration must not exceed fifteen percent (15%) of the average influent concentration. For domestic wastewater facilities which receive flows from combined sewer, Ecology shall decide on a case-by-case basis whether any attainable percent removal can be defined during wet weather.	
TSS (concentration)	30 mg/L	45 mg/L
TSS (concentration)	In addition, the TSS effluent concentration must not exceed fifteen percent (15%) of the average influent concentration. For domestic wastewater facilities which receive flows from combined sewer, Ecology shall decide on a case-by-case basis whether any attainable percent removal can be defined during wet weather.	

Parameter	Monthly Geometric Mean Limit	Weekly Geometric Mean Limit
Fecal Coliform	200 organisms/100 mL	400 organisms/100 mL

Parameter	Daily Minimum	Daily Maximum
pH	6.0 standard units	9.0 standard units

Technology-based mass limits are based on WAC 173-220-130(3)(b) and 173-221-030(11)(b). Ecology calculated the monthly and weekly average mass limits for $CBOD_5$ and Total Suspended Solids as follows:

Mass Limit = CL x DF x CF

where:

CL = Technology-based concentration limits listed in the above table
DF = Maximum Monthly Average Design flow (MGD)
CF = Conversion factor of 8.34

Table 11. Technology-based Mass Limits (West Plant)

Parameter	Concentration Limit (mg/L)	Mass Limit (lbs/day) May-September	Mass Limit (lbs/day) October-April
$CBOD_5$ Monthly Average	25	2,294	3,232
$CBOD_5$ Weekly Average	40	3,670	5,171
TSS Monthly Average	30	2,752	3,878
TSS Weekly Average	45	4,128	5,817

WAC 173-221-050 subsection (3) states that, "for domestic wastewater facilities which receive flows from combined sewers, Ecology shall decide on a case-by-case basis whether any attainable percent removal can be defined during wet weather." The West Plant receives a more dilute influent during wet weather due to a collection system that combines both sanitary sewage and storm water. A dilute influent can make the 85% removal criteria for $CBOD_5$ and TSS difficult to achieve. As part of the recently completed CSO reduction program, Bremerton is conveying a significant portion of its stormwater to the West Plant for treatment. As a result, the plant influent is expected to be more diluted, especially during heavy storm events.

Ecology has determined that the percent removal requirements for $CBOD_5$ and TSS will remain at 65% during wet weather months (October through April) when the influent is likely to have lower than normal concentrations of both BOD_5 and TSS.

C. Technology-based effluent limits (East Plant)

Washington state regulations (chapter 173-245 WAC) define technology-based effluent limits for combined sewer overflow treatment plants. The table below identifies these technology-based limits for TSS removal and settleable solids. Section III.H of this fact sheet reviews the potential for water quality-based limits.

Table 12. Technology-based Mass Limits (East Plant)

Parameter	Limit
TSS Removal [a]	Minimum 50%
Settleable Solids [a]	Less than 0.3 mL/L/hr
Fecal Coliform [b]	400/100 mL

[a] WAC 173-245-020(16)
[b] Washington State Department of Ecology, Criteria for Sewage Works *Design*, 2008, page C3-21.

D. Surface water quality-based effluent limits

The Washington State surface water quality standards (chapter 173-201A WAC) are designed to protect existing water quality and preserve the beneficial uses of Washington's surface waters. Waste discharge permits must include conditions that ensure the discharge will meet the surface water quality standards (WAC 173-201A-510). Water quality-based effluent limits may be based on an individual waste load allocation or on a waste load allocation developed during a basin wide total maximum daily load study (TMDL).

Numerical criteria for the protection of aquatic life and recreation

Numerical water quality criteria are listed in the water quality standards for surface waters (chapter 173-201A WAC). They specify the maximum levels of pollutants allowed in receiving water to protect aquatic life and recreation in and on the water. Ecology uses numerical criteria along with chemical and physical data for the wastewater and receiving water to derive the effluent limits in the discharge permit. When surface water quality-based limits are more stringent or potentially more stringent than technology-based limits, the discharge must meet the water quality-based limits.

Numerical criteria for the protection of human health

In 1992, U.S. EPA published 91 numeric water quality criteria for the protection of human health that are applicable to dischargers in Washington State in its National Toxics Rule [40 CFR (EPA, 1992)]. Ecology submitted a standards revision for 192 new human health criteria for 97 pollutants to EPA on August 1, 2016. In accordance with requirements of CWA section 303(c)(2)(B), EPA finalized 144 new and revised Washington specific human health criteria for priority pollutants, to apply to waters under Washington's jurisdiction. EPA approved 45 human health criteria as submitted by Washington. The EPA took no action on Ecology-submitted criteria for arsenic, dioxin, and thallium. The existing criteria for these three pollutants as adopted in the National Toxics Rule (40 CFR 131.36) remain in effect.

These newly adopted criteria, located in WAC 173-201A-240, are designed to protect humans from exposure to pollutants linked to cancer and other diseases, based on consuming fish and shellfish and drinking contaminated surface waters. The water quality standards also include radionuclide criteria to protect humans from the effects of radioactive substances.

Narrative criteria

Narrative water quality criteria (e.g., WAC 173-201A-240(1); 2006) limit the toxic, radioactive, or other deleterious material concentrations that the facility may discharge to levels below those which have the potential to:

- Adversely affect designated water uses.
- Cause acute or chronic toxicity to biota.
- Impair aesthetic values.
- Adversely affect human health.

Narrative criteria protect the specific designated uses of all fresh waters (WAC 173-201A-200, 2006) and of all marine waters (WAC 173-201A-210, 2006) in the state of Washington.

Antidegradation

Description -- The purpose of Washington's Antidegradation Policy (WAC 173-201A-300-330; 2006) is to:

- Restore and maintain the highest possible quality of the surface waters of Washington.
- Describe situations under which water quality may be lowered from its current condition.
- Apply to human activities that are likely to have an impact on the water quality of surface water.
- Ensure that all human activities likely to contribute to a lowering of water quality, at a minimum, apply all known, available, and reasonable methods of prevention, control, and treatment (AKART).
- Apply three tiers of protection (described below) for surface waters of the state.

Tier I ensures existing and designated uses are maintained and protected and applies to all waters and all sources of pollutions. Tier II ensures that waters of a higher quality than the criteria assigned are not degraded unless such lowering of water quality is necessary and in the overriding public interest. Tier II applies only to a specific list of polluting activities. Tier III prevents the degradati of waters formally listed as "outstanding resource waters," and applies to all sources of pollution.

A facility must prepare a Tier II analysis when all three of the following conditions are met:

- The facility is planning a new or expanded action.
- Ecology regulates or authorizes the action.
- The action has the potential to cause measurable degradation to existing water quality at the edge of a chronic mixing zone.

Facility Specific Requirements -- This facility must meet Tier I requirements.

- Dischargers must maintain and protect existing and designated uses. Ecology must not allow any degradation that will interfere with, or become injurious to, existing or designated uses, except as provided for in chapter 173-201A WAC.

Ecology's analysis described in this section of the fact sheet demonstrates that the proposed permit conditions will protect existing and designated uses of the receiving water.

Combined sewer overflows

Chapter 173-245 WAC requires that "All CSO sites shall achieve and at least maintain the greatest reasonable reduction, and neither cause violations of applicable water quality standards, nor restrictions to the characteristic uses of the receiving water, nor accumulation of deposits which: (a) Exceed sediment criteria or standards; or (b) have an adverse biological effect." "The greatest reasonable reduction" means control of each CSO outfall such that an average of no more than one untreated discharge may occur per year. Ecology includes specific conditions in the proposed permit to ensure that City of Bremerton continues to make progress towards meeting water quality goals for each CSO outfall in its system. Section V of this fact sheet contains more detailed information on these CSO requirements.

Mixing zones

A mixing zone is the defined area in the receiving water surrounding the discharge port(s), where wastewater mixes with receiving water. Within mixing zones the pollutant concentrations may exceed water quality numeric standards, so long as the discharge doesn't interfere with designated uses of the receiving water body (for example, recreation, water supply, and aquatic life and wildlife habitat, etc.) The pollutant concentrations outside of the mixing zones must meet water quality numeric standards.

State and federal rules allow mixing zones because the concentrations and effects of most pollutants diminish rapidly after discharge, due to dilution. Ecology defines mixing zone sizes to limit the amount of time any exposure to the end-of-pipe discharge could harm water quality, plants, or fish.

The state's water quality standards allow Ecology to authorize mixing zones for the facility's permitted wastewater discharges only if those discharges already receive all known, available, and reasonable methods of prevention, control, and treatment (AKART). Mixing zones typically require compliance with water quality criteria within a specified distance from the point of discharge and must not use more than 25% of the available width of the water body for dilution [WAC 173-201A-400 (7)(a)(ii-iii) or WAC 173-201A-400(7)(b)(ii-iii)].

Ecology uses modeling to estimate the amount of mixing within the mixing zone. Through modeling Ecology determines the potential for violating the water quality standards at the edge of the mixing zone and derives any necessary effluent limits. Steady-state models are

the most frequently used tools for conducting mixing zone analyses. Ecology chooses values for each effluent and for receiving water variables that correspond to the time period when the most critical condition is likely to occur (see Ecology's *Permit Writer's Manual*). Each critical condition parameter, by itself, has a low probability of occurrence and the resulting dilution factor is conservative. The term "reasonable worst-case" applies to these values.

The mixing zone analysis produces a numerical value called a dilution factor (DF). A dilution factor represents the amount of mixing of effluent and receiving water that occurs at the boundary of the mixing zone. For example, a dilution factor of 4 means the effluent is 25% and the receiving water is 75% of the total volume of water at the boundary of the mixing zone. Ecology uses dilution factors with the water quality criteria to calculate reasonable potentials and effluent limits. Water quality standards include both aquatic life-based criteria and human health-based criteria. The former are applied at both the acute and chronic mixing zone boundaries; the latter are applied only at the chronic boundary. The concentration of pollutants at the boundaries of any of these mixing zones may not exceed the numerical criteria for that zone.

Most aquatic life *acute* criteria are based on the assumption that organisms are not exposed to that concentration for more than one hour and more often than one exposure in three years. Most aquatic life *chronic* criteria are based on the assumption that organisms are not exposed to that concentration for more than four consecutive days and more often than once in three years.

The two types of human health-based water quality criteria distinguish between those pollutants linked to non-cancer effects (non-carcinogenic) and those linked to cancer effects (carcinogenic). The human health-based water quality criteria incorporate several exposure and risk assumptions. These assumptions include:

- A 70-year lifetime of daily exposures.
- An ingestion rate for fish or shellfish measured in kg/day.
- An ingestion rate of two and four tenths (2.4) liters/day for drinking water (increased from two liters/day in the 2016 Water Quality Standards update).
- A one-in-one-million cancer risk for carcinogenic chemicals.

This permit authorizes a small acute mixing zone, surrounded by a chronic mixing zone around the point of discharge (WAC 173-201A-400). The water quality standards impose certain conditions before allowing the discharger a mixing zone:

1. **Ecology must specify both the allowed size and location in a permit.**

   The proposed permit specifies the size and location of the allowed mixing zone (as specified below).

2. **The facility must fully apply "all known, available, and reasonable methods of prevention, control and treatment" (AKART) to its discharge.**

   Ecology has determined that the treatment provided at Bremerton WWTP meets the requirements of AKART (see "Technology-based Limits").

3. Ecology must consider critical discharge conditions.

Surface water quality-based limits are derived for the water body's critical condition (the receiving water and waste discharge condition with the highest potential for adverse impact on the aquatic biota, human health, and existing or designated waterbody uses). The critical discharge condition is often pollutant-specific or waterbody-specific.

Critical discharge conditions are those conditions that result in reduced dilution or increased effect of the pollutant. Factors affecting dilution include the depth of water, the density stratification in the water column, the currents, and the rate of discharge. Density stratification is determined by the salinity and temperature of the receiving water. Temperatures are warmer in the surface waters in summer. Therefore, density stratification is generally greatest during the summer months. Density stratification affects how far up in the water column a freshwater plume may rise. The rate of mixing is greatest when an effluent is rising. The effluent stops rising when the mixed effluent is the same density as the surrounding water. After the effluent stops rising, the rate of mixing is much more gradual. Water depth can affect dilution when a plume might rise to the surface when there is little or no stratification. Ecology uses the water depth at mean lower low water (MLLW) for marine waters. Ecology's *Permit Writer's Manual* describes additional guidance on criteria/design conditions for determining dilution factors. The manual can be obtained from Ecology's website at: https://fortress.wa.gov/ecy/publications/documents/92109.pdf

Table 13. Critical Conditions Used to Model the West Plant Discharge

Critical Condition		Value
Water Depth at MLLW		29 feet
10th percentile current speed for acute mixing zone		1.3 cm/sec
50th percentile current speed for chronic and human health mixing zones		3.4 cm/sec
Maximum average monthly effluent flow for chronic and human health non-carcinogen	May through September	11.0 MGD
	October through April	15.5 MGD
Maximum daily flow for acute mixing zone	May through September	15.0 MGD
	October through April	30.7 MGD
1 DAD MAX effluent temperature		24 °C

(Source: *Mixing Zone Study Update Re-Rating Analysis Report*, Cosmopolitan Engineering, April 2010)

Table 14. Critical Conditions Used to Model the East Plant Discharge

Critical Condition	Value
Water Depth at MLLW	24 feet
10th percentile current speed for acute mixing zone	0.1 m/sec
50th percentile current speed for chronic and human health mixing zones	0.5 m/sec
Ambient Temperature	9 °C
Ambient Salinity	29 ppt
Effluent Temperature	15.7 °C
Maximum Daily Flow for Acute Mixing Zone	6,500 gpm (9.4 MGD)
4-day Maximum Flow for Chronic and Human Health Non-carcinogen	4,000 gpm (5.8 MGD)

(Source: *Eastside Treatment Plant Outfall Replacement Engineering Report*, Murraysmith, March 2018)

4. **Supporting information must clearly indicate the mixing zone would not:**
   - Have a reasonable potential to cause the loss of sensitive or important habitat.
   - Substantially interfere with the existing or characteristic uses.
   - Result in damage to the ecosystem.
   - Adversely affect public health.

   Ecology established Washington State water quality criteria for toxic chemicals using EPA criteria. EPA developed the criteria using toxicity tests with numerous organisms and set the criteria to generally protect the species tested and to fully protect all commercially and recreationally important species.

   EPA sets acute criteria for toxic chemicals assuming organisms are exposed to the pollutant at the criteria concentration for one hour. They set chronic standards assuming organisms are exposed to the pollutant at the criteria concentration for four days. Dilution modeling under critical conditions generally shows that both acute and chronic criteria concentrations are reached within minutes of discharge.

   The discharge plume does not impact drifting and non-strong swimming organisms because they cannot stay in the plume close to the outfall long enough to be affected. Strong swimming fish could maintain a position within the plume, but they can also avoid the discharge by swimming away. Mixing zones generally do not affect benthic organisms (bottom dwellers) because the buoyant plume rises in the water column. Ecology has additionally determined that the effluent will not exceed 33 degrees C for more than two seconds after discharge; and that the temperature of the water will not create lethal conditions or blockages to fish migration.

   Ecology evaluates the cumulative toxicity of an effluent by testing the discharge with whole effluent toxicity (WET) testing.

   Ecology reviewed the above information, the specific information on the characteristics of the discharge, the receiving water characteristics, and the discharge location. Based on this review, Ecology concluded that the discharge does not have a reasonable potential to cause the loss of sensitive or important habitat, substantially interfere with existing or characteristics uses, result in damage to the ecosystem, or adversely affect public health if the permit limits are met.

5. **The discharge/receiving water mixture must not exceed water quality criteria outside the boundary of a mixing zone.**

   Ecology conducted a reasonable potential analysis, using procedures established by the EPA and by Ecology, for each pollutant and concluded the discharge/receiving water mixture will not violate water quality criteria outside the boundary of the mixing zone if permit limits are met.

6. **The size of the mixing zone and the concentrations of the pollutants must be minimized.**

   At any given time, the effluent plume uses only a portion of the acute and chronic mixing zone, which minimizes the volume of water involved in mixing. Because tidal currents change direction, the plume orientation within the mixing zone changes. The plume mixes as it rises through the water column therefore much of the receiving water volume at lower depths in the mixing zone is not mixed with discharge. Similarly, because the discharge may stop rising at some depth due to density stratification, waters above that depth will not mix with the discharge. Ecology determined it is impractical to specify in the permit the actual, much more limited volume in which the dilution occurs as the plume rises and moves with the current.

   Ecology minimizes the size of mixing zones by requiring dischargers to install diffusers when they are appropriate to the discharge and the specific receiving waterbody. When a diffuser is installed, the discharge is more completely mixed with the receiving water in a shorter time. Ecology also minimizes the size of the mixing zone (in the form of the dilution factor) using design criteria with a low probability of occurrence. For example, Ecology uses the expected 95th percentile pollutant concentration, the 90th percentile background concentration, the centerline dilution factor, and the lowest flow occurring once in every ten years to perform the reasonable potential analysis.

   Because of the above reasons, Ecology has effectively minimized the size of the mixing zone authorized in the proposed permit.

7. **Maximum size of mixing zone.**

   The authorized mixing zone does not exceed the maximum size restriction.

8. **Acute mixing zone.**

   - **The discharge/receiving water mixture must comply with acute criteria as near to the point of discharge as practicably attainable.**

     Ecology determined the acute criteria will be met at 10% of the distance of the chronic mixing zone.

   - **The pollutant concentration, duration, and frequency of exposure to the discharge will not create a barrier to migration or translocation of indigenous organisms to a degree that has the potential to cause damage to the ecosystem.**

     As described above, the toxicity of any pollutant depends upon the exposure, the pollutant concentration, and the time the organism is exposed to that concentration. Authorizing a limited acute mixing zone for this discharge assures that it will not create a barrier to migration. The effluent from this discharge will rise as it enters the receiving water, assuring that the rising effluent will not cause translocation of indigenous organisms near the point of discharge (below the rising effluent).

   - **Comply with size restrictions.**

     The mixing zone authorized for this discharge complies with the size restrictions published in chapter 173-201A WAC.

9. Overlap of mixing zones.

This mixing zone does not overlap another mixing zone.

E. Designated uses and surface water quality criteria

Applicable designated uses and surface water quality criteria are defined in chapter 173-201A WAC. In addition, the U.S. EPA set human health criteria for toxic pollutants (EPA 1992). The tables included below summarize the criteria applicable to the receiving water's designated uses.

- Aquatic life uses are designated using the following general categories. All indigenous fish and non-fish aquatic species must be protected in waters of the state.
  a. Extraordinary quality salmonid and other fish migration, rearing, and spawning; clam, oyster, and mussel rearing and spawning; crustaceans and other shellfish (crabs, shrimp, crayfish, scallops, etc.) rearing and spawning.
  b. Excellent quality salmonid and other fish migration, rearing, and spawning; clam, oyster, and mussel rearing and spawning; crustaceans and other shellfish (crabs, shrimp, crayfish, scallops, etc.) rearing and spawning.
  c. Good quality salmonid migration and rearing; other fish migration, rearing, and spawning; clam, oyster, and mussel rearing and spawning; crustaceans and other shellfish (crabs, shrimp, crayfish, scallops, etc.) rearing and spawning.
  d. Fair quality salmonid and other fish migration.

The *Aquatic Life Uses* and the associated criteria for this receiving water are identified below.

Table 15. Marine Aquatic Life Uses and Associated Criteria for Sinclair Inlet and Port Washington Narrows

Excellent Quality	
Temperature Criteria – Highest 1D MAX	16°C (60.8°F)
Dissolved Oxygen Criteria – Lowest 1-Day Minimum	6.0 mg/L
Turbidity Criteria	• 5 NTU over background when the background is 50 NTU or less; or • A 10 percent increase in turbidity when the background turbidity is more than 50 NTU.
pH Criteria	pH must be within the range of 7.0 to 8.5 with a human-caused variation within the above range of less than 0.5 units.

- To protect shellfish harvesting, fecal coliform organism levels must not exceed a geometric mean value of 14 colonies/100 mL, and not have more than 10 percent of all samples (or any single sample when less than ten sample points exist) obtained for calculating the geometric mean value exceeding 43 colonies/100 mL.
- The *recreational uses* for Sinclair Inlet and Port Washington Narrows are primary contact recreation as identified below.

Table 16. Recreational Uses for Sinclair Inlet and Port Washington Narrows

Recreational Use	Criteria
Primary Contact Recreation	Fecal coliform organism levels must not exceed a geometric mean value of 14 colonies/100 mL, with not more than 10 percent of all samples (or any single sample when less than ten sample points exist) obtained for calculating the geometric mean value exceeding 43 colonies /100 mL.

- The *miscellaneous marine water uses* are wildlife habitat, harvesting, commerce and navigation, boating, and aesthetics.

F. Water quality impairments

West Plant – Sinclair Inlet

Treated wastewater from the West Plant discharges into Sinclair Inlet, Puget Sound. Ecology has not documented any water quality impairments in the receiving water in the vicinity of the outfall.

East Plant – Port Washington Narrows

Treated wastewater from the East Plant discharges into Port Washington Narrows, Puget Sound. Ecology has not documented any water quality impairments in the receiving water in the vicinity of the outfall in the 2012 303(d) list. However, it is currently listed for bacteria as Category 4a. This designation is for the quadrant the outfall is in.

This category is defined as follows:

Category 4: Impaired waters that do not require a TMDL

Category 4a - already has an EPA-approved TMDL plan in place and implemented.

Ecology conducted a total maximum daily load (TMDL) study to address the non-attainment of fecal coliform water quality standards in Sinclair and Dyes Inlets. The study indicated that the existing (technology-based) limits for fecal coliform bacteria in the NPDES permits for the three WWTPs in this water segment, including Bremerton's West Plant, are adequate to protect marine waters. The results of this study are presented in *Sinclair and Dyes Inlets Fecal Coliform Bacteria Total Maximum Daily Load - TMDL and Water Quality Implementation Plan* (Ecology, 2012).

Ecology is also working on a Puget Sound Nutrient Source Reduction Project which helps us work collaboratively with communities, stakeholders, and those already working to manage Puget Sound to address human sources of nutrients. This work focuses regional investments to control nutrients from point and non-point sources to help Puget Sound meet dissolved oxygen water quality criteria.

G. Evaluation of surface water quality-based effluent limits for narrative criteria

Ecology must consider the narrative criteria described in WAC 173-201A-160 when it determines permit limits and conditions. Narrative water quality criteria limit the toxic, radioactive, or other deleterious material concentrations that the facility may discharge which have the potential to adversely affect designated uses, cause acute or chronic toxicity to biota, impair aesthetic values, or adversely affect human health.

Ecology considers narrative criteria when it evaluates the characteristics of the wastewater and when it implements all known, available, and reasonable methods of treatment and prevention (AKART) as described above in the technology-based limits section. When Ecology determines if a facility is meeting AKART it considers the pollutants in the wastewater and the adequacy of the treatment to prevent the violation of narrative criteria.

In addition, Ecology considers the toxicity of the wastewater discharge by requiring whole effluent toxicity (WET) testing when there is a reasonable potential for the discharge to contain toxics. Ecology's analysis of the need for WET testing for this discharge is described later in the fact sheet.

H. Evaluation of surface water quality-based effluent limits for numeric criteria

Pollutants in an effluent may affect the aquatic environment near the point of discharge (near-field) or at a considerable distance from the point of discharge (far-field). Toxic pollutants, for example, are near-field pollutants; their adverse effects diminish rapidly with mixing in the receiving water. Conversely, a pollutant such as biochemical oxygen demand (BOD_5) is a far-field pollutant whose adverse effect occurs away from the discharge even after dilution has occurred. Thus, the method of calculating surface water quality-based effluent limits varies with the point at which the pollutant has its maximum effect.

With technology-based controls (AKART), predicted pollutant concentrations in the discharge exceed water quality criteria. Ecology therefore authorizes a mixing zone in accordance with the geometric configuration, flow restriction, and other restrictions imposed on mixing zones by chapter 173-201A WAC.

West Plant:

The diffuser for the West Plant at Outfall 001 is 120 feet long with a diameter of 36 inches. The diffuser has a total of 20 6.5-inch diameter ports. The distance between ports is 6 feet. The diffuser depth is 29 feet below mean lower low water (MLLW). Ecology obtained this information from the *Mixing Zone Study Upgrade Re-Rating Analysis Report*, April 2010, Cosmopolitan Engineering. The mixing zone analysis was approved by Ecology on February 17, 2011.

Chronic Mixing Zone -- WAC 173-201A-400(7)(b) specifies that mixing zones must not extend in any horizontal direction from the discharge ports for a distance greater than 200 feet plus the depth of water over the discharge ports and may not occupy more than 25% of the width of the water body as measured during MLLW.

The horizontal distance along the semi-major axis of the chronic mixing zone is 678 feet. The horizontal distance along the semi-minor axis of the chronic mixing zone is 458 feet. The mixing zone extends from the bottom to the top of the water column.

Acute Mixing Zone -- WAC 173-201A-400(8)(b) specifies that in estuarine waters a zone where acute criteria may be exceeded must not extend beyond 10% of the distance established for the chronic zone. The acute mixing zone for Outfall 001 extends 22.9 feet in any direction from any discharge port.

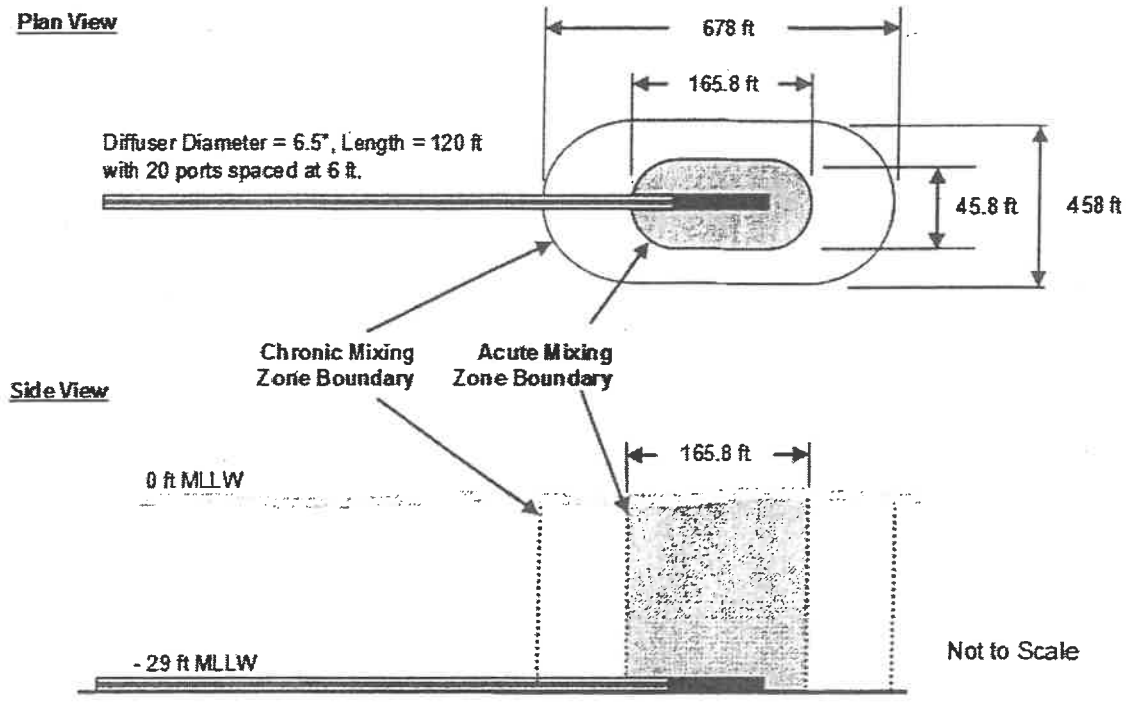


Figure 2. Outfall Mixing Zone Depiction (West Plant)

East Plant:

The diffuser for the East Plant at Outfall 002 is 100 feet long with a diameter of 36 inches. The diffuser has a total of 26 5.75-inch diameter ports. The distance between ports is 4 feet. The diffuser depth is 24 feet below MLLW. Ecology obtained this information from the *Eastside Treatment Plant Outfall Replacement Engineering Report*, March 2018, Murraysmith. The mixing zone analysis was approved by Ecology on March 15, 2018.

Chronic Mixing Zone -- WAC 173-201A-400(7)(b) specifies that mixing zones must not extend in any horizontal direction from the discharge ports for a distance greater than 200 feet plus the depth of water over the discharge ports and may not occupy more than 25% of the width of the water body as measured during MLLW.

The horizontal distance along the semi-major axis of the chronic mixing zone is 548 feet. The horizontal distance along the semi-minor axis of the chronic mixing zone is 448 feet. The mixing zone extends from the bottom to the top of the water column.

Acute Mixing Zone -- WAC 173-201A-400(8)(b) specifies that in estuarine waters a zone where acute criteria may be exceeded must not extend beyond 10% of the distance established for the chronic zone. The acute mixing zone for Outfall 002 extends 22.4 feet in any direction from any discharge port.

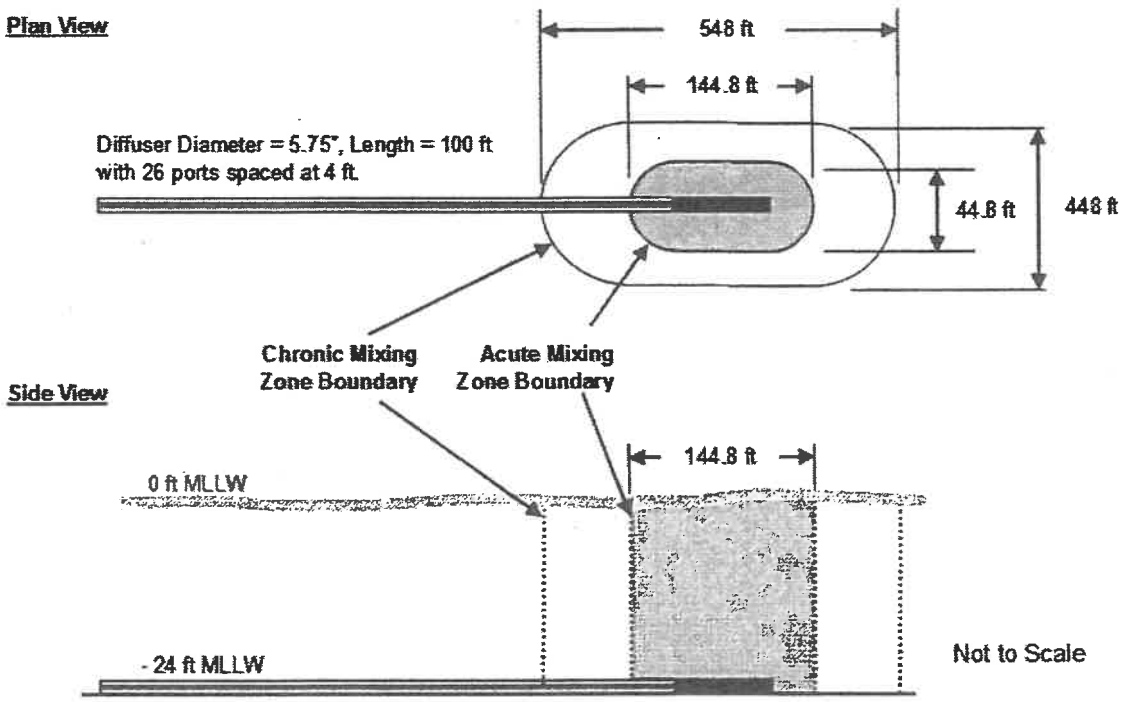


Figure 3. Outfall Mixing Zone Depiction (East Plant)

Ecology determined the dilution factors that occur within these zones at the critical conditions are taken from the mixing zone analyses for the respective plants. The dilution factors are listed below.

Table 17. Dilution Factors

Criteria	Dilution Factors		
	Outfall 001 (West Plant)		Outfall 002 (East Plant)
	May – Sep.	Oct. – Apr.	
Acute Aquatic Life Criteria	37	20	66
Chronic Aquatic Life Criteria	141	127	444
Human Health Criteria – Carcinogen	141	127	444
Human Health Criteria – Non-carcinogen	141	127	444

Evaluation of surface water quality-based effluent limits for numeric criteria for the West Plant

Ecology determined the impacts of dissolved oxygen deficiency, pH, fecal coliform, chlorine, ammonia, metals, other toxics, and temperature as described below, using the dilution factors in the above table. The derivation of surface water quality-based limits also takes into account the variability of pollutant concentrations in both the effluent and the receiving water.

Dissolved Oxygen -- BOD_5 and Ammonia Effects -- Natural decomposition of organic material in wastewater effluent impacts dissolved oxygen in the receiving water at distances far outside of the regulated mixing zone. The 5-day Biochemical Oxygen Demand (BOD_5) of an effluent sample indicates the amount of biodegradable material in the wastewater and estimates the magnitude of oxygen consumption the wastewater will generate in the receiving water. The amount of ammonia-based nitrogen in the wastewater also provides an indication of oxygen demand potential in the receiving water.

With technology-based limits, this discharge results in a small amount of biochemical oxygen demand (BOD_5) relative to the large amount of dilution in the receiving water at critical conditions. Technology-based limits will ensure that dissolved oxygen criteria are met in the receiving water.

pH -- Compliance with the technology-based limits of 6.0 to 9.0 will assure compliance with the water quality standards of surface waters because of the high buffering capacity of marine water.

Fecal Coliform -- Ecology modeled the numbers of fecal coliform by simple mixing analysis using the technology-based limit of 400 organisms per 100 mL and a dilution factor of 127.

Under critical conditions, modeling predicts no violation of the water quality criterion for fecal coliform. Therefore, the proposed permit includes the technology-based effluent limit for fecal coliform bacteria.

Turbidity -- Ecology evaluated the impact of turbidity based on the range of total suspended solids in the effluent and turbidity of the receiving water. Ecology expects no violations of the turbidity criteria outside the designated mixing zone provided the facility meets its technology-based total suspended solids permit limits.

Toxic Pollutants -- Federal regulations (40 CFR 122.44) require Ecology to place limits in NPDES permits on toxic chemicals in an effluent whenever there is a reasonable potential for those chemicals to exceed the surface water quality criteria. Ecology does not exempt facilities with technology-based effluent limits from meeting the surface water quality standards.

The following toxic pollutants are present in the discharge: ammonia, antimony, bromoform, bromodichloromethane, buty benzyl phthalate, chlorine, chloroform, cadmium, copper, di-n-butylphthalate, 2,6-dinitrotoluene, 1,2-diphenylhydazine, iron, lead, mercury, nickel, phenol, pyrene, toluene, and zinc.

Ammonia's toxicity depends on that portion which is available in the unionized form. The amount of unionized ammonia depends on the temperature, pH, and salinity of the receiving marine water. To evaluate ammonia toxicity, Ecology used the available receiving water information for ambient station in section II.B (Description of the receiving water) and Ecology spreadsheet tools.

No valid ambient background data were available for other pollutants listed above. Ecology used zero for background.

Ecology determined that the pollutants above, pose no reasonable potential to exceed the water quality criteria at the critical condition using procedures given in EPA, 1991 (**Appendix D**) and as described above. Ecology's determination assumes that this facility meets the other effluent limits of this permit.

Ecology determined that chlorine poses no reasonable potential to exceed the water quality criteria at the critical condition using procedures given in EPA, 1991 (**Appendix D**). To avoid backsliding, the previous chlorine permit limits remain the same.

Ecology's determination assumes that this facility meets the other effluent limits of this permit.

Evaluation of surface water quality-based effluent limits for numeric criteria for the East Plant

East plant is a CSO plant and discharges infrequently for short durations only during wet weather months as a result of precipitation.

Ecology determined the impacts of pH, fecal coliform, ammonia, metals, and temperature as described below, using the dilution factors in the above table. The derivation of surface water quality-based limits also takes into account the variability of pollutant concentrations in both the effluent and the receiving water.

pH -- Compliance with the technology-based limits of 6.0 to 9.0 will assure compliance with the water quality standards of surface waters because of the high buffering capacity of marine water.

Fecal Coliform -- Ecology modeled the numbers of fecal coliform for the East Plant by simple mixing analysis using the (secondary treatment) technology-based limit of 400 organisms/100 mL, receiving water concentration of 3 organisms/100 mL, and a dilution factor of 444.

Under critical conditions, modeling predicts no violation of the water quality criterion for fecal coliform. Therefore, the proposed permit includes the (secondary treatment) technology-based effluent limit for fecal coliform bacteria.

Toxic Pollutants -- The following toxic pollutants are present in the discharge: ammonia, acenaphthylene, anthracene, antimony, arsenic, benzo(a)anthracene, benzo(a)pyrene, benzofluroacene, bromodichloromethane, chloroform, chromium, chrysene, copper, 2-chloronaphyhalene, dibeno(a,h)anthracene, 1,2 dichloroethane, diethyl phthalate, di-n-butyl phthalate, n-decane, ethylbenzene, fluoranthene, fluorine, lead, mercury, 2-nitrophenol, phenol, pyrene, toluene, and zinc.

Ammonia's toxicity depends on that portion which is available in the unionized form. The amount of unionized ammonia depends on the temperature, pH, and salinity of the receiving marine water. To evaluate ammonia toxicity, Ecology used the available receiving water information for ambient station in section II.B (Description of the receiving water) and Ecology spreadsheet tools. No valid ambient background data were available for ammonia. Ecology used zero for background. Ecology determined that the ammonia poses no reasonable potential to exceed the water quality criteria at the critical condition using procedures given in EPA, 1991 (**Appendix D**) and as described above. Ecology's determination assumes that this facility meets the other effluent limits of this permit.

For these pollutants, acenaphthylene, anthracene, antimony, arsenic, benzo(a)anthracene, benzo(a)pyrene, benzofluroacene, bromodichloromethane, chloroform, chromium, chrysene, copper, 2-chloronaphyhalene, dibeno(a,h)anthracene, 1,2 dichloroethane, diethyl phthalate, di-n-butyl phthalate, n-decane, ethylbenzene, fluoranthene, fluorine, lead, mercury, 2-nitrophenol, phenol, pyrene, toluene, and zinc, Ecology conducted an evaluation (see information later this fact sheet) on these parameters to determine that it would not require effluent limits in this permit. Ecology's determination assumes that this facility meets the other effluent limits of this permit.

Temperature -- The state temperature standards [WAC 173-201A-200-210 and 600-612] include multiple elements:

- Annual summer maximum threshold criteria (June 15 to September 15).
- Supplemental spawning and rearing season criteria (September 15 to June 15).
- Incremental warming restrictions.
- Protections against acute effects.

Ecology evaluates each criterion independently to determine reasonable potential and derive permit limits.

- Annual summer maximum and supplementary spawning/rearing criteria

  Each water body has an annual maximum temperature criterion [WAC 173-201A-200(1)(c), 210(1)(c), and Table 602]. These threshold criteria (e.g., 12, 16, 17.5, 20°C) protect specific categories of aquatic life by controlling the effect of human actions on summer temperatures.

  Some waters have an additional threshold criterion to protect the spawning and incubation of salmonids (9°C for char and 13°C for salmon and trout) [WAC 173-201A-602, Table 602]. These criteria apply during specific date-windows.

  The threshold criteria apply at the edge of the chronic mixing zone. Criteria for most fresh waters are expressed as the highest 7-Day average of daily maximum temperature (7-DADMax). The 7-DADMax temperature is the arithmetic average of seven consecutive measures of daily maximum temperatures. Criteria for marine waters and some fresh waters are expressed as the highest 1-Day annual maximum temperature (1-DMax).

- Incremental warming criteria

  The water quality standards limit the amount of warming human sources can cause under specific situations [WAC 173-201A-200(1)(c)(i)-(ii), 210(1)(c)(i)-(ii)]. The incremental warming criteria apply at the edge of the chronic mixing zone.

  At locations and times when background temperatures are cooler than the assigned threshold criterion, point sources are permitted to warm the water by only a defined increment. These increments are permitted only to the extent doing so does not cause temperatures to exceed either the annual maximum or supplemental spawning criteria.

  At locations and times when a threshold criterion is being exceeded due to natural conditions, all human sources, considered cumulatively, must not warm the water more than 0.3°C above the naturally warm condition.

  When Ecology has not yet completed a TMDL, our policy allows each point source to warm water at the edge of the chronic mixing zone by 0.3°C. This is true regardless of the background temperature and even if doing so would cause the temperature at the edge of a standard mixing zone to exceed the numeric threshold criteria. Allowing a 0.3°C warming for each point source is reasonable and protective where the dilution factor is based on 25% or less of the critical flow. This is because the fully mixed effect on temperature will only be a fraction of the 0.3°C cumulative allowance (0.075°C or less) for all human sources combined.

- Protections for temperature acute effects

  Instantaneous lethality to passing fish: The upper 99th percentile daily maximum effluent temperature must not exceed 33°C, unless a dilution analysis indicates ambient temperatures will not exceed 33°C two seconds after discharge.

  General lethality and migration blockage: Measurable (0.3°C) increases in temperature at the edge of a chronic mixing zone are not allowed when the receiving water temperature exceeds either a 1DMax of 23°C or a 7DADMax of 22°C.

  Lethality to incubating fish: Human actions must not cause a measurable (0.3°C) warming above 17.5°C at locations where eggs are incubating.

Reasonable potential analysis

Annual summer maximum and incremental warming criteria: Ecology calculated the reasonable potential for the discharge to exceed the annual summer maximum and the incremental warming criteria at the edge of the chronic mixing zone during critical condition. No reasonable potential exists to exceed the temperature criterion where:

(Criterion + 0.3) > [Criterion + (Teffluent95 – Criterion)/DF].

West Plant: (16 + 0.3) > (16 + (22 – 16)/127) => 16.3 > 16

East Plant: (16 + 0.3) > (16 + (16.6 – 16)/444) => 16.3 > 16

The figure below graphically portrays the above equation and shows the conditions when a permit limit will apply.

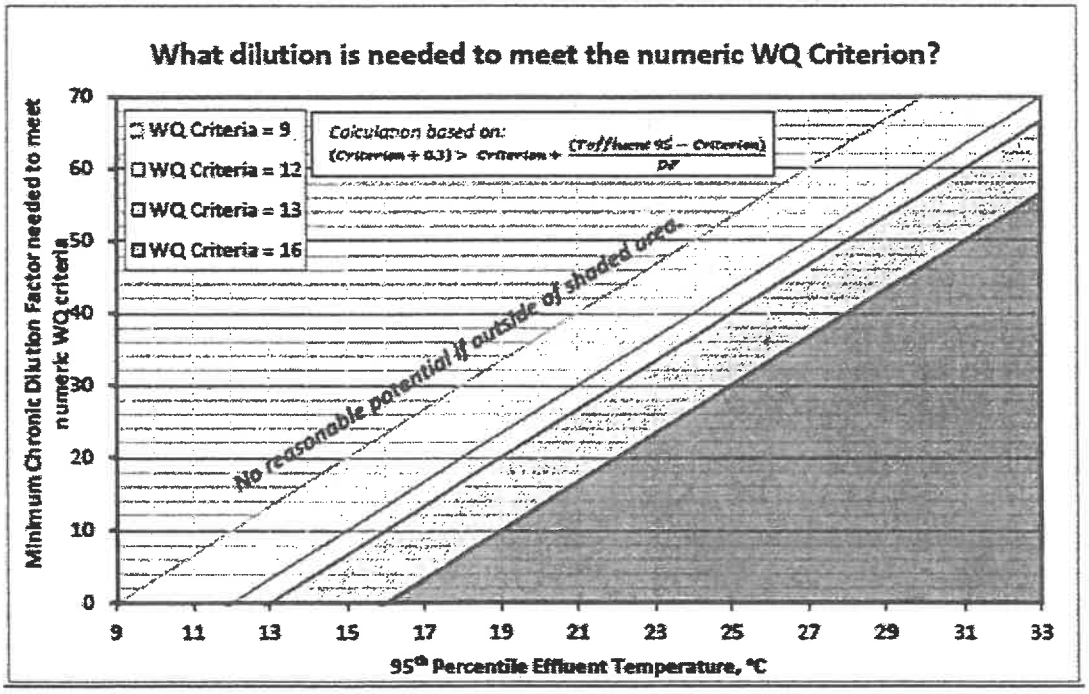


Figure 4. Dilution Necessary to Meet Criteria at Edge of Mixing Zone

Therefore, the proposed permit does not include a temperature limit. The permit requires additional monitoring of effluent temperatures for West Plant and East Plant. Ecology will reevaluate the reasonable potential during the next permit renewal.

I. Human health

Washington's water quality standards include numeric human health-based criteria that Ecology must consider when writing NPDES permits. In accordance with the requirements of CWA section 303(c)(2)(B), EPA has finalized 144 new and revised Washington-specific human health criteria for priority toxic pollutants, to apply to waters under Washington's jurisdiction, and has approved 45 new human health criteria submitted by Washington. For arsenic, dioxin, and thallium, the existing criteria from the National Toxics Rule (40 CFR 131.36) remain in effect.

West Plant:

Ecology determined the effluent contains chemicals of concern for human health, based on data or information reported in priority pollutant testing that indicate regulated chemicals occur in the discharge. A list of the pollutants of concern for human health is listed in **Appendix D**.

Ecology evaluated the discharge's potential to violate the water quality standards as required by 40 CFR 122.44(d) by following the procedures published in the *Technical Support Document for Water Quality-Based Toxics Control* (EPA/505/2-90-001) and Ecology's *Permit Writer's Manual* to make a reasonable potential determination. The evaluation showed that the discharge has no reasonable potential to cause a violation of water quality standards for these pollutants. Effluent limits are not needed for the pollutants listed above. Ecology will reevaluate this discharge for impacts to human health at the next permit reissuance.

The new criteria for bis(2-ethylhexyl) phthalate (DEHP) significantly changed from the previously adopted standard. DEHP, a known carcinogen, is frequently detected in wastewater effluent. Phthalates are plasticizers that are commonly used in hundreds of common consumer and building products. The ubiquitous chemical has also been identified as a common sampling and laboratory contaminant. If phthalates are detected in a facility's effluent, permittees are required to re-sample their effluent using clean sampling techniques to confirm that the detection is not a result of either sampling or laboratory contamination. The proposed permit includes additional sampling requirements for this pollutant.

The permittee should work with an accredited laboratory on specific clean sampling requirements. At a minimum, samples should be collected in clean glass bottles with polytetrafluoroethylene (PFTE or Teflon™) lids. Standard practice may also include an equipment rinse with a non-polar solvent to remove possible organics. Accidental sample contamination from safety equipment (e.g. gloves) is also possible. All samples must be kept from directly contacting plastics of any kind.

To help assess the sample contamination potential, permittees may opt to collect a field blank for comparison with the effluent sample so that field collection contamination may be quantified. It is the laboratory's responsibility to analyze method blanks and laboratory control samples when analyzing batches consisting of 20 or less discrete samples. These laboratory QA results must be submitted with the laboratory report.

East Plant:

Ecology determined the effluent contains chemicals of concern for human health, based on data or information reported in priority pollutant testing that indicate regulated chemicals occur in the discharge. A list of the pollutants of concern for human health is listed in **Appendix D**.

Ecology evaluated the discharge's potential to violate the water quality standards as required by 40 CFR 122.44(d) by following the procedures published in the *Technical Support Document for Water Quality-Based Toxics Control* (EPA/505/2-90-001) and Ecology's *Permit Writer's Manual* to make a reasonable potential determination. The influent to this CSO facility is highly variable in frequency, volume, duration, and pollutant concentration, both between storms and during a single storm event. Therefore, deriving numeric effluent limits for human health criteria is infeasible. The permittee should implement best management practice to control or abate human health pollutants from these discharges. Therefore, effluent limits are not needed for the pollutants listed above. Ecology will reevaluate this discharge for impacts to human health at the next permit reissuance.

The above discussions of the DEHP at the West Plant apply to the monitoring at the East Plant.

J. Sediment quality

The aquatic sediment standards (chapter 173-204 WAC) protect aquatic biota and human health. Under these standards Ecology may require a facility to evaluate the potential for its discharge to cause a violation of sediment standards (WAC 173-204-400). You can obtain additional information about sediments at the Aquatic Lands Cleanup Unit website. https://ecology.wa.gov/Spills-Cleanup/Contamination-cleanup/Sediment-cleanups

The previous permit, issued in 2013, required the submittals of a sediment analysis plan and analysis and sediment monitoring data report. The submitted sediment report did have Sediment Management Standard (SMS) chemical exceedances. The proposed permit includes a special condition requiring sediment sampling requirements to further define the extent of contamination shown by the 2015 sampling results.

K. Whole effluent toxicity (West Plant)

The water quality standards for surface waters forbid discharge of effluent that has the potential to cause toxic effects in the receiving waters. Many toxic pollutants cannot be measured by commonly available detection methods. However, laboratory tests can measure toxicity directly by exposing living organisms to the wastewater and measuring their responses. These tests measure the aggregate toxicity of the whole effluent, so this approach is called whole effluent toxicity (WET) testing. Some WET tests measure acute toxicity and other WET tests measure chronic toxicity.

- *Acute toxicity tests measure mortality as the significant response* to the toxicity of the effluent. Dischargers who monitor their wastewater with acute toxicity tests find early indications of any potential lethal effect of the effluent on organisms in the receiving water.
- *Chronic toxicity tests measure various sublethal toxic responses*, such as reduced growth or reproduction. Chronic toxicity tests often involve either a complete life cycle test on an organism with an extremely short life cycle, or a partial life cycle test during a critical stage of a test organism's life. Some chronic toxicity tests also measure organism survival.

Laboratories accredited by Ecology for WET testing know how to use the proper WET testing protocols, fulfill the data requirements, and submit results in the correct reporting format. Accredited laboratory staff know about WET testing and how to calculate an NOEC, LC50, EC50, IC25, etc. Ecology gives all accredited labs the most recent version of Ecology Publication No. WQ-R-95-80, *Laboratory Guidance and Whole Effluent Toxicity Test Review Criteria* (https://fortress.wa.gov/ecy/publications/documents/9580.pdf), which is referenced in the permit. Ecology recommends that the City of Bremerton send a copy of the acute or chronic toxicity sections(s) of its NPDES permit to the laboratory.

WET testing conducted during the previous permit term showed the facility's effluent has a reasonable potential to cause acute toxicity in the receiving water. The proposed permit will include an acute toxicity limit. **The effluent limit for acute toxicity is: No acute toxicity detected in a test sample representing the acute critical effluent concentration (ACEC).** The acute critical effluent concentration is the concentration of effluent at the boundary of the acute mixing zone during critical conditions.

Compliance with an acute toxicity limit is measured by an acute toxicity test comparing test organism survival in the ACEC (using a sample of effluent diluted to equal the ACEC) to survival in nontoxic control water. The City of Bremerton is in compliance with the acute toxicity limit if there is no statistically significant difference in test organism survival between the ACEC sample and the control sample.

WET testing conducted during effluent characterization showed no reasonable potential for effluent discharges to cause receiving water chronic toxicity. The proposed permit will not include a chronic WET limit. The City of Bremerton must retest the effluent before submitting an application for permit renewal.

- If this facility makes process or material changes which, in Ecology's opinion, increase the potential for effluent toxicity, then Ecology may (in a regulatory order, by permit modification, or in the permit renewal) require the facility to conduct additional effluent characterization
- If WET testing conducted for submittal with a permit application fails to meet the performance standards in WAC 173-205-020, Ecology will assume that effluent toxicity has increased. The City of Bremerton may demonstrate to Ecology that effluent toxicity has not increased by performing additional WET testing after the process or material changes have been made.

L. Groundwater quality limits

The groundwater quality standards (chapter 173-200 WAC) protect beneficial uses of groundwater. Permits issued by Ecology must not allow violations of those standards (WAC 173-200-100).

The City of Bremerton does not discharge wastewater to the ground. No permit limits are required to protect groundwater.

M. Comparison of effluent limits with the previous permit issued on June 21, 2013 (modified on October 1, 2015)

Table 18. Comparison of Previous and Proposed Effluent Limits (West Plant)

Parameter		Basis of Limit	Previous Effluent Limits: Outfall No. 001		Proposed Effluent Limits: Outfall No. 001	
			Average Monthly	Average Weekly	Average Monthly	Average Weekly
$CBOD_5$	May–Sep.	Technology	25 mg/L 2,294 lbs/day 85% removal	40 mg/L 3,670 lbs/day	No change	No change
$CBOD_5$	Oct.-Apr.	Technology	25 mg/L 3,232 lbs/day 65% removal	40 mg/L 5,171 lbs/day	No change	No change
TSS	May–Sep.	Technology	30 mg/L 2,752 lbs/day 85% removal	45 mg/L 4,128 lbs/day	No change	No change
TSS	Oct.-Apr.	Technology	30 mg/L 3,878 lbs/day 65% removal	45 mg/L 5,817 lbs/day	No change	No change

Parameter	Basis of Limit	Monthly Geometric Mean Limit	Weekly Geometric Mean Limit	Monthly Geometric Mean Limit	Weekly Geometric Mean Limit
Fecal Coliform Bacteria	Technology	200/100 mL	400/100 mL	No change	No change

Parameter	Basis of Limit	Limit	Limit
pH	Technology	6.0 – 9.0 Standard Units	No change

Parameter	Basis of Limit	Average Monthly	Maximum Daily	Average Monthly	Maximum Daily
Total Residual Chlorine	Water Quality	0.1 mg/L	0.3 mg/L	No change	No change

Parameter	Basis of Limit	Previous Effluent Limits: Outfall No. 001	Proposed Effluent Limits: Outfall No. 001
Acute Toxicity	Aquatic Life	No acute toxicity in a whole effluent toxicity test concentration representing the acute critical effluent concentration (ACEC) of 2.7% effluent (May–Sep.) and 5% effluent (Oct.-Apr.).	No change

Table 19. Comparison of Previous and Proposed Effluent Limits (East Plant)

Parameter	Basis of Limit	Previous Effluent Limits: Outfall No. 002	Proposed Effluent Limits: Outfall No. 002
		Average Yearly	Average Yearly
TSS Removal Efficiency	Technology	Equal to or greater than 50% removal of influent TSS	No change
Settleable Solids	Technology	0.3 mL/L/hour	No change

Parameter	Basis of Limit	Monthly Geometric Mean Limit	Monthly Geometric Mean Limit
Fecal Coliform Bacteria	Treatment Technology	400/100 mL	No change

Parameter	Basis of Limit	Limit	Limit
pH	Technology	6.0 – 9.0 Standard Units	No change

IV. Monitoring Requirements

Ecology requires monitoring, recording, and reporting (WAC 173-220-210 and 40 CFR 122.41) to verify that the treatment process is functioning correctly and that the discharge complies with the permit's effluent limits.

If a facility uses a contract laboratory to monitor wastewater, it must ensure that the laboratory uses the methods and meets or exceeds the method detection levels required by the permit. The permit describes when facilities may use alternative methods. It also describes what to do in certain situations when the laboratory encounters matrix effects. When a facility uses an alternative method as allowed by the permit, it must report the test method, detection level (DL), and quantitation level (QL) on the discharge monitoring report or in the required report.

A. Wastewater monitoring

The monitoring schedule is detailed in the proposed permit under Special Condition S.2. Specified monitoring frequencies take into account the quantity and variability of the discharge, the treatment method, past compliance, significance of pollutants, and cost of monitoring. The agency guidance for required monitoring frequency given in the current version of Ecology's *Permit Writer's Manual* (Publication Number 92-09) for activated sludge plants with greater than 5 MGD average design flow is: 5/week for BOD_5 and TSS, and daily for fecal coliform.

Bremerton's previous modified permit required monitoring frequency of 3/week for $CBOD_5$ and TSS, and 5/week for fecal coliform, for the West Plant.

An evaluation of the DMR data submitted during the permit term indicated that the facility's monthly average effluent concentrations were only 30% and 27% of the monthly average permit requirements for CBOD5 and TSS respectively (percentages represent [Long Term Average, mg/L] ÷ [Average Monthly Limit, mg/L]). The facility's monitoring program also produces data with relatively low coefficients of variance (CV, the standard deviation over the mean) for CBOD5 and TSS: 0.16 for CBOD5 and 0.20 for TSS showing consistent performance. Retaining the monitoring reduction decision in the new permit is consistent with Ecology's monitoring reduction guidance.

Ecology has included some additional monitoring of nutrients in the proposed permit to establish a baseline for this discharger. It will use this data in the future as it develops TMDLs for dissolved oxygen and establishes WLAs for nutrients.

Monitoring of sludge quantity and quality is necessary to determine the appropriate uses of the sludge. Biosolids monitoring is required by the current state and local solid waste management program and also by EPA under 40 CFR 503.

B. Lab accreditation

Ecology requires that facilities must use a laboratory registered or accredited under the provisions of chapter 173-50 WAC, Accreditation of Environmental Laboratories, to prepare all monitoring data (with the exception of certain parameters). Ecology accredited the laboratory at this facility for the parameters listed below.

Table 20. Accredited Parameters

General Chemistry				
Parameter name	**Analyte code**	**Method description**	**NELAC code**	**Matrix ***
Ammonia	1515	EPA 350.1_2_1993	10063602	N
Total Suspended Solids	1960	SM 2540 D-97	20051201	N
Total Residual Chlorine	1940	SM 4500-Cl G-00	20081612	N
pH	1900	SM 4500-H+ B-00	20105219	N
BOD, CBOD	1532	SM 5210 B-01	20135006	N
Microbiology				
Parameter name	**Analyte code**	**Method description**	**NELAC code**	**Matrix ***
Fecal Coliform-Count	2530	SM 9222 D (m-FC)-97	20210008	N
* Matrix key: N = non-potable water				

V. Other Permit Conditions

A. Reporting and record keeping

Ecology based Special Condition S3 on its authority to specify any appropriate reporting and record keeping requirements to prevent and control waste discharges (WAC 173-220-210).

B. Prevention of facility overloading

Overloading of the treatment plant is a violation of the terms and conditions of the permit. To prevent this from occurring, RCW 90.48.110 and WAC 173-220-150 require City of Bremerton to:

- Take the actions detailed in proposed permit Special Condition S.4.
- Design and construct expansions or modifications before the treatment plant reaches existing capacity.
- Report and correct conditions that could result in new or increased discharges of pollutants.

Special Condition S.4 restricts the amount of flow.

If a municipality intends to apply for Ecology-administered funding for the design or construction of a facility project, the planning documents must meet the requirements of WAC 173-98. The municipality should contact Ecology's regional office as early as practical before planning a project that may include Ecology-administered funding.

C. Operation and maintenance

The proposed permit contains Special Condition S.5 as authorized under RCW 90.48.110, WAC 173-220-150, chapter 173-230 WAC, and WAC 173-240-080. Ecology included it to ensure proper operation and regular maintenance of equipment, and to ensure that the permittee takes adequate safeguards so that it uses constructed facilities to their optimum potential in terms of pollutant capture and treatment.

D. Pretreatment

Duty to enforce discharge prohibitions

This provision prohibits the publicly owned treatment works (POTW) from authorizing or permitting an industrial discharger to discharge certain types of waste into the sanitary sewer.

- The first section of the pretreatment requirements prohibits the POTW from accepting pollutants which causes "pass-through" or "interference". This general prohibition is from 40 CFR §403.5(a). **Appendix C** of this fact sheet defines these terms.
- The second section reinforces a number of specific state and federal pretreatment prohibitions found in WAC 173-216-060 and 40 CFR §403.5(b). These reinforce that the POTW may not accept certain wastes, which:
  a. Are prohibited due to dangerous waste rules.
  b. Are explosive or flammable.
  c. Have too high or low of a pH (too corrosive, acidic or basic).
  d. May cause a blockage such as grease, sand, rocks, or viscous materials.
  e. Are hot enough to cause a problem.
  f. Are of sufficient strength or volume to interfere with treatment.
  g. Contain too much petroleum-based oils, mineral oil, or cutting fluid.
  h. Create noxious or toxic gases at any point.

40 CFR Part 403 contains the regulatory basis for these prohibitions, with the exception of the pH provisions which are based on WAC 173-216-060.

- The third section of pretreatment conditions reflects state prohibitions on the POTW accepting certain types of discharges unless the discharge has received prior written authorization from Ecology. These discharges include:
  a. Cooling water in significant volumes.
  b. Stormwater and other direct inflow sources.
  c. Wastewaters significantly affecting system hydraulic loading, which do not require treatment.

Federal and state pretreatment program requirements

Ecology administers the Pretreatment Program under the terms of the addendum to the "Memorandum of Understanding between Washington Department of Ecology and the United States Environmental Protection Agency, Region 10" (1986) and 40 CFR, part 403. Under this delegation of authority, Ecology issues wastewater discharge permits for significant industrial users (SIUs) discharging to POTWs which have not been delegated authority to issue wastewater discharge permits. Ecology must approve, condition, or deny new discharges or a significant increase in the discharge for existing significant industrial users (SIUs) [40 CFR 403.8 (f)(1)(i) and(iii)].

Industrial dischargers must obtain a permit from Ecology before discharging waste to the Bremerton WWTP [WAC 173-216-110(5)]. Industries discharging wastewater that is similar in character to domestic wastewater do not require a permit.

Routine identification and reporting of industrial users

The permit requires non-delegated POTWs to take "continuous, routine measures to identify all existing, new, and proposed significant industrial users (SIUs) and potential significant industrial users (PSIUs)" discharging to their sewer system. Examples of such routine measures include regular review of water and sewer billing records, business license and building permit applications, advertisements, and personal reconnaissance. System maintenance personnel should be trained on what to look for so they can identify and report new industrial dischargers in the course of performing their jobs. The POTW may not allow SIUs to discharge prior to receiving a permit, and must notify all industrial dischargers (significant or not) in writing of their responsibility to apply for a State Waste Discharge Permit. The POTW must send a copy of this notification to Ecology.

Requirements for performing an industrial user survey

This POTW has the potential to serve significant industrial or commercial users and must conduct an industrial user (IU) survey. The purpose of the IU Survey is to identify all facilities that may be subject to pretreatment standards or requirements so that Ecology can take appropriate measures to control these discharges. The POTW should identify each such user, and require them to apply for a permit before allowing their discharge to the POTW to commence. For SIUs, the POTW must require they actually are issued a permit prior to accepting their discharge. The steps the POTW must document in their IU Survey submittal include:

1. The POTW must develop a master list of businesses that may be subject to pretreatment standards and requirements and show their disposition. This list must be based on several sources of information including business licenses, and water and sewer billing records.
2. The POTW must canvas all the potential sources, having them either complete a survey form or ruling them out by confirming they only generate domestic wastewater.
3. The POTW must develop a list of the SIUs and potential SIUs in all areas served by the POTW. The list must contain sufficient information on each to allow Ecology to decide which discharges merit further controls such as a state waste discharge permit.

Ecology describes the information needed in IU Survey submittals to allow Ecology to make permitting decision in the manual "Performing an Industrial User Survey". Properly completing an Industrial User Survey helps Ecology control discharges that may otherwise harm the POTW including its collection system, processes, and receiving waters. Where surveys are incomplete, Ecology may take such enforcement as appropriate and/or require the POTW to develop a fully delegated pretreatment program.

The proposed permit requires City of Bremerton to conduct an industrial user survey to determine the extent of compliance of all industrial users of the sanitary sewer and wastewater treatment facility with federal pretreatment regulations [40 CFR Part 403 and sections 307(b) and 308 of the Clean Water Act)], with state regulations (chapter 90.48 RCW and chapter 173-216 WAC), and with local ordinances.

E. Solid wastes

To prevent water quality problems the facility is required in permit Special Condition S7 to store and handle all residual solids (grit, screenings, scum, sludge, and other solid waste) in accordance with the requirements of RCW 90.48.080 and state water quality standards.

The final use and disposal of sewage sludge from this facility is regulated by U.S. EPA under 40 CFR 503, and by Ecology under chapter 70.95J RCW, chapter 173-308 WAC "Biosolids Management," and chapter 173-350 WAC "Solid Waste Handling Standards." The disposal of other solid waste is under the jurisdiction of the Kitsap Public Health District.

Requirements for monitoring sewage sludge and record keeping are included in this permit. Ecology will use this information, required under 40 CFR 503, to develop or update local limits.

F. Combined sewer overflows

Combined sewer systems are sewers that are designed to collect rainwater runoff, domestic sewage, and industrial wastewater in the same piping system. Most of the time, combined sewer systems transport all wastewater to a sewage treatment plant, where it is treated and then discharged to a water body. During periods of heavy rainfall or snowmelt, however, the wastewater volume in a combined sewer system can exceed the capacity of the combined sewer system or treatment plant. For this reason, combined sewer systems are designed to overflow occasionally and discharge excess wastewater directly to nearby streams, rivers, or other water bodies. Chapter 173-245 WAC and EPA's CSO control policy (59 FR 18688) identify the required measures for control of overflows from combined sewer systems.

Bremerton's combined sewage collection and conveyance system has 15 CSO outfalls, which are shown in **Appendix D**.

CSO reduction plan/long-term control plan and CSO reduction plan amendments

Ecology requires municipalities to develop combined sewer overflow (CSO) reduction plans per chapter 173-245 WAC requirements. These plans are substantially equivalent to the long-term control plan (LTCP) as defined by EPA in its CSO control policy. Chapter 173-245 WAC requires that "All CSO sites shall achieve and at least maintain the greatest reasonable reduction, and neither cause violations of applicable water quality standards, nor restrictions to the characteristic uses of the receiving water, nor accumulation of deposits which: (a) Exceed sediment criteria or standards; or (b) have an adverse biological effect." "The greatest reasonable reduction" means control of each CSO outfall such that an average of no more than one untreated discharge may occur per year.

Under EPA's CSO Control Policy's presumption approach, CSO controls are presumed to attain WQS if certain performance criteria are met. Ecology presumes that a program that meets the criteria specified in WAC 173-245 and EPA's CSO control policy provides an adequate level of control to meet the water quality-based requirements of the Clean Water Act. This presumption must be verified via a post-construction monitoring program by characterization, monitoring, and modeling of the system, including consideration of sensitive areas.

The City of Bremerton identified that all of its 15 CSO outfalls are controlled to the state standard of one untreated discharge per year per CSO, the City of Bremerton is not required to submit an amendment to the CSO reduction plan as described in WAC 173-245-090(2) for this permit term. If there are substantial changes or updates to the plan the Permittee must submit the updated plan to Ecology for review and approval.

Bremerton identified that all of its 15 CSO outfalls meet the requirement of "greatest reasonable reduction" as defined in WAC 173-245-020(22). Frequency of overflow events at these CSO outfalls, as a result of precipitation events, must continue to meet the performance standard.

Nine minimum controls

Municipalities with combined sewer overflow outfalls must implement nine minimum controls as technology-based standards for CSO discharges. The nine minimum controls are largely programmatic policies and practices designed to minimize the impacts untreated CSOs have on human health and the environment. It is not possible with current knowledge and technology to calculate numeric water quality-based effluent limits for CSOs. Ecology may include numeric water quality-based effluent limits in the future permits only after the long-term control plan is in place and after collection of sufficient water quality data.

The nine minimum controls include:

1. Use proper operations and maintenance practices within the combined collection system to reduce the magnitude, frequency and duration of CSOs.
2. Implement procedures that maximize storage capacity of the combined collection system.
3. Minimize pollution from non-domestic wastewater sources through close management of a pretreatment program.
4. Maximize treatable flow to the wastewater treatment plant during wet weather.
5. Prevent CSO discharges during dry weather and properly report any dry weather CSO discharges immediately to Ecology.
6. Implement procedures to control solid and floatable materials in CSOs.
7. Implement and maintain a pollution prevention program designed to keep pollutants from entering the combined sewer system.
8. Establish a process to notify the public when and where CSOs occur.
9. Monitor CSO outfalls to characterize CSO impacts and the efficacy of CSO controls, including event-based monitoring of all CSO flow quantity, frequency and duration.

CSO monitoring

The proposed permit requires the City of Bremerton to monitor the volume, duration and precipitation associated with each CSO discharge event at each identified outfall.

Annual CSO report

The City of Bremerton must submit annual reports according to the requirements of WAC 173-245-090(1). This report: (a) details the past year's frequency and volume of combined sewage discharge from each CSO site, (b) explains the previous year's CSO reduction

accomplishments, and (c) lists the projects planned for the next year. The report must indicate whether a CSO site has increased over the baseline annual condition. If an increase has occurred, the Permittee must propose a project and/or schedule to reduce that site below its baseline conditions. The report must document implementation of the nine minimum controls, and wet weather operation (flow blending) at the treatment plant.

The City of Bremerton must also assess in its annual reports CSO reduction plan whether identified outfalls meet the state standard of one untreated discharge per year per CSO. Assessment may be based on a long-term average which is currently based on a 20-year moving average.

Post-construction monitoring program

The federal CSO control policy (59 FR 18688) requires post-construction monitoring to verify implemented CSO control strategies comply with water quality standards. Post-construction monitoring applies to any CSO outfall that is controlled to meet the "greatest reasonable reduction" of combined sewer overflows, as defined in chapter 173-245 WAC. Implementation requires development of a monitoring plan and completion of a data report that documents compliance. The City of Bremerton submitted a post-construction monitoring plan to Ecology in 2014. The proposed permit requires the City to implement the monitoring plan and to report monitoring data in the annual CSO report.

Ecology originally approved Bremerton's CSO Reduction Plan on November 20, 1992. Subsequently Bremerton updated its CSO reduction plan, which Ecology approved on February 15, 2001. Bremerton's updated CSO reduction plan recommended a combination of various CSO reduction alternatives, including storm drainage separation as well as storage of combined sewage and subsequent conveyance to one of Bremerton's two treatment plants. Bremerton completed its entire CSO reduction program and identified all its 15 CSO outfalls as meeting the requirement of "greatest reasonable reduction" as defined in WAC 173-245-020(22). The City's CSO Annual reports verify compliance with the "controlled" standard.

G. Wet weather operation – West Plant

The Bremerton WWTP has a larger primary treatment capacity than secondary treatment capacity. The design flow through the headworks, primary clarifiers, chlorine contact basin, and outfall is 32.5 MGD. Design peak flow for secondary treatment is 22.8 MGD. The proposed permit authorizes bypass of the secondary treatment portion of the Bremerton WWTP only when the instantaneous flow rate to the WWTP exceeds 22.8 MGD as a result of precipitation events. The bypass flows receive primary treatment, and are mixed with the secondary treated effluent before disinfection and final discharge. The mixed final effluent must meet the permit limits at all times. The City of Bremerton must report CSO-related bypass events in the monthly discharge monitoring reports and in the annual CSO report.

One effective strategy to abate pollution resulting from CSOs is to maximize the delivery of flows during wet weather to the treatment plant. This practice is consistent with EPA's Nine Minimum Control #4, eliminates or minimizes overflows, and it provides at least primary treatment to combined sewer flows. Under EPA regulations, the intentional diversion of waste streams from any portion of a treatment facility, including secondary treatment, is a bypass. A bypass is allowed only under specific limited circumstances. EPA's *Combined Sewer Overflow Guidance for Permit Writers* states that a CSO-related bypass at a

wastewater treatment plant can only occur if there is no feasible alternative. The no feasible alternative analysis requirement can be met if the record demonstrates that the secondary treatment system is properly operated and maintained, that the system has been designed to meet secondary limits for flows greater than the peak dry weather flow plus an appropriate wet weather flow, and that it is either technically or financially infeasible to provide secondary treatment for greater amounts of flow.

- Inspections and monitoring records demonstrate that the secondary treatment system is properly operated and maintained.
- The City of Bremerton completed planning, design, and construction of secondary treatment and CSO correction. Sewer separation projects reduced inflow substantially prior to construction of the secondary treatment facility. Peak flows up to 22.8 MGD are treated in the secondary aeration basins and clarifiers; the primary treatment system and outfall can handle peak flows up to 32.5 MGD. Since the WWTP has been designed to treat flows to meet secondary limits and well in excess of the future maximum monthly average flow, the WWTP meets the criteria for treating the peak dry weather flow plus an appropriate amount of wet weather flow. Flows higher than 22.8 MGD to the secondary treatment units would cause substantial physical damage by washing out the biological system. The quality of the blended effluent meets all permit limits based on secondary treatment technology.
- The administrative record includes extensive documentation of the engineering decisions, cost-effectiveness analyses, and environmental impacts review done during the design phase, as these projects were financially supported by the state and federal agencies.
- The City of Bremerton is continuing to implement projects to improve the capacity of the collection system and to reduce inflow and CSOs, as documented in the post-construction monitoring plan in 2014. At this time, it is not technically or financially feasible to provide additional secondary treatment for peak wet weather flows at the treatment plant.

H. Outfall evaluation

The proposed permit requires the City of Bremerton to conduct an outfall inspection (West Plant Outfall 001) and submit a report detailing the findings of that inspection (Special Condition S.13). The inspection must evaluate the physical condition of the discharge pipe and diffusers, and evaluate the extent of sediment accumulations in the vicinity of the outfall.

I. General conditions

Ecology bases the standardized General Conditions on state and federal law and regulations. They are included in all individual domestic wastewater NPDES permits issued by Ecology.

VI. Permit Issuance Procedures

A. Permit modifications

Ecology may modify this permit to impose numerical limits, if necessary, to comply with water quality standards for surface waters, with sediment quality standards, or with water quality standards for groundwaters, based on new information from sources such as inspections, effluent monitoring, outfall studies, and effluent mixing studies.

Ecology may also modify this permit to comply with new or amended state or federal regulations.

B. Proposed permit issuance

This proposed permit meets all statutory requirements for Ecology to authorize a wastewater discharge. The permit includes limits and conditions to protect human health and aquatic life, and the beneficial uses of waters of the state of Washington. Ecology proposes to issue this permit for a term of 5 years.

VII. References for Text and Appendices

Environmental Protection Agency (EPA)

1992. National Toxics Rule. Federal Register, V. 57, No. 246, Tuesday, December 22, 1992.

1991. *Technical Support Document for Water Quality-based Toxics Control*. EPA/505/2-90-001.

1988. *Technical Guidance on Supplementary Stream Design Conditions for Steady State Modeling*. USEPA Office of Water, Washington, D.C.

1985. *Water Quality Assessment: A Screening Procedure for Toxic and Conventional Pollutants in Surface and Ground Water*. EPA/600/6-85/002a.

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(https://ecology.wa.gov/Regulations-Permits/Guidance-technical-assistance/Water-quality-permits-guidance)

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Appendix A -- Public Involvement Information

Ecology proposes to reissue a permit to Bremerton WWTP. The permit includes wastewater discharge limits and other conditions. This fact sheet describes the facility and Ecology's reasons for requiring permit conditions.

Ecology placed a Public Notice of Draft on September 12, 2018, in the *Kitsap Sun* to inform the public and to invite comment on the proposed draft National Pollutant Discharge Elimination System permit and fact sheet.

The notice:

- Told where copies of the draft permit and fact sheet were available for public evaluation (a local public library, the closest regional or field office, posted on our website).
- Offered to provide the documents in an alternate format to accommodate special needs.
- Asked people to tell us how well the proposed permit would protect the receiving water.
- Invited people to suggest fairer conditions, limits, and requirements for the permit.
- Invited comments on Ecology's determination of compliance with antidegradation rules.
- Urged people to submit their comments, in writing, before the end of the comment period.
- Told how to request a public hearing about the proposed NPDES permit.
- Explained the next step(s) in the permitting process.

Ecology has published a document entitled *Frequently Asked Questions about Effective Public Commenting,* which is available on our website at https://fortress.wa.gov/ecy/publications/documents/0307023.pdf

You may obtain further information from Ecology by telephone, 425-649-7000, or by writing to the address listed below.

Water Quality Permit Coordinator
Department of Ecology
Northwest Regional Office
3190 160th Avenue SE
Bellevue, WA 98008-5452

The primary author of this permit and fact sheet is Kevin Leung.

Appendix B -- Your Right to Appeal

You have a right to appeal this permit to the Pollution Control Hearing Board (PCHB) within 30 days of the date of receipt of the final permit. The appeal process is governed by chapter 43.21B RCW and chapter 371-08 WAC. "Date of receipt" is defined in RCW 43.21B.001(2) (see glossary).

To appeal you must do the following within 30 days of the date of receipt of this permit:

- File your appeal and a copy of this permit with the PCHB (see addresses below). Filing means actual receipt by the PCHB during regular business hours.
- Serve a copy of your appeal and this permit on Ecology in paper form - by mail or in person. (See addresses below.) E-mail is not accepted.

You must also comply with other applicable requirements in chapter 43.21B RCW and chapter 371-08 WAC.

ADDRESS AND LOCATION INFORMATION

Street Addresses	Mailing Addresses
Department of Ecology Attn: Appeals Processing Desk 300 Desmond Drive SE Lacey, WA 98503	**Department of Ecology** Attn: Appeals Processing Desk PO Box 47608 Olympia, WA 98504-7608
Pollution Control Hearings Board 1111 Israel RD SW, STE 301 Tumwater, WA 98501	**Pollution Control Hearings Board** PO Box 40903 Olympia, WA 98504-0903

Appendix C -- Glossary

1-DMax or 1-day maximum temperature -- The highest water temperature reached on any given day. This measure can be obtained using calibrated maximum/minimum thermometers or continuous monitoring probes having sampling intervals of thirty minutes or less.

7-DADMax or 7-day average of the daily maximum temperatures -- The arithmetic average of seven consecutive measures of daily maximum temperatures. The 7-DADMax for any individual day is calculated by averaging that day's daily maximum temperature with the daily maximum temperatures of the three days prior and the three days after that date.

Acute toxicity -- The lethal effect of a compound on an organism that occurs in a short time period, usually 48 to 96 hours.

AKART -- The acronym for "all known, available, and reasonable methods of prevention, control and treatment." AKART is a technology-based approach to limiting pollutants from wastewater discharges, which requires an engineering judgment and an economic judgment. AKART must be applied to all wastes and contaminants prior to entry into waters of the state in accordance with RCW 90.48.010 and 520, WAC 173-200-030(2)(c)(ii), and WAC 173-216-110(1)(a).

Alternate point of compliance -- An alternative location in the groundwater from the point of compliance where compliance with the groundwater standards is measured. It may be established in the groundwater at locations some distance from the discharge source, up to, but not exceeding the property boundary and is determined on a site specific basis following an AKART analysis. An "early warning value" must be used when an alternate point is established. An alternate point of compliance must be determined and approved in accordance with WAC 173-200-060(2).

Ambient water quality -- The existing environmental condition of the water in a receiving water body.

Ammonia -- Ammonia is produced by the breakdown of nitrogenous materials in wastewater. Ammonia is toxic to aquatic organisms, exerts an oxygen demand, and contributes to eutrophication. It also increases the amount of chlorine needed to disinfect wastewater.

Annual average design flow (AADF) -- The average of the daily flow volumes anticipated to occur over a calendar year.

Average monthly (intermittent) discharge limit -- The average of the measured values obtained over a calendar months' time taking into account zero discharge days.

Average monthly discharge limit -- The average of the measured values obtained over a calendar months' time.

Background water quality -- The concentrations of chemical, physical, biological or radiological constituents or other characteristics in or of groundwater at a particular point in time upgradient of an activity that has not been affected by that activity [WAC 173-200-020(3)]. Background water quality for any parameter is statistically defined as the 95% upper tolerance interval with a 95% confidence based on at least eight hydraulically upgradient water quality samples. The eight samples are collected over a period of at least one year, with no more than one sample collected during any month in a single calendar year.

Best management practices (BMPs) -- Schedules of activities, prohibitions of practices, maintenance procedures, and other physical, structural and/or managerial practices to prevent or reduce the pollution of waters of the state. BMPs include treatment systems, operating procedures, and practices to control: plant site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage. BMPs may be further categorized as operational, source control, erosion and sediment control, and treatment BMPs.

BOD5 -- Determining the five-day Biochemical Oxygen Demand of an effluent is an indirect way of measuring the quantity of organic material present in an effluent that is utilized by bacteria. The BOD5 is used in modeling to measure the reduction of dissolved oxygen in receiving waters after effluent is discharged. Stress caused by reduced dissolved oxygen levels makes organisms less competitive and less able to sustain their species in the aquatic environment. Although BOD_5 is not a specific compound, it is defined as a conventional pollutant under the federal Clean Water Act.

Bypass -- The intentional diversion of waste streams from any portion of a treatment facility.

Categorical pretreatment standards -- National pretreatment standards specifying quantities or concentrations of pollutants or pollutant properties, which may be discharged to a POTW by existing or new industrial users in specific industrial subcategories.

Chlorine -- A chemical used to disinfect wastewaters of pathogens harmful to human health. It is also extremely toxic to aquatic life.

Chronic toxicity -- The effect of a compound on an organism over a relatively long time, often 1/10 of an organism's lifespan or more. Chronic toxicity can measure survival, reproduction or growth rates, or other parameters to measure the toxic effects of a compound or combination of compounds.

Clean water act (CWA) -- The federal Water Pollution Control Act enacted by Public Law 92-500, as amended by Public Laws 95-217, 95-576, 96-483, 97-117; USC 1251 et seq.

Compliance inspection-without sampling -- A site visit for the purpose of determining the compliance of a facility with the terms and conditions of its permit or with applicable statutes and regulations.

Compliance inspection-with sampling -- A site visit for the purpose of determining the compliance of a facility with the terms and conditions of its permit or with applicable statutes and regulations. In addition it includes as a minimum, sampling and analysis for all parameters with limits in the permit to ascertain compliance with those limits; and, for municipal facilities, sampling of influent to ascertain compliance with the 85 percent removal requirement. Ecology may conduct additional sampling.

Composite sample -- A mixture of grab samples collected at the same sampling point at different times, formed either by continuous sampling or by mixing discrete samples. May be "time-composite" (collected at constant time intervals) or "flow-proportional" (collected either as a constant sample volume at time intervals proportional to stream flow, or collected by increasing the volume of each aliquot as the flow increased while maintaining a constant time interval between the aliquots).

Construction activity -- Clearing, grading, excavation, and any other activity, which disturbs the surface of the land. Such activities may include road building; construction of residential houses, office buildings, or industrial buildings; and demolition activity.

Continuous monitoring -- Uninterrupted, unless otherwise noted in the permit.

Critical condition -- The time during which the combination of receiving water and waste discharge conditions have the highest potential for causing toxicity in the receiving water environment. This situation usually occurs when the flow within a water body is low, thus, its ability to dilute effluent is reduced.

Date of receipt -- This is defined in RCW 43.21B.001(2) as five business days after the date of mailing; or the date of actual receipt, when the actual receipt date can be proven by a preponderance of the evidence. The recipient's sworn affidavit or declaration indicating the date of receipt, which is unchallenged by the agency, constitutes sufficient evidence of actual receipt. The date of actual receipt, however, may not exceed forty-five days from the date of mailing.

Detection limit -- The minimum concentration of a substance that can be measured and reported with 99 percent confidence that the pollutant concentration is above zero and is determined from analysis of a sample in a given matrix containing the pollutant.

Dilution factor (DF) -- A measure of the amount of mixing of effluent and receiving water that occurs at the boundary of the mixing zone. Expressed as the inverse of the percent effluent fraction, for example, a dilution factor of 10 means the effluent comprises 10% by volume and the receiving water 90%.

Distribution uniformity -- The uniformity of infiltration (or application in the case of sprinkle or trickle irrigation) throughout the field expressed as a percent relating to the average depth infiltrated in the lowest one-quarter of the area to the average depth of water infiltrated.

Early warning value -- The concentration of a pollutant set in accordance with WAC 173-200-070 that is a percentage of an enforcement limit. It may be established in the effluent, groundwater, surface water, the vadose zone or within the treatment process. This value acts as a trigger to detect and respond to increasing contaminant concentrations prior to the degradation of a beneficial use.

Enforcement limit -- The concentration assigned to a contaminant in the groundwater at the point of compliance for the purpose of regulation, [WAC 173-200-020(11)]. This limit assures that a groundwater criterion will not be exceeded and that background water quality will be protected.

Engineering report -- A document that thoroughly examines the engineering and administrative aspects of a particular domestic or industrial wastewater facility. The report must contain the appropriate information required in WAC 173-240-060 or 173-240-130.

Fecal coliform bacteria -- Fecal coliform bacteria are used as indicators of pathogenic bacteria in the effluent that are harmful to humans. Pathogenic bacteria in wastewater discharges are controlled by disinfecting the wastewater. The presence of high numbers of fecal coliform bacteria in a water body can indicate the recent release of untreated wastewater and/or the presence of animal feces.

Grab sample -- A single sample or measurement taken at a specific time or over as short a period of time as is feasible.

Groundwater -- Water in a saturated zone or stratum beneath the surface of land or below a surface water body.

Industrial user -- A discharger of wastewater to the sanitary sewer that is not sanitary wastewater or is not equivalent to sanitary wastewater in character.

Industrial wastewater -- Water or liquid-carried waste from industrial or commercial processes, as distinct from domestic wastewater. These wastes may result from any process or activity of industry, manufacture, trade or business; from the development of any natural resource; or from animal operations such as feed lots, poultry houses, or dairies. The term includes contaminated stormwater and, also, leachate from solid waste facilities.

Interference -- A discharge which, alone or in conjunction with a discharge or discharges from other sources, both:

- Inhibits or disrupts the POTW, its treatment processes or operations, or its sludge processes, use or disposal; and
- Therefore is a cause of a violation of any requirement of the POTW's NPDES permit (including an increase in the magnitude or duration of a violation) or of the prevention of sewage sludge use or disposal in compliance with the following statutory provisions and regulations or permits issued thereunder (or more stringent State or local regulations): section 405 of the Clean Water Act, the Solid Waste Disposal Act (SWDA) (including title II, more commonly referred to as the Resource Conservation and Recovery Act (RCRA), and including State regulations contained in any State sludge management plan prepared pursuant to subtitle D of the SWDA), sludge regulations appearing in 40 CFR Part 507, the Clean Air Act, the Toxic Substances Control Act, and the Marine Protection, Research and Sanctuaries Act.

Local limits -- Specific prohibitions or limits on pollutants or pollutant parameters developed by a POTW.

Major facility -- A facility discharging to surface water with an EPA rating score of > 80 points based on such factors as flow volume, toxic pollutant potential, and public health impact.

Maximum daily discharge limit -- The highest allowable daily discharge of a pollutant measured during a calendar day or any 24-hour period that reasonably represents the calendar day for purposes of sampling. The daily discharge is calculated as the average measurement of the pollutant over the day.

Maximum day design flow (MDDF) -- The largest volume of flow anticipated to occur during a one-day period, expressed as a daily average.

Maximum month design flow (MMDF) -- The largest volume of flow anticipated to occur during a continuous 30-day period, expressed as a daily average.

Maximum week design flow (MWDF) -- The largest volume of flow anticipated to occur during a continuous 7-day period, expressed as a daily average.

Method detection level (MDL) -- See Detection Limit.

Minor facility -- A facility discharging to surface water with an EPA rating score of < 80 points based on such factors as flow volume, toxic pollutant potential, and public health impact.

Mixing zone -- An area that surrounds an effluent discharge within which water quality criteria may be exceeded. The permit specifies the area of the authorized mixing zone that Ecology defines following procedures outlined in state regulations (chapter 173-201A WAC).

National pollutant discharge elimination system (NPDES) -- The NPDES (section 402 of the Clean Water Act) is the federal wastewater permitting system for discharges to navigable waters of the United States. Many states, including the state of Washington, have been delegated the authority to issue these permits. NPDES permits issued by Washington State permit writers are joint NPDES/State permits issued under both state and federal laws.

pH -- The pH of a liquid measures its acidity or alkalinity. It is the negative logarithm of the hydrogen ion concentration. A pH of 7 is defined as neutral and large variations above or below this value are considered harmful to most aquatic life.

Pass-through -- A discharge which exits the POTW into waters of the State in quantities or concentrations which, alone or in conjunction with a discharge or discharges from other sources, is a cause of a violation of any requirement of the POTW's NPDES permit (including an increase in the magnitude or duration of a violation), or which is a cause of a violation of State water quality standards.

Peak hour design flow (PHDF) -- The largest volume of flow anticipated to occur during a one-hour period, expressed as a daily or hourly average.

Peak instantaneous design flow (PIDF) -- The maximum anticipated instantaneous flow.

Point of compliance -- The location in the groundwater where the enforcement limit must not be exceeded and a facility must comply with the Ground Water Quality Standards. Ecology determines this limit on a site-specific basis. Ecology locates the point of compliance in the groundwater as near and directly downgradient from the pollutant source as technically, hydrogeologically, and geographically feasible, unless it approves an alternative point of compliance.

Potential significant industrial user (PSIU) -- A potential significant industrial user is defined as an Industrial User that does not meet the criteria for a Significant Industrial User, but which discharges wastewater meeting one or more of the following criteria:

a. Exceeds 0.5 % of treatment plant design capacity criteria and discharges <25,000 gallons per day; or

b. Is a member of a group of similar industrial users which, taken together, have the potential to cause pass through or interference at the POTW (e.g. facilities which develop photographic film or paper, and car washes).

Ecology may determine that a discharger initially classified as a potential significant industrial user should be managed as a significant industrial user.

Quantitation level (QL) -- Also known as Minimum Level of Quantitation (ML) – The lowest level at which the entire analytical system must give a recognizable signal and acceptable calibration point for the analyte. It is equivalent to the concentration of the lowest calibration standard, assuming that the lab has used all method-specified sample weights, volumes, and

cleanup procedures. The QL is calculated by multiplying the MDL by 3.18 and rounding the result to the number nearest to (1, 2, or 5) x 10^n, where n is an integer (64 FR 30417).
ALSO GIVEN AS:
The smallest detectable concentration of analyte greater than the Detection Limit (DL) where the accuracy (precision & bias) achieves the objectives of the intended purpose. (Report of the Federal Advisory Committee on Detection and Quantitation Approaches and Uses in Clean Water Act Programs Submitted to the US Environmental Protection Agency, December 2007).

Reasonable potential -- A reasonable potential to cause a water quality violation, or loss of sensitive and/or important habitat.

Responsible corporate officer -- A president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy- or decision-making functions for the corporation, or the manager of one or more manufacturing, production, or operating facilities employing more than 250 persons or have gross annual sales or expenditures exceeding $25 million (in second quarter 1980 dollars), if authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures (40 CFR 122.22).

Sample Maximum -- No sample may exceed this value.

Significant industrial user (SIU) --

1) All industrial users subject to Categorical Pretreatment Standards under 40 CFR 403.6 and 40 CFR Chapter I, Subchapter N; and

2) Any other industrial user that: discharges an average of 25,000 gallons per day or more of process wastewater to the POTW (excluding sanitary, noncontact cooling, and boiler blow-down wastewater); contributes a process wastestream that makes up 5 percent or more of the average dry weather hydraulic or organic capacity of the POTW treatment plant; or is designated as such by the Control Authority* on the basis that the industrial user has a reasonable potential for adversely affecting the POTW's operation or for violating any pretreatment standard or requirement [in accordance with 40 CFR 403.8(f)(6)].

   Upon finding that the industrial user meeting the criteria in paragraph 2, above, has no reasonable potential for adversely affecting the POTW's operation or for violating any pretreatment standard or requirement, the Control Authority* may at any time, on its own initiative or in response to a petition received from an industrial user or POTW, and in accordance with 40 CFR 403.8(f)(6), determine that such industrial user is not a significant industrial user.

*The term "Control Authority" refers to the Washington State Department of Ecology in the case of non-delegated POTWs or to the POTW in the case of delegated POTWs.

Slug discharge -- Any discharge of a non-routine, episodic nature, including but not limited to an accidental spill or a non-customary batch discharge to the POTW. This may include any pollutant released at a flow rate that may cause interference or pass through with the POTW or in any way violate the permit conditions or the POTW's regulations and local limits.

Soil scientist -- An individual who is registered as a Certified or Registered Professional Soil Scientist or as a Certified Professional Soil Specialist by the American Registry of Certified Professionals in Agronomy, Crops, and Soils or by the National Society of Consulting Scientists or who has the credentials for membership. Minimum requirements for eligibility are: possession of a baccalaureate, masters, or doctorate degree from a U.S. or Canadian institution with a minimum of 30 semester hours or 45 quarter hours professional core courses in agronomy, crops or soils, and have 5, 3, or 1 year(s), respectively, of professional experience working in the area of agronomy, crops, or soils.

Solid waste -- All putrescible and non-putrescible solid and semisolid wastes including, but not limited to, garbage, rubbish, ashes, industrial wastes, swill, sewage sludge, demolition and construction wastes, abandoned vehicles or parts thereof, contaminated soils and contaminated dredged material, and recyclable materials.

Soluble BOD_5 -- Determining the soluble fraction of Biochemical Oxygen Demand of an effluent is an indirect way of measuring the quantity of soluble organic material present in an effluent that is utilized by bacteria. Although the soluble BOD_5 test is not specifically described in Standard Methods, filtering the raw sample through at least a 1.2 um filter prior to running the standard BOD_5 test is sufficient to remove the particulate organic fraction.

State waters -- Lakes, rivers, ponds, streams, inland waters, underground waters, salt waters, and all other surface waters and watercourses within the jurisdiction of the state of Washington.

Stormwater -- That portion of precipitation that does not naturally percolate into the ground or evaporate, but flows via overland flow, interflow, pipes, and other features of a stormwater drainage system into a defined surface water body, or a constructed infiltration facility.

Technology-based effluent limit -- A permit limit based on the ability of a treatment method to reduce the pollutant.

Total coliform bacteria -- A microbiological test, which detects and enumerates the total coliform group of bacteria in water samples.

Total dissolved solids -- That portion of total solids in water or wastewater that passes through a specific filter.

Total maximum daily load (TMDL) -- A determination of the amount of pollutant that a water body can receive and still meet water quality standards.

Total suspended solids (TSS) -- Total suspended solids is the particulate material in an effluent. Large quantities of TSS discharged to a receiving water may result in solids accumulation. Apart from any toxic effects attributable to substances leached out by water, suspended solids may kill fish, shellfish, and other aquatic organisms by causing abrasive injuries and by clogging the gills and respiratory passages of various aquatic fauna. Indirectly, suspended solids can screen out light and can promote and maintain the development of noxious conditions through oxygen depletion.

Upset -- An exceptional incident in which there is unintentional and temporary noncompliance with technology-based permit effluent limits because of factors beyond the reasonable control of the Permittee. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, lack of preventative maintenance, or careless or improper operation.

Water quality-based effluent limit -- A limit imposed on the concentration of an effluent parameter to prevent the concentration of that parameter from exceeding its water quality criterion after discharge into receiving waters.

Appendix D -- Technical Calculations

Several of the Excel® spreadsheet tools used to evaluate a discharger's ability to meet Washington State water quality standards can be found in the PermitCalc workbook on Ecology's webpage at: https://ecology.wa.gov/Regulations-Permits/Guidance-technical-assistance/Water-quality-permits-guidance

Simple Mixing:

Ecology uses simple mixing calculations to assess the impacts of certain conservative pollutants, such as the expected increase in fecal coliform bacteria at the edge of the chronic mixing zone boundary. Simple mixing uses a mass balance approach to proportionally distribute a pollutant load from a discharge into the authorized mixing zone. The approach assumes no decay or generation of the pollutant of concern within the mixing zone. The predicted concentration at the edge of a mixing zone (C_{mz}) is based on the following calculation:

$$C_{mz} = Ca + \frac{(Ce - Ca)}{DF}$$

where: Ce = Effluent Concentration
Ca = Ambient Concentration
DF = Dilution Factor

Reasonable Potential Analysis:

The spreadsheets Input 2 – Reasonable Potential, and LimitCalc in Ecology's PermitCalc Workbook determine reasonable potential (to violate the aquatic life and human health water quality standards) and calculate effluent limits. The process and formulas for determining reasonable potential and effluent limits in these spreadsheets are taken directly from the *Technical Support Document for Water Quality-based Toxics Control*, (EPA 505/2-90-001). The adjustment for autocorrelation is from EPA (1996a), and EPA (1996b).

Calculation of Water Quality-Based Effluent Limits:

Water quality-based effluent limits are calculated by the two-value wasteload allocation process as described on page 100 of the TSD (EPA, 1991) and shown below.

1. Calculate the acute wasteload allocation WLA_a by multiplying the acute criteria by the acute dilution factor and subtracting the background factor. Calculate the chronic wasteload allocation (WLA_c) by multiplying the chronic criteria by the chronic dilution factor and subtracting the background factor.

WLA_a = (acute criteria x DF_a) – [(background conc. x (DF_a - 1)]
WLA_c = (chronic criteria x DF_c) – [(background conc. x (DF_c -1)]
where: DF_a = Acute Dilution Factor
DF_c = Chronic Dilution Factor

2. Calculate the long term averages (LTA_a and LTA_c) which will comply with the wasteload allocations WLA_a and WLA_c.

$$LTA_a = WLA_a \times e^{[0.5\sigma^2 - z\sigma]}$$

where: $\sigma^2 = \ln[CV^2 + 1]$

$z = 2.326$

CV = coefficient of variation = std. dev/mean

$$LTA_c = WLA_c \times e^{[0.5\sigma^2 - z\sigma]}$$

where: $\sigma^2 = \ln[(CV^2 \div 4) + 1]$

$z = 2.326$

3. Use the smallest LTA of the LTA_a or LTA_c to calculate the maximum daily effluent limit and the monthly average effluent limit.

MDL = Maximum Daily Limit

$$MDL = LTA \times e^{(Z\sigma - 0.5\sigma^2)}$$

where: $\sigma^2 = \ln[CV^2 + 1]$

$z = 2.326$ (99th percentile occurrence)

LTA = Limiting long term average

AML = Average Monthly Limit

$$AML = LTA \times e^{(Z\sigma_n - 0.5\sigma_n^2)}$$

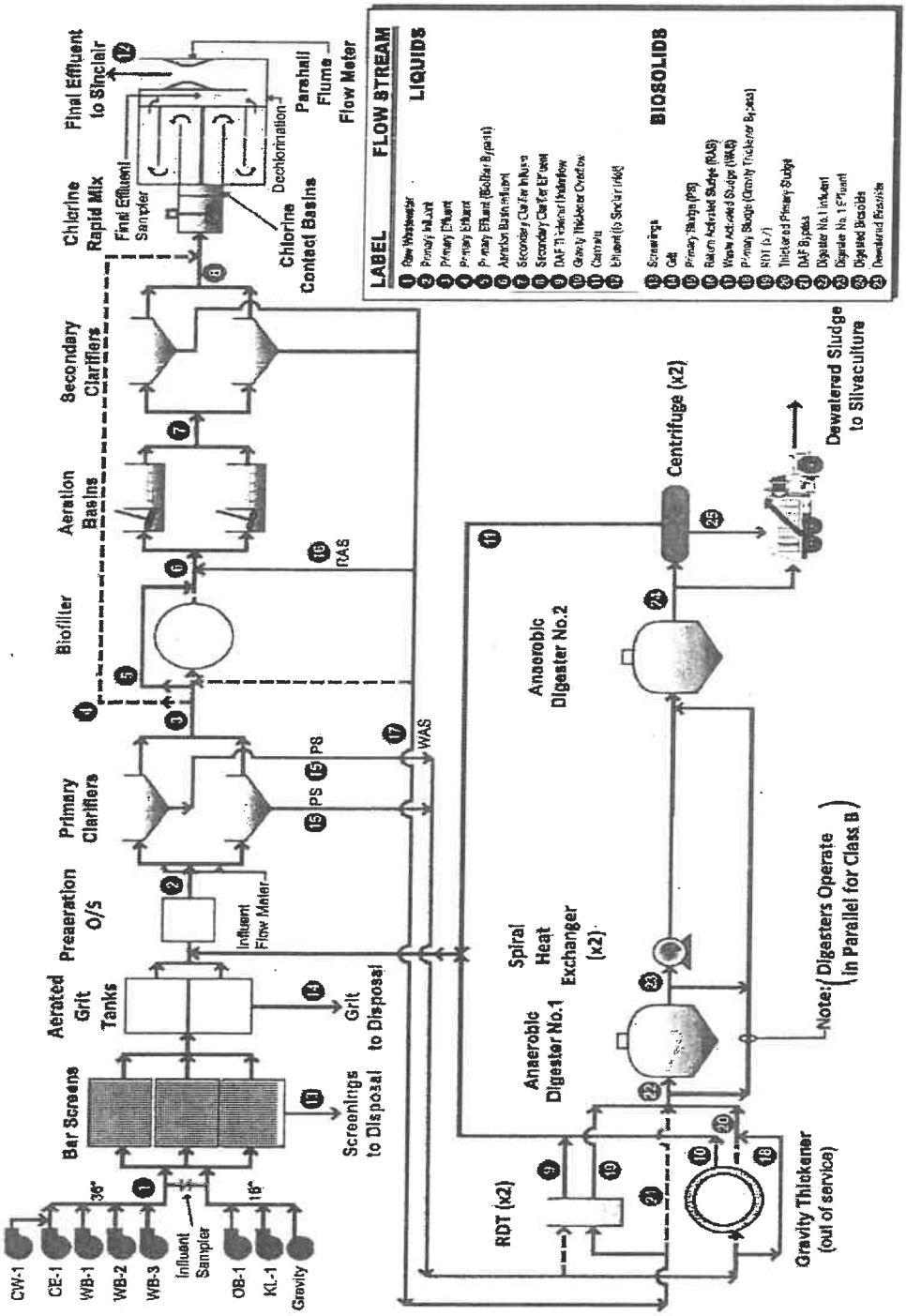
where: $\sigma^2 = \ln[(CV^2 \div n) + 1]$

n = number of samples/month

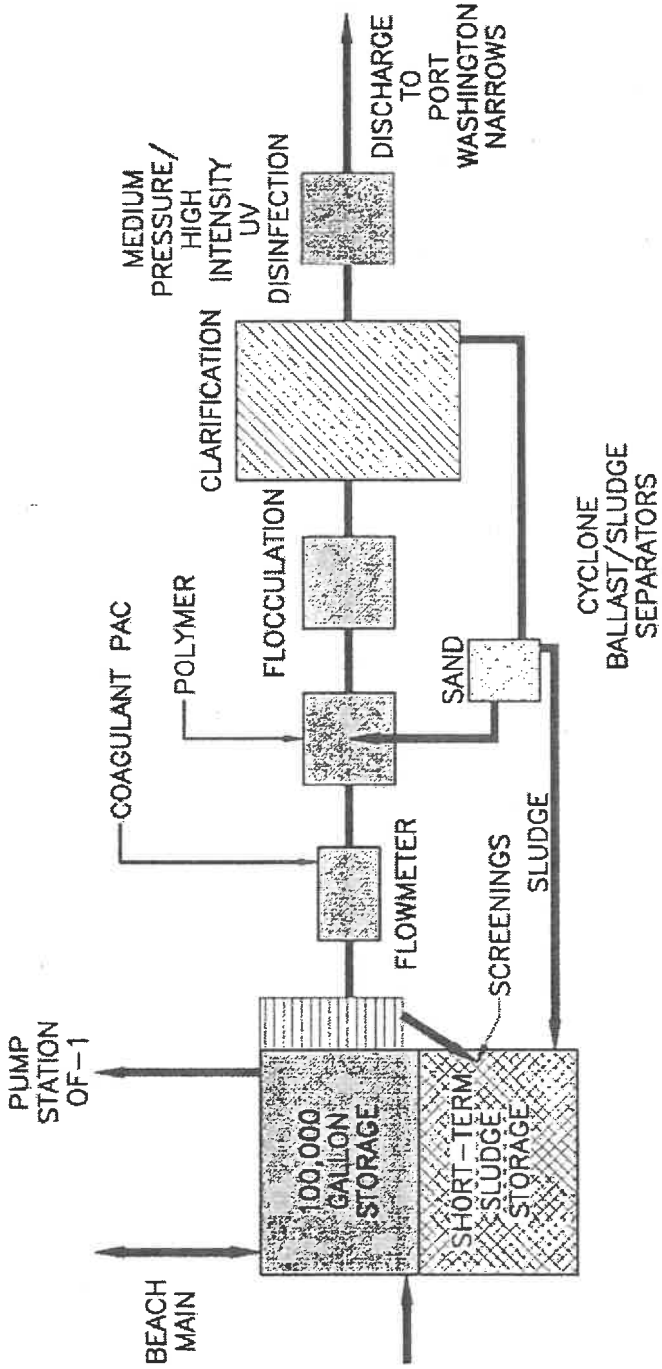
$z = 1.645$ (95th % occurrence probability)

LTA = Limiting long term average

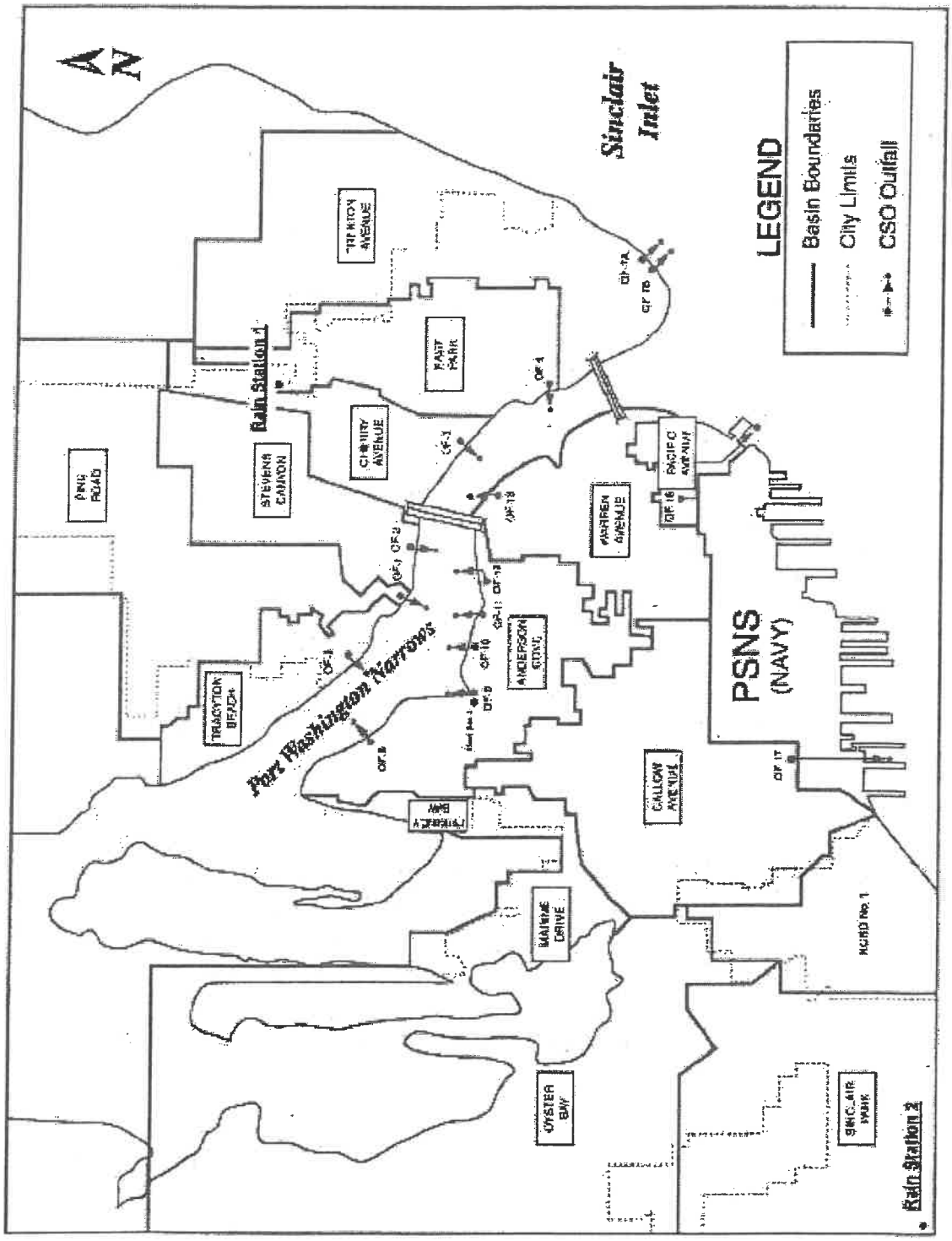
Bremerton West Plant - Process Flow Diagram



Bremerton East Plant - Process Flow Diagram



Map of Bremerton CSO Sites



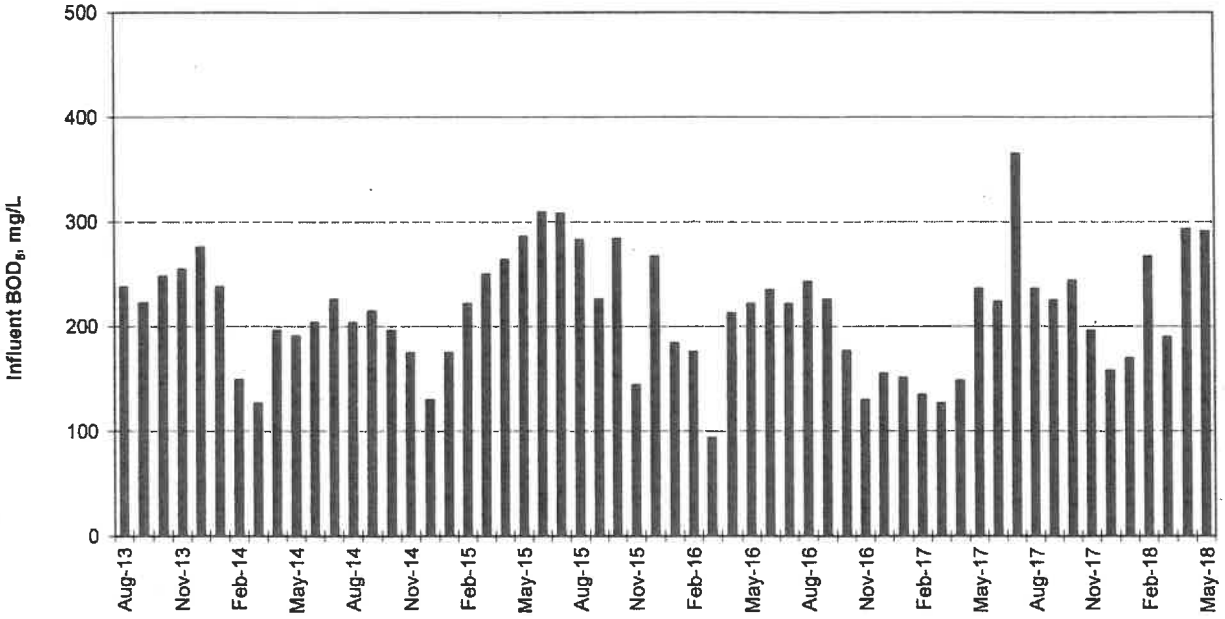
Bremerton West Plant Data (2013-2018)

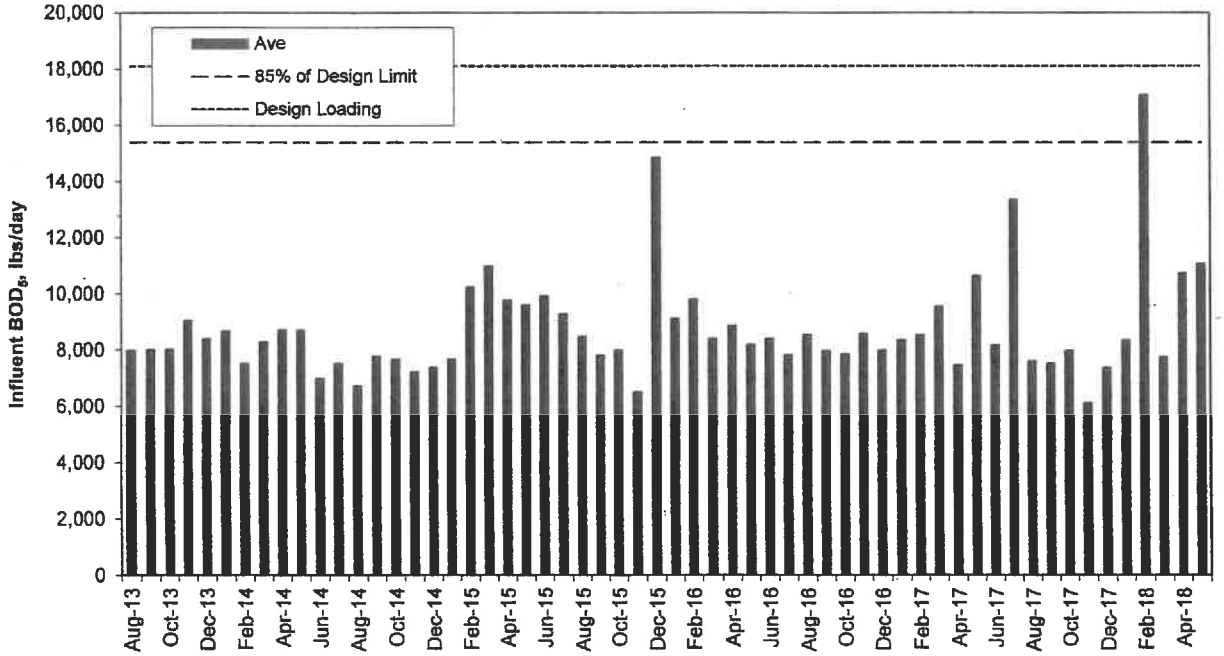
	Influent													
Date	Flow, MGD	Flow, MGD	BOD5, mg/L	BOD5, mg/L	BOD5, ppd	BOD5, ppd	CBOD5, mg/L	CBOD5, mg/L	CBOD, ppd	CBOD, ppd	TSS, mg/L	TSS, mg/L	TSS, ppd	TSS, ppd
	Ave	Max Day	Ave	Max	Ave	Max	Ave	Max	Ave	Max	Ave	Max	Ave	Max
Aug-13	4.0	6.0	238	250	7976	8245					270	285	9125	9584
Sep-13	4.5	11.7	223	255	8000	8383					232	254	8480	9787
Oct-13	3.9	6.4	248	266	8014	8468					227	245	7356	7795
Nov-13	4.1	9.0	255	292	9032	9612					237	303	8103	9604
Dec-13	3.7	4.1	276	307	8375	9481					237	248	7287	7778
Jan-14	4.7	10.7	238	280	8643	9984					210	224	8074	10588
Feb-14	6.9	16.6	149	221	7491	8412					160	210	8372	9840
Mar-14	8.6	19.6	127	185	8260	10415					150	188	9706	12971
Apr-14	5.4	8.3	196	224	8696	10347					202	238	9117	11909
May-14	5.2	10.3	191	219	8682	9760					189	207	8166	8755
Jun-14	4.0	5.0	204	210	6966	7157					222	231	7504	7647
Jul-14	3.9	4.5	226	242	7510	8481					229	242	7424	7819
Aug-14	3.9	6.5	204	229	6705	7185					228	234	7380	8525
Sep-14	4.1	10.6	215	237	7760	10832					240	306	8488	13278
Oct-14	4.7	7.8	196	232	7641	8743					213	238	8313	9403
Nov-14	5.6	16.0	175	213	7201	7763					189	218	8629	10611
Dec-14	7.3	13.0	130	157	7366	9342					145	173	8300	9450
Jan-15	5.7	14.1	175	241	7649	9137					179	203	8213	10263
Feb-15	6.7	14.3	222	267	10224	11012					174	202	8934	10265
Mar-15	5.5	16.6	250	292	10966	11475					181	205	8066	8912
Apr-15	4.4	5.9	264	321	9755	11835					208	229	7637	8761
May-15	4.0	4.5	286	300	9587	10737					264	379	8587	11680
Jun-15	3.8	4.6	309	329	9894	10589					257	264	8144	8987
Jul-15	3.6	4.8	308	317	9260	9663					242	251	7267	7939
Aug-15	3.9	7.0	283	320	8459	9613					244	280	7989	10137
Sep-15	4.1	6.2	226	262	7793	8960					225	238	7621	7951
Oct-15	4.3	8.8	284	284	7973	7973	200	214	6611	7530	245	254	8737	10637
Nov-15	5.9	14.2	144	144	6477	6477	155	180	6842	8013	197	230	8834	9824
Dec-15	9.6	18.9	267	267	14841	14841	106	188	7694	9780	165	230	11979	13976
Jan-16	9.3	28.6	184	304	9100	11782	136	184	8599	9681	195	276	12864	14704
Feb-16	7.4	11.5	176	176	9785	9785	129	140	7768	9303	178	190	10905	12576
Mar-16	8.7	20.3	94	94	8392	8392	108	123	7250	8531	151	194	10339	7399
Apr-16	4.7	5.7	213	265	8845	11159	176	203	7284	7712	238	250	9294	9785
May-16	4.3	5.7	222	261	8171	10284	209	223	7633	8118	255	279	9113	10449
Jun-16	4.0	5.8	235	253	8393	9113	203	217	7123	7702	258	283	8776	9218
Jul-16	4.2	6.0	222	233	7804	8447	190	233	6595	8119	242	263	8368	9067
Aug-16	4.0	4.6	243	272	8527	9725	221	247	7557	8749	253	282	8404	10540
Sep-16	4.1	5.1	226	277	7951	9035	229	240	8000	8720	254	266	8807	9247
Oct-16	6.7	12.1	177	213	7842	8327	163	200	7842	8687	204	235	11018	12961
Nov-16	8.3	20.0	130	155	8573	9339	120	150	7638	8551	157	195	9981	10902
Dec-16	6.0	9.2	155	186	7971	8637	150	175	7365	8155	165	177	8210	8958
Jan-17	6.7	18.9	151	201	8331	12460	147	165	7929	9599	162	187	8718	11530
Feb-17	8.7	21.2	135	152	8518	9976	120	144	8360	11023	140	209	9632	11708
Mar-17	8.8	14.6	127	156	9516	11884	115	125	8150	9226	137	132	9692	10201
Apr-17	6.8	10.1	148	148	7436	7436	138	143	8051	9087	159	182	8915	9442
May-17	5.1	6.4	236	236	10612	10612	182	201	7700	8087	219	225	9393	10084
Jun-17	4.3	7.8	224	224	8149	8149	200	219	7211	7778	235	277	8587	10012
Jul-17	4.3	7.5	365	365	13345	13345	211	300	7461	10057	242	312	8371	10494
Aug-17	3.8	4.3	236	236	7592	7592	229	277	7487	9210	247	284	7923	9557
Sep-17	3.7	4.5	225	225	7510	7510	210	315	6820	11788	245	450	7621	16840
Oct-17	4.5	13.2	244	244	7965	7965	198	261	7001	17194	243	549	9136	34167
Nov-17	7.1	20.8	196	196	6086	6086	159	324	10338	33131	209	435	12948	75455
Dec-17	6.0	12.6	158	158	7342	7342	183	249	9012	18973	145	206	7054	11025
Jan-18	9.0	19.3	170	170	8331	8331	126	188	8868	15747	144	215	10623	30208
Feb-18	6.0	9.6	267	267	17070	17070	196	442	9636	22676	162	217	7954	12211
Mar-18	5.0	8.6	190	190	7733	7733	218	284	9059	15845	195	256	7938	9633
Apr-18	6.0	13.6	293	293	10708	10708	206	346	9823	17009	158	220	7122	8997
May-18	4.6	5.5	291	291	11051	11051	241	368	9205	16013	217	299	8467	13011
AVE:	5.5	10.7	215	238	8721	9555	174	227	7938	11556	206	251	8759	12156
MIN:	3.6	4.1	94	94	6086	6086	106	123	6595	7530	137	132	7054	7399
MAX:	9.6	28.6	365	365	17070	17070	241	442	10338	33131	270	549	12948	75455

Bremerton West Plant Data (2013-2018)

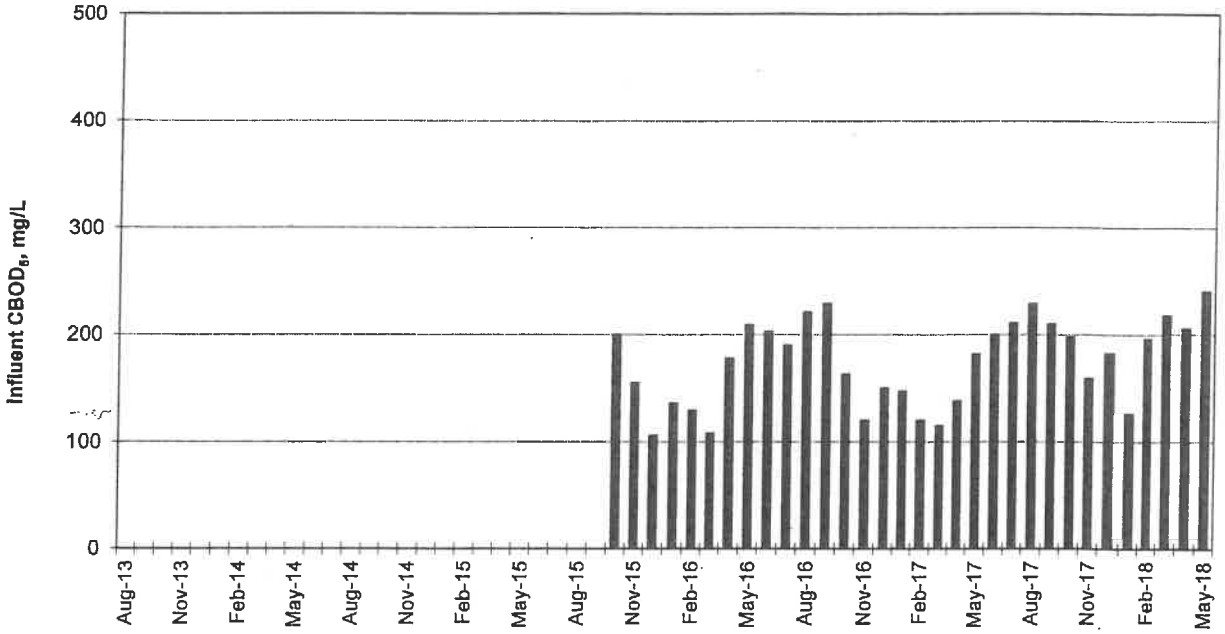
	Effluent																		
Date	BOD5, mg/L	BOD5, mg/L	BOD5, ppd	BOD5, ppd	BOD5, % Removal	CBOD5, mg/L	CBOD6, mg/L	CBOD5, ppd	CBOD5, ppd	CBOD5, % Removal	TSS, mg/L	TSS, mg/L	TSS, ppd	TSS, ppd	TSS, % Removal	Fecal Coliform, #/100 mL	Fecal Coliform, #/100 mL	PH	PH	TRC, mg/L	TRC, mg/L
	Mnthly Ave	Wkly Ave	Mnthly Ave	Wkly Ave	Ave	Mnthly Ave	Wkly Ave	Mnthly Ave	Wkly Ave	Ave	Mnthly Ave	Wkly Ave	Mnthly Ave	Wkly Ave	Ave	GEM	GM7	Min	Max	Ave	Max
Aug-13	6	7	213	253	97						7	8	242	318	97	29	44	6.7	7.2	0.043	0.135
Sep-13	10	13	390	587	95						8	12	351	643	96	37	68	6.5	7.2	0.033	0.090
Oct-13	9	16	294	534	96						4	5	145	251	98	21	67	6.6	7.2	0.044	0.225
Nov-13	6	8	249	401	97						4	5	148	158	98	55	86	6.7	7.3	0.035	0.110
Dec-13	9	11	260	345	97						5	6	159	168	98	35	69	7.2	7.4	0.021	0.165
Jan-14	8	15	304	542	97						6	8	248	492	97	50	84	6.9	7.5	0.034	0.130
Feb-14	6	7	342	514	95						7	9	446	752	95	68	131	6.4	7.3	0.026	0.080
Mar-14	8	45	613	1348	93						9	12	664	1414	93	132	201	6.5	7.2	0.030	0.065
Apr-14	8	12	382	635	96						5	6	231	315	97	118	185	7.0	7.3	0.039	0.115
May-14	12	21	555	1154	93						5	7	230	290	97	87	168	6.8	7.4	0.035	0.140
Jun-14	11	16	368	597	95						7	9	251	292	97	81	99	7.4	7.7	0.030	0.105
Jul-14	10	13	325	410	96						7	10	224	328	97	37	51	7.2	7.9	0.039	0.130
Aug-14	11	17	375	517	94						7	8	241	307	97	24	32	7.3	7.4	0.030	0.130
Sep-14	12	23	444	701	94						8	10	291	387	97	60	133	7.2	7.4	0.022	0.065
Oct-14	9	12	380	566	95						6	7	255	374	97	34	53	7.0	7.4	0.032	0.140
Nov-14	7	11	279	407	96						6	8	322	688	97	31	56	7.0	7.5	0.016	0.045
Dec-14	7	8	433	690	94						7	8	498	715	94	43	61	6.9	7.5	0.020	0.095
Jan-15	6	8	264	413	97						5	6	263	324	97	47	70	6.7	7.4	0.024	0.115
Feb-15	10	12	540	953	95						5	9	361	805	96	33	63	6.9	7.4	0.031	0.085
Mar-15	29	78	1497	3309	87						6	8	309	673	97	56	96	7.3	7.5	0.035	0.085
Apr-15	33	45	1271	1686	89						4	6	162	212	98	36	32	7.2	7.6	0.028	0.080
May-15	22	38	726	1257	97						5	6	178	209	98	19	24	7.4	7.6	0.033	0.170
Jun-15	17	24	548	731	94						7	10	206	289	97	17	22	7.5	7.6	0.025	0.080
Jul-15	16	25	495	765	95						6	6	168	206	98	20	35	7.4	7.6	0.028	0.120
Aug-15	13	17	398	473	95						7	7	217	261	97	58	73	7.0	7.6	0.025	0.110
Sep-15	11	18	401	582	95						6	7	222	253	97	164	201	7.0	7.8	0.087	0.225
Oct-15						7	9	240	264	94	7	8	256	391	91	71	241	7.0	7.4	0.067	0.280
Nov-15						8	9	383	585	88	7	8	382	579	85	10	11	6.8	7.3	0.039	0.080
Dec-15						10	14	887	2048	75	12	15	1044	1972	79	19	34	6.6	7.3	0.036	0.170
Jan-16						9	9	614	779	89	11	14	1034	2071	92	15	21	6.8	7.3	0.023	0.065
Feb-16						9	10	560	711	93	10	14	641	852	94	13	16	6.9	7.3	0.026	0.050
Mar-16						9	10	678	1068	91	9	11	725	1268	93	17	25	6.8	7.3	0.026	0.060
Apr-16						9	10	366	414	95	7	7	256	279	97	17	26	7.1	7.4	0.034	0.140
May-16						9	11	344	422	95	7	8	251	296	97	12	16	7.2	7.6	0.031	0.105
Jun-16						11	16	394	603	94	7	9	250	336	97	14	19	7.3	7.6	0.038	0.105
Jul-16						10	12	338	442	94	6	7	203	236	98	11	14	7.3	7.6	0.029	0.065
Aug-16						9	10	318	347	96	5	7	181	228	98	11	15	7.4	7.6	0.027	0.065
Sep-16						10	12	347	391	96	8	10	278	337	97	14	22	7.5	7.6	0.040	0.125
Oct-16						11	16	564	648	93	9	13	555	860	95	18	30	6.7	7.6	0.035	0.070
Nov-16						7	9	495	695	93	8	11	645	1136	94	24	41	6.5	7.2	0.031	0.085
Dec-16						8	9	425	477	94	8	9	451	539	94	14	16	6.7	7.2	0.035	0.090
Jan-17						11	13	722	1528	92	9	11	557	1191	94	19	28	6.5	7.3	0.036	0.105
Feb-17						10	11	788	1144	91	8	10	689	1045	94	20	25	7.0	7.7	0.037	0.080
Mar-17						11	13	788	1171	90	9	10	651	952	93	20	25	6.5	7.2	0.037	0.095
Apr-17						9	10	515	677	94	6	8	373	512	96	15	17	6.8	7.2	0.037	0.075
May-17						10	13	438	570	94	9	11	367	504	96	26	43	6.8	7.1	0.037	0.080
Jun-17						9	10	319	364	95	9	11	335	468	96	20	30	6.8	7.4	0.039	0.080
Jul-17						7	8	243	291	97	6	7	226	329	97	21	34	7.0	7.5	0.034	0.085
Aug-17						9	12	278	371	96	6	7	208	240	97	23	40	7.2	7.5	0.035	0.150
Sep-17						10	11	308	343	95	7	7	205	224	97	15	16	7.3	7.6	0.035	0.095
Oct-17						7	10	308	656	96	7	9	305	611	97	13	14	6.8	7.5	0.029	0.085
Nov-17						10	15	794	1823	92	12	17	834	1840	93	16	17	7.1	7.3	0.025	0.075
Dec-17						8	11	455	906	94	9	9	481	586	95	15	19	6.8	7.4	0.041	0.190
Jan-18						9	11	782	1255	92	9	11	762	1270	93	16	18	6.8	7.4	0.029	0.075
Feb-18						9	10	426	585	95	10	11	482	520	95	20	30	7.1	7.4	0.033	0.070
Mar-18						6	7	250	312	97	7	8	292	339	97	17	19	7.0	7.4	0.029	0.065
Apr-18						6	7	297	353	96	7	8	369	539	96	20	31	6.7	7.2	0.036	0.075
May-18						9	11	359	422	96	6	7	247	292	97	14	20	7.1	7.4	0.032	0.090
AVE:	12	20	475	783	95	9	11	469	708	93	7	9	372	585	96	34	55	7.0	7.4	0.03	0.11
MIN:	6	7	213	253	87	6	7	240	264	75	4	5	145	158	79	10	11	6.4	7.1	0.02	0.05
MAX:	33	78	1497	3309	97	11	16	887	2048	97	12	17	1044	2071	98	164	241	7.5	7.9	0.09	0.28

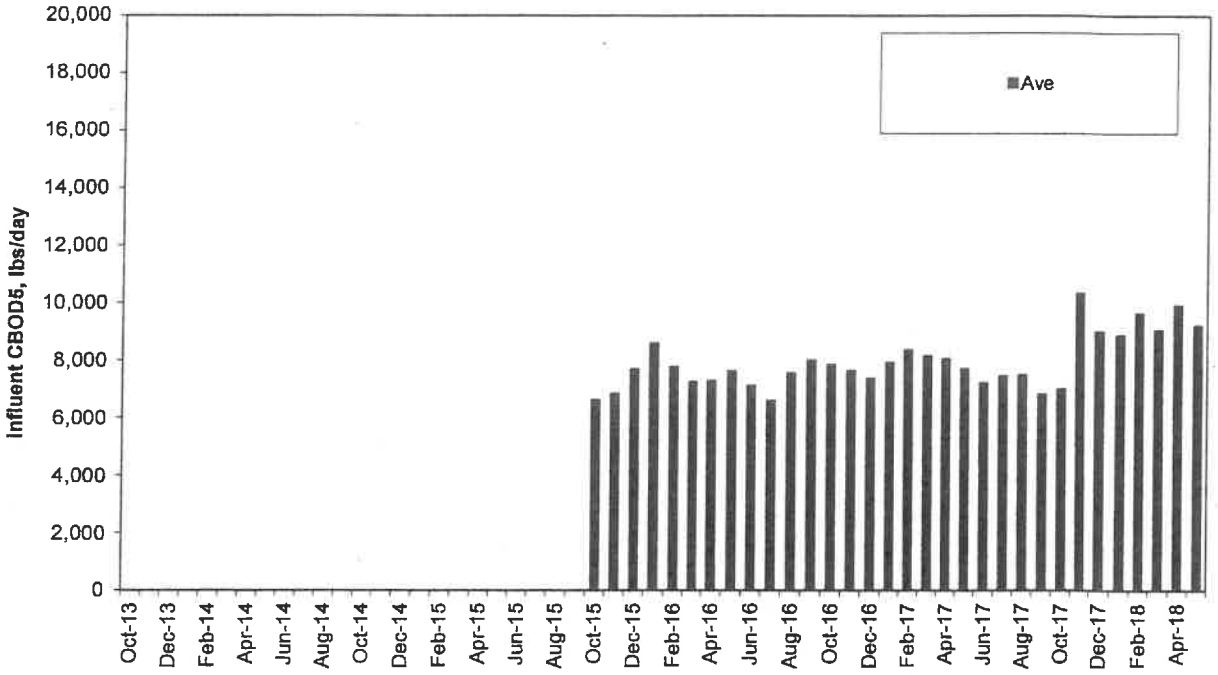
Bremerton West Plant - Influent BOD_5



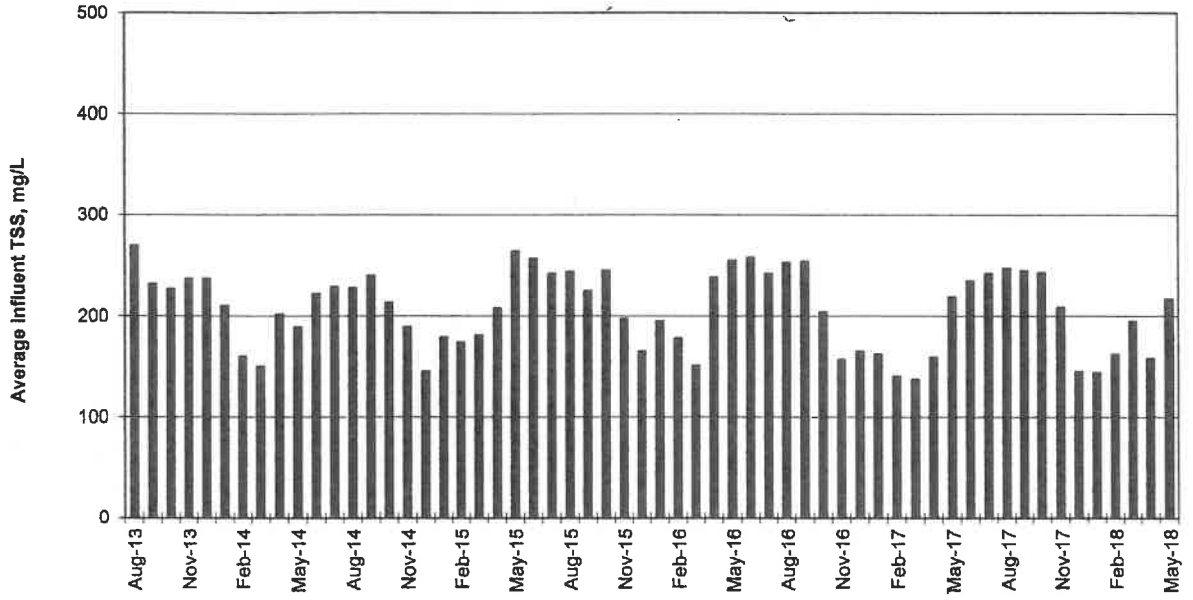


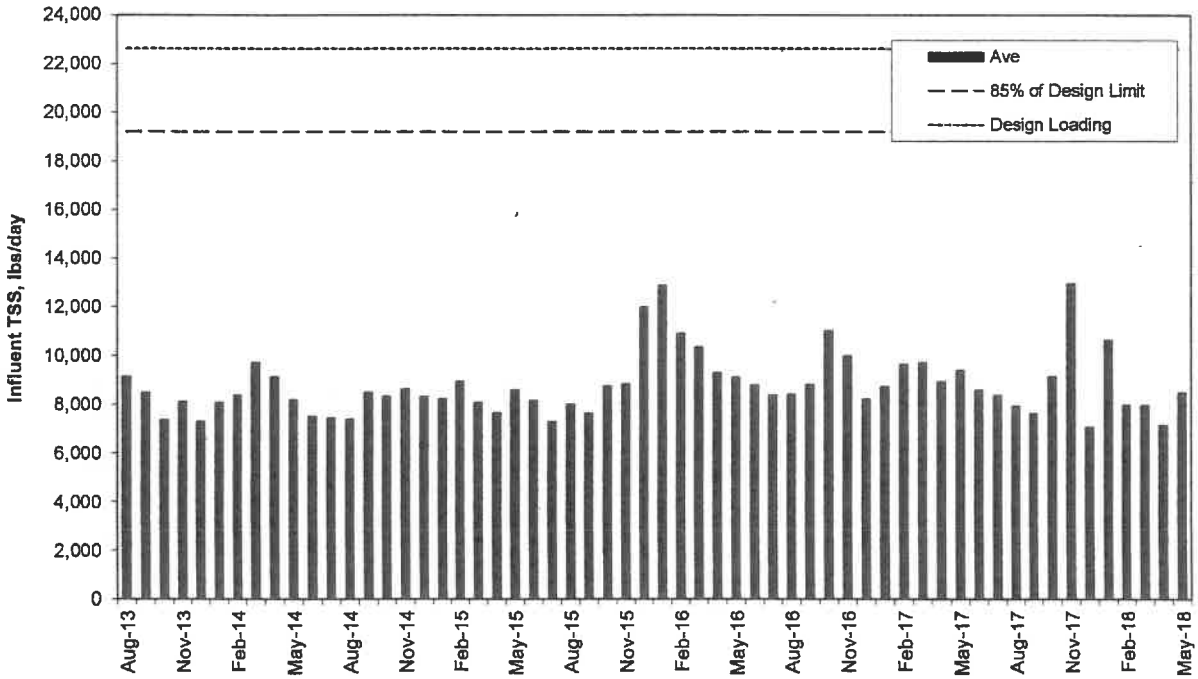
Bremerton West Plant - Influent $CBOD_5$



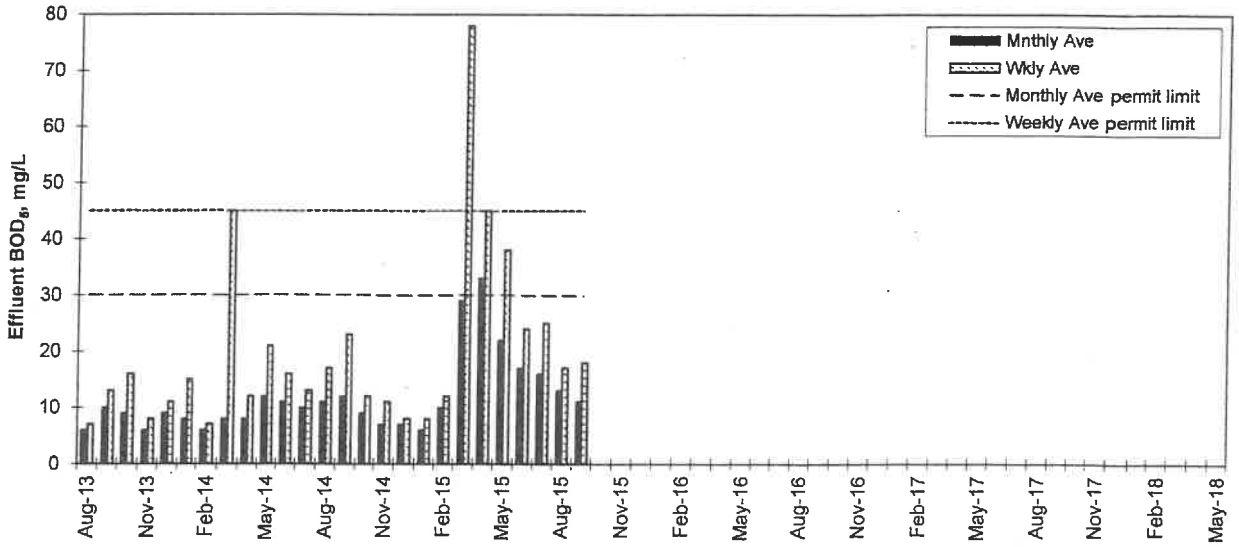


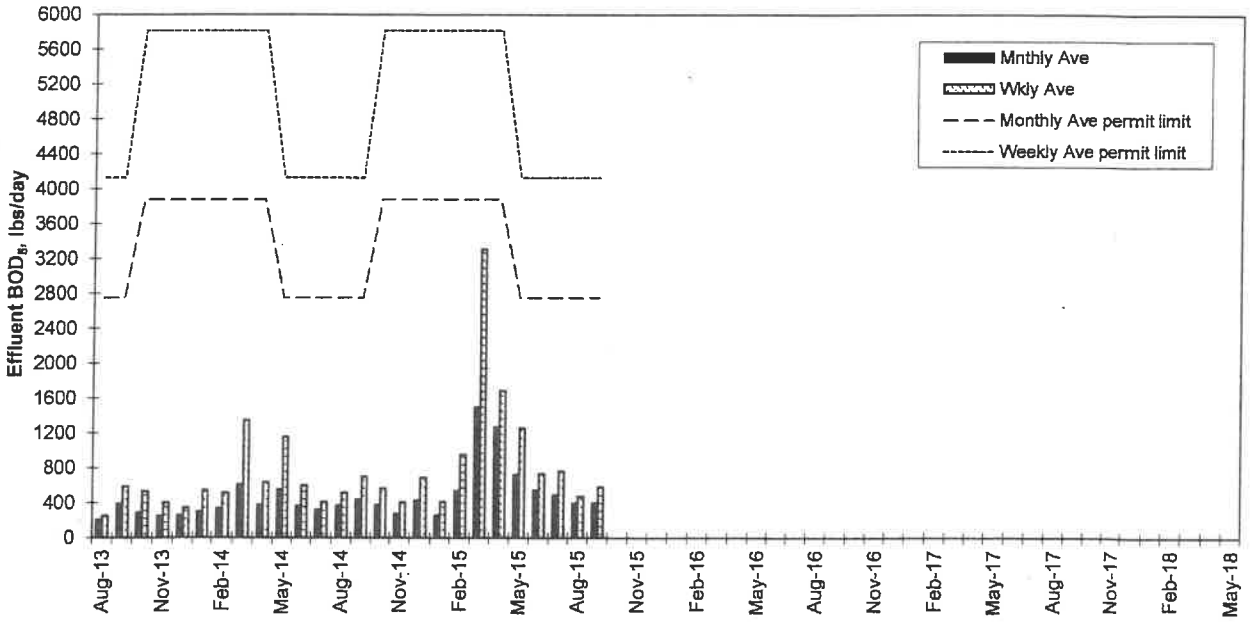
Bremerton West Plant - Influent TSS



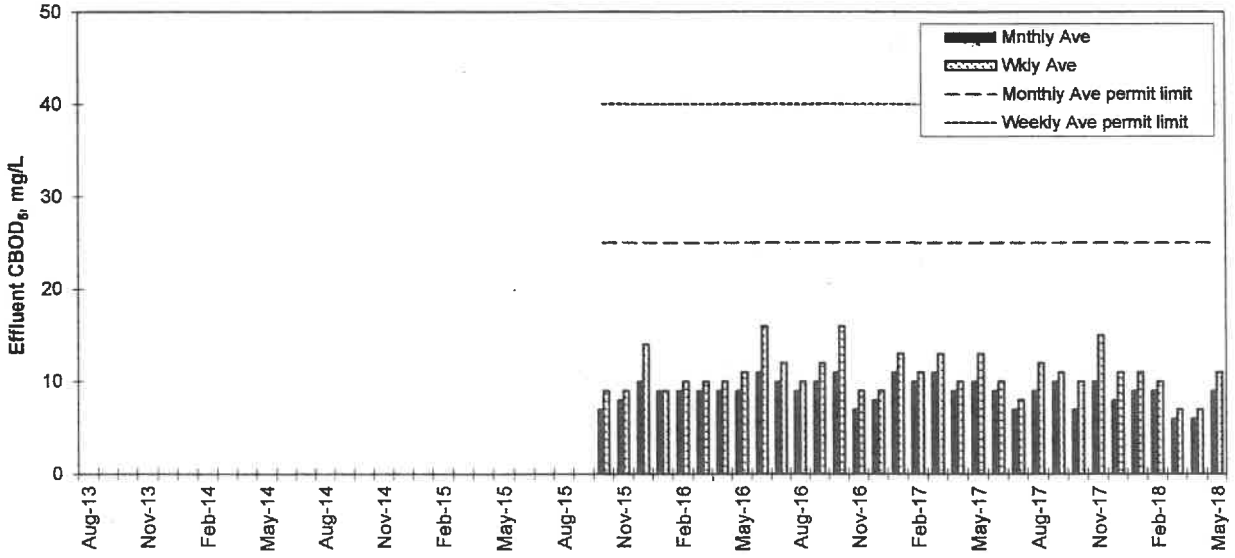


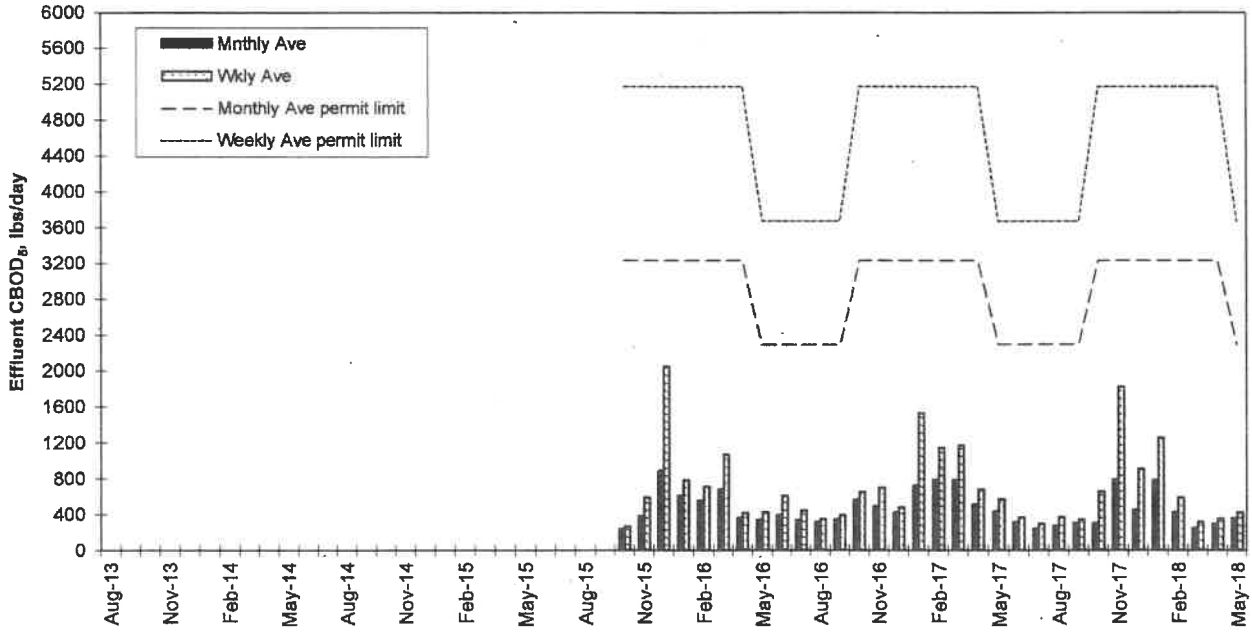
Bremerton West Plant - Effluent BOD_5



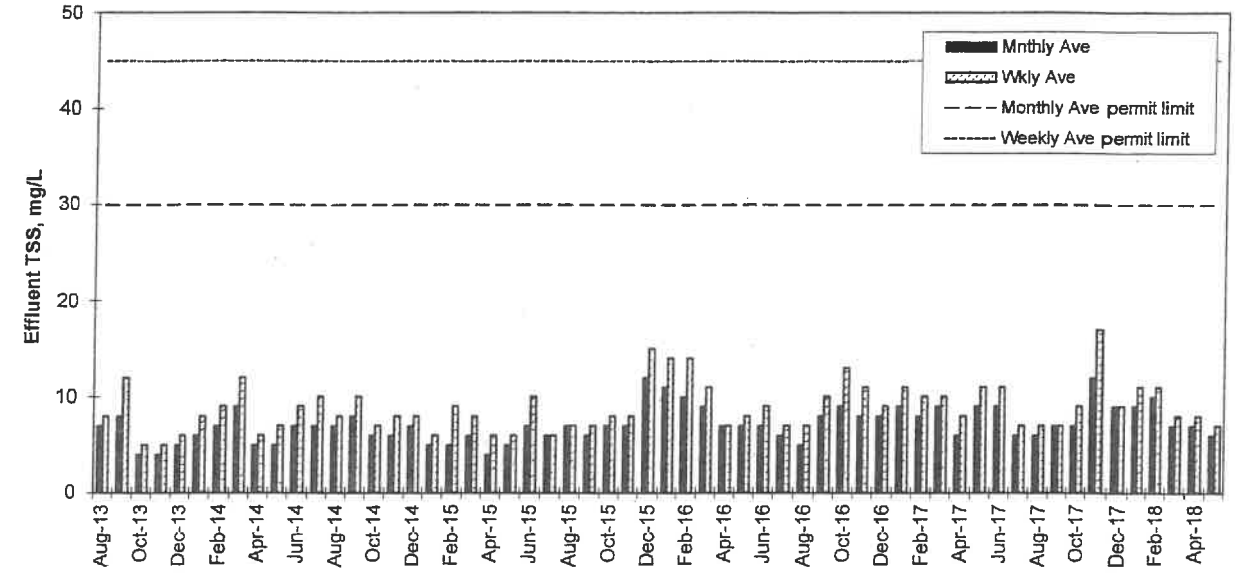


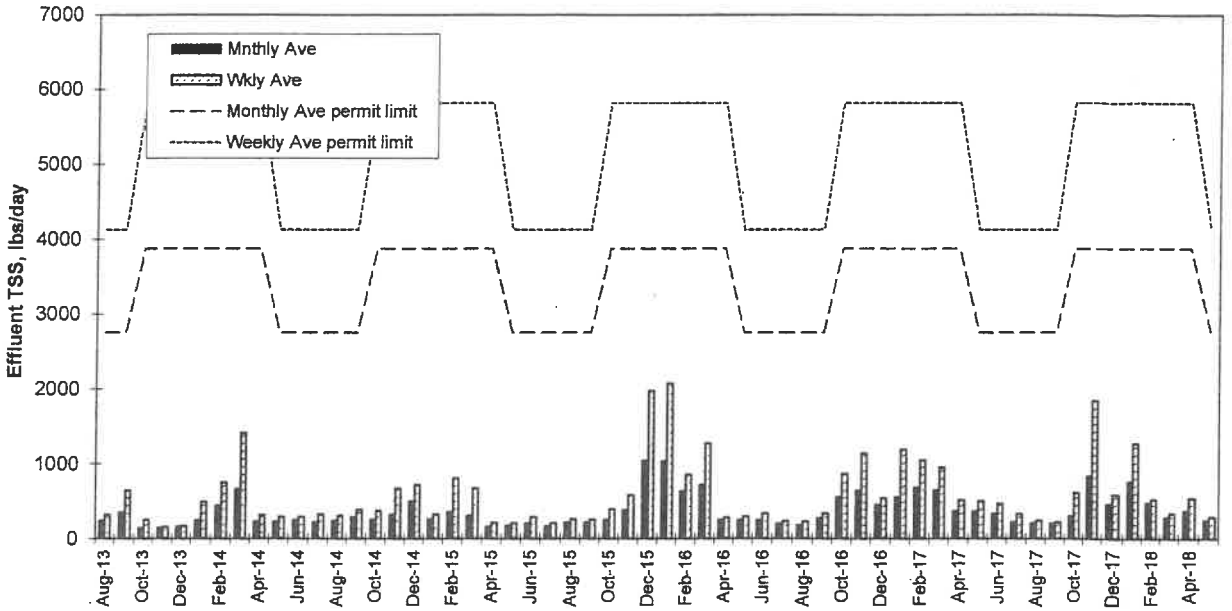
Bremerton West Plant - Effluent $CBOD_5$



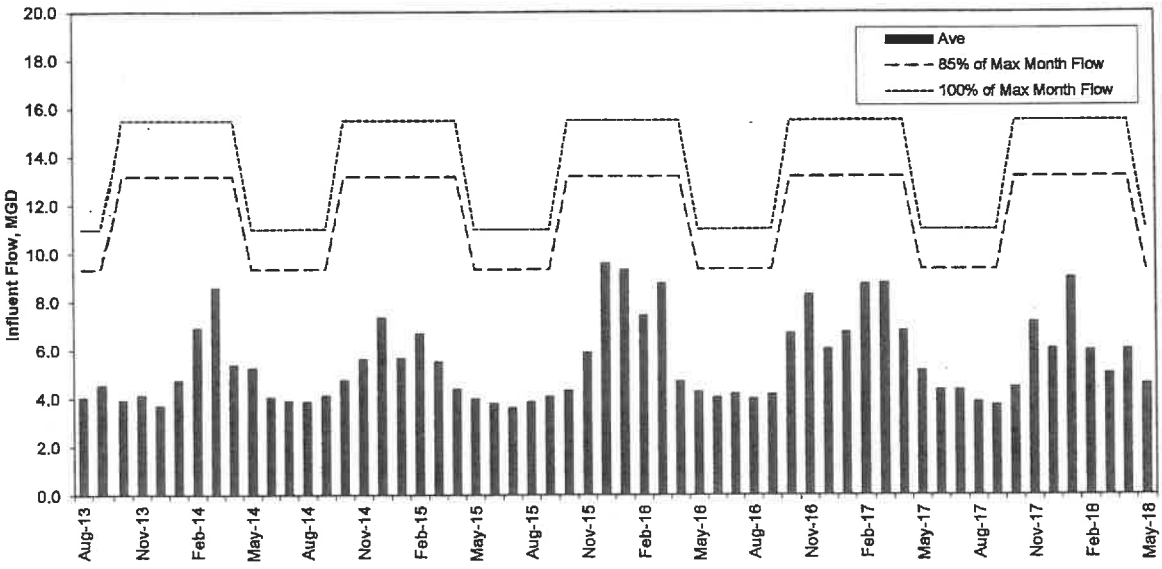


Bremerton West Plant - Effluent TSS

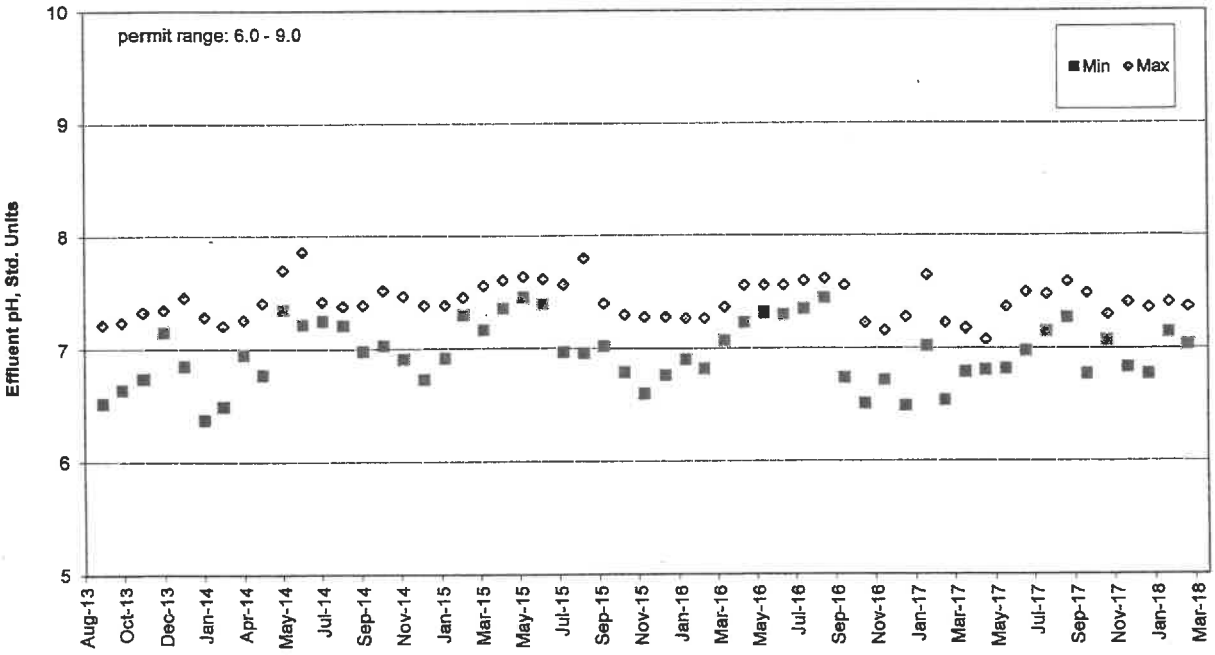




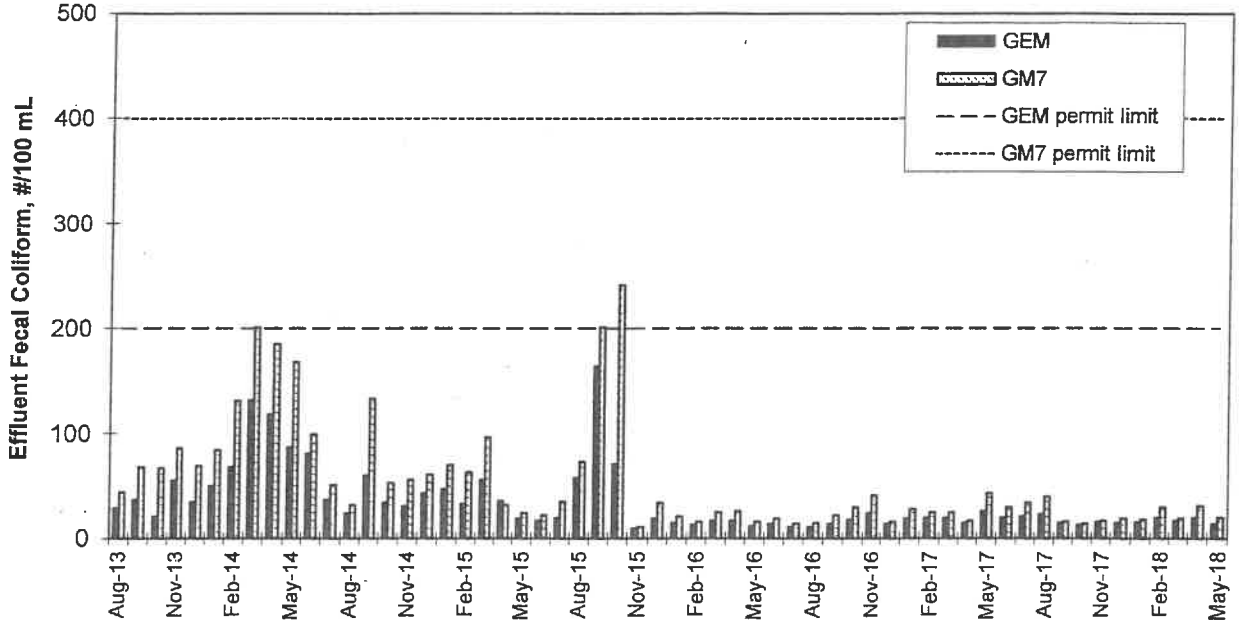
Bremerton West Plant - Influent Flow



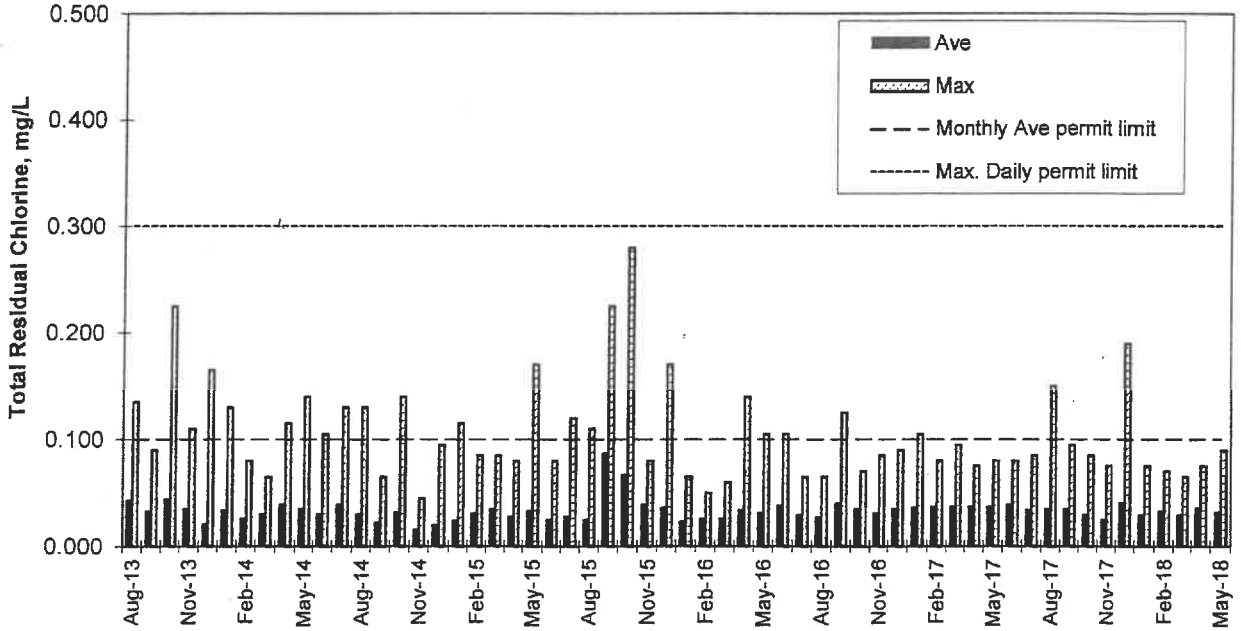
Bremerton West Plant - Effluent pH



Bremerton West Plant - Effluent Fecal Coliform



Bremerton West Plant - Effluent Chlorine



Bremerton West Plant - Additional Effluent Data

Bremerton West Plant - Priority Pollutant Testing Data
(only those parameters with at least one set of results > the detection limit (DL) are listed)

Parameters	Unit	7/2/14	1/7/15	7/12/16	Min.	Avg.	Max.
Chloroform	µg/L	3.4	0.98	0.91	0.91	1.763	3.4
Bromoform	µg/L	<DL	<DL	0.31	0.31	0.31	0.31
Bromodichloromethane	µg/L	0.34	0.24	<DL	0.24	0.29	0.34
Toluene	µg/L	0.17	<DL	<DL	0.17	0.17	0.17
2,6-Dinitrotoluene	µg/L	1	0.62	<DL	0.62	0.81	1
Buty benzyl phthalate	µg/L	<DL	0.24	<DL	0.24	0.24	0.24
Di-n-butyl phthalate	µg/L	<DL	0.15	<DL	0.15	0.15	0.15
Phenol	mg/L	<DL	0.53	<DL	0.53	0.53	0.53
Total Phenol	µg/L	3	9.1	7	3	6.367	9.1
Pyrene	µg/L	<DL	<DL	0.12	0.12	0.12	0.12
1,2-Diphenylhydrazine	µg/L	<DL	0.15	<DL	0.15	0.15	0.15
Bis (2-Ethylhexyl) phthalate	µg/L	11	30	<DL	11	20.5	30
Mercury	µg/L	0.0024	0.0021	0.0042	0.0021	0.003	0
Antimony	µg/L	<DL	0.46	<DL	0.46	0.46	0.46
Cadmium	µg/L	0.2	<DL	0.33	0.2	0.265	0.33
Copper	µg/L	9.4	3.6	8.6	3.6	7.2	9.4
Lead	µg/L	0.26	0.45	<DL	0.26	0.355	0.45
Nickel	µg/L	6.3	3.9	7.9	3.9	6.033	7.9
Zinc	µg/L	17	20	19	17	18.67	20
Iron	mg/L	<DL	<DL	0.21	0.21	0.21	0.21

Other Data							
Parameters	Unit	7/2/14	1/7/15	7/12/16	Min.	Avg.	Max.
Ammonia	mg/L as N	39	<DL	26	26	32.5	39
Nitrate Nitrite	mg/L as N	1.7	<DL	2.2	1.7	1.95	2.2
TKN	mg/L as N	36	<DL	35	35	35.5	36
Phosphorus	mg/L as P	<DL	<DL	3.9	3.9	3.9	3.9
ortho-Phosphate	mg/L as P	<DL	<DL	4	4	4	4
O&G	mg/L	<DL	<DL	<DL			
TDS	mg/L	2000	1800	2100	1800	1967	2100

Bremerton West Plant – WET Test Results Summary

Scheduled	Test Code	Collected	Start Date	Duration	Organism	Endpoint	NOEC	LOEC	PMSD	Effluent Survival (100%)	Met Performance Standard?
2013 January	RMAR2841	1/8/2013	1/9/2013	Acute	*Pimephales promelas* fathead minnow	96-Hour Survival	50%	100%	8.2%	87.5%	Yes
2013 April	RMAR2946	4/9/2013	4/10/2013	Acute	*Ceriodaphnia dubia* water flea	48-Hour Survival	100%	>100%	8.3%	100.0%	Yes
2013 July	RMAR035	7/9/2013	7/10/2013	Acute	*Pimephales promelas* fathead minnow	96-Hour Survival	100%	>100%	5.3%	97.5%	Yes
2014 April	RMAR3253	4/8/2014	4/9/2014	Acute	*Mysis bahia* Shrimp	48-Hour Survival	50%	100%	10.9%	62.5%	No*
2014 July	RMAR3307	7/8/2014	7/9/2014	Acute	*Atherinops affinis* Topsmelt	96-Hour Survival	100%	>100%	13.5%	90.0%	Yes
2014 October	RMAR3451	10/7/2014	10/8/2017	Acute	*Mysis bahia* Shrimp	48-Hour Survival	100%	>100%	8.4%	87.5%	Yes
2015 January	RMAR3532	1/20/2015	1/21/2015	Acute	*Atherinops affinis* Topsmelt	96-Hour Survival	100%	>100%	n/a	100.0%	Yes
2015 April	RMAR3620	4/21/2015	4/22/2015	Acute	*Mysis bahia* Shrimp	48-Hour Survival	25%	50%	14.8%	17.5%	No*
2015 July	RMAR3681	7/21/2015	7/22/2015	Acute	*Atherinops affinis* Topsmelt	96-Hour Survival	100%	>100%	10.9%	100.0%	Yes
2015 October	RMAR3791	10/20/2015	10/21/2015	Acute	*Mysis bahia* Shrimp	48-Hour Survival	50%	100%	9.2%	55.0%	No*
2016 January	N/A	1/19/2017	1/20/2017	Acute	*Atherinops affinis* Topsmelt	96-Hour Survival	100%	>100%	N/A	100.0%	Yes
2016 April	RMAR3914	4/19/2016	4/20/2016	Acute	*Mysis bahia* Shrimp	48-Hour Survival	100%	>100%	12.3%	87.5%	Yes
2016 July	JAMM0168	7/27/2016	7/28/2016	Acute	*Atherinops affinis* Topsmelt	96-Hour Survival	25%	50%	10.4%	0.0%	No*
2016 October	JAMM0169	10/18/2016	10/19/2016	Acute	*Mysis bahia* Shrimp	48-Hour Survival	100%	>100%	14.6%	90.2%	Yes
2017 January	JAMM0170	1/17/2017	1/18/2017	Acute	*Menidia* silverside	96-Hour Survival	100%	>100%	8.3%	87.5%	Yes
2017 April	JAMM0174	4/17/2017	4/18/2017	Chronic	*Mysis bahia* Shrimp	7 Day Survival 7 Day Biomass	50% 10%	100% 50%	13.4% 12.7%	57.5%	Yes
2017 April	JAMM0173	4/18/2017	4/19/2017	Acute	*Mysis bahia* Shrimp	48-Hour Survival	50%	100%	15.0%	32.5%	No*
2017 July	JAMM0199	7/17/2017	7/18/2017	Chronic	*Atherinops affinis* Topsmelt	7 Day Survival 7 Day Biomass	50% 50%	100% 100%	15.2% 15.2%	8.0%	Yes
2017 July	JAMM0198	7/18/2017	7/19/2017	Acute	*Atherinops affinis* Topsmelt	96-Hour Survival	50%	100%	11.3%	5.0%	No*

*The acute test result showed less than 65% survival in 100% effluent. An acute WET limit is needed if the testing was for effluent characterization (WAC 173-205-050(2)(a)(ii)) or compliance monitoring (WAC 173-205-120(1)(a)). Another effluent characterization for acute WET (WAC 173-205-060(3)(a)) is needed if the testing was an end of permit term check (WAC 173-205-030(8)). Note: This does not necessarily mean that the

LOEC = Lowest observed effect concentration.
NOEC= No observed effect concentration.
PMSD= Percent minimum significant difference.

Bremerton West Plant – Monitoring Frequency Evaluation

Date	CBOD5, mg/L	TSS, mg/L
	Mnthly Ave	Mnthly Ave
Oct-15	7	7
Nov-15	8	7
Dec-15	10	12
Jan-16	9	11
Feb-16	9	10
Mar-16	9	9
Apr-16	9	7
May-16	9	7
Jun-16	11	7
Jul-16	10	6
Aug-16	9	5
Sep-16	10	8
Oct-16	11	9
Nov-16	7	8
Dec-16	8	8
Jan-17	11	9
Feb-17	10	8
Mar-17	11	9
Apr-17	9	6
May-17	10	9
Jun-17	9	9
Jul-17	7	6
Aug-17	9	6
Sep-17	10	7
Oct-17	7	7
Nov-17	10	12
Dec-17	8	9
Jan-18	9	9
Feb-18	9	10
Mar-18	6	7
Apr-18	6	7
May-18	9	6
AVE	9	8
MIN	6	5
MAX	11	12
STD	1.4	1.8
CV	0.16	0.22
AML	30	30
Ratio (AVG/AML)	0.30	0.27

Bremerton East Plant Data (2013-2018)

Ambient Data

Parameter	Duration	Rainfall
Units	Hours	Inches
Statistical Base	Total	Total
Date	Value	Value
9/1/13	1.00	0.80
1/1/14	24.00	2.04
2/1/14	24.00	2.04
3/1/14	34.29	10.86
9/1/14	1.75	1.00
11/1/14	3.00	1.54
12/1/14	2.06	1.33
3/1/15	4.10	0.82
12/1/15	54.17	7.08
1/1/16	36.02	7.06
3/1/16	10.80	3.23
10/1/16	0.83	1.56
1/1/17	8.23	4.38
2/1/17	66.02	6.64
3/1/17	16.25	2.72
10/1/17	5.00	1.19
11/1/17	25.54	2.45
12/1/17	6.00	1.80
1/1/18	22.05	6.91
4/1/18	4.80	3.82
Min	0.83	0.80
Max	66.02	10.86
Average	17.50	3.46
Median	9.52	2.24
95th Percentile	54.76	7.27

Influent Data

Parameter	Solids (Residue)	Total BOD5
Units	mg/L	mg/L
Statistical Base	Average	Average
Date	Value	Value
9/1/13	116	88
1/1/14	175	124
2/1/14	125	77
3/1/14	116	71
9/1/14	122	50
11/1/14	50	89
12/1/14	66	37
3/1/15	110	94
12/1/15	69	63
1/1/16	92	66
3/1/16	117	89
10/1/16	160	115
1/1/17	108	74
2/1/17	91	55
3/1/17	93	105
10/1/17	133	123
11/1/17	60	65
12/1/17	172	95
1/1/18	123	64
4/1/18	128	107
Min	50	37
Max	175	124
Average	111	83
Median	116	83
95th Percentile	172	123

Bremerton East Plant Data (2013-2018)

Effluent Data

Parameter	Duration	Fecal Coliform	Flow	Number of Events	pH	pH	Solids (Residue)	Solids (Residue)	Solids (Residue)	Total BOD5	Volume
Units	Hours	#/100 mL	MGD	Number	Standard Units	Standard Units	mL/L	mg/L	Percent	mg/L	MG
Statistical Base	Total	Monthly G.M.	Average	Total	Daily Maximum	Daily Minimum	Average	Average	Average	Average	Total
Limits	- / -	- / 400	- / -	- / -	- / 9	6 / -	- / -	- / -	- / -	- / -	- / -
Date	Value	Value	Value	Value	Value	Value	Value	Value	Value	Value	Value
9/1/13	1.00	10	0.89	1	6.95	6.95	0.010	7	94	51	0.85
1/1/14	5.50	82	0.35	1	7.31	7.31	8.300	24	86	32	0.35
2/1/14	5.50	23	1.50	1	6.78	6.60	0.010	33	73	24	0.35
3/1/14	34.29	114	2.06	3	6.53	5.97	0.110	28	71	26	2.06
9/1/14	1.75	25	0.17	1	6.84	6.84	0.100	9	93	22	0.17
11/1/14	3.00	10	0.41	1	6.67	6.67	0.020	8	84	11	0.41
12/1/14	2.06	17	0.27	2	7.80	7.36	0.010	11	80	13	0.54
3/1/15	4.10	100	1.03	1	7.10	7.10	0.100	34	69	44	1.03
12/1/15	54.17	13	4.51	2	6.78	6.65	0.030	16	73	28	9.02
1/1/16	36.02	14	3.03	2	6.68	6.30	0.010	15	79	15	6.06
3/1/16	10.80	62	0.61	2	6.80	6.46	0.006	6	95	24	5.40
10/1/16	0.83	10	0.88	1	6.10	6.10	0.001	16	60	46	0.88
1/1/17	8.23	10	2.02	1	6.93	6.93	0.001	20	81	25	2.02
2/1/17	66.02	48	4.04	2	6.58	6.51	0.010	14	83	26	4.04
3/1/17	16.25	24	1.07	2	6.62	6.58	0.100	4	96	49	2.14
10/1/17	5.00	44	0.13	2	6.88	6.71	0.010	18	86	37	0.72
11/1/17	25.54	147	2.15	2	7.05	6.93	0.027	8	83	46	4.30
12/1/17	6.00	10	1.57	1	6.81	6.81	0.010	12	93	20	1.57
1/1/18	22.05	28	0.72	5	6.98	6.81	0.016	12	88	24	3.59
4/1/18	4.60	14	0.20	2	7.19	6.98	0.004	11	93	93	0.40
Min	0.83	10	0.13	1	6.10	5.97	0.001	4	60	11	0.17
Max	66.02	147	4.51	5	7.80	7.36	8.300	34	96	93	9.02
Average	15.64	40	1.38	2	6.87	6.73	0.444	15	83	33	2.30
Median	5.75	24	0.96	2	6.83	6.76	0.010	13	84	26	1.30
95th Percentile	54.76	116	4.06	3	7.33	7.31	0.520	33	95	53	6.21

Bremerton East Plant - Additional Effluent Data

Bremerton East Plant - Priority Pollutant Testing Data
(only those parameters with at least one set of results > the detection limit (DL) are listed)

Parameters	Unit	3/15/15	12/7/15	10/13/16	Min.	Avg.	Max.
Chloroform	µg/L	1.9	2.3	7.9	1.9	4.033	7.9
1,2-Dichloroethane	µg/L	0.27	<DL	<DL	0.27	0.27	0.27
Bromodichloromethane	µg/L			1	1	1	1
Toluene	µg/L	1.5	0.75	2.4	0.75	1.55	2.4
Ethylbenzene	µg/L	<DL	<DL	0.36	0.36	0.36	0.36
m-Xylene & p-Xylene	µg/L	<DL	<DL	0.64	0.64	0.64	0.64
o-Xylene	µg/L	<DL	<DL	0.52	0.52	0.52	0.52
2-Chloronaphthalene	µg/L	0.13	<DL	<DL	0.13	0.13	0.13
2-Nitrophenol	µg/L	<DL	0.36	<DL	0.36	0.36	0.36
Acenaphthylene	µg/L	0.1	<DL	<DL	0.1	0.1	0.1
Anthracene	µg/L	0.11	<DL	<DL	0.11	0.11	0.11
Benzo[a]anthracene	µg/L	0.15	<DL	<DL	0.15	0.15	0.15
Benzo[a]pyrene	µg/L	0.12	<DL	<DL	0.12	0.12	0.12
Benzofluroanthene	µg/L	0.21	<DL	<DL	0.21	0.21	0.21
Di-n-butyl phthalate	µg/L	<DL	0.34	<DL	0.34	0.34	0.34
Chrysene	µg/L	0.12	<DL	<DL	0.12	0.12	0.12
Dibenz(a,h)anthracene	µg/L	0.12	<DL	<DL	0.12	0.12	0.12
Diethyl phthalate	µg/L	1.1	0.68	<DL	0.68	0.89	1.1
Fluoranthene	µg/L	0.094	<DL	<DL	0.094	0.094	0.09
Fluorene	µg/L	0.12	<DL	<DL	0.12	0.12	0.12
Octadecane	µg/L	2.4	<DL	<DL	2.4	2.4	2.4
Phenol	µg/L	2.4	1.6	3	1.6	2.333	3
Total Phenol	µg/L	10	<DL	8.3	8.3	9.15	10
Pyrene	µg/L	0.13	<DL	<DL	0.13	0.13	0.13
Bis (2-Ethylhexyl) phthalate	µg/L	<DL	<DL	10	10	10	10
n-Decane	µg/L	<DL	<DL	0.54	0.54	0.54	0.54
Mercury	µg/L	0.0043	0.003	0.0068	0.003	0.005	0.01
Antimony	µg/L	5.8	0.51	<DL	0.51	3.155	5.8
Arsenic	µg/L	2.4	<DL	<DL	2.4	2.4	2.4
Chromium	µg/L	0.85	<DL	0.88	0.85	0.865	0.88
Copper	µg/L	7	<DL	3.5	3.5	5.25	7
Lead	µg/L	1.3	0.22	0.46	0.22	0.66	1.3
Zinc	µg/L	26	16	19	16	20.33	26
Other Data							
Parameters	Unit	7/2/14	1/7/15	7/12/16	Min.	Avg.	Max.
Ammonia	mg/L as N	5.3	3.7	5.1	3.7	4.7	5.3
Nitrate Nitrite	mg/L as N	1.3	1.3	0.63	0.63	1.077	1.3
TKN	mg/L as N	9.1	6.1	6.7	6.1	7.3	9.1
Phosphorus	mg/L as P	0.27	0.34	0.57	0.27	0.393	0.57
ortho-Phosphate	mg/L as P						
O&G	mg/L	<DL	<DL	<DL			
TDS	mg/L	98	150	100	98	116	150

Bremerton West Plant - Reasonable Potential Calculations

Reasonable Potential Calculation

Facility	Bremerton - West Plant
Water Body Type	Marine

Dilution Factors:	Acute	Chronic
Aquatic Life	20.0	127.0
Human Health Carcinogenic		127.0
Human Health Non-Carcinogenic		127.0

Pollutant, CAS No. & NPDES Application Ref. No.		AMMONIA, Criteria as Total NH3	ANTIMONY (INORGANIC) 7440360 1M	BROMOFORM 75252 5V	BUTYLBENZYL PHTHALATE 85687 16B	CADMIUM - 7440439 4M Hardness dependent	CHLORINE (Total Residual) 7782505	CHLOROFORM 67663 11V	COPPER - 7440508 6M Hardness dependent	DICHLOROBROMOMETHANE 75274 12V	DI-n-BUTYL PHTHALATE 84742 26B	DINITROTOLUENE 2,6 606202 28B
Effluent Data	# of Samples (n)	48	3	3	3	3	1764	3	3	3	3	3
	Coeff of Variation (Cv)	0.28	0.6	0.6	0.6	0.6	0.46	0.6	0.6	0.6	0.6	0.6
	Effluent Concentration, ug/L (Max. or 95th Percentile)	39,000	0.46	0.31	0.24	0.33	200	3.4	9.4	0.34	0.15	
	Calculated 50th percentile Effluent Conc. (when n>10)											
Receiving Water Data	90th Percentile Conc., ug/L	0				0	0		0			
	Geo Mean, ug/L		0	0	0			0		0	0	
Water Quality Criteria	Aquatic Life Criteria, ug/L Acute	5,491	-	-	-	42	13	-	4.8	-	-	-
	Aquatic Life Criteria, ug/L Chronic	825	-	-	-	9.3	7.5	-	3.1	-	-	-
	WQ Criteria for Protection of Human Health, ug/L	-	90	12	0.013	-	-	600	-	2.8	8	-
	Metal Criteria Translator, decimal Acute	-	-	-	-	0.994	-	-	0.83	-	-	-
	Metal Criteria Translator, decimal Chronic	-	-	-	-	0.994	-	-	0.83	-	-	-
	Carcinogen?	N	N	Y	N	N	N	Y	N	Y	N	N

Aquatic Life Reasonable Potential

Effluent percentile value		0.950				0.950	0.950		0.950			
s	$s^2=\ln(CV^2+1)$	0.275				0.555	0.438		0.555			
Pn	$Pn=(1-\text{confidence level})^{1/n}$	0.939				0.368	0.998		0.368			
Multiplier		1.00				3.00	1.00		3.00			
Max concentration (ug/L) at edge of...	Acute	1,950				0.049	10.000		1.170			
	Chronic	307				0.008	1.575		0.184			
Reasonable Potential? Limit Required?		NO				NO	NO		NO			

Aquatic Life Limit Calculation

# of Compliance Samples Entered per month												
LTA Coeff Var (Cv) decimal												
Permit Limit Coeff Var (Cv) decimal												
[illegible]	[illegible]											
	[illegible]											
Long Term Average ug/L	Acute											
	Chronic											
[illegible]												
[illegible]												
[illegible]												

Human Health Reasonable Potential

s	$s^2=\ln(CV^2+1)$		0.55451	0.554513	0.55451			0.554513		0.55451	0.55451	
Pn	$Pn=(1-\text{confidence level})^{1/n}$		0.368	0.368	0.368			0.368		0.368	0.368	
Multiplier			1.20486	1.204861	1.20486			1.204861		1.20486	1.20486	
Dilution Factor			127	127	127			127		127	127	
Max Conc. at edge of Chronic Zone, ug/L			0.00436	0.002941	0.00228			3.2E-02		0.00323	0.00142	
Reasonable Potential? Limit Required?			NO	NO	NO			NO		NO	NO	

Reasonable Potential Calculation - Page 2

Facility	Bremerton - West Plant
Water Body Type	Marine

Dilution Factors:	Acute	Chronic
Aquatic Life	20.0	127.0
Human Health Carcinogenic		127.0
Human Health Non-Carcinogenic		127.0

Pollutant, CAS No. & NPDES Application Ref. No.		1,2 DIPHENYLHYDRAZINE 122667 30B	IRON 7439896	LEAD - 7439921 7M Dependent on hardness	MERCURY 7439976 8M	NICKEL - 7440020 9M - Dependent on hardness	PHENOL 108952 10A	PYRENE 129000 45B	TOLUENE 108883 25V	ZINC- 7440666 13M hardness dependent		
Effluent Data	# of Samples (n)	3	3	3	3	3	3	3	3	3	3	3
	Coeff of Variation (Cv)	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
	Effluent Concentration, ug/L (Max or 95th Percentile)	0.15		0.45	0.0042	7.9	0.53	0.12	0.17	20		
	Calculated 50th percentile Effluent Conc. (when n>10)											
Receiving Water Data	90th Percentile Conc., ug/L			0	0	0	0			0		
	Geo Mean, ug/L	0		0	0	0	0	0	0	0		
Water Quality Criteria	Aquatic Life Criteria, ug/L — Acute	-	-	210	1.8	74	-	-	-	90		
	Aquatic Life Criteria, ug/L — Chronic	-	-	8.1	0.025	8.2	-	-	-	81		
	WQ Criteria for Protection of Human Health, ug/L	0.02	-	-	0.15	100	70000	8	130	1000		
	Metal Criteria Translator, decimal — Acute	-	-	0.951	0.85	0.99	-	-	-	0.946		
	Metal Criteria Translator, decimal — Chronic	-	-	0.951	-	0.99	-	-	-	0.946		
	Carcinogen?	Y	N	N	N	N	N	N	N	N		

Aquatic Life Reasonable Potential

Effluent percentile value				0.950	0.950	0.950				0.950		
s	$s^2=\ln(CV^2+1)$			0.555	0.555	0.555				0.555		
Pn	$Pn=(1-\text{confidence level})^{1/n}$			0.368	0.368	0.368				0.368		
Multiplier				3.00	3.00	3.00				3.00		
Max concentration (ug/L) at edge of...	Acute			0.064	0.001	1.173				2.838		
	Chronic			0.010	0.000	0.185				0.447		
Reasonable Potential? Limit Required?				NO	NO	NO				NO		

[illegible]												
[illegible]												
[illegible]												
[illegible]												
[illegible]												
[illegible]												

Human Health Reasonable Potential

s	$s^2=\ln(CV^2+1)$	0.55451			0.55451	0.554513	0.554513	0.554513	0.55451	0.55451		
Pn	$Pn=(1-\text{confidence level})^{1/n}$	0.368			0.368	0.368	0.368	0.368	0.368	0.368		
Multiplier		1.20486			1.20486	1.204861	1.204861	1.204861	1.20486	1.20486		
Dilution Factor		127			127	127	127	127	127	127		
Max Conc. at edge of Chronic Zone, ug/L		0.00142			4E-05	0.074948	5.0E-03	1.1E-03	0.00161	0.18974		
Reasonable Potential? Limit Required?		NO			NO	NO	NO	NO	NO	NO		

Bremerton West Plant - Calculations for Fecal Coliform

Calculation of Fecal Coliform at Chronic Mixing Zone

INPUT	
Chronic Dilution Factor	127.0
Receiving Water Fecal Coliform, #/100 mL	4
Effluent Fecal Coliform - worst case, #/100 mL	400
Surface Water Criteria, #/100 mL	14
OUTPUT	
Fecal Coliform at Mixing Zone Boundary, #/100 mL	7
Difference between mixed and ambient, #/100 mL	3

Conclusion: At design flow, the discharge has no reasonable potential to violate water quality standards for fecal coliform.

Bremerton West Plant - Calculations for Ammonia

Marine Un-ionized Ammonia Criteria Calculation

Calculation of seawater fraction of un-ionized ammonia from Hampson (1977). Un-ionized ammonia criteria for salt water are from EPA 440/5-88-004. Revised 19-Oct-93.

INPUT	
1. Receiving Water Temperature, deg C (90th percentile):	14.8
2. Receiving Water pH, (90th percentile):	8.2
3. Receiving Water Salinity, g/kg (10th percentile):	29.8
4. Pressure, atm (EPA criteria assumes 1 atm):	1.0
5. Unionized ammonia criteria (mg un-ionized NH_3 per liter) from EPA 440/5-88-004:	
Acute:	0.233
Chronic:	0.035
OUTPUT	
Using mixed temp and pH at mixing zone boundaries?	No
1. Molal Ionic Strength (not valid if >0.85):	0.612
2. pKa8 at 25 deg C (Whitfield model "B"):	9.316
3. Percent of Total Ammonia Present as Unionized:	3.5%
4. Total Ammonia Criteria (mg/L as $\underline{NH_3}$):	
Acute:	6.68
Chronic:	1.00
RESULTS	
Total Ammonia Criteria (mg/L as $\underline{N}$)	
Acute:	**5.49**
Chronic:	**0.82**

Bremerton West Plant - Calculations for Temperature

Marine Temperature Reasonable Potential and Limit Calculation

Based on WAC 173-201A-200(1)(c)(i)–(ii) and Water Quality Program Guidance. All Data inputs must meet WQ guidelines. The Water Quality temperature guidance document may be found at: http://www.ecy.wa.gov/biblio/0610100.html

INPUT	
1. Chronic Dilution Factor at Mixing Zone Boundary	127.0
2. Annual max 1DADMax Ambient Temperature (Background 90th percentile)	14.8 °C
3. 1DADMax Effluent Temperature (95th percentile)	22.0 °C
4. Aquatic Life Temperature WQ Criterion	16.0 °C
OUTPUT	
5. Temperature at Chronic Mixing Zone Boundary:	14.86 °C
6. Incremental Temperature Increase or decrease:	0.06 °C
7. Incremental Temperature Increase 12/(T-2) if T≤ crit:	0.94 °C
8. Maximum Allowable Temperature at Mixing Zone Boundary:	15.74 °C
A. If ambient temp is warmer than WQ criterion	
9. Does temp fall within this warmer temp range?	NO
10. Temp increase allowed at mixing zone boundary, if required:	—
B. If ambient temp is cooler than WQ criterion but within 12/(T_{amb}-2) and within 0.3 °C of the criterion	
11. Does temp fall within this incremental temp. range?	NO
12. Temp increase allowed at mixing zone boundary, if required:	—
C. If ambient temp is cooler than (WQ criterion-0.3) but within 12/(T_{amb}-2) of the criterion	
13. Does temp fall within this Incremental temp. range?	NO
14. Temp increase allowed at mixing zone boundary, if required:	—
D. If ambient temp is cooler than (WQ criterion - 12/(T_{amb}-2))	
15. Does temp fall within this Incremental temp. range?	YES
16. Temp increase allowed at mixing zone boundary, if required:	NO LIMIT
RESULTS	
17. Do any of the above cells show a temp increase?	**NO**
18. Temperature Limit if Required?	**NO LIMIT**

Bremerton East Plant - Reasonable Potential Calculations

Reasonable Potential Calculation

Facility	Bremerton - East Plant
Water Body Type	Marine

Dilution Factors:	Acute	Chronic
Aquatic Life	66.0	444.0
Human Health Carcinogenic		444.0
Human Health Non-Carcinogenic		444.0

Pollutant, CAS No. & NPDES Application Ref. No.		AMMONIA, Criteria as Total NH3										
Effluent Data	# of Samples (n)	3										
	Coeff of Variation (Cv)	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
	Effluent Concentration, ug/L (Max. or 95th Percentile)	5,300										
	Calculated 50th percentile Effluent Conc. (when n>10)											
Receiving Water Data	90th Percentile Conc., ug/L	0										
	Geo Mean, ug/L											
Water Quality Criteria	Aquatic Life Criteria, ug/L — Acute	4,909										
	Aquatic Life Criteria, ug/L — Chronic	737										
	WQ Criteria for Protection of Human Health, ug/L	-										
	Metal Criteria Translator, decimal — Acute	-										
	Metal Criteria Translator, decimal — Chronic	-										
	Carcinogen?	N										

Aquatic Life Reasonable Potential

Effluent percentile value			0.950
s	$s^2=\ln(CV^2+1)$		0.555
Pn	$Pn=(1-\text{confidence level})^{1/n}$		0.368
Multiplier			3.00
Max concentration (ug/L) at edge of...		Acute	241
		Chronic	36
Reasonable Potential? Limit Required?			**NO**

Bremerton East Plant - Calculations for Fecal Coliform

Calculation of Fecal Coliform at Chronic Mixing Zone

INPUT	
Chronic Dilution Factor	444.0
Receiving Water Fecal Coliform, #/100 mL	3
Effluent Fecal Coliform - worst case, #/100 mL	400
Surface Water Criteria, #/100 mL	14
OUTPUT	
Fecal Coliform at Mixing Zone Boundary, #/100 mL	**4**
Difference between mixed and ambient, #/100 mL	1

Conclusion: At design flow, the discharge has no reasonable potential to violate water quality standards for fecal coliform.

Bremerton East Plant - Calculations for Ammonia

Marine Un-ionized Ammonia Criteria Calculation

Calculation of seawater fraction of un-ionized ammonia from Hampson (1977). Un-ionized ammonia criteria for salt water are from EPA 440/5-88-004. Revised 19-Oct-93.

INPUT	
1. Receiving Water Temperature, deg C (90th percentile):	13.3
2. Receiving Water pH, (90th percentile):	8.2
3. Receiving Water Salinity, g/kg (10th percentile):	30.2
4. Pressure, atm (EPA criteria assumes 1 atm):	1.0
5. Unionized ammonia criteria (mg un-ionized NH_3 per liter) from EPA 440/5-88-004:	
Acute:	0.233
Chronic:	0.035
OUTPUT	
Using mixed temp and pH at mixing zone boundaries?	No
1. Molal Ionic Strength (not valid if >0.85):	0.620
2. pKa8 at 25 deg C (Whitfield model "B"):	9.317
3. Percent of Total Ammonia Present as Unionized:	3.1%
4. Total Ammonia Criteria (mg/L as $\underline{NH_3}$):	
Acute:	7.45
Chronic:	1.12
RESULTS	
Total Ammonia Criteria (mg/L as $\underline{N}$)	
Acute:	**6.13**
Chronic:	**0.92**

Bremerton East Plant - Calculations for Temperature

Marine Temperature Reasonable Potential and Limit Calculation

Based on WAC 173-201A-200(1)(c)(i)–(ii) and Water Quality Program Guidance. All Data inputs must meet WQ guidelines. The Water Quality temperature guidance document may be found at: http://www.ecy.wa.gov/biblio/0610100.html

INPUT	
1. Chronic Dilution Factor at Mixing Zone Boundary	444.0
2. Annual max 1DADMax Ambient Temperature (Background 90th percentile)	11.2 °C
3. 1DADMax Effluent Temperature (95th percentile)	16.6 °C
4. Aquatic Life Temperature WQ Criterion	16.0 °C
OUTPUT	
5. Temperature at Chronic Mixing Zone Boundary:	11.21 °C
6. Incremental Temperature Increase or decrease:	0.01 °C
7. Incremental Temperature Increase 12/(T-2) if T≤ crit:	1.30 °C
8. Maximum Allowable Temperature at Mixing Zone Boundary:	12.50 °C
A. If ambient temp is warmer than WQ criterion	
9. Does temp fall within this warmer temp range?	NO
10. Temp increase allowed at mixing zone boundary, if required:	—
B. If ambient temp is cooler than WQ criterion but within 12/(T_{amb}-2) and within 0.3 °C of the criterion	
11. Does temp fall within this incremental temp. range?	NO
12. Temp increase allowed at mixing zone boundary, if required:	—
C. If ambient temp is cooler than (WQ criterion-0.3) but within 12/(T_{amb}-2) of the criterion	
13. Does temp fall within this incremental temp. range?	NO
14. Temp increase allowed at mixing zone boundary, if required:	—
D. If ambient temp is cooler than (WQ criterion - 12/(T_{amb}-2))	
15. Does temp fall within this incremental temp. range?	YES
16. Temp increase allowed at mixing zone boundary, if required:	NO LIMIT
RESULTS	
17. Do any of the above cells show a temp increase?	**NO**
18. Temperature Limit if Required?	**NO LIMIT**

Appendix E -- Response to Comments

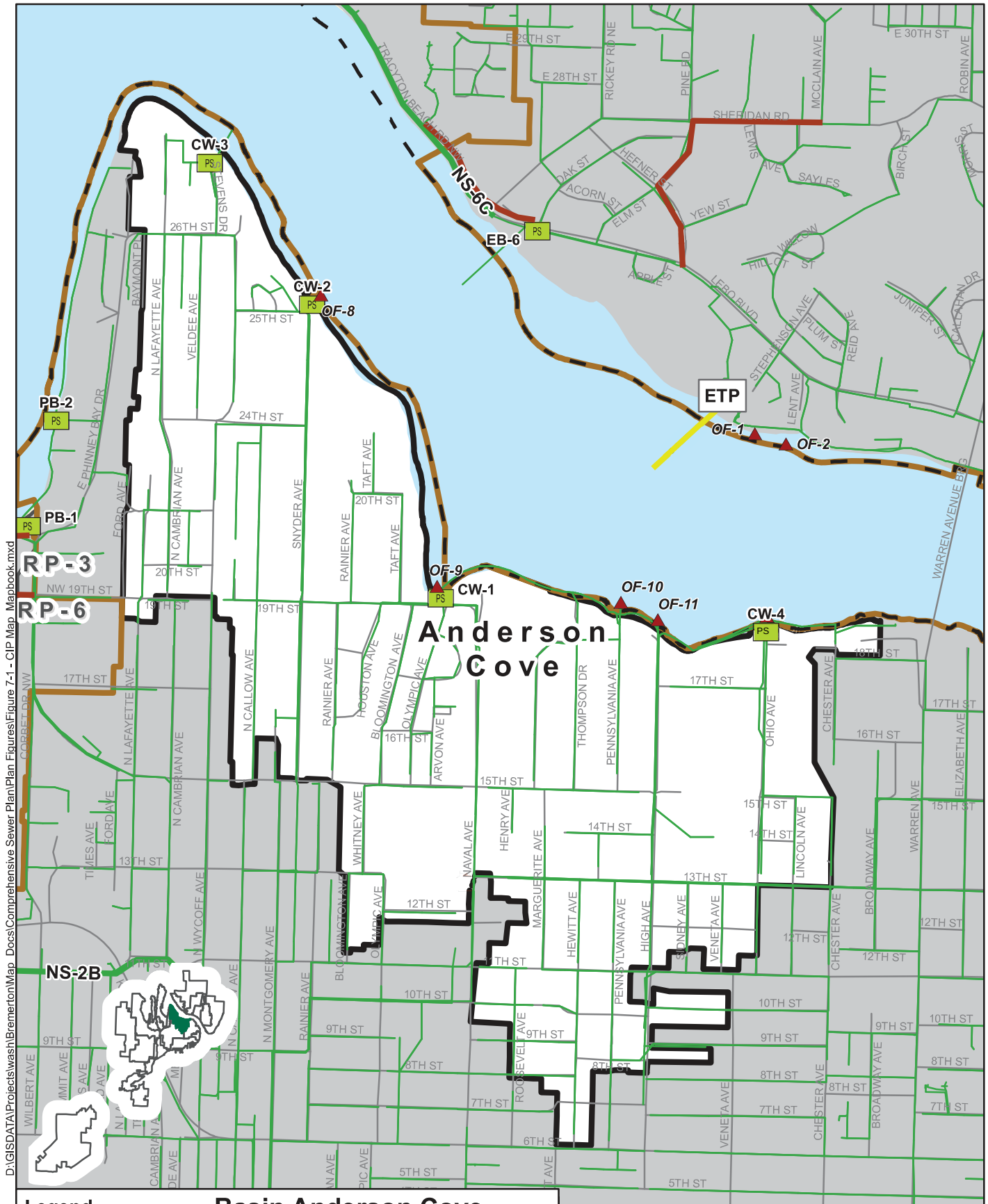
During the public comment period, no comments were received.

Appendix B: Basin Plans

- Basin Plans produced as part of 2014 WWCP Update have been updated in this 2024 WWCP Update to reflect current conditions, including active pump stations and locations and descriptions of the CIP projects developed during this 2024 Update.
- New Service Area (NS) projects are included in the dedicated overview for each basin for completeness. It is restated here that these projects have no financial impact to the analysis presented in Section 8.4, or infrastructure impacts to the sewer collection or WWTP in the various analyses throughout this WWCP.

Anderson Cove Basin			
BASIN DESCRIPTION			
Area (acres)	385		
Land Use	Residential and Business Park		
Location	West Bremerton area, bordered by the Puget Sound Port Washington Narrows, Chester Avenue, 11th Street, and North Lafayette Avenue.		
Description	There are four pump stations (CW-1 through CW-4) along the collection system. CW-1 was upgraded to 3500 gpm in 2007 and pumps to the Crosstown Pipeline via the Naval Avenue Force Main. CW-2 pumps to either CW-1 or into the Callow Avenue Basin. CW-4 was upgraded in 2020 and flow can be directed to either the Crosstown Pipeline or to the beach sewer at the end of High Avenue via a force main along 17th Street.		
SEWER FLOWS			
Existing GPD	Estimated flows from major basin available in Tables 5-10 and 5-11.		
Future GPD			
Percent Developed[1] (%)	Refer to Tables 3-3 and 3-4 for this information.		
Percent Sewered[2] (%)			
EXISTING SYSTEM			
Combined/Separated	Combined		
Receiving Facilities	Naval Avenue Force Main to Crosstown Pipeline		
Existing Pump Stations	CW-1, CW-2, CW-3, and CW-4		
Combined Sewer Outfall	OF-8, OF-9, OF-10A, OF-11		
PUMP STATIONS			
Pump Station	Refer to Table 3-5 or Appendix C.		
CW-1 [(3)]			
CW-2			
CW-3			
CW-4			
CIP			
CIP ID	**Timeline**	**Cost ($1,000)**	
CIP Year 2024-2034			
CIP Year 2035+			
NOTES			
1) Total area of developed parcels divided by the total of developed and undeveloped parcel area excluding parcels designated as right of way or water bodies.			
2) Total area of developed parcels with available sewer service divided by the total developed parcel area.			
3) Flow in exceeding the pump station capacity discharges through OF-9, 10, 11			

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Legend

Basin Anderson Cove

- Odor Control Upgrade
- MBR
- New Pump Station
- Pump Station Upgrade
- Reclaimed Pump Station
- Beach Sewer
- Force Main
- Gravity Sewer
- Low Pressure Sewer
- Outfall
- Reclaimed Main
- Force Main Less Than 24"
- CSO Outfall
- Lift Station
- Sewer Mains
- Streets
- Highway
- New Service Area
- City of Bremerton
- Bremerton UGA

1 inch = 990 feet

0 310 620 930 Feet

BASIN PLAN

City of Bremerton

2025 Update by:

Kennedy Jenks

HDR

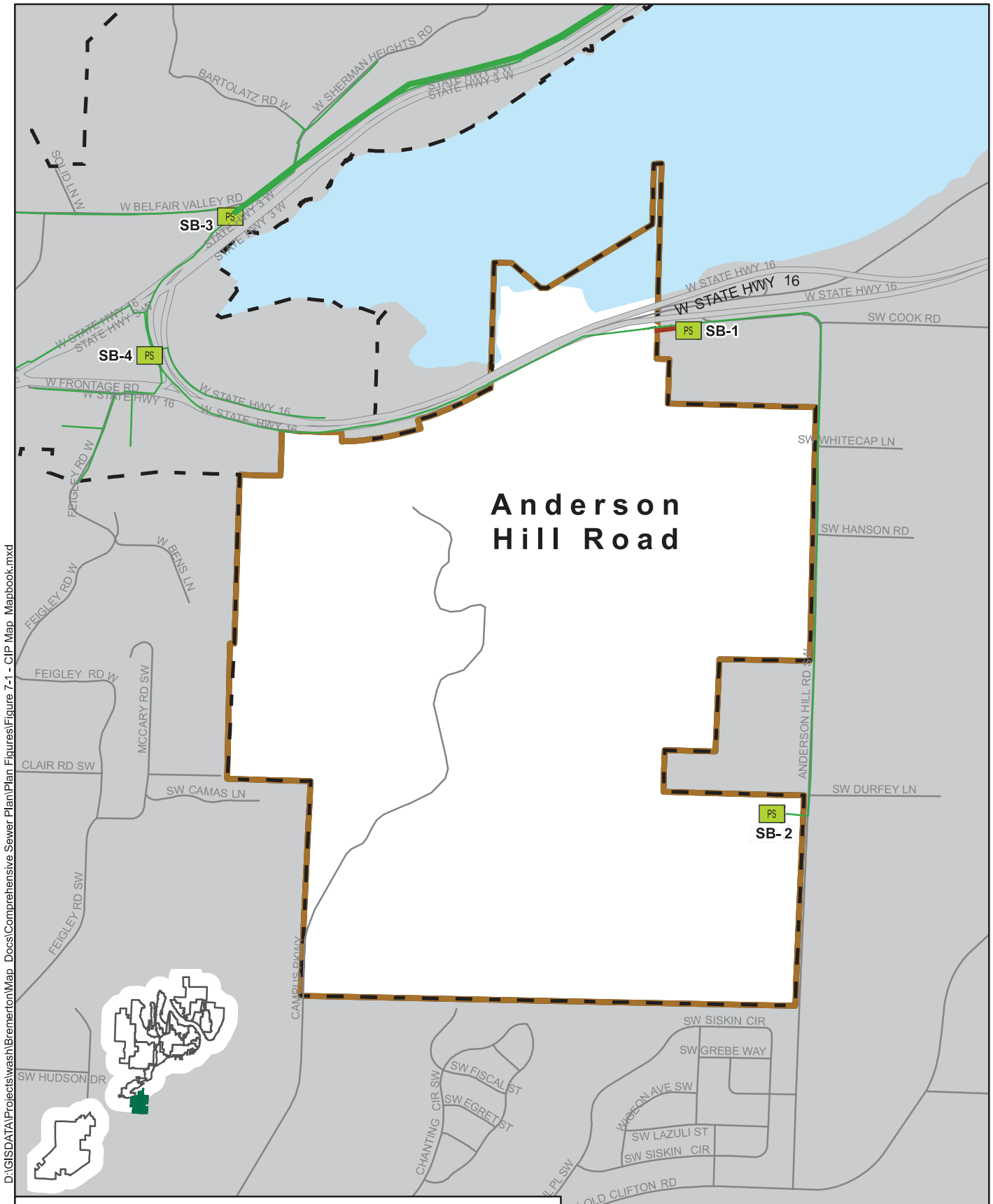
CITY OF BREMERTON

{Revised and updated for 2024 Wastewater Comprehensive Plan Update}

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Anderson Hill Road Basin		
BASIN DESCRIPTION		
Area (acres)	470	
Land Use	Undeveloped area with low-density residential.	
Location	South Bremerton area, bordered by the southern tip of the Puget Sound Sinclair Inlet, Anderson Hill Road, SW. Grebe Way, and McCary Road.	
Description	The Anderson Hill Road Basin is served by a gravity system that discharges to pump station SB-1. There is currently only on development, which is served by SB-2, so the flows in the basin are extremely low. Flows are pumped by SB-1 into Southwest Bremerton Sewer Force Main to WWTP.	
SEWER FLOWS		
Existing GPD	Estimated flows from major basin available in Tables 5-10 and 5-11.	
Future GPD		
Percent Developed[1] (%)	Refer to Tables 3-3 and 3-4 for this information.	
Percent Sewered[2] (%)		
EXISTING SYSTEM		
Combined/Separated	Separate	
Receiving Facilities	Southwest Bremerton Sewer Force Main	
Existing Pump Stations	SB-1, SB-2	
Combined Sewer Outfall		
PUMP STATIONS		
Pump Station	Refer to Table 3-5 or Appendix C.	
SB-1		
SB-2		
CIP		
CIP ID	**Timeline**	**Cost ($1,000)**
CIP Year 2024-2034		
CIP Year 2035+		
NOTES		
1) Total area of developed parcels divided by the total of developed and undeveloped parcel area excluding parcels designated as right of way or water bodies.		
2) Total area of developed parcels with available sewer service divided by the total developed parcel area.		

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Legend

Basin Anderson Hill Road

- Odor Control Upgrade
- MBR — MBR
- PS — New Pump Station
- PS — Pump Station Upgrade
- PS — Reclaimed Pump Station
- Beach Sewer
- Force Main
- Gravity Sewer
- Low Pressure Sewer
- Outfall
- Reclaimed Main
- Force Main Less Than 24"
- CSO Outfall
- PS — Lift Station
- Sewer Mains
- Streets
- Highway
- New Service Area
- City of Bremerton
- Bremerton UGA

1 inch = 1,060 feet

0 330 660 990 Feet

BASIN PLAN

City of Bremerton

2025 Update by:

Kennedy Jenks

HDR

CITY OF BREMERTON

{Revised and updated for 2024 Wastewater Comprehensive Plan Update}

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Callow Avenue Basin

BASIN DESCRIPTION	
Area (acres)	644
Land Use	Residential and Commercial
Location	West Bremerton area, bordered by Kitsap Way, S. Constitution Avenue, High Avenue, and the Puget Sound Naval Shipyard.
Description	The Callow Avenue Basin, the City's largest basin, receives flow from the Phinney Bay Basin continuously, and also from the Anderson Cove Basin (pump station CW-2) during wet weather. There are six pump stations (WB-1 through WB-6) along the collection system. WB-1 and 2 are part of the KCSD No. 1 system. WB-5 is not addressed in this WWCP. In 2003, Bremerton constructed WB-6, and at the same time upgraded WB-3. WB-6 is a true CSO pump station in that it operates only during surcharge in the collection system during peak flows. The WB-3 upgrade was required to address the increased discharge head due to the added surcharge in the CTP from WB-6, and to maximize flow out of the basin. In the Callow Avenue Basin, combined sewer flows and those from the PSNS flow to pump station WB-3, which discharges to the Crosstown Pipeline.
SEWER FLOWS	
Existing GPD	Estimated flows from major basin available in Tables 5-10 and 5-11.
Future GPD	
Percent Developed[1] (%)	Refer to Tables 3-3 and 3-4 for this information.
Percent Sewered[2] (%)	
EXISTING SYSTEM	
Combined/Separated	Combined
Receiving Facilities	Crosstown Pipeline
Existing Pump Stations	WB-3, WB-4, and WB-6
Combined Sewer Outfall	OF-17

PUMP STATIONS	
Pump Station[3]	Refer to Table 3-5 or Appendix C.
WB-3	
WB-6	
WB-4	

CIP		
CIP ID	**Timeline**	**Cost ($1,000)**
CIP Year 2024-2034		
C3	Crosstown Pipeline Improvements - Phase I	
	2031-2032	$13,000
	Proposed improvements on the Crosstown Pipeline will consist of installing a new pipeline to the WWTP beginning near the intersection of 9th Street and Montgomery Avenue. This new pipeline will increase the overall capacity of the Crosstown Pipeline and allow for additional redundancy. For additional information, see Appendix G for the Crosstown Pipelines Alternatives Analysis.	
C4	Crosstown Pipeline Improvements - Phase II	
	2032-2033	$7,000
	After construction of Phase I is complete, the new pipeline will be placed online while the existing pipeline will be taken offline to undergo rehabilitation. For additional information, see Appendix G for the Crosstown Pipelines Alternatives Analysis.	

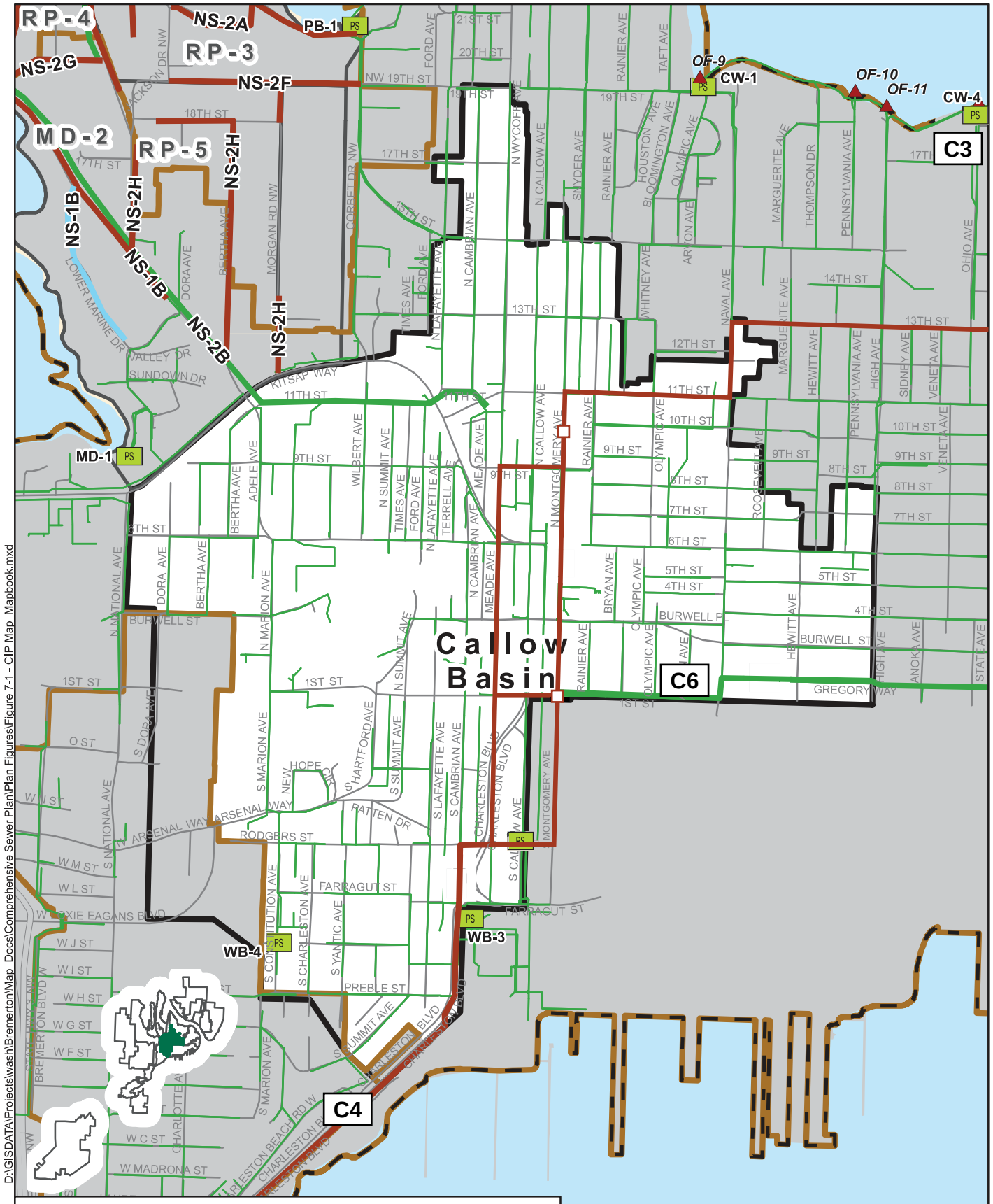
C6	Central Bremerton Force Main	
	2025	$7,200
	Sections of the Central Bremerton Force Main (CBFM) were determined to be failing in December 2023. This critical force main conveys sewage from downtown Bremerton and the east half of the Navy shipyard. This project will replace approximately 3,100 LF of the CBFM from Montgomery Avenue to the surge chamber at Gregory Way and High Avenue. During the final draft of this document, the new section of force main was completed and placed back into service in November 2025.	
CIP Year 2035+		

NOTES

1) Total area of developed parcels divided by the total of developed and undeveloped parcel area excluding parcels designated as right of way or water bodies.

2) Total area of developed parcels with available sewer service divided by the total developed parcel area.

3) Kitsap County Sewer District No. 1 owns and operates pump stations WB-1 and WB-2, no flow or demographic data was generated for these pump stations.



Legend

Basin Callow Basin

- Odor Control Upgrade
- MBR
- New Pump Station
- Pump Station Upgrade
- Reclaimed Pump Station
- Beach Sewer
- Force Main
- Gravity Sewer
- Low Pressure Sewer
- Outfall
- Reclaimed Main
- Force Main Less Than 24"
- CSO Outfall
- Lift Station
- Sewer Mains
- Streets
- Highway
- New Service Area
- City of Bremerton
- Bremerton UGA

1 inch = 1,180 feet

0 370 740 1,110 Feet

BASIN PLAN

City of Bremerton

2025 Update by:

Kennedy Jenks

HDR

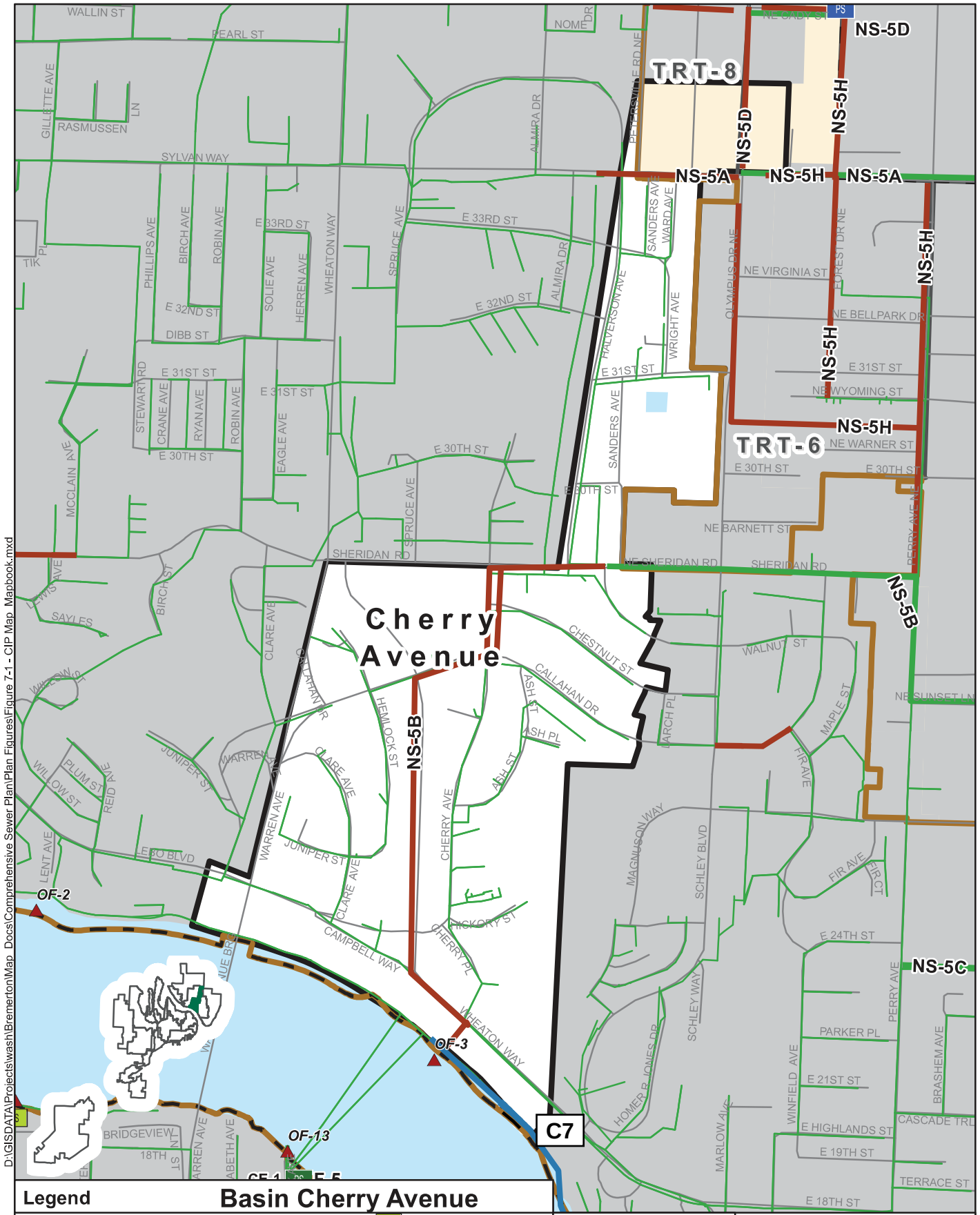
CITY OF BREMERTON

{Revised and updated for 2024 Wastewater Comprehensive Plan Update}

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Cherry Avenue Basin		
BASIN DESCRIPTION		
Area (acres)	214	
Land Use	Residential with some Commercial	
Location	East Bremerton area, bordered by the Puget Sound Port Washington Narrows, Warren Avenue, Sheridan Road, and the East Park Nature area.	
Description	Sanitary sewer flows from the Cherry Avenue Basin are conveyed via the East Bremerton Beach Main to the 16" and 24" siphon mains, which lay along the bottom of the Port Washington Narrows and discharge to CE-1. From CE-1, flow is pumped into the Crosstown Pipeline.	
SEWER FLOWS		
Existing GPD	Estimated flows from major basin available in Tables 5-10 and 5-11.	
Future GPD		
Percent Developed[1] (%)	Refer to Tables 3-3 and 3-4 for this information.	
Percent Sewered[2] (%)		
EXISTING SYSTEM		
Combined/Separated	Combined	
Receiving Facilities	East Bremerton Beach Main to the Crosstown Pipeline	
Existing Pump Stations		
Combined Sewer Outfall	OF-3	
PUMP STATIONS		
Pump Station	Refer to Table 3-5 or Appendix C.	
CIP		
CIP ID	**Timeline**	**Cost ($1,000)**
CIP Year 2024-2034		
CIP Year 2035+		
NOTES		
1) Total area of developed parcels divided by the total of developed and undeveloped parcel area excluding parcels designated as right of way or water bodies.		
2) Total area of developed parcels with available sewer service divided by the total developed parcel area.		

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East Park Basin

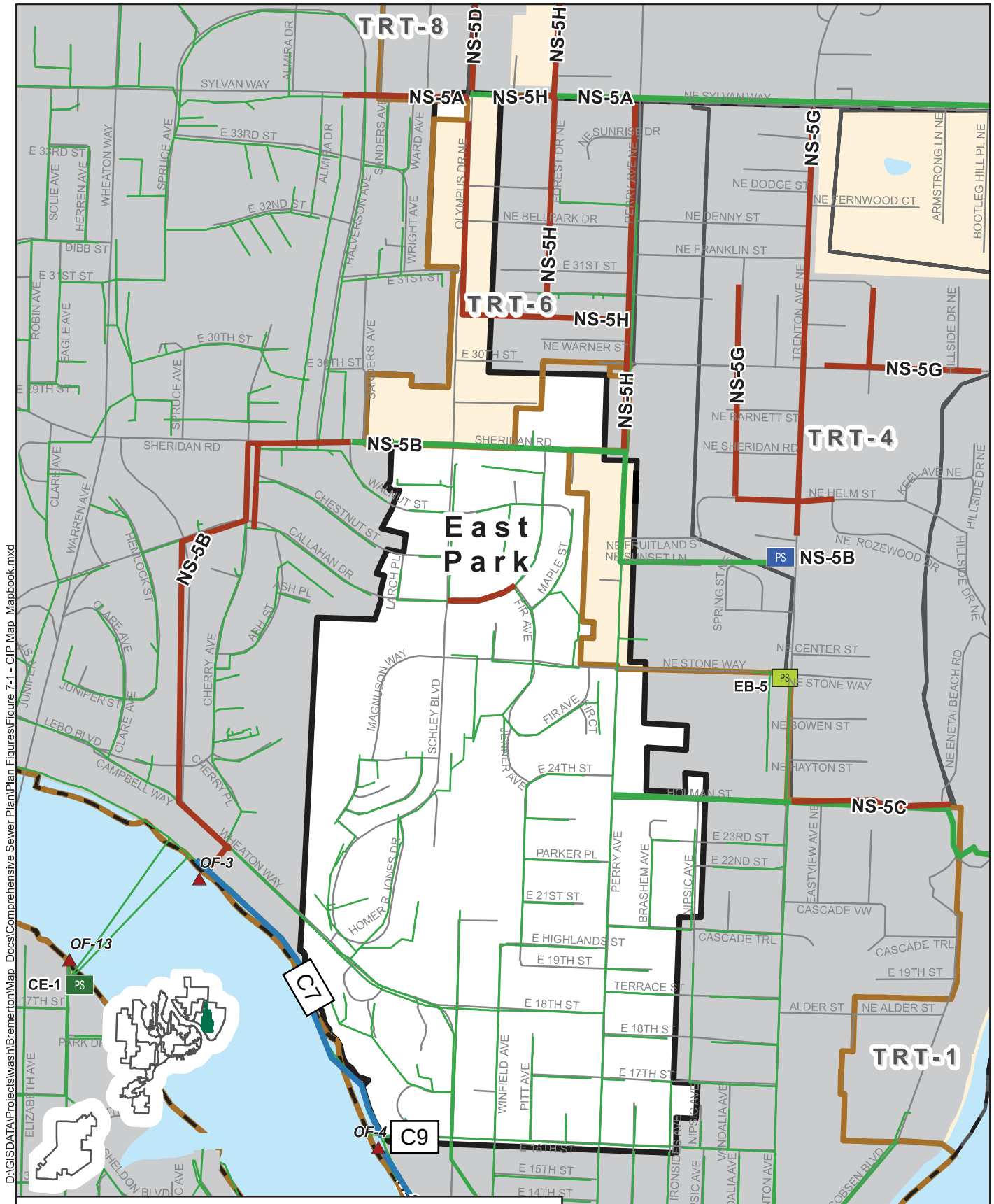
BASIN DESCRIPTION	
Area (acres)	346
Land Use	Residential
Location	East Bremerton area, bordered by E 16th Street, the Puget Sound Port Washington Narrows, Sylvan Way, and Perry Ave.
Description	Sanitary sewer flows from the East Park Basin are conveyed via gravity sewer mains to the East Bremerton Beach Main. The collection sewers within the East Park service area are known to have high rates of infiltration.
SEWER FLOWS	
Existing GPD	Estimated flows from major basin available in Tables 5-10 and 5-11.
Future GPD	
Percent Developed[1] (%)	Refer to Tables 3-3 and 3-4 for this information.
Percent Sewered[2] (%)	
EXISTING SYSTEM	
Combined/Separated	Combined
Receiving Facilities	To Cherry Avenue Basin, where it flows into the East Bremerton Beach Main
Existing Pump Stations	
Combined Sewer Outfall	Formerly OF-4, flow redirected to Cherry Avenue Basin and Trenton Avenue Basin

PUMP STATIONS	
Pump Station	Refer to Table 3-5 or Appendix C.

CIP		
CIP ID	**Timeline**	**Cost ($1,000)**
CIP Year 2024-2034		
C7	East Bremerton Beach Main Replacment	
	2029 - 2030	$1,700
	This project would replace a segment of the East Bremerton Beach Main. Approximately 2,700 linear feet of 16-inch ductile iron piping would be replaced with 18-inch HDPE pipe from OF-4 to the Port Washington Narrows Siphons.	
C9	Decommission Beach Sewer in Manette (OF-4 to EB-2)	
	2025-2026	$5,212
	The project will construct a municipal pump station at E. 16th Street and an upland low pressure sewer system for the properties that discharge to this sewer in order to decommission this beach sewer.	
CIP Year 2035+		

NOTES
1) Total area of developed parcels divided by the total of developed and undeveloped parcel area excluding parcels designated as right of way or water bodies.
2) Total area of developed parcels with available sewer service divided by the total developed parcel area.

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Legend

Basin East Park

- Odor Control Upgrade
- MBR
- New Pump Station
- Pump Station Upgrade
- Reclaimed Pump Station
- Beach Sewer
- Force Main
- Gravity Sewer
- Low Pressure Sewer
- Outfall
- Reclaimed Main
- Force Main Less Than 24"
- CSO Outfall
- Lift Station
- Sewer Mains
- Streets
- Highway
- New Service Area
- City of Bremerton
- Bremerton UGA

1 inch = 1,020 feet

0 320 640 960 Feet

BASIN PLAN

City of Bremerton

2025 Update by:

Kennedy Jenks

HDR

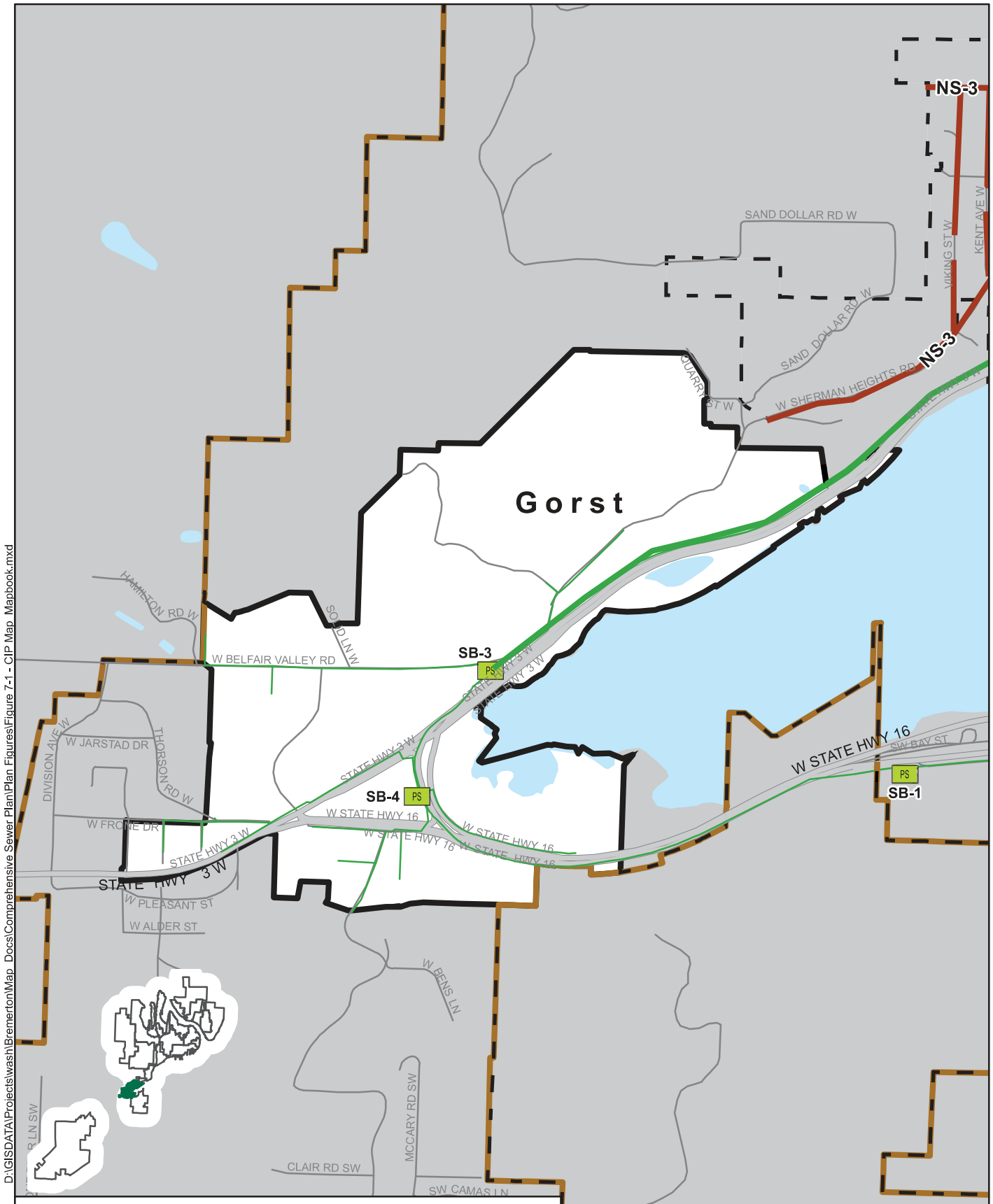
CITY OF BREMERTON

{Revised and updated for 2024 Wastewater Comprehensive Plan Update}

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Gorst Basin		
BASIN DESCRIPTION		
Area (acres)	333	
Land Use	Undeveloped area with low-density residential.	
Location	South Bremerton area, bordered by the southern tip of the Puget Sound Sinclair Inlet, W. Frontage Road, and Hamilton Road.	
Description	The Gorst Basin is within Bremerton's UGA and is served by a combination of gravity mains and low pressure sewer mains. There are two pump stations, SB-3 and SB-4, which discharge into the Southwest Bremerton Sewer Force Main. Flows are conveyed directly to the WWTP.	
SEWER FLOWS		
Existing GPD	Estimated flows from major basin available in Tables 5-10 and 5-11.	
Future GPD		
Percent Developed[1] (%)	Refer to Tables 3-3 and 3-4 for this information.	
Percent Sewered[2] (%)		
EXISTING SYSTEM		
Combined/Separated	Separate	
Receiving Facilities	Southwest Bremerton Sewer Force Main	
Existing Pump Stations	SB-3, and SB-4	
Combined Sewer Outfall		
PUMP STATIONS		
Pump Station	Refer to Table 3-5 or Appendix C.	
SB-3		
SB-4		
CIP		
CIP ID	**Timeline**	**Cost ($1,000)**
CIP Year 2024-2034		
CIP Year 2035+		
NOTES		
1) Total area of developed parcels divided by the total of developed and undeveloped parcel area excluding parcels designated as right of way or water bodies.		
2) Total area of developed parcels with available sewer service divided by the total developed parcel area.		

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Legend

- Odor Control Upgrade
- MBR — MBR
- PS — New Pump Station
- PS — Pump Station Upgrade
- PS — Reclaimed Pump Station
- Beach Sewer
- Force Main
- Gravity Sewer
- Low Pressure Sewer
- Outfall
- Reclaimed Main
- Force Main Less Than 24"
- CSO Outfall
- PS — Lift Station
- Sewer Mains
- Streets
- Highway
- New Service Area
- City of Bremerton
- Bremerton UGA

Basin Gorst

1 inch = 1,170 feet

0 370 740 1,110 Feet

BASIN PLAN

City of Bremerton

2025 Update by:

Kennedy Jenks

HDR

CITY OF BREMERTON

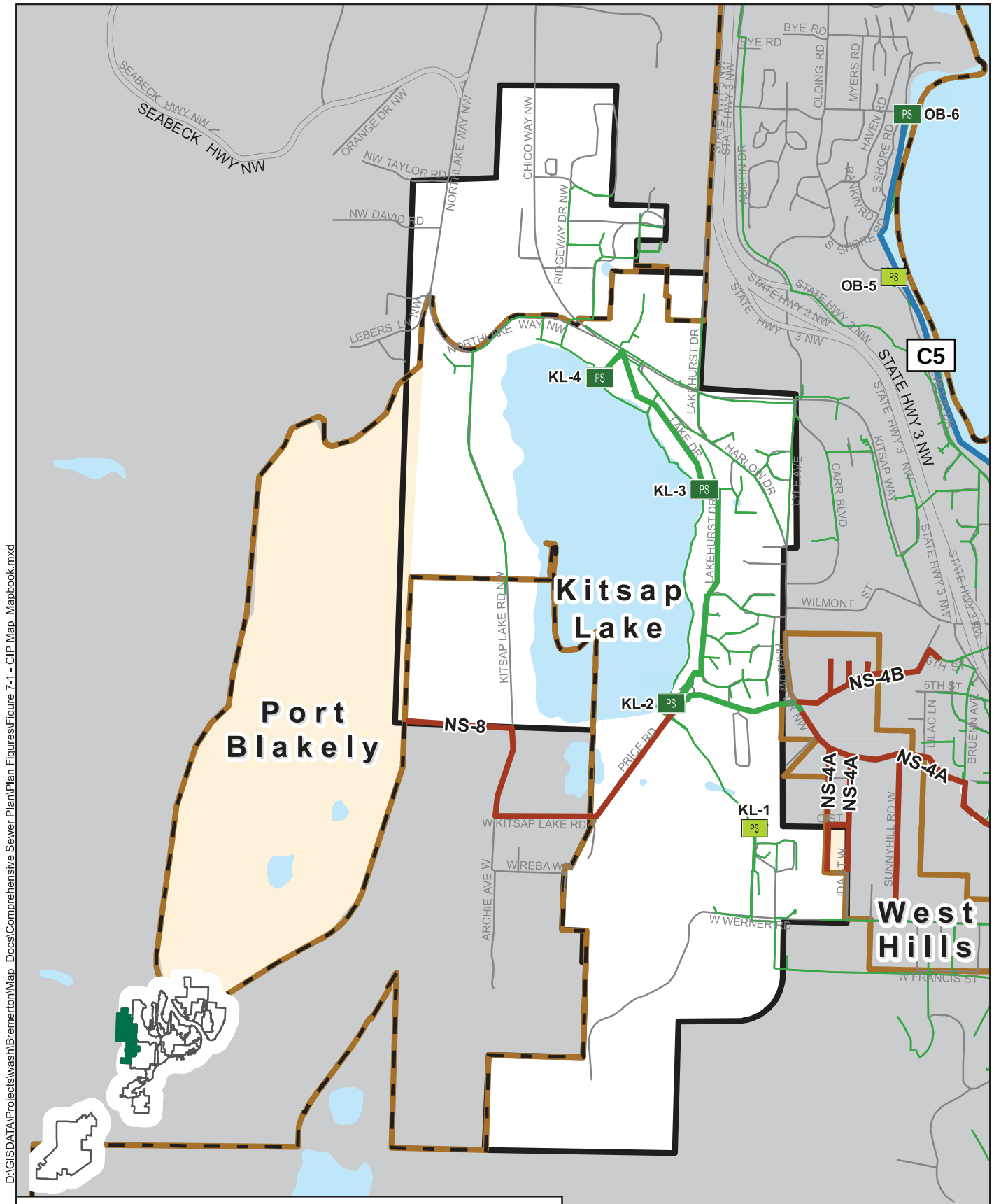
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Kitsap Lake Basin		
BASIN DESCRIPTION		
Area (acres)	996	
Land Use	Rural, Residential, Commercial, and Industrial Park	
Location	West Bremerton area surrounding Lake Kitsap, bordered by Northlake Way, Lyle Avenue, and the Kitsap Golf and Country Club.	
Description	Sanitary sewer flows in the Kitsap Lake Basins are conveyed through a series of pump stations that ultimately flow into the Sinclair Park Basin, and then to the WWTP by gravity. Kitsap Lake Basin currently has four pump stations (KL-1, KL-2, KL-3, and KL-4) along the collection system. Significant housing developments constructed within the past 10 year at the south end of the basin have increased basin flow. This flow, which combines with discharge from KL-1 and flows to Sinclair Park Basin, led the City to construct a bypass along 3rd Avenue to reduce flow through the undersized piping along Jones and Cottman immediately west of the WWTP. Additional large housing developments in this basin are anticipated in the future which will continue to increase the pressure on the sewers in Kitsap Lake and Sinclair Park Basins.	
SEWER FLOWS		
Existing GPD	Estimated flows from major basin available in Tables 5-10 and 5-11.	
Future GPD		
Percent Developed[1] (%)	Refer to Tables 3-3 and 3-4 for this information.	
Percent Sewered[2] (%)		
EXISTING SYSTEM		
Combined/Separated	Separate	
Receiving Facilities	Collection system piping to Sinclair Park Basin to WWTP	
Existing Pump Stations	KL-1, KL-2, KL-3, and KL-4	
Combined Sewer Outfall		
PUMP STATIONS		
Pump Station [(3)]	Refer to Table 3-5 or Appendix C.	
KL-1		
KL-2		
KL-3		
KL-4		
CIP		
CIP ID	**Timeline**	**Cost ($1,000)**
CIP Year 2024-2034		
C5	Oyster Bay Sewer Basin Upgrades	
	2025-2028	$5,500
	This upgrade includes design and construction of low-pressure sewer systems for properties along Shorewood Drive and part of Madrona Point Drive that front Ostrich Bay which will allow the City to decommission beach sewers or convert them to dedicated force mains with no lateral connections. The properties are between pump stations OB-5 and OB-2 and OB-3 and OB-2. Upgrading OB-2 is also part of this project and will allow the City to pump into the upland 4,000 foot, 12-inch HDPE force main installed in 2022 and abandon the existing 12-inch force main located along the bottom of Oyster Bay. The City anticipates loan funding for this work. Additionally, the City is considering extending the beach sewer decommissioning further north to OB-6 (on Navy property), which would require loan or grant funding.	

CIP Year 2035+		

NOTES
1) Total area of developed parcels divided by the total of developed and undeveloped parcel area excluding parcels designated as right of way or water bodies.
2) Total area of developed parcels with available sewer service divided by the total developed parcel area.
3) Each pump station contains two pumps that are capable of pumping during peak flow conditions.



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Legend

Basin Kitsap Lake

- Odor Control Upgrade
- MBR — MBR
- PS — New Pump Station
- PS — Pump Station Upgrade
- PS — Reclaimed Pump Station
- Beach Sewer
- Force Main
- Gravity Sewer
- Low Pressure Sewer
- Outfall
- Reclaimed Main
- Force Main Less Than 24"
- CSO Outfall
- PS — Lift Station
- Sewer Mains
- Streets
- Highway
- New Service Area
- City of Bremerton
- Bremerton UGA

1 inch = 1,870 feet

0 590 1,180 1,770 Feet

BASIN PLAN

City of Bremerton

2025 Update by:

Kennedy Jenks

HDR

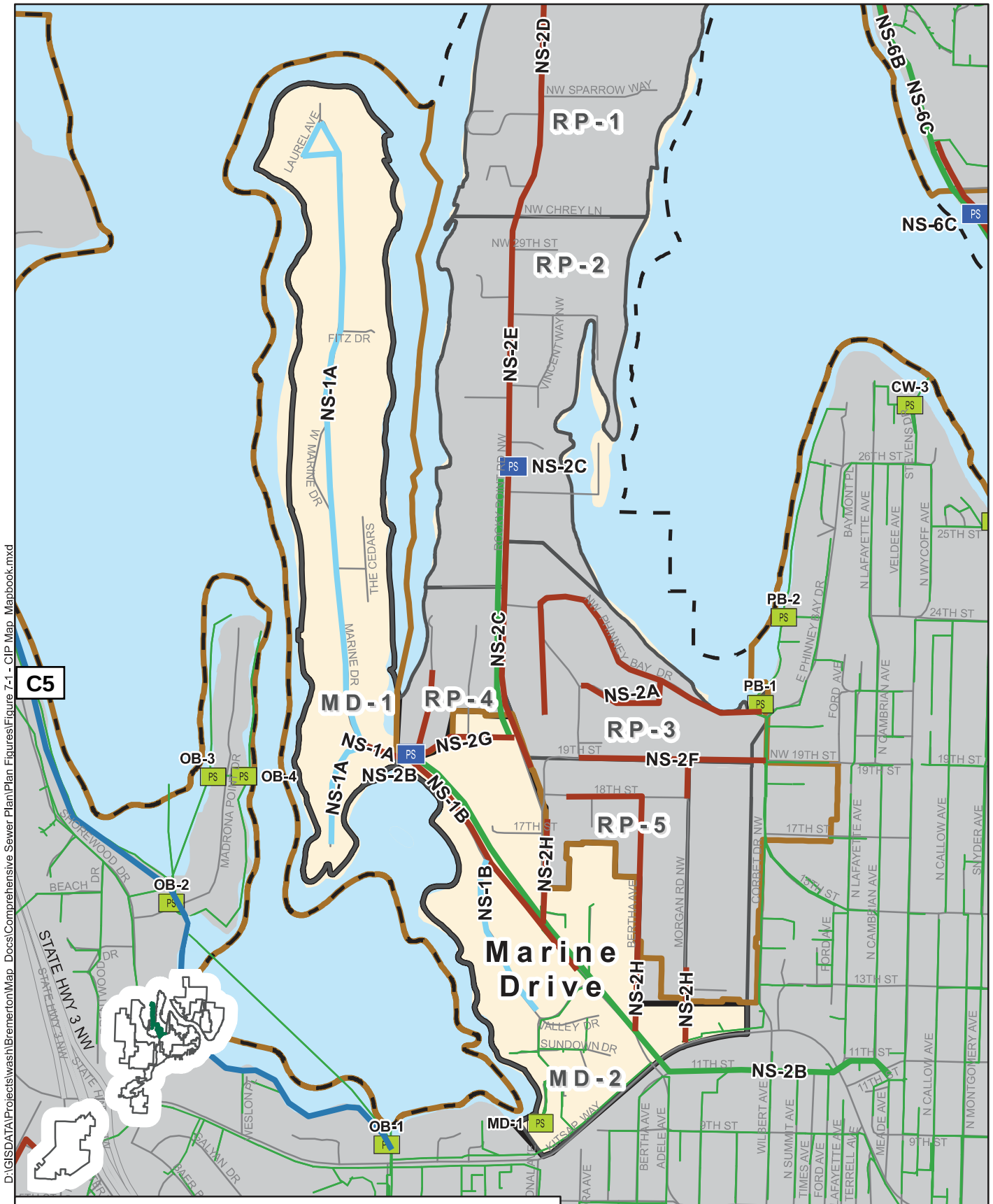
CITY OF BREMERTON

{Revised and updated for 2024 Wastewater Comprehensive Plan Update}

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Marine Drive Basin		
BASIN DESCRIPTION		
Area (acres)	244	
Land Use	Residential with some Commercial	
Location	West Bremerton peninsula, bordered by the Puget Sound Ostrich, Oyster, and Mud Bay, as well as Kitsap Way and Bertha Avenue.	
Description	The Marine Drive Basin currently has one pump station, MD-1. With the exception of the southern portion of the basin, the Marine Drive Basin is predominantly unsewered. The southern portion of the basin is served by gravity mains which discharge to pump station MD-1, which conveys flows to pump station OB-1 in the Oyster Bay Basin. A plan for extending sewer service was developed and described in *Sewer Planning – Marine Drive Area* (Sep, 2008). The improvements described in the plan are sub-divided into two projects described below.	
SEWER FLOWS		
Existing GPD	Estimated flows from major basin available in Tables 5-10 and 5-11.	
Future GPD		
Percent Developed[1] (%)	Refer to Tables 3-3 and 3-4 for this information.	
Percent Sewered[2] (%)		
EXISTING SYSTEM		
Combined/Separated	Separate	
Receiving Facilities	OB-1 Pump Station	
Existing Pump Stations	MD-1	
Combined Sewer Outfall		
PUMP STATIONS		
Pump Station	Refer to Table 3-5 or Appendix C.	
MD-1		
CIP		
CIP ID	**Timeline**	**Cost ($1,000)**
CIP Year 2024-2034		
CIP Year 2035+		
NS-1A	Sewer Collection - Sub Basin MD-1	
	2040+	$2,550
	Install approximately 6,450 LF of 6-inch low pressure main along Marine Drive and approximately 1,200 LF of 3-inch low-pressure main along South Marine Drive. Both mains would connect to approximately 450 LF of 8-inch gravity sewer to convey flow to the proposed pump station MD-2 (project NS-2C "Pump Station MD-3").	
NS-1B	Sewer Collection - Sub Basin MD-2	
	2040+	$1,320
	Install approximately 2,420 LF of 8-inch gravity sewer along Marine Drive from Dora Avenue to the proposed pump station MD-2 (project NS-2C "Pump Station MD-3"). Install approximately 1,380 of 3-inch low-pressure main along Lower Marine Drive to the 8-inch gravity sewer.	
NOTES		
1) Total area of developed parcels divided by the total of developed and undeveloped parcel area excluding parcels designated as right of way or water bodies.		
2) Total area of developed parcels with available sewer service divided by the total developed parcel area.		

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Legend

Basin Marine Drive

- Odor Control Upgrade
- MBR
- New Pump Station
- Pump Station Upgrade
- Reclaimed Pump Station
- Beach Sewer
- Force Main
- Gravity Sewer
- Low Pressure Sewer
- Outfall
- Reclaimed Main
- Force Main Less Than 24"
- CSO Outfall
- Lift Station
- Sewer Mains
- Streets
- Highway
- New Service Area
- City of Bremerton
- Bremerton UGA

1 inch = 1,210 feet

0 380 760 1,140 Feet

BASIN PLAN

City of Bremerton

2025 Update by:

Kennedy Jenks

HDR

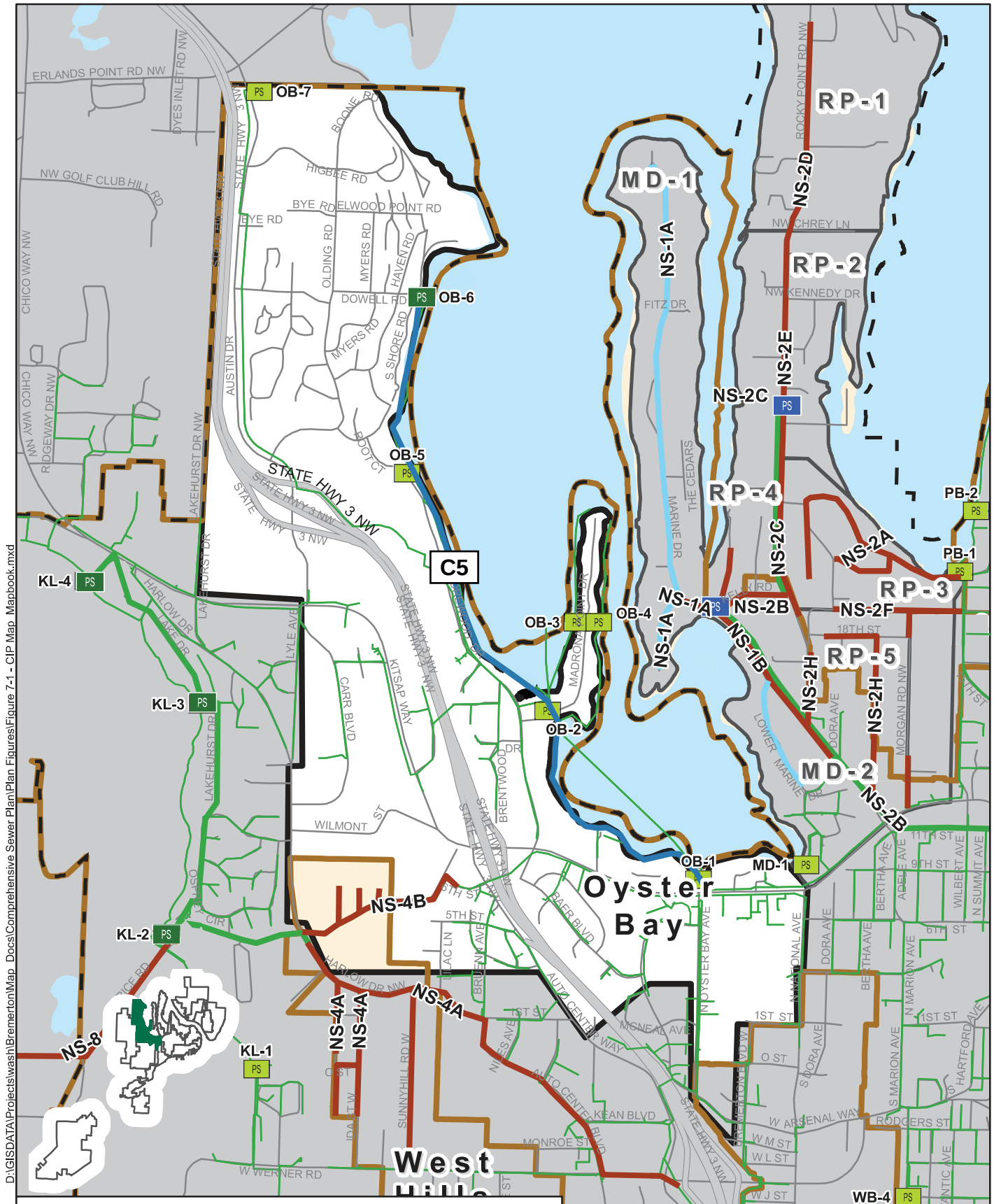
CITY OF BREMERTON

{Revised and updated for 2024 Wastewater Comprehensive Plan Update}

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Oyster Bay Basin			
BASIN DESCRIPTION			
Area (acres)	958		
Land Use	Residential, Commercial, General Industrial, Industrial Park		
Location	West Bremerton area, bordered by Harlow Drive, SR 3, the Puget Sound Dyes Inlet, and National Avenue.		
Description	The Oyster Bay Basin has seven pump stations (OB-1 through OB-7) along the collection system. OB-6 receives flow from the Naval facility (formerly known as Jackson Park). In 2022, the City constructed an upland sewer system and installed a 12-inch force main along Shorewood Drive and Kitsap Way. These improvements allow for decommissioning of the Oyster Bay gravity-pressure beach sewer and cross-bay force main between OB-2 and OB-1. Future projects will continue to focus on decommissioning beach sewers north of OB-2 along Ostrich Bay.		
SEWER FLOWS			
Existing GPD	Estimated flows from major basin available in Tables 5-10 and 5-11.		
Future GPD			
Percent Developed[1] (%)	Refer to Tables 3-3 and 3-4 for this information.		
Percent Sewered[2] (%)			
EXISTING SYSTEM			
Combined/Separated	Separate		
Receiving Facilities	Gravity Sewer at Bremerton Blvd. and Arsenal Way / Oyster Bay Force Main		
Existing Pump Stations	OB-1, OB-2, OB-3, OB-4, OB-5, OB-6, and OB-7		
Combined Sewer Outfall			
PUMP STATIONS			
Pump Station	Refer to Table 3-5 or Appendix C.		
OB-1			
OB-2			
OB-3			
OB-4			
OB-5			
OB-6			
OB-7			
CIP			
CIP ID	**Timeline**	**Cost ($1,000)**	
CIP Year 2024-2034			
C5	Oyster Bay Sewer Basin Upgrades		
	2025-2028	$5,500	
	This upgrade includes design and construction of low-pressure sewer systems for properties along Shorewood Drive and part of Madrona Point Drive that front Ostrich Bay which will allow the City to decommission beach sewers or convert them to dedicated force mains with no lateral connections. The properties are between pump stations OB-5 and OB-2 and OB-3 and OB-2. Upgrading OB-2 is also part of this project and will allow the City to pump into the upland 4,000 foot, 12-inch HDPE force main installed in 2022 and abandon the existing 12-inch force main located along the bottom of Oyster Bay. The City anticipates loan funding for this work. Additionally, the City is considering extending the beach sewer decommissioning further north to OB-6 (on Navy property), which would require loan or grant funding.		

CIP Year 2035+		
NOTES		
1) Total area of developed parcels divided by the total of developed and undeveloped parcel area excluding parcels designated as right-of-way or water bodies.		
2) Total area of developed parcels with available sewer service divided by the total developed parcel area.		



Legend

Basin Oyster Bay

- Odor Control Upgrade
- MBR — MBR
- New Pump Station
- Pump Station Upgrade
- Beach Sewer
- Force Main
- Gravity Sewer
- Low Pressure Sewer
- Outfall
- Reclaimed Main
- Force Main Less
- Lift Station
- Sewer Mains
- Streets
- Highway
- New Service Area
- City of Bremerton
- Bremerton UGA

1 inch = 1,730 feet

0 550 1,100 1,650 Feet

BASIN PLAN

City of Bremerton

2025 Update by:

Kennedy Jenks

HDR

CITY OF BREMERTON

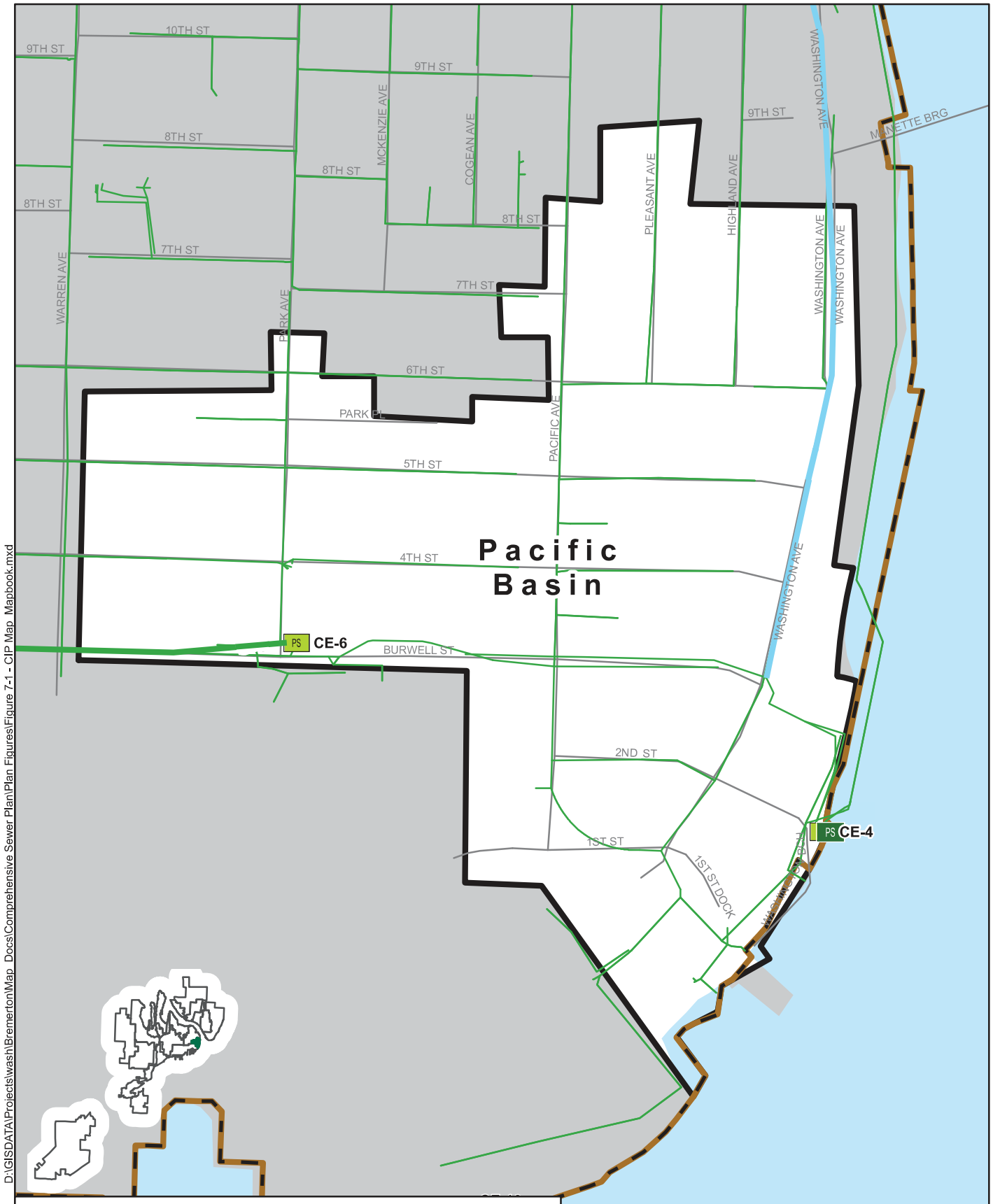
Excerpted from City of Bremerton 2024 Wastewater Comprehensive Plan Update

{Revised and updated for 2024 Wastewater Comprehensive Plan Update}

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Pacific Avenue Basin		
BASIN DESCRIPTION		
Area (acres)	78	
Land Use	Commercial with Some Residential	
Location	West Bremerton area, bordered by the Puget Sound Naval Shipyard, Warren Avenue, 7th Street, and the Puget Sound Port Washington Narrows.	
Description	Pacific Avenue Basin combined sewer flows are directed to pump stations CE-4 and CE-6. CE-4 discharges into the 14-inch-diameter Central Bremerton Force Main, which discharges to the CTP. Pump station CE-6 discharges into the Warren Avenue Basin on Park Avenue and the flow is conveyed to pump station CE-1. CSO reduction improvements in the Pacific Avenue Basin were completed between 2004 and 2006. These system improvements include an upgrade to pump station CE-6, construction of a large-diameter trunk storm drain from CE-6 to the ferry terminal, construction of various collector sewers, and inflow & infiltration reduction through rehabilitation of specific facilities.	
SEWER FLOWS		
Existing GPD	Estimated flows from major basin available in Tables 5-10 and 5-11.	
Future GPD		
Percent Developed[1] (%)	Refer to Tables 3-3 and 3-4 for this information.	
Percent Sewered[2] (%)		
EXISTING SYSTEM		
Combined/Separated	Combined	
Receiving Facilities	Central Bremerton Force Main to Crosstown Pipeline and CE-1	
Existing Pump Stations	CE-4 and CE-6	
Combined Sewer Outfall	OF-16	
PUMP STATIONS		
Pump Station	Refer to Table 3-5 or Appendix C.	
CE-4		
CE-6		
CIP		
CIP ID	**Timeline**	**Cost ($1,000)**
CIP Year 2024-2034		
CIP Year 2035+		
NOTES		
1) Total area of developed parcels divided by the total of developed and undeveloped parcel area excluding parcels designated as right of way or water bodies.		
2) Total area of developed parcels with available sewer service divided by the total developed parcel area.		

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Legend

Basin Pacific Basin

- Odor Control Upgrade
- MBR — MBR
- PS — New Pump Station
- PS — Pump Station Upgrade
- PS — Reclaimed Pump Station
- Beach Sewer
- Force Main
- Gravity Sewer
- Low Pressure Sewer
- Outfall
- Reclaimed Main
- Force Main Less Than 24"
- CSO Outfall
- PS — Lift Station
- Sewer Mains
- Streets
- Highway
- New Service Area
- City of Bremerton
- Bremerton UGA

1 inch = 400 feet

0 125 250 375 Feet

BASIN PLAN

City of Bremerton

2025 Update by:

Kennedy Jenks

HDR

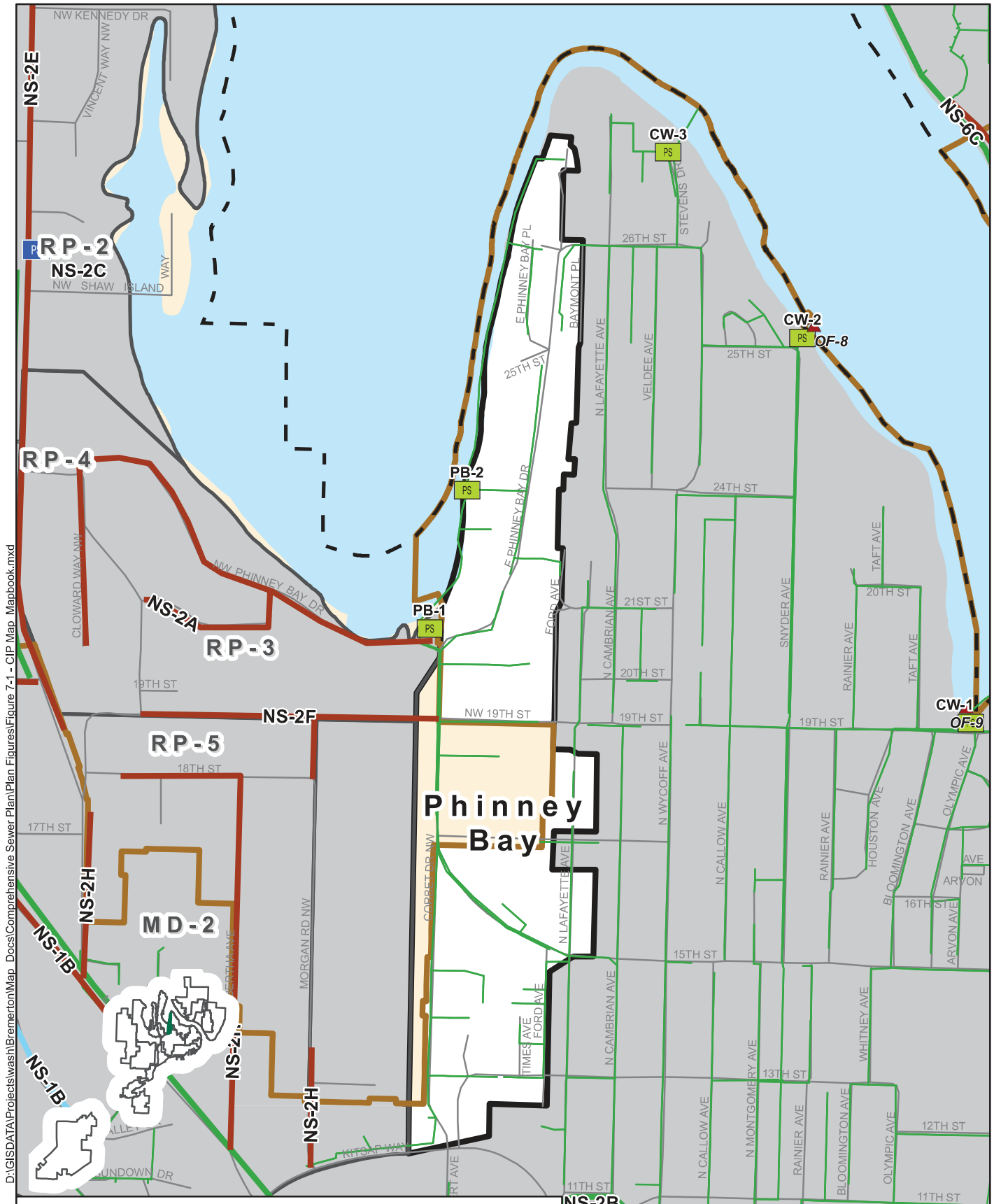
CITY OF BREMERTON

{Revised and updated for 2024 Wastewater Comprehensive Plan Update}

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Phinney Bay Basin		
BASIN DESCRIPTION		
Area (acres)	86	
Land Use	Commercial and Residential	
Location	West Bremerton area, bordered by Kitsap Way, Corbet Drive, the Puget Sound, and Lafayette Avenue.	
Description	Phinney Bay Basin has two pump stations (PB-1 and PB-2) along the collection system. Sanitary sewer flows are conveyed from PB-2 to PB-1 and then discharged to the Callow Avenue Basin Pipeline. Phinney Bay is adjacent to the Rocky Point basin. A plan to extend sewer service to the Rocky Point basin would convey a portion of the service area to the PB-1 pump station. A capacity upgrade at the pump station may be necessary in the future. A strategy for providing sewer service to the Rocky Point area was developed and described in *Sewer Urban Growth Area Planning* (Feb, 2008).	
SEWER FLOWS		
Existing GPD	Estimated flows from major basin available in Tables 5-10 and 5-11.	
Future GPD		
Percent Developed[1] (%)	Refer to Tables 3-3 and 3-4 for this information.	
Percent Sewered[2] (%)		
EXISTING SYSTEM		
Combined/Separated	Separate	
Receiving Facilities	Callow Ave Basin Pipeline	
Existing Pump Stations	PB-1 and PB-2	
Combined Sewer Outfall		
PUMP STATIONS		
Pump Station	Refer to Table 3-5 or Appendix C.	
PB-1		
PB-2		
CIP		
CIP ID	**Timeline**	**Cost ($1,000)**
CIP Year 2024-2034		
CIP Year 2035+		
NOTES		
1) Total area of developed parcels divided by the total of developed and undeveloped parcel area excluding parcels designated as right of way or water bodies.		
2) Total area of developed parcels with available sewer service divided by the total developed parcel area.		

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Legend

Basin Phinney Bay

- Odor Control Upgrade
- MBR
- New Pump Station
- Pump Station Upgrade
- Reclaimed Pump Station
- Beach Sewer
- Force Main
- Gravity Sewer
- Low Pressure Sewer
- Outfall
- Reclaimed Main
- Force Main Less Than 24"
- CSO Outfall
- Lift Station
- Sewer Mains
- Streets
- Highway
- New Service Area
- City of Bremerton
- Bremerton UGA

1 inch = 760 feet

0 240 480 720 Feet

BASIN PLAN

City of Bremerton

2025 Update by:

Kennedy Jenks

HDR

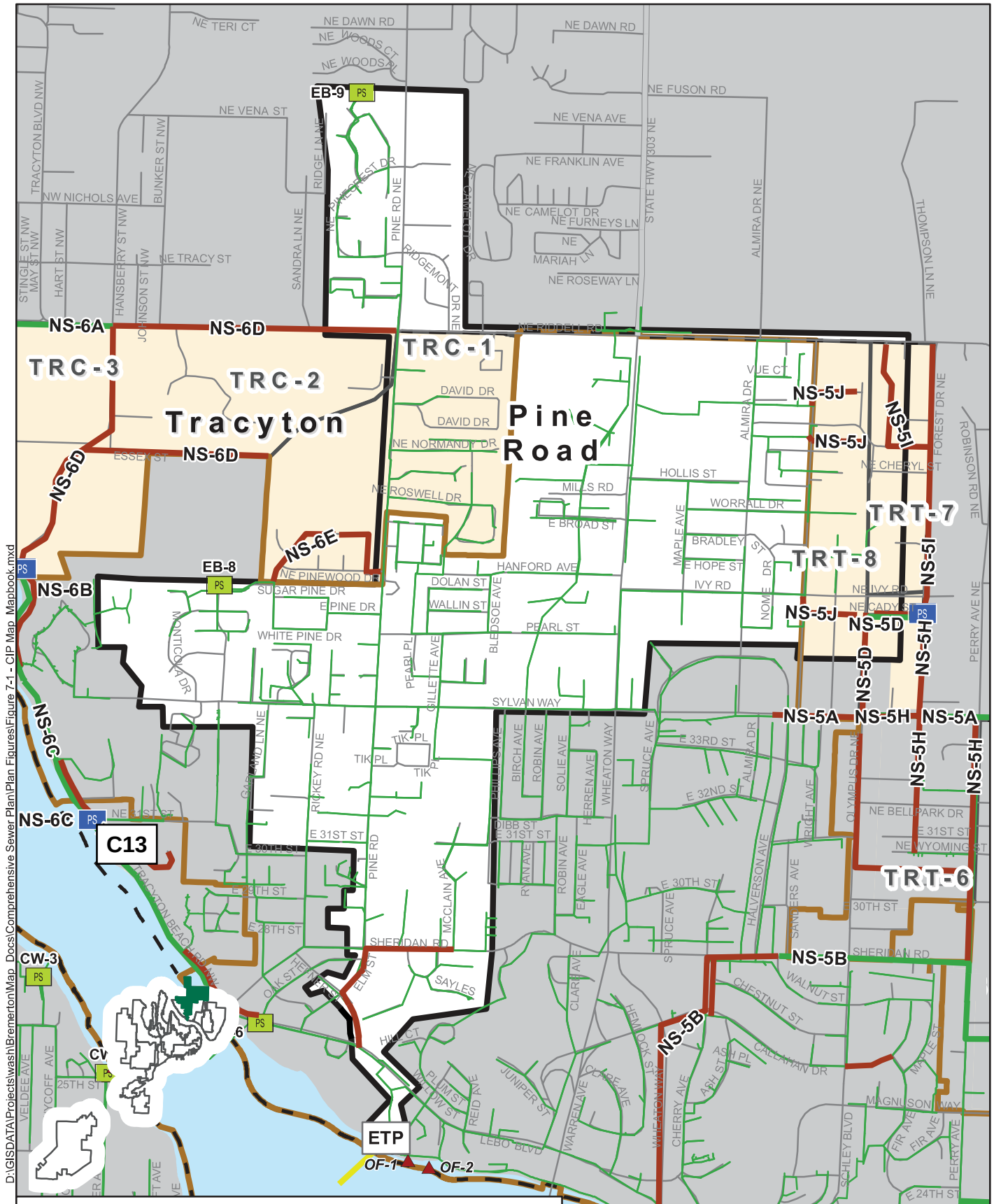
CITY OF BREMERTON

{Revised and updated for 2024 Wastewater Comprehensive Plan Update}

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Pine Road Basin			
BASIN DESCRIPTION			
Area (acres)	871		
Land Use	Residential with some Commercial		
Location	East Bremerton area, bordered by Pine Road, Riddle Road, Forest Drive, and the Lions Community Playfield.		
Description	The Pine Road Basin has two pump stations (EB-8 and EB-9). Sanitary sewer flows from this basin are conveyed by the East Bremerton Beach Main to the CTP. Flows from Tracyton Beach Basin are conveyed to overflow station OF-1 in the Pine Road Basin. Bremerton constructed a CSO storage facility in this basin in 2000, and a trunk sanitary sewer/in-line storage facility as well as the Eastside Treatment Plant (ETP) in 2001. The trunk sanitary sewer connects the downstream end of the Stephenson Canyon Basin to the inlet and to the ETP. During peak flow conditions, the beach main downstream of overflow station OF-2 in the Stephenson Canyon Basin will surcharge and reverse flow in the trunk sewer to convey it to the ETP.		
SEWER FLOWS			
Existing GPD	Estimated flows from major basin available in Tables 5-10 and 5-11.		
Future GPD			
Percent Developed[1] (%)	Refer to Tables 3-3 and 3-4 for this information.		
Percent Sewered[2] (%)			
EXISTING SYSTEM			
Combined/Separated	Combined		
Receiving Facilities	East Bremerton Beach Main		
Existing Pump Stations	EB-8 and EB-9		
Combined Sewer Outfall	OF-1		
PUMP STATIONS			
Pump Station	Refer to Table 3-5 or Appendix C.		
EB-8			
EB-9			
CIP			
CIP ID	**Timeline**	**Cost ($1,000)**	
CIP Year 2024-2034			
CIP Year 2035+			
NOTES			
1) Total area of developed parcels divided by the total of developed and undeveloped parcel area excluding parcels designated as right of way or water bodies.			
2) Total area of developed parcels with available sewer service divided by the total developed parcel area.			

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Legend

Basin Pine Road

- Odor Control Upgrade
- MBR
- New Pump Station
- Pump Station Upgrade
- Reclaimed Pump Station
- Beach Sewer
- Force Main
- Gravity Sewer
- Low Pressure Sewer
- Outfall
- Reclaimed Main
- Force Main Less Than 24"
- CSO Outfall
- Lift Station
- Sewer Mains
- Streets
- Highway
- New Service Area
- City of Bremerton
- Bremerton UGA

1 inch = 1,470 feet

0 460 920 1,380 Feet

BASIN PLAN

City of Bremerton

2025 Update by:

Kennedy Jenks

HDR

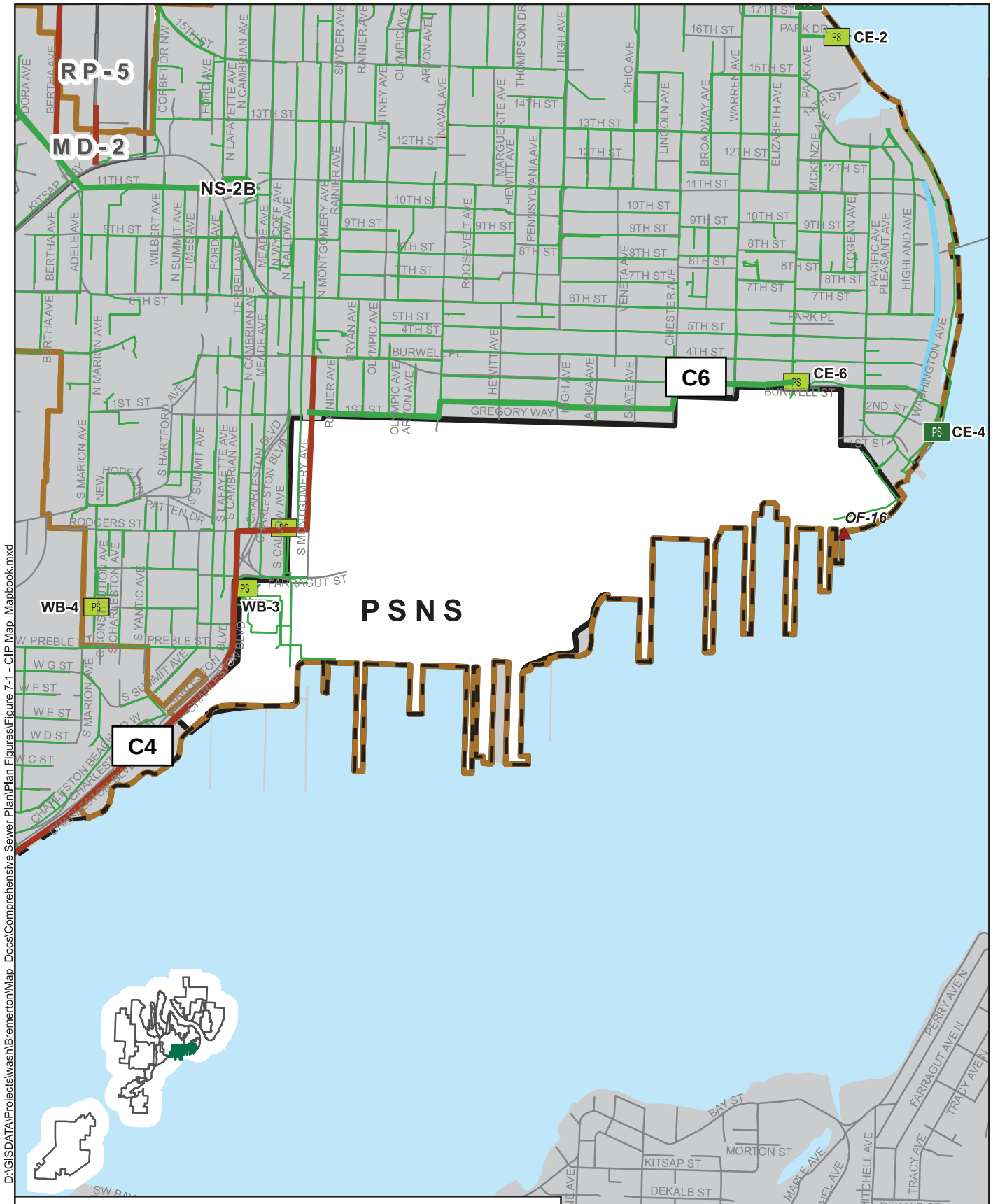
CITY OF BREMERTON

{Revised and updated for 2024 Wastewater Comprehensive Plan Update}

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PSNS Basin		
BASIN DESCRIPTION		
Area (acres)	385	
Land Use	Industrial area, Naval Station and Shipyard.	
Location	West Bremerton area, bordered by the Puget Sound Sinclair Inlet, Charleston Boulevard, 1st Street, and Terminal Way.	
Description	Sewage discharges from the Puget Sound Naval Shipyard (PSNS) are conveyed, treated, and disposed of by the City as agreed in the U.S. Navy Contract. The U.S. Navy owns and maintains an onsite sewage collection system for its facilities and discharges to the City pump stations CE-4 and WB-3. Combined sewer from the PSND area flow to pump station WB-3, which discharges to the CTP and on to the WWTP	
SEWER FLOWS		
Existing GPD	Estimated flows from major basin available in Tables 5-10 and 5-11.	
Future GPD		
Percent Developed[1] (%)	Refer to Tables 3-3 and 3-4 for this information.	
Percent Sewered[2] (%)		
EXISTING SYSTEM		
Combined/Separated	Contract	
Receiving Facilities	Pump stations CE-4 and WB-3	
Existing Pump Stations		
Combined Sewer Outfall		
PUMP STATIONS		
Pump Station	Refer to Table 3-5 or Appendix C.	
CIP		
CIP ID	**Timeline**	**Cost ($1,000)**
CIP Year 2024-2034		
CIP Year 2035+		
NOTES		
1) Total area of developed parcels divided by the total of developed and undeveloped parcel area excluding parcels designated as right of way or water bodies.		
2) Total area of developed parcels with available sewer service divided by the total developed parcel area.		

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{Revised and updated for 2024 Wastewater Comprehensive Plan Update}

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Rocky Point Basin		
BASIN DESCRIPTION		
Area (acres)	423	
Land Use	Low-density residential with some commercial.	
Location	West Bremerton area, bordered by Kelly Road, the Puget Sound Dyes Inlet, Corbet Drive, and Morgan Lane.	
Description	The Rocky Point service area (currently unincorporated) is an unsewered peninsula north of the City and is part of the West Bremerton UGA. Ultimately this basin will be served by a combination of low pressure sewer systems, gravity mains, and a new pump station, MD-3, that would direct the flow to pump station OB-1 in the Oyster Bay Basin. The development of Rocky Point Basins would also require improvements to the conveyance system in Kitsap Way and upgrades to OB-1 to accommodate additional flows. A strategy for providing sewer service to the area was developed and described in *Sewer Urban Growth Area Planning* (Feb, 2008). The improvements described in the plan are sub-divided into eight projects described below.	
SEWER FLOWS		
Existing GPD	Estimated flows from major basin available in Tables 5-10 and 5-11.	
Future GPD		
Percent Developed[1] (%)	Refer to Tables 3-3 and 3-4 for this information.	
Percent Sewered[2] (%)		
EXISTING SYSTEM		
Combined/Separated	Separate	
Receiving Facilities		
Existing Pump Stations		
Combined Sewer Outfall		
PUMP STATIONS		
Pump Station	Refer to Table 3-5 or Appendix C.	
CIP		
CIP ID	**Timeline**	**Cost ($1,000)**
CIP Year 2024-2034		
CIP Year 2035+		
NS-2A	Phinney Bay Extension (Sub Basin RP-3)	
	2036-2037	$1,960
	Install approximately 4,600 LF of 8-inch sewer main along NW Phinney Bay Drive, Jackson Drive, Cloward Way, and Cartier Drive. This project would extend sewer service and eliminate failing septic systems to meet total maximum daily load (TMDL) compliance. The PB-1 pump station capacity should be evaluated based on the additional flows from this project and project NS-2F "Jackson Drive to Corbet Drive (Sub-Basin RP-3)".	
NS-2F	Jackson to Corbet Drive (Sub Basin RP-3)	
	2037-2038	$830
	Install approximately 2,200 LF of 8-inch gravity sewer from Jackson Drive to Corbet Drive along an easement. The central part of sub-basin RP-6 will flow by low pressure sewer (LPS) to the City's existing sewers along Corbet Drive or proposed gravity sewers along Morgan Road to pump station PB-1.	

NS-2H	Sewer Collection - Sub Basin RP-5	
	2038-2040	$1,910
	Approximately 4,500 LF of 8-inch gravity sewers would be installed along 18th Street, Bertha Avenue, and Rocky Point Road to the 8-inch gravity sewer along Marine Drive that would be installed in project NS-1B "Sewer Collection – Sub-Basin MD-2".	
NS-2B	Pump Station MD-2	
	2040+	$4,730
	Construct pump station MD-2 near Marine Drive and Kelly Road to convey flows from the Marine Drive and Rocky Point service areas east to the Callow Basin via approximately 6,000 LF of 12-inch force main. One potential discharge location is into an existing 30-inch sewer main at 11th Street and Meade Avenue. A preliminary estimate of the pump station capacity is 1,620 gpm based on projected flows in the service area. An estimated 6,100 gallon wet well volume would be needed.	
NS-2C	Pump Station MD-3	
	2040+	$2,380
	Construct pump station MD-3 along Rocky Point Road near Holly Beach Court to convey sewer flow from sub-basins RP-1 and RP-2 south to MD-2 via approximately 2,400 LF of 10-inch force main. A preliminary estimate for the pump station capacity is 1,050 gpm at 120-feet of TDH based on projected flows in the sub-basins. An estimated 4,000 gallon wet well volume would be needed.	
NS-2D	Sewer Collection - Sub Basin RP-1	
	2040+	$1,220
	Install approximately 2,800 LF of 10-inch gravity main along Rocky Point Road from Brygman Street to Chrey Lane to collect sewer flows from sub-basin RP-1. This project would connect to a proposed gravity main installed in project NS-2F "Jackson Drive to Corbet Drive (Sub-Basin RP-3)".	
NS-2E	Sewer Collection - Sub Basin RP-2	
	2040+	$2,180
	Install approximately 2,200 LF of 12-inch gravity main along Rocky Point Road from Chrey Lane to proposed pump station MD-3 and approximately 2,800 LF of 8-inch gravity sewer along Rocky Point Road from 19th Street to MD-3 to convey sewer flows from sub-basins RP-1 and RP-2. Construct in conjunction with project NS-2C "Pump Station MD-3".	
NS-2G	Sewer Collection - Sub Basin RP-4	
	2040+	$820
	Install approximately 900 LF of 8-inch gravity sewer along Shamrock Road and 1,000 LF of 12-inch gravity sewer along Kelly Road to the proposed pump station MD-2 to convey sewer flow from sub-basins RP-3 and RP-4. Pump station MD-3 pumps through a 10-inch force main which discharges to a 12-inch gravity sewer conveying flow to the proposed pump station MD-2. Construct in conjunction with project NS-2B "Pump Station MD-2".	
NOTES		
1) Total area of developed parcels divided by the total of developed and undeveloped parcel area excluding parcels designated as right-of-way or water bodies.		
2) Total area of developed parcels with available sewer service divided by the total developed parcel area.		



Legend

Basin Rocky Point

- Odor Control Upgrade
- MBR
- New Pump Station
- Pump Station Upgrade
- Reclaimed Pump Station
- Beach Sewer
- Force Main
- Gravity Sewer
- Low Pressure Sewer
- Outfall
- Reclaimed Main
- Force Main Less Than 24"
- CSO Outfall
- Lift Station
- Sewer Mains
- Streets
- Highway
- New Service Area
- City of Bremerton
- Bremerton UGA

1 inch = 1,440 feet

0 450 900 1,350 Feet

BASIN PLAN

City of Bremerton

2025 Update by:

Kennedy Jenks

HDR

CITY OF BREMERTON

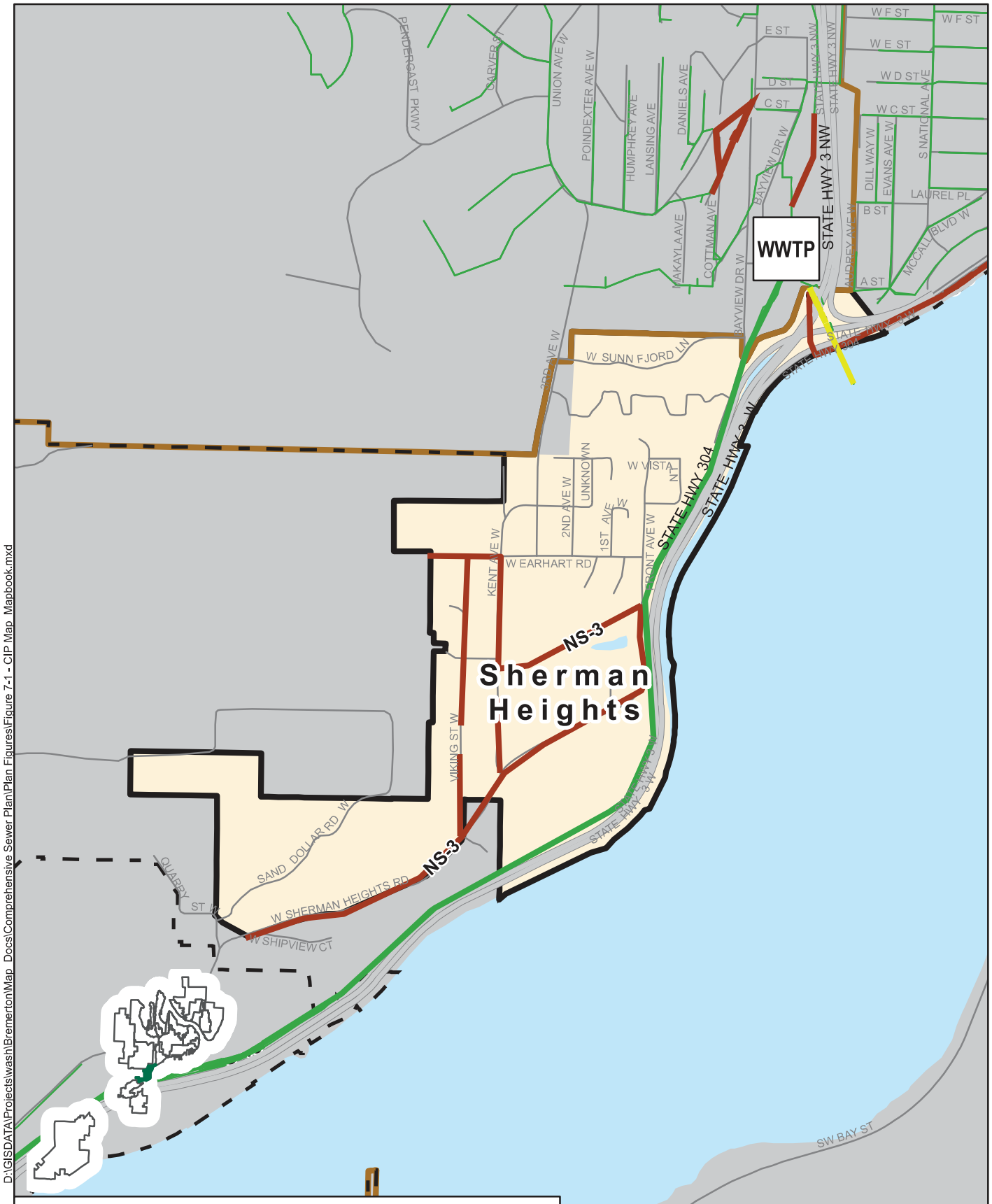
{Revised and updated for 2024 Wastewater Comprehensive Plan Update}

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Sherman Heights Basin		
BASIN DESCRIPTION		
Area (acres)	209	
Land Use	Undeveloped area with low-density residential.	
Location	West Bremerton area, bordered by the Puget Sound Sinclair Inlet, W. Sherman Heights Road, Viking Street, and W. Sunnfjord Lane.	
Description	The Sherman Heights Basin is located within Bremerton's UGA. The northern portion of the basin is located within the Kitsap County Sewer District 1 boundary. The southern portion of the basin is unsewered. The southern portion of the basin would be served by gravity sewers that direct flow to the Kitsap County Sewer District 1 pump station WB-1, and then to the WWTP via the Southwest Bremerton Sewer Force Main. The sewer system improvements that would extend service in the SR 304 service area are describes in detail in Sewer Urban Growth Area Planning (Feb, 2008).	
SEWER FLOWS		
Existing GPD	Estimated flows from major basin available in Tables 5-10 and 5-11.	
Future GPD		
Percent Developed[1] (%)	Refer to Tables 3-3 and 3-4 for this information.	
Percent Sewered[2] (%)		
EXISTING SYSTEM		
Combined/Separated	Separate	
Receiving Facilities	Southwest Bremerton Sewer Force Main	
Existing Pump Stations		
Combined Sewer Outfall		
PUMP STATIONS		
Pump Station	Refer to Table 3-5 or Appendix C.	
CIP		
CIP ID	**Timeline**	**Cost ($1,000)**
CIP Year 2024-2034		
CIP Year 2035+		
NS-3	SR 304 Sewer Collection	
	2040+	$4,280
	A portion of the SR 304 service area is currently sewered and referred to as Sewer District 1. This project would expand sewer service to the remainder of the SR 304 service area utilizing the existing 12-inch gravity sewer main parallel to SR 3. Approximately 9,420 LF of 8-inch gravity sewer would be installed along Sherman Heights Road, Kent Avenue, and Viking Street to extend sewer service. Grinder pumps and low-pressure sewer mains could be implemented where gravity conveyance is not possible. The sewer system improvements that would extend service in the SR 304 service area are described in detail in Sewer Urban Growth Area Planning (Feb, 2008).	
NOTES		
1) Total area of developed parcels divided by the total of developed and undeveloped parcel area excluding parcels designated as right of way or water bodies.		
2) Total area of developed parcels with available sewer service divided by the total developed parcel area.		

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Legend

- Odor Control Upgrade
- MBR — MBR
- PS — New Pump Station
- PS — Pump Station Upgrade
- PS — Reclaimed Pump Station
- Beach Sewer
- Force Main
- Gravity Sewer
- Low Pressure Sewer
- Outfall
- Reclaimed Main
- Force Main Less Than 24"
- CSO Outfall
- PS — Lift Station
- Sewer Mains
- Streets
- Highway
- New Service Area
- City of Bremerton
- Bremerton UGA

Basin Sherman Heights

1 inch = 1,020 feet

0 320 640 960 Feet

BASIN PLAN

City of Bremerton

2025 Update by:

Kennedy Jenks

HDR

CITY OF BREMERTON

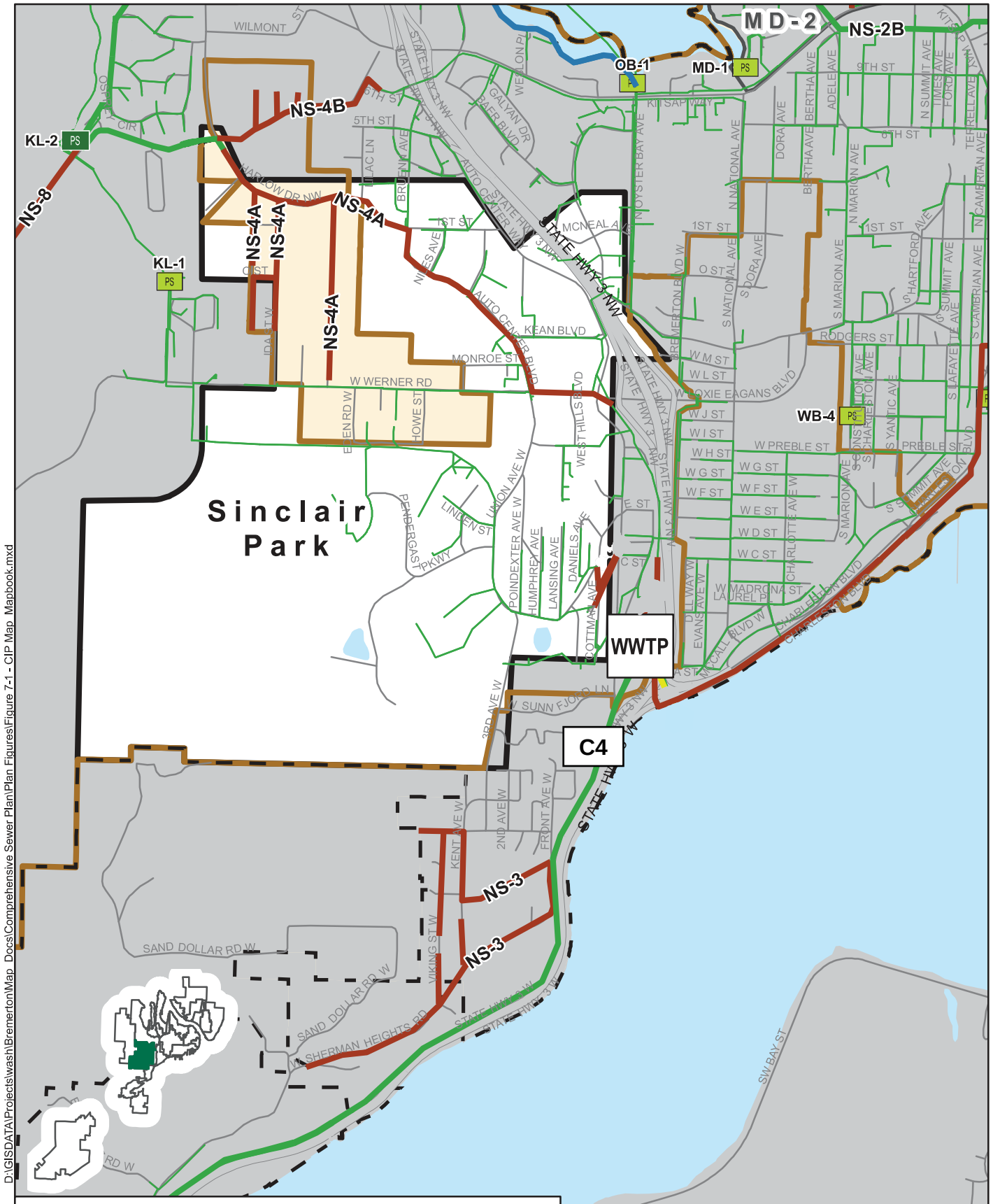
{Revised and updated for 2024 Wastewater Comprehensive Plan Update}

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Sinclair Park Basin		
BASIN DESCRIPTION		
Area (acres)	875	
Land Use	Residential with commercial and light Industrial	
Location	West Bremerton area, bordered by W. Harbor Drive, Ida Street, Harlow Drive, and Oyster Bay Ave.	
Description	Sanitary sewer flows in Oyster Bay and Kitsap Lake Basins are conveyed through a series of pump stations that ultimately flow into the Sinclair Park Basin, and then to the WWTP by gravity. Kitsap Lake pump station KL-1 currently discharges to overloaded sewers in the Sinclair Park Basin. Projects to address overloaded sewers are discussed below. Extendeding sewer service to the West Hills service area would add to flows in the Sinclair Park Basin. The West Hills service area (currently unincorporated) is located in the West Bremerton UGA, just west of Navy Yard City between Dyes and Sinclair Inlet, primarily in the Sinclair Park Basin. West Hills is predominantly urban low-density residential with some industrial. The City's current sewer system has a few gravity sewer pipes that are located in a small southern section of the service area. Sewer flows generated from the West Hills service area will be collected in a series of 8-inch gravity sewer mains and will be conveyed to the existing sewer system. A plan developed to extend sewer service to the area is described in *New Service Area Plans – East Bremerton and West Hills* (Feb, 2014).	
SEWER FLOWS		
Existing GPD	Estimated flows from major basin available in Tables 5-10 and 5-11.	
Future GPD		
Percent Developed[1] (%)	Refer to Tables 3-3 and 3-4 for this information.	
Percent Sewered[2] (%)		
EXISTING SYSTEM		
Combined/Separated	Separate	
Receiving Facilities	Pipeline from KL-1 to WWTP	
Existing Pump Stations	PP-1	
Combined Sewer Outfall		
PUMP STATIONS		
Pump Station	Refer to Table 3-5 or Appendix C.	
PP-1		
CIP		
CIP ID	**Timeline**	**Cost ($1,000)**
CIP Year 2024-2034		
CIP Year 2035+		
NS-4A	Ostrich Bay Extension	
	2038-2040	$3,720
	The Ostrich Bay Extension project would extend sewer service to an area within West Hills between Harlow Drive and Werner Road and would eliminate failing septic systems to meet TMDL compliance. This project would allow for sewer conveyance, as described in the West Hills service area plan, by installing approximately 2,900 LF of 18-inch gravity sewer along Harlow Drive from Price Road to Sunnyhill Road and 5,800 LF of 8-inch gravity sewer south of Harlow Drive along Sunnyhill Road, Ida Street, and Broad Street.	

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NS-4B	North Extension	
	2040+	$1,450
	This project would allow for sewer conveyance, as described in the West Hills service area plan, by installing approximately 3,350 LF of 8-inch sewer along Price Road to connect to the existing sewer main on 6th Street.	
NOTES		
1) Total area of developed parcels divided by the total of developed and undeveloped parcel area excluding parcels designated as right of way or water bodies.		
2) Total area of developed parcels with available sewer service divided by the total developed parcel area.		



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Legend

Basin Sinclair Park

- Odor Control Upgrade
- MBR
- New Pump Station
- Pump Station Upgrade
- Reclaimed Pump Station
- Beach Sewer
- Force Main
- Gravity Sewer
- Low Pressure Sewer
- Outfall
- Reclaimed Main
- Force Main Less Than 24"
- CSO Outfall
- Lift Station
- Sewer Mains
- Streets
- Highway
- New Service Area
- City of Bremerton
- Bremerton UGA

1 inch = 1,650 feet

0 520 1,040 1,560 Feet

BASIN PLAN

City of Bremerton

2025 Update by:

Kennedy Jenks

HDR

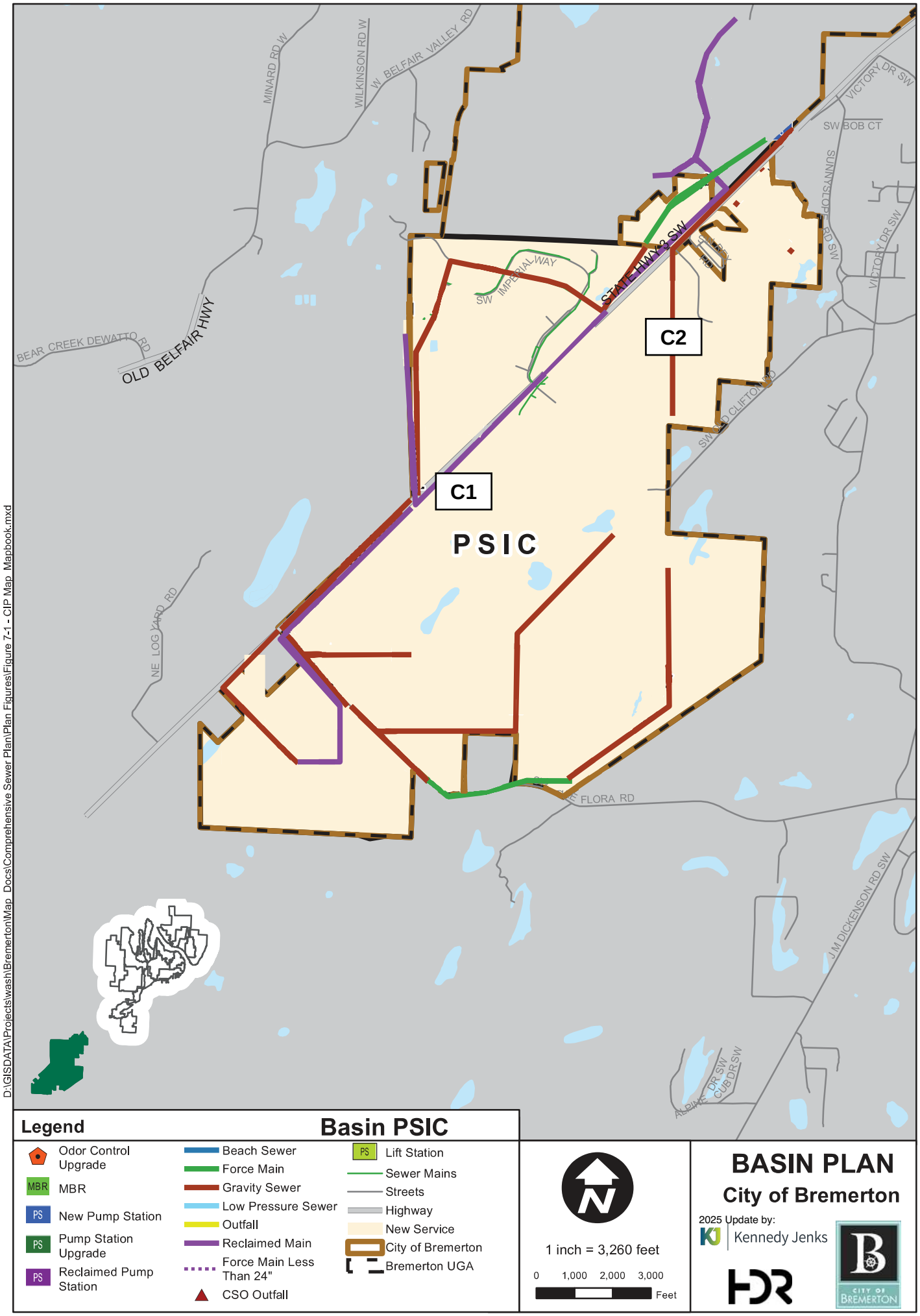
CITY OF BREMERTON

{Revised and updated for 2024 Wastewater Comprehensive Plan Update}

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PSIC Basin		
BASIN DESCRIPTION		
Area (acres)	3430	
Land Use	Undeveloped area with low-density residential and some industrial.	
Location	South Bremerton area, bordered by SW. Lake Flora Road, State Highway 3, Sunnyslope Road, and SW. Old Clifton Road.	
Description	The Puget Sound Industrial Center (PSIC), currently unincorporated, is projected to be a major industrial growth area. The 2024 WWCP Update evaluates options for providing sewer service area, which include pumping to the treatment plant at the north end of Mason County, constructing an MBR facility at the Port of Bremerton, or pumping to Gorst and to the WWTP in Bremerton. The City will continue to evaluate these alternatives with stakeholder input, including engaging Mason County officials, to service this area as growth increases.	
SEWER FLOWS		
Existing GPD	Estimated flows from major basin available in Tables 5-10 and 5-11.	
Future GPD		
Percent Developed[1] (%)	Refer to Tables 3-3 and 3-4 for this information.	
Percent Sewered[2] (%)		
EXISTING SYSTEM		
Combined/Separated	Separate	
Receiving Facilities	Not determined	
Existing Pump Stations		
Combined Sewer Outfall		
PUMP STATIONS		
Pump Station	Refer to Table 3-5 or Appendix C.	
CIP		
CIP ID	**Timeline**	**Cost ($1,000)**
CIP Year 2024-2034		
C1	See PSIC Memorandum in Appendix H	
CIP Year 2035+		
C2	See PSIC Memorandum in Appendix H	
NOTES		
1) Total area of developed parcels divided by the total of developed and undeveloped parcel area excluding parcels designated as right of way or water bodies.		
2) Total area of developed parcels with available sewer service divided by the total developed parcel area.		

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Legend

Basin PSIC

- Odor Control Upgrade
- MBR
- New Pump Station
- Pump Station Upgrade
- Reclaimed Pump Station
- Beach Sewer
- Force Main
- Gravity Sewer
- Low Pressure Sewer
- Outfall
- Reclaimed Main
- Force Main Less Than 24"
- CSO Outfall
- Lift Station
- Sewer Mains
- Streets
- Highway
- New Service
- City of Bremerton
- Bremerton UGA

1 inch = 3,260 feet

0 1,000 2,000 3,000 Feet

BASIN PLAN

City of Bremerton

2025 Update by:

Kennedy Jenks

HDR

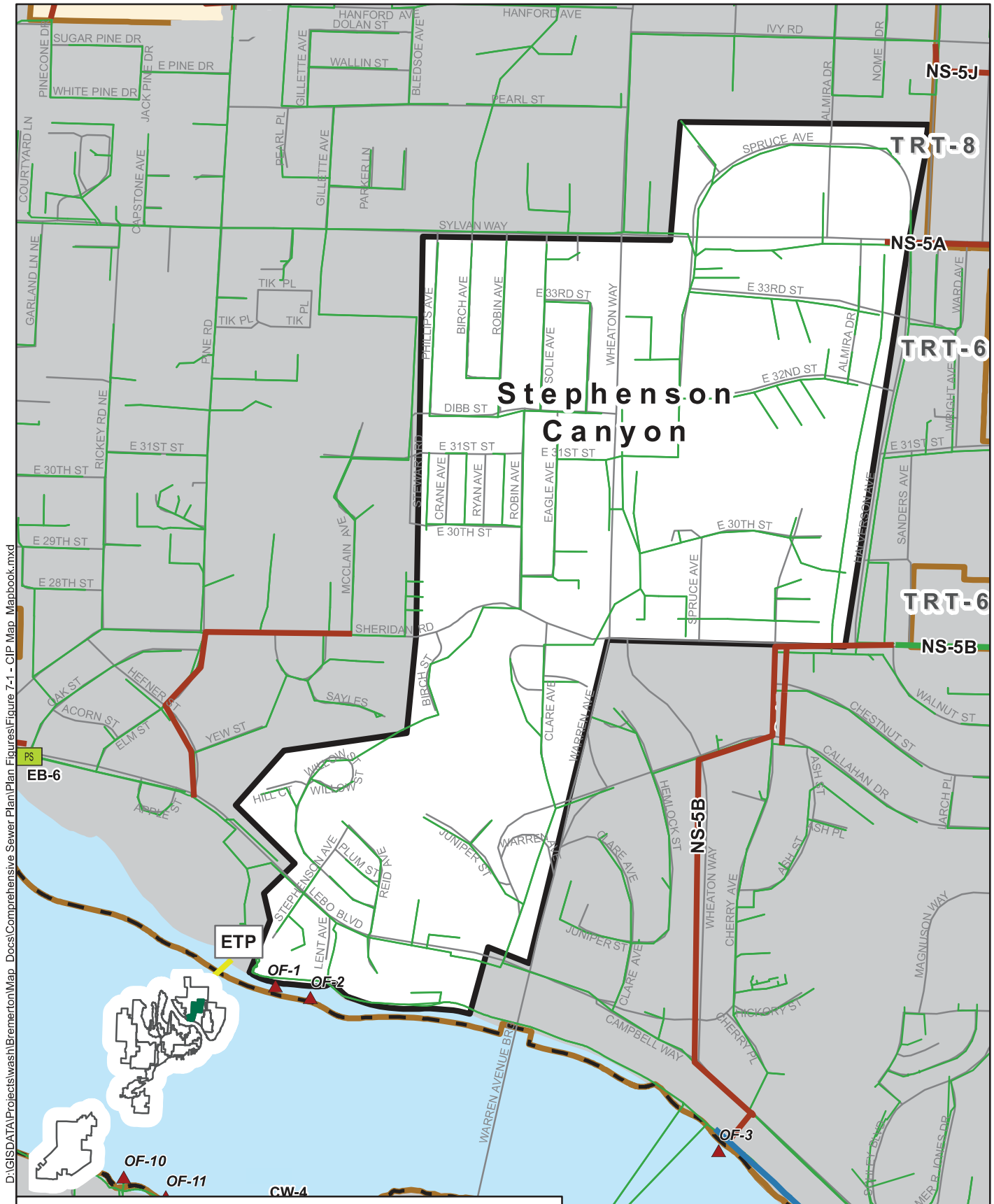
CITY OF BREMERTON

{Revised and updated for 2024 Wastewater Comprehensive Plan Update}

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Stephenson Canyon Basin		
BASIN DESCRIPTION		
Area (acres)	299	
Land Use	Residential with Some Commercial	
Location	East Bremerton area, bordered by the Puget Sound Port Washington Narrows, Phillips Avenue, Sylvan Way, Halverson Avenue, and Warren Avenue.	
Description	Sanitary sewer flows from the Stephenson Canyon Basin are conveyed via the East Bremerton Beach Main to the CTP. The City constructed a truck sanitary sewer/in-line storage facility that connects the Stephenson Canyon Basin to the ETP in the Pine Road Basin. During peak flow conditions, the beach main downstream of overflow structure OF-2 will surcharge and reverse flow in the trunk sewer and convey flow to the ETP.	
SEWER FLOWS		
Existing GPD	Estimated flows from major basin available in Tables 5-10 and 5-11.	
Future GPD		
Percent Developed[1] (%)	Refer to Tables 3-3 and 3-4 for this information.	
Percent Sewered[2] (%)		
EXISTING SYSTEM		
Combined/Separated	Combined	
Receiving Facilities	East Bremerton Beach Main	
Existing Pump Stations		
Combined Sewer Outfall	OF-2	
PUMP STATIONS		
Pump Station	Refer to Table 3-5 or Appendix C.	
CIP		
CIP ID	**Timeline**	**Cost ($1,000)**
CIP Year 2024-2034		
CIP Year 2035+		
NOTES		
1) Total area of developed parcels divided by the total of developed and undeveloped parcel area excluding parcels designated as right of way or water bodies.		
2) Total area of developed parcels with available sewer service divided by the total developed parcel area.		

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Legend

Basin Stephenson Canyon

- Odor Control Upgrade
- MBR
- New Pump Station
- Pump Station Upgrade
- Reclaimed Pump Station
- Beach Sewer
- Force Main
- Gravity Sewer
- Low Pressure Sewer
- Outfall
- Reclaimed Main
- Force Main Less Than 24"
- CSO Outfall
- Lift Station
- Sewer Mains
- Streets
- Highway
- New Service
- City of Bremerton
- Bremerton UGA

1 inch = 880 feet

0 275 550 825 Feet

BASIN PLAN

City of Bremerton

2025 Update by:

Kennedy Jenks

HDR

CITY OF BREMERTON

{Revised and updated for 2024 Wastewater Comprehensive Plan Update}

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Tracyton Beach Basin

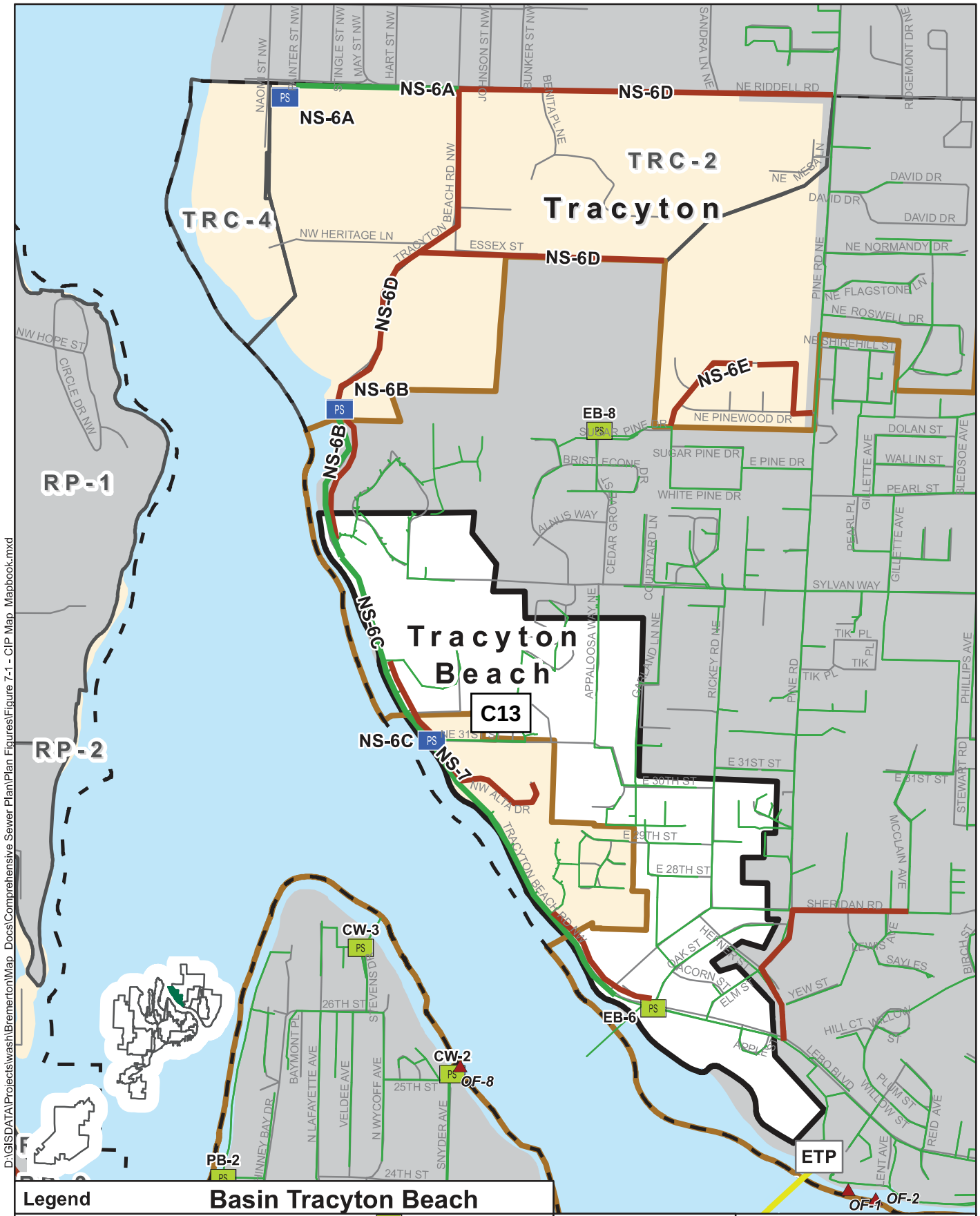
BASIN DESCRIPTION	
Area (acres)	187
Land Use	Urban low-density residential
Location	East Bremerton area, bordered by the Puget Sound Port Washington Narrows, Sylvan Way, E. 30th Street, Pine Road, and Hefner Street.
Description	The Tracyton Beach basin (currently unincorporated) is located in the East Bremerton UGA on the east bank of the Port Washington Narrows. Combined sewers in the Tracyton Beach Basin discharge through overflow structure OF-6 to pump station EB-6. EB-6 delivers flows through an 8-inch-diameter force main to overflow structure OF-1 in the Pine Road Basin. The Tracyton service area (currently unincorporated) is located just north of Tracyton Beach in the East Bremerton UGA. The City's current sewer system has gravity sewer pipes that handle sewer demand in the eastern portion of this service area. A plan developed to extend sewer service in the service area is described in *New Service Area Plans – East Bremerton and West Hills* (Feb, 2014).
SEWER FLOWS	
Existing GPD	Estimated flows from major basin available in Tables 5-10 and 5-11.
Future GPD	
Percent Developed[1] (%)	Refer to Tables 3-3 and 3-4 for this information.
Percent Sewered[2] (%)	
EXISTING SYSTEM	
Combined/Separated	Combined
Receiving Facilities	East Bremerton Beach Main
Existing Pump Stations	EB-6
Combined Sewer Outfall	OF-6

PUMP STATIONS	
Pump Station	Refer to Table 3-5 or Appendix C.
EB-6	

CIP		
CIP ID	**Timeline**	**Cost ($1,000)**
CIP Year 2024-2034		
C13	Tracyton Beach Main Conversion	
	2025	$4,400
	The City will convert the existing gravity sewer along this road between NW Carter Farms Ct and Gerard Place to a standard force main with two pump stations and some gravity sewer.	
CIP Year 2035+		
NS-6B	Pump Station TB-2	
	2036-2038	$1,670
	Construct pump station TB-2 along Tracyton Beach Road to convey sewer flow from sub-basins TRC-2, 3 and 4. A preliminary estimate of the pump station capacity would be 700 gpm at 95-feet of TDH based on the projected flows in the sub-basins. An estimated 2,650 gallons wet well volume would be needed. Install approximately 1,200 LF of 8-inch force main from the proposed pump station to the existing 8-inch ductile iron pressure gravity main on Tracyton Beach Road that would be converted into a force main. The additional flows from TB-2 are projected to exceed the capacity of pump station EB-6 and pumping upgrades to the pump station may be considered if and when needed.	

NS-6C	Tracyton Beach Rd Main Conversion	
	2036-2038	$1,580
	for the TB-2 pump station. Gravity connections to the existing main would be disconnected. A small package pump station would be installed to convey flow from services along Sulphur Springs Lane to pump station TB-2 and from services north of Sheridan Road to EB-6. Grinder pump stations for private properties may also be installed once the existing sewer main is converted to a force main.	
NS-6A	Pump Station TB-1	
	2040+	$3,620
	Construct pump station TB-1 in the vicinity of Riddell Road and Naomi Avenue to convey sewer flow from sub-basins TRC-3 and TRC-4. TRC-4 is a low pressure sewer area that would utilize grinder pumps to convey flow into the proposed pump station TB-1. Install approximately 1,400 LF of 6-inch force main along Riddell Road from Naomi Avenue to Tracyton Beach Road and connect to a proposed 10-inch gravity sewer as part of project NS-6D "Sewer Collection- Sub-Basin TRC-2". A preliminary estimate of the pump station capacity is 350 gpm at 130-feet of TDH based on the	
NS-6D	Sewer Collection - Sub Basin TRC-2	
	2040+	$3,500
	Install approximately 3,100 LF of 10-inch gravity sewer along Tracyton Beach Road from Riddell Road to the proposed pump station TB-2 (project NS-6B "Pump Station TB-2"). Install approximately 5,200 LF of 8-inch gravity sewer along Riddell Road from Pine Road to Tracyton Beach Road and along Essex Road to Tracyton Beach Road. This project would extend gravity sewer to sub-basin TRC-2.	
NS-6E	Sewer Collection - Sub Basin TRC-4	
	2040+	$740
	Approximately 1,900 LF of 8-inch gravity sewer would be installed along Pinecone Drive to extend gravity sewer to a residential area that is not currently sewered.	
NS-7	Tracyton Beach Sewer Collection	
	2040+	$580
	The Tracyton Beach service area is within the East Bremerton UGA. A plan developed to extend sewer service in the service area is described in New Service Area Plans – East Bremerton and West Hills (Feb, 2014). Sewer service would be extended to the remaining unsewered portion of the service area by installing approximately 1,200 LF of 8-inch gravity sewer along Alta Drive.	

NOTES
1) Total area of developed parcels divided by the total of developed and undeveloped parcel area excluding parcels designated as right of way or water bodies.
2) Total area of developed parcels with available sewer service divided by the total developed parcel area.



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Legend

Basin Tracyton Beach

- Odor Control Upgrade
- MBR
- New Pump Station
- Pump Station Upgrade
- Reclaimed Pump Station
- Beach Sewer
- Force Main
- Gravity Sewer
- Low Pressure Sewer
- Outfall
- Reclaimed Main
- Force Main Less Than 24"
- CSO Outfall
- Lift Station
- Sewer Mains
- Streets
- Highway
- New Service Area
- City of Bremerton
- Bremerton UGA

1 inch = 1,100 feet

0 340 680 1,020 Feet

BASIN PLAN

City of Bremerton

2025 Update by:

Kennedy Jenks

HDR

CITY OF BREMERTON

{Revised and updated for 2024 Wastewater Comprehensive Plan Update}

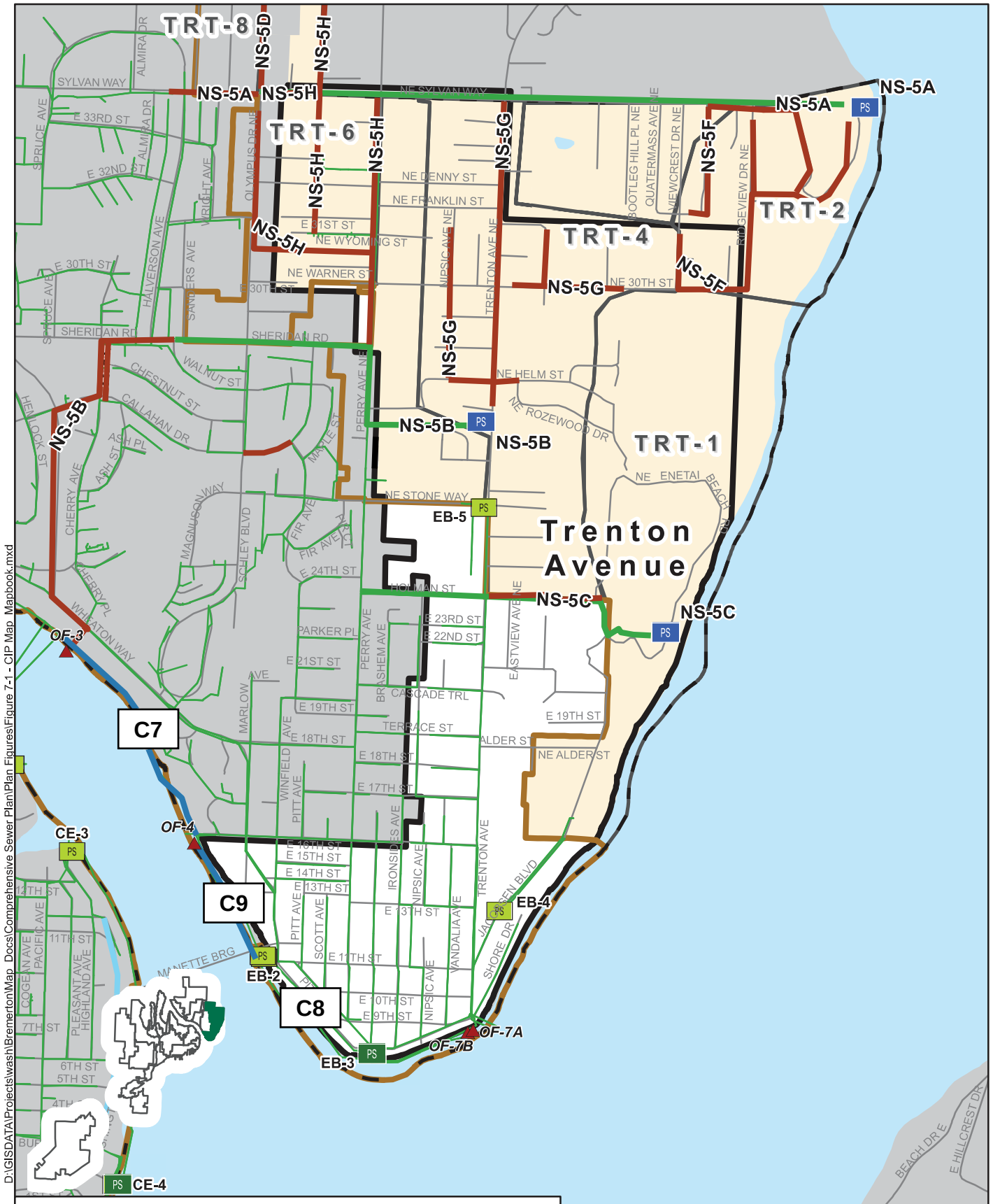
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Trenton Avenue Basin		
BASIN DESCRIPTION		
Area (acres)	728	
Land Use	Low-density residential and commercial	
Location	East Bremerton area, bordered by the Puget Sound Port Orchard Bay, Perry Ave, Sylvan Way, and Ridgeview Drive.	
Description	There are four existing pump stations (EB-2, EB-3, EB-4, and EB-5) within the Trenton Avenue Basin. Combined flow transits through overflow station OF-7 to pump station EB-3 and to pump station EB-2. These pump stations discharge to the beach main. Pump station EB-2 is two separate pump stations: EB-2 Local (DW) and EB-2 High Flow (WW). EB-2 DW collects inflow from beach sewers and conveys flows to the 18-inch EB-2 force main installed on the beach. This force main typically conveys flow as a gravity-pressure main; however, during high flow conditions the beach sewer will surcharge and divert flows to EB-2 WW. At this point, the force main operates as a true force main, conveying the flow from EB-2 WW to the beach sewer and on to either pump station CE-1 or to the ETP. Similarly, when sanitary sewer influent to pump station EB-3 begin to surcharge flows are diverted to EB-2 WW. When EB-2 WW becomes overloaded flows are diverted to overflow station OF-7B. The eastern portion of the service area is in the East Bremerton UGA and mostly undeveloped. Ultimately this area will be served by a combination of gravity sewer pipes, force mains, and three new pump stations (TA-1, TA-2, and TA-3). A plan to extend sewer service to this service area is described in *New Service Area Plans – East Bremerton and West Hills* (Feb, 2014).	
SEWER FLOWS		
Existing GPD	Estimated flows from major basin available in Tables 5-10 and 5-11.	
Future GPD		
Percent Developed[1] (%)	Refer to Tables 3-3 and 3-4 for this information.	
Percent Sewered[2] (%)		
EXISTING SYSTEM		
Combined/Separated	Combined	
Receiving Facilities	East Bremerton Beach Main	
Existing Pump Stations	EB-2, EB-3, EB-4, and EB-5	
Combined Sewer Outfall	OF-7	
PUMP STATIONS		
Pump Station	Refer to Table 3-5 or Appendix C.	
EB-2 DW		
EB-2 WW		
EB-3		
EB-4		
EB-5		
CIP		
CIP ID	**Timeline**	**Cost ($1,000)**
CIP Year 2024-2034		
C8	EB-2 Seawall	
	2026-2028	$700
	The existing seawall supporting the EB-2 wet well and an adjacent stormwater outfall is undermining and has cracked due to wave action. This project will design and replace the wall.	

CIP Year 2035+		
NS-5A	Pump Station TA-1	
	2040+	$6,100
	Construct pump station TA-1 at the northern end of Bahia Vista Drive to convey sewer flow from sub-basin TRT-2 to Sylvan Way and Olympus Drive via approximately 6,400 LF of 6-inch force main. A preliminary estimate of the pump station capacity is 350 gpm at 500-feet of TDH based on projected flows in the sub-basins. An estimated 1,350 gallon wet well volume would be needed.	
NS-5B	Pump Station TA-2	
	2040+	$9,480
	Construct pump station TA-2 in the vicinity of Helm Street and Trenton Avenue to convey sewer flow from sub-basin TRT-4, 5, and 6. A preliminary estimate of the pump station capacity is 1,350 gpm at 210-feet of TDH based on the projected flows in the sub-basins. An estimated 5,000 gallon wet well volume would be needed. Install approximately 3,900 LF of 10-inch force main along Sheridan Road to discharge into the Cherry Avenue Basin in the vicinity of Schley Boulevard and Sheridan Road. Install a new gravity sewer along Sheridan Avenue, Cherry Avenue, Callahan Drive, and Wheaton Way with approximately 4,800 LF of 18-inch gravity main to provide conveyance for flows from TA-2 through the Cherry Avenue Basin to the East Bremerton beach main.	
NS-5C	Pump Station TA-3	
	2040+	$6,000
	Construct pump station TA-3 along Enetai Beach Drive to convey sewer flow from sub-basin TRT-1. A preliminary estimate of the pump station capacity is 900 gpm at 230-feet of TDH based on the projected flows in the sub-basins. An estimated 3,300 gallon wet well volume would be needed. Install approximately 3,900 LF of 8-inch force main along Enetai Beach Road and Holman Street to convey flow to Perry Avenue.	
NS-5D	Pump Station TA-4	
	2040+	$2,760
	Construct pump station TA-4 in the vicinity of Forest Drive and Ivy Road to convey sewer flow from sub-basin TRT-7. A preliminary estimate of the pump station capacity is 350 gpm at 35-feet of TDH based on the projected flows in the sub-basins. An estimated 500 gallon wet well volume would be needed. Install approximately 700 LF of 4-inch force main along Ivy Road to convey flow to a new gravity main on Olympus Drive.	
NS-5E	Sewer Collection - Sub Basin TRT-1	
	2040+	$1,630
	Install approximately 4,200 LF of 8-inch gravity sewer from 30th Street along Enetai Beach Drive to proposed pump station TA-3 and along Holman from Trenton Avenue to Enetai Beach Road. Construct in conjunction with project NS-5C “Pump Station TA-3”.	
NS-5F	Sewer Collection - Sub Basin TRT-2	
	2040+	$3,290
	Install approximately 8,200 LF of 8-inch gravity sewer in sub-basin TRT-2 along 30th Street, Ridgeview Drive, and Bahia Vista Drive to convey flow to proposed pump station TA-1. Construct in conjunction with project NS-5A “Pump Station TA-1”.	

NS-5G	Sewer Collection - Sub Basin TRT-4	
	2040+	$3,370
	Install approximately 4,400 LF of 8-inch gravity sewer along 30th Street from Hillside Drive to Trenton Avenue and between Trenton Avenue and Perry Avenue from Franklin Street to Helms Street. Install approximately 3,400 LF of 10-inch gravity sewer along Trenton Avenue from Sylvan Way to the proposed pump station TA-2. Construct in conjunction with project NS-5B "Pump Station TA-2".	
NS-5H	Sewer Collection - Sub Basin TRT-6	
	2040+	$4,200
	Install approximately 5,400 LF of 8-inch gravity sewer along Forest Drive from Ivy Road to Warner Street and along Olympus Drive from Ivy Road to Warner Street. Install approximately 4,500 LF of 10-inch gravity sewer along Perry Avenue from Sylvan Way to TA-2.	
NS-5I	Sewer Collection - Sub Basin TRT-7	
	2040+	$1,520
	Install approximately 3,900 LF of 8-inch gravity sewer along Olympus Drive and Clemens Street to Forest Drive and along Forest Drive from Riddell Road to Ivy Road and connect to TA-4. Construct in conjunction with project NS-5D "Pump Station TA-4".	
NS-5J	Sewer Collection - Sub Basin TRT-8	
	2040+	$1,840
	Install approximately 4,500 LF of 8-inch gravity sewer along Windermere Drive, Clemens Street, and Ivy Road to convey flow into the existing sewer collection system west of Petersville Road and along Olympus Drive to convey flow to a new gravity sewer along Sylvan Way.	
NOTES		
1) Total area of developed parcels divided by the total of developed and undeveloped parcel area excluding parcels designated as right of way or water bodies.		
2) Total area of developed parcels with available sewer service divided by the total developed parcel area.		

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Legend

Basin Trenton Avenue

- Odor Control Upgrade
- MBR
- New Pump Station
- Pump Station Upgrade
- Reclaimed Pump Station
- Beach Sewer
- Force Main
- Gravity Sewer
- Low Pressure Sewer
- Outfall
- Reclaimed Main
- Force Main Less Than 24"
- CSO Outfall
- Lift Station
- Sewer Mains
- Streets
- Highway
- New Service Area
- City of Bremerton
- Bremerton UGA

1 inch = 1,430 feet

0 450 900 1,350 Feet

BASIN PLAN

City of Bremerton

2025 Update by:

Kennedy Jenks

HDR

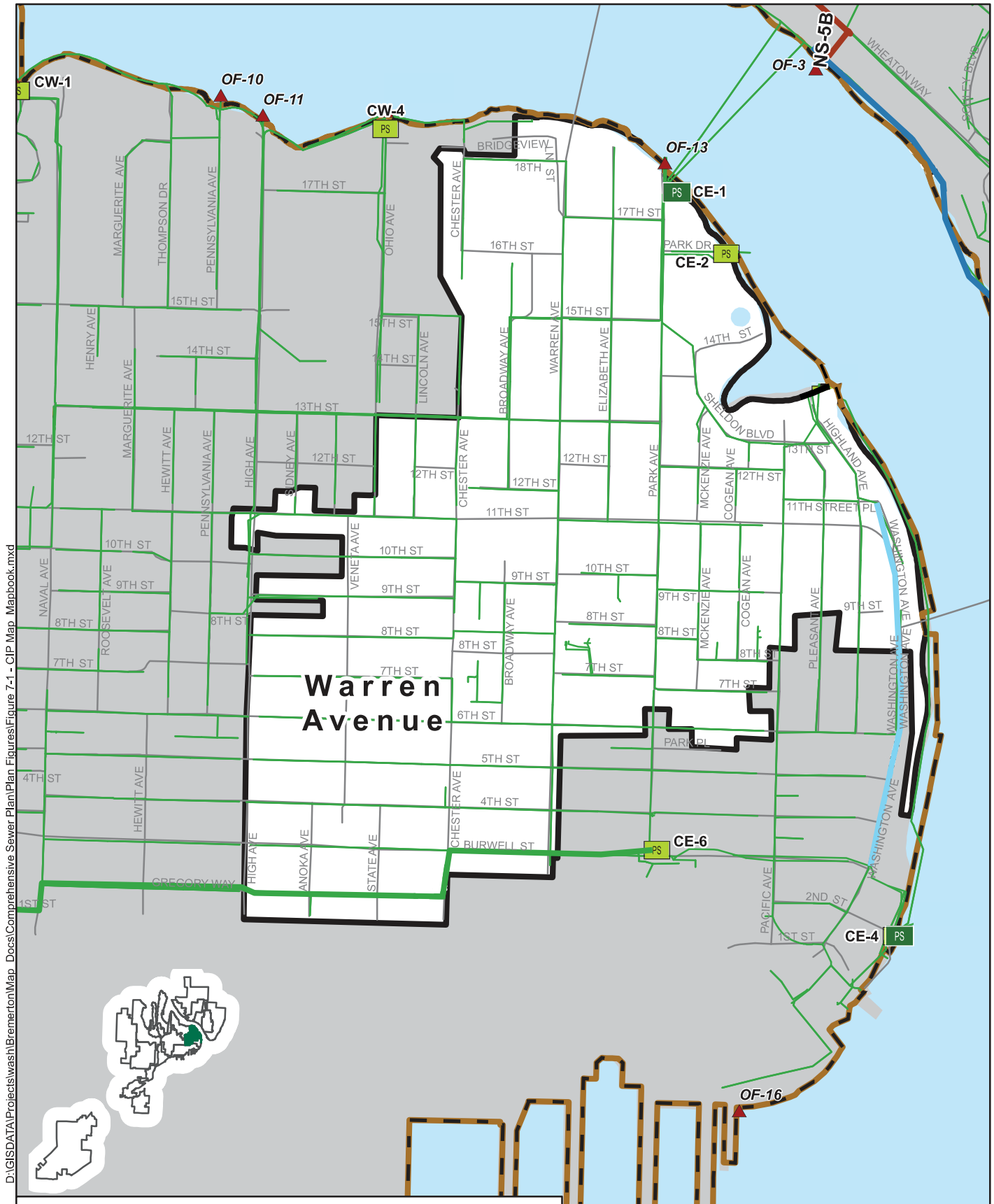
CITY OF BREMERTON

{Revised and updated for 2024 Wastewater Comprehensive Plan Update}

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Warren Avenue Basin		
BASIN DESCRIPTION		
Area (acres)	309	
Land Use	Residential with some Commercial and Park Lands	
Location	West Bremerton area, bordered by the Puget Sound Naval Shipyard, High Avenue, the Puget Sound Port Washington Narrows, and 7th Street.	
Description	There are two pump stations (CE-1, CE-2), and an upland sewer system with grinder pumps within the Warren Avenue Basin. Pump station CE-2 conveys flows to CE-1. Pump station CE-6, located in the Pacific Avenue Basin, also pumps to CE-1. CE-1 conveys dry weather flows from all East Bremerton, as well as all flow from the Warren Avenue Basin to the WWTP via the CTP. Current and projected flows are within the capacity of the sewer system.	
SEWER FLOWS		
Existing GPD	Estimated flows from major basin available in Tables 5-10 and 5-11.	
Future GPD		
Percent Developed[1] (%)	Refer to Tables 3-3 and 3-4 for this information.	
Percent Sewered[2] (%)		
EXISTING SYSTEM		
Combined/Separated	Combined	
Receiving Facilities	Crosstown Pipeline	
Existing Pump Stations	CE-1, CE-2, and CE-3	
Combined Sewer Outfall	OF-13 and OF-14	
PUMP STATIONS		
Pump Station	Refer to Table 3-5 or Appendix C.	
CE-1 [(3)]		
CE-2		
CIP		
CIP ID	**Timeline**	**Cost ($1,000)**
CIP Year 2024-2034		
CIP Year 2035+		
NOTES		
1) Total area of developed parcels divided by the total of developed and undeveloped parcel area excluding parcels designated as right of way or water bodies.		
2) Total area of developed parcels with available sewer service divided by the total developed parcel area.		

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Legend

Basin Warren Avenue

- Odor Control Upgrade
- MBR
- New Pump Station
- Pump Station Upgrade
- Reclaimed Pump Station
- Beach Sewer
- Force Main
- Gravity Sewer
- Low Pressure Sewer
- Outfall
- Reclaimed Main
- Force Main Less Than 24"
- CSO Outfall
- Lift Station
- Sewer Mains
- Streets
- Highway
- New Service Area
- City of Bremerton
- Bremerton UGA

1 inch = 880 feet

0 275 550 825 Feet

BASIN PLAN

City of Bremerton

2025 Update by:

Kennedy Jenks

HDR

CITY OF BREMERTON

{Revised and updated for 2024 Wastewater Comprehensive Plan Update}

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Appendix C: Pump Stations

Parameter	STATION							
Pump Station	**CE-1**		**CE-2**	**CE-4**	**CE-6**	**CW-1**	**CW-2**	**CW-3**
Type	Dry Well		Dry Well	Dry Well	Dry Well	Dry Well	Wet Well	Wet Well
Notes/Description	32ft diameter segmented caisson		S&LL Package Pump Station	--	Metal	--	--	--
Year Constructed	1985		1973	1989	1989	1984	1999	~1970
Significant Upgrades/Updates	--		--	--	2006	2004/2007	--	--
Pump Manufacturer	Sulzer	Flygt	S&LL	Flygt	Flygt	ABS	Flygt	Zoeller
Number of Pumps	2	2	2	2	3	3	3	2
Pump Type	Dry-pit Submersible	Dry-pit Submersible	Dry-Pit	Dry-pit Submersible	Dry-pit Submersible	Dry-pit Submersible	Submersible	Submersible
Horsepower	128	385	3	160	12	201	75	2
Lead-Lag or Standby?	LL	SB	LL	LL	LL - 3rd Pump Standby	LL - 3rd Pump Standby	LL - 3rd Pump Standby	LS
VFDs? (Y/N)	Y	Y	N	Y	Y	Y	Y	N
Single Pump Capacity (gpm)	2100	7000	200	900	970	2600	1050	50
Operating TDH (ft)	167	167	--	--	33	186	142	--
Maximum Capacity (gpm)	10000		--	1940	1600	3500	1260	50
Maximum TDH (ft)	--		--	238	--	--	--	40
Backup Power	Yes		Portable	Yes	Yes	Yes	Yes	Portable
Basin / Upstream Station	Warren Ave Basin, East Bremerton		Warren Ave Basin	Pacific Avenue Basin, PSNS	Pacific Avenue Basin	Anderson Cove Basin	Anderson Cove Basin	Anderson Cove Basin
CSO Outfalls	OF-13		--	--	OF-16	OF-8, OF-10A, OF-9, OF-11	OF-8	--
Discharge Location	Start of CTP		Park Ave Sewer, gravity to CE-1	Central Bremerton FM to CTP	Gravity Sewer @ 7th & Park	Naval Ave Force Main to CTP	Callow Ave sewer, with intertie to CW-1	Gravity sewer on 26th, flows to CW-2
	Note: Maximum Capacity and Maximum TDH does not include operation of the standby pump (e.g. 3 pumps at a station will include 2 pumps plus 1 standby. The standby pump will not operate unless one of the other pumps fails.)							

Parameter	STATION								
Pump Station	**CW-4**	**KL-1**	**KL-2**	**KL-3**	**KL-4**	**MD-1**	**OB-1**	**OB-2**	**OB-3**
Type	Wet Well	Wet Well	Dry Well	Dry Well	Dry Well	Wet Well	Dry Well	Dry Well	Dry Well
Notes/Description	--	Converted Wet Well	--	--	--	--	--	--	--
Year Constructed	2020	~1970	~1970	~1970	~1970	1994	1966	1966	1970
Significant Upgrades/Updates	--	2013 (Conversion)	--	--	--	--	--	--	--
Pump Manufacturer	Flygt	Flygt	Flygt	Fairbanks Morse	Fairbanks Morse	Essco	Flygt	Flygt	Fairbanks
Number of Pumps	2	2	2	2	2	2	3	2	2
Pump Type	Submersible	Submersible	Dry-pit Submersible	Dry-pit Submersible	Dry-pit Submersible	Submersible	Dry-pit Submersible	Dry-pit Submersible	Dry-pit Submersible
Horsepower	--	30	85	5	5	40	65	15	5
Lead-Lag or Standby?	LS	LS	LS	LS	LS	LS	LL - 3rd Pump Standby	LS	LL
VFDs? (Y/N)	Y	N	Y	N	N	N	Y	Y	N
Single Pump Capacity (gpm)	250	950	1150	450	475	950	950	750	200
Operating TDH (ft)	45	88	--	14	16	--	212	65	--
Maximum Capacity (gpm)	450	950	1150	450	475	950	--		--
Maximum TDH (ft)	45	--	148	--	--	212	--	--	--
Backup Power	Portable	Yes	Yes	Yes	Yes	Portable	Yes	Yes	Portable
Basin / Upstream Station	Anderson Cove Basin	Kitsap Lake Basin, KL-2	Kitsap Lake Basin, KL-3	Kitsap Lake Basin, KL-4	Kitsap Lake Basin	Marine Drive Basin	OB Basin, MD-1, OB-2	OB Basin, OB-3, OB-5	Madrona Point, OB-4
CSO Outfalls	--	--	--	--	--	--	--	--	--
Discharge Location	End of High Ave into beach sewer; intertie to CTP at 13th/Ohio	Gravity Sewer Near Pendergast Field to WWTP	KL-1	KL-2	KL-3	Kitsap Way gravity sewer, flows to OB-1	Gravity Sewer at Bremerton Blvd & Arsenal Way	OB-1	OB-2
	Note: Maximum Capacity and Maximum TDH does not include operation of the standby pump (e.g. 3 pumps at a station will include 2 pumps plus 1 standby. The standby pump will not operate unless one of the other pumps fails.)								

Parameter	STATION								
Pump Station	**OB-4**	**OB-5**		**OB-6**	**OB-7**	**PB-1**	**PB-2**	**PP-1 (PG)**	**SB-1**
Type	Dry Well	Dry Well		Dry Well	Wet Well	Dry Well	Dry Well	Wet Well	Wet Well
Notes/Description	--	May be upgraded in near future		--	--	S&LI Package Pump Station	S&LI Package Pump Station	--	--
Year Constructed	1971	1966		1966	~1970	~1970	~1970	~1990	--
Significant Upgrades/Updates	--	--		--	--	--	--	--	--
Pump Manufacturer	Fairbanks	Flygt	Flygt	Flygt	Essco	Flygt	Fairbank-Morse	Essco	Flygt
Number of Pumps	2	1	1	2	2	2	2	2	2
Pump Type	Dry-pit Submersible	Dry-pit Submersible	Dry-pit Submersible	Dry-pit Submersible	Submersible	Dry-pit Submersible	Dry-pit	Submersible	Submersible
Horsepower	5	12	15	15	50	20	--	8	105
Lead-Lag or Standby?	LL	Lead	Lag	LL	LL	LL	LL	LL	LL
VFDs? (Y/N)	N	Y	Y	N	N	N	N	N	Y
Single Pump Capacity (gpm)	150	350	--	490	375	150	--	--	--
Operating TDH (ft)	46	--	--	40	70	100	--	--	--
Maximum Capacity (gpm)	--	500		--	--	--	350	140	--
Maximum TDH (ft)	--	--		--	--	--	--	45	--
Backup Power	Portable	Portable		Portable	No	Portable	Portable	Portable	Yes
Basin / Upstream Station	Madrona Point	Oyster Bay Basin, OB-6		Oyster Bay Basin	Erlands Point Apartment	Phinney Bay Basin	Phinney Bay Basin	Services Pendergast ONLY	--
CSO Outfalls	--	--		--	--	--	--	--	--
Discharge Location	OB-3	OB-2		OB-5	Gravity sewer on Austin Dr 600' NW of Olding RD	Callow Avenue gravity sewer	PB-1	KL-1 discharge gravity sewer, south of Francis St.	SW Bremerton Force Main
	Note: Maximum Capacity and Maximum TDH does not include operation of the standby pump (e.g. 3 pumps at a station will include 2 pumps plus 1 standby. The standby pump will not operate unless one of the other pumps fails.)								

Parameter	STATION								
Pump Station	**SB-2**	**SB-3**	**SB-4**	**WB-1**	**WB-2**	**WB-3**		**WB-4**	**WB-6**
Type	Wet Well	Wet Well	Wet Well	Wet Well	Dry Well	Dry Well		Dry Well	Wet Well
Notes/Description	--	--	--	Maintatined by KCSD#1	Maintatined by KCSD#1	--		S&LI Package Pump Station	CSO Flow Only
Year Constructed	--	--	--	1989	1989	2002/03		1971	2003
Significant Upgrades/Updates	--	--	--	--	--	--		--	--
Pump Manufacturer	Flygt	Flygt	Flygt	--	--	Flygt	Fairbanks	Smith & Loveless	Flo-Serve
Number of Pumps	2	2	2	2	2	2	3	2	3
Pump Type	Submersible	Submersible	Submersible	Submersible	--	Dry-pit Submersible	Dry-pit Submersible	Dry-pit	Submersible
Horsepower	11	23	24	--	--	20	238	5	200
Lead-Lag or Standby?	LL	LL	LL	LL	LL	LL	LL - 3rd Pump Standby	LL	LL - 3rd Pump Standby
VFDs? (Y/N)	Y	Y	Y	--	--	Y	Y	N	Y
Single Pump Capacity (gpm)	--	--	--	230	780	950	5300	100	3750
Operating TDH (ft)	--	--	--	50	70	55	110	42	130
Maximum Capacity (gpm)	--	--	--	--	--	10000		--	--
Maximum TDH (ft)	--	--	--	--	--	--		--	--
Backup Power	Yes	Yes	Yes	No	No	Yes		Portable	Yes
Basin / Upstream Station	--	--	--	Sinclair Park, Beachfront	KCSD #1	Callow Ave, PSNS, Phinney Bay, Anderson Cove		Callow Ave Basin	WB-3 Overflow
CSO Outfalls	--	--	--	--	--	OF-17		--	OF-17
Discharge Location	SB-1	SW Bremerton Force Main	SW Bremerton Force Main	Crosstown Pipeline	Crosstown Pipeline	Crosstown Pipeline		Farragut St gravity sewer that goes to WB-3	Crosstown Pipeline
	Note: Maximum Capacity and Maximum TDH does not include operation of the standby pump (e.g. 3 pumps at a station will include 2 pumps plus 1 standby. The standby pump will not operate unless one of the other pumps fails.)								

Parameter	STATION								
Pump Station	**EB-2**		**EB-3**	**EB-4**	**EB-5**	**EB-6**	**EB-7**	**EB-8**	**EB-9**
Type	High Flow (Wet Well)	Normal Flow (Wet Well)	Dry Well	Wet Well	Wet Well	Wet Well	--	Dry Well	Wet Well
Notes/Description	Active for high flow	Active for low flow	--	Converted Wet Well	Converted to Wet Well	--	Pending (2025)	S&LI Package Pump Station	--
Year Constructed	1973		1972	~1940	~1970	1947	--	1971	~1970
Significant Upgrades/Updates	2003		1984, 2005	--	1995	2004	--	--	--
Pump Manufacturer	Flowserve	Flygt	Flygt	Flygt	Zoeller	Flygt	--	Smith & Loveless	Flygt
Number of Pumps	3	2	2	2	2	3	--	2	2
Pump Type	Submersible	Submersible	Dry-pit Submersible	Submersible	Submersible	Submersible	--	Dry-pit	Submersible
Horsepower	75	5	30	7.5	2	45	--	10	10
Lead-Lag or Standby?	LL - 3rd Pump Standby	LL	LS	LL	LL	LL - 3rd Pump Standby	--	LL	LL
VFDs? (Y/N)	Y	N	Y	N	N	Y	--	N	N
Single Pump Capacity (gpm)	2175	450	750	100	245	650	--	200	100
Operating TDH (ft)	91	30	64	80	50	102	--	51	75
Maximum Capacity (gpm)	4100		1400	--	--	1200	--	--	--
Maximum TDH (ft)	--		--	--	--	--	--	--	--
Backup Power	Yes		Yes	Portable	Portable	Yes	--	Portable	Portable
Basin / Upstream Station	Trenton Ave Basin		Trenton Ave Basin	Trenton Ave Basin	Trenton Ave Basin	Tracyton Beach Basin	--	Pine Road Basin	Pine Road Basin
CSO Outfalls	OF-7		OF-7	--	--	OF-6	--	--	--
Discharge Location	Eastside Beachmain		Gravity sewer on E. 10th, flows to EB-2	Gravity sewer on Jacobsen Blvd by Trenton Ave	Trenton Ave at Holman St gravity sewer	Gravity sewer at Lebo BLVD and Hefner St	--	Gravity sewer at Sugar Pine Dr and Pinecone Dr	Gravity sewer on NE Pinecrest Dr
	Note: Maximum Capacity and Maximum TDH does not include operation of the standby pump (e.g. 3 pumps at a station will include 2 pumps plus 1 standby. The standby pump will not operate unless one of the other pumps fails.)								

Appendix D: Treatment System Modeling Results

Bremerton Westside WWTP

Aeration Basin Capacity Modeling Summary

Prepared By: Eun Kim
Date: May 16, 2024
Checked By: David Seymour
Summary- A summary of the modeling results for three scenarios is provided below. The targeted SRT of the aeration basins was met for Scenario 2, where the aeration basins are in service to treat the 2044 AAF and AAL. However, the SRT for the MML and the AAL in the maintenance scenario did not meet the targeted

	S1	S2	S3	
Design Year	2044	2044	2044	
Influent Flow	MM WWF	AAF	AAF	
Influent Load	MML	AAL	AAL	
Influent Data				Notes
Influent Flow, MGD	13.50	6.19	6.19	
Influent COD, mg/L	218	352	352	
Influent cBOD, mg/L	115	185	185	
Influent TSS, mg/L	139	232	232	
Influent VSS, mg/L	105	177	177	
Influent TKN, mg/L as N	23.0	37.1	37.1	
Influent Ammonia, mg/L as N	15.5	25.0	25.0	
Influent TP, mg/L as P	2.6	4.1	4.1	
Influent Alkalinity, mg/L as CaCO3	280	280	280	
Process				
Primary Clarifier Area, sqft	10053	10053	10053	
Aeration Basin Volume, MG	0.83	0.83	0.41	
Secondary Clarifier Area, sqft	19007	19007	19007	
Anaerobic Digester Volume, MG	0.68	0.68	0.68	
Primary Clarification				
Primary Sludge Flow, GPD	21300	20800	20200	
Primary TSS Removal Rate, % per Influent	45%	59%	59%	
Primary CBOD Removal Rate, , % per Influent	25%	33%	33%	
Primary TKN Removal Rate, , % per Influent	-5%	-2%	-4%	
Primary Effluent TSS, mg/L	76.3	94.7	94.5	
Primary Effluent CBOD, mg/L	85.6	124.3	124.5	
Primary Effluent TKN, mg/L	24.2	37.8	38.5	
Aeration Basin				
Aeration Basin Total SRT, days	2.4	4.0	2.0	Target = 5 days (WWF), 4 days (AAF)
Total HRT, hrs	1.5	3.2	1.6	
MLSS Concentration, mg/L	2509	2487	2532	
MLVSS Concentration, mg/L	2058	1982	2255	
VSS/TSS Ratio	0.82	0.80	0.89	
Aeration Basin DO, mg/L	2.0	2.0	2.0	
Aeration Basin Airflow, scfm	2008	1715	1384	
Solids Production and Yield				
Yield, lbs TSS/lbs PE CBOD	0.74	0.66	0.69	(WAS TSS+Eff TSS)/PE CBOD
RAS TSS, mg/L	8504	5211	5301	
WAS Flow, MGD	0.10	0.10	0.10	
WAS, lbs/d at RAS TSS Calculated	7156	4259	4417	
RAS Rate, MGD	5.60	5.60	5.60	
RAS Flow Fraction	0.41	0.90	0.90	
Secondary Effluent				
CBOD, mg/L	14	12	17	Permit: '<25 mg/L
Soluble CBOD, mg/L	4	2	4	
TSS, mg/L	20	24	24	Permit: '<30 mg/L
pH	7.0	7.1	7.1	
NH3-N, mg/L	18	29	29	
TKN, mg/L	20.1	31.8	32.5	
NO3-N, mg/L	0.0	0.0	0.0	
Alkalinity, mg/L as CaCO3	289.1	289.1	289.1	
DO, mg/L	2.0	2.0	2.0	
Temperature, C	11.5	17.0	17.0	
RDT (Thickening)				
Thickened TSS, %	7.2%	7.0%	7.3%	
Thickened TSS to Digester, ppd	6656	3983	4112	
Thickened VSS to Digester, ppd	5456	3156	3660	
Anaerobic Digestion				
Digester Volume, MG	0.68	0.68	0.68	
HRT, days	20.9	24.6	25.1	
Digested TSS (model), TS (DMR), %	3.4%	3.3%	3.2%	
Digested VSS (mode), VS (DMR), %	1.8%	1.7%	1.6%	
VS/TS,%	52.5%	52.1%	51.2%	
Gas, scfd	84602	60665	69879	
GAS/VS Fed, scf/lbs	7.6	7.1	7.7	
VSS destruction, %	57%	54%	59%	
Centrifuge				
Dewatered TSS, %	22%	22%	22%	
Cake Dry, PPD	7470	6079	5994	
Centrate TKN, mg/L	1691	1428	1614	
Centrate Flow, GPD	28400	24200	23800	
Aeration				
Total SOTR, lb/hr	545	464	375	
Aeration Basin SOTE	26.0%	25.9%	26.0%	
Aeration Basin OUR, mg/L/hr	13.1	13.1	13.1	
Airflow, scfm	2008	1715	1384	

Appendix E: Interagency Agreements

- Agreement 1: Interlocal Agreement KC 111-93 – Removal of Sanitary Sewer Meters.
- Agreement 2: Water & Sewer Service Agreement with US Navy for Water & Wastewater Rates.

COPY OF SEWER SERVICE AGREEMENT WITH KITSAP COUNTY FOR DISTRICT 1 SEWER DISCHARGE TO CITY SYSTEM
23 PAGES TOTAL
EXPIRES: IF EITHER PARTY DECIDES TO TERMINATE
RENEWS: EVERY 5 YEARS
LAST REVIEWED: MAY 1, 2014

PUBLIC WORKS & UTILITIES
Director's Office

August 7, 2007

Mr. Barry Loveless
Kitsap County Public Works
614 Division Street, MS-26
Port Orchard, WA 98366

Re: Interlocal Agreement KC 111-93 – Removal of Sanitary Sewer Meters

Dear Barry:

The City of Bremerton requests this letter serve as evidence of an understanding between our agencies with regard to the removal of two sanitary sewer meters located in the Kitsap County Sewer District #1 system. In accordance with the existing Interlocal Agreement, sewer fees for the system are based on a wholesale rate and accompanying flow rate. If average flow exceeds .4 mgd per day, rate adjustment provisions are applied for the additional flow. The City wishes to remove these meters for the following reasons:

- In over 2 years, average flow has not exceeded the base flow rate. As such, the City is currently expending funds to calibrate the meters yearly, plus crew time to read the meters, maintain, and service them. The benefit here to the County is that the utility billing will remain the same, any flows exceeding the wholesale rate will not be metered or billed.

- As you are aware, the City has been negotiating with the County to take over responsibilities for this system. Upon transfer, the meters will no longer be needed. Transfer of the system should be within the year. As the City and County currently have our joint project, the SR 304 T.I.P.; Navy Yard Highway Phase, working adjacent to the meter at 1550 Charleston Beach Road this would be an opportune time to remove the meter and vault now.

Removal of the meters would be done at no expense to the County. If you agree to their removal, please sign and return the letter. If you have any questions or require additional information, please contact Gunnar Fridriksson at 360.473.2354.

Sincerely,

Phil Williams
Director of Public Works & Utilities

I concur with the City's request.

cc:
Mike Mecham, City Engineer
Lynn Price, Project Manager
Gunnar Fridriksson, Civil Engineer II
Ann Finnegan, Utility Billing Supervisor
Stella Vakarcs , P.E., Kitsap County

Contract Number	5317
Vendor	KITSAP COUNTY SEWER DISTRICT #1
Subject	ILA - Discharge of Sewer
Department	Public Works
File Class	LEG 12-1
Begin Date	8/1/1991
End Date	
Review Date	5/1/2014
Vault Date	
Comments	Renews every 5 years unless termed

INTERLOCAL AGREEMENT FOR DISCHARGE OF SEWER
SEWER DISTRICT #1

THIS AGREEMENT, between Kitsap County Sewer District #1, a municipal corporation, duly organized and existing under the laws of the State of Washington, hereinafter referred to as "DISTRICT", and the City of Bremerton, a municipal corporation organized and existing under the laws of the State of Washington, hereinafter referred to as "CITY", is entered into pursuant to and in conformity with RCW 39.34, the Interlocal Corporations Act and RCW 39.67.300

THE PARTIES AGREE as follows:

Section 1. Purpose and Scope of Contract

The CITY shall receive from, treat, and dispose of the DISTRICT's wastewater in accordance with the terms and specifications as hereinafter set forth. This agreement replaces and supersedes all previous agreements entered into between the CITY and the DISTRICT for service.

Section 2. Term of Contract

This contract will be in effect for a period of five years from

August 1, 1991. The agreement will automatically renew for an additional five year term, unless one of the parties gives written notice of an intent to terminate not less than 180 days in advance of the end of the initial five year term. Provided, however, that the CITY may not terminate this agreement unless the DISTRICT has a suitable alternate source for treatment of its wastewater. ~~Nothing stated herein shall prevent renewal or extension of this agreement beyond 10 years upon approval and agreement of both parties.~~

Section 3. Definitions

For the purpose of this agreement, unless it is plainly evident from the context that a different meaning is intended, the following words and phrases when used, are defined as follows:

"Allocated Flow" means the maximum average flow that the DISTRICT is permitted to discharge into the CITY System.

"Average Flow" means the average daily discharge of sewage computed by dividing the total quantity discharged during a month by the total number of days in said month. The result is expressed in million gallons per day (MGD).

"Biochemical Oxygen Demand" (BOD) means the quantity of oxygen used in the biochemical oxidation of organic matter in a specified time

and at a specified temperature. BOD shall be the standard measure of sewage strength.

"Capital Costs" means costs relating in whole or in part to the CITY treatment system and conveyance system which CITY has incurred or plans to incur for the purpose of new or expanded facilities and equipment to accommodate population, commercial and industrial growth; to meet federal, state, regional and local regulatory requirements; to replace deteriorated or inefficient facilities and equipment that are beyond the scope of normal maintenance; or for monitoring and data collection facilities. Such costs shall include, but not be limited to both direct and indirect costs for planning, design, construction, equipment, inspection, change orders and claims settlements.

"CITY" means authorized employees and officials of the City of Bremerton or its designated agent.

"City Treatment System" means the City of Bremerton Wastewater Treatment Plant, any sludge processing facilities (wherever located) designed to be operated in coordination or conjunction with the foregoing facility, and appurtenances necessary for the operation of the same.

"Conveyance System" means all main line gravity sewers and force mains and pump stations, including appurtenances necessary or

convenient to the operation thereof. Said appurtenances include, but are not limited to, flow metering stations, control equipment, maintenance and cleanout facilities, and easements. These improvements may also be referred to in this contract as the "Transmission System".

"Direct Costs" mean those costs to CITY which are identified specifically with a particular project. Direct costs may include, but are not limited to, direct labor; costs of materials acquired, expended, or consumed; costs of construction contracts; costs of consultant contracts and costs of energy to operate the treatment and conveyance facilities.

"DISTRICT" means authorized employees and/or officials of Kitsap County Sewer District No. 1 or its designated agent.

"DISTRICT System" means all wastewater collection and conveyance facilities owned and operated by DISTRICT including gravity sewers, force mains, and pump stations.

"Domestic Sewage" means wastewater from ordinary living processes discharged from dwellings, business buildings, and institutions.

"Domestic Sewage Strength" is defined as not to exceed 220 mg/L BOD and/or TSS.

"Excess Flow" means flow over the average flow allocated to the DISTRICT.

"Indirect Costs" means those costs to CITY which are applicable to a project or activity but are allocated among organizational units in relation to benefits derived in accordance with generally accepted accounting principles. Indirect costs may include, but are not limited to, labor expenses for elected officials and their staffs, for commissions, and for performance of administrative and supervisory functions; and expenses for data processing services, building services, utilities and materials.

"Infiltration" means water other than wastewater which enters a sewer system from the ground through such means as defective pipes, pipe joints, connections, or access structures. Infiltration does not include, and is distinguished from, inflow.

"Inflow" means water other than wastewater which enters a sewer system from sources such as roof leaders, cellar drains, yard drains, area drains, drains from springs and swampy areas, access structure covers, cross connections between storm sewers and sanitary sewers, catch basins, storm waters, surface runoff, or drainage. Inflow does not include, and is distinguished from, infiltration.

"MGD" means million gallons per day of wastewater flow.

"Peak Flow" means the highest instantaneous rate of discharge, expressed as a volume per unit of time.

"Point of Delivery" means any connection of a DISTRICT Sewer to the CITY System.

"Service Area" means the areas located within the City or County jurisdiction designated to be served by CITY or DISTRICT. A service area may extend beyond the CITY or DISTRICT boundaries respectively. Respective Service areas in the vicinity of the DISTRICT shall be as defined in this agreement.

"Sludge" means the accumulated settled solids deposited from wastewater or industrial wastes, raw or treated.

"System Capacity" means the annual average design capacity of the City System.

"System Average Flow" means the system volume divided by the number of time units in a calendar year.

"System Volume" means the volume of sewage treated in the CITY System during a calendar year.

"Total Suspended Solids" (TSS) means solids that either float on the surface of, or are suspended in water, wastewater, or other

liquids and are largely removable by laboratory filtrations. TSS is a standard measure of sewage strength.

"Wastewater" means the combination of the liquid and water - carried wastes discharged from residences, commercial and industrial establishments, together with infiltration and inflow that may be present.

"Wholesale Rate" means a negotiated charge per unit of wastewater discharged to the City system by a customer whose discharge volume represents a significant portion of system volume such that direct cost allocations are feasible.

Section 4. Service Levels

A. Allocated Flow

The DISTRICT is allocated an average flow of .4 million gallons per day into the city treatment system. All discharges by the DISTRICT to the CITY system shall be through the three flow metering stations:

Pump Station WB-1 Flow Metering Station

Pump Station WB-2 Flow Metering Station

C Street Flow Metering Station

No other points of discharge to the CITY system are presently known. Should additional points of discharge be identified in the future, the method of metering such discharges shall be as

designated by the CITY.

B. Sewage Strength

All wastewater discharge by the DISTRICT to the CITY system shall be domestic sewage strength as defined in Section 3 above.

Section 5. Wholesale Rate

A. Initial Wholesale Rate

Commencing with the month of August 1991, the DISTRICT shall pay a wholesale rate of $15,970 per month. This rate assumes the DISTRICT's average flow does not exceed .4 mgd per day. If the average flow exceeds this limit, the rate adjustment provisions found in subsection D below shall apply.

B. Basis for Initial Wholesale Rate.

The CITY and the DISTRICT agree that the initial monthly wholesale rate is established using the figures set forth below. The CITY and the DISTRICT agree these numbers represent the DISTRICT's appropriate share of the system expense, given the DISTRICT's allocation of plant capacity. The basis for the monthly wholesale rate is as follows:

Capital Cost Debt Service	$ 130,915.00
Operations and Maintenance	41,175.00
City overhead	6,176.25
SUBTOTAL	$ 178,266.25

B & O tax of 6%	10,695.98
Excise tax of 1.5%	2,673.99
Total payment in first year of contract	$ 191,636.22 ÷ 12
Monthly Kitsap Sewer District Wholesale Rate	$ 15,970.00

C. Adjustments to Initial Wholesale Rate

(1) August 1st of each year, the operation and maintenance, and CITY overhead numbers, will be adjusted upward by the percentage increase in the Seattle/Everett all item consumer price index during the preceding calendar year, or the successor to this index. If there is not successor, then any generally accepted index showing the inflation rate, if any, for the United States as a whole shall be used to establish the increase in the rate.

(2) At the CITY's request, the capital cost figure will be adjusted upward to reflect the DISTRICT's proportionate share of any treatment system capital cost incurred. Provided, however, this does not include treatment system capital costs to increase plant capacity. The additional debt service shall be computed after deducting any portion of the treatment system capital cost paid by the United States Navy, or grants.

(3) The B & O tax and excise tax expenses shall be adjusted in the next calendar month after any change in their rate. These taxes shall also be adjusted in the next calendar month after any change in the DISTRICT's share of the capitol cost, operation and

maintenance, and CITY overhead expense.

(4) For any given calendar month, the wholesale rate shall be the sum of the DISTRICT's responsibility for capitol cost debt service, operation and maintenance, CITY overhead, B & O taxes, and excise taxes, as they may be adjusted above. It is the CITY's responsibility to advise the DISTRICT of the need for these adjustments, and the basis for their assessment.

D. Adjustment for Excess Average Flow

(1) The DISTRICT's allocated flow is .4 mgd. As provided in Section 6(A), the CITY will measure the DISTRICT's wholesale flow on the first Monday of each calendar month. For any measuring period when the total wholesale flow exceeds .4 mgd times the number of days in the measuring period, the DISTRICT shall pay the wholesale rate as established under Paragraph 5(A) above, plus the following additional charge:

a. For up to 3 million gallons of flow beyond the allocated flow, $2.14 per thousand gallons in flow, or part thereof.

2 b. For all flow beyond 3 million gallons over the allocated flow, $2.81 per thousand gallons, or part thereof.

(2) The additional charge for excess flow will not apply until two years after the date this agreement is executed and approved by both the CITY and KITSAP COUNTY SEWER DISTRICT #1. August 1 of each year, beginning with the first August 1 after the additional

charge for excess flow is in effect, the rates for excess flow shall be adjusted upward by the percentage increase in the Seattle/Everett All Item Consumer Price Index during the preceding calendar year, or the successor to this index. If there is no successor, than any generally accepted index showing the inflation rate, if any, for the United States as a whole shall be used to establish the increase in the rates.

E. Wholesale Rate Adjustments for Excess Domestic Sewage Strength

X

X

X

X

X

X

X

X

X

X

X

X

X

1. The CITY will periodically test the strength of the DISTRICT's sewage. If for any three consecutive tests, the DISTRICT's sewage strength exceeds "domestic sewage strength" as defined in Section 3 above, the CITY reserves the right to reopen this contract on the issue of whether there should be a surcharge for excess sewage strength. For the purpose of this subparagraph, the CITY shall use the "twenty-four hour composite sample" method to test the sewage strength.

Section 6. Metering, Billing, and Payment

A. The CITY will be responsible for measuring flows at the points of delivery identified in Section 4 above. The CITY shall install, operate, and maintain the required metering equipment. The CITY will read the flow meters on the first Monday of each month.

B. The CITY shall submit a monthly bill for wholesale sewer service to the DISTRICT based on the contract rates defined in this agreement. The bill will include a statement of the DISTRICT's total monthly flows to the CITY's sewage system at each flow monitoring station.

C. The DISTRICT shall pay the CITY for services rendered within 60 days of receipt of the bill from the CITY. Interest at the rate of 1% per month will be charged on any invoice not paid with the 60 day limit. A minimum of one month's interest will be charged for

all late payments.

D. On a bi-monthly basis, the CITY shall provide the DISTRICT with a computerized list showing the domestic water consumption for all CITY water customers found within the service area boundary of the DISTRICT.

Section 7. Service Area Boundary

(a) For the purposes of this agreement, the boundaries of the DISTRICT service area shall be defined as follows:

Beginning at a point that is the junction of the East right-of-way line of McCollum Avenue and the boundary of Sinclair Inlet meander line, then NE along McCollum Avenue to the NW right-of-way line of SR304 the NE along SR304 right-of-way approximately 760 feet, then NW to Lafayette Avenue, then SW along Lafayette Avenue to McCollum Avenue, then North along McCollum Avenue to Preble Street, then West along Preble Street to the center of Section 22 T24N R1E, then North (along the center of section line) 360 feet, then West from the center of section line to a point 250 feet East of National Avenue, then North parallel to National Avenue to a point 150 feet South of 1st Street, then West parallel to 1st Street to Oyster Bay Avenue, then South along Oyster Bay Avenue and to SR3, then South along the east margin of SR3 to the South

section line (Section 22, Township 24 North, Range 1 East) then West along the section line to the 1/8 section corner of Section 28, Township 24 North, Range 1 East, then South along said 1/8 section line to Davis Street, then West on Davis Street to Kent Avenue and South on Kent Avenue to the center of section line (Section 28, Township 24 North, Range 1 East) then East of the center line to Sinclair Inlet.

(b) The CITY agrees to not extend service to any resident within the DISTRICT's service area boundaries, except by written permission of the DISTRICT or as may be defined pursuant to R.C.W. 35.13A. The DISTRICT agrees to not extend service or expand its boundaries to any resident beyond the DISTRICT service area boundaries except by written permission of the CITY.

(c) If the DISTRICT chooses to reassign any of its allocated flow to the CITY, the DISTRICT's wholesale rate, and the formula for establishing excess flow charges, shall be adjusted proportionate to the reassignment.

Section 8. Facilities Ownership and Operation Responsibilities

The CITY and DISTRICT with the execution of this agreement acknowledge that ownership of all facilities lying within the DISTRICT and upstream of the CITY's metering stations shall remain the property of the DISTRICT. The CITY assumes no responsibility

for operating, maintaining or replacing the DISTRICT's facilities by this agreement.

At the request of the DISTRICT, the CITY may, at its option based upon available resources, provide additional services to the DISTRICT on a time and materials basis. Other services may include, but not be limited to, operation, maintenance or repair of facilities owned and operated by the DISTRICT, surveys, comprehensive planning,and utility billing.

The CITY reserves the right to construct, use, own and maintain transmission mains and appurtenances for the purposes of conveyance of CITY wastewater from the CITY's system across the DISTRICT to the CITY's Wastewater Treatment Plant, subject to the terms of its existing and future local and state franchise agreements.

Section 9. Transfer Ownership of Facilities

The DISTRICT agrees to discontinue use, vacate, and transfer ownership to the CITY the 21- to 24-inch diameter sewage transmission main, originating at a connection point to the CITY's system at Rodgers Road and Auto Center Way and continuing South along the west side of State Highway No. 3, to a connection point to the CITY's system at the north property line of the CITY's Wastewater Treatment Plant. Together with those collection system mains and appurtenances lying West of SR3 and north of the south

section line of Section 21, Township 24 North, Range 1 East.

The CITY agrees to discontinue use, vacate, and transfer ownership to the DISTRICT the 14- to 21-inch diameter sewage transmission main originating at a connection point with the CITY system at Oyster Bay Blvd. and Arsenal Way and continuing south along the east side and across State Highway No. 3 to a connection point with the City's system at D Street and Bayview Drive.

Section 10. Regulatory Compliance

The DISTRICT agrees to comply with the provisions of all federal, state, and local rules and regulations governing sewage systems and the introduction of prohibitive discharges. The DISTRICT further agrees to insure that DISTRICT customers comply with all federal, state, and local rules and regulations regarding sanitary sewer construction. In the case of discrepancies between rules or regulations, the most stringent shall apply.

Section 11. General Conditions

(a) This document, including the exhibits incorporated herein, embodies the entire agreement between the CITY and the DISTRICT. No verbal agreements or conversations with any officer, agent, or employee of the CITY or DISTRICT prior or subsequent to the execution of this agreement shall affect, or modify any of its

terms or obligations. Deviation of any sort from the agreement terms must be authorized formally, in writing. No other authority for deviation from this agreement will be recognized as prior or official.

The parties expressly reserve the right to renegotiate the provisions hereto, including the terms of this agreement, from time to time as may be necessary and to amend this agreement in response to current and future regulatory or other applicable requirements, provided however, that no alteration or modification of the terms or conditions hereof shall be valid and binding unless made in writing and signed by the authorized representatives of the parties.

(b) This agreement shall be binding upon the successors and assigns of each of the parties. But neither party will assign this agreement without the written consent of the other. This written consent will not be unreasonably withheld, and at execution of this agreement, the CITY understands and accepts that the DISTRICT intends to assign its rights and responsibilities under this contract to Kitsap County at some time in the future.

(c) It is understood that the relationship of the CITY to the DISTRICT is independent. None of the employees or agents of the respective parties shall be considered employees of the other.

(d) Each party warrants and represents that it has authority to enter into this agreement.

(e) All notices to be given by either of the parties hereto to the other party shall be in writing and may either be delivered personally or may be deposited in the United States Mail, postage prepaid, as either certified or regular mail, addressed as specified below, or to such other designate in writing. Notices sent by mail shall be deemed to have been given 48 hours after properly mailed; the postmark affixed by the United States Post Office shall be conclusive evidence of the date of mailing.

City: Director of Utilities
3027 Olympus Drive
Bremerton, WA 98310

City Clerk
239 Fourth Street
Bremerton, WA 98310

District: Sewer District No. 1
702 Charlotte Ave S
Bremerton WA 98312

(f) In the event that any provision herein is declared illegal or invalid, no other provisions of this agreement shall be affected,

and this agreement shall then continue in full force and effect as though such illegal or invalid provisions had not been contained herein.

(g) This agreement shall be construed and interpreted in accordance with the laws of the State of Washington. The venue of any action brought hereunder shall be the Superior Court of Kitsap County, Washington.

(h) The DISTRICT agrees to complete and present to the CITY by December 31, 1993, a complete infiltration and inflow study, and an engineering report/comprehensive plan establishing the DISTRICT's capital needs, estimated costs for construction, and a schedule for construction, to repair any infiltration and inflow problems or other capital deficiencies found within the DISTRICT's system.

(i) The City will agree to defend, and hold the District, and its assigns, harmless from, the pending litigation over the sewer plant, including the costs of litigation. Provided, that if the City is required to provide any capital improvements to the plant, or purchase land to resolve the litigation, the District and its assigns will pay 6.34% of the average annual debt service for this expense.

(j) If either party to this agreement is required to use the

services of an attorney to enforce any provisions in this agreement, the prevailing party in that dispute shall be entitled to an award of costs, and a reasonable attorney's fee.

DATED this 27 day of July, 1992.

CITY OF BREMERTON

BY: _____
LOUIS MENTOR, Mayor

ATTEST:

_____
KATHLEEN L. McCLUSKEY, Clerk

DEPARTMENT APPROVAL:

BY: _____
WILLIAM DUFFY,
Utilities Director

APPROVED AS TO FORM:

_____
IAN R. SIEVERS, City Attorney

KITSAP COUNTY SEWER DISTRICT #1

BY: _____
Lynn A. Johnson

_____

STATE OF WASHINGTON)
: ss.
COUNTY OF KITSAP)

On this day personally appeared before me Louis Mentor, Bremerton City Mayor, and Kathleen L. McCluskey, Bremerton City Clerk, to me known to be the individuals described in and who executed the within and foregoing instrument, and acknowledged that they signed the same as their free and voluntary act and deed for

the uses and purposes therein mentioned.

Given under my hand and official seal this 28 day of July, 1992.

Darlene E Hermann
Notary Public in and for the State of Washington, residing at Bremerton.
My Commission Expires: 10-4-94.

STATE OF WASHINGTON)
: ss.
COUNTY OF KITSAP)

On this day personally appeared before me JAMES HOOD, LYNN JOHNSON, and GEORGE MURKER, of Kitsap County Sewer District #1, to me known to be the individuals described in and who executed the within and foregoing instrument, and acknowledged that they signed the same as their free and voluntary act and deed for the uses and purposes therein mentioned.

Given under my hand and official seal this 6 day of April, 1992.

Notary Public in and for the State of Washington, residing at Bremerton.
My Commission Expires: 11/1/92.

COPY OF WATER & SEWER SERVICE AGREEMENT WITH US NAVY FOR WATER & WASTEWATER RATES
32 PAGES TOTAL
EXPIRES: NOVEMBER 31, 2027

SOLICITATION, OFFER AND AWARD

1. THIS CONTRACT IS A RATED ORDER UNDER DPAS (15 CFR 700)	RATING	PAGE 1 OF PAGES 22

2. CONTRACT NO.	3. SOLICITATION NO.	4. TYPE OF SOLICITATION	5. DATE ISSUED	6. REQUISITION/PURCHASE NO.
N4425518C5002		[ ] SEALED BID (IFB) [ ] NEGOTIATED (RFP)		

7. ISSUED BY	CODE	8. ADDRESS OFFER TO (If other than Item 7)	CODE
NAVFAC NORTHWEST 1101 TAUTOG CIRCLE SILVERDALE WA 98315-1101 TEL: FAX:	N44255	See Item 7 TEL: FAX:	

NOTE: In sealed bid solicitations "offer" and "offeror" mean "bid" and "bidder".

SOLICITATION

9. Sealed offers in original and _____ copies for furnishing the supplies or services in the Schedule will be received at the place specified in Item 8, or if handcarried, in the depository located in _____ until _____ (Hour) local time _____ (Date)

CAUTION - LATE Submissions, Modifications, and Withdrawals: See Section L, Provision No. 52.214-7 or 52.215-1. All offers are subject to all terms and conditions contained in this solicitation.

10. FOR INFORMATION CALL:	A. NAME	B. TELEPHONE (Include area code) (NO COLLECT CALLS)	C. E-MAIL ADDRESS

11. TABLE OF CONTENTS

(X)	SEC.	DESCRIPTION	PAGE(S)	(X)	SEC.	DESCRIPTION	PAGE(S)
		PART I - THE SCHEDULE				**PART II - CONTRACT CLAUSES**	
X	A	SOLICITATION/ CONTRACT FORM	1	X	I	CONTRACT CLAUSES	9 - 21
X	B	SUPPLIES OR SERVICES AND PRICES/ COSTS	2			**PART III - LIST OF DOCUMENTS, EXHIBITS AND OTHER ATTACHMENTS**	
X	C	DESCRIPTION/ SPECS./ WORK STATEMENT	3 - 4	X	J	LIST OF ATTACHMENTS	22
	D	PACKAGING AND MARKING				**PART IV - REPRESENTATIONS AND INSTRUCTIONS**	
X	E	INSPECTION AND ACCEPTANCE	5		K	REPRESENTATIONS, CERTIFICATIONS AND OTHER STATEMENTS OF OFFERORS	
X	F	DELIVERIES OR PERFORMANCE	6				
X	G	CONTRACT ADMINISTRATION DATA	7 - 8		L	INSTRS., CONDS., AND NOTICES TO OFFERORS	
	H	SPECIAL CONTRACT REQUIREMENTS			M	EVALUATION FACTORS FOR AWARD	

OFFER (Must be fully completed by offeror)

NOTE: Item 12 does not apply if the solicitation includes the provisions at 52.214-16, Minimum Bid Acceptance Period.

12. In compliance with the above, the undersigned agrees, if this offer is accepted within _____ calendar days (60 calendar days unless a different period is inserted by the offeror) from the date for receipt of offers specified above, to furnish any or all items upon which prices are offered at the price set opposite each item, delivered at the designated point(s), within the time specified in the schedule.

13. DISCOUNT FOR PROMPT PAYMENT (See Section I, Clause No. 52.232-8)				
14. ACKNOWLEDGMENT OF AMENDMENTS (The offeror acknowledges receipt of amendments to the SOLICITATION for offerors and related documents numbered and dated):	AMENDMENT NO.	DATE	AMENDMENT NO.	DATE

15A. NAME AND ADDRESS OF OFFEROR	CODE 04DN7	FACILITY 04DN7	16. NAME AND TITLE OF PERSON AUTHORIZED TO SIGN OFFER (Type or print)
CITY OF BREMERTON * 100 OYSTER BAY AVE N BREMERTON WA 98312-3455			* / GOV'T POC

15B. TELEPHONE NO (Include area code)	15C. CHECK IF REMITTANCE ADDRESS IS DIFFERENT FROM ABOVE - ENTER SUCH ADDRESS IN SCHEDULE.	17. SIGNATURE	18. OFFER DATE
360-473-5296	☐		

AWARD (To be completed by Government)

19. ACCEPTED AS TO ITEMS NUMBERED	20. AMOUNT	21. ACCOUNTING AND APPROPRIATION
	$864,340.00 EST	

22. AUTHORITY FOR USING OTHER THAN FULL AND OPEN COMPETITION:	23. SUBMIT INVOICES TO ADDRESS SHOWN IN (4 copies unless otherwise specified)	ITEM
☒ 10 U.S.C. 2304(c)(1) ☐ 41 U.S.C. 253(c)( )		

24. ADMINISTERED BY (If other than Item 7)	CODE	25. PAYMENT WILL BE MADE BY	CODE
See Item 7		DFAS CLEVELAND ACCOUNTS PAYABLE PO BOX 998022 CLEVELAND OH 44199-8022	N68732

26. NAME OF CONTRACTING OFFICER (Type or print)	27. UNITED STATES OF AMERICA	28. AWARD DATE
CHARLES D. BENSON TEL: 360-396-0052 EMAIL: chuck.benson@navy.mil	(Signature of Contracting Officer)	30-Nov-2017

IMPORTANT - Award will be made on this Form, or on Standard Form 26, or by other authorized official written notice.

Section B - Supplies or Services and Prices

ITEM NO	SUPPLIES/SERVICES	QUANTITY	UNIT	UNIT PRICE	AMOUNT
0001		399,740	Each	$1.00	$399,740.00 EST

Potable Water at NAVHOSP Bremerton
FFP
Price for metered water at the Naval Hospital shall be based on the City's retail water service rate for a six-inch meter (accounts 5352740 & 5352680) as indicated in the City of Bremerton Ordinance provided as Attachment J.1 to this contract. See Attachment J.2 for a listing of accounts and deduct meter sizes for water charges.
FOB: Destination

NET AMT	$399,740.00 (EST.)

ITEM NO	SUPPLIES/SERVICES	QUANTITY	UNIT	UNIT PRICE	AMOUNT
0002		464,600	Each	$1.00	$464,600.00 EST

Sewer Service at NAVHOSP Bremerton
FFP
Price for sewage at Naval Hospital Bremerton, (account 5352690) shall be based upon the City's retail wastewater service rate "Commercial 1" as shown on Attachment J.1 for rates and J.2 for cacluations.
FOB: Destination

NET AMT	$464,600.00 (EST.)

Section C - Descriptions and Specifications

DESCRIPTION OF SERVICE

C.1 General Requirements: The contractor shall provide all labor, supervision, tools, equipment, and transportation necessary to provide for services under this contract.

C.2 Premises to be Served:

Naval Hospital Bremerton
Buildings 01, 17, 87, and the Satellite Pharmacy
Boone Road
Bremerton, WA

C.3 Points of Delivery (P.O.D.):

CLIN – 0001 - Water shall be supplied by the City of Brremerton to the Naval Hospital via the two connections at Jackson Park Housing (contract N44255-18-C-5001). One P.O.D. is located near the southwesterly corner of Jackson Park Housing at Austin Drive and Olding Road, easterly along Olding Road approximately 400 feet. This P.O.D. is a 10" diameter supply pipe with a 10" meter. The second P.O.D. is located near the southeasterly corner of Jackson Park Housing, approximately 100 feet beyond Root Court and this is the 8" supply pipe and meter. The water used at the hospital is measured at the 6" meter found under account 5352740, (See the map in Attachment J.3)

CLIN – 0002 – Account 5352690, Wastewater shall be received and metered by the City of Bremerton at the POD. near the City's lift station #16 at the easterly end of Dowell Road.

C.4 Estimated Service:

CLIN 0001 - WATER	
Estimated annual volume:	20,000 HCF
CLIN 0002 - SEWER	
Estimated annual Volume:	10,000 HCF

C.5 Service to be Rendered:

WATER: The City shall provide at its expense all necessary facilities and permits required to connect the City of Bremerton water distribution system to the Government water system at the points of delivery specified in this contract for the purpose of providing reliable water service to Naval Hospital Bremerton. The City shall take all reasonable efforts to proivde a peak fire flow demand (combined from both P.O.D.'s) of 3750 gpm at a residual pressure of approximately 75 psig at the Root Court connection and a residual pressure of approximately 40 psig at the Olding Road connection. The city shall maintain a minimum normal pressure range within 10% of these pressures at the respective P.O.D.s.

The water supplied will be clear, potable, and safe for human consumption. The water supplied shall be in accordance with the applicable standards as promulgated by, and as may be revised by, Federal, state, and local agencies having regulatory authority.

SEWER: The City shall provide at its expense all necessary facilities and permits required to receive, carry, treat, and dispose of sewage from Naval Hospital Bremerton at the point of delivery specified in this contract. The City shall receive, carry, treat, and dispose of sewage in a manner, and by such means, as will not constitute a hazard to the public health. The City shall operate its sewage facilities in conformity with applicable laws, rules, and regulations as promulgated by, and as may be revised by, Federal, state, and local agencies having regulatory authority.

C.6 **Term of Service:** This contract shall be in effect for a period of ten (10) years commmencing on 1 December 2017, (the day after the previous contract for services expires). or until terminated at the option of the Government by giving written notice to the City of Bremerton not less that 30 days in advance of the effective date of termination.

C.7 **Rate Schedule:** Water and Sewer rates charged on this contract shall be in accordance with the City of Bremerton's current rates and charges as shown in "Assessments, Rates, Fees, and Charges" provided as Attachment J.1. This rate schedule may also be found at the city's website at the following link:

http://www.ci.bremerton.wa.us/524/Utility-Billing

Water charges at Bremerton Naval Hospital shall be based upon the retail rate for the six (6) inch meter, Inside City Limits and using the Non-Residential Commodity Charge". Bremerton Naval Hospital is considered "Comercial I" for wastewater services

Attachment J.2 provides a listing of water and sewer account information and Attachment J.3 provides a map of the Hospital site and meter locations.

End of Section C

Section E - Inspection and Acceptance

INSPECTION AND ACCEPTANCE TERMS

Supplies/services will be inspected/accepted at:

CLIN	INSPECT AT	INSPECT BY	ACCEPT AT	ACCEPT BY
0001	N/A	N/A	N/A	Government
0002	N/A	N/A	N/A	Government

Section F - Deliveries or Performance

DELIVERY INFORMATION

CLIN	DELIVERY DATE	QUANTITY	SHIP TO ADDRESS	DODAAC / CAGE
0001	30-NOV-2027	399,740	NAVFAC NORTHWEST CHARLES D. BENSON 1101 TAUTOG CIRCLE SILVERDALE WA 98315-1101 360-396-0052 FOB: Destination	N44255
0002	30-NOV-2027	464,600	(SAME AS PREVIOUS LOCATION) FOB: Destination	N44255

Section G - Contract Administration Data

ACCOUNT & INVOICE INFORMATION

G.1 Payments: The City shall be paid by the designated disbursing office for services furnished under the contract at the rates specified. All bills for regular monthly service shall be paid according to the Prompt Payment Act. The Government shall be entitled to any discounts customarily applicable to payment of bills by all customers of the City under like conditions of service. The Government shall notify the City, in writing, within 30 days following receipt of any disputed billing. The Government may pay the disputed billings in full under protest, pending a negotiated resolution pursuant to an appropriate audit, if required, and in accordance with the Disputes Clause of the contract.

G. 2 Invoices: Invoices for water and sewage service provided under CLINS 0001 and 0002 shall contain statements of the meter readings at the beginning and end of the billing period, including the consumption during the billing period. Invoices will also clearly state the negotiated rate(s) or City rate applied to the appropriate CLINs. The fixed and volumetric components of the appropriate rate(s) shall be clearly identified. Navy contract number, N44255-18-C-5002, the individual city utility account and applicable meter numbers shall also be clearly presented on the invoice. Water and sewage billing shall be on a monthly basis.

All copies of invoices shall be submitted directly to the following address:

COMMANDING OFFICER, CODE 08
NAVAL HOSPITAL , ONE BOONE ROAD
BREMERTON, WA 98312-1898

G.3 Other Communication: All other communication regarding this contract shall be addressed as follows:

Utility Service Provider	City of Bremerton Attn: Public Works Department 100 Oyster Bay Ave N Bremerton, WA 98312-3455
Government:	Department of Navy Naval Facilities Engineering Command Northwest Attention: Utilities Contracts 1101 Tautog Circle Silverdale, WA 98315-1101

G.4 Accounting and Appropriation Data: The Certifying Official shall cite funding for recurring services on each invoice. Nonrecurring services will normally be procured through contract modification and shall be separately invoiced.

G.5 Base Access and Security Requirements:

5.1 Navy Installations Access - The Contractor shall ensure that all security/entrance clearances are obtained. All Contractor employees shall obtain the required employee and vehicle passes. Employee badges may be obtained either by visiting the Pass and ID Office daily to obtain a pass or utilizing the Defense Biometric Identification System (DBIDS). More information on DBIDS can be found at https://www.cnic.navy.mil/om/dbids.html . The Contractor is responsible for filling out all forms and providing all information necessary to request passes and/or badges. Heightened security requirements may cause unexpected delays. The Contractor is responsible for requesting badges in a timely manner. Each employee shall wear the Government issued badge over the front of the outer clothing. When working on site, if wearing the badge would be a safety hazard, the individual may remove the badge but shall retain it in his/her possession to show if

challenged. When an employee leaves the Contractor's or subcontractor's service, the employee's pass and/or badge shall be returned to the Government. Upon completion of the work, the Contractor shall return all identification items issued to him during the course of the contract. The Contractor shall provide accompanied escorts for contractor and subcontractor personnel as needed to meet installation security requirements. Contractor or subcontractor personnel who do not possess permanent access credentials shall not be left unattended.

5.2 Camera, Video and Recording Equipment — No camera, video, or recording equipment may be brought aboard an Activity without submission and approval of camera/video/recording (Camcorder) equipment permit. The request must be submitted to the Activity Energy Manager/COR via the Contracting Officer.

5.3 Radio Transmitter Restrictions — Conform to the restrictions and procedures for the use of radio transmitting equipment, as directed. Do not use transmitters without prior approval.

G.6 **Rate Changes:** The City shall notify the Navy of any rate changes as far in advance as is reasonable. Changes in rates or terms and conditions of service are subject to the provisions of FAR Clause 52.241-8, “Change in Rates or Terms and Conditions of Service for Unregulated Services (Feb 1995).

CLAUSES INCORPORATED BY FULL TEXT

252.204-0008 CONTRACT-WIDE: CONTRACTING OFFICER SPECIFIED ACRN ORDER. (SEP 2009)

The payment office shall make payment in sequential ACRN order within the contract or order, exhausting all funds in the previous ACRN before paying from the next ACRN in the sequence order specified below:
ACRN Order

LOA will be cited at time of payment.

(End of clause)

Section I - Contract Clauses

CLAUSES INCORPORATED BY REFERENCE

52.202-1	Definitions	NOV 2013
52.203-3	Gratuities	APR 1984
52.203-5	Covenant Against Contingent Fees	MAY 2014
52.203-6	Restrictions On Subcontractor Sales To The Government	SEP 2006
52.203-7	Anti-Kickback Procedures	MAY 2014
52.203-8	Cancellation, Rescission, and Recovery of Funds for Illegal or Improper Activity	MAY 2014
52.203-10	Price Or Fee Adjustment For Illegal Or Improper Activity	MAY 2014
52.203-12	Limitation On Payments To Influence Certain Federal Transactions	OCT 2010
52.204-4	Printed or Copied Double-Sided on Postconsumer Fiber Content Paper	MAY 2011
52.204-7	System for Award Management	OCT 2016
52.219-8	Utilization of Small Business Concerns	NOV 2016
52.222-3	Convict Labor	JUN 2003
52.222-21	Prohibition Of Segregated Facilities	APR 2015
52.222-26	Equal Opportunity	SEP 2016
52.222-50	Combating Trafficking in Persons	MAR 2015
52.223-18	Encouraging Contractor Policies To Ban Text Messaging While Driving	AUG 2011
52.232-1	Payments	APR 1984
52.232-11	Extras	APR 1984
52.232-19	Availability Of Funds For The Next Fiscal Year	APR 1984
52.232-25	Prompt Payment	JAN 2017
52.232-33	Payment by Electronic Funds Transfer--System for Award Management	JUL 2013
52.232-39	Unenforceability of Unauthorized Obligations	JUN 2013
52.233-4	Applicable Law for Breach of Contract Claim	OCT 2004
52.237-2	Protection Of Government Buildings, Equipment, And Vegetation	APR 1984
52.237-3	Continuity Of Services	JAN 1991
52.241-2	Order of Precedence - Utilities	FEB 1995
52.241-4	Change in Class of Service	FEB 1995
52.241-5	Contractor's Facilities	FEB 1995
52.241-11	Multiple Service Locations	FEB 1995
52.249-1	Termination For Convenience Of The Government (Fixed Price) (Short Form)	APR 1984
52.249-2	Termination For Convenience Of The Government (Fixed-Price)	APR 2012
52.249-8	Default (Fixed-Price Supply & Service)	APR 1984
52.253-1	Computer Generated Forms	JAN 1991
252.203-7001	Prohibition On Persons Convicted of Fraud or Other Defense-Contract-Related Felonies	DEC 2008
252.204-7000	Disclosure Of Information	OCT 2016
252.204-7003	Control Of Government Personnel Work Product	APR 1992
252.209-7004	Subcontracting With Firms That Are Owned or Controlled By The Government of a Country that is a State Sponsor of Terrorism	OCT 2015
252.223-7006	Prohibition On Storage, Treatment, and Disposal of Toxic or Hazardous Materials	SEP 2014

252.241-7001	Government Access	DEC 1991
252.243-7002	Requests for Equitable Adjustment	DEC 2012

CLAUSES INCORPORATED BY FULL TEXT

52.222-26 EQUAL OPPORTUNITY (SEPT 2016) ALTERNATE I (FEB 1999)

Notice. The following terms of this clause are waived for this contract: NA .

(a) Definitions. As used in this clause--

Compensation means any payments made to, or on behalf of, an employee or offered to an applicant as remuneration for employment, including but not limited to salary, wages, overtime pay, shift differentials, bonuses, commissions, vacation and holiday pay, allowances, insurance and other benefits, stock options and awards, profit sharing, and retirement.

Compensation information means the amount and type of compensation provided to employees or offered to applicants, including, but not limited to, the desire of the Contractor to attract and retain a particular employee for the value the employee is perceived to add to the Contractor's profit or productivity; the availability of employees with like skills in the marketplace; market research about the worth of similar jobs in the relevant marketplace; job analysis, descriptions, and evaluations; salary and pay structures; salary surveys; labor union agreements; and Contractor decisions, statements and policies related to setting or altering employee compensation.

Essential job functions means the fundamental job duties of the employment position an individual holds. A job function may be considered essential if--

(1) The access to compensation information is necessary in order to perform that function or another routinely assigned business task; or

(2) The function or duties of the position include protecting and maintaining the privacy of employee personnel records, including compensation information.

Gender identity has the meaning given by the Department of Labor's Office of Federal Contract Compliance Programs, and is found at www.dol.gov/ofccp/LGBT/LGBT_FAQs.html.

Sexual orientation has the meaning given by the Department of Labor's Office of Federal Contract Compliance Programs, and is found at www.dol.gov/ofccp/LGBT/LGBT_FAQs.html.

United States means the 50 States, the District of Columbia, Puerto Rico, the Northern Mariana Islands, American Samoa, Guam, the U.S. Virgin Islands, and Wake Island.

(b)(1) If, during any 12-month period (including the 12 months preceding the award of this contract), the Contractor has been or is awarded nonexempt Federal contracts and/or subcontracts that have an aggregate value in excess of $10,000, the Contractor shall comply with this clause, except for work performed outside the United States by employees who were not recruited within the United States. Upon request, the Contractor shall provide information necessary to determine the applicability of this clause.

(2) If the Contractor is a religious corporation, association, educational institution, or society, the requirements of this clause do not apply with respect to the employment of individuals of a particular religion to perform work connected with the carrying on of the Contractor's activities (41 CFR 60-1.5).

(c) (1) The Contractor shall not discriminate against any employee or applicant for employment because of race, color, religion, sex, sexual orientation, gender identity, or national origin. However, it shall not be a violation of this

clause for the Contractor to extend a publicly announced preference in employment to Indians living on or near an Indian reservation, in connection with employment opportunities on or near an Indian reservation, as permitted by 41 CFR 60-1.5.

(2) The Contractor shall take affirmative action to ensure that applicants are employed, and that employees are treated during employment, without regard to their race, color, religion, sex, sexual orientation, gender identity, or national origin. This shall include, but not be limited to, (i) employment, (ii) upgrading, (iii) demotion, (iv) transfer, (v) recruitment or recruitment advertising, (vi) layoff or termination, (vii) rates of pay or other forms of compensation, and (viii) selection for training, including apprenticeship.

(3) The Contractor shall post in conspicuous places available to employees and applicants for employment the notices to be provided by the Contracting Officer that explain this clause.

(4) The Contractor shall, in all solicitations or advertisements for employees placed by or on behalf of the Contractor, state that all qualified applicants will receive consideration for employment without regard to race, color, religion, sex, sexual orientation, gender identity, or national origin.

(5)(i) The Contractor shall not discharge or in any other manner discriminate against any employee or applicant for employment because such employee or applicant has inquired about, discussed, or disclosed the compensation of the employee or applicant or another employee or applicant. This prohibition against discrimination does not apply to instances in which an employee who has access to the compensation information of other employees or applicants as a part of such employee's essential job functions discloses the compensation of such other employees or applicants to individuals who do not otherwise have access to such information, unless such disclosure is in response to a formal complaint or charge, in furtherance of an investigation, proceeding, hearing, or action, including an investigation conducted by the employer, or is consistent with the Contractor's legal duty to furnish information.

(ii) The Contractor shall disseminate the prohibition on discrimination in paragraph (c)(5)(i) of this clause, using language prescribed by the Director of the Office of Federal Contract Compliance Programs (OFCCP), to employees and applicants by—

(A) Incorporation into existing employee manuals or handbooks; and

(B) Electronic posting or by posting a copy of the provision in conspicuous places available to employees and applicants for employment.

(6) The Contractor shall send, to each labor union or representative of workers with which it has a collective bargaining agreement or other contract or understanding, the notice to be provided by the Contracting Officer advising the labor union or workers' representative of the Contractor's commitments under this clause, and post copies of the notice in conspicuous places available to employees and applicants for employment.

(7) The Contractor shall comply with Executive Order 11246, as amended, and the rules, regulations, and orders of the Secretary of Labor.

(8) The Contractor shall furnish to the contracting agency all information required by Executive Order 11246, as amended, and by the rules, regulations, and orders of the Secretary of Labor. The Contractor shall also file Standard Form 100 (EEO-1), or any successor form, as prescribed in 41 CFR part 60-1. Unless the Contractor has filed within the 12 months preceding the date of contract award, the Contractor shall, within 30 days after contract award, apply to either the regional Office of Federal Contract Compliance Programs (OFCCP) or the local office of the Equal Employment Opportunity Commission for the necessary forms.

(9) The Contractor shall permit access to its premises, during normal business hours, by the contracting agency or the OFCCP for the purpose of conducting on-site compliance evaluations and complaint investigations. The Contractor shall permit the Government to inspect and copy any books, accounts, records (including computerized

records), and other material that may be relevant to the matter under investigation and pertinent to compliance with Executive Order 11246, as amended, and rules and regulations that implement the Executive Order.

(10) If the OFCCP determines that the Contractor is not in compliance with this clause or any rule, regulation, or order of the Secretary of Labor, this contract may be canceled, terminated, or suspended in whole or in part and the Contractor may be declared ineligible for further Government contracts, under the procedures authorized in Executive Order 11246, as amended. In addition, sanctions may be imposed and remedies invoked against the Contractor as provided in Executive Order 11246, as amended; in the rules, regulations, and orders of the Secretary of Labor; or as otherwise provided by law.

(11) The Contractor shall include the terms and conditions of this clause in every subcontract or purchase order that is not exempted by the rules, regulations, or orders of the Secretary of Labor issued under Executive Order 11246, as amended, so that these terms and conditions will be binding upon each subcontractor or vendor.

(12) The Contractor shall take such action with respect to any subcontract or purchase order as the Director of OFCCP may direct as a means of enforcing these terms and conditions, including sanctions for noncompliance; provided, that if the Contractor becomes involved in, or is threatened with, litigation with a subcontractor or vendor as a result of any direction, the Contractor may request the United States to enter into the litigation to protect the interests of the United States.

(d) Notwithstanding any other clause in this contract, disputes relative to this clause will be governed by the procedures in 41 CFR part 60-1.

(End of clause)

52.222-35 EQUAL OPPORTUNITY FOR VETERANS (OCT 2015) ALTERNATE I (JUL 2014)

Notice: The following term(s) of this clause are waived for this contract: ----------NA

(a) Definitions. As used in this clause--

``Active duty wartime or campaign badge veteran,'' ``Armed Forces service medal veteran,'' ``disabled veteran,'' ``protected veteran,'' ``qualified disabled veteran,'' and ``recently separated veteran'' have the meanings given at FAR 22.1301.

(b) Equal opportunity clause. The Contractor shall abide by the requirements of the equal opportunity clause at 41 CFR 60-300.5(a), as of March 24, 2014. This clause prohibits discrimination against qualified protected veterans, and requires affirmative action by the Contractor to employ and advance in employment qualified protected veterans.

(c) Subcontracts. The Contractor shall insert the terms of this clause in subcontracts of $100,000 or more unless exempted by rules, regulations, or orders of the Secretary of Labor. The Contractor shall act as specified by the Director, Office of Federal Contract Compliance Programs, to enforce the terms, including action for noncompliance. Such necessary changes in language may be made as shall be appropriate to identify properly the parties and their undertakings.

(End of clause)

52.232-40 PROVIDING ACCELERATED PAYMENTS TO SMALL BUSINESS

SUBCONTRACTORS (DEC 2013)

(a) Upon receipt of accelerated payments from the Government, the Contractor shall make accelerated payments to its small business subcontractors under this contract, to the maximum extent practicable and prior to when such payment is otherwise required under the applicable contract or subcontract, after receipt of a proper invoice and all other required documentation from the small business subcontractor.

(b) The acceleration of payments under this clause does not provide any new rights under the Prompt Payment Act.

(c) Include the substance of this clause, including this paragraph (c), in all subcontracts with small business concerns, including subcontracts with small business concerns for the acquisition of commercial items.

(End of clause)

52.233-1 DISPUTES. (MAY 2014) -- ALTERNATE I (DEC 1991)

(a) This contract is subject to 41 U.S.C. chapter 71, Contract Disputes.

(b) Except as provided in 41 U.S.C. chapter 71, all disputes arising under or relating to this contract shall be resolved under this clause.

(c) Claim, as used in this clause, means a written demand or written assertion by one of the contracting parties seeking, as a matter of right, the payment of money in a sum certain, the adjustment or interpretation of contract terms, or other relief arising under or relating to this contract. However, a written demand or written assertion by the Contractor seeking the payment of money exceeding $100,000 is not a claim under 41 U.S.C. chapter 71 until certified. A voucher, invoice, or other routine request for payment that is not in dispute when submitted is not a claim under 41 U.S.C. chapter 71. The submission may be converted to a claim under 41 U.S.C. chapter 71, by complying with the submission and certification requirements of this clause, if it is disputed either as to liability or amount or is not acted upon in a reasonable time.

(d)(1) A claim by the Contractor shall be made in writing and, unless otherwise stated in this contract, submitted within 6 years after accrual of the claim to the Contracting Officer for a written decision. A claim by the Government against the Contractor shall be subject to a written decision by the Contracting Officer.

(2) (i) Contractors shall provide the certification specified in subparagraph (d)(2)(iii) of this clause when submitting any claimexceeding $100,000.

(ii) The certification requirement does not apply to issues in controversy that have not been submitted as all or part of a claim.

(iii) The certification shall state as follows: "I certify that the claim is made in good faith; that the supporting data are accurate and complete to the best of my knowledge and belief; that the amount requested accurately reflects the contract adjustment for which the Contractor believes the Government is liable; and that I am authorized to certify the claim on behalf of the Contractor.

(3) The certification may be executed by any person authorized to bind the Contractor with respect to the claim.

(e) For Contractor claims of $100,000 or less, the Contracting Officer must, if requested in writing by the Contractor, render a decision within 60 days of the request. For Contractor-certified claims over $100,000, the Contracting Officer must, within 60 days, decide the claim or notify the Contractor of the date by which the decision will be made.

(f) The Contracting Officer's decision shall be final unless the Contractor appeals or files a suit as provided in 41 U.S.C. chapter 71.

(g) If the claim by the Contractor is submitted to the Contracting Officer or a claim by the Government is presented to the Contractor, the parties, by mutual consent, may agree to use ADR. If the Contractor refuses an offer for alternative disputes resolution, the Contractor shall inform the Contracting Officer, in writing, of the Contractor's specific reasons for rejecting the request. When using arbitration conducted pursuant to 5 U.S.C. 575-580, or when using any other ADR technique that the agency elects to handle in accordance with the ADRA, any claim, regardless of amount, shall be accompanied by the certification described in subparagraph (d)(2)(iii) of this clause, and executed in accordance with subparagraph (d)(3) of this clause.

(h) The Government shall pay interest on the amount found due and unpaid from (1) the date the Contracting Officer receives the claim (certified, if required); or (2) the date that payment otherwise would be due, if that date is later, until the date of payment. With regard to claims having defective certifications, as defined in (FAR) 48 CFR 33.201, interest shall be paid from the date that the Contracting Officer initially receives the claim. Simple interest on claims shall be paid at the rate, fixed by the Secretary of the Treasury as provided in the Act, which is applicable to the period during which the Contracting Officer receives the claim and then at the rate applicable for each 6-month period as fixed by the Treasury Secretary during the pendency of the claim.

(i) The Contractor shall proceed diligently with performance of this contract, pending final resolution of any request for relief, claim, appeal, or action arising under or relating to the contract, and comply with any decision of the Contracting Officer.

(End of clause)

52.241-3 SCOPE AND DURATION OF CONTRACT (FEB 1995)

(a) For the period of 10 years commencing on 30 November 2017 and ending 29 November 2027 the Contractor agrees to furnish and the Government agrees to purchase Water and Sewer utility service in accordance with the applicable tariff(s), rules, and regulations as approved by the applicable governing regulatory body and as set forth in the contract.

(b) It is expressly understood that neither the Contractor nor the Government is under any obligation to continue any service under the terms and conditions of this contract beyond the expiration date.

(c) The Contractor shall provide the Government with one complete set of rates, terms, and conditions of service which are in effect as of the date of this contract and any subsequently approved rates.

(d) The Contractor shall be paid at the applicable rate(s) under the tariff and the Government shall be liable for the minimum monthly charge, if any, specified in this contract commencing with the period in which service is initially furnished and continuing for the term of this contract. Any minimum monthly charge specified in this contract shall be equitably prorated for the periods in which commencement and termination of this contract become effective.

(End of clause)

52.241-6 SERVICE PROVISIONS (FEB 1995)

(a) Measurement of service. (1) All service furnished by the Contractor shall be measured by suitable metering equipment of standard manufacture, to be furnished, installed, maintained, repaired, calibrated, and read by the Contractor at its expense. When more than a single meter is installed at a service location, the readings thereof may be billed conjunctively, if appropriate. In the event any meter fails to register (or registers incorrectly) the service

furnished, the parties shall agree upon the length of time of meter malfunction and the quantity of service delivered during such period of time. An appropriate adjustment shall be made to the next invoice for the purpose of correcting such errors. However, any meter which registers not more than 3% percent slow or fast shall be deemed correct.

(2) The Contractor shall read all meters at periodic intervals of approximately 30 days or in accordance with the policy of the cognizant regulatory body or applicable bylaws. All billings based on meter readings of less than 28 days shall be prorated accordingly.

(b) Meter test. (1) The Contractor, at its expense, shall periodically inspect and test Contractor-installed meters at intervals not exceeding 5 year(s) The Government has the right to have representation during the inspection and test.

(2) At the written request of the Contracting Officer, the Contractor shall make additional tests of any or all such meters in the presence of Government representatives. The cost of such additional tests shall be borne by the Government if the percentage of errors is found to be not more than 3% percent slow or fast.

(3) No meter shall be placed in service or allowed to remain in service which has an error in registration in excess of 3% percent under normal operating conditions.

(c) Change in volume or character. Reasonable notice shall be given by the Contracting Officer to the Contractor regarding any material changes anticipated in the volume or characteristics of the utility service required at each location.

(d) Continuity of service and consumption. The Contractor shall use reasonable diligence to provide a regular and uninterrupted supply of service at each service location, but shall not be liable for damages, breach of contract or otherwise, to the Government for failure, suspension, diminution, or other variations of service occasioned by or in consequence of any cause beyond the control of the Contractor, including but not limited to acts of God or of the public enemy, fires, floods, earthquakes, or other catastrophe, strikes, or failure or breakdown of transmission or other facilities. If any such failure, suspension, diminution, or other variation of service shall aggregate more than 24 hour(s) during any billing period hereunder, an equitable adjustment shall be made in the monthly billing specified in this contract (including the minimum monthly charge).

(End of clause)

52.241-8 CHANGE IN RATES OR TERMS AND CONDITIONS OF SERVICE FOR UNREGULATED SERVICES (FEB 1995)

(a) This clause applies to the extent that services furnished hereunder are not subject to regulation by a regulatory body.

(b) After one year , either party may request a change in rates or terms and conditions of service, unless otherwise provided in this contract. Both parties agree to enter in negotiations concerning such changes upon receipt of a written request detailing the proposed changes and specifying the reasons for the proposed changes.

(c) The effective date of any change shall be as agreed to by the parties. The Contractor agrees that throughout the life of this contract the rates so negotiated will not be in excess of published and unpublished rates charged to any other customer of the same class under similar terms and conditions of use and service.

(d) The failure of the parties to agree upon any change after a reasonable period of time shall be a dispute under the Disputes clause of this contract.

(e) Any changes to rates, terms, or conditions as a result of such negotiations shall be made a part of this contract by

the issuance of a contract modification.

(End of clause)

52.243-1 CHANGES--FIXED-PRICE (AUG 1987) - ALTERNATE I (APR 1984)

(a) The Contracting Officer may at any time, by written order, and without notice to the sureties, if any, make changes within the general scope of this contract in any one or more of the following:

(1) Description of services to be performed.

(2) Time of performance (*i.e.,* hours of the day, days of the week, etc.).

(3) Place of performance of the services.

(b) If any such change causes an increase or decrease in the cost of, or the time required for, performance of any part of the work under this contract, whether or not changed by the order, the Contracting Officer shall make an equitable adjustment in the contract price, the delivery schedule, or both, and shall modify the contract.

(c) The Contractor must assert its right to an adjustment under this clause within 30 days from the date of receipt of the written order. However, if the Contracting Officer decides that the facts justify it, the Contracting Officer may receive and act upon a proposal submitted before final payment of the contract.

(d) If the Contractor's proposal includes the cost of property made obsolete or excess by the change, the Contracting Officer shall have the right to prescribe the manner of the disposition of the property.

(e) Failure to agree to any adjustment shall be a dispute under the Disputes clause. However, nothing in this clause shall excuse the Contractor from proceeding with the contract as changed.

(End of clause)

52.252-2 CLAUSES INCORPORATED BY REFERENCE (FEB 1998)

This contract incorporates one or more clauses by reference, with the same force and effect as if they were given in full text. Upon request, the Contracting Officer will make their full text available. Also, the full text of a clause may be accessed electronically at this/these address(es):

https://www.acquisition.gov/?q=browsefar

(End of clause)

252.204-7012 SAFEGUARDING COVERED DEFENSE INFORMATION AND CYBER INCIDENT REPORTING (OCT 2016)

(a) Definitions. As used in this clause--

Adequate security means protective measures that are commensurate with the consequences and probability of loss, misuse, or unauthorized access to, or modification of information.

Compromise means disclosure of information to unauthorized persons, or a violation of the security policy of a system, in which unauthorized intentional or unintentional disclosure, modification, destruction, or loss of an object, or the copying of information to unauthorized media may have occurred.

Contractor attributional/proprietary information means information that identifies the contractor(s), whether directly or indirectly, by the grouping of information that can be traced back to the contractor(s) (e.g., program description, facility locations), personally identifiable information, as well as trade secrets, commercial or financial information, or other commercially sensitive information that is not customarily shared outside of the company.

Controlled technical information means technical information with military or space application that is subject to controls on the access, use, reproduction, modification, performance, display, release, disclosure, or dissemination. Controlled technical information would meet the criteria, if disseminated, for distribution statements B through F using the criteria set forth in DoD Instruction 5230.24, Distribution Statements on Technical Documents. The term does not include information that is lawfully publicly available without restrictions.

Covered contractor information system means an unclassified information system that is owned, or operated by or for, a contractor and that processes, stores, or transmits covered defense information.

Covered defense information means unclassified controlled technical information or other information, as described in the Controlled Unclassified Information (CUI) Registry at http://www.archives.gov/cui/registry/category-list.html, that requires safeguarding or dissemination controls pursuant to and consistent with law, regulations, and Governmentwide policies, and is--

(1) Marked or otherwise identified in the contract, task order, or delivery order and provided to the contractor by or on behalf of DoD in support of the performance of the contract; or

(2) Collected, developed, received, transmitted, used, or stored by or on behalf of the contractor in support of the performance of the contract.

Cyber incident means actions taken through the use of computer networks that result in a compromise or an actual or potentially adverse effect on an information system and/or the information residing therein.

Forensic analysis means the practice of gathering, retaining, and analyzing computer-related data for investigative purposes in a manner that maintains the integrity of the data.

Information system means a discrete set of information resources organized for the collection, processing, maintenance, use, sharing, dissemination, or disposition of information.

Malicious software means computer software or firmware intended to perform an unauthorized process that will have adverse impact on the confidentiality, integrity, or availability of an information system. This definition includes a virus, worm, Trojan horse, or other code-based entity that infects a host, as well as spyware and some forms of adware.

Media means physical devices or writing surfaces including, but is not limited to, magnetic tapes, optical disks, magnetic disks, large-scale integration memory chips, and printouts onto which covered defense information is recorded, stored, or printed within a covered contractor information system.

Operationally critical support means supplies or services designated by the Government as critical for airlift, sealift, intermodal transportation services, or logistical support that is essential to the mobilization, deployment, or sustainment of the Armed Forces in a contingency operation.

Rapidly report means within 72 hours of discovery of any cyber incident.

Technical information means technical data or computer software, as those terms are defined in the clause at DFARS 252.227-7013, Rights in Technical Data--Noncommercial Items, regardless of whether or not the clause is incorporated in this solicitation or contract. Examples of technical information include research and engineering data, engineering drawings, and associated lists, specifications, standards, process sheets, manuals, technical reports, technical orders, catalog-item identifications, data sets, studies and analyses and related information, and computer software executable code and source code.

(b) Adequate security. The Contractor shall provide adequate security on all covered contractor information systems. To provide adequate security, the Contractor shall implement, at a minimum, the following information security protections:

(1) For covered contractor information systems that are part of an information technology (IT) service or system operated on behalf of the Government, the following security requirements apply:

(i) Cloud computing services shall be subject to the security requirements specified in the clause 252.239-7010, Cloud Computing Services, of this contract.

(ii) Any other such IT service or system (i.e., other than cloud computing) shall be subject to the security requirements specified elsewhere in this contract.

(2) For covered contractor information systems that are not part of an IT service or system operated on behalf of the Government and therefore are not subject to the security requirement specified at paragraph (b)(1) of this clause, the following security requirements apply:

(i) Except as provided in paragraph (b)(2)(ii) of this clause, the covered contractor information system shall be subject to the security requirements in National Institute of Standards and Technology (NIST) Special Publication (SP) 800-171, ``Protecting Controlled Unclassified Information in Nonfederal Information Systems and Organizations" (available via the internet at http://dx.doi.org/10.6028/NIST.SP.800-171) in effect at the time the solicitation is issued or as authorized by the Contracting Officer.

(ii)(A) The Contractor shall implement NIST SP 800-171, as soon aspractical, but not later than December 31, 2017. For all contracts awarded prior to October 1, 2017, the Contractor shall notify the DoD Chief Information Officer (CIO), via email at osd.dibcsia@mail.mil, within 30 days of contract award, of any security requirements specified by NIST SP 800-171 not implemented at the time of contract award.

(B) The Contractor shall submit requests to vary from NIST SP 800-171 in writing to the Contracting Officer, for consideration by the DoD CIO. The Contractor need not implement any security requirement adjudicated by an authorized representative of the DoD CIO to be nonapplicable or to have an alternative, but equally effective, security measure that may be implemented in its place.

(C) If the DoD CIO has previously adjudicated the contractor's requests indicating that a requirement is not applicable or that an alternative security measure is equally effective, a copy of that approval shall be provided to the Contracting Officer when requesting its recognition under this contract.

(D) If the Contractor intends to use an external cloud service provider to store, process, or transmit any covered defense information in performance of this contract, the Contractor shall require and ensure that the cloud service provider meets security requirements equivalent to those established by the Government for the Federal Risk and Authorization Management Program (FedRAMP) Moderate baseline (https://www.fedramp.gov/resources/documents/) and that the cloud service provider complies with requirements in paragraphs (c) through (g) of this clause for cyber incident reporting, malicious software, media preservation and protection, access to additional information and equipment necessary for forensic analysis, and cyber incident damage assessment.

(3) Apply other information systems security measures when the Contractor reasonably determines that information systems security measures, in addition to those identified in paragraphs (b)(1) and (2)

of this clause, may be required to provide adequate security in a dynamic environment or to accommodate special circumstances (e.g., medical devices) and any individual, isolated, or temporary deficiencies based on an assessed risk or vulnerability. These measures may be addressed in a system security plan.

(c) Cyber incident reporting requirement.

(1) When the Contractor discovers a cyber incident that affects a covered contractor information system or the covered defense information residing therein, or that affects the contractor's ability to perform the requirements of the contract that are designated as operationally critical support and identified in the contract, the Contractor shall--

(i) Conduct a review for evidence of compromise of covered defense information, including, but not limited to, identifying compromised computers, servers, specific data, and user accounts. This review shall also include analyzing covered contractor information system(s) that were part of the cyber incident, as well as other information systems on the Contractor's network(s), that may have been accessed as a result of the incident in order to identify compromised covered defense information, or that affect the Contractor's ability to provide operationally critical support; and

(ii) Rapidly report cyber incidents to DoD at http://dibnet.dod.mil.

(2) Cyber incident report. The cyber incident report shall be treated as information created by or for DoD and shall include, at a minimum, the required elements at http://dibnet.dod.mil.

(3) Medium assurance certificate requirement. In order to report cyber incidents in accordance with this clause, the Contractor or subcontractor shall have or acquire a DoD-approved medium assurance certificate to report cyber incidents. For information on obtaining a DoD-approved medium assurance certificate, see http://iase.disa.mil/pki/eca/Pages/index.aspx.

(d) Malicious software. When the Contractor or subcontractors discover and isolate malicious software in connection with a reported cyber incident, submit the malicious software to DoD Cyber Crime Center (DC3) in accordance with instructions provided by DC3 or the Contracting Officer. Do not send the malicious software to the Contracting Officer.

(e) Media preservation and protection. When a Contractor discovers a cyber incident has occurred, the Contractor shall preserve and protect images of all known affected information systems identified in paragraph (c)(1)(i) of this clause and all relevant monitoring/packet capture data for at least 90 days from the submission of the cyber incident report to allow DoD to request the media or decline interest.

(f) Access to additional information or equipment necessary for forensic analysis. Upon request by DoD, the Contractor shall provide DoD with access to additional information or equipment that is necessary to conduct a forensic analysis.

(g) Cyber incident damage assessment activities. If DoD elects to conduct a damage assessment, the Contracting Officer will request that the Contractor provide all of the damage assessment information gathered in accordance with paragraph (e) of this clause.

(h) DoD safeguarding and use of contractor attributional/proprietary information. The Government shall protect against the unauthorized use or release of information obtained from the contractor (or derived from information obtained from the contractor) under this clause that includes contractor attributional/proprietary information, including such information submitted in accordance with paragraph (c). To the maximum extent practicable, the Contractor shall identify and mark attributional/proprietary information. In making an authorized release of such information, the Government will implement appropriate procedures to minimize the contractor attributional/proprietary information that is included in such authorized release, seeking to include only that information that is necessary for the authorized purpose(s) for which the information is being released.

(i) Use and release of contractor attributional/proprietary information not created by or for DoD. Information that is obtained from the contractor (or derived from information obtained from the contractor) under this clause that is not created by or for DoD is authorized to be released outside of DoD--

(1) To entities with missions that may be affected by such information;

(2) To entities that may be called upon to assist in the diagnosis, detection, or mitigation of cyber incidents;

(3) To Government entities that conduct counterintelligence or law enforcement investigations;

(4) For national security purposes, including cyber situational awareness and defense purposes (including with Defense Industrial Base (DIB) participants in the program at 32 CFR part 236); or

(5) To a support services contractor (``recipient'') that is directly supporting Government activities under a contract that includes the clause at 252.204-7009, Limitations on the Use or Disclosure of Third-Party Contractor Reported Cyber Incident Information.

(j) Use and release of contractor attributional/proprietary information created by or for DoD. Information that is obtained from the contractor (or derived from information obtained from the contractor) under this clause that is created by or for DoD (including the information submitted pursuant to paragraph (c) of this clause) is authorized to be used and released outside of DoD for purposes and activities authorized by paragraph (i) of this clause, and for any other lawful Government purpose or activity, subject to all applicable statutory, regulatory, and policy based restrictions on the Government's use and release of such information.

(k) The Contractor shall conduct activities under this clause in accordance with applicable laws and regulations on the interception, monitoring, access, use, and disclosure of electronic communications and data.

(l) Other safeguarding or reporting requirements. The safeguarding and cyber incident reporting required by this clause in no way abrogates the Contractor's responsibility for other safeguarding or cyber incident reporting pertaining to its unclassified information systems as required by other applicable clauses of this contract, or as a result of other applicable U.S. Government statutory or regulatory requirements.

(m) Subcontracts. The Contractor shall--

(1) Include this clause, including this paragraph (m), in subcontracts, or similar contractual instruments, for operationally critical support, or for which subcontract performance will involve covered defense information, including subcontracts for commercial items, without alteration, except to identify the parties. The Contractor shall determine if the information required for subcontractor performance retains its identity as covered defense information and will require protection under this clause, and, if necessary, consult with the Contracting Officer; and

(2) Require subcontractors to--

(i) Notify the prime Contractor (or next higher-tier subcontractor) when submitting a request to vary from a NIST SP 800-171 security requirement to the Contracting Officer, in accordance with paragraph (b)(2)(ii)(B) of this clause; and

(ii) Provide the incident report number, automatically assigned by DoD, to the prime Contractor (or next higher-tier subcontractor) as soon as practicable, when reporting a cyber incident to DoD as required in paragraph (c) of this clause.

(End of clause)

252.225-7048 EXPORT-CONTROLLED ITEMS (JUNE 2013)

(a) Definition. ``Export-controlled items,'' as used in this clause, means items subject to the Export Administration Regulations (EAR) (15 CFR Parts 730-774) or the International Traffic in Arms Regulations (ITAR) (22 CFR Parts 120-130). The term includes--

(1) ``Defense items,'' defined in the Arms Export Control Act, 22 U.S.C. 2778(j)(4)(A), as defense articles, defense services, and related technical data, and further defined in the ITAR, 22 CFR Part 120; and

(2) ``Items,'' defined in the EAR as ``commodities'', ``software'', and ``technology,'' terms that are also defined in the EAR, 15 CFR 772.1.

(b) The Contractor shall comply with all applicable laws and regulations regarding export-controlled items, including, but not limited to, the requirement for contractors to register with the Department of State in accordance with the ITAR. The Contractor shall consult with the Department of State regarding any questions relating to compliance with the ITAR and shall consult with the Department of Commerce regarding any questions relating to compliance with the EAR.

(c) The Contractor's responsibility to comply with all applicable laws and regulations regarding export-controlled items exists independent of, and is not established or limited by, the information provided by this clause.

(d) Nothing in the terms of this contract adds, changes, supersedes, or waives any of the requirements of applicable Federal laws, Executive orders, and regulations, including but not limited to—

(1) The Export Administration Act of 1979, as amended (50 U.S.C. App. 2401, et seq.);

(2) The Arms Export Control Act (22 U.S.C. 2751, et seq.);

(3) The International Emergency Economic Powers Act (50 U.S.C. 1701, et seq.);

(4) The Export Administration Regulations (15 CFR Parts 730-774);

(5) The International Traffic in Arms Regulations (22 CFR Parts 120-130); and

(6) Executive Order 13222, as extended.

(e) The Contractor shall include the substance of this clause, including this paragraph (e), in all subcontracts.

(End of clause)

Section J - List of Documents, Exhibits and Other Attachments

CONTRACT ATTACHMENTS

The following documents are appended to the contract and do not increase or alter the page count shown throughout the rest of contract document.

Attachment J.1 City of Bremerton “Assessments, Rates, Fees, and Charges Effective July 1, 2017”

Attachment J.2 Accounts and Adjustments for Naval Hospital Bremerton

Attachment J.3 Naval Hospital Bremerton Base map with meter locations

ASSESSMENTS, RATES, FEES, AND CHARGES
EFFECTIVE July 1, 2017

	2017 Inside/Outside City Limits	2018 Inside/Outside City Limits
GENERAL FACILITY CHARGES*		
Water based on meter size average normal flow		
5/8" x 3/4" Residential and Commercial	$4,448.58	$5,880.00
1" Residential	$4,448.58	$5,880.00
1" Commercial	$6,094.59	$8,056.00
1 1/2" Commercial	$35,587.67	$47,040.00
2" Commercial	$35,587.67	$47,040.00
3" Commercial	$88,969.18	$117,600.00
4" Commercial	$177,938.37	$235,200.00
Greater than 4"	Case by Case basis	Case by Case basis
Wastewater based on meter size average normal flow		
5/8" x 3/4" Residential and Commercial	$5,714.91	$6,863.00
1" Residential	$5,714.91	$6,863.00
1" Commercial	$7,086.43	$8,510.00
1 1/2" Commercial	$40,004.40	$48,041.00
2" Commercial	$40,004.40	$48,041.00
3" Commercial	$102,868.46	$123,534.00
4" Commercial	$205,736.92	$247,068.00
Greater than 4"	Case by Case basis	Case by Case basis
Stormwater (per IHSU)	$2,443.00	$3,157.00

The Seattle Construction Index (SCI) set forth in BMC 15.06.020 shall not be applied to the January 1, 2017, and January 1, 2018, general facility charges unless approved by City Council.

	2017 Inside City Limits	2017 Outside City Limits
CONNECTION FEES		
Water Connection Fees		
5/8" x 3/4"	$2,710.00	$4,065.00
1"	$2,922.00	$4,383.00
1 1/2"	$6,190.00	$9,285.00
2"	$7,003.00	$10,505.00
3" - 4" x 4" - Service to property line	$13,038.00	$19,557.00
3" - 4" x 6" - Service to property line	$13,216.00	$19,824.00
3" - 4" x 8" - Service to property line	$13,536.00	$20,305.00
3" - 4" x 10" - Service to property line	$15,225.00	$22,838.00
3" - 4" x 12" - Service to property line	$13,279.00	$19,919.00
4" - 4" x 4" - Service to property line	$14,412.00	$21,619.00
4" - 4" x 6" - Service to property line	$14,591.00	$21,886.00
4" - 4" x 8" - Service to property line	$14,912.00	$22,367.00
4" - 4" x 10" - Service to property line	$16,599.00	$24,899.00
4" - 4" x 12" - Service to property line	$16,605.00	$24,906.00
6" - 6" x 6" - Service to property line	$17,476.00	$26,214.00
6" - 6" x 8" - Service to property line	$17,797.00	$26,695.00
6" - 6" x 10" - Service to property line	$19,485.00	$29,227.00
6" - 6" x 12" - Service to property line	$19,485.00	$29,227.00
8" - 8" x 8" - Service to property line	$23,150.00	$34,725.00

ASSESSMENTS, RATES, FEES, AND CHARGES
EFFECTIVE July 1, 2017

	2017 Inside City Limits	2017 Outside City Limits
8" - 8" x 10" - Service to property line	$24,909.00	$37,363.00
8" - 8" x 12" - Service to property line	$24,909.00	$37,363.00
10" - 10" x 10" - Service to property line	$28,312.00	$42,468.00
10" - 10" x 12" - Service to property line	$28,811.00	$43,216.00
Greater than 12"	Actual Time & Materials	Actual Time & Materials
Wet Tapping (Water Main Only)*		
4" x 4" - excluding excavation & backfill	$3,075.00	$4,613.00
4" x 6" - excluding excavation & backfill	$3,253.00	$4,879.00
4" x 8" - excluding excavation & backfill	$3,574.00	$5,360.00
4" x 10" - excluding excavation & backfill	$5,262.00	$7,893.00
4" x 12" - excluding excavation & backfill	$5,267.00	$7,900.00
6" x 6" - excluding excavation & backfill	$3,485.00	$5,226.00
6" x 8" - excluding excavation & backfill	$3,805.00	$5,707.00
6" x 10" - excluding excavation & backfill	$5,494.00	$8,240.00
6" x 12" - excluding excavation & backfill	$5,494.00	$8,240.00
8" x 8" - excluding excavation & backfill	$4,451.00	$6,675.00
8" x 10" - excluding excavation & backfill	$6,211.00	$9,316.00
8" x 12" - excluding excavation & backfill	$6,330.00	$9,495.00
10" x 10" - excluding excavation & backfill	$7,077.00	$10,614.00
10" x 12" - excluding excavation & backfill	$7,547.00	$11,321.00
12" x 12" - excluding excavation & backfill	$7,457.00	$11,186.00
2" - service to property line	$3,783.00	$5,674.00
4" x 4" - service to property line	$8,992.00	$13,487.00
4" x 6" - service to property line	$9,171.00	$13,756.00
4" x 8" - service to property line	$9,491.00	$14,237.00
4" x 10" - service to property line	$11,179.00	$16,768.00
4" x 12" - service to property line	$11,184.00	$16,776.00
6" x 6" - service to property line	$9,061.00	$13,592.00
6" x 8" - service to property line	$9,382.00	$14,072.00
6" x 10" - service to property line	$11,071.00	$16,606.00
6" x 12" - service to property line	$11,071.00	$16,606.00
8" x 8" - service to property line	$10,388.00	$15,581.00
8" x 10" - service to property line	$12,148.00	$18,222.00
8" x 12" - service to property line	$12,147.00	$18,220.00
10" x 10" - service to property line	$13,672.00	$20,508.00
10" x 12" - service to property line	$14,170.00	$21,255.00
12" x 12" - service to property line	$15,077.00	$22,615.00
Fire Hydrant Installation*		
6" x 8" and smaller - service to property line	$11,731.00	$17,597.00
6"x 10" - service to property line	$13,420.00	$20,130.00
6"x 12" service to property line	$13,420.00	$20,130.00
PLAN CHECK/INSPECTION FEES		
Engineering Services**		
Plan Check Fees		
Main Extensions: per foot	$0.30	$0.44
BUT not less than	$249.00	$374.00
(Includes hydrants and appurtenances and connection to water system)		

ASSESSMENTS, RATES, FEES, AND CHARGES
EFFECTIVE July 1, 2017

	2017 Inside City Limits	2017 Outside City Limits
Pump Stations	$626.00	$939.00
Fireline Extension	$100.00	$150.00
Irrigation Systems	$100.00	$150.00
Miscellaneous (per hour)	$83.00	$124.00
Storm Drainage Plan Review Fees * **		
Preliminary Drainage Plans		
Residential Development	$387.00	N/A
Non-Residential Development	$268.00	N/A
Plus per IHSU	$11.65	N/A
Final Detailed Drainage Plans		
Residential Development (per lot)		
0 - 20 Lots	$41.93	N/A
21 - 50 Lots	$30.29	N/A
51 - 100 Lots	$26.80	N/A
100+ Lots	$23.30	N/A
Minimum Charge	$297.00	N/A
Non-Residential Development		
per IHSU	$23.30	N/A
Minimum Charge	$356.00	N/A
Resubmittal Fees		
First Resubmittal	No Charge	N/A
Subsequent Resubmittal	$297.00	N/A
Field Inspection Fees		
Water main extensions (per foot)	$1.32	$1.98
but not less than:	$487.00	$731.00
Pump Station	$642.00	$963.00
Miscellaneous (per hour)	$83.00	$124.00
Wastewater Connection Fees		
Lateral Connection at P/L	$83.00	$124.00
Lateral Connection at Main	$314.00	$472.00
Conveyance Facility Ext. (Per Foot)	$1.74	$2.60
but not less than:	$379.00	$568.00
Pump Station	$630.00	$945.00
Miscellaneous (per hour)	$83.00	$124.00
Storm Drainage Inspection Fees * **		
Residential Development (per lot)	$17.48	N/A
Non-Residential Development (per IHSU)	$17.48	N/A
Minimum Charge	$179.00	N/A
Conveyance Facility Extensions (per foot)	$0.93	N/A
Minimum Charge	$356.00	N/A
Unscheduled Inspections**** (per site visit)	$83.00	N/A
MISCELLANEOUS FEES AND CHARGES		
Office Services		
New Account (includes water turn-on)	$20.00	$20.00
Account Maintenance	$5.00	$5.00
Past Due Notice	$3.00	$3.00
Lien Recovery Charge	$102.00	$102.00
Close Account/Meter Read/Water Service Turn- off	$20.00	$20.00

ASSESSMENTS, RATES, FEES, AND CHARGES
EFFECTIVE July 1, 2017

	2017 Inside City Limits	2017 Outside City Limits
Utility/Lien Search Fee (Manual) per parcel	$31.00	$31.00
Park Reservation Fee (non-refundable)	$102.00	$102.00
Field Services		
Pavement Restoration Charge		
(refundable, if assessed and not required)		
Asphalt Patch	$709.00	$1,063.00
Concrete Patch	$1,274.00	$1,911.00
Asphalt Trench	$1,615.00	$2,423.00
Concrete Trench	$1,632.00	$2,447.00
County Road Permit	N/A	Cost
Water Meter Installation		
3/4" & 1"	$148.00	$148.00
1-1/2" & 2"	$229.00	$229.00
3" and greater	Actual Time & Materials	Actual Time & Materials
Water Meter Reactivation- Snowbirds	$51.00	$51.00
Water Meter Tampering		
Tampering Fee	$255.00	$255.00
Tampering Repair	Actual Time & Materials	Actual Time & Materials
Fire Service - Detector, Meter & MXU	$470.00	$470.00
Storz Adapter	$242.00	$242.00
Water Service Turn-off/Turn-on		
(Customer Request)		
Regular Hours	$41.00	$41.00
After Hours	$186.00	$186.00
Delinquency Notice	$20.00	$20.00
Water Service Turn-off/Turn-on		
(Delinquent Accounts)		
Regular Hours	$61.00	$61.00
After Hours	$186.00	$186.00
Flow and Pressure Test (Uncertified)		
3/4" & 1" meters only	$83.00	$83.00
1-1/2" & 2" meters only	$151.00	$151.00
Larger than 2"	Actual Time & Materials	Actual Time & Materials
Meter Test Fee (based on meter size)		
3/4" & 1"	$186.00	$186.00
1-1/2" & 2"	253.00	$253.00
3" or greater	Actual Time & Materials	Actual Time & Materials
Utility Plant Locates		
Regular Hours	No Charge	No Charge
After Hours	$186.00	$186.00
Emergency	No Charge	No Charge
Utility Compliance Specialist		
Inspection	$83.00	$83.00
Administration Fee	$35.00	$35.00
Utility Labor Rate Hourly (Equipment not included)	$67.00	$67.00

ASSESSMENTS, RATES, FEES, AND CHARGES
EFFECTIVE July 1, 2017

	2017 Inside City Limits	2017 Outside City Limits
RETAIL WATER SERVICE RATES		
General Service - Monthly Service Charge		
Meter Size		
5/8 x 3/4 inches	$12.84	$19.26
1 inch	$14.68	$22.03
1 1/2 inch	$20.87	$31.31
2 inch	$28.04	$42.06
3 inch	$53.20	$79.80
4 inch	$98.86	$148.29
6 inch	$351.51	$527.27
8 inch	$1,284.01	$1,926.02
10 inch	$4,579.50	$6,869.23
12 inch	$17,215.80	$25,823.70
Residential Commodity Charge (per HCF)		
Per HCF/Month	$2.22	$3.33
Non - Residential Commodity Charge (per HCF)	$2.00	$3.00
Fire Protection - Monthly Service Charge		
Service Size		
1 inch	$26.65	$39.97
1 1/2 inch	$40.11	$60.17
2 inch	$52.15	$78.23
3 inch	$57.46	$86.21
4 inch	$62.64	$93.95
6 inch	$78.18	$117.27
8 inch	$104.09	$156.13
10 inch	$145.66	$218.49
12 inch	$208.09	$312.13
Commodity Charge (per HCF)	$4.02	$6.02
- For Usage Other Than Firefighting		
Low-Income Senior and Low-Income Disabled Citizen		
- Monthly Service Charge		
Base Charge (per account) 5/8" x 3/4"	$12.84	$19.26
Base Charge (per account) 1"	$14.68	$22.03
Commodity Charge		
0 - 5 HCF/Month	No Charge	No Charge
Over 5 HCF/Month	$2.22	$3.33
Temporary/Construction Meter		
1" Meter		
Deposit	$300.00	$300.00
Base Fee (per month)	$14.68	$22.03
Set Up Fee & Removal Fee	$296.00	296.00
Hydrant meter (3" Meter)		
Deposit	$2,000.00	$2,000.00
Base Fee (per month)	$53.20	$79.80
Set Up Fee	$296.00	$296.00
Equipment Loss/Damage	Actual Time & Materials	Actual Time & Materials
Commodity Charge (per HCF)	$2.00	$3.00
City Parks and Recreation Dept. - Irrigation		
Commodity Charge (per HCF)	$1.00	N/A

	2017 Inside City Limits	2017 Outside City Limits
Gold Mountain Golf Course Complex - Irrigation		
Commodity Charge (per HCF)	$1.36	N/A
RETAIL WASTEWATER SERVICE RATES		
Monthly Service Charge		
Single Family		
Base Charge (per account)	$34.24	$51.36
Commodity Charge (per HCF)	$4.59	$6.89
Duplex on 1 Meter or 2 Bldgs. on 1 Meter		
Base Charge (per unit)	$27.12	$40.68
Commodity Charge (per HCF)	$4.59	$6.89
Multi - Family		
Base Charge (per unit)	$27.12	$40.68
Commodity Charge (per HCF)	$4.59	$6.89
Low-Income Senior and Low-Income Disabled Citizen		
Base Charge (per account)	$21.24	$32.26
Commodity Charge (per HCF)		
0 - 5 HCF/Month	No Charge	No Charge
Over 5 HCF/Month	$4.59	$6.89
Commercial I		
Base Charge (per account)	$50.61	$75.93
Commodity Charge (per HCF)	$4.73	$7.10
Commercial II		
Base Charge (per account)	$50.99	$76.48
Commodity Charge (per HCF)	$6.06	$9.09
Commercial III		
Base Charge (per account)	$51.49	77.24
Commodity Charge (per HCF)	$7.40	$11.10
Commercial IV		
Base Charge (per account)	$51.99	$77.99
Commodity Charge (per HCF)	$8.74	$13.11
Commercial V		
Base Charge (per account)	$57.19	$85.80
Commodity Charge (per HCF)	$10.93	$16.40
Commercial VI		
Base Charge (per account)	$62.91	$94.37
Commodity Charge (per HCF)	$13.66	$20.49
Commercial VII		
Base Charge (per account)	$69.20	$103.80
Commodity Charge (per HCF)	$15.95	$23.93
Commercial Special		
Base Charge (per account)	$76.12	$114.18
Commodity Charge (per HCF)	$21.35	$32.00
Beverage Production		
Base Charge (per account)	$51.49	$77.24
Commodity Charge (per HCF)	$4.81	$7.21
Commercial Fountains - Separately Metered		
Base Charge (per account)	$50.61	$75.93
Commodity Charge (per HCF)	$1.56	$2.34

ASSESSMENTS, RATES, FEES, AND CHARGES
EFFECTIVE July 1, 2017

	2017 Inside City Limits	2017 Outside City Limits
Septage Disposal (per gallon of tank capacity)	$0.26	$0.38
Leachate Per Gallon of Tank Capacity		
Individual Residential Grinder Pumps		
Grinder Pump Surcharge	$11.03	$16.55
Low-Income Senior and Low-Income Disabled Grinder Pump Surcharge	$8.28	$12.42
RETAIL STORMWATER RATES		
Monthly Service Charge		
Residential I (Single Family/Duplex)		
Base Charge (per account)	$13.73	N/A
Exception: Duplex with 2 Meters (per account)	$6.90	N/A
Residential II - SW Impact Fee (per IHSU)		
50% of the Res I Base Charge	$6.87	N/A
Residential III - SW Impact Fee (per IHSU)		
100% of the Res I Base Charge	$13.73	N/A
Commercial I		
Base Charge (per IHSU)	$13.73	N/A
Commercial II - SW Impact Fee (per IHSU)		
50% of the Comm I Base Charge	$6.87	N/A
Commercial III - SW Impact Fee (per IHSU)		
100% of the Comm I Base Charge	$13.73	N/A
Public School Districts (per account)	$13.73	N/A
Low-Income Senior and Low-Income Disabled Citizen		
Base Charge (per account)	$8.36	N/A
Multi - Family & Commercial Rate Adjustment		
Water Quality (per IHSU)	$1.52	N/A
Water Quantity (per IHSU)	$4.59	N/A
Stormwater Penalty		
New Multi - Family & Commercial development without on-site detention		
Charge (per IHSU)	$3.04	N/A

* Pavement Restoration Charge May Also Be Assessed.
** Fees include original review and one resubmittal review.
Additional reviews will be charged at miscellaneous hourly rate (above).
*** Does not apply to single family residence or duplex construction on an existing established lot.
**** (Unscheduled inspections shall be tracked through the course of a project and billed after the final site inspection. Fees for unscheduled inspections shall be paid prior to final occupancy approval.)
N/A when noted means “not applicable.”

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ASSESSMENTS, RATES, FEES, AND CHARGES
EFFECTIVE January 1, 2016, January 1, 2017 and January 1, 2018
Inside and Outside City Limits

GENERAL FACILITY CHARGES

Water based on meter size average normal flow	2016	2017	2018
5/8" x 3/4"	$ 3,016.92	$ 4,448.58	$ 5,880.00
1"	$ 3,016.92	$ 4,448.58	$ 5,880.00
1" Commercial	$ 4,133.18	$ 6,094.59	$ 8,056.00
1 1/2" Commercial	$ 24,135.35	$ 35,587.67	$ 47,040.00
2" Commercial	$ 24,135.35	$ 35,587.67	$ 47,040.00
3" Commercial	$ 60,338.37	$ 88,969.18	$ 117,600.00
4" Commercial	$ 120,676.74	$ 177,938.37	$ 235,200.00
Greater than 4"		Case by Case basis	Case by Case basis

Wastewater based on meter size average normal flow			
5/8" x 3/4"	$ 4,566.83	$ 5,714.91	$ 6,863.00
1"	$ 4,566.83	$ 5,714.91	$ 6,863.00
1" Commercial	$ 5,662.87	$ 7,086.43	$ 8,510.00
1 1/2" Commercial	$ 31,967.80	$ 40,004.40	$ 48,041.00
2" Commercial	$ 31,967.80	$ 40,004.40	$ 48,041.00
3" Commercial	$ 82,202.92	$ 102,868.46	$ 123,534.00
4" Commercial	$ 164,405.83	$ 205,736.92	$ 247,068.00
Greater than 4"	Case by Case basis	Case by Case basis	Case by Case basis

Stormwater (per IHSU)	$ 1,731.00	$ 2,443.00	$ 3,157.00

The GFCs shall be effective January 1, 2016, January 1, 2017, and January 1, 2018 as noted, except that:

1) Projects with a complete building permit application or site development permit application which includes utility services filed with the City on or before December 31, 2015, or projects with land use approval granted by the City on or before December 31, 2015, shall be vested to the GFCs in effect on the date of filing the completed application or the date approval is granted if that amount is lower than the current rate.

2) The Seattle Construction Index (SCI) set forth in BMC 15.06.020 shall not be applied to the January 1, 2016, January 1, 2017 and January 1, 2018 charges unless otherwise approved by City Council.

CITY OF BREMERTON
NAVY UTILITY CONTRACTS

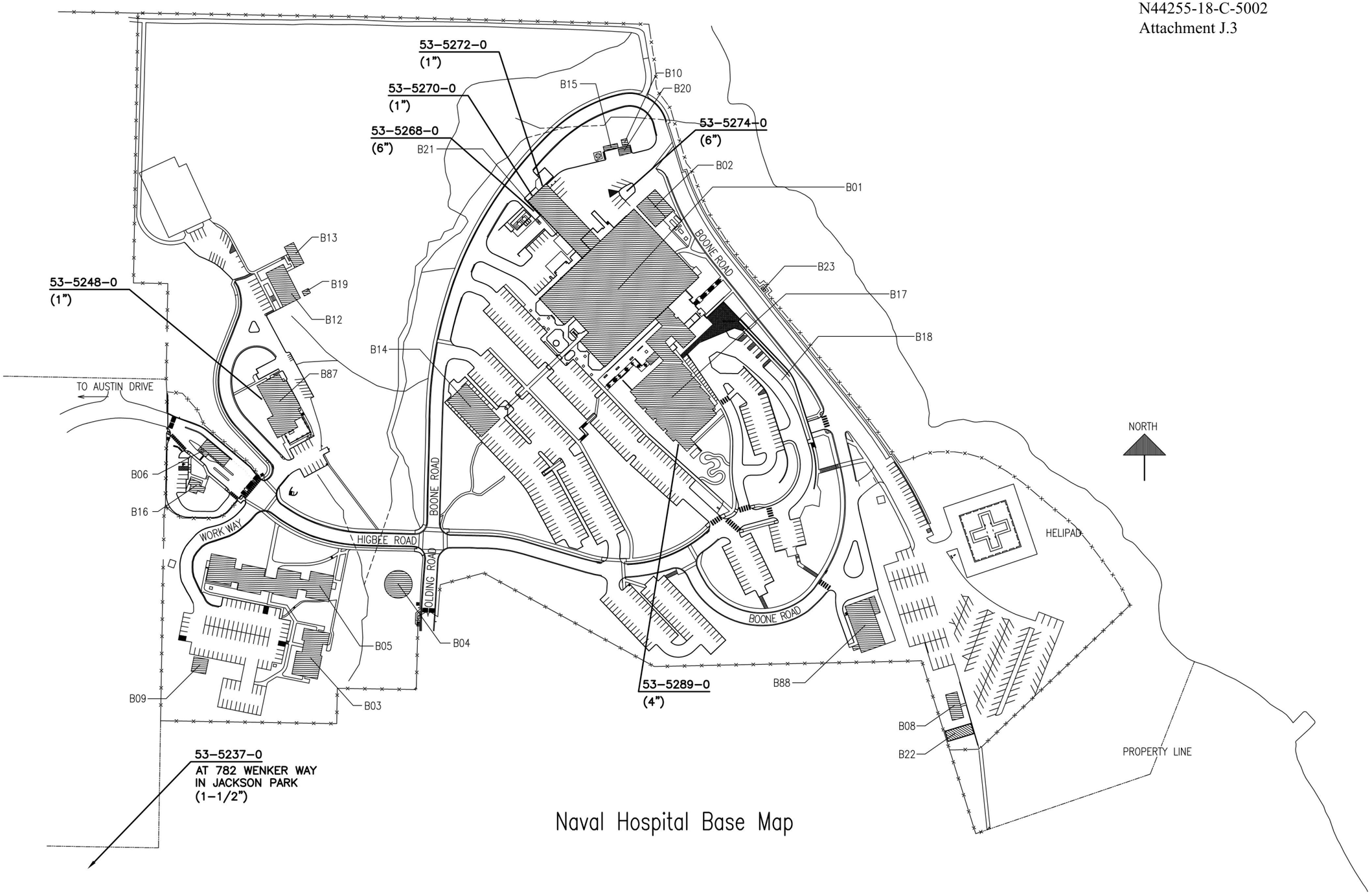
Accounts and Adjustments for Naval Hospital Bremerton

BUILDING	ACCOUNT	METER #	METER SIZE/SERVICE	Sewer Service Type	Volume
Water:					
B-01 Hospital - Primary	5352740	73251294	6” Domestic	C1	Water Meter
B-01 Hospital – Back-up	5352680	73251293	6” Domestic	C1	Water Meter
B-01 Hospital	5352700	68667273	1” Cooling Water	None*	
B-01 Hospital	5352720	80206322	1” Boiler Make-up	None*	
B-17 Clinic	5352890	74263032	4” Domestic/Sewer	C1	Water Meter
B-87 Optics Lab	5352480	63693040	1” Domestic/Sewer	C1	Water Meter
JP-01 Satellite Pharmacy	5352370	63220696	1” Domestic/Sewer	C1	Water Meter
Sewer:					
B-01 Hospital	5352690	00000079	Calculated from (4) water meters**		

Notes
*These accounts are not billed to the Hospital and are included in the Jackson Park Housing meter reading (Contract N44255-18-C-5001)

** The sewer account is calculated by adding the meter readings from the Primary and Back-up domestic water accounts at subtracting the Cooling and Boiler Make-up usage for Building 01 - Hospital.

N44255-18-C-5002
Attachment J.3



Naval Hospital Base Map

Appendix F: Outfall Evaluation Report

Outfall Evaluation

PO Box 623 • Gig Harbor, WA 98335
(253) 265-2958 • Fax (253) 272-7250
BFox@cosmopolitaneng.com

DATE: November 25, 2018

TO: Pat Coxon and Larry Willman, City of Bremerton

FROM: Bill Fox, Cosmopolitan Marine Engineering

RE: West Plant Outfall Evaluation Report

This report documents the results of an inspection and evaluation of the City of Bremerton's West Plant treatment facility outfall 001 in Sinclair Inlet. An inspection dive and video were conducted on November 8, 2018, covering the outfall from the terminus of the diffuser to the inshore end where the pipeline disappears below mudline.

Outfall Drawing

The as-built drawing for the West Plant Outfall from 1971 is attached. The drawing shows a 36-inch diameter reinforced concrete pipe (RCP) outfall originating from a casing jacked under SR3 and the BNRR tracks, buried out to an elevation of approximately 82 feet city datum, then laid at a flat grade out to a 20-port diffuser. The drawing shows 30 inch high spalls to the springline of the pipe, with the crown 4 feet above native grade. The RCP outfall was constructed in 12-foot lengths, with gasketed bell-and-spigot joints. Joint restraint is by lugs at the springline drawn together by stainless steel all-thread rods and single backing nuts.

Video Record

Global Diving and Salvage vessel and personnel supported the inspection. The video record of the final dive is provided on thumb drives that are included in this report by reference. After finding and selectively cleaning marine growth from the outfall pipe and diffuser, Rhodamine WT fluorescent dye was injected into the effluent to aid in visualizing the discharge from the diffuser ports, and detection of leaks in the pipe.

Two video files are included:

1. The first video file is 21 minutes in duration. It begins at the terminus of the diffuser, just prior to arrival of the dye in the effluent. The effluent is first observed at the second diffuser port working shoreward. The video continues shoreward, showing all diffuser ports, pipe joints and restraints, and anchors. The first video concludes at the point where the pipe disappears below mudline at the shoreward end.

2. The second video file is three minutes in duration. It returns to the terminus of the diffuser, providing a complete video assessment of the end cap, restraints, and minor leakage at that location. It also shows the dyed effluent plume from port #1 that was missed in the first video file.

Outfall Evaluation

This evaluation is required by NPDES Permit No. WA0029289, Condition S13. Specific assessments required by the NPDES permit, and that are documented in this report include:

- Obtain GPS coordinates and confirm depths for beginning, midpoint and terminus of the diffuser.
- Determine the extent of sediment accumulation in the vicinity of the diffuser.
- Assess whether diffuser ports are free of obstructions and if they are flowing uniformly.
- Assess the physical condition of the outfall pipe, pipe joints, concrete anchors, diffuser section and end cap.

Diffuser Location and Depth. The dive team quickly found the end of the diffuser by descending a down line to temporary anchor deployed at previously recorded GPS coordinates. A downline was affixed to the diffuser end cap restraints and held tight in a vertical orientation. GPS coordinates were recorded over the vertical downline at the diffuser end, as were depths to the sea bottom and to the crown of the pipe.

GPS coordinates for midpoint were determined from the diffuser end based on known distance and bearing. Elevations of the bottom and crown of pipe have been adjusted to MLLW datum, based on published tide of +6 ft MLLW when the soundings were taken.

Depths and GPS locations of points of interest are tabulated below:

Location	Depth at Crown (MLLW datum)	Bottom Depth (MLLW datum)	Latitude (47° N)	Longitude (122° W)
Diffuser End	-28 ft	-42 ft	32’ 46.9”	40’ 11.0”
Diffuser Midpt	-28 ft	-41 ft	32’ 47.5”	40’ 11.3”
Diffuser Begin	-28 ft	-40 ft	32’ 48.0”	40’ 11.6”

Sediment Accumulation. Sediments graded from medium to coarse sand near the diffuser pipe, to fine grained silt (mud) a few feet away. The coarser particles adjacent to the pipe are presumably due to the induced currents that the effluent plume creates, or the biota that are present near the pipe and outlets. Sediments further shoreward after the diffuser ends graded to finer particles.

There is no observed accumulation or scour of sediments in the vicinity of the West Plant diffuser. The pipe has been in place for 47-years, and thus the local sediments have achieved an equilibrium with the outfall.

Diffuser Ports. The dyed effluent in the video clearly reveals that all diffuser ports were open and flowing freely. An abandoned fishing net covered several of the offshore ports, but were not visually impeding effluent flow.

Physical Condition. The following observations of the physical condition of the outfall pipe and diffuser are noted:

- During the initial dive pass there were points of interest cleaned for inspection and video recording. The points were in random order at multiple locations of hardware and diffusers. The outfall appeared to be in overall good condition based on this first pass.

- The most noteworthy finding may be that there are 22 ports, not the 20 ports shown on the drawings. Previous inspections had noted that there was a discrepancy, and this inspection definitively confirmed that there are 22 ports.

- The flush-wall diffusers on the outfall had moderate marine growth surrounding the outlet, consisting of anemones and tubeworms. Most of the growth was removed for the video, but was left in place for the nearshore ports to reveal that effluent flow was not impeded.

- An abandoned fishing net has been snared by the diffuser at the end. This has occurred since the previous inspection in 2009. There has been no damage caused to the pipe, or impact on effluent flow from any of the ports.

- There were no signs of cracking or damage to the pipe observed at any location. All joints were sealed in grout bands, and no leaking joints were observed.

- The joint harnesses consisted of lugs at the springline, on both sides of the pipe, that were drawn together by stainless steel all-thread rods and single nuts. Each joint harness was inspected closely, including several that had all marine growth removed by wire brush. The all-thread was intact and shiny. The nuts retained the hex heads, that could probably accept a hex wrench if there were a need to action the nuts.

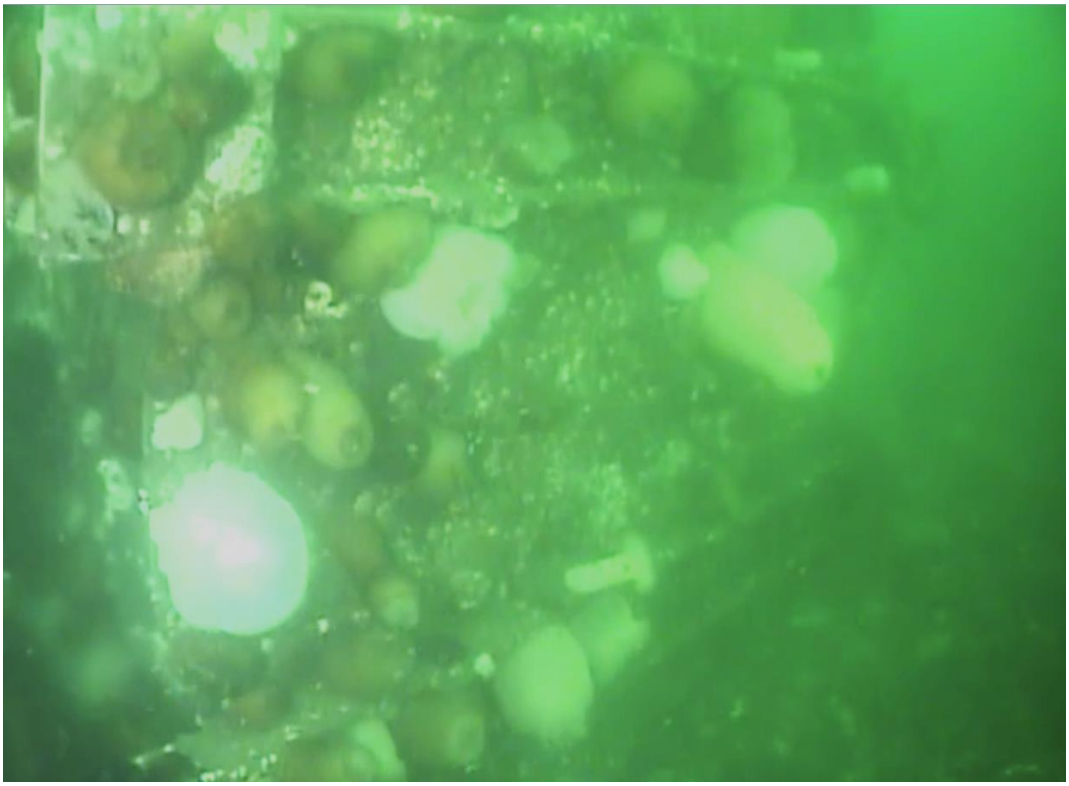
- The outfall was originally held in place with chain tying it to pipe support pads made of 4x12" creosote mats that are 6'-6" in width. The chain that ties the outfall to these mats has deteriorated and no longer provides restraint for the outfall. The restraints may have been installed only for construction purposes and were not intended to be permanent. Regardless, the 47-year-old pipe is stable without any other restraint than the joint harnesses.

- The diffuser end cap consists of a steel end plate held fast by C-shape mild steel channels running horizontal across the cap from 2- to 10-o'clock position and 8- to 4-o'clock position. The C-channels are restrained by stainless tie rods to lugs on the diffuser pipe. Minor leakage of effluent was observed at the end cap restraints, but this is thought to be inconsequential because the volume is very minor, and the function of this portion of the outfall is to diffuser effluent anyway.

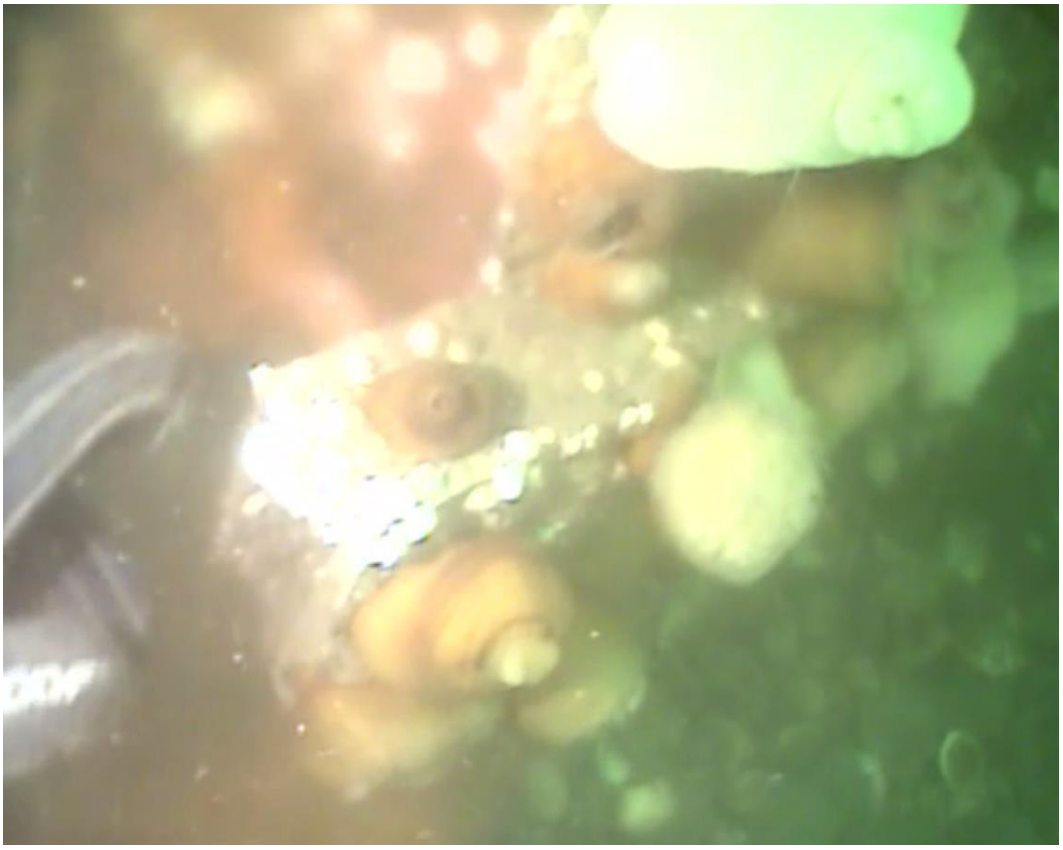
Summary

The RCP outfall and diffuser are in good condition and operating as intended. The presence of 22 diffuser ports rather than 20 shown on the drawings is confirmed.

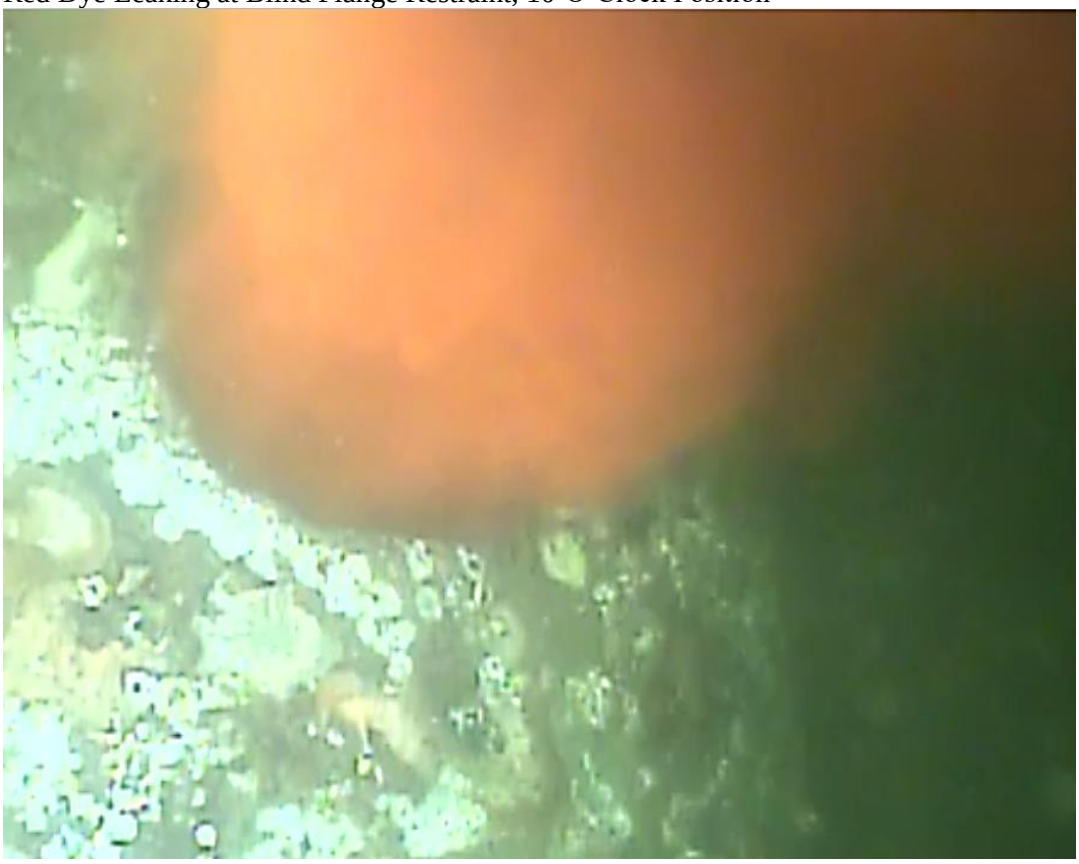
Photos



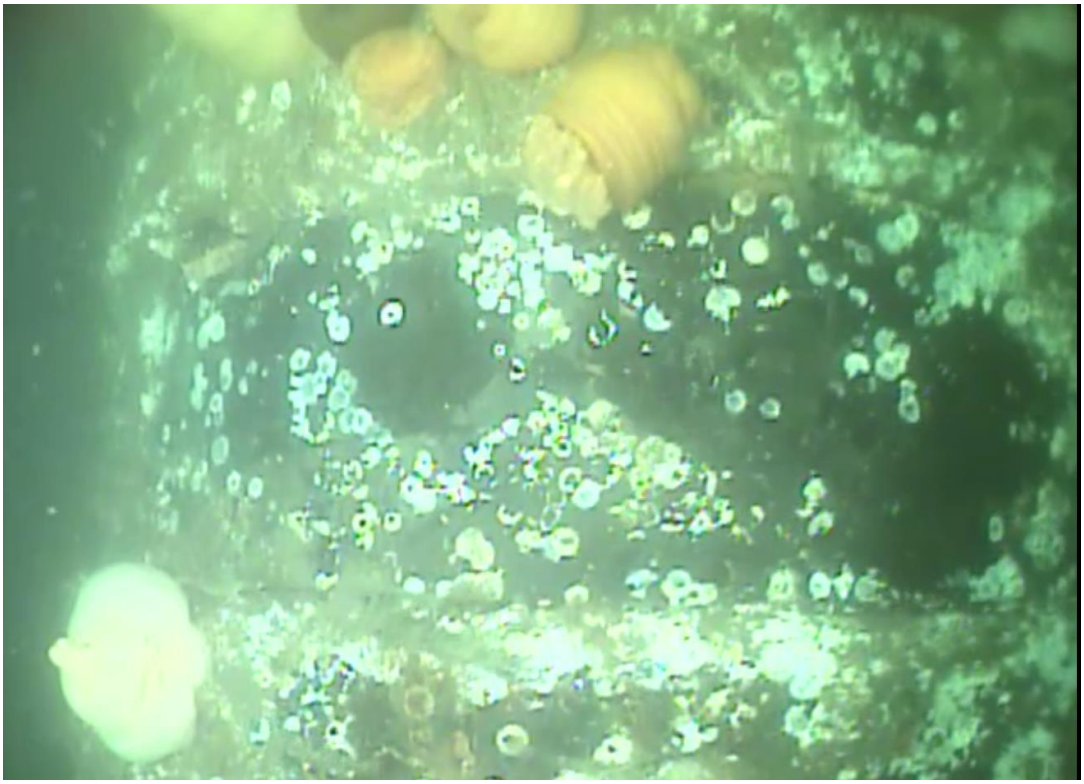
Blind Flange, Offshore End of Outfall Showing C-Channel Restraints



Red Dye Leaking at Blind Flange Restraint, 10-O'Clock Position



Typical Diffuser Port with Red Dye Discharge



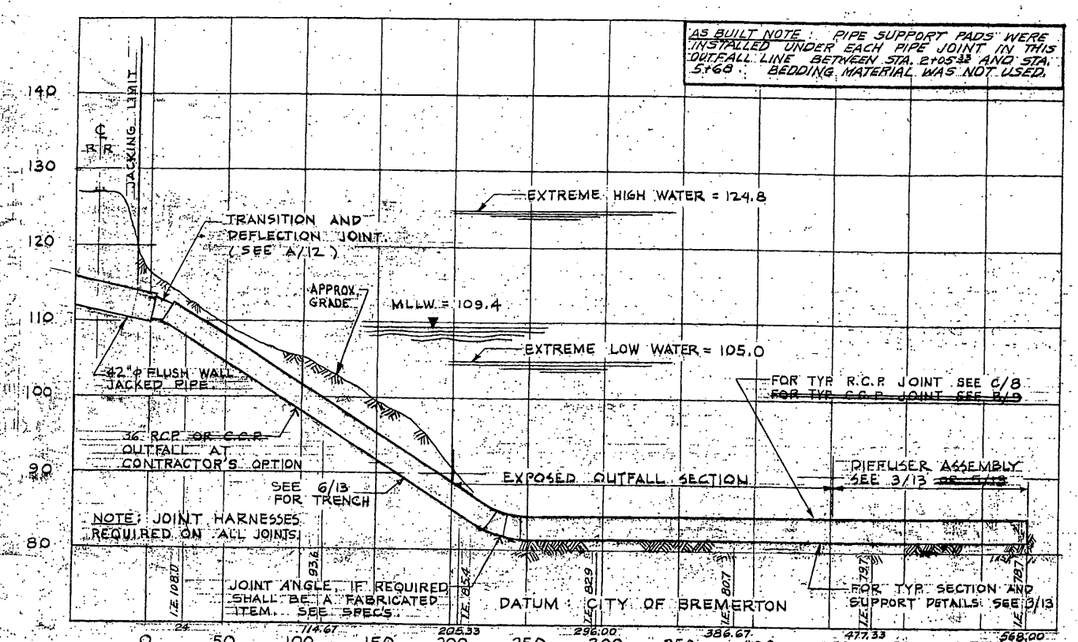
Typical Joint Grout Injection Band



Pipe Joint Restraining Rod

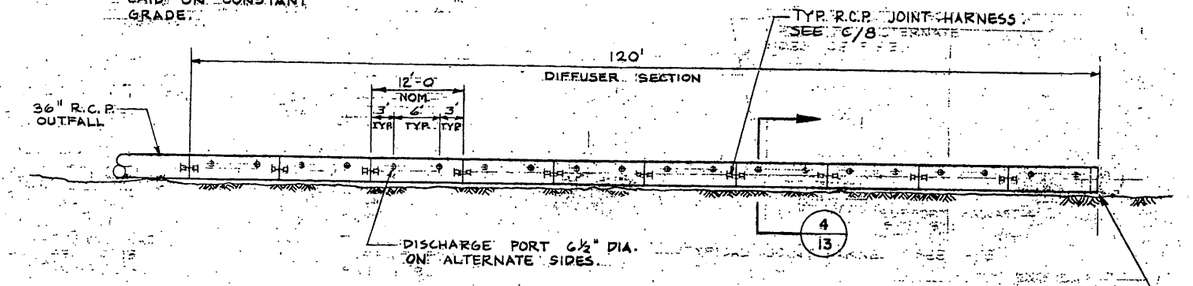


Joint Restraining Lug Attached to RCP Pipe

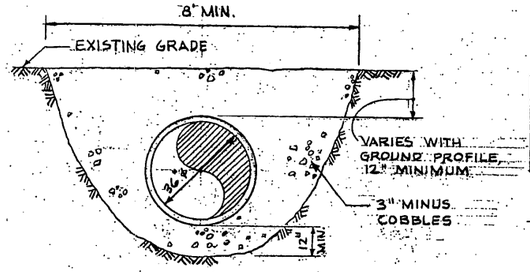


OUTFALL PROFILE
SCALE: HORIZ. 1" = 50', VERT. 1" = 10' (2/13)

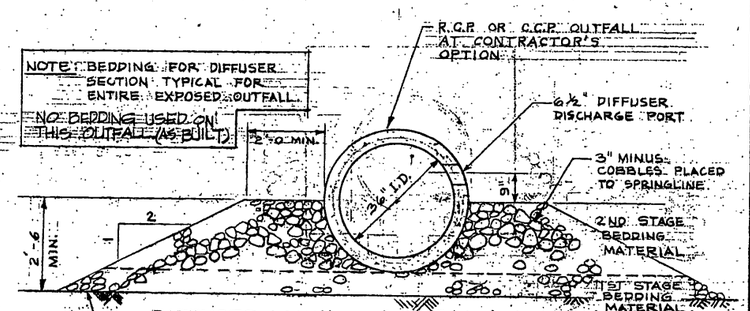
NOTE: DIFFUSER TO BE LAID ON CONSTANT GRADE.



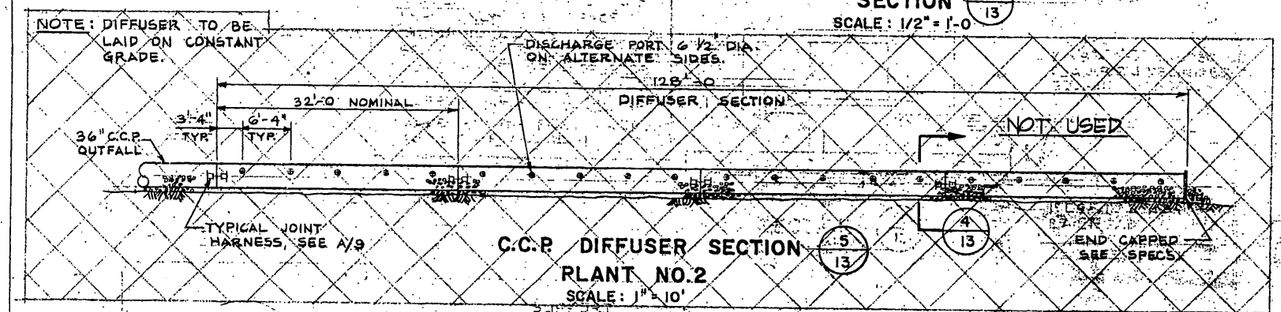
R.C.P. DIFFUSER SECTION (3/13)
PLANT NO. 2
SCALE: 1" = 10'



TYPICAL TRENCH SECTION FOR BURIED PIPE (6/13)
NO SCALE

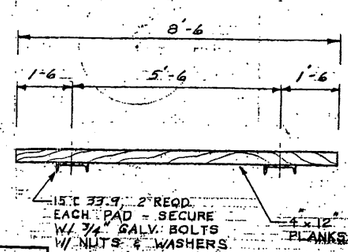


DIFFUSER AND TYPICAL PIPE SUPPORT SECTION (4/13)
SCALE: 1/2" = 1'-0

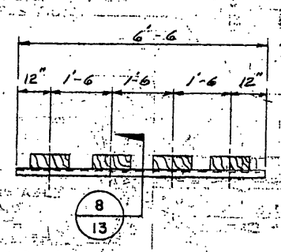


C.C.P. DIFFUSER SECTION (5/13)
PLANT NO. 2
SCALE: 1" = 10'

NOTE: PADS SHALL BE PLACED, WHEN NEEDED, BENEATH COBBLE BEDDING AT EITHER OR BOTH PLANTS AT THE DIRECTION OF THE ENGINEER. THE NEED FOR SUCH PADS SHALL BE MADE AFTER APPROPRIATE SOIL DETERMINATIONS. SEE SPECS. FOR DETAILS. SPACING OF PADS SHALL BE DETERMINED IN THE FIELD BY THE ENGINEER.

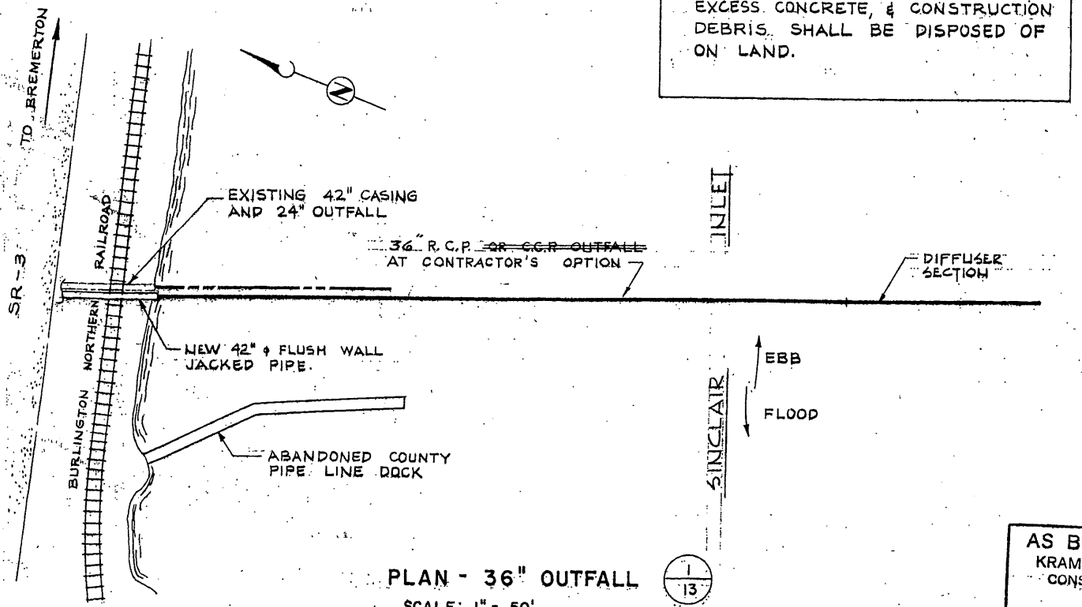


SECTION (8/13)



END VIEW (7/13)

PIPE SUPPORT PAD (8/13)
SCALE: 1/2" = 1'-0



PLAN - 36" OUTFALL (1/13)
SCALE: 1" = 50'

NOTE: ALL EXCAVATED MATERIAL, EXCESS CONCRETE, & CONSTRUCTION DEBRIS SHALL BE DISPOSED OF ON LAND.

AS BUILT DRAWING
KRAMER, CHIN & MAYO
CONSULTING ENGINEERS
APP'D. BY O.O. DATE 3/27/72

RONALD D. MAYO — STATE OF WASHINGTON — REGISTERED PROFESSIONAL ENGINEER
ROBERT G. CHIN — STATE OF WASHINGTON — REGISTERED PROFESSIONAL ENGINEER

REVISIONS	DW'N BY: O.E., C.R.J.	DES BY: V. OBLAS	DATE: FEB. 1971	KRAMER CHIN & MAYO CONSULTING ENGINEERS	CITY OF BREMERTON	OUTFALL AND DIFFUSER DETAILS	DRAWING NUMBER

Appendix G: Crosstown Pipeline Memorandum

Kennedy Jenks

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Crosstown Pipeline Alternatives Analysis

4 February 2025

Prepared for

City of Bremerton
345 6th Street
Bremerton, WA 98337

KJ Project No. 2397011*00

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A Engineer Opinion of Probable Construction Costs

Section 1: Introduction

The Crosstown Pipeline (CTP), originally constructed in 1984, plays a key role in the City of Bremerton's (City's) collection system infrastructure. The high-capacity pipeline extends from the northeast quadrant of West Bremerton approximately 20,000 linear feet (LF) to the Westside Wastewater Treatment Plant (WWTP)Starting at Sewage Pump Station CE-1, the pipeline is comprised of 24-inch cement-lined ductile iron pipe (DIP), 30-inch DIP (CIPP-lined in 2012), 36-inch HDPE (installed in 2012), 30-inch prestressed concrete cylinder pipe (PCCP), and 36-inch PCCP, which ends immediately upstream of the WWTP headworks. The CTP receives flows from pump stations CE-1, CW-1, CW-4, CE-4 (via the Central Bremerton Force Main), WB-3, WB-6, WB-1 and WB-2 (both owned and managed by Kitsap County Sewer District No. 1), SB-1, SB-3, and SB-4. The CTP acts both as a gravity and pressure main. Approximately 11,000 LF of the initial section of the CTP starting at the WWTP is lower than the headworks and therefore always pressurized. Moving further upstream from the WWTP, the elevation of the CTP increases and flow occurs via gravity. However, these sections can become pressurized during high flow conditions caused by wet weather events. During these events, the pipeline is capable of safely conveying up to approximately 30 MGD to the WWTP.

Kennedy/Jenks Consultants, Inc. (Kennedy Jenks) has been retained by the City to develop conceptual alternatives for increasing the capacity and reliability of the CTP. This analysis has been performed in conjunction with the 2024 update to the City's Wastewater Comprehensive Plan (WCP), for which Kennedy Jenks has also been retained. As such, the analyses herein consider collection system flows across the planning horizon of 2024-2044.

Kennedy Jenks has assessed each conceptual alternative with respect to select criteria developed collaboratively with City personnel, yielding an overall score for each alternative.

Section 2: Alternatives Analysis

Per discussions with the City held September 27, 2024, Kennedy Jenks progressed two pipeline alignments through conceptual design. The different alignments include options for sizing the pipeline, based on the intended use of the new pipeline. A total of three alternatives were developed that utilize two different pipeline alignments. Each alternative developed includes proposed alignment routing, approximate quantity and type of utility crossings, constructability considerations, potential risks and a Class 5 cost estimate per the Association for the Advancement of Cost Engineering (AACE) guidelines.

2.1 Alternative 1A – Larger Parallel Pipeline

2.1.1 General Description

Alternative 1A proposes to install a pipeline beginning near the intersection of 9th Street and Montgomery Avenue that runs predominantly parallel to the existing CTP to the WWTP, approximately 11,500 LF. At the pipeline start, an existing blind flange at the intersection can be modified to convey upstream flow to either the existing CTP or the new, parallel CTP. A flow split structure or valving will be added at the junction of the CTP and the Central Bremerton Force Main (CBFM). Each pump station that conveys flow to the CTP downstream of the parallel pipeline origin will undergo pipeline connection improvements to allow for conveyance to the proposed parallel pipeline in addition to the existing connection to the existing CTP. Figure 2-1 below illustrates the alternative.

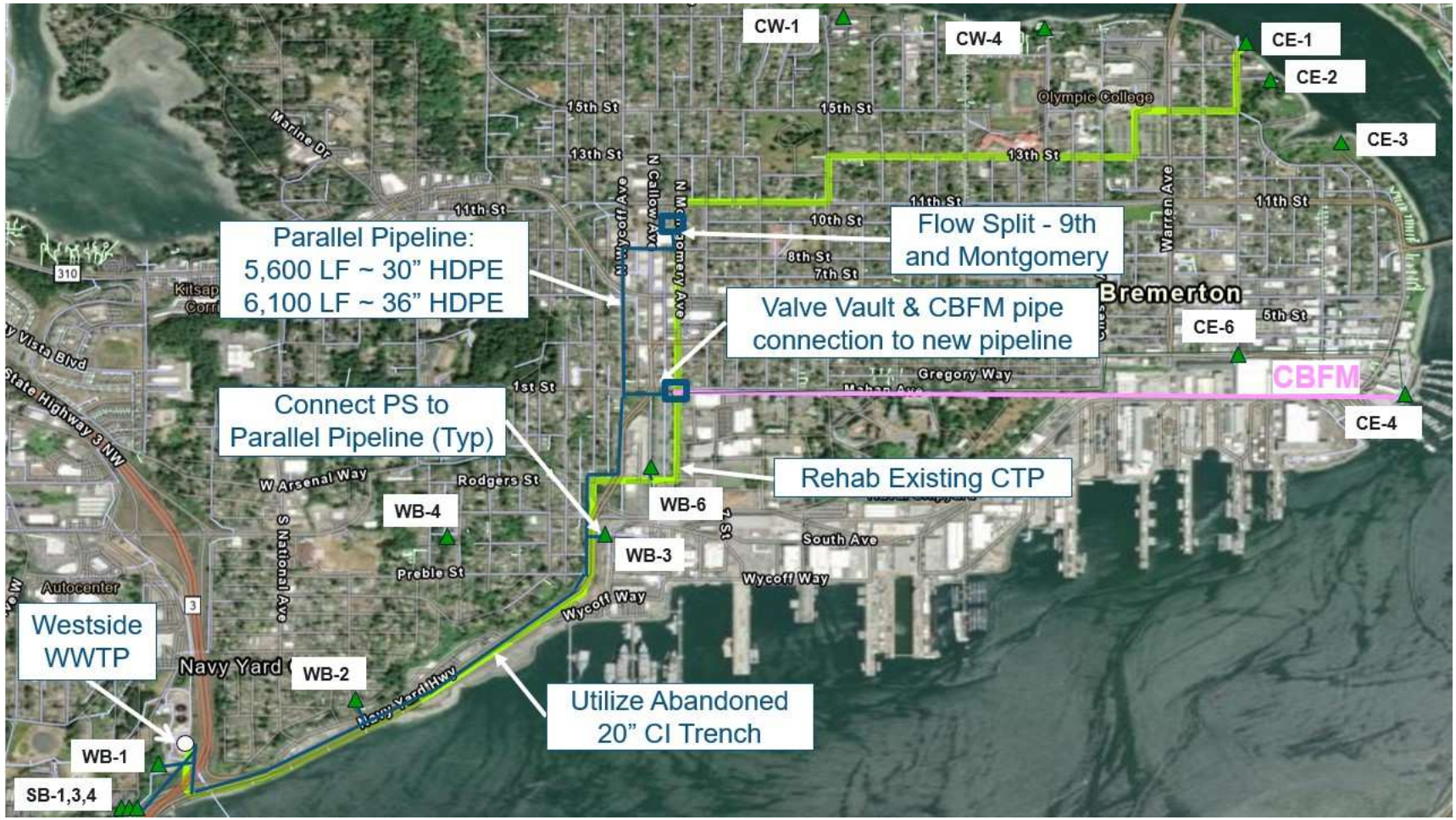


Figure 2-1: Alternative 1A - Larger Parallel Pipeline Concept

2.1.2 Pipeline Capacity

As part of the 2024 WCP Update (2024, Kennedy Jenks), the City's population growth and subsequent collection system loading were assessed across the planning horizon of 2024-2044 with respect to each sewer basin.

The proposed pipeline is sized as 30-inch and 36-inch, similar to the existing CTP, to allow for full redundancy and operational flexibility downstream of the origin point, with capacity for average dry weather and peak wet weather flows through 2044. Table 2-1 and Table 2-2 evaluate the proposed pipeline sizes for each segment against the projected 2024 and 2044 flows, respectively. Through the planning horizon, the velocity through the pipeline during the dry weather season is below two feet per second, the typical design standard for minimum flow through a sewer. Settling of solids within the pipeline may occur, which can cause odor control issues within the pipeline.

Table 2-1: Pipeline Capacity Servicing 2024 Flows

	Wet Weather			Dry Weather		
CTP Pipe Segment	**Cumulative PHF[1] (gpm)**	**Pipe Size (Inches)**	**Pipe Velocity (ft/s)**	**Cumulative ADWF[1] (gpm)**	**Pipe Size (Inches)**	**Pipe Velocity (ft/s)**
Origin to CE-4 (CBFM/CTP Junction)	11,685	30	5.8	1,107	30	0.9
CE-4 to WB-6	12,234	30	6.0	1,111	30	0.9
WB-6 to WB-3	17,869	36	6.2	1,113	36	0.6
WB-3 to WB-1[2]	24,798	36	8.5	1,693	36	0.8
WB-1[2] to WB-2[2]	25,028	36	8.6	1,722	36	0.8
WB-2[2] to SBFM[2,3]	25,808	36	8.9	1,819	36	0.9
SBFM[3] to WWTP	27,788	36	9.6	2,067	36	1.0

Notes:

(1) Peak hourly flows (PHFs) and Average Dry Weather Flows (ADWFs) based on 2023 pump station data provided by City in gallons per minute (gpm).

(2) No current pump station data provided. Flows based on 2013 pump station data per 2014 Wastewater Comprehensive Plan Update report.

(3) Average dry weather flows (ADWFs) from SB-1, SB-3, and SB-4 conveyed via South Bremerton Force Main (SBFM)

Table 2-2: Pipeline Capacity Servicing 2044 Flows

CTP Pipe Segment	Wet Weather			Dry Weather		
	Cumulative PHF[1] (gpm)	Pipe Size (Inches)	Pipe Velocity (ft/s)	Cumulative ADWF[1] (gpm)	Pipe Size (Inches)	Pipe Velocity (ft/s)
Origin to CE-4 (CBFM/CTP Junction)	14,289	30	6.5	1,762	30	0.8
CE-4 to WB-6	15,037	30	6.8	1,790	30	0.8
WB-6 to WB-3	20,673	36	6.5	1,792	36	0.6
WB-3 to WB-1[2]	27,767	36	8.8	2,396	36	0.8
WB-1[2] to WB-2[2]	27,997	36	8.8	2,425	36	0.8
WB-2[2] to SBFM[2,3]	28,777	36	9.1	2,522	36	0.8
SBFM[3] to WWTP	32,564	36	10.3	2,983	36	0.9

Notes:

(1) Peak hourly flows (PHFs) based on 2023 pump station data provided by City in gallons per minute (gpm).

(2) No current pump station data provided. Flows based on 2013 pump station data per 2014 Wastewater Comprehensive Plan Update report.

(3) Average dry weather flows (ADWFs) from SB-1, SB-3, and SB-4 conveyed via South Bremerton Force Main (SBFM)

Per conversations with the City in November 2024, there are concerns and unknowns about the condition of the existing CTP. The proposed pipeline in this alternative is sized for full capacity of the contributing flows to the CTP, thereby reducing the criticality of failure for the existing CTP.

2.1.3 Pipeline Alignment

The proposed alignment follows the existing CTP closely to limit the construction scope required to connect the downstream pump stations, Central Bremerton Force Main, and South Bremerton Force Main to the parallel pipeline. The connection points included in this alternative allow for the CE-4, WB-6, WB-3, WB-1, WB-2, and SB-1/3/4 (via SBFM) pump stations to convey into the existing CTP or the proposed parallel pipeline.

A significant portion of the proposed pipeline runs within a Washington State Department of Transportation (WSDOT) limited access-full control corridor along Charleston Boulevard. These types of corridors are historically difficult for contractually negotiating longitudinal pipeline access. The City already has two pipelines running longitudinally through this corridor: the existing CTP and an abandoned 20-inch cast iron pipeline. Per City GIS, the abandoned pipeline runs approximately from the connection point of WB-3 to the CTP to the WWTP. The proposed alternative assumes WSDOT will accept the design intent to utilize the trench to remove the abandoned line and replace it with the proposed 36-inch pipeline.

The proposed parallel pipeline must cross State Route 3 to reach the WWTP. This section of the State highway is also a WSDOT limited access-full control corridor. Per conversations with WSDOT personnel in September 2024, perpendicular crossings of these types of corridors are historically viable. The existing CTP makes such a crossing in the same area as the proposed parallel pipeline.

The proposed pipeline follows a similar alignment to the existing CTP but avoids several utility-congested intersections at the upstream portion. Specifically, the Montgomery Avenue right-of-way includes some large diameter water lines, therefore the proposed pipeline follows 9th Street further west of Montgomery to Wycoff Avenue. The pipeline then travels south down Wycoff Avenue, instead of Montgomery Avenue; this road has more available space for the new pipeline. The CBFM will also connect to the new pipeline on Wycoff Avenue to avoid the congested utilities in Montgomery Avenue. A valve vault located near 1st Street and Montgomery Ave will provide a connection between the existing CTP and CBFM and it will also connect to a new pipeline that travels west until it connects to the proposed pipeline at 1st Street and Wycoff. Table 2-3 summarizes the approximate number of utility crossings:

Table 2-3: Alternative 1A Utility Crossings

	Water Crossings[1]	Sewer Crossings[1]	Storm Crossings[1]	Gas/Electrical/Telecom Crossings (Each)[2]
Alternative 1A	18	7	30	14

Notes:
(1) Water/Sewer/Storm Crossings quantified per City GIS
(2) Gas/Electrical/Telecommunications Crossings estimated based on the number of road crossings

2.1.4 Construction Sequencing

A proposed sequence of constructing this alternative, to achieve the goals of increasing capacity and providing opportunity to assess the condition of and rehabilitate the existing CTP could be as follows:

1. Construct a means of flow splitting at 9th Street and Montgomery Avenue. An existing cross with a 30-inch blind flange can be utilized for the beginning of the parallel pipeline. Additional valving on the existing CTP to provide flow isolation would be required.

2. Construct the parallel pipeline, and construct pump station connections to the parallel pipeline, as well as the CBFM connection.

3. Perform condition assessments and execute rehabilitation of the existing Crosstown Pipeline. The parallel pipeline is sized for peak wet weather flows, so construction and condition assessments can take place in the dry weather or wet weather months if necessary. The existing CTP can be taken offline in full for the assessments and rehabilitation.

2.1.5 Alternative 1A Challenges

At the conceptual level, the following challenges have been identified for this alternative:

- Considerable WSDOT coordination will be required to obtain approval to construct or rehabilitate infrastructure in the limited access-full control corridor along Charleston Boulevard.
- Additional WSDOT coordination will be required for crossing under State Route 3 next to the WWTP.
- The condition of the abandoned 20-inch cast iron pipe and trench is largely unknown. More investigation into the pipe's condition is needed to assess feasibility of removing and replacing this pipeline.
- All connection points to the CTP need to be investigated further to determine the constructability of select discharging into the existing CTP and the proposed parallel line. Such investigations include alignment routing, connection point condition assessment, nearby utility potholing, and permitting.

2.2 Alternative 1B – Smaller Parallel Pipeline

2.2.1 General Description

Alternative 1B is nearly identical to Alternative 1A, with the parallel pipeline sized for dry weather flows instead of wet weather flows. The reduction in pipeline capacity introduces the possibility to utilize the abandoned 20-inch CI pipe, instead of Alternative 1A's scope of removing the pipe and utilizing the trench for a larger pipe. The proposed flow splitting structures and the proposed pipeline connection improvements for each pump station will remain the same as Alternative 1A. Figure 2-2 below illustrates the alternative.

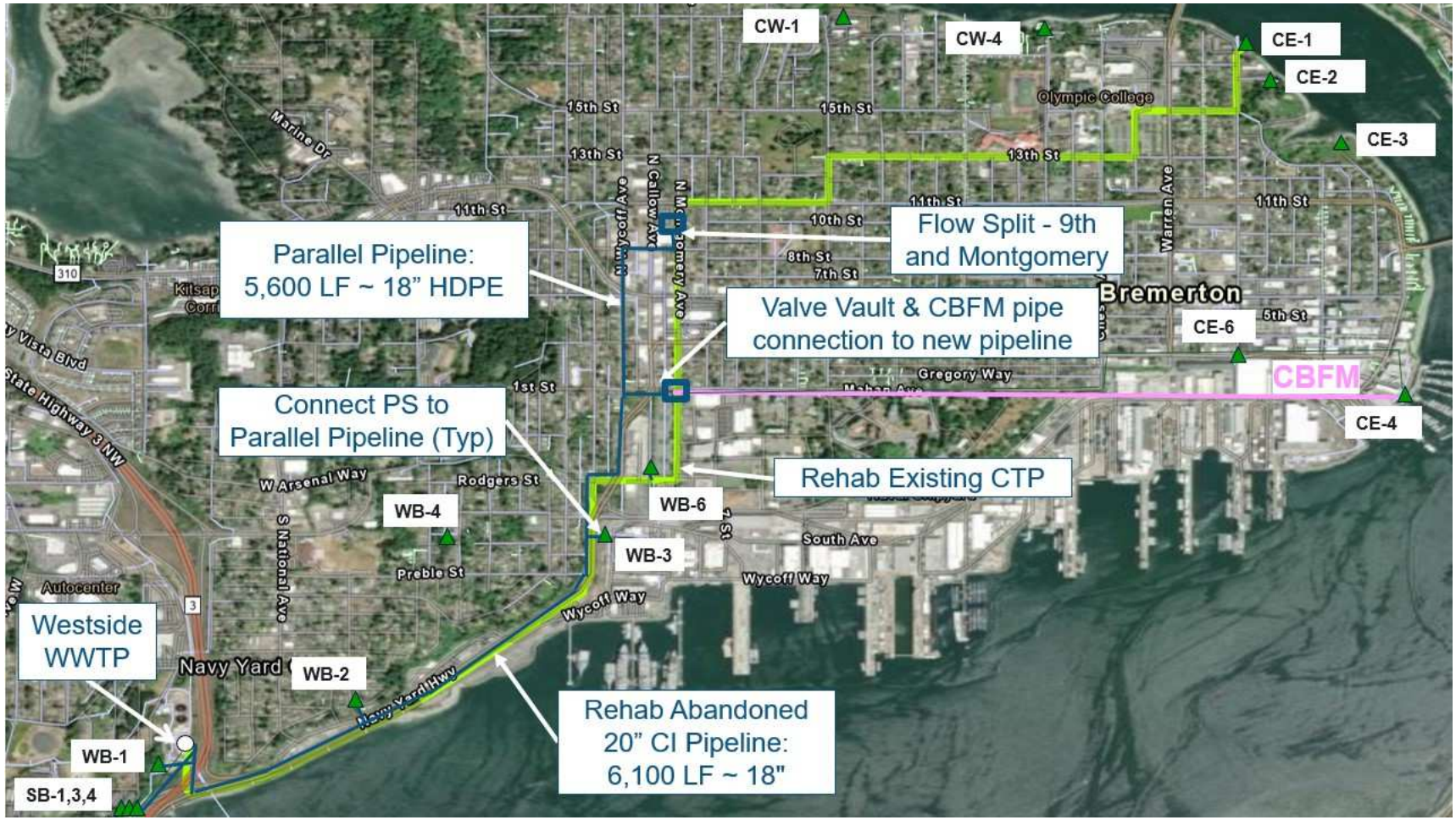


Figure 2-2: Alternative 1B - Smaller Parallel Pipeline Concept

2.2.2 Pipeline Capacity

Alternative 1B is sized for average dry weather flow. The proposed pipeline is 15-inches and 18-inches to meet minimum velocity standards in the 2024 flow regime and accommodate future increases in flow across the 20-year horizon. The pipeline capacity sizing across the 2024-2044 planning horizon is summarized in Table 2-4 below.

Table 2-4: Pipeline Capacity Servicing Dry Weather Flows

	2024			2044		
CTP Pipe Segment	**Cumulative ADWF[1] (gpm)**	**Pipe Size (Inches)**	**Pipe Velocity (ft/s)**	**Cumulative ADWF[1] (gpm)**	**Pipe Size (Inches)**	**Pipe Velocity (ft/s)**
Origin to CE-4 (CBFM/CTP Junction)	1,107	15	2.0	1,762	15	3.2
CE-4 to WB-6	1,111	15	2.0	1,790	15	3.2
WB-6 to WB-3	1,113	15	2.0	1,792	15	3.3
WB-3 to WB-1[2]	1,693	18	2.1	2,396	18	3.0
WB-1[2] to WB-2[2]	1,722	18	2.2	2,425	18	3.1
WB-2[2] to SBFM[2,3]	1,819	18	2.3	2,522	18	3.2
SBFM[3] to WWTP	2,067	18	2.6	2,983	18	3.8

Notes:

(1) 2024 Average Dry Weather Flows (ADWFs) based on 2023 pump station data provided by City in gallons per minute (gpm).

(2) No current pump station data provided. 2024 flows based on 2013 pump station data per 2014 Wastewater Comprehensive Plan Update report.

(3) Average dry weather flows (ADWFs) from SB-1, SB-3, and SB-4 conveyed via South Bremerton Force Main (SBFM)

2.2.3 Pipeline Alignment

The proposed alignment for Alternative 1B follows that of Alternative 1A exactly. The first section of pipe will be brand new pipe, however the proposed alternative involves rehabilitating the abandoned 20-inch CI pipe within the WSDOT limit access-full control corridor. At WB-3, the abandoned 20-inch DI pipe will be rehabilitated and connected to new 18-inch pipe.

A significant portion of the proposed pipeline runs within a WSDOT limited access-full control corridor along Charleston Boulevard and the proposed parallel pipeline must cross State Route 3 to reach the WWTP. Additionally, Alternative 1B will also install a valve vault that connects the existing CTP and CBFM at the same location as Alternative 1A. The approximate number of utility crossings from Table 2-3 above applies to both Alternatives 1A and 1B.

2.2.4 Construction Sequencing

A proposed sequence of constructing this alternative, to achieve the goals of increasing capacity and providing opportunity to assess the condition of and rehabilitate the existing CTP could be as follows:

1. Construct a means of flow splitting at 9th Street and Montgomery Avenue. An existing cross with a 30-inch blind flange can be utilized for the beginning of the parallel pipeline. Additional valving on the existing CTP to provide flow isolation would be required.

2. Construct the parallel pipeline, and construct pump station connections to the parallel pipeline, as well as the CBFM connection.

3. During the summer months, perform condition assessments and execute rehabilitation of the existing Crosstown Pipeline. The parallel pipeline is sized for average dry weather flows, therefore condition assessments and rehabilitation efforts should be timed around rain events. During the wet weather season, condition assessments and rehabilitation should not be conducted.

2.2.5 Alternative 1B Challenges

At the conceptual level, the following challenges have been identified for this alternative:

- Considerable WSDOT coordination will be required to obtain approval to construct or rehabilitate infrastructure in the limited access-full control corridor along Charleston Boulevard.

- Additional WSDOT coordination will be required for crossing State Route 3.

- The condition of the abandoned 20-inch cast iron pipe is largely unknown. This Alternative assumes the 20-inch pipe can be lined and rehabilitated with a less invasive method than open trench construction.

- All connection points to the CTP and the 20-inch abandoned cast-iron pipe need to be investigated further to determine the constructability of select discharging into the existing CTP and the proposed parallel line.

- There is always a risk of unplanned wet weather events which could dramatically increase the flow within the new pipeline that is sized only for conveying dry weather flows. The development of a standard operating procedure (SOP) to account for wet weather events while the smaller pipeline is in use is recommended.

2.3 Alternative 2 – Alternate Alignment

Alternative 2 proposes to install a pipeline beginning near the intersection of 9th Street and Montgomery Avenue that runs parallel to the existing CTP for approximately 3,500 linear feet before turning west along a new horizontal alignment, primarily along Preble Street, before crossing Route 3 and reaching the WWTP, totaling approximately 11,500 linear feet. At the pipeline start, a flow splitting structure will be constructed with valving to convey flow from the upstream pump stations (CE-1 and CW-1) to either the existing CTP or the proposed pipeline. To convey wastewater uphill and into the WWTP, a new pump station will be constructed, and the remaining pipeline will be pressurized force main. Figure 2-3 below summarizes the alternative.

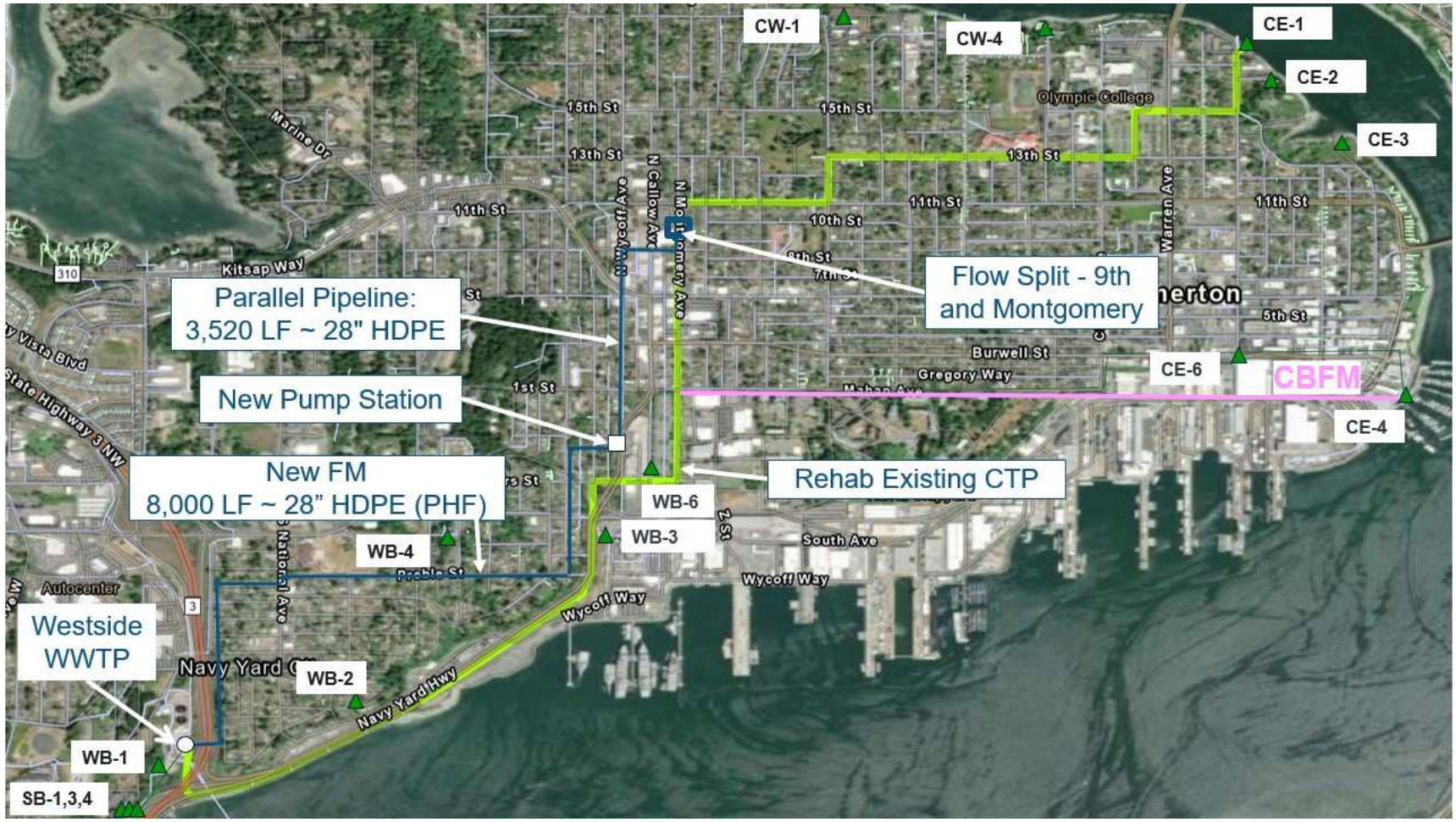


Figure 2-3: Alternative 2 – Alternative Alignment Concept

2.3.1 Pipeline Capacity

The proposed alternative will be capable of conveying flow from CE-1 and CW-1 to the WWTP without using the CTP; downstream pump station connections will continue to discharge to the existing CTP. The proposed pipeline is sized to handle peak hour wet weather flows of these upstream pump stations, as its primary function would be to reduce flow through the existing CTP during peak wet weather events. The pipeline capacity of the proposed alternative pipeline at both ends of the 20-year planning horizon is described in Table 2-5.

Table 2-5: Proposed Pipeline Capacity Servicing 2024-2044 Wet Weather Flows

	2024			2044		
Pipe Segment	**Cumulative PHF[1] (gpm)**	**Pipe Size (Inches)**	**Pipe Velocity (ft/s)**	**Cumulative PHF[2] (gpm)**	**Pipe Size (Inches)**	**Pipe Velocity (ft/s)**
Origin to New PS	11,685	30	5.3	16,590	30	7.5
New PS to WWTP	11,685	28	6.1	16,590	28	8.6

Notes:
(1) Flows based on 2023 pump station data provided by City
(2) Flow based on population growth data per Kitsap County Planning Policies (2021).

With reduced flow necessary through the existing CTP during wet weather events, the existing Crosstown Pipeline will have sufficient capacity for 2024 and 2044 peak wet weather flows even with rehabilitation of the pipeline resulting in a reduction in capacity. A summary of the existing CTP capacity under this alternative is shown in Table 2-6.

Table 2-6: Existing CTP Servicing 2024-2044 Flows (excluding CE-1 and CW-4)

	2024			2044		
CTP Pipe Segment	**Cumulative PHF[1] (gpm)**	**Pipe Size (Inches)**	**Pipe Velocity (ft/s)**	**Cumulative PHF[2] (gpm)**	**Pipe Size (Inches)[3]**	**Pipe Velocity (ft/s)**
Origin to CE-4[4]	-	-	-	-	-	-
CE-4 to WB-6	549	30	0.3	2,404	26	1.5
WB-6 to WB-3	6,184	30	3.7	9,993	26	6.0
WB-3 to WB-1[5]	13,113	36	5.2	15,956	32	6.4
WB-1[5] to WB-2[5]	13,343	36	5.3	16,456	32	6.6
WB-2[5] to SBFM[5,6]	14,123	36	5.6	17,456	32	7.0
SBFM[6] to WWTP	16,103	36	6.4	19,656	32	7.8

Notes:
(1) Flows based on 2023 pump station data provided by City
(2) Flow based on population growth data per Kitsap County Planning Policies (2021).
(3) Assuming rehabilitation results in reduction of pipeline diameter
(4) CE-4 contributes to the CTP via the CBFM
(5) No current pump station data provided. Flows based on 2013 pump station data per 2014 Wastewater Comprehensive Plan Update report.
(6) Flows from SB-1, SB-3, and SB-4 conveyed via South Bremerton Force Main (SBFM)

2.3.2 Pipeline Alignment

The proposed alignment follows the existing CTP along Montgomery Avenue, then deviates west before reaching a proposed new pump station. The pump station will convey flow to the WWTP by way of Lafayette Avenue, Preble Street, and Bremerton Boulevard. Lafayette Avenue and Preble Street are residential in this area, with less congested underground utilities along the route. The City has existing infrastructure along Bremerton Boulevard, adjacent to State Route 3. The proposed alignment avoids the WSDOT limited access-full control corridor along Charleston Boulevard, reducing the permitting-related risks to construct the pipeline. A portion of the proposed new pipeline along Preble Street does enter Kitsap County right-of-way within the Navy Yard City neighborhood.

The connection points included in this alternative allow for the CE-1, CW-4, and CW-1 pump stations to convey into the existing CTP or the proposed parallel pipeline.

The proposed alignment must cross State Route 3 to reach the Westside WWTP. This section of the State highway is also a WSDOT limited access-full control corridor. Per conversations with WSDOT personnel in September 2024, perpendicular crossings of these types of corridors are historically viable. The proposed alignment crosses State Route 3 near an existing City sewer crossing.

The proposed pipeline is expected to make several utility crossings along the proposed alignment. The Montgomery Avenue right-of-way includes some large diameter waterlines, but the sections along Lafayette Avenue, Preble Street, and Bremerton Boulevard are areas with less congested utility corridors and intersections. Table 2-7 below summarizes the approximate quantity of utility crossings related to the alternative.

Table 2-7: Alternative 2 Utility Crossings

	Water Crossings[1]	Sewer Crossings[1]	Storm Crossings[1]	Gas/Electrical/Telecom Crossings (Each)[2]
Alternative 2	30	8	36	24

Notes:

(1) The Water/Sewer/Storm Crossings were quantified utilizing the City's GIS

(2) The Gas/Electrical/Telecommunications Crossings were quantified by summating the number of road crossings in the City's GIS

2.3.3 Alternative 2 Challenges

At the conceptual level, the following risks and challenges have been identified for this alternative:

- Land acquisition will be required for locating the newly proposed pump station.
- WSDOT coordination will be required for crossing State Route 3.
- Coordination with Kitsap County will be required for crossing through Navy Yard City.

2.4 Alternative Costs

Project capital construction costs were developed for each alternative to gain an understanding of the potential costs for equipment and high-level construction requirements. Several markups were also applied to these estimates to provide a preliminary cost for ancillary project needs such as costs for electrical, instrumentation and controls and permitting. A summary of the ranges of costs is presented below in Table 2-8. The detailed estimates with assumed markups and taxes are included in Appendix A.

Table 2-8: Alternative Capital Costs

Alternative	Capital Cost	Cost Estimate Range[1]
1A - Parallel Pipeline (Larger Pipe)	$27.6M	$19.3M - $41.4M
1B - Parallel Pipeline (Smaller Pipe)	$20.9M	$14.6M - $31.4M
2 - Alternative Alignment	$29.2M	$20.4M - $43.8M

Notes:
(1) AACE Class 5 cost estimate range -30%/+50%

Section 3: Alternatives Evaluation

Each alternative was evaluated based on established weighted criteria relevant to the City's needs and priorities. The evaluation yielded a weighted score for each alternative.

3.1 Criteria Descriptions

A defined set of criteria was developed with the City to evaluate the alternatives, as follows:.

- Constructability
- Rehabilitation of CTP
- Capital Cost
- Operation & Maintenance
- Redundancy
- Ease of Permitting

3.1.1 Constructability

Each alternative has a unique layout and set of spatial constraints. With different layouts, there are a mix of utility crossings required for each alternative. The estimated quantity of required utility crossings was leveraged as a predictor of the level of effort required to install a new pipeline. Additionally, larger pipelines were scored lower than smaller pipelines, as they are more difficult to determine a viable location where all minimum utility offsets are met.

3.1.2 Capital Costs

For each project there are costs associated with rehabilitating the existing CTP and completing bypass pumping during the rehabilitation. The duration of bypass pumping required varies for each project depending on the proposed locations to tie-in the existing flow. One of the largest project costs is the amount of new piping required for the new pipeline. The newly proposed lines vary between 18-inch and 36-inch HDPE pipes. Each alternative also has costs associated with the amount of utility crossings, Route 3 crossing costs, land acquisition and traffic control costs. All alternatives also include at least one new flow split structure as well as reconnection costs to one or more existing pump stations. Each alternative was scored based on the estimated probable construction cost. The most expensive alternatives were scored the lowest and the least expensive were scored the highest.

3.1.3 Redundancy

Per conversations with the City describing each concept, redundancy was identified as one the City's top priorities. Redundancy in this application is defined as the amount of flow that can be received by each alternative, and whether the alternative can wet weather flows in addition to dry season flows.

3.1.4 Rehabilitation of the Existing CTP

The existing section of the CTP that the City is most concerned about and would like to rehabilitate is approximately 11,000 LF of PCCP. The current condition is largely unknown and there is no way to currently bypass or divert flow in order to perform a condition assessment.

Similar large pipes in the system have experienced pipe breaks and have identified major structural issues, therefore the City has prioritized rehabilitating the existing CTP since currently there is no redundancy for this section. Each alternative was scored by the ease of bypass pumping during rehabilitation and ability to receive flow during rehabilitation. Alternatives where excessive bypass piping was required scored lowest and alternatives where easy connections can be made during bypass pumping scored higher.

3.1.5 Operations & Maintenance

Adding a new pipeline to the current system introduces new operational opportunities and challenges. Alternatives that have more flexibility during operations can be useful but could also introduce complications if they are not managed correctly. More operationally complex alternatives were scored lower than simpler designs that do not require operational interference. Installing new pipelines and pump stations increases the amount of infrastructure the City is required to maintain. Alternatives with the most amount of additional piping or new construction elements (e.g., flow splitters, pump stations) scored lower than simpler designs.

3.1.6 Permitting

Securing the required permits and coordination are required before moving forward with any alternative, and the relative difficulty in obtaining approval from authorities having jurisdiction has been factored into evaluating each alternative. Part of the existing CTP is located parallel to the Puget Sound Naval Shipyard and a downstream section is within a WSDOT limited access-full control corridor, parallel to Charleston Boulevard and a railroad. All alternatives require crossing State Highway 3 is mandatory to reach the WWTP. Furthermore, some alternatives may require land acquisition for any permanent fixtures outside of an already established right-of-way. Alternatives with less permitting complications were scored the highest.

3.2 Alternatives Criteria Matrix

Every alternative was scored utilizing the Criteria Evaluation Matrix in Table 3-1. The justification for each score is detailed for each criterion, and the criterion weight is also denoted. The criterion weights were collaboratively determined with City Operations and Project Management staff during workshops preceding the finalization of this memorandum.

Table 3-1: Criteria Evaluation Matrix

	Scoring			
Criteria	3	2	1	1
Cost (20%)	Total cost <$25,000,000. Costs can be covered by reallocating authorized funding in operational or CIP budgets.	Total cost between $25,000,000-$30,000,000. Costs require additional funding through council approval	Total Cost $30,000,000-$50,000,000. Requires extensive funding.	>$50,000,000. Project costs are incredibly high and unreasonable to move forward with the project.
Constructability (15%)	The proposed pipeline is small (<30") and crosses through primarily neighborhood intersections.	The proposed pipeline is small (<30") and crosses through many congested intersections.	The proposed pipeline is large (>30") and crosses through many congested intersections.	The alternative is not feasible to construct
Redundancy (15%)	New line can handle all maximum PHF during wet weather conditions and can withstand all flow that goes to the existing CTP.	New line provides full redundancy for dry weather flows and can withstand additional wet weather flows.	New line can only withstand ADWF or overflows from storm events not greater than ADWFs.	New line cannot handle the ADWF and can only withstand smaller overflows or low flow Summer ADWF.
Rehab of CTP (25%)	Existing CTP can be taken offline while new pipe can withstand all upstream, downstream and connecting flows in the system.	Existing CTP can be taken offline, one section at a time, while new pipe withstands the partial flows.	Existing CTP can be taken offline, one section at a time, but alternative sewers or excessive bypassing is required to handle existing flows.	New pipe will not be able to be utilized at all to divert any flow during rehabilitation of existing CTP
O&M (15%)	"Hands-off approach" New pipeline's typical operation does not interfere with other pipe operations. O&M staff do not need to complete any programming or day-to-day operations of new pipe.	New pipeline's typical operation can be programmed to require the least amount of operator interference/responsibility	Operator is expected to understand the system capabilities and adjust accordingly as well as keep an eye on the daily operations	Pipeline operation will differentiate on a daily basis and will require constant operator attention.
Permitting (10%)	Minimal challenges acquiring land and staying within City ROW. Limited challenges acquiring permits and crossing State Routes.	Some challenges with other entities and private property owners. Requires multiple permitting efforts and new easements.	Multiple challenges that require extensive conversation and permitting with other entities and negotiations with private property owners	Due to known permitting and land acquisition conditions, construction of the alternative is not feasible.

3.3 Alternative Criteria Matrix Scoring

Each alternative received a score for each set of criteria. The unweighted and weighted scores assigned are in Table 3-2 below. Criteria weighting was developed collaboratively with City Operations and Engineering personnel. The weighted score was calculated by multiplying the unweighted score by the collaboratively-defined weight percentage.

Table 3-2: Alternative Evaluation Scoring

	Alternative 1A – Larger Pipe		Alternative 1B – Smaller Pipe		Alternative 2 – Alternate Alignment	
	Unweighted	Weighted	Unweighted	Weighted	Unweighted	Weighted
Cost (20%)	2	0.4	3	0.6	2	0.4
Constructability (15%)	1	0.15	2	0.3	3	0.45
Redundancy (15%)	3	0.45	2	0.3	1	0.15
Rehab of CTP (25%)	3	0.75	2	0.5	1	0.25
O&M (15%)	2	0.3	2	0.3	1	0.15
Permitting (10%)	1	0.1	2	0.2	3	0.3
Total	12	2.15	13	2.2	10	1.7

The scores for each alternative were then tallied to get a cumulative total score. Alternative 1B scored the highest when comparing the raw and weighted scores, scoring just slightly higher than 1A.

3.3.1 Alternative 1A Scoring

Alternative 1A scored the second highest, due to its extensive functionality and ability to receive all of the flow the existing CTP receives. The alternative scored a one (1) for constructability due to the difficulty of constructing a large diameter pipe along a busy City corridor. Alternative 1A scored a three (3) for Redundancy and Rehab of CTP. Since this alternative proposes a new pipeline that is the same size as the existing CTP, this allows for full redundancy and the new alignment is very similar to the CTP which makes the bypass pumping the least difficult to divert flows from the CTP. Alternative 1A scored a two (2) for Cost and O&M. This alternative was the second most expensive, mostly due to the large sized pipe required. The O&M scored well for the functionality, but the multifunctionality of the new pipe can make the typical operation difficult; various portions of flow can be sent to the new line, including any number of pump stations that supply the CTP. Alternative 1A scored a one (1) was for the Permitting. The alignment has most of the same challenges as the CTP, including crossing State Highway 3, being parallel to the railroad and Charleston Blvd. and being in close proximity to the Puget Sound Naval Shipyard.

3.3.2 Alternative 1B Scoring

Alternative 1B scored the highest. This alternative is very similar to Alternative 1A (Larger Pipe), but the newly proposed pipe is smaller and cannot handle as much flow as the Larger Pipe alternative. The alternative scored a two (2) for constructability due to the reduced difficulty of constructing a smaller diameter pipe along a busy City corridor as compared to Alternative 1A. The O&M score was the same as the Larger Pipe alternative, because the alignment is the same and there are the same challenges. This alternative scored higher on constructability than its larger pipe counterpart as it is expected that construction of the pipeline through WSDOT's limited access-full control corridor along Charleston will involve utilizing the abandoned 20-inch cast iron pipe as a host pipe, leading to less invasive construction methods within the corridor. This less invasive construction is expected to increase the City's likelihood of obtaining WSDOT approval for construction the alternative. The rehabilitation of CTP score was lower than that of Alternative 1A, however the rehabilitation work can still be completed in the summertime without any capacity issues. Since the proposed pipe is smaller, the cost was the less expensive.

3.3.3 Alternative 2 Scoring

Alternative 2 introduces a brand-new alignment, and also avoids larger permitting obstacles. The new pipeline may not always receive flow and the increase in elevation along the alignment requires a new pump station to get the flow to the WWTP. The costs associated with constructing a new pump station to convey flows along Preble Street are the largest factor that makes this alternative the most expensive. This alternative scores poorly for Redundancy and Rehab of CTP. The new pipeline will only alleviate upstream flows from the CTP and all downstream flows will still get sent to the existing CTP with no option to divert flows. In addition, the alignment is not near the exiting CTP and therefore cannot be relied upon for bypass pumping. The new alignment does score highly for Permitting; the alignment was chosen, because it avoids major conflicts by avoiding the Puget Sound Naval Shipyard and the US Navy railroad while also reducing the amount of coordination with WSDOT. Considering operation and maintenance, Alternative 2 is considered less complex due to less operational flow splitting capabilities than Alternatives 1A and 1B. However, it introduces a new pump station that needs to be located and eventually maintained. This alternative ultimately scored the lowest based on the established criteria.

3.3.4 Preferred Alternative Selection

After discussions with City staff and given that the scores for Alternative 1A and 1B were almost the same, either alternative would suffice. Alternative 1A would be more practical and a better long-term solution since it provides complete redundancy. However, the constructability challenges of 1A due to the larger diameter, as well as the higher cost compared to 1B, reduce the appeal of this alternative. Before proceeding further with either of these alternatives, the decision-making process would benefit from field investigation to understand the former 20-inch pipe trench in the WSDOT limited access corridor and to validate the proposed alignment by confirming the crossing utilities conflicts.

References

HDR Engineering, Incorporated. 2014. City of Bremerton Wastewater Comprehensive Plan Update.

Kennedy Jenks Consultants, Incorporated. 2024. City of Bremerton Wastewater Comprehensive Plan Update.

Appendix A: Engineer Opinion of Probable Construction Costs

OPINION OF PROBABLE CONSTRUCTION COST

KENNEDY/JENKS CONSULTANTS, INC.

Project: Bremerton WCP - Crosstown Pipeline Improvements

Prepared By: RH/RL/JH
Date Prepared: 29-Jan-25
KJ Proj. No. 2397011

Building, Area: Alternative 1A - Parallel Pipeline, Larger Pipe

Current at ENR
Escalated to ENR
Months to Midpoint of Construct 48

Estimate Type: [x] **Conceptual** [ ] **Construction**
[ ] **Preliminary (w/o plans)** [ ] **Change Order**
[ ] **Design Development @** _____ **% Complete**

Spec. No.	Item No.	Description	Qty	Units	Materials $/Unit	Materials Total	Installation $/Unit	Installation Total	Sub-contractor $/Unit	Sub-contractor Total	Total
DIVISION ___ - _____											
		30" PCCP Pipe Rehab	7,830	LF	4.00	31,320	28.00	219,240	467	3,656,610	3,907,170
		36" PCCP Pipe Rehab	6,100	LF	7.00	42,700	46.00	280,600	637	3,885,700	4,209,000
		Bypass Pumping	12	Weeks					40,000	480,000	480,000
		30" HDPE Pipe	5,600	LF	135.00	756,000	125.00	700,000	92	515,200	1,971,200
		36" HDPE Pipe	6,100	LF	150.00	915,000	145.00	884,500	104	634,400	2,433,900
		20" CI Pipe Removal	6,100	LF	5.00	30,500	80.00	488,000	75	457,500	976,000
		Pump Station Connections	5	EA	42,200.00	211,000	22,200.00	111,000	35,400	177,000	499,000
		Utility Crossings	65	EA			2,500.00	162,500			162,500
		Flow Split Structure	2	EA	106,700.00	213,400	48,200.00	96,400	79,600	159,200	469,000
		Traffic Control	1	LS					772,889	772,889	772,889
		Route 3 Crossing	1	LS					350,000	350,000	350,000
		Subtotals				2199920.00		2942240.00		11088498.50	16,230,658.50
		Division 1 Costs	@	10%		219992.00		294224.00		1108849.85	1,623,065.85
		Subtotals				2419912.00		3236464.00		12197348.35	17,853,724.35
		Taxes - Materials Costs	@	9.20%		222631.90					222,631.90
		Subtotals				2642543.90		3236464.00		12197348.35	18,076,356.25
		Taxes - Labor Costs	@								
		Subtotals				2642543.90		3236464.00		12197348.35	18,076,356.25
		Contractor Markup for Sub	@	12%						1463681.80	1,463,681.80
		Subtotals				2642543.90		3236464.00		13661030.15	19,540,038.06
		Contractor OH&P	@	15%		396381.59		485469.60			881,851.19
		Subtotals				3038925.49		3721933.60		13661030.15	20,421,889.24
		Estimate Contingency	@	25%							5,105,472.31
		Subtotals									25,527,361.55
		Escalate to Midpoint of Construct	@	2%							2,042,188.92
		Estimated Bid Cost									27,569,550.48
		Total Estimate									27,600,000

Estimate Accuracy	
+50%	-30%

Estimated Range of Probable Cost		
+50%	Total Est.	-30%
$41,400,000	**$27,600,000**	**$19,320,000**

OPINION OF PROBABLE CONSTRUCTION COST | **KENNEDY/JENKS CONSULTANTS, INC.**

Project: Bremerton WCP - Crosstown Pipeline Improvements

Building, Area: Alternative 1B - Parallel Pipeline, Smaller Pipe

Prepared By: RH/RL
Date Prepared: 29-Jan-25
KJ Proj. No. 2397011

Current at ENR
Escalated to ENR
Months to Midpoint of Construct

Estimate Type:
[x] **Conceptual**
[ ] **Preliminary (w/o plans)**
[ ] **Design Development @** _____ **% Complete**
[ ] **Construction**
[ ] **Change Order**

Spec. No.	Item No.	Description	Qty	Units	Materials $/Unit	Materials Total	Installation $/Unit	Installation Total	Sub-contractor $/Unit	Sub-contractor Total	Total
DIVISION ___ - _____											
		30" PCCP Pipe Rehab	7,830	LF	4.00	31,320	28.00	219,240	467	3,656,610	3,907,170
		36" PCCP Pipe Rehab	6,100	LF	7.00	42,700	46.00	280,600	637	3,885,700	4,209,000
		Bypass Pumping	12	Week					40,000	480,000	480,000
		18" HDPE Pipe	5,600	LF	80.00	448,000	75.00	420,000	77	431,200	1,299,200
		20" CI Pipe Rehabilitation	6,100	LF	9.00	54,900	42.00	256,200	176	1,073,600	1,384,700
		Pump Station Connections	5	EA	42,200.00	211,000	22,200.00	111,000	35,400	177,000	499,000
		Utility Crossings	65	EA			2,500.00	162,500			162,500
		Flow Split Structure	2	EA	106,700.00	213,400	48,200.00	96,400	79,600	159,200	469,000
		Traffic Control	1	LS					638,029	638,029	638,029
		Route 3 Crossing	1	LS					350,000	350,000	350,000
		Subtotals				1001320.00		1545940.00		10851338.50	13,398,598.50
		Division 1 Costs	@	10%		100132.00		154594.00		1085133.85	1,339,859.85
		Subtotals				1101452.00		1700534.00		11936472.35	14,738,458.35
		Taxes - Materials Costs	@	9.20%		101333.58					101,333.58
		Subtotals				1202785.58		1700534.00		11936472.35	14,839,791.93
		Taxes - Labor Costs	@								
		Subtotals				1202785.58		1700534.00		11936472.35	14,839,791.93
		Contractor Markup for Sub	@	12%						1432376.68	1,432,376.68
		Subtotals				1202785.58		1700534.00		13368849.03	16,272,168.62
		Contractor OH&P	@	15%		180417.84		255080.10			435,497.94
		Subtotals				1383203.42		1955614.10		13368849.03	16,707,666.55
		Estimate Contingency	@	25%							4,176,916.64
		Subtotals									20,884,583.19
		Escalate to Midpoint of Construct	@	2%							
		Estimated Bid Cost									20,884,583.19
		Total Estimate									20,900,000.00

Estimate Accuracy	
+50%	-30%

Estimated Range of Probable Cost		
+50%	Total Est.	-30%
$31,350,000	**$20,900,000**	**$14,630,000**

OPINION OF PROBABLE CONSTRUCTION COST **KENNEDY/JENKS CONSULTANTS, INC.**

Project: Bremerton WCP - Crosstown Pipeline Improvements - Alternative 2

Building, Area: Alternative 2 - Alternate Alignment

Prepared By: RH/RL
Date Prepared: 29-Jan-25
KJ Proj. No. 2397011

Current at ENR
Escalated to ENR
Months to Midpoint of Construct

Estimate Type: [x] **Conceptual** [ ] **Construction**
[ ] **Preliminary (w/o plans)** [ ] **Change Order**
[ ] **Design Development @** _____ **% Complete**

Spec. No.	Item No.	Description	Qty	Units	Materials $/Unit	Materials Total	Installation $/Unit	Installation Total	Sub-contractor $/Unit	Sub-contractor Total	Total
DIVISION ___ - _____											
		30" PCCP Pipe Rehab	7,830	LF	4.00	31,320	28.00	219,240	476	3,727,080	3,977,640
		36" PCCP Pipe Rehab	6,100	LF	7.00	42,700	46.00	280,600	637	3,885,700	4,209,000
		Bypass Pumping	20	Week					40,000	800,000	800,000
		28" HDPE Pipe	11,520	LF	120.00	1,382,400	77.00	887,040	82	944,640	3,214,080
		Pump Station Connections	1	EA	42,200.00	42,200	22,200.00	22,200	35,400	35,400	99,800
		Utility Crossings	98	EA			2,500.00	245,000			245,000
		Pump Station	1	EA					4,500,000	4,500,000	4,500,000
		Flow Split Structure	1	EA	106,700.00	106,700	48,200.00	48,200	79,600	79,600	234,500
		Route 3 Crossing	1	LS					350,000	350,000	350,000
		Land Acquisition	1	LS					150,000	150,000	150,000
		Traffic Control	1	LS					881,501	881,501	881,501
		Subtotals				1605320.00		1702280.00		15353921.00	18,661,521
		Division 1 Costs	@	10%		160532.00		170228.00		1535392.10	1,866,152
		Subtotals				1765852.00		1872508.00		16889313.10	20,527,673
		Taxes - Materials Costs	@	9.20%		162458.38					162,458
		Subtotals				1928310.38		1872508.00		16889313.10	20,690,131
		Taxes - Labor Costs	@								
		Subtotals				1928310.38		1872508.00		16889313.10	20,690,131
		Contractor Markup for Sub	@	12%						2026717.57	2,026,718
		Subtotals				1928310.38		1872508.00		18916030.67	22,716,849
		Contractor OH&P	@	15%		289246.56		280876.20			570,123
		Subtotals				2217556.94		2153384.20		18916030.67	23,286,972
		Estimate Contingency	@	25%							5,821,743
		Subtotals									29,108,715
		Escalate to Midpoint of Construct	@	2%							
		Estimated Bid Cost									29,108,715
		Total Estimate									29,200,000

Estimate Accuracy	
+50%	-30%

Estimated Range of Probable Cost		
+50%	Total Est.	-30%
$43,800,000	**$29,200,000**	**$20,440,000**

Appendix H: PSIC Memorandum

Kennedy Jenks

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Federal Way, WA 98001
(253) 835-6400

Bremerton Puget Sound Industrial Center (PSIC) Feasibility Study

15 February 2025

Prepared for

City of Bremerton
345 6th Street
Bremerton, WA 98337

KJ Project No. 2397011*00

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A Opinion of Probable Construction Cost Estimates (Class 5)

Frequently Used Acronyms and Abbreviations

AWWA	American Water Works Association
AACE	Association for the Advancement of Cost Engineering
AAF	Average Annual Flow
AAL	Average Annual Loading
ADWF	Average Dry Weather Flow
AWWF	Average Wet Weather Flow
BOD	Biochemical Oxygen Demand
DOE	Department of Ecology
I/I	Inflow and Infiltration
MBR	Membrane Bioreactor
MGD	Million Gallons Per Day
MIC	Manufacturing Industrial Center
MM WWF	Maximum Month Wet Weather Flow
MML	Maximum Month Loading
O&M	Operations & Maintenance
OPCC	Opinion of Probably Construction Cost Estimate
PD WWF	Peak Daily Wet Weather Flow
PDL	Peak Daily Loading
PHF	Peak Hourly Flow
PPD	Pounds Per Day
PSIC	Puget Sound Industrial Center
ROW	Right-Of-Way
TSS	Total Suspended Solids
UV	Ultraviolet
WAC	Washington Administrative Code
WSDOT	Washington Department of Transportation

Section 1: Executive Summary

1.1 Executive Summary

The Puget Sound Industrial Center (PSIC) located in Bremerton, WA contains approximately 3,700 acres of property planned for future industrial development and usage. The City of Bremerton (City) recognizes this area as a major hub for employment once fully built out and the Kitsap County TAZ analysis has documented the proposed increase in the 2024 City Services Comprehensive Plan. An existing lagoon wastewater treatment plant that currently serves the Port of Bremerton's (Port) Bremerton National Airport, the only existing development in the PSIC area, is operated onsite and discharges to a nearby drain field. Because of the large-scale plan for expansion in this area, the existing treatment facility onsite needed to be evaluated to determine if the plant's capacities can meet the expansion goals. The City also maintains a desire to treat the new effluent to Class A reclaimed water standards for discharge into the drain field and investigate the potential for beneficially reusing the Class A reclaimed water. A previous evaluation was conducted by Richwine Environmental that recommended implementing a two-phase approach to increase the plant's capacity. The first phase included increasing the hydraulic loading rate on the existing drain field soils and the second phase included constructing a new treatment facility featuring a membrane bioreactor (MBR) as the primary treatment component.

Several options for increasing the existing plant's capacity were identified for this study. This included a new MBR treatment system and new pumping stations. Benefits and drawbacks as well as risks and opportunities for these options were identified in this report. Several iterations were developed that included both an MBR treatment system and a series of pumping stations. The alternatives that were developed are as follows:

- Alternative 1 – South PSIC flows to Mason County, North PSIC Flows to new MBR system. Phased approach to send flows to Mason County until flow limit is reached, then send all flows to MBR system. Discharge as reclaimed water to Gold Mountain Golf Club.

- Alternative 2 – South PSIC flows to new pump station, then to new MBR system. New MBR system sized for both North and South PSIC flows. Discharge as reclaimed water to Gold Mountain Golf Club.

- Alternative 3 – South PSIC flows to new pump station, then into another pump station sized for North and South PSIC flows. All flows conveyed to community of Gorst infrastructure where flows are discharged as untreated effluent to Bremerton Wastewater Treatment Plant.

Several discharge considerations were discussed in this report and included discharging to Gold Mountain Golf Club as reclaimed water and utilizing the existing drain fields, provided there is capacity to do so.

Once the alternatives were developed, high level evaluations were conducted for each option relative to several criteria. The criteria included cost, operation & maintenance (O&M), beneficial

reuse, agency coordination, and permitting. In summary, the alternatives that contained a new MBR system had a relatively higher cost and more agency coordination efforts than alternatives without this type of treatment system. Alternatives with a new MBR system also contain a higher level of complexity with O&M activities and higher onsite presence than alternatives that only contain new pumping stations. Permitting efforts are relatively similar across all alternatives due to the nature of the work involved. The results of the evaluation scoring are presented in Table 1-1

Table 1-1 Alternatives Scoring Matrix

	Alternative 1		Alternative 2		Alternative 3	
	Unweighted	Weighted	Unweighted	Weighted	Unweighted	Weighted
Cost	2	0.4	2	0.4	2	0.4
O&M	1	0.25	1	0.25	3	0.75
Beneficial Reuse	2	0.5	2	0.5	0	0
Agency Coordination	1	0.1	1	0.1	2	0.2
Permitting	3	0.6	1	0.2	2	0.4
Totals	**9**	**1.85**	**7**	**1.45**	**9**	**1.75**

The projected costs for each alternative are presented below in Table 1-2:

Table 1-2 Alternative Project Construction Costs

Estimated Total Project Capital Cost & Range		
Alternative 1	**Alternative 2**	**Alternative 3**
$78M	$85M	$51M
$55M to $118M	$59M to $127M	$35M to $76M

Alternative 1 Phasing	
Phase 1	**Phase 2/3**
$52M	$26M
$36M to $78M	$18M to $40M

The results of the alternatives evaluation have shown that Alternative 1 scored the highest. This alternative is recommended to be carried forward into a potential phasing implementation plan. This plan is summarized below and includes a graphic detailing this approach which assumes linear population growth over time:

- Phase 1
    - City enters interagency agreement with Mason County to send up to 160,000 gpd of flow from South PSIC to their infrastructure.
    - City begins developing plans for constructing a new pump station in South PSIC that will pump flows beyond 160,000 gpd to North PSIC.
    - City begins developing studies for phasing in a new MBR treatment system in North PSIC that accepts flows from South PSIC and discharges reclaimed water to Gold Mountain Golf Club and solids as Class A biosolids for beneficial reuse.
- Phase 2
    - City begins sending flows from the new South PSIC pump station to new MBR treatment system until a capacity threshold is reached. This will trigger the City to begin implementing plans for final phasing of the MBR system to the full projected build-out flows.
- Phase 3
    - City begins construction of the MBR system expansion to account for full capacity flows. The City would enter an interagency agreement with the Port to receive all flows on Port property to the new treatment system.

An illustration of this phased approach is also presented below in Figure 1-1. This strategy is a viable option for increased population growth in this area over time.

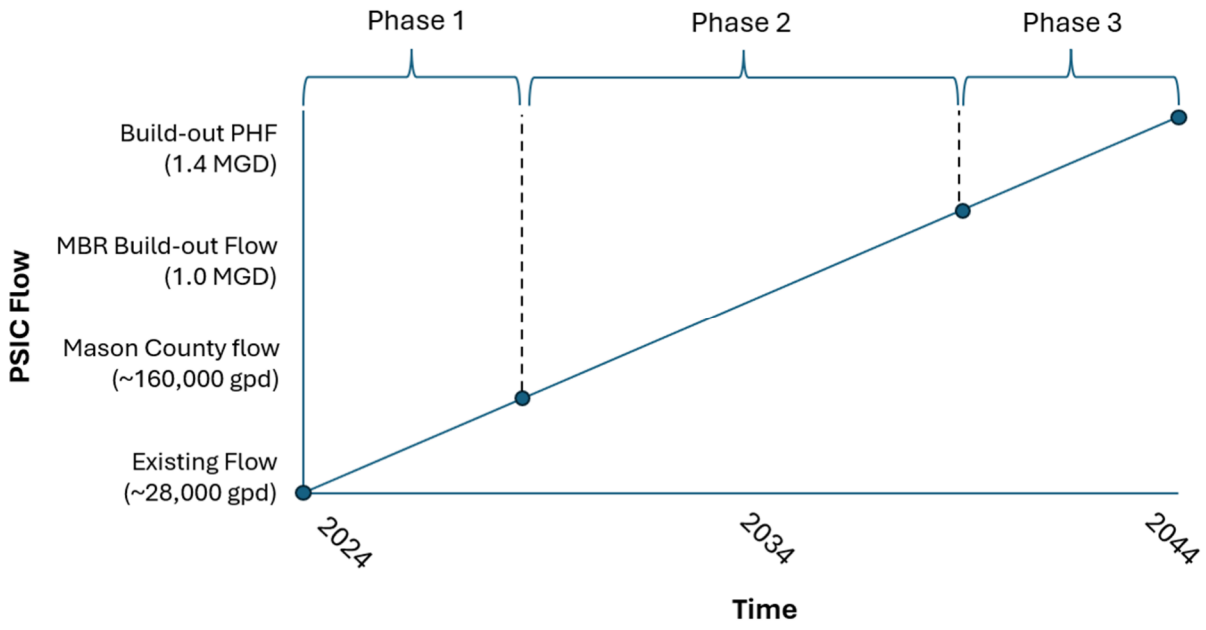


Figure 1-1 PSIC Phasing Strategy

Section 2: Project Background

2.1 Project Purpose and Understanding

The Puget Sound Industrial Center (PSIC) located in Bremerton, WA contains approximately 3,700 acres of property planned for future industrial development and usage. The City of Bremerton (City) recognizes this area as a major hub for employment once fully built out and the Kitsap County TAZ analysis has documented the proposed increase in the 2024 City Services Comprehensive Plan. An existing lagoon wastewater treatment plant that currently serves the Port of Bremerton's Bremerton National Airport, the only existing development in the PSIC area, is operated onsite and discharges to a nearby drain field. Because of the large-scale plan for expansion in this area, the existing treatment facility onsite needed to be evaluated to determine if the plant's capacities can meet the expansion goals. The City also maintains a desire to treat the new effluent to Class A reclaimed water standards for discharge into the drain field, and investigate the potential for beneficially reusing the Class A reclaimed water. A previous evaluation was conducted by Richwine Environmental that recommended implementing a two-phase approach to increase the plant's capacity. The first phase included increasing the hydraulic loading rate on the existing drain field soils and the second phase included constructing a new treatment facility featuring a MBR as the primary treatment component. The purpose of this report is to build off previous evaluations and provide several options and alternatives for increasing the plant's capacity with respect to the goals of the City.

This feasibility study includes the following major components:

- Development of flows and loads for the 20-year planning period.
- Development of preliminary site plans for the evaluated options, including conveyance to deliver reclaimed water to the Gold Mountain Golf Club.
- Development of an Association for the Advancement of Cost Engineering (AACE) Class 5 Opinion of Probable Construction Cost (OPCC) for all evaluated alternatives discussed within this report.
- Alternatives analysis and preliminary phasing and implementation plan for the recommended alternative.

2.2 Project Location

The PSIC area is defined in the inset in the bottom right corner of Figure 2-1. This area was developed by the Puget Sound Regional Council and was deemed an important area for future employment. The unincorporated community of Gorst is located to the northeast of the PSIC area while Mason County borders the PSIC area to the southwest of the boundary. indicates the approximate location of the existing lagoon treatment facility and drain field location.

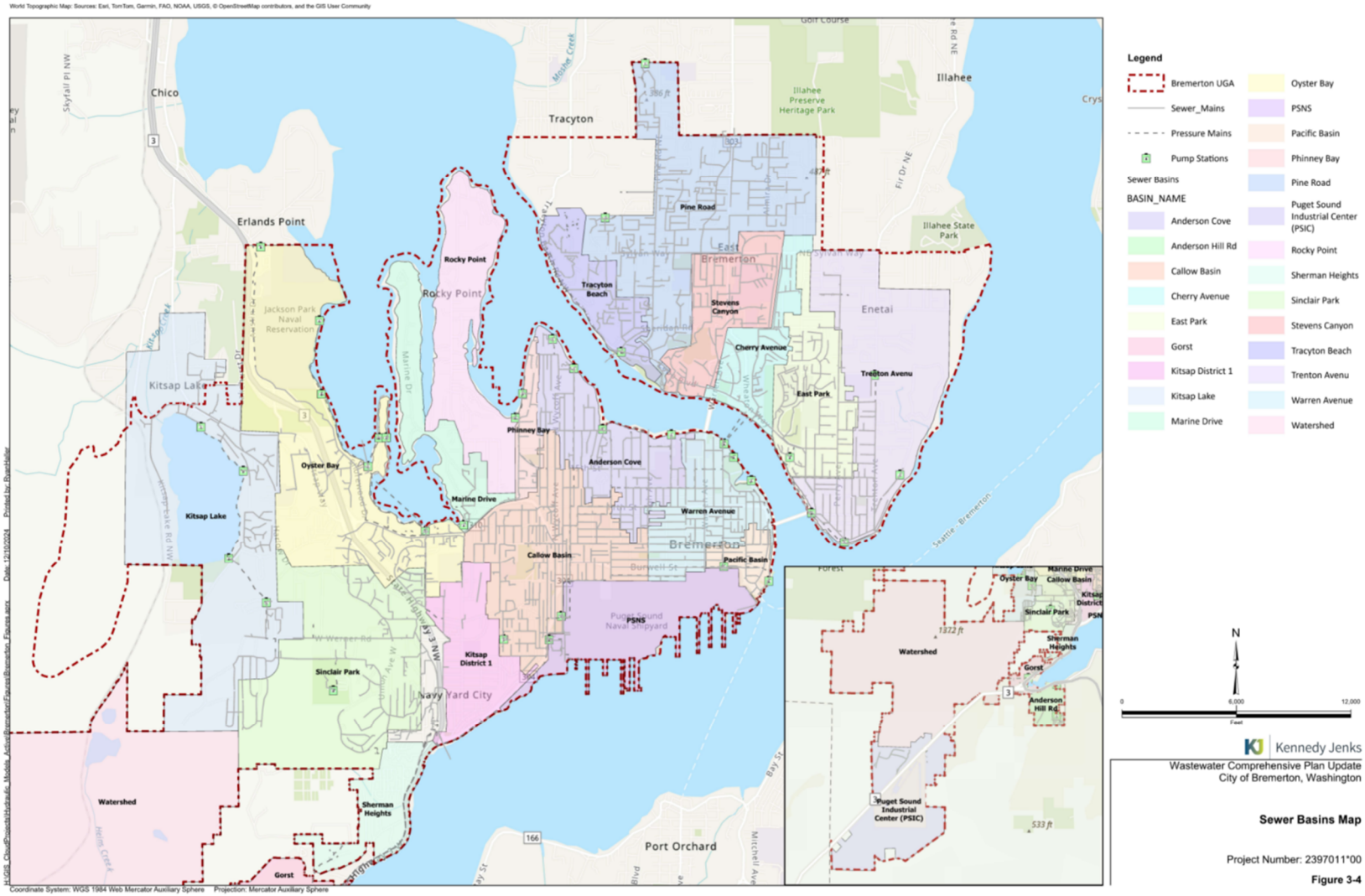


Figure 2-1 City of Bremerton Basin Map

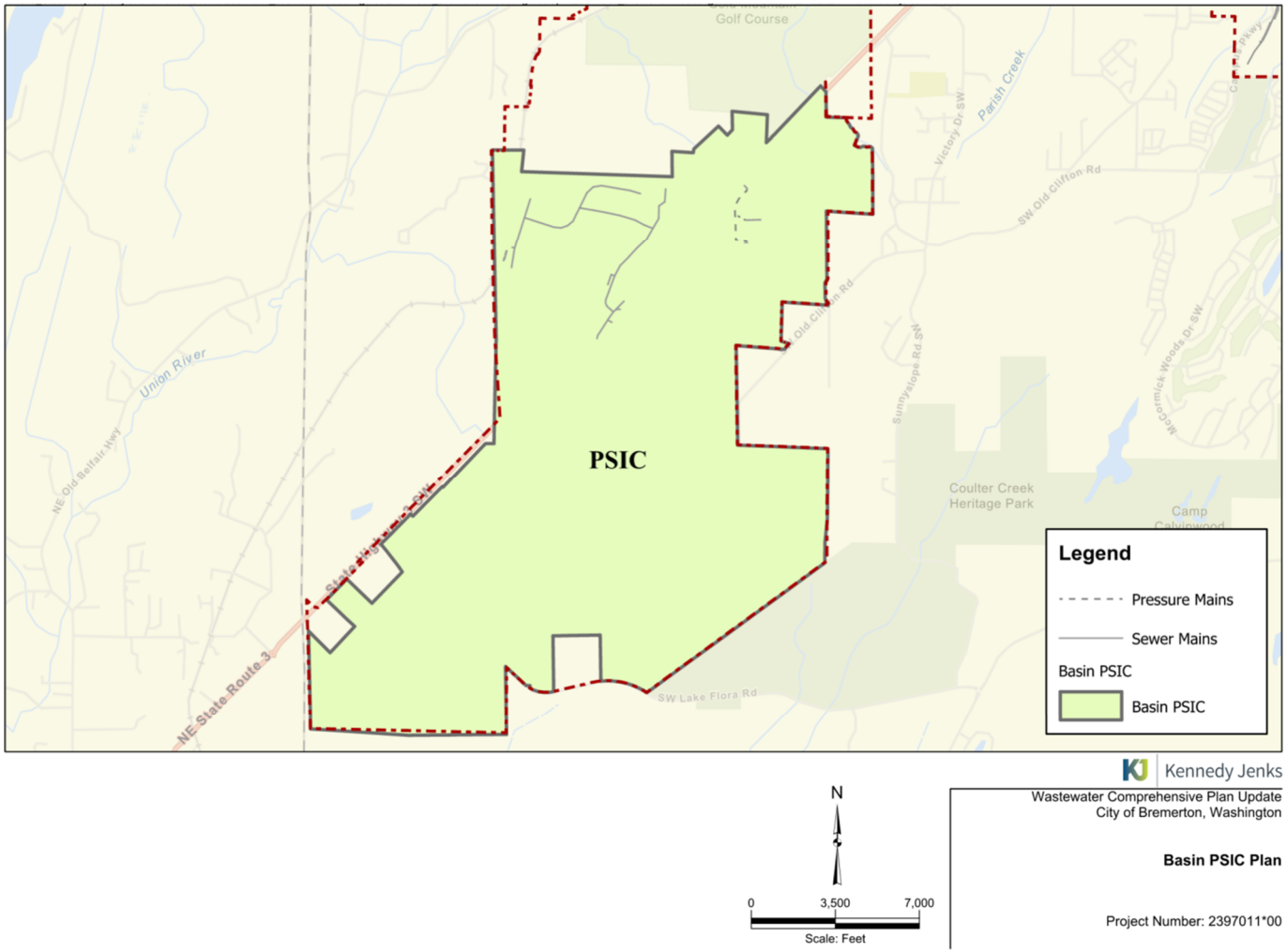


Figure 2-2 PSIC Basin Plan

2.3 Existing Information Review

The existing treatment system serving the airport is currently comprised of aeration ponds, polishing ponds, and currently discharges to two drain fields. This system was originally installed as two systems that could be operated either in parallel or in series. The first system installed in 1973 consists of an aeration pond, an influent pump station, polishing pond, dosing station, and a drain field. The second system was installed in 1987 and is composed of an aeration pond, polishing pond, effluent pump station, and a drain field.

Projected influent flows and loads were calculated based on population projections for the PSIC area per county-provided TAZ data. The assumed sewer generation factor for this projected population was provided by the City of Bremerton and summarized in the 2014 Wastewater Comprehensive Plan Update Report (HDR, 2014). The PSIC area is currently zoned as a manufacturing industrial center (MIC) and was previously defined for future employment, thus the population increases in this area are all categorized as employment only. The annual population growth rate was calculated based on existing sewer flows for PSIC taken from the 2014 report to determine existing population, and from County-provided growth estimates (2044 TAZ data for Bremerton). Once the projected population values for the PSIC area were calculated, the projected flows and loads could then be estimated by multiplying the future PSIC population by a standard sewer generation per person per the Department of Ecology (DOE) Orange Book designation. A summary of these inputs for calculating the projected flows and loads are presented below in Table 2-1.

Table 2-1 Inputs for Flow and Load Projections

Parameter	Units	Value
PSIC Population (Employment, 2044)	people	10,476
Annual Population Growth for PSIC	%	11.12
Sewer Generation (Employment, per 8-hour shift)	gpdc	35
Sewer Generation (Employment) (TSS+BOD)	ppdc	0.04

Applying the Orange Book sewer generation flowrate to the 2044 PSIC population yielded the design average dry weather flow (ADWF) criterion. A peaking factor based on 2018-2023 Westside Wastewater Treatment Plant influent data was applied to yield average annual flow (AAF). For newly constructed sewer infrastructure, the Orange Book recommends implementing an empirical data-based ratio of peak hourly flow (PHF) to design average annual flow to determine peak hourly flow. For the projected PSIC population served in 2044, a peaking factor of 3.0 was applied to the average annual flow to obtain the peak hourly flow. According to the Orange Book, this peaking factor does account for infiltration and inflow (I/I) associated with the new sewer infrastructure. To obtain other design criteria necessary for the analyses herein, peaking factors based on 2018-2023 Westside Wastewater Treatment Plant data were applied to the average annual flow**.** A summary of the peaking factors and flow design criteria are presented in Tables 2-2 and 2-3, respectively.

Table 2-2 Peaking Factors

ADWF (MGD)	AAF (MGD)	MM WWF (MGD)	PHF (MGD)
0.77	1	2.1	3.0

Table 2-3 Design Criteria

ADWF (MGD)	AAF (MGD)	MM WWF (MGD)	PHF (MGD)
0.4	0.5	1.0	1.4

BOD (ppd)			TSS (ppd)	
AAL	MML	PDL	AAL	MML
442	600	915	443	600

2.4 Regulatory Requirements

The existing treatment system currently treats to Treatment Level C as prescribed by the discharge permit issued by the Washington Department of Health for the existing lagoon treatment system. These requirements are summarized in Washington Administrative Code (WAC) 246-272B-06250 and in Table 2-4 below.

Table 2-4 WAC 246-272B-06250 - Treatment Level C

	Effluent Parameters					
Treatment Level	CBOD5	TSS	O&G	FC	TN	P
C	25 mg/L	30 mg/L	-	-	-	-

For this evaluation, treating the effluent to Class A reclaimed water standards will be investigated for the purpose of providing a source of beneficial reuse for the City. Performance standards for Class A reclaimed water are defined in WAC 173-219-330 and are summarized in Table 2-5 in this report. Additional analyses and feasibility studies will be required under separate, dedicated cover to evaluate the viability of Class A reclaimed water for each alternative prepared.

Table 2-5 Class A Reclaimed Water Performance Standards

Parameter	Class A Reclaimed Water	
Coagulation/Filtration		
Turbidity	Monthly Average	Sample Maximum
	2 NTU	5 NTU
Membrane Filtration		
Turbidity	Monthly Average	Sample Maximum
	0.2 NTU	0.5 NTU
Disinfection		
Total Coliform	7-day Median	Sample Maximum
	2.2 MPN/100 mL or CFU/100 mL	23 MPN/mL or CFU/mL
Virus Removal	Refer to WAC 173-219-340 requirements	
Denitrification		
Total Nitrogen	Monthly Average	Weekly Average
	10 mg/L	15 mg/L

Section 3: Alternatives Analysis

3.1 Introduction

This section focuses on presenting the two primary options in consideration as building blocks for the increase in overall treatment capacity for the PSIC area, as well as providing a comprehensive comparison between these options. Three alternatives of the options were developed with two alternatives including a new MBR treatment system and one alternative including a new pump station/conveyance option. The MBR treatment system intends to provide for increased flows from the North PSIC and South PSIC areas and treating to Class A reclaimed water for beneficial reuse, while the new pump station option intends to focus the increased flows to existing or new conveyance away from the site. Several configurations of these alternatives are discussed in Section 3.4. Preliminary layouts are presented, and a high-level cost comparison will also be discussed. The calculated influent flows and loads generated for this evaluation per Table 3-12 were leveraged for preliminary sizing of the alternatives.

3.2 Membrane Bioreactor Treatment System

The MBR treatment system option is leveraged in two of the three alternatives and is anticipated to be installed within the boundary of the secondary drain field for the existing treatment system. This system is expected to include fine screening, primary treatment, and effluent disinfection, as well as all required appurtenances, as part of the package. The MBR supplier will be responsible for providing this service and to ensure that the new system will meet the effluent requirements dictated by the discharge permit. The MBR supplier will also provide support for biological verification for treatment down to the specified effluent requirements. The MBR system will be capable of meeting Class A reclaimed water standards for beneficial reuse purposes.

3.2.1 Description, Sizing, and Location

A MBR is a component of a treatment process that combines a conventional activated sludge process, which separates sludge between solids and liquids through clarification, with a microfiltration process using microporous membranes. MBR systems allow for a high biomass concentration to be maintained, therefore operating at a higher volumetric loading rate compared to a more conventional process. This allows for lower hydraulic retention times and smaller bioreactors and less overall space requirements. The effluent from MBR systems typically contain low concentrations of bacteria, TSS, BOD, and phosphorus, which facilitates high-level disinfection. MBR systems do, however, require a constant, minimum water level for normal operation which is generally done by internal or external equalization basins. A typical MBR process includes the use of screening for influent flow, equalization basins, anoxic basins, pre-aeration and aerobic basins, membrane basins, and then discharging out of the system. Effluent disinfection in the form of ultraviolet (UV) type is common depending on desired effluent concentrations. The need for solids handling is another component of a typical MBR treatment process to further refine process solids for final disposal. This could be in the form of a dewatering and aerobic digestion system that can dispense solids as Class B biosolids for land

application purposes. This solid handling configuration can also provide for future expansion in the PSIC area.

The MBR system will be sized according to the flows and loads described in Table 3-1 and Table 3-2 as well as from the effluent quality objectives. This information will be submitted to a selected MBR manufacturer to determine preliminary sizing, treatment system components, and cost. Once the project progresses through to design and a manufacturer is selected for further assistance, the overall MBR system design can be refined for more precise layout configurations and actual treatment system performance. For this study, only preliminary design information from an MBR manufacturer was considered.

The MBR system is anticipated to be installed where the existing lagoon treatment system is located. Figure 3-2 depicts the approximate location of this system. The MBR system will likely need several process buildings to house mechanical and electrical equipment necessary for routine operation. These buildings can be built with the expansion into the PSIC area in mind. The existing drain fields are also anticipated to be reused, provided the MBR system treats the incoming wastewater to the necessary permitted levels. Reclaimed water can also be discharged to the nearby Gold Mountain Golf Club. This will require extensive conveyance to the golf course's irrigation system for reuse.

3.2.2 Operations and Maintenance

The O&M requirements for a typical MBR system configuration includes several activities in the form of routine inspections of all active equipment, taking samples to ensure adequate treatment activity, annual cleaning, and replacement of parts when needed. Consistent sampling and monitoring of the biological process basins are especially important due to providing confirmation that the treatment is working as intended. The membranes themselves will also need to be replaced on an infrequent basis and is highly dependent on the type of membrane selected and the overall quality of the incoming water that is treated. O&M activities for MBR systems will require one or two onsite personnel several days a week to ensure proper function and operation. Depending on the solids handling performance and needs of the system, the solids holding tanks will need to be emptied on an infrequent basis.

3.2.3 Benefits and Drawbacks

A list of benefits and drawbacks were developed for this option.

Table 3-1 Benefits and Drawbacks – MBR Treatment System

Package MBR System	
Benefits	Drawbacks
• High treatment capabilities to provide reclaimed water for beneficial reuse opportunities and for future contaminants of emerging concern. • Remote monitoring capabilities. • Reduces cost for disposal compared to sending to separate or offsite treatment system. • Does not require additional force main to existing collection system. • Reduced overall footprint.	• Moderate complexity of operation; requires dedicated operators on a regular basis. • Requires higher level of operator certification for normal operation. • High capital and operating energy costs.

3.3 New Pumping Station

The new pump station will consist of a wet well fitted with a number of submersible pumps. These pumps will be sized according to employment projections in the PSIC industrial area and will convey influent sewage to new or existing infrastructure depending on the defined alternative. Additional pump stations may be required in the future to accommodate more sewage connections as the PSIC area develops. This option can be used as a building block for Alternatives 1 through 3.

3.3.1 Description, Sizing, and Location

A pump station is an engineered pumping system that is designed to collect and transport wastewater from a low to high elevation. The collection system of a pumping station generally receives incoming wastewater by gravity from nearby wastewater sources and collects the influent water in a large underground pit or wet well. The wet well is outfitted with several types of instrumentation that can detect the level of feed water within the wet well. And when the wastewater reaches a predetermined level in the wet well, pumps within the wet well become activated and lifts the wastewater through a pressurized conveyance system to its next destination.

The pumps are generally sized for flow anticipated for a predetermined area. In this study, the flow is represented by the peak flow anticipated for the PSIC industrial area in 20 years. These flows are presented in Table 3-2. During normal operation, only one pump will operate at a time until a specified flow rate is reached. Then, additional pumps may be required to operate

increased flow. For this study, it is assumed that two pumps will be installed per pump station for redundancy.

Several pump stations are anticipated to be installed along the specified route depending on the elevation differentials. As mentioned, pump stations are designed to transport the flow of wastewater from a low point to a high point where it then transitions to gravity before discharging into the next flow structure. The elevation profiles along the predetermined route will determine the number of pump stations required as well as how deep the conveyance lines will need to be.

3.3.2 Operations and Maintenance

O&M requirements for pump stations typically include routine visual and performative inspections and general maintenance. The City currently owns and operates several pump stations of varying capacities so the O&M requirements will likely be very similar to what is currently being done. Visual inspections should be done on a regular basis to ensure there are no leaks or cracks in the piping or pumping systems and ensuring any instrumentation readings are accurate. Pump maintenance will be at the discretion of the manufacturer and should be performed as required. Electrical systems within the pump station should also be checked on a regular basis.

3.3.3 Benefits and Drawbacks

A list of benefits and drawbacks were developed for this option.

Table 3-2 Benefits and Drawbacks – Pump Stations

Pump Station	
Benefits	Drawbacks
• Routine O&M does not require additional training or certifications. • Can provide for present and future capacity considerations. • Low energy consumption. • Remote monitoring capabilities.	• Requires extensive excavation and construction dewatering requirements. • High costs for conveyance to offsite treatment system. • No treatment capabilities to provide reclaimed water. • Requires additional O&M for current operators for each pump station added.

3.4 Alternative Scenarios

3.4.1 Alternative 1 – Centralized MBR with Mason County Agreement

Alternative 1 involves the installation of two new pump stations in the South PSIC area. One will convey flows directly to a predetermined tie-in point on the Mason County line and the other will convey flows to a new MBR treatment system to the north. The new MBR treatment system would be installed in the North PSIC area to process and treat future flows accumulated in the

North and South PSIC areas. This alternative is contingent upon an agreement with Mason County being able to accept the future flows anticipated to be produced by the South PSIC developments, which is currently underway. The South PSIC pump station routed to Mason County would be funded by others. Should Mason County accept a portion of the future flows, a phased approach for this alternative can be considered. Alternative phasing details can be found in Section 4.3.4. Highway 3 is considered a limited access right-of-way (ROW) and Washington State Department of Transportation (WSDOT) does not allow utilities to be installed unless all other options are expended. Further conversations with WSDOT should be had if conveyance along Highway 3 is considered. Figure 3-1 below depicts a preliminary plan view of this alternative. Since there is a possibility the Port may not allow the installation of a new MBR system on their property, alternative locations on City property should be considered.

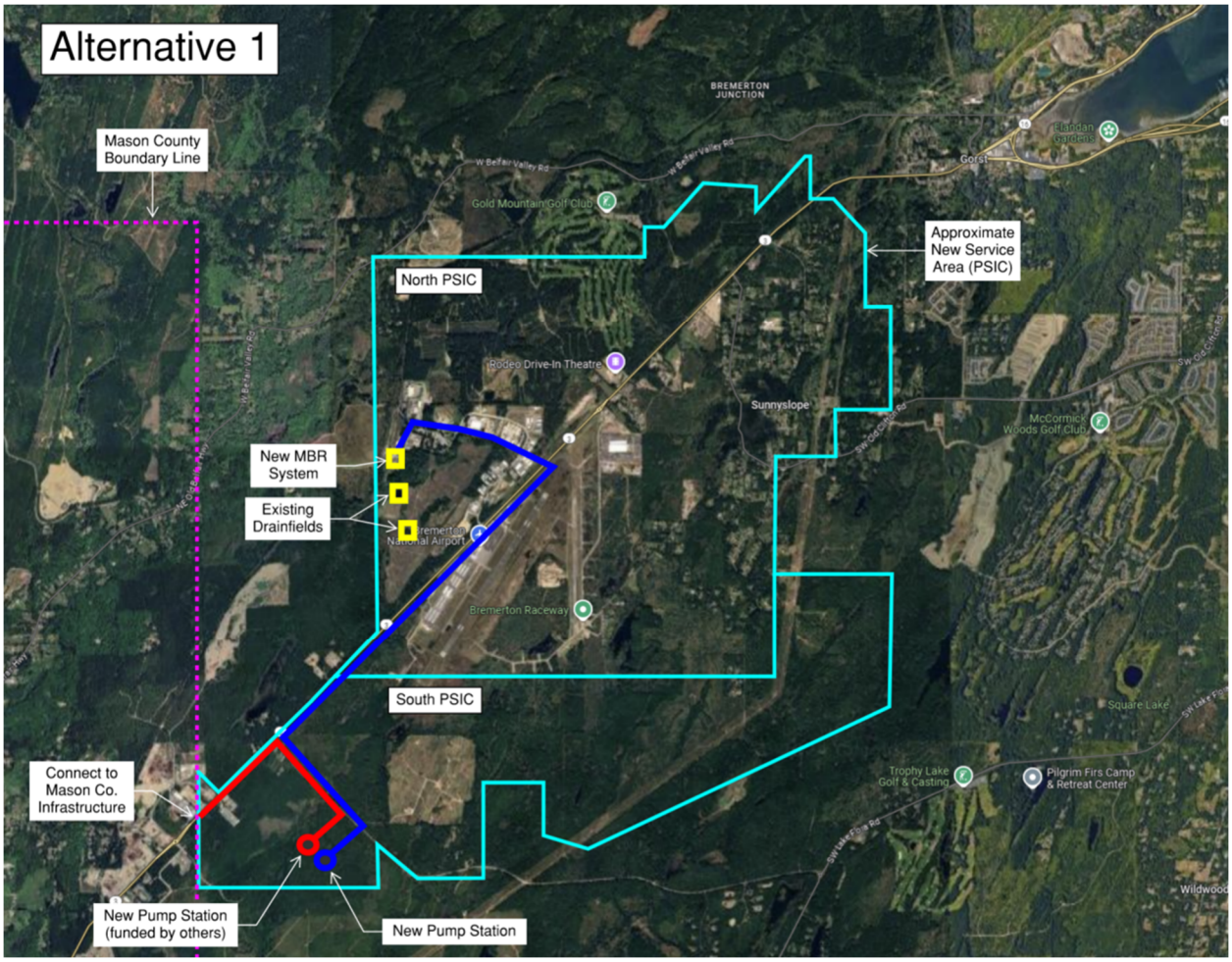


Figure 3-1 Alternative 1 Plan

3.4.2 Alternative 2 – Centralized MBR without Mason County Agreement

Alternative 2 involves the installation of a new pump station in the South PSIC area which will convey future flows in this area to a newly installed MBR treatment system in the North PSIC area. This MBR system will be sized to accommodate all future flows in the entire PSIC basin and will convey discharge flows to either the Gold Mountain Golf Club for beneficial reuse or north to the community of Gorst's existing wastewater infrastructure. The beneficial reuse option is contingent upon the MBR system treating flows to reclaimed water standards and the golf course being able to accommodate these flows for storage. Figure 3-2 below depicts a preliminary plan view of this alternative. Highway 3 is considered a limited access ROW and WSDOT does not allow utilities to be installed unless all other options are expended. Further conversations with WSDOT should be had if conveyance along Highway 3 is considered. And since there is a possibility that the Port may not allow the installation of a new MBR system on their property, alternative locations on City property should be considered.

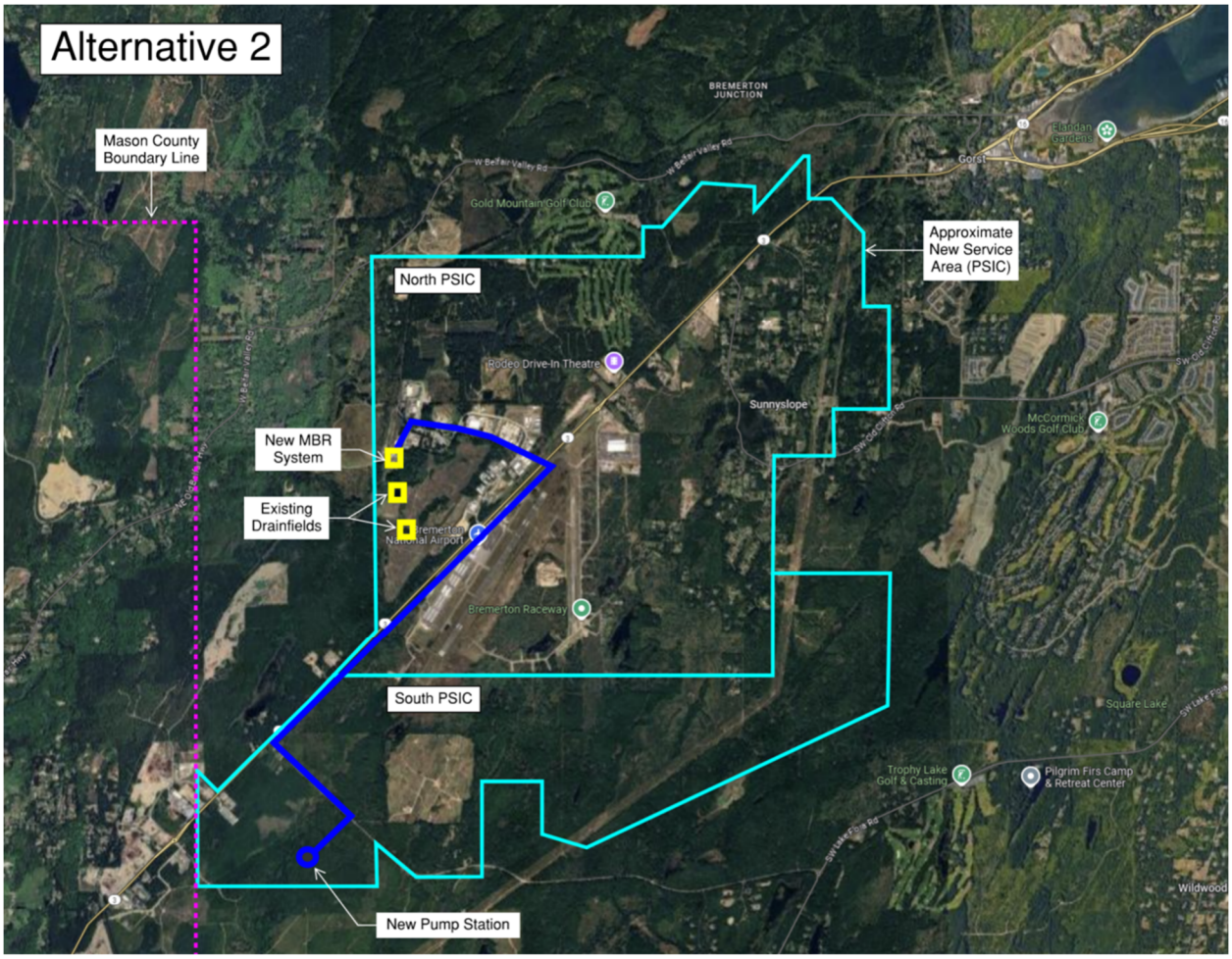


Figure 3-2 Alternative 2 Plan

3.4.3 Alternative 3 – Conveyance to Existing Service Area

Alternative 3 involves the installation of a new pump station in the South PSIC area which will convey future flows to an additional new pump station installed in the North PSIC area. This pump station would then convey the flows north to the community of Gorst's existing wastewater infrastructure through existing Pump Station SB-3 operated by the City. An analysis was conducted to verify sufficient pump station and force main capacity in Section 3.4.3.1. Highway 3 is considered a limited access ROW and WSDOT does not allow utilities to be installed unless all other options are expended. Further conversations with WSDOT should be had if conveyance along Highway 3 is considered. Figure 3-3 below depicts a preliminary plan view of this alternative.

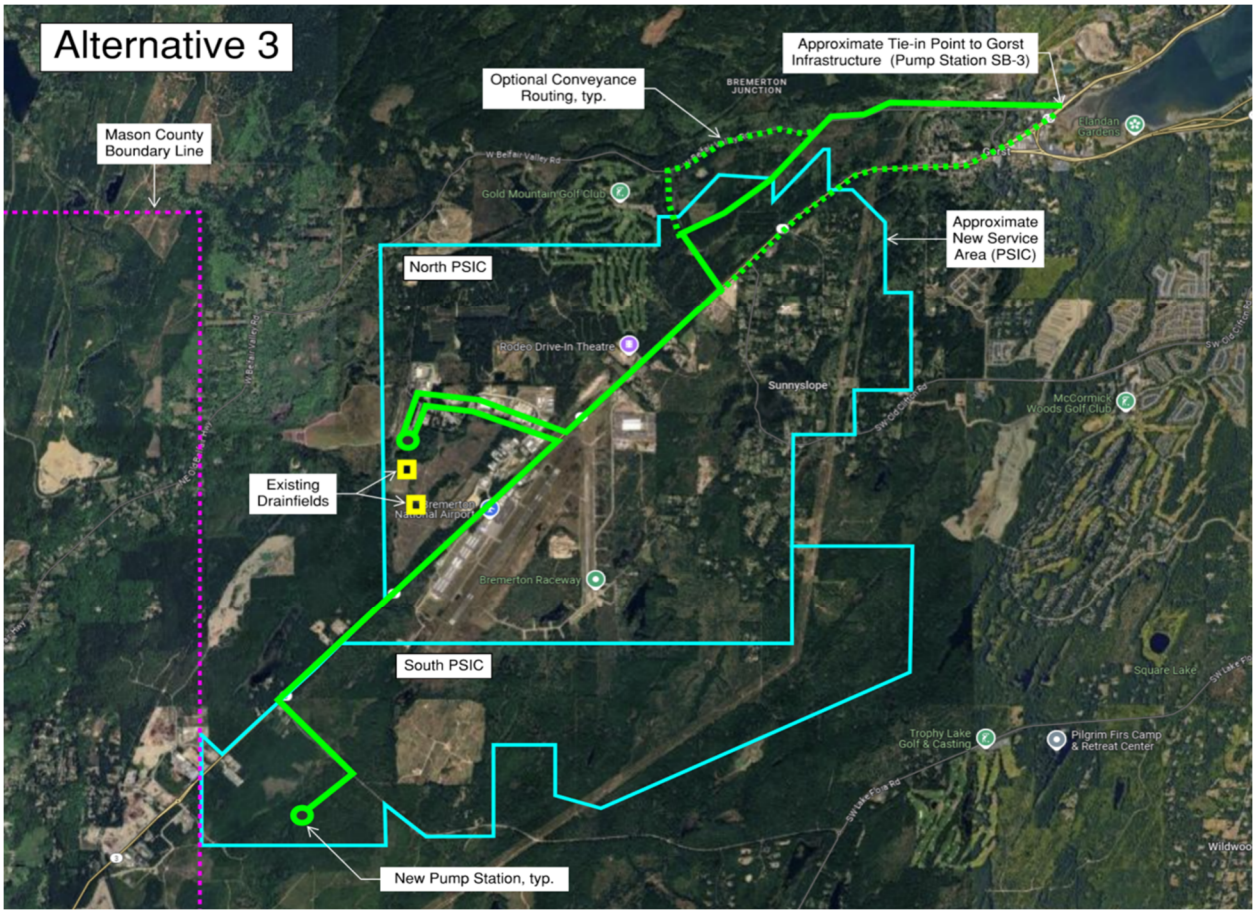


Figure 3-3 Alternative 3 Plan

3.4.3.1 Alternative 3 Flow Analysis

Kennedy Jenks performed a brief hydraulic analysis to determine the existing City infrastructure's capability to accept flows from PSIC across the planning horizon. Because the existing Pump Station SB-3 is only rated for 207.5 gpm, and projections for this service area are to exceed this flow rate, additional pumps will be needed to accommodate these new flows. SB-3 currently receives flows in series from existing pump stations SB-1 and SB-4. This means that if Alternative 3 were to connect at SB-3, Pump Station SB-3 and its associated force mains would need to have sufficient capacity to accommodate the sum of all these flows. From SB-3, one 10-inch and two 8-inch force mains convey flows approximately two miles downstream to the Bremerton Wastewater Treatment Plant; these force mains are known collectively as the South Bremerton Force Main (SBFM). A summary of the peak flows from the existing pump stations compared to the projected PSIC flows are presented below.

Figure 3-4 Flow Rate Comparison

Peak Flow Rates	
SB-1	900 gpm
SB-3	500 gpm
SB-4	580 gpm
PSIC	972 gpm
Total	**2,952 gpm**

Notes:
Pump Stations SB-1, SB-3, and SB-4 peak flow rates taken from the City of Bremerton 2014 Wastewater Comprehensive Plan Update.

Because pump station SB-3 contains three parallel effluent force mains, the total flow can be assumed to be operated concurrently and be split into three for this analysis. The calculated pipe velocity through the 10-inch and two 8-inch force mains will be 4.0 feet per second and 6.3 feet per second, respectively. Given the total flow rate calculated for the build-out flow, the velocity ranges observed are within typical design standards. Additionally, velocities through the force mains would increase should one of the force mains require maintenance during periods after full buildout. Based on this preliminary analysis, there appears to be sufficient capacity in the existing SBFM. Upsizing of the SBFM may need to be considered for this option to prevent negative effects such as pressure losses and water hammer potential. The City should conduct an independent study on this matter to confirm existing flows and conditions of the existing infrastructure. This assessment was performed solely based on existing pump station's rated capacities and not historical flows for this area. Additionally, no analysis was performed for effects on treatment plant performance, capacity, or nutrient loading. If this Alternative is developed in more detail, effects on the Westside WWTP will be evaluated in future, separate analyses.

3.4.4 MBR Effluent Discharge Options

Beneficial reuse of the effluent from a possible new MBR treatment system as reclaimed water was explored for this study. Several discharge points were considered for each alternative and are as follows:

- Discharge as reclaimed water to Gold Mountain Golf Club irrigation system for beneficial reuse.
- Discharge to the rock quarry area southwest of East Fork Union River.
- Discharge to the existing drain fields.

Discharging to the nearby Gold Mountain Golf Club is a viable option for beneficial reuse but will require extensive conveyance from the treatment facility location to the golf course's onsite storage for irrigation. This option for discharge also requires treatment to Class A reclaimed water standards as shown in Table 2-4. Thus, the alternatives that cannot meet this parameter should not be considered for this discharge option. The golf course is currently on City property so conversations with other entities will be minimized or nonexistent regarding the potential

usage of reclaimed water. A preliminary site plan depicting two potential conveyance alignment options from the treatment plant to the golf course are shown in Figure 3-5. Option 1 will likely require less restoration efforts due to the alignment situated along what appears to be a trail or logging road while Option 2 is aligned along existing roadways and will require coordination with WSDOT as well as extensive restoration efforts. Depending on the elevation profiles in this area, one or more pump stations may be needed to convey the effluent water to the designated discharge point.

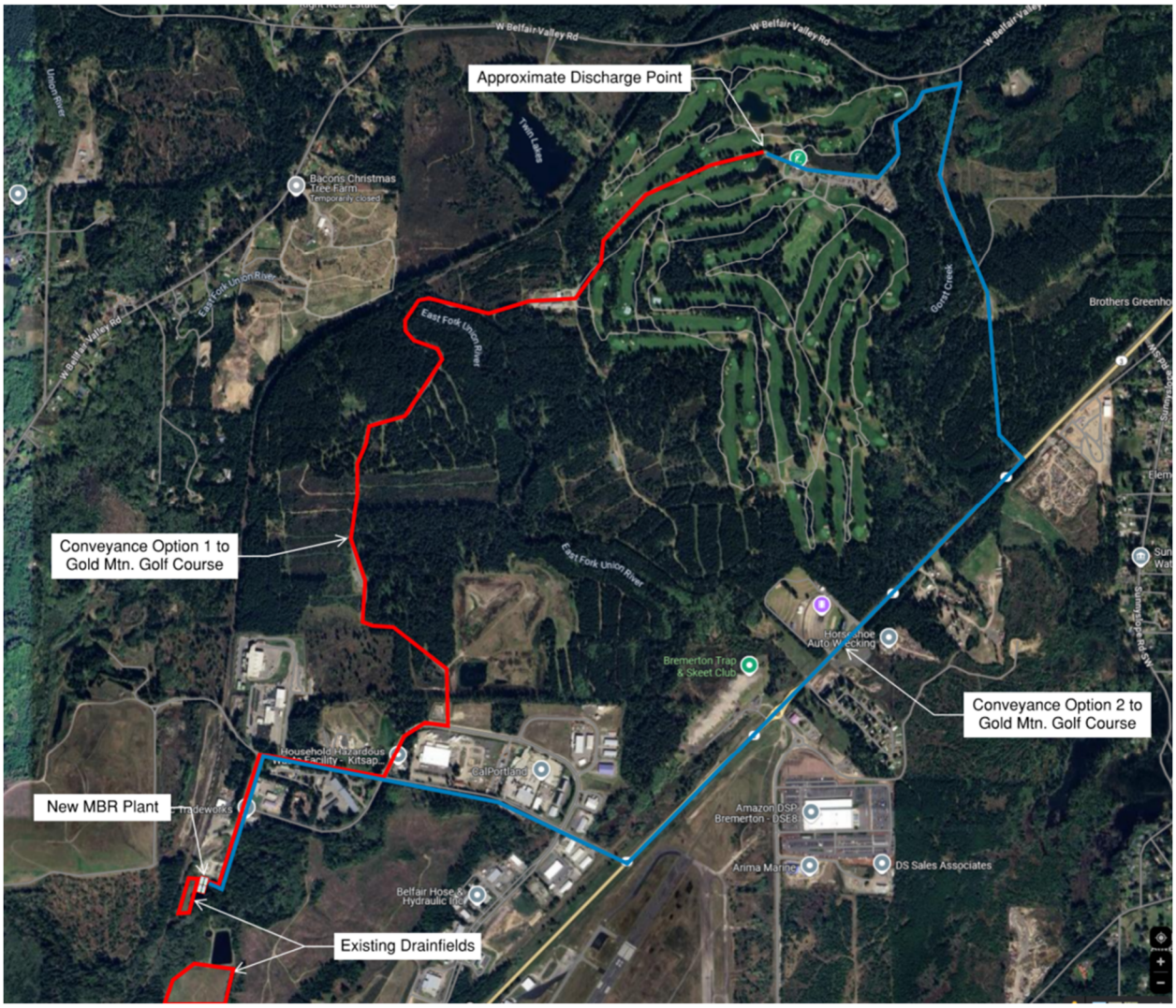


Figure 3-5 Effluent Conveyance Plan

Discharging to the nearby rock quarry southwest of East Fork Union River is an option to consider if discharging to Gold Mountain Golf Club and the existing drain fields do not have sufficient capacity. This location is available for consideration and is on City property so there would be no need for conversations with the Port. The City would need to conduct an

independent study to confirm this area is suitable for discharge from the treatment system and modify the discharge area accordingly.

A previous study evaluated the use of discharging to the existing drain fields. The study concluded the existing treatment system, as well as a newly constructed MBR treatment facility, should discharge into the existing drain field points. Since the flow currently received by the plant are well within the permitted limits, the drain fields could be reused up to the design capacity. This option would likely require an evaluation of the drain field's capacity to ensure the increased flows from the treatment system are able to be met.

The community of Gorst is located to the north of the PSIC area and is within the sanitary sewer service area of Bremerton. Following Alternative 3, the City can opt to tie into Gorst's existing infrastructure through Pump Station SB-3, provided there is sufficient capacity to do so. The City will likely need to perform an evaluation on potentially upsizing this existing pump station to account for the increased flows.

3.5 Alternative Project Costs

Class 5 OPCC estimates were developed for each alternative following AACE guidelines. The expected accuracy range for a Class 5 estimate ranges from -30% to +50%. These estimates will serve as a high-level cost comparison between each alternative and should be considered in further evaluations.

3.5.1 Cost Comparison

Project costs were developed for each alternative to gain an understanding of the potential costs for equipment and high-level construction requirements. Several markups were also applied to these estimates to provide a preliminary cost for ancillary project needs such as electrical, instrumentation and controls, and permitting. A summary of the project costs and assumed markups for each alternative are presented in Table 3-3 below, while the full detailed estimates including select soft costs can be found in Appendix A.

Table 3-3 Alternative Project Construction Costs

Estimated Project Construction Cost & Range		
Alternative 1	**Alternative 2**	**Alternative 3**
$78M	$85M	$51M
$55M to $118M	$59M to $127M	$35M to $76M

Alternative 1 Phasing	
Phase 1	**Phases 2+3**
$52M	$26M
$36M to $78M	$18M to $40M

Alternative 2 has the highest projected cost, followed by Alternative 1 and then Alternative 3. Alternatives 1 and 2 contain a new MBR treatment system sized for North PSIC and South PSIC flows and two new pump station configurations to Mason County and to the new MBR system. The bulk of the costs in these options come from the MBR system and its necessary components. Alternative 3 contains no MBR treatment system but a series of pump stations that convey flows northeast to existing Pump Station SB-3. The bulk of these costs mainly come from the installation of several pump stations and lengthy conveyance from the PSIC area to Gorst, which is much higher compared to the other alternatives. Upgrade efforts will likely be extensive for this alternative due to a portion of the conveyance installed along a major highway. Pump Station SB-3 will likely need minor upgrades for the expected increase in flows to the existing system.

Section 4: Alternatives Evaluation

4.1 Criteria Descriptions

A set of criteria were developed to evaluate the alternatives based on factors relevant to the City and the overall study.

4.1.1 Costs

Capital project costs for each alternative vary depending on the goals and components of the alternative. For each alternative, there are costs associated with influent and effluent conveyance as well as the major components for flow. The costs for pump stations were developed by assuming a cost per unit of flow, which was developed based on similar projects completed in the past. The new MBR system costs for the alternatives that included this represents a major cost component due to the primary equipment, installation, and ancillary items for construction. Several standard markups were also applied to each alternative cost estimate. Alternatives with a higher estimated project capital cost score lower than alternatives with a lower cost.

4.1.2 Operations & Maintenance

O&M of the alternatives is a major factor to consider. Adding a new MBR treatment system introduces new operational demands the City may not have much experience implementing. An MBR system requires consistent maintenance, such as onsite sampling, to ensure it is operating properly and the biological treatment is working as intended. Adding additional pump stations will require the City to maintain additional infrastructure, which may be similar to what the City currently operates and maintains. Alternatives with similar or minimal operations and maintenance will score higher than alternatives with newer operational challenges or more frequent maintenance activities.

4.1.3 Beneficial Reuse

Considerations for beneficial reuse of effluent water is an important factor for this study. A pump station on its own will not be able to produce Class A reclaimed water so options that contain a new MBR treatment system will score higher due to being able to produce this quality of water. Not being able to produce Class A reclaimed water will limit the alternatives' ability to discharge to the Gold Mountain Golf Club so other methods of discharge must be considered for those options. Alternatives that can produce Class A reclaimed water for beneficial reuse score higher than alternatives that cannot.

4.1.4 Agency Coordination & Permitting

Coordination with applicable agencies is an important factor to consider. Assumptions were made for alternatives that were contingent upon Mason County accepting a portion of flows from the South PSIC area. This will require communication on the intent as well as developing a plan for routing the flows to the county boundary line. The new MBR treatment system is also

anticipated to be installed on Port property so coordination with this entity is needed unless the City ultimately decides to consider alternative locations for the treatment system on City property. Alternatives with minimal or no external communication will score higher than alternatives that will require several coordination efforts.

Permitting with applicable agencies is another important factor to consider before moving forward with any alternative. The alternatives that have been identified to contain installation of conveyance along Highway 3 will require coordination with WSDOT as Highway 3 is considered a limited access corridor in this area. All alternatives will require some level of installation along this highway so coordination with WSDOT is likely guaranteed unless unorthodox approaches for conveyance are implemented. Installation of a new MBR treatment system will require coordination with DOE as flows are anticipated to process above 100,000 gpd. Coordination with DOE will need to occur prior and into detailed design. Discharging to the golf course as reclaimed water will also require a reclaimed water management plan and associated permit with DOE. Alternatives with minimal or no permitting efforts will score higher than alternatives with several permitting efforts.

4.1.5 Implementation/Phasing

Implementation and phasing is an important factor to consider such that all alternatives will have a specific timeline and approach before becoming fully operational. Other factors such as interagency agreements can also have an impact on the overall implementation of an alternative. A MBR system generally has an opportunity to implement a phased approach where the overall facility can be built while the membranes themselves can be installed according to the flow rates anticipated to be received in the interim. Once a threshold is reached, the remaining membranes can be procured and installed accordingly at a later date. Pump stations generally do not have the same flexibility as a MBR system in regards to phasing and implementation, but can likely be fully built much faster than a new MBR facility. Alternatives that contain a new MBR system will likely score lower, except for when an interagency agreement is established. Then, the alternative has an opportunity to score higher. Alternatives that contain a pump station or several pump stations will also score lower given that there is less opportunity to implement a phased approach.

4.2 Alternative Criteria Matrix

Each alternative was provided a score based on a criteria matrix developed for this project and are presented in**.** The justification for each score is detailed for each individual criterion. A weighting was also applied to each criterion and was determined based on the assumed overall impact to the City's goals for this study. Criteria and weighting were developed collaboratively with City staff during workshops held before finalization of the memorandum.

Table 4-1 Scoring Criteria Matrix

	Evaluation Scoring			
Criteria (Weighting)	3	2	1	0
Cost (20%)	Total project capital cost <$50M	Total project capital cost between $50M and $100M	Total project capital cost >$100M	-
O&M (25%)	Alternative requires minimal onsite presence and minor impacts to City's current O&M operations	Alternative requires some level of onsite presence and requires some new operator responsibilities	Alternative requires frequent onsite presence and many new operator responsibilities at initial Alternative implementation	Alternative requires full time staff onsite daily and new operator certifications required for routine O&M
Beneficial Reuse of Reclaimed Water (25%)	-	Alternative can provide full discharge flow for beneficial reuse (reclaimed water) and/or requires minimal effluent conveyance challenges	-	Alternative can provide no level of RW for beneficial reuse and/or requires extensive effluent conveyance challenges
Local Agency Coordination & Permitting (10%)	Alternative requires no inter-agency coordination going into design and construction and no additional permitting beyond current operations	Alternative requires one inter-agency coordination exercise and some new permitting efforts prior to design and construction	Alternative requires two or more agency coordination efforts and several new permitting efforts prior to design and construction	Alternative is not viable due to extensive agency coordination that is known to be infeasible and requires known extensive permitting efforts that highly impact future construction efforts
Implementation/ Phasing (20%)	Alternative can initiate in a phased approach, greatly reducing costs and schedule to initiate before full implementation	Alternative can initiate in a phased approach, moderately reducing costs and schedule to initiate before full implementation	Alternative can initiate in a phased approach, somewhat reducing costs and schedule to initiate before full implementation	Alternative can provide no level of streamlined implementation with no reduction to overall project costs or schedule before full implementation

Scores for each alternative ranged from zero (0) to three (3) with 3 being the most favorable and 0 being the least favorable in the specified criteria.

4.3 Evaluation Criteria and Weighting

Based on the criteria matrix in Table 4-1, each alternative was assigned a score for each. The unweighted and weighted scores are presented in Table 4-2 below.

Table 4-2 Alternatives Scoring Matrix

	Alternative 1		Alternative 2		Alternative 3	
	Unweighted	Weighted	Unweighted	Weighted	Unweighted	Weighted
Cost	2	0.4	2	0.4	2	0.4
O&M	1	0.25	1	0.25	3	0.75
Beneficial Reuse	2	0.5	2	0.5	0	0
Agency Coordination & Permitting	1	0.1	1	0.1	2	0.2
Implementation/ Phasing	3	0.6	1	0.2	2	0.4
Totals	**9**	**1.85**	**7**	**1.45**	**9**	**1.75**

4.3.1 Alternatives Comparison

Each alternative was developed with a different purpose for serving the future developments in the PSIC industrial area. Alternatives 1 and 2 represent the alternatives with lower overall conveyance but higher complexity due to needing a new MBR treatment system for the North and South PSIC developments. Alternative 1 was considered due to the City's ongoing conversations with Mason County for a potential agreement on sending a portion of flows from the South PSIC area to Mason County infrastructure. The conveyance agreement with Mason County would potentially allow for several years of buffer time before operations staff would need be trained to operate an MBR system, therefore Alternative 1 scored higher than Alternatives 2 and 3 in the Implementation/Phasing category. There is a potential for high capital investments in the later phases for Alternative 1 due to sewage age and minimum flows required for the new MBR system.

Alternative 2 should be considered provided Mason County does not allow the City to send any flows to their jurisdiction and a high level of treatment and capacity is desired with the MBR system. This alternative scored the lowest in the Implementation/Phasing category due to the overall construction requirements of a MBR system and the minimum flows required to initially operate.

Alternative 3 represents the option that is the least complex due to not needing a new MBR treatment system but does require a higher number of pump stations along the specified routing. The absence of a new MBR system defaults this alternative to not being able to provide any amount of effluent as reclaimed water. A higher amount of conveyance would also be needed due to the potential for connecting to Gorst's wastewater infrastructure to the north of the PSIC industrial area. This alternative would also require higher upfront time to construct and become fully online due to the pump stations installed in series. Compared to Alternative 1 where an agreement is made and only one pump station is needed initially, this alternative scored lower than Alternative 3 in the Implementation/Phasing category. This alternative can be considered provided Mason County does not allow the City to send any flows to their jurisdiction and if the City prefers to work with a system that is familiar.

4.3.2 Alternative 3 Conclusion

Based on prior discussions with the City and the flow analysis conducted in Section 3.4.3.1, it is recommended that the City only consider Alternative 3 if the SBFM from existing pump station SB-3 to the Westside WWTP has sufficient capacity to handle the expected increase in flow. City operations and project management staff have indicated that upsizing the SBFM to accommodate increased flows from Alternative 3 would incur significant additional costs and permitting restrictions, which would render the Alternative a non-starter.

The amount of flow projected from the existing pump stations feeding into SB-3 as well as from the entirety of the PSIC area into SB-3, are preliminarily determined to meet the current capacity of the pump station and the force mains that convey the flows. Therefore, Alternative 3 should only be reconsidered if these conditions are confirmed via future analyses.

4.3.3 Risks and Opportunities

Several risks and opportunities have been identified for the MBR system option. The risks that have been developed are as follows:

- MBR system will need to consistently meet effluent discharge requirements dictated by Department of Ecology (DOE) permitting.
- MBR system will require specific operator training and frequent onsite presence for routine operation and maintenance.
- Conveyance alignment will require coordination with WSDOT along Highway 3 due to being a limited access corridor.
- Coordination with other entities such as the Port.

The opportunities that have been developed are as follows:

- The MBR system will provide a pathway for future treatment capabilities for the PSIC industrial area.

- The MBR system will build upon existing treatment infrastructure to increase overall capacity and reduce loading.

- The MBR system can produce Class A reclaimed water for several potential beneficial reuse opportunities in the immediate area.

Several risks and opportunities have been identified for the construction of new pumping stations. The risks are as follows:

- Pump stations can generate unwanted noise in the immediate and surrounding area.

- Pump stations can pose as a risk for personnel performing maintenance due to being in the vicinity of pressurized systems.

- Pump stations can be prone to a loss of power during outages so contingency measures should be considered.

- Conveyance alignment will require coordination with WSDOT along Highway 3 due to being a limited access corridor.

The opportunities are as follows:

- Pump stations can provide for additional capacity for future development in the area.

- Pump stations have the potential to provide an additional source of employment for the City.

4.3.4 Recommendation & Phasing Strategy

Based on the final results from the alternative evaluation scoring and the comparison between the alternatives, it is recommended that the City proceeds with developing plans for Alternative 1. Although this alternative does require an initial agreement with Mason County to send a portion of flows to their infrastructure, this allows the City to concurrently begin making the necessary plans for future buildout. A phased approach described in this section should also be considered for this alternative as it provides a streamlined pathway for development of the full build-out system and will also provide for future expansion in this area.

Preparing for considerable capacity increases with no existing infrastructure, a phased approach the City could consider would involve determining preliminary sizing for the South PSIC pump station up to the maximum amount of flow allowed by Mason County while concurrently developing a plan for another pump station sized for the remaining future flows in the South PSIC area. A new MBR treatment system initially sized for the current flows seen in the North PSIC area combined with the South PSIC area would also be developed. The MBR system capacity could be rounded up to half of the build-out flows to account for intermediate studies and plans that will need to be developed in the interim. The MBR system would be situated such that future expansion up to the 20-year projected employment population is considered. The South PSIC pump station that would convey flows to Mason County would be

influenced and funded by others and should not be considered in future plans for this study. The new MBR system would require new facilities to be developed such as a new headworks and mechanical building to house the necessary equipment for standard MBR system functionality while also containing enough space for expansion in the future. If the new MBR system is installed adjacent to the existing lagoon treatment system, the existing system could also send all flows to the new treatment system via a new gravity line. Once the new treatment system is operational, it would be monitored to ensure its maximum loading capacity is not reached. A specific threshold would be developed to determine when the City would need to begin developing a plan for expansion. An example phased plan is summarized below:

- Phase 1
    - City enters interagency agreement with Mason County to send up to 160,000 gpd of flow from South PSIC to their infrastructure.
    - City begins developing plans for constructing a new pump station in South PSIC that will pump flows beyond 160,000 gpd to North PSIC.
    - City begins developing studies for phasing in a new MBR treatment system in North PSIC that accepts flows from South PSIC and discharges reclaimed water to Gold Mountain Golf Club and solids as Class A biosolids for beneficial reuse. Select MBR infrastructure will be sized to accommodate future expansion of treatment capacity.
- Phase 2
    - City begins sending flows from the new South PSIC pump station to new MBR treatment system until a capacity threshold is reached. This will trigger the City to begin implementing plans for final phasing of the MBR system to the full projected build-out flows.
- Phase 3
    - City begins construction of the MBR system expansion to account for full capacity flows. The City would enter an interagency agreement with the Port to receive all flows on Port property to the new treatment system.

An illustration of this phased approach is also presented below in Figure 4-1. This strategy assumes linear employment population growth, however it is a viable, milestone-based approach for non-linear increases in population in this area over time.

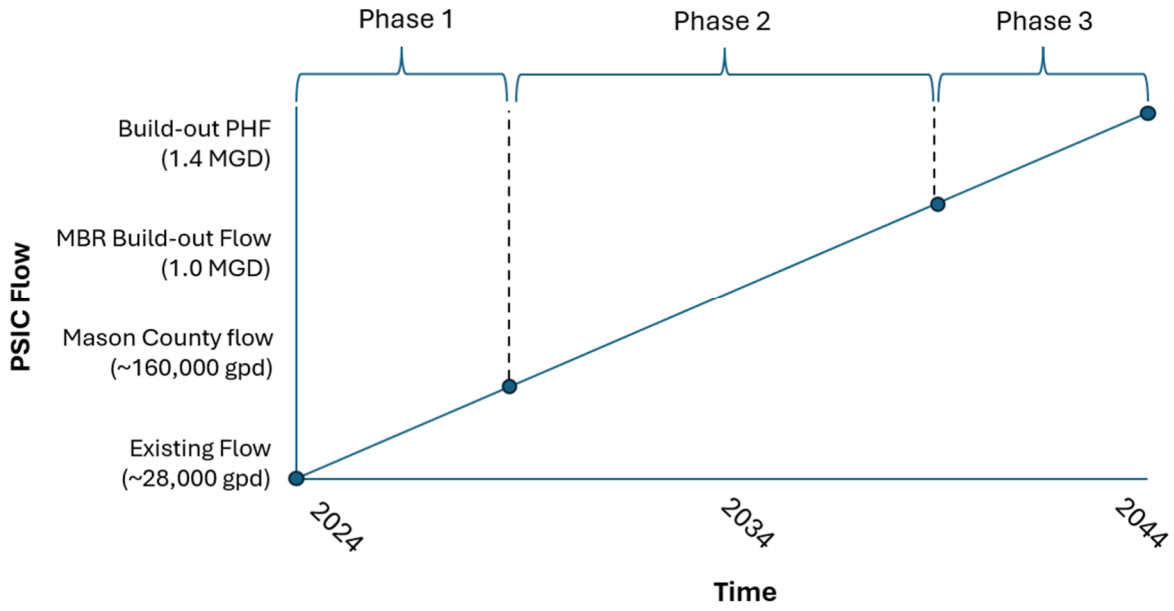


Figure 4-1 PSIC Phasing Strategy

Appendix A: Opinion of Probable Construction Cost Estimates (Class 5)

OPINION OF PROBABLE CONSTRUCTION COST

KENNEDY/JENKS CONSULTANTS, INC.

Project: Bremerton PSIC Feasibility Study

Building, Area: PSIC Industrial Area (Future)

ALTERNATIVE 3, PHASE 1: South PSIC Flows to Mason County

Estimate Type:
- [x] **Conceptual**
- [ ] **Preliminary (w/o plans)**
- [ ] **Design Development @** ____ **% Complete**
- [ ] **Construction**
- [ ] **Change Order**

Prepared By: CO/JH
Date Prepared: 12-Feb-25
KJ Proj. No. 2397011*00
Current at ENR
Escalated to ENR Escalation not included
Months to Midpoint of Construct

Spec. Section	Item No.	Description	Qty	Units	Total Costs $/Unit	Total Costs Total	Total		Source
Facilty Capital Costs									
	1	**Pump Stations**							
		(S PSIC) Duplex lift station, manhole, odor control, piping, utilities, E&IC, emergency generator, site improvements	1	LS	1,914,250.00	1,914,250	1,914,250		Ref $/MGD assumption includes contractor markups
		Pumps & standard accessories	3	EA	48,262.50	144,788	434,363		Ref quote from WECI dated 10/16/24
					Subtotal Pump Stations			**2,348,613**	
	2	**Pipelines**							
		Force Main New Pump Station to Mason County Line							
		FM Piping (PVC), trenching, restoration	6,900	LF	200.00	1,380,000	1,380,000		Assumes 6" Dia , includes contractor markups
		Gravity Pipeline							
		Gravity Piping (PVC), trenching, restoration, manholes	3,100	LF	280.00	868,000	868,000		Assumes 8" Dia , includes contractor markups
		Tie-in Point	1	LS	10,000.00	10,000	10,000		Allowance
		Pipelines additional for in roadway	7,000	LF	240.00	1,680,000	1,680,000		Trenching, paving, removal and patch
					Subtotal Pipelines			**3,938,000**	
		Div 1 , Mobilization, bonds, permits		10%		628,661	628,661		
		Contractor OH&P		15%		942,992	942,992		
						Subtotal Facility Total Cost	**1,571,653**	**1,571,653**	
						TOTAL		**7,858,266**	
		Estimate Contingency		30%		2,357,480	2,357,480	2,357,480	
						Project Construction Cost Total		**10,215,745**	
		WA State Sales Tax (Brementon)		9.2%				939,849	
						Project Construction Cost Total		**11,155,594**	
		Project Soft Costs							
		Engineering and Design		5%			557,780		
		Construction Management		8%			892,448		
		Environmental/ Permitting		1%			111,556		
		Startup/ Testing		0.5%			55,778		
		Subtotal					**1,617,561**	**1,617,561**	
						Total Project Cost (Construction + Soft Costs)		**$ 12,773,155**	

OPINION OF PROBABLE CONSTRUCTION COST

KENNEDY/JENKS CONSULTANTS, INC.

Project: Bremerton PSIC Feasibility Study

Building, Area: PSIC Industrial Area (Future)

ALTERNATIVE 3, PHASE 2: North PSIC Flows to Gorst

Estimate Type:
- [x] **Conceptual**
- [ ] **Preliminary (w/o plans)**
- [ ] **Design Development @** ____ **% Complete**
- [ ] **Construction**
- [ ] **Change Order**

Prepared By: CO/JH
Date Prepared: 12-Feb-25
KJ Proj. No. 2397011*00
Current at ENR
Escalated to ENR Escalation not included
Months to Midpoint of Construct

Spec. Section	Item No.	Description	Qty	Units	Total Costs $/Unit	Total Costs Total	Total		Source
Facilty Capital Costs									
	1	**Pump Stations**							
		PS SB-3 upgrades	1	LS	3,000,000.00	3,000,000	3,000,000		
		(N. PSIC) Duplex lift station, manhole, odor control, piping, utilities, E&IC, emergency generator, site improvements	1	LS	2,170,000.00	2,170,000	2,170,000		Ref $/MGD assumption
		Pumps & standard accessories	3	EA	48,262.50	144,788	434,363		Ref quote from WECI dated 10/16/24
					Subtotal Pump Stations			**5,604,363**	
	2	**Pipelines**							
		Force Main New Pump Station to Gorst							
		FM Piping (PVC), trenching, restoration	5,900	LF	200.00	1,180,000	1,180,000		Assumes 6" Dia , includes contractor markups
		Gravity Pipeline							
		Gravity Piping (PVC), trenching, restoration, manholes	22,100	LF	280.00	6,188,000	6,188,000		Assumes 8" Dia , includes contractor markups
		Tie-in Point	1	LS	10,000.00	10,000	10,000		Allowance
		Pipelines additional for in roadway	10,600	LF	240.00	2,544,000	2,544,000		Trenching, paving, removal and patch
					Subtotal Pipelines			**9,922,000**	
		Div 1 , Mobilization, bonds, permits		10%		1,552,636	1,552,636		
		Contractor OH&P		15%		2,328,954	2,328,954		
						Subtotal Facility Total Cost	**3,881,591**	**3,881,591**	
								19,407,953	
		Estimate Contingency		30%		5,822,386	5,822,386	5,822,386	
						Project Construction Cost Total		**25,230,339**	
		WA State Sales Tax (Brementon)		9.2%				2,321,191	
						Project Construction Cost Total		**27,551,530**	
		Project Soft Costs							
		Engineering and Design		5%			1,377,577		
		Construction Management		8%			2,204,122		
		Environmental/ Permitting		1%			275,515		
		Startup/ Testing		0.5%			137,758		
		Subtotal					**3,994,972**	**3,994,972**	
								$ 31,546,502	

OPINION OF PROBABLE CONSTRUCTION COST

KENNEDY/JENKS CONSULTANTS, INC.

Project: Bremerton PSIC Feasibility Study

Prepared By: CO/JH
Date Prepared: 12-Feb-25
KJ Proj. No. 2397011*00

Building, Area: PSIC Industrial Area (Future)

ALTERNATIVE 3, PHASE 3: South PSIC Flows to Mason County, North PSIC Flows to Gorst

Current at ENR
Escalated to ENR Escalation not included
Months to Midpoint of Construct

Estimate Type:
- [x] **Conceptual**
- [ ] **Preliminary (w/o plans)**
- [ ] **Design Development @** _____ **% Complete**
- [ ] **Construction**
- [ ] **Change Order**

Spec. Section	Item No.	Description	Qty	Units	Total Costs $/Unit	Total Costs Total	Total		Source
Facilty Capital Costs									
	1	**Pipelines**							
		Force Main South PSIC Pump Station to North PSIC Pump Station							
		FM Piping (PVC), trenching, restoration	8,500	LF	200.00	1,700,000	1,700,000		Assumes 6" Dia , includes contractor markups
		Gravity Pipeline							
		Gravity Piping (PVC), trenching, restoration, manholes	19,300	LF	280.00	5,404,000	5,404,000		Assumes 8" Dia , includes contractor markups
		Tie-in Point	1	LS	10,000.00	10,000	10,000		Allowance
		Pipelines additional for in roadway	24,800	LF	240.00	5,952,000	5,952,000		Trenching, paving, removal and patch
					Subtotal Pipelines			**13,066,000**	
		Div 1 , Mobilization, bonds, permits		10%		1,306,600	1,306,600		
		Contractor OH&P		15%		1,959,900	1,959,900		
					Subtotal Facility Total Cost		**3,266,500**	**3,266,500**	
					TOTAL			**16,332,500**	
		Estimate Contingency		30%		4,899,750	4,899,750	4,899,750	
					Project Construction Cost Total			**21,232,250**	
		WA State Sales Tax (Brementon)		9.2%				1,953,367	
					Project Construction Cost Total			**23,185,617**	
		Project Soft Costs							
		Engineering and Design		5%			1,159,281		
		Construction Management		8%			1,854,849		
		Environmental/ Permitting		1%			231,856		
		Startup/ Testing		0.5%			115,928		
		Subtotal					**3,361,914**	**3,361,914**	
					Total Project Cost (Construction + Soft Costs)			**$ 26,547,531**	

Appendix I: Oyster Bay Sewerage Pre-Design Alternatives

Technical Memorandum

To: Bill Davis, Ned Lever

From: Kenneth Packard; Eric Bergstrom, PE

Date: October 10, 2016

Subject: Oyster Bay Sewerage Pre-Design Alternatives

Introduction

The primary sewage conveyance pipelines within the Oyster Bay sewer basin are pressure gravity sewer mains installed within the beaches of Oyster and Ostrich Bay (referred to throughout as beach mains). A series of pump stations in the sewer basin convey flow through the beach mains to pump station OB-1 which pumps sewage to the wastewater treatment plant.

Another aspect of the Oyster Bay sewer basin is that many residential and commercial properties discharge sewage through sewer lateral connections into the beach mains. Sewage flows by gravity from these property connections. In the past during periods of high sewage flow where the pump stations are operating at or near their capacity, sewer overflows were reported at several properties. The suspected cause of the sewer overflows is the hydraulic grade in the beach mains rising to the elevation of the properties. In response to sewer overflow events, backwater valves were installed (BWV) to protect properties from sewer overflows. Since installing backwater valves and reconfiguring the discharge piping at OB-2, the City has not received any reports of sewer overflows since approximately the mid 2000s.

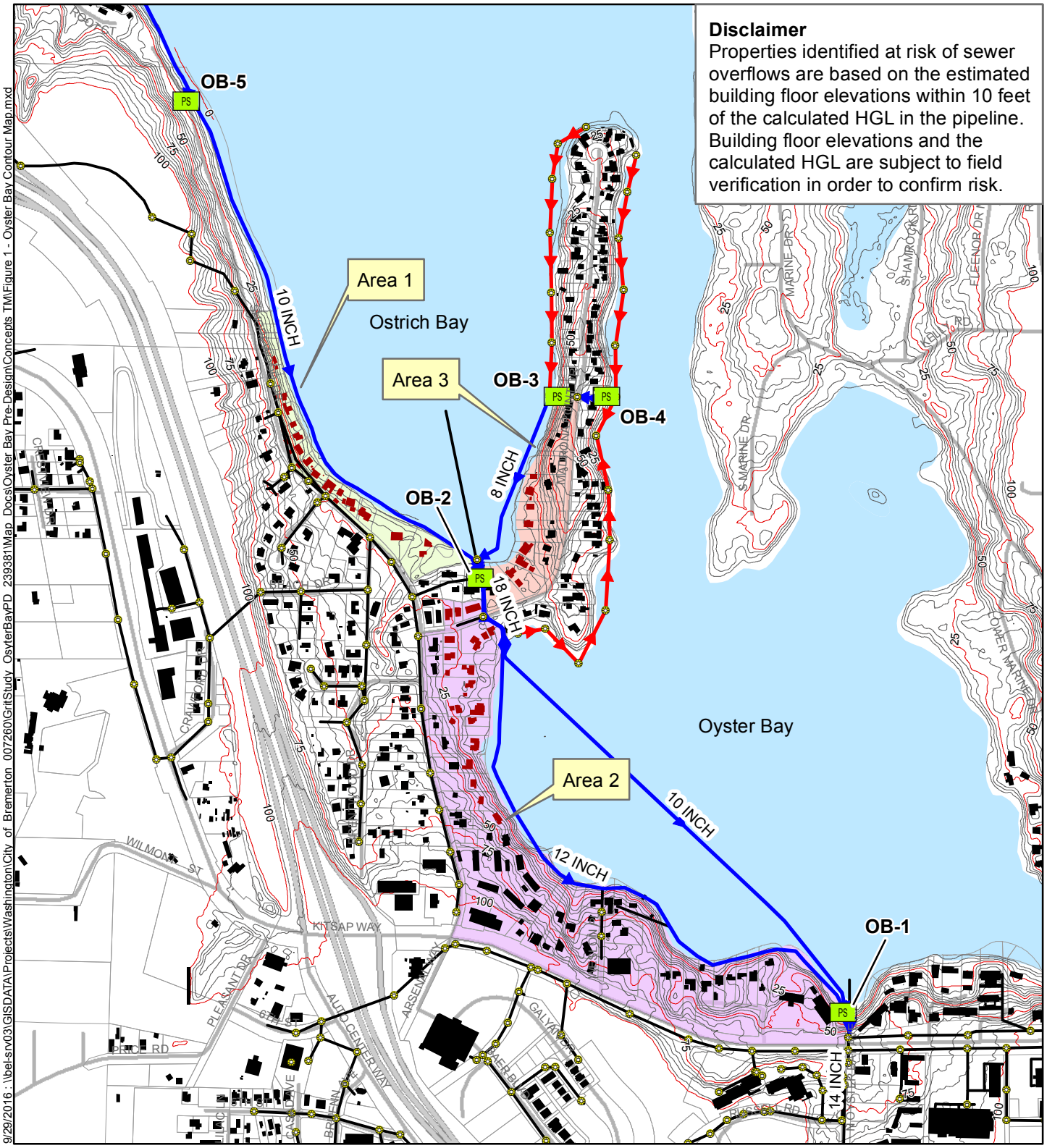
This technical memorandum (TM) focuses on three study areas described below and shown in Figure 1.

1. Area 1 – Pump Station OB-5 to OB-2: Pump Station OB-5 discharges to a 10-inch beach main along the southwestern beach of Ostrich Bay which conveys flow to OB-2. There are 15 residential gravity sewer connections to the beach main.
2. Area 2 – Pump Station OB-2 to OB-1: Pump Station OB-2 contains two pumps. Each pump in OB-2 is hydraulically independent of the other. Pump 1 is dedicated to a 12-inch beach main along the western beach of Oyster Bay which conveys flow to OB-1. There are approximately 53 residential and commercial gravity sewer connections to the 12-inch beach main. Pump 2 is dedicated to a parallel force main through Oyster Bay conveying flow to OB-1. The majority of the force main is 10-inch pipe with a segment of 18-inch pipe on either side of Oyster Bay. There are no residential or commercial gravity sewer connections to the force main beneath Oyster Bay.
3. Area 3 – Pump Station OB-3 to OB-2: Pump Station OB-3 discharges to an 8-inch beach main along the southwestern beach of Madrona Point which conveys flow to OB-2. There are 17 residential gravity sewer connections to the 8-inch main.

Purpose

The purpose of this TM is (1) to evaluate alternatives to reduce the risk of sewer overflows to private properties, and (2) to evaluate alternatives to abandon or remove the beach mains within the study area. One driver to implement improvements in the basin is to reduce the risk of sewer overflows. Backwater valves have been installed on certain customer connections in the past. This TM evaluates additional alternatives and the cost and benefit of each that could reduce the risk of sewer overflows. Another driver is the anticipated regulatory requirement to remove the sewer pipelines from the beach, thus alternatives are evaluated that would enable the beach mains to either be abandoned in place or removed.

The objective of this TM is to provide the City with information to plan for future sewer improvements to the Oyster Bay sewer basin in order to address the two regulatory drivers described above. The following sections provide a hydraulic evaluation of the beach mains, describe alternatives, provide planning level cost estimates, and summarize benefits for each alternative.



Disclaimer
Properties identified at risk of sewer overflows are based on the estimated building floor elevations within 10 feet of the calculated HGL in the pipeline. Building floor elevations and the calculated HGL are subject to field verification in order to confirm risk.

Legend

Study Areas
- Area 1
- Area 2
- Area 3

Potential Sewer Overflow Risk by Structure
- No
- Yes

- Existing Pump Stations
- Existing Manhole
- Existing Upland Gravity Main
- Existing Gravity Beach Main
- Force Main/Pressure Gravity
- Water Body
- Highway
- Streets

Contour (ft)
- 25 feet
- 5 feet

Source of Data:
1) Kitsap County GIS
2) City of Bremerton GIS

N

0 125 250 500 Feet

Figure 1
Oyster Bay Basin Site Map

CITY OF BREMERTON
OYSTER BAY ALTERNATIVES

Hydraulic Evaluation

A hydraulic evaluation was conducted of the beach mains and force main facilities in each of the three study areas to identify properties with a potential risk of sewer overflows. The evaluation to identify the potential sewer overflow risk was conducted in the following steps.

- The hydraulic grade line (HGL) in the beach mains was estimated based on the operation of the pumping facilities and the physical characteristics of the pipelines. Hazen-Williams C factors of 70 for the cast iron beach mains and 100 for the ductile iron force main were assigned based on standard values for the material and age of the pipe. Pump discharge pressures were recorded at pump station OB-2 and OB-5 on Sep 9th and Oct 15th 2015. The pressure readings were used to verify the HGL calculations.
- Property elevations were estimated based on the GIS location of each building footprint and contour elevations. The actual property elevations are subject to field verification.
- Potential risk of sewer overflows was identified for properties with an estimated building floor elevation within 10 feet above the calculated HGL. Figure 1 depicts the location of properties identified with a potential risk of sewer overflows.

The estimated number of potential risk properties is used as a basis for developing alternatives and planning level project cost estimates in the following sections. The actual risk of sewer overflow to private properties is subject to field verification to confirm the assumptions of building flooring elevation and the HGL in the pressure mains.

Area 1 – Pump Station OB-5 to OB-2

Pump station OB-5 discharges to a 10-inch cast iron beach main, with an estimated 15 connections, conveying flow to OB-2. The pump station contains two pumps that operate as lead and lag during normal flows but during periods of high flow, operate simultaneously. Table 1 provides information on the study area facilities.

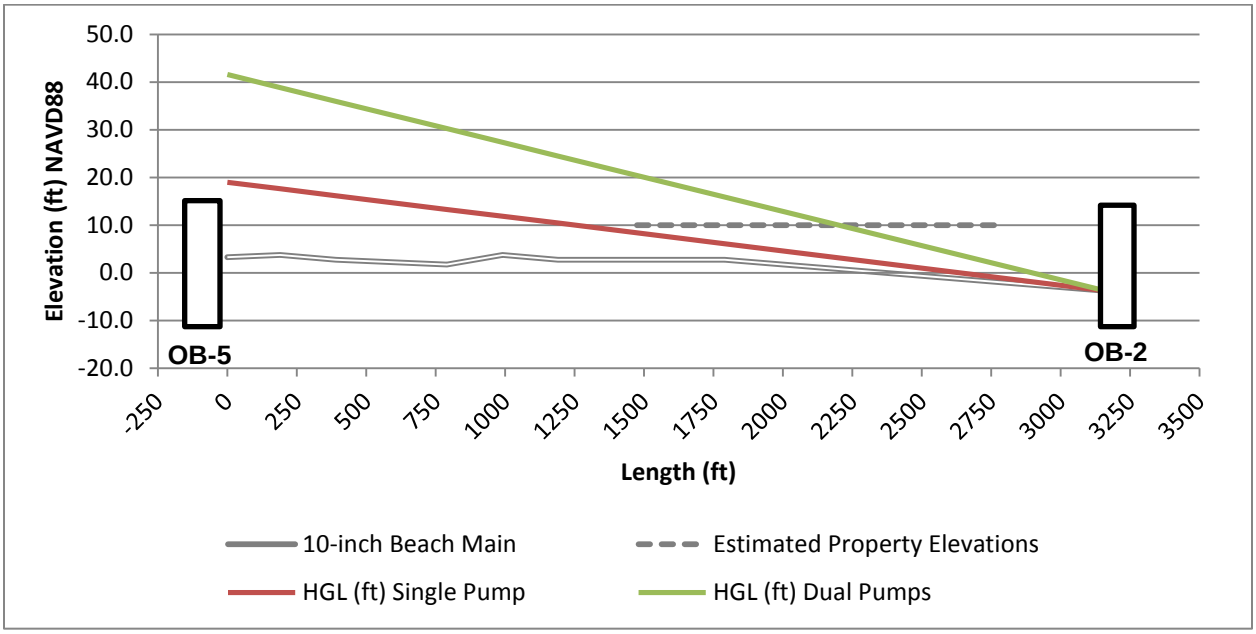
Figure 2 depicts the hydraulic grade line (HGL) in the 10-inch cast iron beach main for single and dual pump operation. The approximate property elevations depicted in the figure are based on the GIS location of the building footprints and contour elevations. The actual home and basement floor elevations are subject to field verification.

Table 1. Summary of Area 1 Facilities and Operation

	Operation
Rated Capacity[1]	550 gpm at 47 feet TDH (2 pumps)
Estimated Combined Pumping Rate[2]	850 gpm
Pump Discharge Pressure[3]	12 psi, Elev. 19 feet
Discharge Pipe[4]	3,160 LF of 10-inch Cast Iron
Gravity Sewer Connections[5]	15 residential properties
Connections with Potential Sewer Overflow Risk[6]	15 properties

1. Table 3-7 of 2014 Wastewater Comprehensive Plan.
2. Estimated from system curve developed for the force main and pump curves.
3. Pump discharge pressure recorded at Pump 1 4-inch outlet on 10/15/2015. Approximate gauge elevation is -9 feet NAVD88. A pressure reading with both pumps operating was not obtained in the field.
4. Based on as-built drawings
5. Approximate number based on GIS data for properties adjacent to the beach main.
6. Approximate number of properties located where the surcharge elevation in the pipe is within 10 feet of the building floor elevation. The actual home and basement floor elevations are subject to confirmation.

Figure 2. Area 1 10-inch Beach Main Hydraulic Grade Line



Area 2 – Pump Station OB-2 to OB-1

Pump station OB-2 contains two pumps. Each pump is currently dedicated to a single force main, but valving in the station allows the flexibility to switch force mains or have both pumps discharge into a single force main. Currently, Pump 1 discharges into a 12-inch cast iron beach main, with an estimated 53 lateral connections, installed along the beach of Oyster Bay. Pump 2 discharges into a 10-inch ductile iron force main installed across Oyster Bay. Both pipelines convey flow to OB-1. Table 2 provides information on the facilities in the study area. Figure 3 depicts the hydraulic grade line (HGL) in the 12-inch cast iron beach main. Figure 4 depicts the hydraulic grade line (HGL) in the 10-inch ductile iron force main. The approximate property elevations depicted in the figure are based on the GIS location of the building footprints and contour elevations. The actual home and basement floor elevations are subject to field verification.

Table 2. Summary of Area 2 Facilities and Operation

	Operation
Rated Capacity[1]	750 gpm at 65 feet TDH (2 pumps)
Pump 1 Discharge Pressure[2]	16.5 psi, Elev. 29 feet (12-inch beach main)
Pump 2 Discharge Pressure[2]	14 psi, Elev. 23 feet (10-inch force main)
Pump 1 Discharge Pipe[3]	3,650 LF of 12-inch Cast Iron
Pump 2 Discharge Pipe[3]	2,700 LF of 10-inch Ductile Iron and 500 LF of 18-inch Cast Iron
Gravity Sewer Connections[4]	53 residential and commercial properties
Connections with Potential Risk of Sewer Overflow[5]	21 properties

1. Table 3-7 of 2014 Wastewater Comprehensive Plan.
2. Pump discharge pressure recorded at pump outlet on 9/9/2015. Approximate gauge elevation is -9 feet NAVD88.
3. Based on as-built drawings
4. Based on GIS data for properties adjacent to the beach main
5. Approximate number of properties located where the surcharge elevation in the pipe is within 10 feet of the building floor elevation. The actual home and basement floor elevations are subject to confirmation.

Figure 3. Area 2 12-inch Beach Main Hydraulic Grade Line

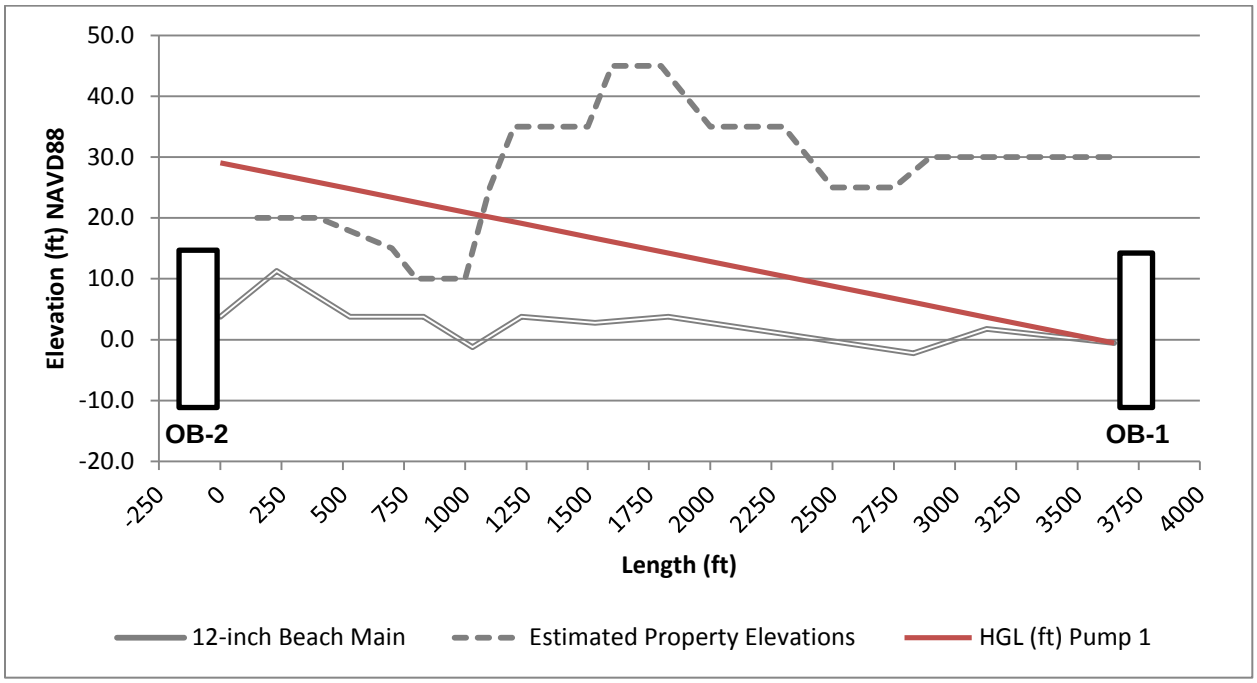


Figure 4. Area 2 10-inch Force Main Hydraulic Grade Line



Area 3 – Pump Station OB-3 to OB-2

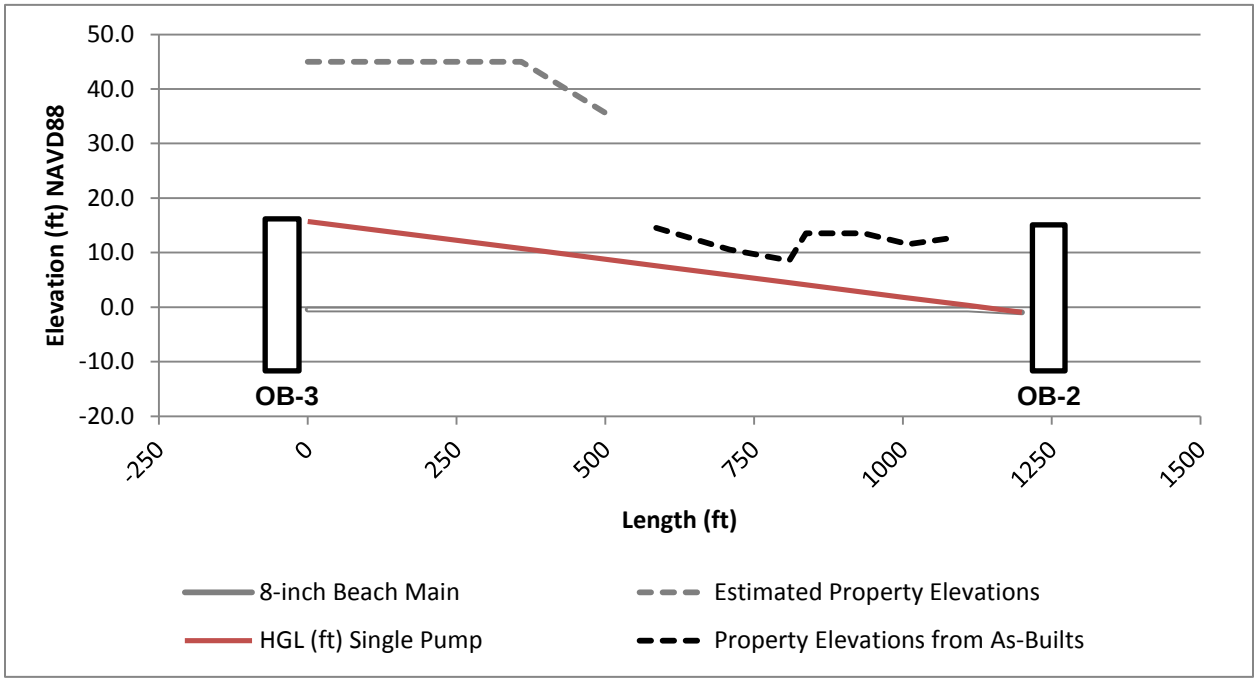
Pump station OB-3 discharges to an 8-inch cast iron beach main, with an estimated 17 lateral connections, conveying flow to OB-2. The pump station contains two pumps that operate as lead and lag. Table 3 provides information on the facilities in the study area. Figure 5 depicts the hydraulic grade line (HGL) in the 8-inch cast iron beach main. The approximate property elevations are also depicted in the figure based on the GIS location of the building footprints and contour elevations. The properties with the lowest elevations are provided in the as-built drawings for the gravity pressure main.

Table 3. Summary of Area 3 Facilities and Operation

	Operation
Rated Capacity[1]	400 gpm at 13 feet TDH (2 pumps)
Pump Discharge Pressure[2]	Not collected in the field
Discharge Pipe[3]	1,200 LF of 8-inch Cast Iron
Gravity Sewer Connections[4]	17 residential properties
Connections with Potential Risk of Sewer Overflow[5]	7 properties

1. Table 3-6 of 2014 Wastewater Comprehensive Plan.
2. No pressure readings obtained in the field.
3. Based on plan drawings
4. Based on GIS data for properties adjacent to the beach main. Basement flow elevations are provided in the plan drawings for 8 properties with the lowest elevations.
5. Approximate number of properties located where the surcharge elevation in the pipe is within 10 feet of the building floor elevation. The actual home and basement floor elevations are subject to confirmation.

Figure 5. Area 3 8-inch Beach Main Hydraulic Grade Line



Alternative Improvements

This section presents alternatives for each study area, a summary of benefits, and planning level cost estimates.

Costs are based on engineering estimates and contractor bid tab estimates from similar engineering and construction work. Costs include a construction contingency factor of 40 percent, sales tax of 8.7 percent, and an allowance for engineering, permitting, and administrative fees (allied costs) of 20 percent. Estimated costs are in 2015 dollars and based on Engineering News-Record's (ENR) material and building cost index for Seattle in January 2015 (10,388). Project cost estimates are at a Class 5 concept screening level as defined by the Association for the Advancement of Cost Engineering (AACE). The expected accuracy range is (-)25 percent to (+)50 percent. Those ranges are applied to the project cost estimates and reported in the following tables. The Appendix contains the details for each cost estimate

Area 1 Alternatives

There are fifteen residences with gravity sewer connections to the 10-inch beach main installed on the beach in Ostrich Bay conveying flow to pump station OB-2. Based on the hydraulic evaluation, all 15 properties have a potential risk of sewer overflows when the operation of OB-5 causes the beach main to surcharge. Four conceptual alternatives have been identified to improve the sewer system. Table 4 presents a summary of the Area 1 alternatives and planning level cost estimates.

Alternatives to Address Driver #1: Sewer Overflow Risks

- **Alternative 1A – Backwater Valve Program.**[1] The City continues its program of notifying property owners that they are required to install backwater valves (per BMC 15.03.120) at properties with a potential risk of sewer overflows through sewer lateral connections to the beach main. Ten letters are sent out per month (120 per year) to property owners and City operations staff will visit homeowners as requested to answer questions.
- **Alternative 1B – Install Grinder Pumps for At-Risk Properties.** Install grinder pumps at all 15 properties along the alignment that have a potential risk of sewer overflows. Grinder pump force mains would be sliplined through the existing service lateral and grouted into the existing gravity beach sewer.
- **Alternative 1C – Connect to Existing Upland Gravity Sewer and Convert Beach Main to Force Main.** Grinder pumps would be installed at all 15 properties along the alignment. New grinder pump force mains would be routed to the existing 8-inch gravity upland sewer on Shorewood Drive. The beach main would be converted to a dedicated force main by capping and sealing the existing lateral connections to the beach main.

[1] The City began their backwater valve notification program three years ago. The cost to the City for alternatives 1A, 2A, and 3A is minimal and places the requirement for installing a backwater valve on the property owner. The programs consists of sending out 10 letters per month which notifies customers that they are required to install backwater valves per BMC 15.03.120. Additionally, City operations staff will visit home owners to provide site-specific recommendations upon request. The City does not install the backwater valve or conduct maintenance.

15.03.120 BACKWATER VALVES. When a premises discharges wastewater into a force main or pressure main or wherever a situation exists involving an unusual danger of backflow, a backwater valve shall be required and shall be installed in a manner accessible for maintenance. The installation and effective operation of the backwater valve shall be the sole responsibility of the owner connecting to the wastewater system. The installation shall meet the requirements of the Engineering Design and Construction Standards. (Ord. 5250 §1 (in part), 2014: Ord. 4309 §2 (in part), 1991)

Alternatives to Address Driver #2: Potential Regulatory Requirement to Abandon/Remove Beach Mains

- **Alternative 1D – Connect to Existing Upland Gravity Sewer, Install Upland Force Main, and Abandon Beach Main.** A parallel force main would be installed along Shorewood Drive from PS OB-5 to PS OB-2. Flows from OB-5 would be routed to the proposed upland force main. Grinder pumps would be installed at every property currently connected to the beach main and convey flow to the existing upland gravity sewer. The existing beach main would be abandoned in place.
- **Alternative 1E – Connect to Existing Upland Gravity Sewer, Install Upland Force Main, and Remove Beach Main.** All provisions in Alternative 1D except the existing beach main would be removed from the beach.

Table 4. Area 1 Alternative Summary and Estimated Costs

Alternative	Features	Pros	Cons	Estimated Project Cost
1A	Backwater Valve Program	• Inexpensive protection from sewer overflows • Very low cost	• Risk of BWV failure	$3,000
1B	Grinder pump stations, slipline and grout existing laterals connections	• Pressure connections to beach main • Sliplining reduces cost	• Connections to beach main • Property coordination • Pump maintenance • Access easement	$530,000
1C	Grinder pump stations, force mains to 8-inch upland gravity sewer, and cap and seal existing laterals	• No beach main connections	• Property coordination • Pump maintenance • Access easement	$690,000
1D	Force main along Shorewood Drive, grinder pump stations, abandon beach main	• Beach main no longer in service • Maintenance access improved	• Pump maintenance • Property coordination • Access easement • New force main	$2,000,000
1E	Alternative 1D and beach main is removed	• Beach main no longer in service • Maintenance access improved	• Pump maintenance • Property coordination • Access easement • New force main • Beach main removal	$2,130,000

Area 2 Alternatives

There are 53 estimated residential and commercial property gravity connections to the existing 12-inch beach main along Oyster Bay from OB-2 to OB-1. Based on the hydraulic evaluation, 21 properties have a potential risk of sewer overflows when the operation of OB-2 causes the beach main to surcharge. Five conceptual alternatives are presented below to reduce the risk of sewer overflows to these services. Table 5 presents a summary of the Area 2 alternatives and planning level cost estimates.

Alternatives to Address Driver #1: Sewer Overflow Risks

- **Alternative 2A – Backwater Valve Program.** The City continues its program of notifying property owners that they are required to install backwater valves (per BMC 15.03.120) at properties with a potential risk of sewer overflows through sewer lateral connections to the beach main. Ten letters are sent out per month (120 per year) to property owners and City operations staff will visit homeowners as requested to answer questions.
- **Alternative 2B – Install control valve in OB-2.** Automation and a control valve would be installed in OB-2 to limit flows to the 12-inch main by diverting these flows to the 10-inch force main through Oyster Bay. Flow diversion would prevent the surcharge depth in the beach main from backing up into private side sewer connections. Currently one pump is dedicated to each force main.
- **Alternative 2C – Install Grinder Pumps for At-Risk Properties.** Install grinder pumps at 21 properties along the alignment with a potential risk of sewer overflows. Grinder pump force mains would be sliplined through the existing service lateral and grouted into the existing gravity beach sewer.
- **Alternative 2D – Connect to Existing Upland Gravity Sewer and Convert Beach Main to Force Main.** Grinder pumps would be installed at all 53 properties. Grinder pump force mains would connect to the existing 8-inch gravity upland sewer on Shorewood Drive and Kitsap Way. The main would become a dedicated force main for OB-2.

Alternatives to Address Driver #2: Potential Regulatory Requirement to Abandon/Remove Beach Mains

- **Alternative 2E – Connect to Existing Upland Gravity Sewer, Install Upland Force Main, and Abandon Beach Main.** A new force main would be installed along Shorewood Drive and Kitsap Way to OB-1. Flows from OB-2 would be routed to the upland force main. Grinder pumps would be installed at every property currently connected to the beach main and convey flow to the existing upland gravity sewer. The existing 12-inch beach main and 10-inch force main would be abandoned in place.
- **Alternative 2F – Connect to Existing Upland Gravity Sewer, Install Upland Force Main, and Remove Beach Main.** All provisions in Alternative 2D and the existing 12-inch beach main would be removed from the beach.

Table 5. Area 2 Alternative Summary and Estimated Costs

Alternative	Features	Pros	Cons	Estimated Project Cost
2A	Backwater Valve Program	• Inexpensive protection from sewer overflows • Very low cost	• Risk of BWV failure	$3,000
2B	Automation and control valve at OB-2	• Protects properties by limiting HGL in beach main • No property coordination	• Connections to beach main • Dual pumping to force main decreases combined capacity	$56,000
2C	Limited grinder pump stations, slipline and grout existing laterals	• Pressure connections to beach main • Sliplining reduces cost • Limited grinder pumps	• Connections to beach main • Property coordination • Pump maintenance • Access easement	$830,000
2D	Grinder pump stations, force mains to 8-inch upland gravity sewer, and cap and seal existing laterals	• No beach main connections	• Property coordination • Pump maintenance • Access easement	$2,510,000
2E	Force main along Shorewood Drive and grinder pump stations	• Beach main and force main no longer in service • Maintenance access improved	• Pump maintenance • Property coordination • Access easement • New force main	$4,560,000
2F	Alternative 2E and the beach main is removed	• Beach main and force main no longer in service • Maintenance access improved	• Pump maintenance • Property coordination • Access easement • New force main • Beach/force main removal	$4,690,000

Area 3 Alternatives

There are 17 residential gravity sewer connections to the 8-inch beach main between pump stations OB-3 and OB-2. No sewer overflows were reported in this area and no back water valves have been installed. The City identified this area for an improvement to the gravity connections to the beach main but it is a lower priority area since there have been no recorded overflows to residences. Based on the hydraulic evaluation, 7 properties have a potential risk of sewer overflows when the operation of OB-3 causes the beach main to surcharge. Three conceptual alternatives have been identified for this area. Table 6 presents a summary of the Area 3 alternatives and planning level cost estimates.

Alternatives to Address Driver #1: Sewer Overflow Risks

- **Alternative 3A – Backwater Valve Program.** The City its program of notifying property owners that they are required to install backwater valves (per BMC 15.03.120) at properties with a potential risk of sewer overflows through sewer lateral connections to the beach main. Ten letters are sent out per month (120 per year) to property owners and City operations staff will visit homeowners as requested to answer questions.
- **Alternative 3B – Install Grinder Pumps for At-Risk Properties.** Install grinder pumps at 7 properties with a potential risk of sewer overflows. Grinder pump force mains would be sliplined through the existing service lateral and grouted into the existing gravity beach sewer.

Alternatives to Address Driver #2: Potential Regulatory Requirement to Abandon/Remove Beach Mains

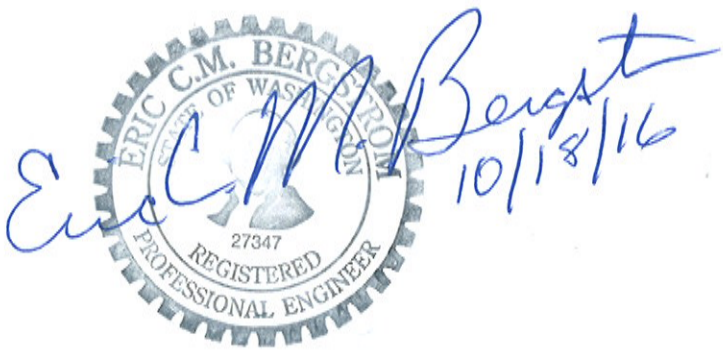
- **Alternative 3C – Connect to Existing Upland Gravity Sewer, Install Upland Force Main, and Abandon Beach Main.** Grinder pumps would be installed at each property along the alignment. Grinder pump force mains would be routed to discharge to a new low pressure force main installed along Madrona Point. The new low pressure force main would be sized to convey flows from OB-3 to OB-2. The existing beach main would be abandoned in place.
- **Alternative 3D – Connect to Existing Upland Gravity Sewer, Install Upland Force Main, and Remove Beach Main.** All provisions in Alternative 3C and the existing 8-inch beach main would be removed from the beach.

Table 6. Area 3 Alternative Summary and Estimated Costs

Alternative	Features	Pros	Cons	Estimated Project Cost
3A	Backwater Valve Program	• Inexpensive protection from sewer overflows • Very low cost	• Risk of BWV failure	$3,000
3B	Grinder pump stations and slipline and grout existing laterals	• Pressure connections • Sliplining reduces cost • Limited grinder pumps	• Connections to beach main • Property coordination • Pump maintenance • Access easement	$280,000
3C	Grinder pump stations, new force main, cap and seal existing laterals, abandon beach main	• Beach main no longer in service • Maintenance access improved	• Pump maintenance • Property coordination • Access easement • New force main	$1,480,000
3D	Alternative 3C and the beach is removed	• Beach main no longer in service • Maintenance access improved	• Pump maintenance • Property coordination • Access easement • New force main • Beach main removal	$1,450,000

Summary

The objective of this TM is to provide information for the City to evaluate the alternatives presented in the preceding section. At this time, the backwater valve program continues to be successful in protecting properties from sewer overflows and additional improvements such as installing grinder pumps or disconnecting sewer lateral connections from the beach main may not be warranted. It is uncertain if the driver to abandon or remove the beach main pipelines will be a future requirement. In the event the requirement to remove beach mains is enforced, a funding source would need to be identified to construct those improvements.



Appendix

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City of Bremerton
Oyster Bay Alternatives TM
Class 5 Cost Estimate
September 2016

Alternative 1A
Backwater Valve Program

Item	Quantity	Unit	Unit Cost	Total	Comment
Backwater Valves	1	LS	$ 3,000	$ 3,000	Continue program of notifying property owners that they are required to install backwater valves (per BMC 15.03.120)
			Subtotal	**$ 3,000**	
			Low (-25%)	**$ 2,000**	
			High (+50%)	**$ 5,000**	

City of Bremerton
Oyster Bay Alternatives TM
Class 5 Cost Estimate
September 2016

Alternative 1B
Install grinder pumps for at-risk properties

Item	Quantity	Unit	Unit Cost	Total	Comment
General Items	15	EA	$ 2,500	$ 37,500	Minor Change SPCC Plan, Property Restoration, Mobilization, Obstruction Removal, Landscaping, Erosion Control per Ginder Pump from Gorst Collection System Improvements Bid Tab adjusted to 2015 dollars
Grinder Pumps	15	EA	$ 9,000	$ 135,000	From Gorst Bid Tab adjusted to 2015 dollars
PE LPS Main 1.25 In. Diam.	1500	LF	$ 25	$ 37,500	100 LF per grinder pump
Lateral Sliplining	15	EA	$ 1,000	$ 15,000	Roto-Rooter Quote for lateral inspection and moderate root removal to install each lateral
Beach Excavation and Restoration	15	EA	$ 500	$ 7,500	10 CY of Excavation including Haul and Gravel Backfill per grinder pump
Wet tap beach main	15	EA	$ 2,750	$ 41,250	Pipe Repair (Romac quote) and corp stop etc (Speer Taps)
Shoring and Dewatering	15	EA	$ 1,000	$ 15,000	Per grinder pump
			Subtotal	**$ 288,750**	
			Construction Contingency (40%)	$ 115,500	
			Subtotal Construction Costs	**$ 404,250**	
			Sales Tax (8.7%)	$ 35,200	
			Allied Costs (20%)	$ 80,900	
			Total Project Cost	***$ 530,000***	
			Low (-25%)	**$ 400,000**	
			High (+50%)	**$ 800,000**	

City of Bremerton
Oyster Bay Alternatives TM
Class 5 Cost Estimate
September 2016

Alternative 1C
Connect to existing upland gravity sewer and convert beach main to force main

Item	Quantity	Unit	Unit Cost	Total	Comment
General Items	15	EA	$ 2,500	$ 37,500	Minor Change SPCC Plan, Property Restoration, Mobilization, Obstruction Removal, Landscaping, Erosion Control per Ginder Pump from Gorst Collection System Improvements Bid Tab adjusted to 2015 dollars
Grinder Pumps	15	EA	$ 9,000	$ 135,000	From Gorst Bid Tab adjusted to 2015 dollars
PE LPS Main 1.25 In. Diam.	3000	LF	$ 20	$ 60,000	200 LF per grinder pump, Unit Cost from bid tab
Excavation and Restoration	15	EA	$ 1,000	$ 15,000	25 CY Excavation and Gravel Backfill per grinder pump
Asphalt Replacement	75	SY	$ 110	$ 8,250	5 SY of pavement restoration per lateral, Tabula unit cost
Traffic Control	120	HRS	$ 110	$ 13,200	8 hrs of traffic control per grinder pump, Tabula unit cost
Upland Sewer Wet Tap	15	EA	$ 2,750	$ 41,250	Pipe Repair (Romac quote) and corp stop etc (Speer Taps)
Remove and Cap Lateral	15	EA	$ 2,500	$ 37,500	Excavation and native backfill, remove and dispose of lateral, install cap on lateral
Shoring and Dewatering	30	EA	$ 1,000	$ 30,000	Per beach main lateral and ginder pump
			Subtotal	**$ 377,700**	
			Construction Contingency (40%)	$ 151,080	
			Subtotal Construction Costs	**$ 528,780**	
			Sales Tax (8.7%)	$ 46,100	
			Allied Costs (20%)	$ 105,800	
			Total Project Cost	***$ 690,000***	
			Low (-25%)	**$ 520,000**	
			High (+50%)	**$ 1,040,000**	

City of Bremerton
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September 2016

Alternative 1D
Connect to existing upland gravity sewer, install upland force main, and abandon beach main

Item	Quantity	Unit	Unit Cost	Total	Comment
General Items	15	EA	$ 2,500	$ 37,500	Minor Change SPCC Plan, Property Restoration, Mobilization, Obstruction Removal, Landscaping, Erosion Control per Ginder Pump from Gorst Collection System Improvements Bid Tab adjusted to 2015 dollars
Grinder Pumps	15	EA	$ 9,000	$ 135,000	From Gorst Bid Tab adjusted to 2015 dollars
PE LPS Main 1.25 In. Diam.	3000	LF	$ 20	$ 60,000	200 LF per grinder pump, Unit Cost from bid tab
Excavation and Restoration	15	EA	$ 1,000	$ 15,000	25 CY Excavation and Gravel Backfill per grinder pump
Asphalt Replacement	75	SY	$ 110	$ 8,250	5 SY of pavement restoration per lateral, Tabula unit cost
Traffic Control	120	HRS	$ 110	$ 13,200	8 hrs of traffic control per grinder pump, Tabula unit cost
Upland Sewer Wet Tap	15	EA	$ 2,750	$ 41,250	Pipe Repair (Romac quote) and corp stop etc (Speer Taps)
Shoring and Dewatering	30	EA	$ 1,000	$ 30,000	Per beach main lateral and ginder pump
10-inch Force main	3500	LF	$ 185	$ 647,500	Bid Tabs from Gorst Improvements adjusted to 2015 dollars, incl excation, backfill, and restoration
Fill and Abandon Beach Main	3200	LF	$ 10	$ 32,000	Estimate to fill and abandon from Seattle Seawall Improvements
Remove and Cap Lateral	15	EA	$ 2,500	$ 37,500	Excavation and native backfill, remove and dispose of lateral, install cap on lateral connection to Beach Main
DNR Leasing	1	LS	$ 50,000	$ 50,000	Estimate of DNR lease costs related to abandoned utilities in the beach.
			Subtotal	**$ 1,107,200**	
			Construction Contingency (40%)	$ 442,880	
			Subtotal Construction Costs	**$ 1,550,080**	
			Sales Tax (8.7%)	$ 134,900	
			Allied Costs (20%)	$ 310,100	
			Total Project Cost	***$ 2,000,000***	
			Low (-25%)	**$ 1,500,000**	
			High (+50%)	**$ 3,000,000**	

City of Bremerton
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Alternative 1E
Connect to existing upland gravity sewer, install upland force main, and remove beach main

Item	Quantity	Unit	Unit Cost	Total	Comment
General Items	15	EA	$ 2,500	$ 37,500	Minor Change SPCC Plan, Property Restoration, Mobilization, Obstruction Removal, Landscaping, Erosion Control per Ginder Pump from Gorst Collection System Improvements Bid Tab adjusted to 2015 dollars
Grinder Pumps	15	EA	$ 9,000	$ 135,000	From Gorst Bid Tab adjusted to 2015 dollars
PE LPS Main 1.25 In. Diam.	3000	LF	$ 20	$ 60,000	200 LF per grinder pump, Unit Cost from bid tab
Excavation and Restoration	15	EA	$ 1,000	$ 15,000	25 CY Excavation and Gravel Backfill per grinder pump
Asphalt Replacement	75	SY	$ 110	$ 8,250	5 SY of pavement restoration per lateral, Tabula unit cost
Traffic Control	120	HRS	$ 110	$ 13,200	8 hrs of traffic control per grinder pump, Tabula unit cost
Upland Sewer Wet Tap	15	EA	$ 2,750	$ 41,250	Pipe Repair (Romac quote) and corp stop etc (Speer Taps)
Shoring and Dewatering	30	EA	$ 1,000	$ 30,000	Per beach main lateral and ginder pump
10-inch Force main	3500	LF	$ 185	$ 647,500	Bid Tabs from Gorst Improvements adjusted to 2015 dollars, incl excation, backfill, and restoration
Remove laterals	15	EA	$ 2,000	$ 30,000	Excavation and native backfill, remove and dispose of lateral
Remove beach main	3200	LF	$ 50	$ 160,000	Estimated from Washington Avenue Sewer Project
			Subtotal	**$ 1,177,700**	
			Construction Contingency (40%)	$ 471,080	
			Subtotal Construction Costs	**$ 1,648,780**	
			Sales Tax (8.7%)	$ 143,500	
			Allied Costs (20%)	$ 329,800	
			Total Project Cost	***$ 2,130,000***	
			Low (-25%)	**$ 1,600,000**	
			High (+50%)	**$ 3,200,000**	

City of Bremerton
Oyster Bay Alternatives TM
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Alternative 2A
Backwater valve program

Item	Quantity	Unit	Unit Cost	Total	Comment
Backwater Valves	1	LS	$ 3,000	$ 3,000	Continue program of notifying property owners that they are required to install backwater valves (per BMC 15.03.120)
			Subtotal	**$ 3,000**	
			Low (-25%)	**$ 2,000**	
			High (+50%)	**$ 5,000**	

City of Bremerton
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Alternative 2B
Install control valve in OB-2

Item	Quantity	Unit	Unit Cost	Total	Comment
Mobilization	1	LS	$ 1,500	$ 1,500	5% of construction cost
Motor Actuators	2	EA	$ 5,000	$ 10,000	Cost of motor actuator delivered to site
Pressure Transducer	1	LS	$ 2,500	$ 2,500	Cost of transducer
Installation	1	LS	$ 12,000	$ 12,000	One week labor for 4 person crew
Electrical I&C Allowance	1	LS	$ 5,000	$ 5,000	Extension of existing on-site power supply and controls to motor actuators
			Subtotal	**$ 31,000**	
			Construction Contingency (40%)	$ 12,400	
			Subtotal Construction Costs	**$ 43,400**	
			Sales Tax (8.7%)	$ 3,800	
			Allied Costs (20%)	$ 8,700	
			Total Project Cost	***$ 56,000***	
			Low (-25%)	**$ 42,000**	
			High (+50%)	**$ 84,000**	

City of Bremerton
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Class 5 Cost Estimate
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Alternative 2C
Install grainder pumps for at-risk properties

Item	Quantity	Unit	Unit Cost	Total	Comment
General Items	21	EA	$ 2,500	$ 52,500	Minor Change SPCC Plan, Property Restoration, Mobilization, Obstruction Removal, Landscaping, Erosion Control per Ginder Pump from Gorst Collection System Improvements Bid Tab adjusted to 2015 dollars
Grinder Pumps	21	EA	$ 9,000	$ 189,000	From Gorst Bid Tab adjusted to 2015 dollars
PE LPS Main 1.25 In. Diam.	5250	LF	$ 20	$ 105,000	250 LF per grinder pump
Lateral Sliplining	21	EA	$ 1,000	$ 21,000	Roto-Rooter Quote for lateral inspection and moderate root removal to install each lateral
Beach Excavation and Restoration	21	EA	$ 500	$ 10,500	10 CY of Excavation including Haul and Gravel Backfill per grinder pump
Wet tap beach main	21	EA	$ 2,750	$ 57,750	Pipe Repair (Romac quote) and corp stop etc (Speer Taps)
Shoring and Dewatering	21	EA	$ 1,000	$ 21,000	Per grinder pump
			Subtotal	**$ 456,750**	
			Construction Contingency (40%)	$ 182,700	
			Subtotal Construction Costs	**$ 639,450**	
			Sales Tax (8.7%)	$ 55,700	
			Allied Costs (20%)	$ 127,900	
			Total Project Cost	***$ 830,000***	
			Low (-25%)	**$ 630,000**	
			High (+50%)	**$ 1,250,000**	

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Alternative 2D
Connect to existing upland gravity sewer and convert beach main to force main

Item	Quantity	Unit	Unit Cost	Total	Comment
General Items	53	EA	$ 2,500	$ 132,500	Minor Change SPCC Plan, Property Restoration, Mobilization, Obstruction Removal, Landscaping, Erosion Control per Ginder Pump from Gorst Collection System Improvements Bid Tab adjusted to 2015 dollars
Grinder Pumps	53	EA	$ 9,000	$ 477,000	From Gorst Bid Tab adjusted to 2015 dollars
PE LPS Main 1.25 In. Diam.	13250	LF	$ 20	$ 265,000	250 LF per grinder pump, Unit Cost from bid tab
Excavation and Restoration	53	EA	$ 1,000	$ 53,000	25 CY Excavation and Gravel Backfill per grinder pump
Asphalt Replacement	265	SY	$ 110	$ 29,150	5 SY of pavement restoration per lateral, Tabula unit cost
Traffic Control	424	HRS	$ 110	$ 46,640	8 hrs of traffic control per grinder pump, Tabula unit cost
Upland Sewer Wet Tap	53	EA	$ 2,750	$ 145,750	Pipe Repair (Romac quote) and corp stop etc (Speer Taps)
Remove and Cap Lateral	53	EA	$ 2,500	$ 132,500	Excavation and native backfill, remove and dispose of lateral, install cap on lateral connection to Beach Main
Shoring and Dewatering	106	EA	$ 1,000	$ 106,000	Per beach main lateral and ginder pump
			Subtotal	**$ 1,387,540**	
			Construction Contingency (40%)	$ 555,016	
			Subtotal Construction Costs	**$ 1,942,556**	
			Sales Tax (8.7%)	$ 169,100	
			Allied Costs (20%)	$ 388,600	
			Total Project Cost	***$ 2,510,000***	
			Low (-25%)	**$ 1,890,000**	
			High (+50%)	**$ 3,770,000**	

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Alternative 2E
Connect to existing upland gravity sewer, install upland force main, and abandon beach main

Item	Quantity	Unit	Unit Cost	Total	Comment
General Items	53	EA	$ 2,500	$ 132,500	Minor Change SPCC Plan, Property Restoration, Mobilization, Obstruction Removal, Landscaping, Erosion Control per Ginder Pump from Gorst Collection System Improvements Bid Tab adjusted to 2015 dollars
Grinder Pumps	53	EA	$ 9,000	$ 477,000	From Gorst Bid Tab adjusted to 2015 dollars
PE LPS Main 1.25 In. Diam.	13250	LF	$ 20	$ 265,000	250 LF per grinder pump, Unit Cost from bid tab
Excavation and Restoration	53	EA	$ 1,000	$ 53,000	25 CY Excavation and Gravel Backfill per grinder pump
Asphalt Replacement	265	SY	$ 110	$ 29,150	5 SY of pavement restoration per lateral, Tabula unit cost
Traffic Control	424	HRS	$ 110	$ 46,640	8 hrs of traffic control per grinder pump, Tabula unit cost
Upland Sewer Wet Tap	53	EA	$ 2,750	$ 145,750	Pipe Repair (Romac quote) and corp stop etc (Speer Taps)
Shoring and Dewatering	98	EA	$ 1,000	$ 98,000	Per beach main lateral and ginder pump
12-inch Force main	4800	LF	$ 200	$ 960,000	Bid Tabs from Gorst Improvements adjusted to 2015 dollars
Fill and Abandon Beach Main	3700	LF	$ 10	$ 37,000	Estimate to fill and abandon from Seattle Seawall Improvements
Remove and Cap Lateral	53	EA	$ 2,500	$ 132,500	Excavation and native backfill, remove and dispose of lateral, install cap on lateral connection to Beach Main
DNR Leasing	1	LS	$ 50,000	$ 50,000	Estimate of DNR lease costs related to abandoned utilities in the beach. City to verify.
Replace Pumps	1	LS	$ 100,000	$ 100,000	$80,000 for two 72 HP pumps and appurtenances plus $20,000 installation
			Subtotal	**$ 2,526,540**	
			Construction Contingency (40%)	$ 1,010,616	
			Subtotal Construction Costs	**$ 3,537,156**	
			Sales Tax (8.7%)	$ 307,800	
			Allied Costs (20%)	$ 707,500	
			Total Project Cost	***$ 4,560,000***	
			Low (-25%)	**$ 3,420,000**	
			High (+50%)	**$ 6,840,000**	

City of Bremerton
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Alternative 2F
Connect to existing upland gravity sewer, install upland force main, and remove beach main

Item	Quantity	Unit	Unit Cost	Total	Comment
General Items	53	EA	$ 2,500	$ 132,500	Minor Change SPCC Plan, Property Restoration, Mobilization, Obstruction Removal, Landscaping, Erosion Control per Ginder Pump from Gorst Collection System Improvements Bid Tab adjusted to 2015 dollars
Grinder Pumps	53	EA	$ 9,000	$ 477,000	From Gorst Bid Tab adjusted to 2015 dollars
PE LPS Main 1.25 In. Diam.	13250	LF	$ 20	$ 265,000	250 LF per grinder pump, Unit Cost from bid tab
Excavation and Restoration	53	EA	$ 1,000	$ 53,000	25 CY Excavation and Gravel Backfill per grinder pump
Asphalt Replacement	265	SY	$ 110	$ 29,150	5 SY of pavement restoration per lateral, Tabula unit cost
Traffic Control	424	HRS	$ 110	$ 46,640	8 hrs of traffic control per grinder pump, Tabula unit cost
Upland Sewer Wet Tap	53	EA	$ 2,750	$ 145,750	Pipe Repair (Romac quote) and corp stop etc (Speer Taps)
Shoring and Dewatering	98	EA	$ 1,000	$ 98,000	Per beach main lateral and ginder pump
12-inch Force main	4800	LF	$ 200	$ 960,000	Bid Tabs from Gorst Improvements adjusted to 2015 dollars
Remove beach main	3700	LF	$ 50	$ 185,000	Estimated from Washington Avenue Sewer Project
Remove laterals	53	EA	$ 2,000	$ 106,000	Excavation and native backfill, remove and dispose of lateral
Replace Pumps	1	LS	$ 100,000	$ 100,000	$80,000 for two 72 HP pumps and appurtenances plus $20,000 installation
			Subtotal	**$ 2,598,040**	
			Construction Contingency (40%)	$ 1,039,216	
			Subtotal Construction Costs	**$ 3,637,256**	
			Sales Tax (8.7%)	$ 316,500	
			Allied Costs (20%)	$ 727,500	
			Total Project Cost	***$ 4,690,000***	
			Low (-25%)	**$ 3,520,000**	
			High (+50%)	**$ 7,040,000**	

City of Bremerton
Oyster Bay Alternatives TM
Class 5 Cost Estimate
September 2016

Alternative 3A
Backwater valve program

Item	Quantity	Unit	Unit Cost	Total	Comment
Backwater Valves	1	LS	$ 3,000	$ 3,000	Continue program of notifying property owners that they are required to install backwater valves (per BMC 15.03.120)
			Subtotal	**$ 3,000**	
			Low (-25%)	**$ 2,000**	
			High (+50%)	**$ 5,000**	

City of Bremerton
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Alternative 3B
Install grinder pumps for at-risk properties

Item	Quantity	Unit	Unit Cost	Total	Comment
General Items	7	EA	$ 2,500	$ 17,500	Minor Change SPCC Plan, Property Restoration, Mobilization, Obstruction Removal, Landscaping, Erosion Control per Ginder Pump from Gorst Collection System Improvements Bid Tab adjusted to 2015 dollars
Grinder Pumps	7	EA	$ 9,000	$ 63,000	From Gorst Bid Tab adjusted to 2015 dollars
PE LPS Main 1.25 In. Diam.	1750	LF	$ 20	$ 35,000	250 LF per grinder pump
Lateral Sliplining	7	EA	$ 1,000	$ 7,000	Roto-Rooter Quote for lateral inspection and moderate root removal to install each lateral
Beach Excavation and Restoration	7	EA	$ 500	$ 3,500	10 CY of Excavation including Haul and Gravel Backfill per grinder pump
Wet tap beach main	7	EA	$ 2,750	$ 19,250	Pipe Repair (Romac quote) and corp stop etc (Speer Taps)
Shoring and Dewatering	7	EA	$ 1,000	$ 7,000	Per grinder pump
			Subtotal	**$ 152,250**	
			Construction Contingency (40%)	$ 60,900	
			Subtotal Construction Costs	**$ 213,150**	
			Sales Tax (8.7%)	$ 18,600	
			Allied Costs (20%)	$ 42,700	
			Total Project Cost	***$ 280,000***	
			Low (-25%)	**$ 210,000**	
			High (+50%)	**$ 420,000**	

City of Bremerton
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Alternative 3C
Connect to existing upland gravity sewer, install upland force main, and abandon beach main

Item	Quantity	Unit	Unit Cost	Total	Comment
General Items	17	EA	$ 2,500	$ 42,500	Minor Change SPCC Plan, Property Restoration, Mobilization, Obstruction Removal, Landscaping, Erosion Control per Ginder Pump from Gorst Collection System Improvements Bid Tab adjusted to 2015 dollars
Grinder Pumps	17	EA	$ 9,000	$ 153,000	From Gorst Bid Tab adjusted to 2015 dollars
PE LPS Main 1.25 In. Diam.	4250	LF	$ 20	$ 85,000	250 LF per grinder pump, Unit Cost from bid tab
Excavation and Restoration	17	EA	$ 1,000	$ 17,000	25 CY Excavation and Gravel Backfill per grinder pump
Asphalt Replacement	85	SY	$ 110	$ 9,350	5 SY of pavement restoration per lateral, Tabula unit cost
Traffic Control	136	HRS	$ 110	$ 14,960	8 hrs of traffic control per grinder pump, Tabula unit cost
Upland Sewer Wet Tap	17	EA	$ 2,750	$ 46,750	Pipe Repair (Romac quote) and corp stop etc (Speer Taps)
Shoring and Dewatering	34	EA	$ 1,000	$ 34,000	Per beach main lateral and ginder pump
8-inch Force main	1500	LF	$ 175	$ 262,500	Bid Tabs from Gorst Improvements adjusted to 2015 dollars
Fill and Abandon Beach Main	1100	LF	$ 10	$ 11,000	Estimate to fill and abandon from Seattle Seawall Improvements
Remove and Cap Lateral	17	EA	$ 2,500	$ 42,500	Excavation and native backfill, remove and dispose of lateral, install cap on lateral connection to Beach Main
DNR Leasing	1	LS	$ 50,000	$ 50,000	Estimate of DNR lease costs
Replace Pumps	1	LS	$ 50,000	$ 50,000	$35,000 for two 15 HP pumps and appurtenances plus $15,000 installation
			Subtotal	**$ 818,560**	
			Construction Contingency (40%)	$ 327,424	
			Subtotal Construction Costs	**$ 1,145,984**	
			Sales Tax (8.7%)	$ 99,800	
			Allied Costs (20%)	$ 229,200	
			Total Project Cost	***$ 1,480,000***	
			Low (-25%)	**$ 1,110,000**	
			High (+50%)	**$ 2,220,000**	

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Alternative 3D
Connect to existing upland gravity sewer, install upland force main, and remove beach main

Item	Quantity	Unit	Unit Cost	Total	Comment
General Items	17	EA	$ 2,500	$ 42,500	Minor Change SPCC Plan, Property Restoration, Mobilization, Obstruction Removal, Landscaping, Erosion Control per Ginder Pump from Gorst Collection System Improvements Bid Tab adjusted to 2015 dollars
Grinder Pumps	17	EA	$ 9,000	$ 153,000	From Gorst Bid Tab adjusted to 2015 dollars
PE LPS Main 1.25 In. Diam.	4250	LF	$ 20	$ 85,000	250 LF per grinder pump, Unit Cost from bid tab
Excavation and Restoration	17	EA	$ 1,000	$ 17,000	25 CY Excavation and Gravel Backfill per grinder pump
Asphalt Replacement	85	SY	$ 110	$ 9,350	5 SY of pavement restoration per lateral, Tabula unit cost
Traffic Control	136	HRS	$ 110	$ 14,960	8 hrs of traffic control per grinder pump, Tabula unit cost
Upland Sewer Wet Tap	17	EA	$ 2,750	$ 46,750	Pipe Repair (Romac quote) and corp stop etc (Speer Taps)
Shoring and Dewatering	34	EA	$ 1,000	$ 34,000	Per beach main lateral and ginder pump
8-inch Force main	1500	LF	$ 175	$ 262,500	Bid Tabs from Gorst Improvements adjusted to 2015 dollars
Remove beach main	1100	LF	$ 50	$ 55,000	Estimated from Washington Avenue Sewer Project
Remove laterals	17	EA	$ 2,000	$ 34,000	Excavation and native backfill, remove and dispose of lateral
Replace Pumps	1	LS	$ 50,000	$ 50,000	$35,000 for two 15 HP pumps and appurtenances plus $15,000 installation
			Subtotal	**$ 804,060**	
			Construction Contingency (40%)	$ 321,624	
			Subtotal Construction Costs	**$ 1,125,684**	
			Sales Tax (8.7%)	$ 98,000	
			Allied Costs (20%)	$ 225,200	
			Total Project Cost	***$ 1,450,000***	
			Low (-25%)	**$ 1,090,000**	
			High (+50%)	**$ 2,180,000**	

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Appendix J: SEPA Determination Letter and Checklist

This Appendix includes the following:

- SEPA Determination Letter
- SEPA Checklist
- Public Comments and Response on Draft 2024 WWCP Update

City of Bremerton
Department of Community Development

DETERMINATION OF NONSIGNIFICANCE

PROPOSAL: The 2024 Wastewater Comprehensive Plan Update provides a 20-year plan for maintaining, improving, and increasing the capacity of the sewer collection and treatment systems within the City's sewer service area.

APPLICANT: City of Bremerton Department of Public Works & Utilities

LOCATION: The geographical area covered includes the entire City limits, and also areas within the established Urban Growth Areas that are within the City's sewer service area.

FILE NUMBER: BP25 00220

The lead agency for this proposal has determined that it does not have a probable significant adverse impact on the environment. An environmental impact statement (EIS) is not required under RCW 43.21C.030(2)(c). This decision was made after review of a completed environmental checklist and other information on file with the lead agency. This information is available to the public on request. This DNS is issued under 197-11-340(2) WAC; the lead agency will not act on this proposal for 14 days from the date below.

RESPONSIBLE OFFICIAL: **Andrea L. Spencer, Director**
Department of Community Development
City of Bremerton
345 6th Street, Suite 600
Bremerton, WA 98337

STAFF CONTACT: Kelli Lambert, (360) 473-5245

COMMENT PERIOD: **June 6 – 20, 2025**

DATE OF ISSUE: **June 6, 2025**

Andrea L. Spencer Digitally signed by Andrea L. Spencer
Date: 2025.06.06 08:34:06 -07'00'

Andrea L. Spencer, Responsible Official

NOTE: Pursuant to RCW 43.21C.075 and City of Bremerton environmental regulations (BMC Chapter 20.04.210), decisions of the Responsible Official may be appealed. Appeals must be filed with the appropriate fees at the Department of Community Development located at the Bremerton Government Center, 345 Sixth Street, Bremerton, 98337.

NOTE: The issuance of this DNS does not constitute project approval. The applicant must comply with all other applicable requirements of the City of Bremerton and the State of Washington.

DEPARTMENT OF COMMUNITY DEVELOPMENT

NOTICE OF APPLICATION AND SEPA DETERMINATION

PROPOSAL: The 2024 Wastewater Comprehensive Plan Update provides a 20-year plan for maintaining, improving, and increasing the capacity of the sewer collection and treatment systems within the City's sewer service area. The geographical area covered includes the entire City limits, and also areas within the established Urban Growth Areas that are within the City's sewer service area.

LOCATION: Citywide, and UGAs

APPLICANT: City of Bremerton Department of Public Works & Utilities

DATE OF APPLICATION: 5/28/2025

NOTICE OF COMPLETENESS: 6/2/2025

NOTICE OF APPLICATION: 6/6/2025

FILE NUMBER: BP25 00220

EXISTING ENVIRO DOCUMENTS: Environmental Checklist, Draft 2024 Wastewater Comprehensive Plan Update

DEADLINE FOR COMMENTS: June 20, 2025 by 5:00 P.M.

The City of Bremerton has received application for the proposal described above. Consistent with the provisions of Bremerton Municipal Code, a fourteen (14) day comment period will be utilized to obtain comments on the Notice of Application.

The lead agency for this proposal has determined that it does not have a probable significant adverse impact on the environment. An environmental impact statement (EIS) is not required under RCW 43.21C.030(2)(c). This decision was made after review of a completed environmental checklist and other information on file with the lead agency. This information is available to the public on request. This DNS is issued under 197-11-340(2); the lead agency will not act on this proposal for 14 days from the date below.

Any person may submit written comments on the application by the time and date above. Any person may also request to receive a copy of the decision once made, and any appeal rights. Please direct any questions, comments or requests for additional information to the Department of Community Development, 345 Sixth Street, Suite 100, Bremerton, WA 98337-1873; or Kelli Lambert, Senior Planner, Kelli.Lambert@ci.bremerton.wa.us or (360) 473-5245.

Distribution:

Suquamish Tribe
Port Gamble S'Klallam Tribe
Kitsap Public Health District
Kitsap County Assessor
Kitsap County DCD
US Navy
Cascade Natural Gas
City of Port Orchard
Kitsap Transit
Bremerton School District
Central Kitsap School District
Army Corps of Engineers
Port of Bremerton
Puget Sound Clean Air Agency
Puget Sound Energy
WA Department of Ecology
WA Department of Fish & Wildlife
WA Department of Historic Preservation
WA Department of Natural Resources
WA Department of Commerce SEPA Review Team
Waste Management
Washington State Department of Transportation
Energy Facility Site Evaluation Council

SEPA[1] Environmental Checklist

Purpose of checklist

Governmental agencies use this checklist to help determine whether the environmental impacts of your proposal are significant. This information is also helpful to determine if available avoidance, minimization, or compensatory mitigation measures will address the probable significant impacts or if an environmental impact statement will be prepared to further analyze the proposal.

Instructions for applicants

This environmental checklist asks you to describe some basic information about your proposal. Please answer each question accurately and carefully, to the best of your knowledge. You may need to consult with an agency specialist or private consultant for some questions. **You may use "not applicable" or "does not apply" only when you can explain why it does not apply and not when the answer is unknown.** You may also attach or incorporate by reference additional studies reports. Complete and accurate answers to these questions often avoid delays with the SEPA process as well as later in the decision-making process.

The checklist questions apply to **all parts of your proposal**, even if you plan to do them over a period of time or on different parcels of land. Attach any additional information that will help describe your proposal or its environmental effects. The agency to which you submit this checklist may ask you to explain your answers or provide additional information reasonably related to determining if there may be significant adverse impact.

Instructions for lead agencies

Please adjust the format of this template as needed. Additional information may be necessary to evaluate the existing environment, all interrelated aspects of the proposal and an analysis of adverse impacts. The checklist is considered the first but not necessarily the only source of information needed to make an adequate threshold determination. Once a threshold determination is made, the lead agency is responsible for the completeness and accuracy of the checklist and other supporting documents.

Use of checklist for nonproject proposals

For nonproject proposals (such as ordinances, regulations, plans and programs), complete the applicable parts of sections A and B, plus the Supplemental Sheet for Nonproject Actions (Part D). Please completely answer all questions that apply and note that the words "project," "applicant," and "property or site" should be read as "proposal," "proponent," and "affected geographic area," respectively. The lead agency may exclude (for non-projects) questions in "Part B: Environmental Elements" that do not contribute meaningfully to the analysis of the proposal.

[1] https://ecology.wa.gov/Regulations-Permits/SEPA/Environmental-review/SEPA-guidance/Checklist-guidance

A.Background

Find help answering background questions[2]

1. **Name of proposed project, if applicable:**

   City of Bremerton – 2024 Wastewater Comprehensive Plan Update. This is a planning document and is a non-project proposal. *The document will be referred to as the 2024 WWCP for the remainder of this checklist.*

2. **Name of applicant:**

   City of Bremerton, Department of Public Works and Utilities

3. **Address and phone number of applicant and contact person:**

   William Davis, P.E.

   City of Bremerton

   Engineering Division

   345 6th Street, Suite 100

   Bremerton, WA 98337

   Ph. 360-473-2312

4. **Date checklist prepared:**

   May 15, 2025

5. **Agency requesting checklist:**

   City of Bremerton, Department of Community Development

6. **Proposed timing of schedule (including phasing, if applicable):**

   The 2024 WWCP is an update to the previous 2014 WWCP and uses a 20-year planning horizon from 2025 to 2044.

7. **Do you have any plans for future additions, expansion, or further activity related to or connected with this proposal? If yes, explain.**

   Yes. The 2024 WWCP is a working document that is edited and amended as needed. The Capital Improvement Plan (CIP) is included and may be adjusted on an annual basis in reaction to growth in specific geographic areas or unforeseen capital needs. The City has been updating the 2024 WWCP in entirety every 10 years, with the next update anticipated in 2034.

8. **List any environmental information you know about that has been prepared, or will be prepared, directly related to this proposal.**

[2] https://ecology.wa.gov/Regulations-Permits/SEPA/Environmental-review/SEPA-guidance/SEPA-checklist-guidance/SEPA-Checklist-Section-A-Background

No specific environmental information has been prepared for 2024 WWCP. SEPA reviews and environmental permitting will be done during the pre-design or design phase of individual projects.

9. **Do you know whether applications are pending for governmental approvals of other proposals directly affecting the property covered by your proposal? If yes, explain.**

   Not applicable for the 2024 WWCP but will be evaluated on a project-specific basis at the time of the project design.

10. **List any government approvals or permits that will be needed for your proposal, if known.**

    The 2024 WWCP is currently being reviewed and must be approved by the Department of Ecology in accordance with Washington Administrative Code (WAC) 173-240-050. The approved plan will be adopted by Bremerton City Council.

11. **Give brief, complete description of your proposal, including the proposed uses and the size of the project and site. There are several questions later in this checklist that ask you to describe certain aspects of your proposal. You do not need to repeat those answers on this page. (Lead agencies may modify this form to include additional specific information on project description.)**

    The 2024 WWCP, also referred to as a general sewer plan in WAC 173-240-020, provides a 20-year plan for maintaining, improving, and increasing the capacity of the sewer collection and treatment systems within the City's sewer service area. The plan was prepared by the City's consultant Kennedy Jenks. The plan has ten sections (chapters), which are described below. For individual projects listed in the 20-year CIP in Section 8, high-level cost estimates, implementation year, and project descriptions are provided.

    Section 1: Executive Summary – A brief summary of the entire document

    Section 2: Introduction – Provides a summary of relevant background information, regulatory requirements, NDPES permit compliance status, and identifies related documents and sources of planning information.

    Section 3: Service Area and System Description – Describes the characteristics of the surrounding vicinity, the sewer service area, and the existing wastewater infrastructure.

    Section 4: Business Risk and Vulnerability Assessment (BRVA) – Provides an evaluation of treatment unit processes and collection system infrastructure to identify vulnerabilities and failure modes. The data was gathered and conclusions were developed based on several workshops with the Kennedy Jenks, City O&M, and Engineering staff, as well as site visits to critical infrastructure.

    Section 5: Historical and Projected Flows and Loads – Discussion of current and projected future population, land use, sewer flows, loads, and their impacts on the utility within the sewer service area.

Section 6: Collection System Evaluation – Evaluates the collection system based on hydraulic modeling using AquaTwin Sewer modeling software. Model development, calibration, and results (current and future conditions) are discussed. The population, flows, and loading data presented in Section 5 are used in the model. The model will continue to be used by the City and updated and calibrated regularly.

Section 7: Treatment Facilities Evaluation – Includes a description of the liquid and solid stream treatment processes at the Westside Wastewater Treatment Plant (WWTP) and provides a hydraulic and biological evaluation of these processes. The City's Eastside Treatment Plant (ETP) is not evaluated.

Section 8: Capital Improvement Program – Describes the Capital Improvement Program (CIP) for the WWTP and the wastewater collection system, including recommended improvements, cost estimates, rate development and funding sources.

Section 9: Operation and Maintenance – Describes the operation and maintenance aspects of the City's wastewater collection and treatment systems. Topics addressed include responsibility and authority, standard system operations, routine and preventive maintenance, current and future staffing requirements, new construction, safety measures, and emergency response protocols.

Section 10: Implementation – Discusses requirements that the plan must comply with Ecology requirements for a general sewer plan as described in the WAC, Kitsap County growth requirements, and go through a SEPA review process for the overall plan, noting that project-specific environmental review (i.e. NEPA/SEPA) is also expected to be conducted, with costs borne by the developer. The plan will be adopted by the Bremerton City Council prior to implementation.

Appendix A: NPDES Permit Sheet and Fact Sheet – Includes the City's NDPES Permit (WA0029289) and Fact Sheet

Appendix B: Basin Plans – These basin plans were developed for the 2014 WWCP Update and have not been updated for the 2024 WWCP. Some of the projects listed are currently outside of City limits but within the City's sewer service area and in Urban Growth Areas (UGAs). The City is required by the Growth Management Act to provide a plan for sewering designated UGAs.

Appendix C: Pump Stations – A table showing all the City's municipal pump stations and relevant information. This table does not include any grinder pump systems.

Appendix D: Treatment System Modeling Results – WWTP modeling results

Appendix E: Interagency Agreements – Agreements between Bremerton and the U.S. Navy and Kitsap County for the City to provide sewer service for these agencies

Appendix F: Outfall Evaluation Report – A 2018 report that evaluated the outfall at the City's WWTP.

Appendix G: Crosstown Pipeline Memorandum – A technical memorandum prepared by Kennedy Jenks as part of this update, which evaluates alternatives for providing redundancy for a critical section of the City's Crosstown from 9th and Montgomery to the WWTP

Appendix H: PSIC Memorandum – A technical memorandum prepared by Kennedy Jenks as part of this update, which evaluates alternatives for providing sewer service to Puget Sound Industrial Center (PSIC)

Appendix I: Oyster Bay Sewerage Pre-design Alternatives – A 2016 technical memorandum prepared by HDR which describes and evaluates alternatives for decommissioning beach sewers and installing an upland sewer system for Oyster and Ostrich Bays.

12. Location of the proposal. Give sufficient information for a person to understand the precise location of your proposed project, including a street address, if any, and section, township, and range, if known. If a proposal would occur over a range of area, provide the range or boundaries of the site(s). Provide a legal description, site plan, vicinity map, and topographic map, if reasonably available. While you should submit any plans required by the agency, you are not required to duplicate maps or detailed plans submitted with any permit applications related to this checklist.

The geographical area covered includes the entire city limits and also areas within the established Urban Growth Areas that have been assigned to the City and are located within the City's sewer service area. Refer to attached Sewer Service Area map at the end of this document, which is Figure 3-2 from the 2024 WWCP.

B.Environmental Elements

1. Earth

Find help answering earth questions[3]

a. General description of the site:

Circle or highlight one: Flat, rolling, hilly, steep slopes, mountainous, other:

b. What is the steepest slope on the site (approximate percent slope)?

Approximately 100 percent at high bank waterfront bluffs.

[3] https://ecology.wa.gov/regulations-permits/sepa/environmental-review/sepa-guidance/sepa-checklist-guidance/sepa-checklist-section-b-environmental-elements/environmental-elements-earth

c. What general types of soils are found on the site (for example, clay, sand, gravel, peat, muck)? If you know the classification of agricultural soils, specify them, and note any agricultural land of long-term commercial significance and whether the proposal results in removing any of these soils.

As the project includes the entire City limits and Sewer Service Area, many differing soil conditions are applicable.

d. Are there surface indications or history of unstable soils in the immediate vicinity? If so, describe.

Unstable soils are identified in the City Critical Areas mapping. Generally, installing sewer infrastructure in critical areas subject to unstable soils is avoided.

e. Describe the purpose, type, total area, and approximate quantities and total affected area of any filling, excavation, and grading proposed. Indicate source of fill.

Not applicable for the 2024 WWCP but will evaluated on a project-specific basis at the time of the project design.

f. Could erosion occur because of clearing, construction, or use? If so, generally describe.

Possibly. Potential erosion would only be associated with specific projects identified in the CIP. Those projects will require erosion control BMP's to be implemented as appropriate.

g. About what percent of the site will be covered with impervious surfaces after project construction (for example, asphalt or buildings)?

Not applicable for the 2024 WWCP but will evaluated on a project-specific basis at the time of the project design.

Proposed measures to reduce or control erosion, or other impacts to the earth, if any.

An erosion and sediment control plan will be developed for specific projects identified in the CIP as appropriate.

2. Air

Find help answering air questions[4]

a. What types of emissions to the air would result from the proposal during construction, operation, and maintenance when the project is completed? If any, generally describe and give approximate quantities if known.

The City operates and maintains odor control facilities out in the system and within the Wastewater Treatment Plant (WWTP). These facilities require ongoing maintenance and CIP improvements which are covered in the 2024 WWCP.

[4] https://ecology.wa.gov/Regulations-Permits/SEPA/Environmental-review/SEPA-guidance/SEPA-checklist-guidance/SEPA-Checklist-Section-B-Environmental-elements/Environmental-elements-Air

b. Are there any off-site sources of emissions or odor that may affect your proposal? If so, generally describe.

There are no off-site sources of emissions that would affect this proposal.

c. Proposed measures to reduce or control emissions or other impacts to air, if any:

The 2024 WWCP includes measures to ensure that odor control facilities are properly operated and maintained. These measures include adequate staffing for maintenance and upgrades to the existing system which are included in specific line items in the CIP.

3. Water

Find help answering water questions[5]

a. Surface:

Find help answering surface water questions[6]

1. Is there any surface water body on or in the immediate vicinity of the site (including year-round and seasonal streams, saltwater, lakes, ponds, wetlands)? If yes, describe type and provide names. If appropriate, state what stream or river it flows into.

The City has a number of riparian and marine areas within the Sewer Service Area. These are described in Section 3 of the 2024 WWCP.

The City maintains CSO Outfalls that discharge to both Sinclair Inlet and the Port Washington Narrows (which connects Dyes Inlet to Port Orchard Bay), both of which are tributary to Puget Sound.

2. Will the project require any work over, in, or adjacent to (within 200 feet) the described waters? If yes, please describe and attach available plans.

Yes, for example, outfall replacement. These projects will undergo environmental review on an individual project basis.

3. Estimate the amount of fill and dredge material that would be placed in or removed from surface water or wetlands and indicate the area of the site that would be affected. Indicate the source of fill material.

Not applicable for the 2024 WWCP but will evaluated on a project-specific basis at the time of the project design.

4. Will the proposal require surface water withdrawals or diversions? Give a general description, purpose, and approximate quantities if known.

[5] https://ecology.wa.gov/Regulations-Permits/SEPA/Environmental-review/SEPA-guidance/SEPA-checklist-guidance/SEPA-Checklist-Section-B-Environmental-elements/Environmental-elements-3-Water

[6] https://ecology.wa.gov/Regulations-Permits/SEPA/Environmental-review/SEPA-guidance/SEPA-checklist-guidance/SEPA-Checklist-Section-B-Environmental-elements/Environmental-elements-3-Water/Environmental-elements-Surface-water

Not applicable for the 2024 WWCP but will evaluated on a project-specific basis at the time of the project design.

5. **Does the proposal lie within a 100-year floodplain? If so, note location on the site plan.**

   There is City sewer infrastructure that does lie within the 100 year floodplain. Any proposed projects that are identified in the CIP and require work within the 100 year floodplain will be required to meet all local, state, and federal requirements.

6. **Does the proposal involve any discharges of waste materials to surface waters? If so, describe the type of waste and anticipated volume of discharge.**

   None anticipated. The City of Bremerton sanitary sewer system includes combined sewage basins which include Combined Sewer Overflow (CSO) outfalls. The City has fully implemented its CSO Reduction Plan and is currently in compliance with state and federal regulations related to CSO discharges to the Puget Sound.

b. Ground:

Find help answering groundwater questions[7]

1. **Will groundwater be withdrawn from a well for drinking water or other purposes? If so, give a general description of the well, proposed uses and approximate quantities withdrawn from the well. Will water be discharged to groundwater? Give a general description, purpose, and approximate quantities if known.**

   Not applicable as groundwater withdrawal is not related to the City's wastewater system.

2. **Describe waste material that will be discharged into the ground from septic tanks or other sources, if any (domestic sewage; industrial, containing the following chemicals…; agricultural; etc.). Describe the general size of the system, the number of such systems, the number of houses to be served (if applicable), or the number of animals or humans the system(s) are expected to serve.**

   Unknown at this time.

c. Water Runoff (including stormwater):

1. **Describe the source of runoff (including stormwater) and method of collection and disposal, if any (include quantities, if known). Where will this water flow? Will this water flow into other waters? If so, describe.**

   As stated previously, the City operates and maintains a number of CSO outfalls that can release combine sewer flow to the Puget Sound. This 2024 WWCP does not result in an increase in these flows but recognizes that system capacity is predicated on the system relieving during extreme storm events as permitted in accordance

[7] https://ecology.wa.gov/Regulations-Permits/SEPA/Environmental-review/SEPA-guidance/SEPA-checklist-guidance/SEPA-Checklist-Section-B-Environmental-elements/Environmental-elements-3-Water/Environmental-elements-Groundwater

with NPDES requirements. Stormwater Pollution Prevention and Erosion and Sedimentation Control Plans will be developed on a project-specific basis.

2. **Could waste materials enter ground or surface waters? If so, generally describe.**

   Not applicable for the 2024 WWCP but will be evaluated on a project-specific basis at the time of the project design.

3. **Does the proposal alter or otherwise affect drainage patterns in the vicinity of the site? If so, describe.**

   Not applicable for the 2024 WWCP but will be evaluated on a project-specific basis at the time of the project design.

d. Proposed measures to reduce or control surface, ground, and runoff water, and drainage pattern impacts, if any:

Not applicable for the 2024 WWCP but control of stormwater and runoff will be evaluated on a project-specific basis at the time of the project design.

4. Plants

Find help answering plants questions

a. Check the types of vegetation found on the site:

☒ **deciduous tree: alder, maple, aspen, other**

☒ **evergreen tree: fir, cedar, pine, other**

☒ **shrubs**

☒ **grass**

☒ **pasture**

☐ **crop or grain**

☐ **orchards, vineyards, or other permanent crops.**

☒ **wet soil plants: cattail, buttercup, bullrush, skunk cabbage, other**

☒ **water plants: water lily, eelgrass, milfoil, other**

☐ **other types of vegetation**

b. What kind and amount of vegetation will be removed or altered?

Not applicable for the 2024 WWCP and will be evaluated on a project-specific basis at the time of the project design.

c. List threatened and endangered species known to be on or near the site.

Not applicable for the 2024 WWCP and will be evaluated on a project-specific basis at the time of the project design.

d. Proposed landscaping, use of native plants, or other measures to preserve or enhance vegetation on the site, if any.

Not applicable for the 2024 WWCP and will be evaluated on a project-specific basis at the time of the project design.

e. List all noxious weeds and invasive species known to be on or near the site.

Not applicable for the 2024 WWCP and will be evaluated on a project-specific basis at the time of the project design.

5. Animals

Find help answering animal questions[8]

a. List any birds and other animals that have been observed on or near the site or are known to be on or near the site.

Examples include:

- **Birds: hawk, heron, eagle, songbirds, other: shorebirds**
- **Mammals: deer, bear, elk, beaver, other:**
- **Fish: bass, salmon, trout, herring, shellfish, other:**

b. List any threatened and endangered species known to be on or near the site.

Based on information provided by the U.S. Fish and Wildlife Service (USFWS) and the National Marine Fisheries Service (NMFS), the following ESA-listed species could occur within the action area (one-quarter mile):

- Chinook salmon (Oncorhynchus tshawytscha) Puget Sound Evolutionarily Significant Unit (ESU) (Threatened)
- Steelhead trout (O. mykiss) Puget Sound ESU (Threatened)
- Bull trout (Salvelinus confluentus) Coastal/Puget Sound Distinct
- Population Segment (DPS) (Threatened)
- Eulachon (Thaleichthys pacificus) Southern DPS (Threatened)
- Bocaccio (Sebastes paucispinis) Puget Sound/Georgia Basin DPS (Endangered)
- Canary rockfish (S. pinniger) Puget Sound/Georgia Basin DPS (Threatened)
- Yelloweye rockfish (S. ruberrimus) Puget Sound/Georgia Basin DPS (Threatened)
- Marbled murrelet (Brachyranphus marmoratus) (Threatened)
- Killer whale (Orcinus orca) Southern Resident DPS (Endangered)
- Gray whale (Eschrichtius robustus)(Endangered)

[8] https://ecology.wa.gov/Regulations-Permits/SEPA/Environmental-review/SEPA-guidance/SEPA-checklist-guidance/SEPA-Checklist-Section-B-Environmental-elements/Environmental-elements-5-Animals

- Humpback whale (Megaptera novaeangliae) (Endangered)
- Steller sea lion (Eumetopiasjubatus) (Threatened)

Whales, Steller sea lions and bull trout, if present, only occur rarely in the action area.

c. Is the site part of a migration route? If so, explain.

All areas within the Puget Sound lowlands are within the Pacific Migratory Flyway.

d. Proposed measures to preserve or enhance wildlife, if any.

Not applicable for the 2024 WWCP and will be evaluated on a project-specific basis at the time of the project design.

e. List any invasive animal species known to be on or near the site.

Not applicable for the 2024 WWCP and will be evaluated on a project-specific basis at the time of the project design.

6. Energy and natural resources

Find help answering energy and natural resource questions[9]

a. What kinds of energy (electric, natural gas, oil, wood stove, solar) will be used to meet the completed project's energy needs? Describe whether it will be used for heating, manufacturing, etc.

Not applicable for the 2024 WWCP and will be evaluated on a project-specific basis at the time of the project design.

Would your project affect the potential use of solar energy by adjacent properties? If so, generally describe.

Not applicable for the 2024 WWCP and will be evaluated on a project-specific basis at the time of the project design.

b. What kinds of energy conservation features are included in the plans of this proposal? List other proposed measures to reduce or control energy impacts, if any.

Not applicable for the 2024 WWCP and will be evaluated on a project-specific basis at the time of the project design.

7. Environmental health

Find help with answering environmental health questions[10]

a. Are there any environmental health hazards, including exposure to toxic chemicals, risk of fire and explosion, spill, or hazardous waste, that could occur because of this proposal? If so, describe.

[9] https://ecology.wa.gov/Regulations-Permits/SEPA/Environmental-review/SEPA-guidance/SEPA-checklist-guidance/SEPA-Checklist-Section-B-Environmental-elements/Environmental-elements-6-Energy-natural-resou
[10] https://ecology.wa.gov/Regulations-Permits/SEPA/Environmental-review/SEPA-guidance/SEPA-checklist-guidance/SEPA-Checklist-Section-B-Environmental-elements/Environmental-elements-7-Environmental-health

Very unlikely, as there are limited environmental health hazards associated with the wastewater system. Sanitary sewer discharges are rare and the City plans and controls for connections that could expose raw sewage to the environment. However, this will need to be evaluated on a project-specific basis at the time of the project design.

1. **Describe any known or possible contamination at the site from present or past uses.**

   Not applicable for the 2024 WWCP and will be evaluated on a project-specific basis at the time of the project design.

2. **Describe existing hazardous chemicals/conditions that might affect project development and design. This includes underground hazardous liquid and gas transmission pipelines located within the project area and in the vicinity.**

   Not applicable for the 2024 WWCP and will be evaluated on a project-specific basis at the time of the project design.

3. **Describe any toxic or hazardous chemicals that might be stored, used, or produced during the project's development or construction, or at any time during the operating life of the project.**

   Not applicable for the 2024 WWCP and will be evaluated on a project-specific basis at the time of the project design.

4. **Describe special emergency services that might be required.**

   Not applicable for the 2024 WWCP and will be evaluated on a project-specific basis at the time of the project design.

5. **Proposed measures to reduce or control environmental health hazards, if any.**

   The primary function of the WWCP Update is to ensure that adequate planning is in place to ensure the continued operation of the wastewater collection and treatment systems, essentially managing the environmental health hazards related to the wastewater system. At the time of the specific project, potential environmental hazards will be evaluated.

b. Noise

What types of noise exist in the area which may affect your project (for example: traffic, equipment, operation, other)?

Not applicable for the 2024 WWCP and will be evaluated on a project-specific basis at the time of the project design.

1. **What types and levels of noise would be created by or associated with the project on a short-term or a long-term basis (for example: traffic, construction, operation, other)? Indicate what hours noise would come from the site)?**

   Not applicable for the 2024 WWCP and will be evaluated on a project-specific basis at the time of the project design.

   Proposed measures to reduce or control noise impacts, if any:

Not applicable for the 2024 WWCP and will be evaluated on a project-specific basis at the time of the project design.

8. Land and shoreline use

Find help answering land and shoreline use questions[11]

a. What is the current use of the site and adjacent properties? Will the proposal affect current land uses on nearby or adjacent properties? If so, describe.

Not applicable for the 2024 WWCP and will be evaluated on a project-specific basis at the time of the project design.

b. Has the project site been used as working farmlands or working forest lands? If so, describe. How much agricultural or forest land of long-term commercial significance will be converted to other uses because of the proposal, if any? If resource lands have not been designated, how many acres in farmland or forest land tax status will be converted to nonfarm or nonforest use?

Not applicable for the 2024 WWCP and will be evaluated on a project-specific basis at the time of the project design.

1. **Will the proposal affect or be affected by surrounding working farm or forest land normal business operations, such as oversize equipment access, the application of pesticides, tilling, and harvesting? If so, how?**

   Not applicable for the 2024 WWCP and will be evaluated on a project-specific basis at the time of the project design.

c. Describe any structures on the site. Will any structures be demolished? If so, what?

Not applicable for the 2024 WWCP and will be evaluated on a project-specific basis at the time of the project design.

d. What is the current zoning classification of the site?

Not applicable for the 2024 WWCP and will be evaluated on a project-specific basis at the time of the project design.

e. What is the current comprehensive plan designation of the site?

Not applicable for the 2024 WWCP and will be evaluated on a project-specific basis at the time of the project design.

f. If applicable, what is the current shoreline master program designation of the site?

Not applicable for the 2024 WWCP and will be evaluated on a project-specific basis at the time of the project design.

g. Has any part of the site been classified as a critical area by the city or county? If so, specify.

[11] https://ecology.wa.gov/Regulations-Permits/SEPA/Environmental-review/SEPA-guidance/SEPA-checklist-guidance/SEPA-Checklist-Section-B-Environmental-elements/Environmental-elements-8-Land-shoreline-use

Not applicable for the 2024 WWCP and will be evaluated on a project-specific basis at the time of the project design.

h. Approximately how many people would reside or work in the completed project?

Not applicable for the 2024 WWCP and will be evaluated on a project-specific basis at the time of the project design.

i. Approximately how many people would the completed project displace?

Not applicable for the 2024 WWCP and will be evaluated on a project-specific basis at the time of the project design.

j. Proposed measures to avoid or reduce displacement impacts, if any.

Not applicable for the 2024 WWCP and will be evaluated on a project-specific basis at the time of the project design.

k. Proposed measures to ensure the proposal is compatible with existing and projected land uses and plans, if any.

All individual project plans will be reviewed by the City to ensure compliance with all applicable adopted plans.

l. Proposed measures to reduce or control impacts to agricultural and forest lands of long-term commercial significance, if any:

Not applicable for the 2024 WWCP and will be evaluated on a project-specific basis at the time of the project design.

9. Housing

Find help answering housing questions[12]

a. Approximately how many units would be provided, if any? Indicate whether high, middle, or low-income housing.

Not applicable as no housing is being built.

b. Approximately how many units, if any, would be eliminated? Indicate whether high, middle, or low-income housing.

Not applicable as no housing is being built.

c. Proposed measures to reduce or control housing impacts, if any:

Not applicable as no housing is being built.

[12] https://ecology.wa.gov/Regulations-Permits/SEPA/Environmental-review/SEPA-guidance/SEPA-checklist-guidance/SEPA-Checklist-Section-B-Environmental-elements/Environmental-elements-9-Housing

10. Aesthetics

Find help answering aesthetics questions[13]

a. What is the tallest height of any proposed structure(s), not including antennas; what is the principal exterior building material(s) proposed?

Not applicable for the 2024 WWCP and will be evaluated on a project-specific basis at the time of the project design.

b. What views in the immediate vicinity would be altered or obstructed?

Not applicable for the 2024 WWCP and will be evaluated on a project-specific basis at the time of the project design.

c. Proposed measures to reduce or control aesthetic impacts, if any:

Not applicable for the 2024 WWCP and will be evaluated on a project-specific basis at the time of the project design.

11. Light and glare

Find help answering light and glare questions[14]

a. What type of light or glare will the proposal produce? What time of day would it mainly occur?

Not applicable for the 2024 WWCP and will be evaluated on a project-specific basis at the time of the project design.

Could light or glare from the finished project be a safety hazard or interfere with views?

Not applicable for the 2024 WWCP and will be evaluated on a project-specific basis at the time of the project design.

b. What existing off-site sources of light or glare may affect your proposal?

Not applicable for the 2024 WWCP and will be evaluated on a project-specific basis at the time of the project design.

c. Proposed measures to reduce or control light and glare impacts, if any:

Not applicable for the 2024 WWCP and will be evaluated on a project-specific basis at the time of the project design.

[13] https://ecology.wa.gov/Regulations-Permits/SEPA/Environmental-review/SEPA-guidance/SEPA-checklist-guidance/SEPA-Checklist-Section-B-Environmental-elements/Environmental-elements-10-Aesthetics
[14] https://ecology.wa.gov/Regulations-Permits/SEPA/Environmental-review/SEPA-guidance/SEPA-checklist-guidance/SEPA-Checklist-Section-B-Environmental-elements/Environmental-elements-11-Light-glare

12. Recreation

Find help answering recreation questions

a. What designated and informal recreational opportunities are in the immediate vicinity?

Water bodies that provide recreational access include Kitsap Lake, Sinclair Inlet and the Port Washington Narrows. Gold Mountain Golf Course is located within the City limits, and there are numerous City Parks within the proposal area.

b. Would the proposed project displace any existing recreational uses? If so, describe.

Not applicable for the 2024 WWCP and will be evaluated on a project-specific basis at the time of the project design.

c. Proposed measures to reduce or control impacts on recreation, including recreation opportunities to be provided by the project or applicant, if any:

Not applicable for the 2024 WWCP and will be evaluated on a project-specific basis at the time of the project design.

13. Historic and cultural preservation

Find help answering historic and cultural preservation questions[15]

a. Are there any buildings, structures, or sites, located on or near the site that are over 45 years old listed in or eligible for listing in national, state, or local preservation registers? If so, specifically describe.

b. Not applicable for the 2024 WWCP and will be evaluated on a project-specific basis at the time of the project design. For SRF loan-funded projects, the City must go through the State Environmental Review Process (SERP) which compliance with Section 106 of the National Historic Preservation Act.

c. Are there any landmarks, features, or other evidence of Indian or historic use or occupation? This may include human burials or old cemeteries. Are there any material evidence, artifacts, or areas of cultural importance on or near the site? Please list any professional studies conducted at the site to identify such resources.

d. Not applicable for the 2024 WWCP and will be evaluated on a project-specific basis at the time of the project design. For SRF loan-funded projects, the City must go through the State Environmental Review Process (SERP) which compliance with Section 106 of the National Historic Preservation Act.

Describe the methods used to assess the potential impacts to cultural and historic resources on or near the project site. Examples include consultation with tribes and the department of archeology and historic preservation, archaeological surveys, historic maps, GIS data, etc.

[15] https://ecology.wa.gov/Regulations-Permits/SEPA/Environmental-review/SEPA-guidance/SEPA-checklist-guidance/SEPA-Checklist-Section-B-Environmental-elements/Environmental-elements-13-Historic-cultural-p

The City consults with tribes and the Washington State Department of Archaeology and Historical Preservation for cultural resources review of loan-funded projects. The review will be done on a project-specific basis.

e. Proposed measures to avoid, minimize, or compensate for loss, changes to, and disturbance to resources. Please include plans for the above and any permits that may be required.

Not applicable for the 2024 WWCP and will be evaluated on a project-specific basis at the time of the project design.

14. Transportation

Find help with answering transportation questions[16]

a. Identify public streets and highways serving the site or affected geographic area and describe proposed access to the existing street system. Show on site plans, if any.

The City is primarily served by SR 3, SR 304, SR 303, and the Washington State Ferry system. This will also be evaluated for specific projects.

b. Is the site or affected geographic area currently served by public transit? If so, generally describe. If not, what is the approximate distance to the nearest transit stop?

The sewer service area is served by Kitsap Transit and the Washington State Ferry system.

c. Will the proposal require any new or improvements to existing roads, streets, pedestrian, bicycle, or state transportation facilities, not including driveways? If so, generally describe (indicate whether public or private).

For wastewater projects, the City will restore the streets to existing conditions or improve them. The addition of sidewalks and pedestrian and bicycle lanes would be determined at the time of design for specific projects.

d. Will the project or proposal use (or occur in the immediate vicinity of) water, rail, or air transportation? If so, generally describe.

Not applicable for the 2024 WWCP and will be evaluated on a project-specific basis at the time of the project design.

e. How many vehicular trips per day would be generated by the completed project or proposal? If known, indicate when peak volumes would occur and what percentage of the volume would be trucks (such as commercial and nonpassenger vehicles). What data or transportation models were used to make these estimates?

Not applicable for the 2024 WWCP and will be evaluated on a project-specific basis at the time of the project design.

[16] https://ecology.wa.gov/Regulations-Permits/SEPA/Environmental-review/SEPA-guidance/SEPA-checklist-guidance/SEPA-Checklist-Section-B-Environmental-elements/Environmental-elements-14-Transportation

f. Will the proposal interfere with, affect, or be affected by the movement of agricultural and forest products on roads or streets in the area? If so, generally describe.

Not applicable for the 2024 WWCP and will be evaluated on a project-specific basis at the time of the project design.

g. Proposed measures to reduce or control transportation impacts, if any:

Not applicable for the 2024 WWCP and will be evaluated on a project-specific basis at the time of the project design.

15. Public services

Find help answering public service questions[17]

a. Would the project result in an increased need for public services (for example: fire protection, police protection, public transit, health care, schools, other)? If so, generally describe.

If new sewers, municipal pump stations, or treatment facilities are added or enlarged, additional public service from the City's wastewater fund will be required to maintain new infrastructure.

b. Proposed measures to reduce or control direct impacts on public services, if any.

This would be determined at the time of the project design.

16. Utilities

Find help answering utilities questions[18]

Circle utilities currently available at the site: electricity, natural gas, water, refuse service, telephone, sanitary sewer, septic system, other:

All of the utilities listed are located within the City's sewer service area.

a. Describe the utilities that are proposed for the project, the utility providing the service, and the general construction activities on the site or in the immediate vicinity which might be needed.

The proposal outlines the wastewater improvements for the City's sewer system over a 20 year planning horizon. Improvements include collection system expansion, trunk sewer conveyance improvements, and treatment facility upgrades. The proposed projects can be reviewed in the 2024 WWCP.

[17] https://ecology.wa.gov/regulations-permits/sepa/environmental-review/sepa-guidance/sepa-checklist-guidance/sepa-checklist-section-b-environmental-elements/environmental-elements-15-public-services
[18] https://ecology.wa.gov/regulations-permits/sepa/environmental-review/sepa-guidance/sepa-checklist-guidance/sepa-checklist-section-b-environmental-elements/environmental-elements-16-utilities

C.Signature

Find help about who should sign[19]

The above answers are true and complete to the best of my knowledge. I understand that the lead agency is relying on them to make its decision.

X William Davis

Digitally signed by William Davis
DN: E=William.Davis@ci.bremerton.wa.us, CN=William Davis, OU=PW Engineering, OU=Domain Users, DC=ci, DC=bremerton, DC=wa, DC=us
Date: 2025.05.28 13:59:30-07'00'

Type name of signee: William Davis, P.E.

Position and agency/organization: Managing Engineer, City of Bremerton

Date submitted: **X/XX/XXXX**

D.Supplemental sheet for nonproject actions

Find help for the nonproject actions worksheet[20]

Do not use this section for project actions.

Because these questions are very general, it may be helpful to read them in conjunction with the list of the elements of the environment.

When answering these questions, be aware of the extent the proposal, or the types of activities likely to result from the proposal, would affect the item at a greater intensity or at a faster rate than if the proposal were not implemented. Respond briefly and in general terms.

1. **How would the proposal be likely to increase discharge to water; emissions to air; production, storage, or release of toxic or hazardous substances; or production of noise?**

   The 2024 WWCP anticipates the expansion of the sewer system due to development and population growth. This expansion will result in increased wastewater in the collection system and conveyed to the WWTP, which in turn will result in increased treated effluent

[19] https://ecology.wa.gov/Regulations-Permits/SEPA/Environmental-review/SEPA-guidance/SEPA-checklist-guidance/SEPA-Checklist-Section-C-Signature

[20] https://ecology.wa.gov/regulations-permits/sepa/environmental-review/sepa-guidance/sepa-checklist-guidance/sepa-checklist-section-d-non-project-actions

discharged to receiving waters. The plan should not result in increased release of toxic substances or an increased production of noise.

- **Proposed measures to avoid or reduce such increases are:**

  The 2024 WWCP identifies programmatic changes and capital improvements that are necessary to accommodate the expansion of the sewer system and ensures that the utility is in compliance with state and federal requirements. Individual projects that require noise-generating equipment, such as generators, will be considered on a case-by-case basis.

2. How would the proposal be likely to affect plants, animals, fish, or marine life?

The City's NPDES permit allows one annual CSO overflow event for each CSO outfall based on a 20-year rolling average (paragraph S.9.D.b of the permit). When overflows occur, there is a resultant short-term impact on the water quality of the receiving waters. This can also have a short-term negative impact on shellfish harvests in the local area. This plan has a positive benefit associated with the City's silviculture program. Bio-solids from the WWTP are land applied in the watershed to promote timber growth prior to harvest.

- **Proposed measures to protect or conserve plants, animals, fish, or marine life are:**

  There are ongoing capacity upgrades and inflow and infiltration (I&I) reduction projects which will either allow for additional flow to be conveyed to the WWTP for treatment or remove storm water inflow from the system which will assist in reducing CSO overflow events. Additionally, the City continues to eliminate active sewers in the marine environment by replacing them with upland sewer systems.

3. How would the proposal be likely to deplete energy or natural resources?

The proposal should not deplete energy or natural resources. Energy used is typically from electrical sources (Puget Sound Energy, PSE) or diesel fuel related to pumping equipment and treatment processes.

- **Proposed measures to protect or conserve energy and natural resources are:**

  The City has a long history of upgrading and replacing older and less efficient equipment and processes to save energy. Some examples include pump upgrades, blower replacement and air compressor replacement. The City has historically received a number of PSE grants associated with these upgrades and will continue to apply for these grants in the future. Continued equipment upgrades should result in a reduction of energy use over time.

4. How would the proposal be likely to use or affect environmentally sensitive areas or areas designated (or eligible or under study) for governmental protection, such as parks, wilderness, wild and scenic rivers, threatened or endangered species habitat, historic or cultural sites, wetlands, floodplains, or prime farmlands?

Treated effluent from the WWTP and Eastside Treatment Plant (ETP) will discharge to Sinclair Inlet and the Port Washington Narrows. Untreated CSO overflows will also be

discharged during extreme storm events to these same waters, which is permitted by the City's NPDES permit.

- **Proposed measures to protect such resources or to avoid or reduce impacts are:**

  Effluent from the WWTP and ETP will be treated prior to discharging to the surface waters in accordance with state and federal requirements and the most current NPDES discharge permit. CSO events should be reduced in the future as a result of system capacity upgrades and I&I reduction.

5. **How would the proposal be likely to affect land and shoreline use, including whether it would allow or encourage land or shoreline uses incompatible with existing plans?**

The City's NPDES permit allows one annual CSO overflow event for each CSO outfall based on a 20-year rolling average (paragraph S.9.D.b of the permit). When overflows occur, there is a resultant short-term impact on the water quality of the receiving waters. This can also have a short-term impact on shellfish harvests and swimming in the local area. Over the last 10 years the City has constructed several projects which have eliminated sewers in the marine environment by installing upland sewer systems and has projects programmed to remove additional beach sewers over the next 5 to 10 years

- **Proposed measures to avoid or reduce shoreline and land use impacts are:**

  The City continues to incrementally increase system capacity and reduce I&I to allow more combined sewage flows to be treated at the WWTP or ETP, as well as reduce the number of active sewers in the marine environment.

6. **How would the proposal be likely to increase demands on transportation or public services and utilities?**

The proposal should not increase demands on transportation or other public services or utilities other that the wastewater utility itself.

- **Proposed measures to reduce or respond to such demand(s) are:**

  The 2024 WWCP includes added staffing requirements and additional equipment that will reduce the impacts of increased service demands.

7. **Identify, if possible, whether the proposal may conflict with local, state, or federal laws or requirements for the protection of the environment.**

The proposal will not conflict with local, state, or federal laws. The 2024 WWCP was prepared in accordance with WAC 173-240-020. The 2024 WWCP must be reviewed and approved by the Washington State Department of Ecology prior to its adoption. Specific projects will require their own regulatory and environmental reviews.

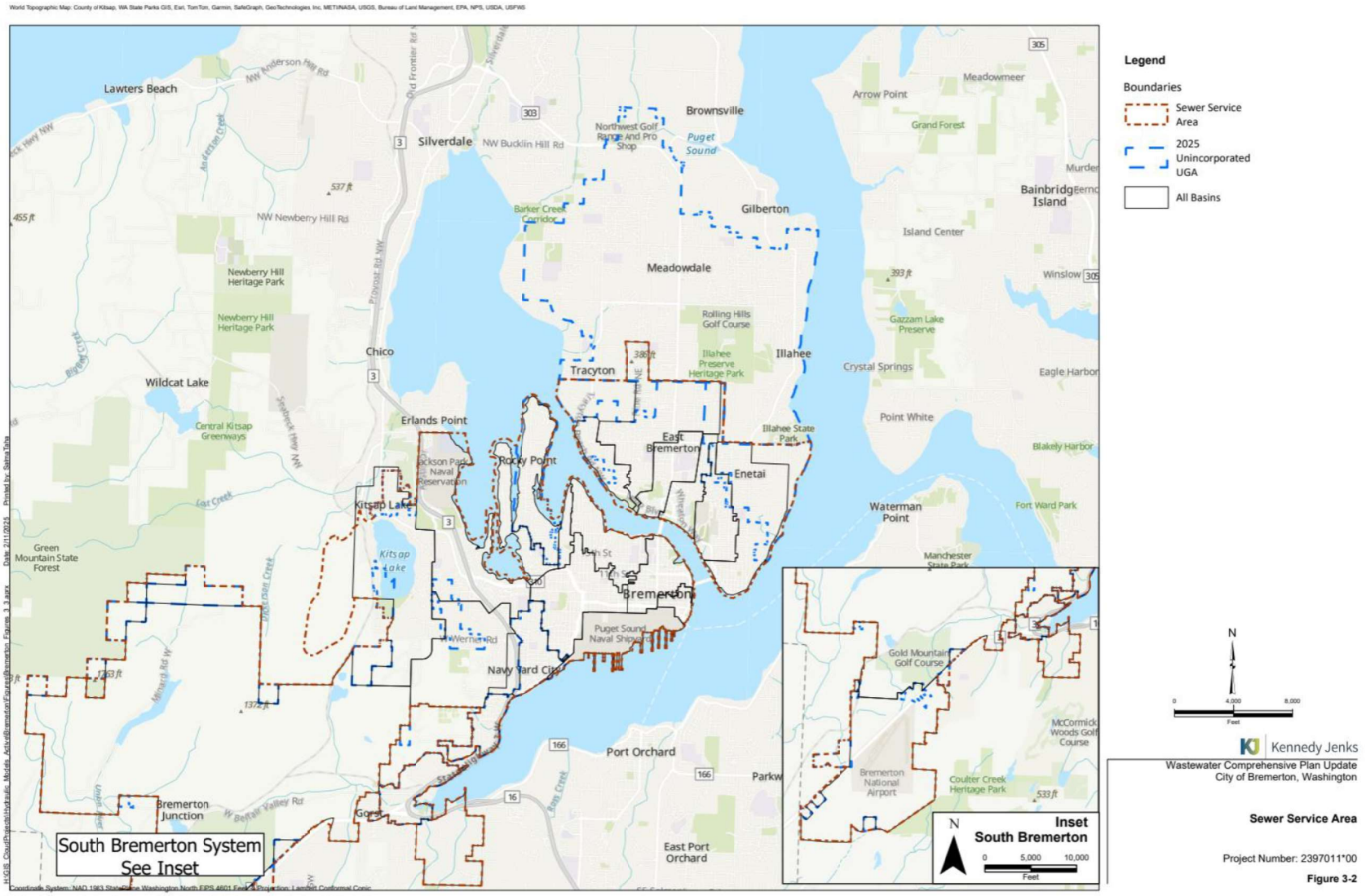


Figure 3-2: Sewer Service Area

Appendix J: Public Comments and Response on Draft 2024 WWCP Update

The City of Bremerton included a public comment period for the 2024 Wastewater Comprehensive Plan Update. The public comment period was from February 27, 2025 to March 29, 2025. Only one individual submitted comments, which was through an email to City staff. The following table lists the comments that were included in the email and provides a response to each comment.

DRAFT

Comment #	From and Date	Comment	Response
1	Kathie Lustig, Email dated March 30, 2025	The plan fails to include the Illahee and Enetai watersheds (WRIA 15). These include significant wetlands, and Illahee & Enetai creeks that share the same headwaters, both of which empty to Port Orchard Washington Narrows. These are important to the ecosystem in East Bremerton. They both are designated as fish bearing, in part by WDFW. Note: the Illahee Forest Preserve is in the process of acquiring the south branch of Illahee Creek, a series of beaver ponds and wetlands that lead south and merge with Enetai Creek just north of Sylvan way.	In Section 3.2.5, there is a discussion of marine waterbodies in WRIA 15, including Sinclair Inlet, Dyes Inlet, and Port Washington Narrows, which receive treated effluent from the City's two treatment plants. Enetai Creek and Illahee Creek are not discussed since they do not flow into these waterbodies. Sewer basin plans showing system improvements in each basin were developed for the 2014 Wastewater Comprehensive Plan (WWCP) Update. These plans were included in the 2024 Update (Appendix B) unchanged since many of the projects still apply and there is helpful information in the plans. The project descriptions and layouts included in the basin plans show conceptually how sewer could be provided in these areas. Pumping rates and force main sizes were estimated based on projected growth data. Elevations were based on topographic maps. Routing the force main was typically shown along a straight alignment. Environmental review and critical areas evaluation would be completed concurrently with any future development proposal. Any future sewer infrastructure approved for construction must comply with Bremerton design standards. Environmental review of critical areas and geotechnical evaluation would be done through Kitsap County and state agencies.

DRAFT

2	Kathie Lustig, Email dated March 30, 2025	*Comment on the Trenton Ave Basin Plan in Appendix B:* NS-5C and NS-5B: New lines w/ new pump stations both appear to cross critical areas of Enetai Creek in what is the most pristine sections of the creek and important wildlife corridors. These areas are mapped as high geologically hazardous areas with steep slopes with continual land slides / sloughing.	See response to Comment #1.
3	Kathie Lustig, Email dated March 30, 2025	*Comment on the Trenton Ave Basin Plan in Appendix B:* NS-5G is confusingly mapped in segments and unclear. A portion of that appears to be in yet another section of Enetai Creek with high geologically hazardous areas.	See response to Comment #1.
4	Kathie Lustig, Email dated March 30, 2025	*Comment on the Trenton Ave Basin Plan in Appendix B:* NS-5E is described but not mapped. It appears by its descriptions to go from 30th straight down Enetai Creek adjacent to yet another most critical area of the creek to the mouth and known wildlife corridors. Why is it not shown on the map? It should be added.	See response to Comment #1.
5	Kathie Lustig, Email dated March 30, 2025	*Comment on the Trenton Ave Basin Plan in Appendix B:* The wastewater plan fails to outline that WDFW has designated parts of Enetai as a wildlife patch and priority species area (see Illahee Community Plan)	See response to Comment #1.

DRAFT

6	Kathie Lustig, Email dated March 30, 2025	At the City Council meeting a couple weeks ago it was clarified that the capital fund sewer budget did not include providing sewer to Enetai. Further, within the plan, it is stated the only time sewer would be provided, was if a developer paid for it.	In the 2024 WWCP Update, there is no capital money allocated in the 20-year CIP for sewering the UGA within the Trenton Avenue Basin. For this reason, it is anticipated that providing sewer would be privately funded.
7	Kathie Lustig, Email dated March 30, 2025	Enetai has been in the UGA for 27 years (since 1998 Comp plan). It was brought into UGA with GMA requirement to provide services within 20 years. We have exceeded that. Now, the City has no plans in the capitol budget to provide sewer to Enetai for next 20 years. For these reasons, why does Enatai continue to be in the UGA?	The decision to keep this area in Bremerton's UGA is made by Kitsap County. Also see response to Comment #6.
8	Kathie Lustig, Email dated March 30, 2025	The City has already acknowledged it is infeasible to provide sewer to Enetai due to steep slopes and significant critical areas and it is cost prohibitive. Enetai should not be in the UGA because of all its critical areas.	See responses to Comment #6 and #7.
9	Kathie Lustig, Email dated March 30, 2025	The subbasin plan shows sewer lines running in significant critical areas and most importantly Enetai Creek which is infeasible and inappropriate unless you plan to destroy the creek. To issue a blanket Determination of Non-significance (SEPA) that claims to cover Enetai Creek, high geological hazard areas, earthquake zone and old growth forest (Tree canopy) is far from accurate. These things need to be addressed.	The WWCP, which is required per WAC 173-240-050, is a planning document for the City's entire wastewater system and describes how we intend to provide reliable wastewater service over the next 20 years. No site-specific environmental information is included in the WWCP. The SEPA determination for the WWCP is for a non-project action proposal. The SEPA checklist will be reviewed by the City of Bremerton Department of Community Development (DCD), anticipated to be submitted to DCD in May 2025.

DRAFT

			Site-specific projects, depending on the location, type, and size of the project, could require SEPA review. When required, the review is typically done during the design stage and must be completed prior to construction. The projects that were referenced (NS-5B, NS-5C, NS-5E, and NS-5G) have components that are both within and outside of City limits, though it appears that most of the work is outside of City limits, so we anticipate that Kitsap County would be the lead SEPA reviewer for those projects. This would be determined during design.

DRAFT

Appendix K: Spill Response Plan

CITY OF BREMERTON Public Works & Utilities	Spill Response Plan	
POLICY INDEX **Utility**	EFFECTIVE DATE: 12-21-17 REVIEW DATE: REVISED DATE:	APPROVED

Background:

Federal and State Phase II stormwater regulations require municipal facilities to implement an operation and maintenance program that includes an employee training component and has the ultimate goal of preventing or reducing pollutant runoff from municipal operations.

Goal:

Preventing spills of materials and wastes is a significant component of complying with these regulations. However, even with the best preventive efforts, spills may still occur. When they do, it is up to facility personnel to respond quickly and effectively to clean up the spilled material or notify someone who can. This plan will outline procedures in the event of a spill. This plan will be posted in all areas that chemicals and/or waste products are stored and in a location that is easily accessible for employees.

Policy:

At a minimum, a spill response plan will consist of the following:

1) Facility's responsible person(s) and emergency contact numbers
2) Instructions for initiating cleanup procedures
3) Materials inventory
4) Facility map
5) Spill kit inventories
6) Employee training log

Name	Position	Phone No.
Chance Berthiaume	NPDES Stormwater Permit Coordinator	360.473.5929
Milenka Hawkins-Bates	Admin Manager/PW Ops Manager	360.473.5333
Wayne Hamilton	Utility/Facility Manager	360.473.5207
Chuck Ernst	Auto Equipment Technician Supervisor	360.473.5621
Chris Mottner	Facility/Inventory Supervisor	360.473.2316

Responsibilities:

- The **Facility's Responsible Person** has primary responsibility for coordinating the response to emergencies, including chemical spills
- **Supervisors** should ensure that employees are familiar with these procedures and receive any necessary training.
- **All employees** should follow these procedures in the event of a spill.

Emergency Contact Numbers:

The following telephone numbers should be posted near telephones and in other conspicuous locations:

- Outside emergency services (Police and Fire departments): 911
- Hospital: Harrison Memorial 360.377.3911
- Facility's Responsible Person: Chris Mottner; 360.473.2316
- Poison Control Center: 800.222.1222
- Regional EPA Office: 800.424.4372
- Kitsap County Health District: 360.377.5235
- OSHA Regional Office: 800.423.7233
- Kitsap County Emergency Management: 360.307.5870

Reporting a Spill:

All chemical spills, regardless of size, should be reported as soon as possible to the Facility Response Person (or designee). The Response Person will determine whether the spill has the potential to affect the environment outside of the facility and must be reported to 911.

Examples of spill that could affect the outside environment include spills that are accompanied by fire or explosion and spills that could reach nearby bodies of water.

Clean Up Procedures:

Spilled chemicals or hazardous waste should be effectively and quickly contained and cleaned up. Employees should clean up spills themselves **only if properly trained and protected.** Employees who are not trained in spill cleanup procedures should report the spill to the Responsible Person(s) listed above, warn other employees, and leave the area.

The following general guidelines should be followed for evacuation, spill control, notification of proper authorities, and general emergency procedures in the event of a chemical incident in which there is potential for a significant release of hazardous materials.

1. **Evacuation**
   Persons in the immediate vicinity of a spill should immediately evacuate the premises (except for employees with training in spill response in circumstances described below). If the spill is of "medium" or "large" size, or if the spill seems hazardous, immediately notify emergency response personnel.

2. **Spill Control Techniques**
   Once a spill has occurred, the employee needs to decide whether the spill is small enough to handle without outside assistance. Only employees with training in spill response should attempt to contain or clean up a spill.

   NOTE: If you are cleaning up a spill yourself, make sure you are aware of the hazards associated with the materials spilled, have adequate ventilation, and proper personal protective equipment (PPE). Treat all residual chemical and cleanup materials as hazardous waste.

   Spill control equipment should be located wherever significant quantities of hazardous materials are received or stored. MSDSs, absorbents, over-pack containers, container patch kits, spill dams, shovels, floor dry, acid/base neutralizers, and "caution-keep-out" signs are common spill response items.

3. **Spill Response and Cleanup**

Chemical spills are divided into three categories: Small, Medium and Large. Response and cleanup procedures vary depending on the size of the spill.

Small Spills: Any spill where the major dimension is less than 18 inches in diameter. Small spills are generally handled by internal personnel and usually do not require an emergency response by police or fire department HAZMAT teams.

- Quickly control the spill by stopping or securing the spill source. This could be as simple as up righting a container and using floor-dry or absorbent pads to soak up spilled material. Wear gloves and protective clothing.
- Put spill material and absorbents in secure containers if any are available most spill kits include large plastic bags for this material.
- Consult with the Facility Response Person and the MSDS for the spill and waste disposal procedures.
- In some instances, the area of the spill should not be washed with water. Use Dry Cleanup Methods and never wash spills down a drain, onto a storm drain or onto the driveway or parking lot.
- Both spilled material and the absorbent may be considered hazardous waste and must be disposed of in compliance with state and federal environmental regulations.

Medium Spills: Spills where the major dimension exceeds 18 inches, but is less than 6 feet. Outside emergency response personnel (police and fire department HAZMAT teams) should usually be called for medium spills, common sense, however, will dictate when it is necessary to call them.

- Immediately try to help contain the spill at its source by simple measures only. This means quickly up righting a container, or putting a lid on a container, if possible. Do not use absorbents unless they are immediately available. Once you have made a quick attempt to contain the spill, or once you have quickly determined you cannot take any brief containment measures, leave the area and alert Emergency Responders at 911. Closing doors behind you while leaving (if indoors) helps contain fumes from spills. Give police accurate

information as to the location, chemical, and estimated amount of the spill.

- Evaluate the area outside the spill. Engines and electrical equipment near the spill area must be turned off. This eliminates various sources of ignition in the area. Advise Emergency Responders on how to turn off engines or electrical sources. Do not go back in to the spill area once you have left. Help emergency responders by trying to determine how to shut off heating, air conditioning equipment, or air circulating equipment, if necessary.
- If emergency responders evacuate the spill area, follow their instructions in leaving the area.
- After emergency responders have contained the spill, be prepared to assist them with any other information that may be necessary, such as MSDSs and questions about the facility. Emergency responders or trained personnel with proper personal protective equipment will them clean up the spill residue, DO NOT RE-ENTER the area until the responder in charge gives the all clear. Be prepared to assist these persons from outside the spill area with SDSs, absorbents and containers.
- Reports must be filed with proper authorities. It is the responsibility of the spiller to inform both his/her supervisor and the emergency responders as to what caused the spill. The response for the large spills is similar to the procedures for medium spills, except that the exposure danger is greater.

Large Spills: Any spill involving flammable liquid where the major dimension exceeds 6 feet in diameter; and any "running" spill, where the source of the spill has not been contained or flow has not been stopped.

- Leave the area and notify Emergency Responders (911). Give the operator the spill location, chemical spilled, and the approximate amount.
- From a safe area, attempt to get SDS information for the spilled chemical for the emergency responders to use. Also, be prepared to advise responders as to any ignition sources, engines, electrical power or air conditioning/ventilation

systems that may need to be shut off. Advise responders of any absorbents, containers or spill control equipment that may be available, this may need to be done from a remote area because and evacuation that would place the spiller far from the scene may be needed. Use radio or phone to assist from a distance, if necessary.

- Only emergency response personnel, in accordance with their own established procedures, should handle spills greater than 6 feet in any dimension or that are continuous. Remember, once the emergency responders or HAZMAT team is on the job cleaning up spills or putting out fires, the area is under their control and no one may reenter the area until the responder in charge gives the all clear.
- Provide information for reports to supervisors and responders, just as in medium spills.

MATERIAL INVENTORY

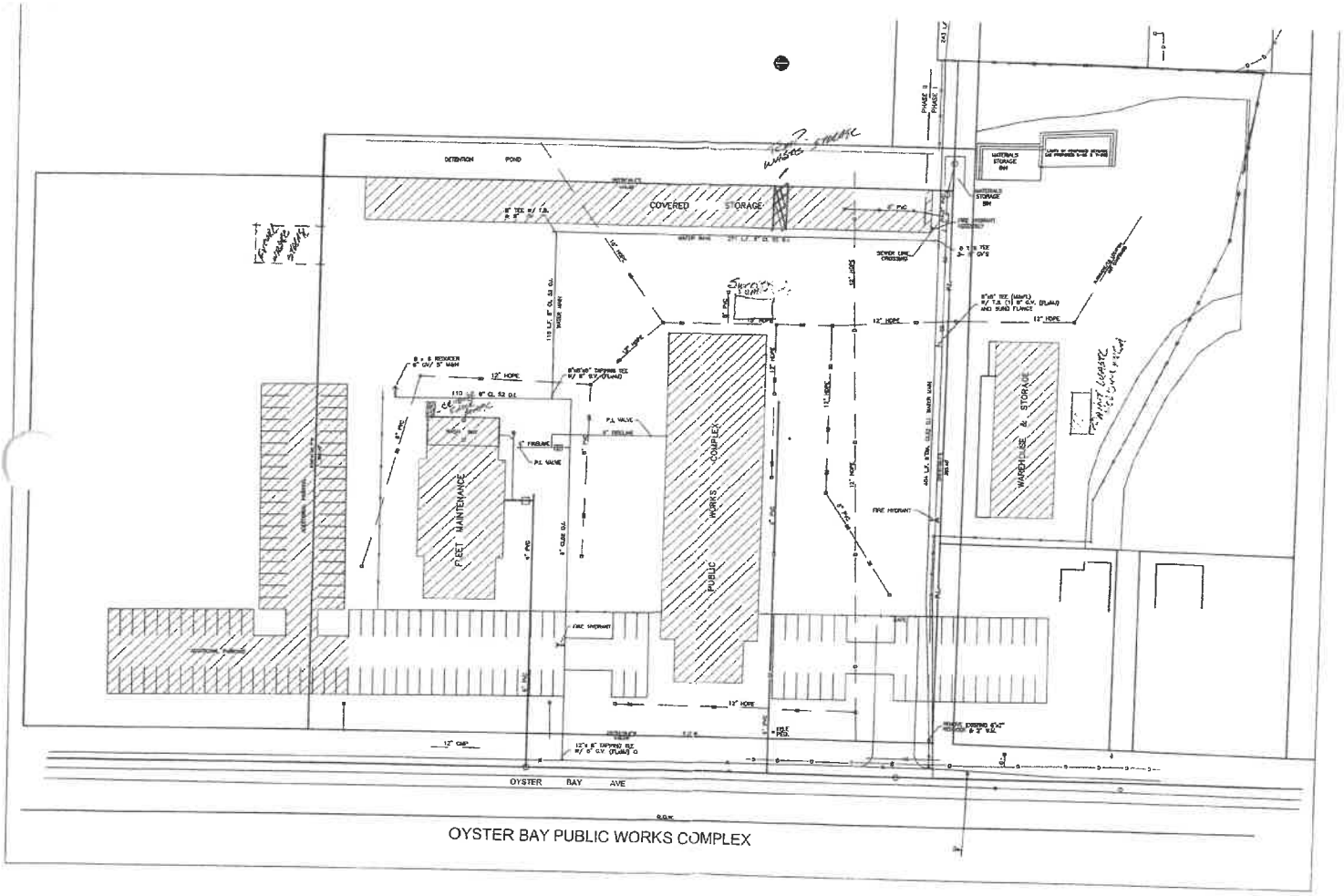
List all materials or wastes that may require clean up. List the average amounts on site and their storage locations.

Material	Amount	Locations
Antifreeze		
Degreaser		
Diesel Fuel		
Gasoline		
Motor Oil		
Hydraulic Oil		
Paints/Stains		
Solvents		
Used Oil		
Paint Waste		
Acetone		

EMPLOYEE TRAINING LOG

Identify the spill response training provided to each employee or contractor who is charged with responsibility for spill response.

Employee or Contractor Name	Instructor	Date of Training



OYSTER BAY PUBLIC WORKS COMPLEX

CITY OF BREMERTON Public Works & Utilities		Unauthorized Wastewater Discharge Incident Report
POLICY INDEX **Utility**	EFFECTIVE DATE: 12-21-17 REVIEW DATE: REVISED DATE:	APPROVED

Goal: To prevent public exposure or the negative environmental impact from sewage spills from the wastewater infrastructure and to respond quickly to any potential situations.

To report any discharge incident to the agencies according to established procedures and to evaluate the facilities involved and implement corrective measures to correct future incidents.

All actual or suspected sewage overflows or leaks that have entered into any surface or ground waters will be reported.

Procedure:

The following procedures will apply in most circumstances; however, personnel will contact CenCom (911) anytime a sewage spill exceeds their response capability or represents an imminent threat to public health or safety.

1. Treatment Plant or Sewer Lift Stations discharge.
   a. **Take immediate action to stop, contain, and clean-up the discharge. It must be stressed that every effort must be made to minimize the impact of the incident.**
   b. If assistance is required, get help as soon as possible.
   c. As soon as possible, initiate sampling procedures. These are outlined in Addendum A.
   d. As soon as possible, contact your immediate supervisor.

2. Sanitary Sewer Spills in Collection System

   During normal working hours:
   a. Call comes into dispatch about a potential discharge.
      - Dispatch sends the Customer Response person to investigate.
      - Dispatch contacts Sewer Maintenance crew of a potential sewer discharge.
   b. Customer Response person investigates the call.
      - Customer Response person will correct the problem if possible, and fill out the Unauthorized Wastewater Discharge Incident Report.

- If the Customer Response person is unable to correct the problem, the Sewer Maintenance crew is contacted to correct the problem.

c. The Sewer Maintenance crew will respond and correct the problem and complete the Unauthorized Wastewater Discharge Incident Report in its entirety.
   - As soon as possible, the Supervisor needs to be notified of the discharge.
   - The Utilities/Facility Manager also needs to be notified ASAP.
   - Contact the Wastewater Treatment Plant for sampling assistance.

d. Spill clean-up:
   - Isolate the spill area and vactor and/or rake up as much of the spill as possible.
   - Apply hydrated lime to reduce ph and pathogen levels and help absorb remaining liquid (with) limited application near surface water.

3. As soon as possible, but no later than **four hours**, contact the following Agencies and persons:
   Dept. of Ecology: (425) 649-7000
   Dept. of Health, Shellfish Division: Main Office (360) 236-3330;
   Mark Toy – (360) 236-3321; After hours pager – (360) 789-8962
   Kitsap County Health Dept.: Main Office (360) 337-5235;
   Shawn Ultican – (360) 337-5562; Cell (360) 731-5713;
   After hours pager (360) 415-2005
   Pat Coxon: (360) 473-5448; (360) 473-5400/Cell (360) 340-2523
   Home (360) 697-6360

4. As soon as possible, completely fill out the Public Works and Utility department's Unauthorized Wastewater Discharge Incident Report' and submit all pertinent information to your immediate supervisor.

Remember to document everything (utilizing telephone and personal logs, and incident reports) relating to the incident: agencies and persons contacted, dates, times, corrective actions, etc. This is extremely important, not only with respect to notification guidelines, but to ensure that future corrective measures involving policies, mechanical and/or electrical improvements, etc., are appropriate.

5. The completed Report will be given to the appropriate Manager, who will prepare a written report and submit to D.O.E. within five (5) days of discharge.

After normal working hours and weekends:

a. As soon as possible, but no later than four (4) hours, report the spill to the appropriate contacts on the Unauthorized Wastewater Discharge Incident Report.
   - For outside of business hours report the spill to Public Health Duty Officer (360) 415-2005
   - If the Duty Officer does not return your page within fifteen (15) minutes, contact the health staff at home. Numbers are on the Unauthorized Wastewater Discharge Incident Report.

b. Duty Officer needs the following information:
   - Your name, title, employer and phone number
   - Location of spill – address or nearest intersection
   - Estimated number of gallons spilled

c. The following information needs to be reported on the form
   - Your name, title, employer and phone number
   - Location of spill
   - Cause of spill (broken sewer line, plugged sewer, etc.)
   - Duration of spill
   - Estimated number of gallons spilled
   - Public of private properties impacted
   - Surface/groundwater bodies impacted or potentially impacted
   - Estimated date and time of completion of repair
   - Steps taken to contain or decontaminate the spill

If any unforeseen events, issues, or questions arise during an overflow incident, do not hesitate to contact your immediate supervisor immediately.

- The completed report will be given to the appropriate Manager, who will prepare a written report and submit to D.O.E. within five (5) days of discharge.
- The Unauthorized Wastewater Discharge Incident Report is attached.
- A copy of the report will be given to the Public Works & Utilities Director.

Note: To retrieve the form:
Go to http://cobweb/
Select Forms/Documents
Select Public Works & Utilities
Select Unauthorized Wastewater Discharge Incident Report

City of Bremerton
Department of Public Works & Utilities
Unauthorized Wastewater Discharge Incident Report

Print Form

Name:

Location of Discharge:

Date of Discharge: *Time of Discharge:* ○ AM ○ PM

Duration of Discharge: ○ AM ○ PM *to* ○ AM ○ PM

Estimated Amount of Discharge:

Receiving Water Body:

Reason for Discharge:

Response:

Department of Ecology ***425-649-7000 was called on (date/time)***

Contact Person:

Department of Health Shellfish Division ***360-236-3321 was called on (date/time)***

Contact Person:

Kitsap Public Health District ***360-337-5235 was called on (date/time)***

Contact Person:

After hours call 360-415-2005 (pager). If no response within 15 min, call Stuart Whitford 360-598-1774 (hm), 360-337-0351 (cell) or Shawn Ultican 360-876-4377 (hm), 360-731-5713 (cell), or Newton Morgan 360-394-2063 (hm), 360-710-3176 (cell).

City of Bremerton Wastewater Treatment Plant ***360-473-5400 was called on (date/time)***

Contact Person:

City of Bremerton Risk Manager ***360-473-5302 was called on (date/time)***

Contact Person:

Director of Public Works & Utilities ***360-473-5758 was called on (date/time)***

Contact Person:

Completed By:

Letter to Ecology sent on (date)

Other response:

Signature:

City of Bremerton WWTP

Sanitary Sewage Overflow Reporting

Standard Operating Procedure

Created February 14, 2023

Revision #0

Goal: To enable all WWTP staff to effectively and accurately report sanitary sewer overflows (SSO) in accordance with policies from the Washington Department of Ecology; the Washington Department of Health (Shellfish); the Kitsap Public Health District and the City of Bremerton's "Unauthorized Wastewater Discharge Incident Report."

The first step of this whole process is to prevent environmental and human impacts of the overflow. Once the SSO has been stopped, it is important to

1. Immediately notify your immediate supervisor.
2. Supervisor will notify the Wastewater Manager and the Public Works Director
3. Fill out a Sanitary Sewer Overflow Incident Report Form with details of the SSO.
4. Within two hours after the SSO has been stopped, the following entities need to be contacted by phone: Washington Department of Ecology; Washington Department of Health (Shellfish); and the Kitsap Public Health Department. Make sure you write down the date/time when you called each agency and who you talked to. Ecology will give you and "ERTS" number that needs to be recorded on the incident form. This serves as a "tracking number" for Ecology.
5. When contacting the KPHD, we need to make sure we coordinate with that agency on where to put signage. Please reference the City's policy. More importantly, we need to make sure OUR signage is out whether or not the KPHD has put theirs out or not.

6. Ecology has their own Report Form for these incidents. There is a lot of duplicate information, but the report is to prepare you for questions that Ecology might have.
7. In areas where the SSO has made contact with the ground, please utilize hydrated lime (from a hardware store, etc.) to disinfect the area.

Helpful Hints:

1. The PW&U Director needs to be contacted either before or shortly after we notify the KPHD.
2. For purposes of incident report, please keep the cause of the overflow brief and to the point i.e. "mechanical failure" or the like. A more detailed account should be conveyed to your immediate Supervisor, at which point a more detailed account of what happened will be written by the Supervisor after the incident has been remediated. It should also be noted that the PW&U Director will want to know details of the incident when he is notified.
3. Sampling: the preferred sample would represent what is going into the receiving water body *PRIOR* to the discharge actually hitting the water. If a sample is taken, it must be in a bottle with sodium thiosulfate (preservative) with the following information: Sample date/time; person who sampled it. IF the lab tech is not available, put the labelled sample in the lab refrigerator along with a note to the lab tech that it needs tested. There should be sample kits in about every vehicle for this purpose. IF a sample can't be taken for whatever reason it is not a big issue.
4. Signage. Of the four SSOs the City of Bremerton had in 2022, one of the most difficult to deal with resulted from an argument from members of the public that there was not enough public notice in the immediate area of the SSO. So, we need to make sure we get our signage out pronto, and coordinate with the KPHD on where they are going to put their signage as well.

For Collection System Overflows, Plant Bypasses, Upsets, Loss of Disinfection Contact **IMMEDIATELY**

DEPARTMENT OF ECOLOGY
State of Washington

Department of Ecology 24-hr:

(206) 594-0000 to report a spill

Washington State Department of Health

Department of Health Shellfish 24-hr:

(360) 236-3330 (business hours)

or (360) 789-8962 (after hours)

KITSAP PUBLIC HEALTH DISTRICT

Kitsap Public Health District

(360) 728-2235 (press 9 after hours)

Written follow-up report due to Ecology within 5 days of discovery – see NPDES Permit for noncompliance notification and sampling details

Appendix L: Sea Level Rise Policy

CITY OF BREMERTON Public Works & Utilities	Sea Level Rise	
POLICY INDEX **Administration**	EFFECTIVE DATE: 11/15/19 REVIEW DATE: REVISED DATE:	APPROVED

General:
Bremerton's Department of Public Works and Utilities is currently programming, designing, and constructing infrastructure projects that may still be in operation 80 years from now. Sea level rise is happening and according to the scientific literature, is likely to accelerate in the future. Although the amount of sea level rise is uncertain, it is prudent to program, design and construct projects so that sea level rise is taken into account.

Policy:

1. It is the policy of the Public Works Department and Utilities Department to incorporate the potential impact of sea level rise into all new projects and major repair work involving infrastructure that could be affected by sea level rise.
2. The amount of sea level rise to use as a planning factor will be the median number provided by the University of Washington's Climate Impacts Group. Currently, that number is 23 inches by the year 2100[1].
3. All project programming, design and construction work will incorporate this figure at a minimum and use a larger figure if possible.
4. This planning figure will be adjusted as the University of Washington's Climate Impacts Group adjusts its figure.

[1] Climate Impacts Group, College of the Environment, University of Washington. *State of Knowledge Report* – Climate Change in Puget Sound. November 2015, p. 4-4.