CITY OF BREMERTON

Wastewater Comprehensive Plan Update

FINAL

December 2014

HDR

City of Bremerton

2014 Wastewater Comprehensive Plan Update

C E R T I F I C A T I O N

This 2014 Wastewater Comprehensive Plan Update for the City of Bremerton has been prepared under the direction of the following Registered Professional Engineers.

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STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
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November 14, 2014

Mr. Pat Coxon, Wastewater Manager
Department of Public Works & Utilities
City of Bremerton
1600 Oyster Bay Ave S
Bremerton, WA 98312

Re: City of Bremerton Comprehensive Sewer Plan (October 2014)

Dear Mr. Coxon:

Pursuant to RCW 90.48.110 and WAC 173-240-050, the above-referenced general sewer plan has been reviewed and is hereby approved. This general sewer plan approval shall not be construed as an approval of or authorization to extend service areas beyond growth management boundaries established under the Growth Management Act (GMA). Extensions of service into new areas shall be undertaken only after obtaining the advice and consent of the appropriate local GMA planning department or agency.

Sewage collection facilities within the planning area boundary shall be constructed according to the approved general sewer plan or amendments thereto. Plans and specifications for construction of planned collection facilities shall be submitted to this department for review and approval in accordance with Chapter 173-240 WAC. Prior to construction, the District is required to submit a written description of the project and written assurance that the extension is in conformance with the general sewer plan. Engineering reports and plans and specifications for sewer line extensions, including pump stations, need not be submitted for approval, unless:

a) The proposed sewers or pump stations involve installation of overflows or bypasses; or

b) The proposed sewers or pump stations discharge to an overloaded treatment, collection, or disposal facility.

If you have any questions concerning this approval, please contact Tonya Lane at 425-649-7050 or tonya.lane@ecy.wa.gov.

Sincerely,

Kevin C. Fitzpatrick

Kevin C. Fitzpatrick
Section Manager
NWRO Water Quality Section

e-cc: Ned Lever, PE, City of Bremerton
Eric Habermeyer, PE, HDR Inc.
Lazaro Eleuterio, PE, Washington Department of Ecology

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ORDINANCE NO. 5268

AN ORDINANCE of the City Council of the City of Bremerton, Washington, updating the City of Bremerton Wastewater Comprehensive Plan.

WHEREAS, the City of Bremerton desires to plan for the future and growth in its wastewater system service area; and

WHEREAS, a wastewater comprehensive plan provides a means to meet future wastewater collection system and wastewater treatment plant needs; and;

WHEREAS, the City has not adopted a wastewater comprehensive plan since the Wastewater Comprehensive Plan Update completed in 2005; and

WHEREAS, the requirements for comprehensive wastewater planning are specified in State of Washington, Department of Ecology regulations promulgated under Washington Administrative Code 173-240-020 and 173-240-050; NOW THEREFORE,

THE CITY COUNCIL OF THE CITY OF BREMERTON, WASHINGTON, DOES HEREBY ORDAIN AS FOLLOWS:

SECTION 1. The City of Bremerton Wastewater Comprehensive Plan Update Final Draft dated October 2014 is hereby incorporated as if fully set forth herein and adopted as the City of Bremerton Wastewater Comprehensive Plan.

SECTION 2. *Severability.* If any one or more sections, subsections, or sentences of this Ordinance are held to be unconstitutional or invalid, such decision shall not affect the validity of the remaining portion of this Ordinance and the same shall remain in full force and effect.

SECTION 3. *Effective Date.* This ordinance shall take effect and be in force ten (10) days from and after its passage, approval and publication as provided by law.

PASSED by the City Council the 17th day of December, 2014

Greg Wheeler

GREG WHEELER, Council President

Approved this 17th day of December, 2014

PATTY LENT, Mayor

ATTEST:

SHANNON CORIN, City Clerk

APPROVED AS TO FORM:

ROGER A. LUBOVICH, City Attorney

PUBLISHED the 22nd day of December, 2014
EFFECTIVE the 1st day of January, 2015
ORDINANCE NO. 5268

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Abbreviations

Ac	Acre
BOD	Biological Oxygen Demand
BUF	Beneficial Use Facility
CCP	Cured Concrete Pipe
CFR	Code of Federal Regulations
CIP	Capital Improvement Program
CIPP	Cured-in-place pipe
CSO	Combined Sewer Overflow
CTP	Crosstown Pipeline
CWA	Clean Water Act
EPA	Environment Protection Act
ETP	Eastside Treatment Plant
FIRM	Flood Insurance Rate Map
FMF	Fire Mountain Farms
FTE	Full Time Employee
GAC	Granular Activated Carbon
GMA	Growth Management Act
gpd	Gallons per Day
gpm	Gallons per Minute
HDPE	High Density Polyethylene
HGL	Hydraulic Grade Line
I&I	Infiltration and Inflow
KCSD No. 1	Kitsap County Sewer District No. 1
lb	pounds
LF	lineal feet
LPS	Low Pressure Sewer
MBR	Membrane Bioreactor Treatment Plant
MG	Million Gallons
mgd	Million Gallons per Day
NAAQS	National Ambient Air Quality Standards
NAVD	North Atlantic Vertical Datum
NEPA	Natural Environmental Policy Act
NPDES	National Pollution Discharge Elimination System
OCS	Odor Control Station

Abbreviations

PLC	Programmable Logic Control
PSCAA	Puget Sound Clean Air Agency
PSNS	Puget Sound Naval Shipyard
PVC	Polyvinyl Chloride
RAS	Return Activated Sludge
RCW	Revised Code of Washington
RDII	Rainfall Derived Infiltration and Inflow
RDT	Rotating Drum Thickeners
SCADA	Supervisory Control and Data Acquisition
SEPA	State Environmental Policy Act
PSIC	Puget Sound Industrial Center
SSO	Sanitary Sewer Overflow
SWMM	Stormwater Management Model
TAZ	Traffic Analysis Zone
TMDL	Total Maximum Daily Limit
TSS	Total Suspended Solids
UGA	Urban Growth Area
ULID	Utility Local Improvement Group
USFWS	U.S. Fish and Wildlife Service
UV	Ultra Violet
WAC	Washington Administrative Code
WAS	Waste Activated Sludge
WDFW	Washington Department of Fish and Wildlife
WRIA	Water Resource Inventory Area
WWCP	Wastewater Comprehensive Plan
WWTP	Westside Wastewater Treatment Plant

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Section 1 Executive Summary

1.1 Introduction

Bremerton Department of Public Works and Utilities (Bremerton) is responsible for providing wastewater service to the City of Bremerton and surrounding areas. Bremerton prepared this Wastewater Comprehensive Plan (WWCP) to review the adequacy of existing and future wastewater system capacity and to plan for improvements. The WWCP, also commonly referred to as a “general sewer plan”, fulfills the requirements of Washington Administrative Code (WAC) 173-240-020 and minimum WWCP content requirements outlined in WAC 173-240-050.

The previous WWCP was completed in August 2005, and adopted through Resolution No. 2979 by the City Council on September 21, 2005. This 2014 WWCP updates the previous WWCP and uses a 20-year planning horizon from 2014 to 2033. Periodic plan review and revisions may be necessary to address changes in regulations or system conditions.

1.2 Service Area and System Description

Bremerton is located in the central part of Kitsap County about 15 miles west of Seattle, just southwest of Bainbridge Island. Bremerton is located on the west side of Puget Sound and is surrounded by two waterways, Sinclair Inlet and Dyes Inlet. Port Washington Narrows connects Sinclair and Dyes Inlet and separates Bremerton into two portions. The northeastern portion of the City is commonly called East Bremerton and the southwestern portion of the City is commonly called West Bremerton.

Bremerton provides sewer service to West Bremerton, East Bremerton, and surrounding areas of unincorporated Kitsap County. Bremerton also receives 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. Bremerton’s general land use classifications updated in GIS in 2010 indicate that the City is approximately 28 percent residential, 24 percent industrial, 9 percent commercial, civic/institutional, and mixed use, and 39 percent utility land/watershed.

The main components of Bremerton’s sewer system are as follows:

- **Sewer Basins:** Twenty-two sewer basins; six in East Bremerton with a sewered area of 1,660 acres, and sixteen in West Bremerton with a sewered area of 5,360 acres. In East Bremerton, all six basins are combined sewer systems that are partially separated with storm water facilities in the right-of-way. In West Bremerton, two basins are contract customers PSNS and KCSD No. 1, four are combined with storm water facilities in the right-of-way, and ten are separated.
- **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, concrete cylinder, and ductile iron pipe.
- **Pump Stations**: Thirty-nine sewer pump stations including the two Kitsap County Basins WB1 and WB2.
- **Odor Control Stations:** Seven odor control stations throughout the collection system.
- **CSO Outfalls:** Fifteen CSO outfalls for discharging untreated combined sewer flows into Puget Sound during extreme wet weather events.

- **Westside Wastewater Treatment Plant (WWTP):** One conventional wastewater treatment plant for treating dry weather flows and the majority of wet weather flows.
- **Eastside CSO Treatment Plant (ETP):** One high rate clarification and UV disinfection treatment facility for treating excess flows during some heavy wet weather conditions.

1.3 Historical and Projected Flow and Loads

1.3.1 Historical Flow and Loads

Monitoring was conducted at the WWTP for influent flow and load characteristics. The following are flow averages between 2010 and 2012 from discharge monitoring reports:

- Average Dry Weather Flow: 3.6 mgd.
- Average Annual Flow: 4.7 mgd.
- Maximum Month (May – Sep) Average Flow: 4.1 mgd.
- Maximum Month (Oct – Apr) Average Flow: 9.6 mgd.
- Maximum Day Flow: 25.5 mgd.

Average day and maximum month loads for Biological Oxygen Demand (BOD) and Total Suspended Solids (TSS) between 2010 and 2012 are listed below:

- BOD Average Day: 7,300 lb per day.
- BOD Maximum Month Average: 8,500 lb per day.
- TSS Average Day: 7,900 lb per day.
- TSS Maximum Month Average: 9,500 lb per day.

1.3.2 Projected Flow and Loads

Average dry weather flow is also referred to as sanitary sewer flow. Sanitary sewer flow projections were developed by applying the sewer flow factors, 71 gallons per person per day and 35 gallons per employee per day, to demographic projections for Bremerton's sewer service area. The projections were generated for each sewer basin level and for two sectors (residential and non-residential), and the results were aggregated to the entire sewer service area.

Demographics developed for Bremerton's sewer service area are based on two documents from the County and the City. The first document is the *Kitsap County Comprehensive Plan*, which was adopted in 2006, with the most recent updates being reflected in the *2012 Kitsap County UGA Sizing and Composition Remand*. The second document is the *Bremerton Comprehensive Plan*, which was adopted in 2004, and most recently updated in 2010.

The 2013 population served by Bremerton is estimated to be 38,308, and the service area population is estimated to increase to 56,803 by 2033. The current employment within the City's service area is estimated to be 34,302 employees, with an increase to 54,467 employees by 2033.

In addition to demographic growth within the existing service area, Bremerton anticipates providing sewer to nine new service areas that are currently unsewered. These areas are Marine Drive, Port Blakely, Rocky Point, West Hills, State Route (SR) 304 (Sherman Heights), Trenton, Tracyton, Tracyton Beach, and Puget Sound Industrial Center (PSIC) formerly referred to as South Kitsap Industrial Area (SKIA).

Figure 1-1 depicts the sanitary sewer flow projection developed for this WWCP.

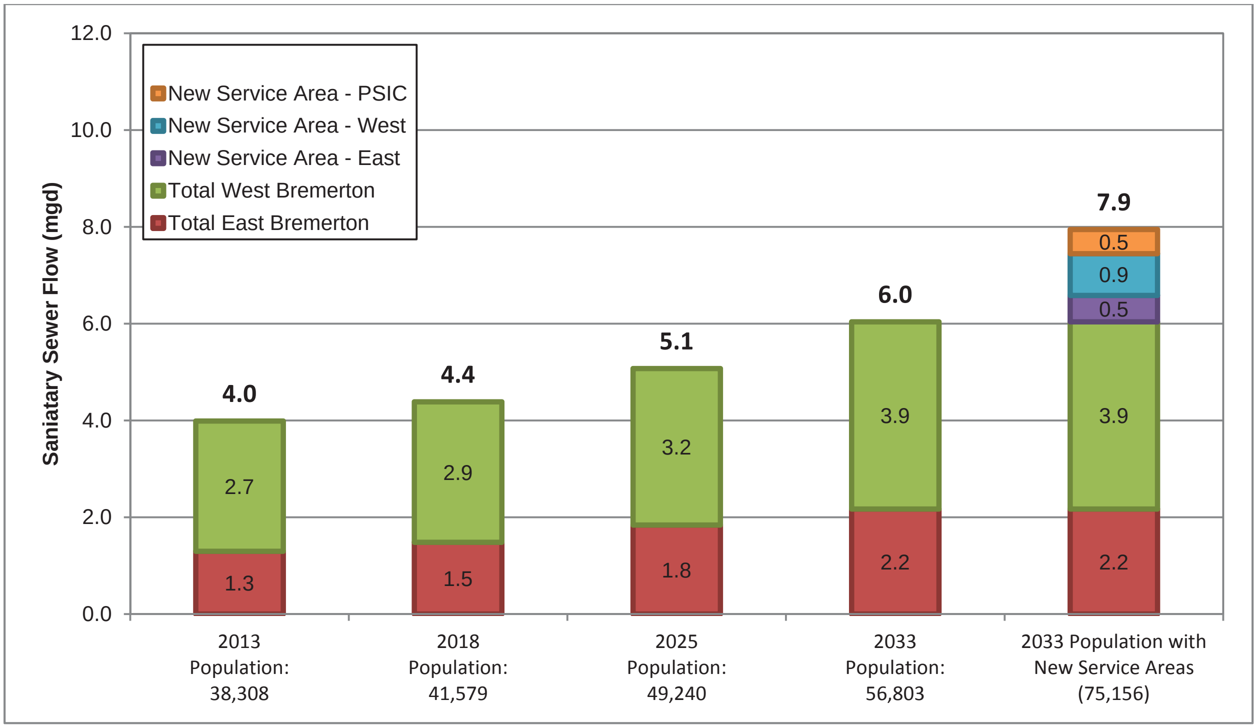

Figure 1-1. Sanitary Sewer Flow Projections

The projected influent flows to the WWTP consist of the sanitary sewer flow projections (i.e., average dry weather flows) and infiltration and inflow (I&I) that defines the annual average, maximum month, and maximum day flows. The projected influent flows to the WWTP are presented in Table 1-1. Flows from PSIC are excluded from this figure as treatment facilities will be constructed in the basin.

Table 1-1. WWTP Influent Flow Projections

YEAR	FLOW				
	Average Day Dry Weather	Average Annual	Max Month (May-Sep)	Max Month (Oct-Apr)	Max Day
	Mgd	mgd	Mgd	mgd	mgd
Permit Limit	NA	NA	11.0	15.5	NA
2013	4.0	5.2	4.5	10.0	27.0
2018	4.4	5.6	4.9	10.4	27.4
2025	5.1	6.3	5.6	11.1	28.1
2033	6.0	7.2	6.5	12.0	29.0
2033 with New Service Area	7.4	9.2	8.1	15.4	36.0

The future average daily and maximum month BOD and TSS loads are calculated using a ratio of the projected (2033) average annual flow over the current (2010-2012) average annual flow of 4.7 mgd. This assumes the average day and maximum month BOD and TSS will increase in proportion to the average annual flow. The projected loads to the WWTP are presented in Table 1-2.

Table 1-2. WWTP Influent Load Projections

YEAR	FLOW	BIOCHEMICAL OXYGEN DEMAND		TOTAL SUSPENDED SOLIDS	
	Average Annual	Average Daily BOD	Max Month BOD	Average Daily TSS	Max Month TSS
	mgd	lb	lb	lb	lb
Permit Limit	NA	NA	18,100	NA	22,600
2013	5.2	7,900	9,200	8,600	10,300
2018	5.6	8,500	10,000	9,200	11,100
2025	6.3	9,500	11,200	10,400	12,500
2033	7.2	10,900	12,800	11,900	14,300
2033 and New Service Area	9.2	13,900	16,400	15,100	18,300

1.4 Collection System Evaluation

A hydraulic model of the major interceptor and sewer conveyance facilities was developed for the WWCP to conduct analyses of the City's wastewater collection system in the combined sewer area, while spreadsheet calculations were used to analyze the separated sewer basins by evaluating the projected flow response at pump stations, force mains, and interceptors. The sanitary sewer flow projections and recent monitoring of flow response due to I&I provided sufficient information to determine the impact from future growth and expansion upon the separated portions of the system.

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 by using rainfall data from three storms that occurred during the fall of 2012 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, outfalls, and the ETP.

The model was then used to simulate the flow response in the model due to population growth and expansion of sewer service to unsewered areas. Table 1-3 lists the facilities analyzed in the collection system evaluation and the new service areas affecting each facility. The collection system evaluation estimated the impact to each structure and recommended alternatives for improvement where necessary.

Table 1-3. Collection Facilities Evaluation

FACILITIES EVALUATED	NEW SERVICE AREAS AFFECTING
Crosstown Pipeline	Trenton, Tracyton, Tracyton Beach, Rocky Point, and Marine Drive
CE-4	Rocky Point and Marine Drive
Eastside Treatment Plant, CE-1, East Bremerton Beach Main	Trenton, Tracyton, and Tracyton Beach
EB-2	Trenton
EB-6	Tracyton and Tracyton Beach
Kitsap Lake Pump Stations	Port Blakely
WB-3 and WB-6	Rocky Point and Marine Drive
PB-1	Portion of Rocky Point

1.5 Treatment Facilities Evaluation

A new National Pollution Discharge Elimination System (NPDES) Permit was issued by the Washington State Department of Ecology (Ecology) on June 21, 2013, and became effective August 1, 2013. The WWTP is currently permitted for a maximum month average flow of 15.5 mgd during the wet season months (October – April) and 11.0 mgd during the dry season months (May – September). The WWTP has been in compliance with all discharge standards since 2005. The permit requires Bremerton to begin planning for expansion when the actual flow reaches 85 percent of the permit capacity for three consecutive months. With anticipated growth in the existing system and assuming full expansion into new service areas, the projected dry weather flow in 2033 is 7.4 mgd and maximum month average flow is 15.4 mgd. The flow projection suggests the maximum month flow may approach the permitted limit of 15.5 mgd by the year 2033; however, it is unlikely that that the projected flow will reach this level within 20 years for the following reasons:

- The population projection based on the Kitsap County Remand predicts the City of Bremerton population will have a total increase of 50 percent by the year 2033. The actual population growth between 2000 and 2010 was a total increase of 1.2 percent over 10 years. The population projections developed by the County may be conservatively high when considering the population growth between 2000 and 2010.
- Water usage has declined in the City of Bremerton due to conservation. The average household water usage between 2000 and 2005 was 200 gpm, which decreased to 145 gpd in 2013. The average dry weather flow factors are based on water usage and the flow projections developed for the PSIC, Rocky Point, Port Blakely, Marine Drive, and SR 304 new service areas utilized the higher water usage of 200 gpd per household which is conservatively high.
- The expansion of new service areas is dependent on grant and or Utility Local Improvement District (ULID) funding. The total cost of constructing sewage facilities for the new service areas is estimated to be $108 million and it is likely that only a fraction of the projects will be completed by 2033.

The City monitors flow to the WWTP and would begin planning for expansion of the WWTP when flow reaches 85 percent of the permit capacity for three consecutive months.

This WWCP does not anticipate more restrictive discharge requirements will be imposed in the foreseeable future. The current permitted limits for maximum month BOD and TSS are 18,100 lb per day and 22,600 lb per day respectively. The mass limits are not expected to be exceeded over the period covered in this WWCP.

1.6 Capital Improvement Program

Capital improvement projects are recommended based on the capacity analysis of the collection system, available condition assessment information, and infrastructure needed to expand sewer service to unsewered areas.

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

- **Sewer Conveyance Improvements:** Replacement or repair of existing pipelines to correct existing conveyance deficiencies or to convey future flows.
- **New Service Area Improvements:** Installation of sewer infrastructure to provide sewer service to the new service areas: Marine Drive, Rocky Point, SR 304 Area, PSIC, West Hills, Trenton, Tracyton, Tracyton Beach, and Port Blakely.
- **Facility and Equipment Improvements:** Rehabilitation, replacement, or upgrades to building, equipment, and facilities. This includes specific projects to improve pump stations, surge tanks, and warehouses, and provide emergency generators.
- **Treatment Improvements:** Rehabilitation, replacement, or upgrades to treatment plant infrastructure.
- **Operations and Maintenance Improvements:** Annual programs for substandard main replacement, main cleaning, miscellaneous equipment improvements, metering upgrades, pump station improvements, and cured-in-place pipe (CIPP) rehabilitations. This also includes additional projects that improve the operation and maintenance of the sewer system.

A summary of the recommended CIP project costs is provided in Table 1-4. Basins plans are provided in Appendix C with detailed descriptions of each project in the CIP.

Table 1-4. CIP Summary

IMPROVEMENT TYPE	SCHEDULE OF IMPROVEMENTS (2015 $1,000S)							
	2015	2016	2017	2018	2019	2020	6-Year Total	Beyond 2020
Sewer Conveyance	$1,910	$2,525	$3,550	$0	$150	$2,700	$10,835	$19,160
New Service Area	$0	$1,765	$10,490	$5,510	$2,390	$2,390	$22,545	$104,259
Facility and Equipment	$100	$1,400	$600	$0	$0	$0	$2,100	$4,500
Treatment	$2,805	$525	$250	$0	$50	$3,150	$6,780	$0
Operations and Maintenance	$1,695	$1,920	$1,920	$1,886	$1,886	$1,670	$10,977	$2,030 (1)
Total CIP	$6,510	$8,135	$16,810	$7,396	$4,476	$9,910	$53,237	$129,949

1. Average annual cost of ongoing Operations and Maintenance programs is $1,780.

A financial plan was developed for the City's sewer system revenue and expenses shown in Table 1-5. In order to fund the expenses of the sewer system, rate increases of 3.5 percent in 2015 and 2016 and 4.0 percent in 2017 through 2020 are required.

Table 1-5. Financial Plan

SOURCES OF REVENUE	2015	2016	2017	2018	2019	2020
Sources of Revenue						
Rate Revenue	$13,159	$13,258	$13,357	$13,457	$13,548	$13,643
Miscellaneous Revenue	454	456	466	468	470	473
Total Revenue	$13,614	$13,714	$13,823	$13,925	$14,019	$14,116
Expenses						
O&M Expenses	$6,747	$6,971	$7,207	$7,454	$7,715	$7,985
Taxes	3,067	3,089	3,112	3,135	3,156	3,266
Debt Service (P+I)	3,394	3,679	4,222	4,164	4,507	4,453
Rate Funded Capital	800	800	1,000	1,300	1,300	1,500
Total Revenue Required	$14,007	$14,540	$15,540	$16,053	$16,678	$17,204
Balance/(Deficiency)	(394)	(745)	(1,637)	(2,048)	(2,659)	(3,088)
Rate Adjustment	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%
Additional Revenue	$714	$1,098	$1,577	$2,041	$2,550	$3,086
End Balance/(Deficit)	$320	$352	($80)	($7)	($109)	($2)

1.7 Operations and Maintenance

The Wastewater Utility falls under the authority of the Director of Public Works and Utilities. The operations and maintenance responsibilities have been divided between the Wastewater Manager and the Utilities Operations Manager who both report to the Director.

There are 16 personnel that work under the supervision of the Wastewater Manager. There are currently 7 employees who have the responsibility for plant operations, and 8 employees that are responsible for pump station and plant maintenance. There are 10 personnel that work under the supervision of the Utility Operations Manager that are responsible for the maintenance of both the wastewater and stormwater collection systems.

Operation and maintenance of the wastewater system is typically completed by City staff with City-owned equipment. They are responsible for the operation and maintenance of wastewater and stormwater collection systems, treatment facilities and pump stations, and data collection and management.

Since 2005, Bremerton has constructed three new pump stations (SB-1, SB-3, and SB-4), and expanded the collection system by over 25 miles. No additional staff have been added to operate and maintain these new and expanded facilities; therefore, overall operations and maintenance of the utility infrastructure have been affected. Staff has scaled back maintenance activities in order to meet typical day-to-day operational demands.

In addition to current maintenance activities, the following is a list of proposed programs and additional staffing needs as required:

- **Collection System Evaluation:** This program continues systematic inspection of all pipes and structures within the collection system to identify structural deficiencies and develop rehabilitation actions. A total of approximately 23 miles of collection system has been inspected annually between 2009 and 2012.
- **Inflow and Infiltration Reduction:** This program would target and reduce sources of inflow and infiltration to allow for growth, reduce pumping and treatment costs, and provide a “buffer” or “safety factor” that will ensure continued compliance with CSO regulations. No additional staffing needs are specified. Projects have been added to the capital projects list and will be constructed by contractors.
- **Beach Main and Inverted Siphon Cleaning:** This program would clean beach mains, inverted siphons, and other critical components of the conveyance system. After an initial cleaning has been completed, regular cleaning of these critical pipelines should be scheduled at a frequency of once every 5 years.

1.8 Implementation

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 assess the effectiveness of its improvements to the sewer system and expansion of sewer service to new service areas. 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

2.1 Background

Bremerton Department of Public Works and Utilities is responsible for providing wastewater service to Bremerton and surrounding areas. Bremerton prepared this WWCP to review the adequacy of existing and future wastewater capacity and to plan for wastewater system improvements. The WWCP, also commonly referred to as a “general sewer plan”, fulfills the requirements of Washington Administrative Code (WAC) 173-240-020 and minimum WWCP content requirements outlined in WAC 173-240-050.

The previous WWCP was completed in August 2005 and adopted through Resolution No. 2979 by the City Council on September 21, 2005. This 2014 WWCP updates the 2005 plan and uses a 20-year planning horizon from 2014 to 2033. Periodic plan review and revisions may be necessary to address regulation changes or other changes in conditions.

2.2 Regulatory Requirements

This WWCP addresses relevant federal, state, county, and local regulatory requirements.

2.2.1 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 requirements over wastewater collection, treatment, and disposal. The CWA gave the United States Environmental Protection Agency (EPA) the authority to implement pollution control programs such as setting wastewater standards. 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) administers and enforces the CWA.

Federal regulations for biosolids treatment and disposal are contained in Title 40 Part 503 of the Code of Federal Regulations (CFR). Biosolids, as defined by EPA Part 503 regulations, are divided into two classifications, Class A and Class B, based on the resulting pathogen density level achieved by the treatment process.

Class A biosolids must meet strict pathogen standards and can be used with no restrictions, while Class B biosolids must meet less stringent pathogen requirements, with application restricted to crops with limited human and animal exposure. Biosolids in both classes must meet VAR requirements. All biosolids that are to be land applied for beneficial use must meet the requirements of one of these classifications.

The EPA has established minimum requirements for states to use in enacting regulations for wastewater reuse and reclamation.

2.2.2 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.

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)

Chapter 173-240 implements the “plans and specifications” from RCW 90.48.110 and include the requirements for engineering reports, plans and specifications, and general sewer plans. WAC Chapter 173-240 includes the following:

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

Combined Sewer Overflow (CSO) regulations are addressed in the RCW 90.48.480 and WAC Chapter 173-245. These regulations call for “the greatest reasonable reduction in CSOs at the earliest possible date.” The WAC Chapter 173-245 regulations developed from this law allow only one CSO per year per CSO site. The CSO regulations have been addressed in Bremerton’s CSO Reduction Plan, October 2000 and in the Addendum to the CSO Reduction Plan, July 2003. Bremerton has achieved compliance with the regulations as indicated in the CSO Annual Report of 2012.

Mirroring associated federal regulations, WAC 173-308 and WAC 173-351 govern the management, beneficial use, and disposal of biosolids generated by wastewater treatment processes.

Title 90.46 of the RCW establishes Washington State law governing the use of reclaimed wastewater including treatment requirements according to types of use.

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 Chapter 365-195 and require all counties and cities with specified populations and growth rates to meet the requirements of the GMA. One of the requirements of the GMA is development of a comprehensive plan. 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 and WAC 365-195-315. 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.
- A requirement to reassess the land use element if the probable funding falls short.

General Sewer Plans

A general sewer plan as defined in WAC 173-240-020 is “a comprehensive plan for a system of sewers adopted by a local government entity.” General sewer plans should include the general location and description of the following:

- Treatment and disposal facilities.
- Trunk and interceptor sewers.

- Pumping stations.
- Monitoring and control facilities.
- Local service areas and a general description of the collection system to serve these areas.

The required contents of a general sewer plan are further described in WAC 173-240-050. This WWCP has been developed to comply with the above federal and state regulations.

2.3 Compliance Status

EPA has delegated responsibility for administering CWA National Pollution Discharge Elimination System (NPDES) permits to the State of Washington. Bremerton's NPDES Permit (WA-002928-9) (Appendix A) was issued on June 21, 2013.

The WWTP has met weekly and monthly effluent BOD & TSS permit standards since 2005. The WWTP has also received an Outstanding Performance Award from Ecology for the past eight consecutive years (2005-2012). More detailed information on specific permit compliance issues are discussed in Section 5.

In 1993, Ecology issued Order on Consent No. 93WQ-150 to the City of Bremerton; this order set out the schedule for completing the individual elements in the City's CSO Reduction Plan. Ecology determined all projects listed in the "Order on Consent" were completed on February 17, 2011.

Additionally, in 1992 the Puget Soundkeeper Alliance sued the City of Bremerton to implement CSO measures under the Federal Clean Water Act. As a result, the City settled the suit with a Federal Consent Decree requiring implementation of the City's CSO Reduction Plan. On May 11, 2011, the US District Court terminated the Consent Decree as requested by the City and Puget Soundkeeper Alliance.

2.4 Planning Information Sources

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

- Population:
  - United States Census Bureau, 2010 census data.
  - Kitsap County-Wide Planning Policy, December 15, 2003.
- Land Use:
  - Kitsap County Comprehensive Plan, 2012.
  - City of Bremerton Comprehensive Plan, December 2004.
  - City of Bremerton Zoning Ordinance, November 30, 2005.
- Drinking Water Impacts:
  - City of Bremerton Water System Plan, 2005.
- Water Quality Plans:
  - City of Bremerton CSO Reduction Plan, October 2000.
  - City of Bremerton Pacific Avenue Basin Predesign Report, July, 2003.
  - City of Bremerton CSO Annual Report for 2012.

2.5 Plan Organization

The objective of the WWCP is to summarize planning strategies, policies, and regulatory compliance efforts for the Bremerton wastewater utility. The WWCP establishes long-term system planning and service criteria and evaluates the capacity, condition, and regulatory compliance of Bremerton's wastewater utility facilities in accordance with the Washington State Growth Management Act and Bremerton's Comprehensive Plan.

Specific plan components include:

- **Executive Summary (Section 1).**
- **Introduction (Section 2)** – Summarizes the relevant background information, provides descriptions of the existing system including applicable regulatory and other requirements, and identifies related documents and planning information sources.
- **Service Area and System Description (Section 3)** – Provides a description of the surrounding vicinity characteristics, the sewer service area, and the current infrastructure.
- **Historical and Projected Flows and Loads (Section 4)** – Documents existing and anticipated future population, land use, sewer flows and loads, and utility impacts throughout the sewer service area.
- **Collection System Evaluation (Section 5)** – Presents an evaluation of necessary system improvements to the sanitary sewer system based on proposed expansion of the City's sewer service area to include new service areas.
- **Treatment Facilities Evaluation (Section 6)** – Establishes relevant planning and design criteria and assesses the potential impacts of anticipated sewage flows on treatment processes and facilities with regard to treatment standards and requirements. Identifies treatment and process improvements necessary to accommodate anticipated waste flows and loadings, including those necessary for proper and beneficial use and disposal of effluents and solids.
- **Capital Improvement Program (Section 7)** – Summarizes, schedules, and prioritizes improvements identified in the WWCP to include implementation and cost estimates.
- **Financial Analysis (Section 8)** –Includes a financial analysis of the current revenues and expenditures to assess financial resources and requirements.
- **Operations and Maintenance (Section 9)** – Describes the Utility's organization and operation and maintenance procedures and programs.
- **Implementation (Section 10)** – Discusses the process to be followed to coordinate and implement WWCP, and the environmental impact from the implementation of this and future WWCPs.

Section 3 Service Area and System Description

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

3.1 Surrounding Vicinity Characteristics

3.1.1 City of Bremerton

Bremerton is located in the central part of Kitsap County about 15 miles west of Seattle, just southwest of Bainbridge Island. Bremerton is located on the west side of Puget Sound and is surrounded by two waterways, Sinclair Inlet and Dyes Inlet. Port Washington Narrows connects Sinclair and Dyes Inlet and separates Bremerton into two portions. The northeastern portion of the City is commonly called East Bremerton and the southwestern portion of the City is commonly called West Bremerton. Figure 3-1 illustrates the City and the surrounding vicinity characteristics.

3.1.2 Topography

The Kitsap County area lies in a structural downfold between two mountain ranges known as the Puget Trough or Puget Sound Lowland. The county is located in a long, narrow, irregular-shaped part of the Kitsap Peninsula and is indented by many bays and smaller inlets that form a very long, irregular-shaped coastline. Waters of the Puget Sound bound all except the southern part of the county. The relief of the area is moderately subdued with undulating to rolling lowlands.

3.1.3 Geology and Soils

Bremerton is part of the Puget Lowland, and is part of the large glacial drift plane. This plane is characterized by the low, gently rolling north-south trending ridges that are separated by valleys and marine embayment. This area is mantled by glacial till underlain by older glacial and interglacial deposits. The till in this area ranges in depths from several to 100 feet in depth. Tills are generally composed of cobbles and coarse gravel bound in clays, silts, and sands and is usually very dense.

Underlying the till, from Bainbridge Island to Bremerton, are the Blakely Formation sediments. The Blakely Formation is composed of massive to moderate bedded, dark reddish-brown cobble to boulder conglomerate in well-cemented matrix of coarse-grained, poorly sorted sandstone. Sandstone and conglomerate are composed of subangular to well-rounded groups of basalt, andesite, hard well-cemented basaltic sandstone, dark gray siltstone, and a few quartzite and metamorphic rock fragments. Thin layers of lighter gray-brown clay mudstone, carbonaceous siltstone, and coal are interbedded. From Bremerton west there is a large outcrop of areas of Eocene Crescent volcanic rocks.

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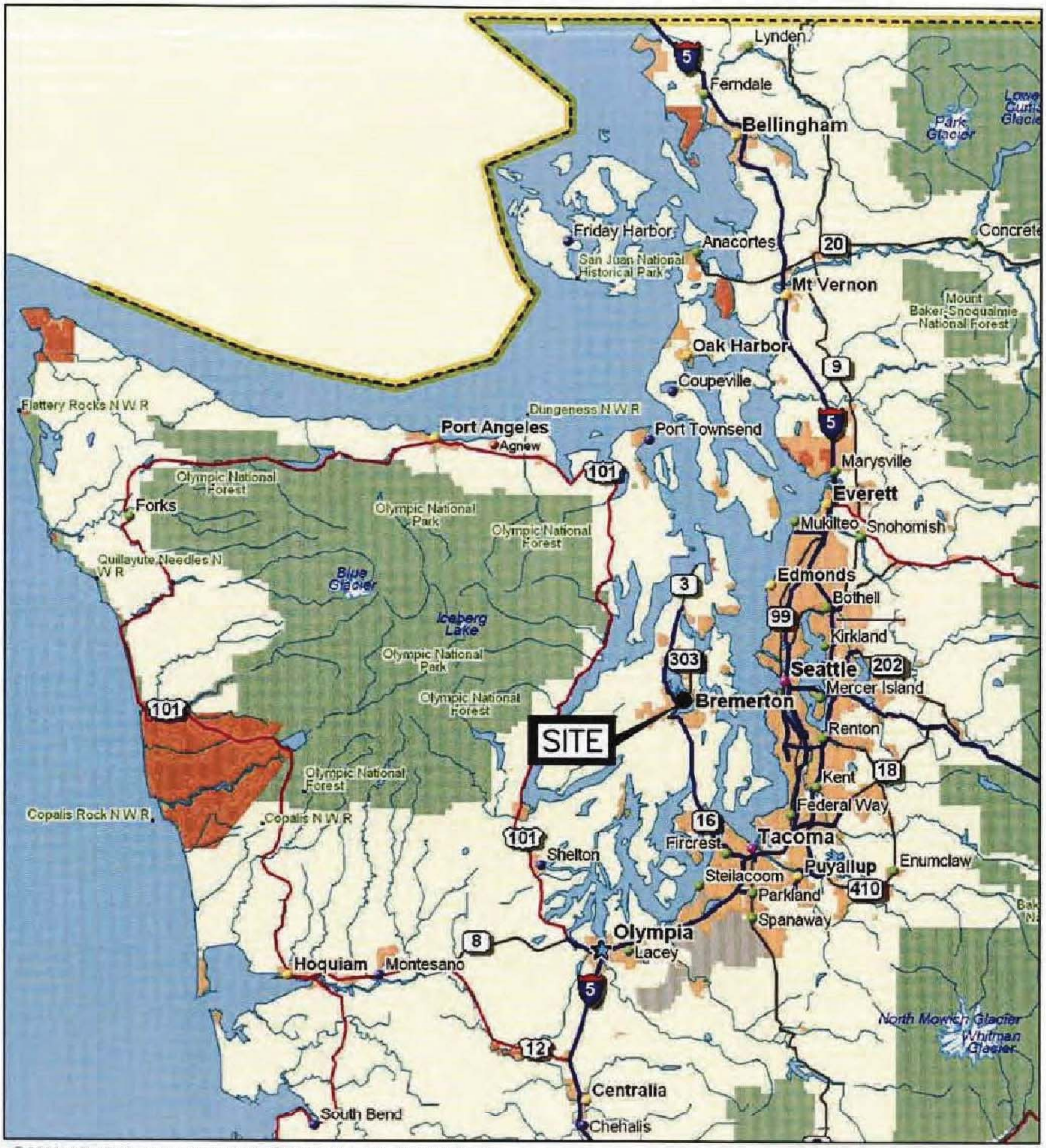

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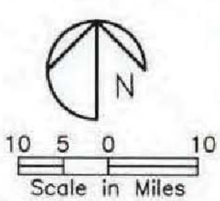

Figure 3-1
Location Map
CITY OF BREMERTON
WWCP UPDATE

HDR

CITY OF BREMERTON

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3.1.4 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. Precipitation in the county ranges from just under 30 inches per year in the north to almost 70 inches per year in the southwest portion. On a seasonal basis, nearly 80 percent of the precipitation in Bremerton occurs in the 6-month period from October through March. Precipitation as snowfall occurs infrequently and is generally light, at a depth that seldom exceeds 3 to 6 inches in the lower elevations. Snowmelt typically occurs within the first 24 hours after a snowstorm.

The Puget Sound Clean Air Agency (PSCAA) is the regional air quality management agency for Kitsap County. PSCAA represents the U.S. Environmental Protection Agency, 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.

3.1.5 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 waters 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 (173-201A WAC). Table 3-1 lists these designations and parameters.

Table 3-1. Water Resource Designations

DESIGNATION	PARAMETERS
Aquatic Life Uses	Fresh waters: Char Spawning/Rearing, Core Summer Habitat, Spawning/Rearing, Rearing/Migration Only, Redband Trout, Warm Water Species
	Marine waters: Extraordinary, Excellent, Good, Fair
Recreational Uses	Fresh waters: Extraordinary Primary Contact, Primary Contact, Secondary Contact
	Marine waters: Primary Contact, secondary Contact
Water Supply Uses	Fresh waters: Domestic, agricultural, industrial, and stock watering.
Shellfish Harvesting	Marine waters

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 (173-201A WAC). The following fresh water bodies are within the Sinclair Inlet Watershed:

- Anderson Creek
- Annapolis Creek
- Beaver Creek
- Blackjack Creek
- Gorst Creek
- Karcher Creek
- Ross Creek
- Ruby Creek (a tributary to Blackjack Creek)
- Sacco Creek

Dyes Inlet Watershed

The Dyes Inlet Watershed is located west of Bremerton in central Kitsap County. Surface waters of this watershed are primary contact as designated by the State of Washington (173-201A WAC). The following fresh water 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

Drinking Water Resources Management Area

The head waters of the Union River have been impounded to form Bremerton's main water supply. Approximately 65 percent of Bremerton's potable water comes from the Union River. Additional water comes from wells located near Anderson Creek and Gorst Creek (both creek's are located within the Sinclair Inlet Watershed) and from wells in the Central Kitsap area to the north of East Bremerton.

There are also individual private wells within the sewer service area that provide water supply to individual residences and businesses.

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 (173-201A WAC).

Dyes Inlet and Port Washington Narrows

The Port Washington Narrows flows between Dyes and Sinclair Inlet's. Strong currents, associated with the tidal cycles, characterize 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 water and habitat quality. Dyes Inlet and Port Washington Narrows are classified as being of excellent quality for Aquatic Life Uses, supports shellfish harvest, and is a primary contact for recreational uses according to the State of Washington (173-201A WAC).

Other Water Resources

The waters within Bremerton's service area have differing water quality due to natural conditions as well as 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 3-2.

Table 3-2. Major Water Resources

WATER BODY	CURRENT WATER QUALITY
Kitsap Lake (1)(2)	Worsening
Sinclair Inlet (1)(3)	Excellent
Dyes Inlet (1)(3)	Excellent
Port Washington Narrows (1)(3)	Excellent
Chico Creek	Improving
Gorst Creek (1)	Improving
Anderson Creek	Stationary
Union River	Stationary

Source: Kitsap Co. Health Dist. (SSWM) 2012 Water Quality Monitor Report
(1) Water body is 303(d) listed for fecal coliform bacteria
(2) Water body is 303(d) listed for phosphorous
(3) Water body is 303(d) listed for heavy metal, organic, and/or inorganic parameters

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 Bremerton down into three flood zones. FIRM zones and areas include:

- **Zone A1*:*** Defined as areas of 100-year flood; base flood elevations and flood hazard factors determined. This zone includes the entire City coastline and Kitsap Lake (shoreline, el. 10) (Kitsap Lake, el. 159).
- **Zone B**: Defined as areas between limits of the 100-year flood and 500-year flood; or certain areas subject to 100-year flooding with average depths less than one foot or where the contributing drainage area is less than one square mile; or areas protected by levees from the base flood. A small 5 or 6 block area south of Kitsap Way (low area) is considered Zone B.
- **Zone C:** Defined as areas of minimal flooding. This zone designation includes the rest of Bremerton.

The City recognizes that a rise in sea level could impact existing sewer facilities, particularly in low lying areas and at outfalls from the combined basins, WWTP, and ETP. An evaluation of the impact to the sewer system due to sea level rise will be addressed in the next WWCP.

3.1.6 Wildlife and Endangered Species

The following threatened, endangered, proposed, or candidate species listed in Table 3-3 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 3-3. Threatened, Endangered, Proposed, and Candidate Species Identified as Potentially Occurring within the Project Area

COMMON NAME	SCIENTIFIC NAME	FEDERAL STATUS	STATE STATUS
Marbled murrelet	*Brachyramphus marmoratus marmoratus*	Species Threatened	Threatened
Chinook salmon (Puget Sound ESU)	*Oncorhynchus tshawytscha*	Species Threatened	Candidate
Steelhead	*Oncorhynchus mykiss*	Species Threatened	NA
Bulltrout	*Salvelinus confluentusconfluentus*	Species Threatened	Candidate

Source: WDFW 2013

Sinclair Inlet, Port Washington Narrows, and the adjacent Dyes Inlet are considered environmentally sensitive areas.

3.2 Sewer Service Area

Bremerton provides service to the City of Bremerton Urban Growth Area. The sewer service area is shown in Figure 3-2. In addition to providing retail sewer service in these areas, Bremerton also accepts sewer flows from the U.S. Navy Puget Sound Naval Shipyard (PSNS) and Kitsap County Sewer District No. 1 (KCSD No. 1). Also indicated in the figure are new service areas. These are predominantly unsewered areas to which the City anticipates extending sewer service in the future. Separate planning documents have been developed that document these areas in detail.

There are two areas within the existing sewer service area that are not located within a UGA boundary. One area is north of Kitsap Lake and the other is southwest of the lake. Both areas have existing sewer facilities serving current customers. The City has suspended selling new service in these areas pending modification of the UGA Boundaries which will be evaluated during Kitsap County's 2016 Comprehensive Plan Update process.

3.2.1 Land Use and Zoning

Bremerton's land use and zoning information was updated in 2010 and is divided into seven general land use classifications. Table 3-4 provides a summary of each classification with the approximate percentage of Bremerton's Urban Growth Area (UGA).

Table 3-4. Summary of Area by General Land Use Classification

GENERAL LAND USE CLASSIFICATION	PERCENT OF UGA
Civic/Institutional	0.2%
Commercial	1.8%
East Park Sub Area	0.3%
Industrial	23.8%
Mixed Use	7.0%
Residential Single Family	28.2%
Utility Land/ Watershed	38.7%

The industrial areas include the Port of Bremerton industrial park, the PSNS, the Bremerton National Airport, and the PSIC. Other than the PSNS and the airport, there are no major industries in the study area.

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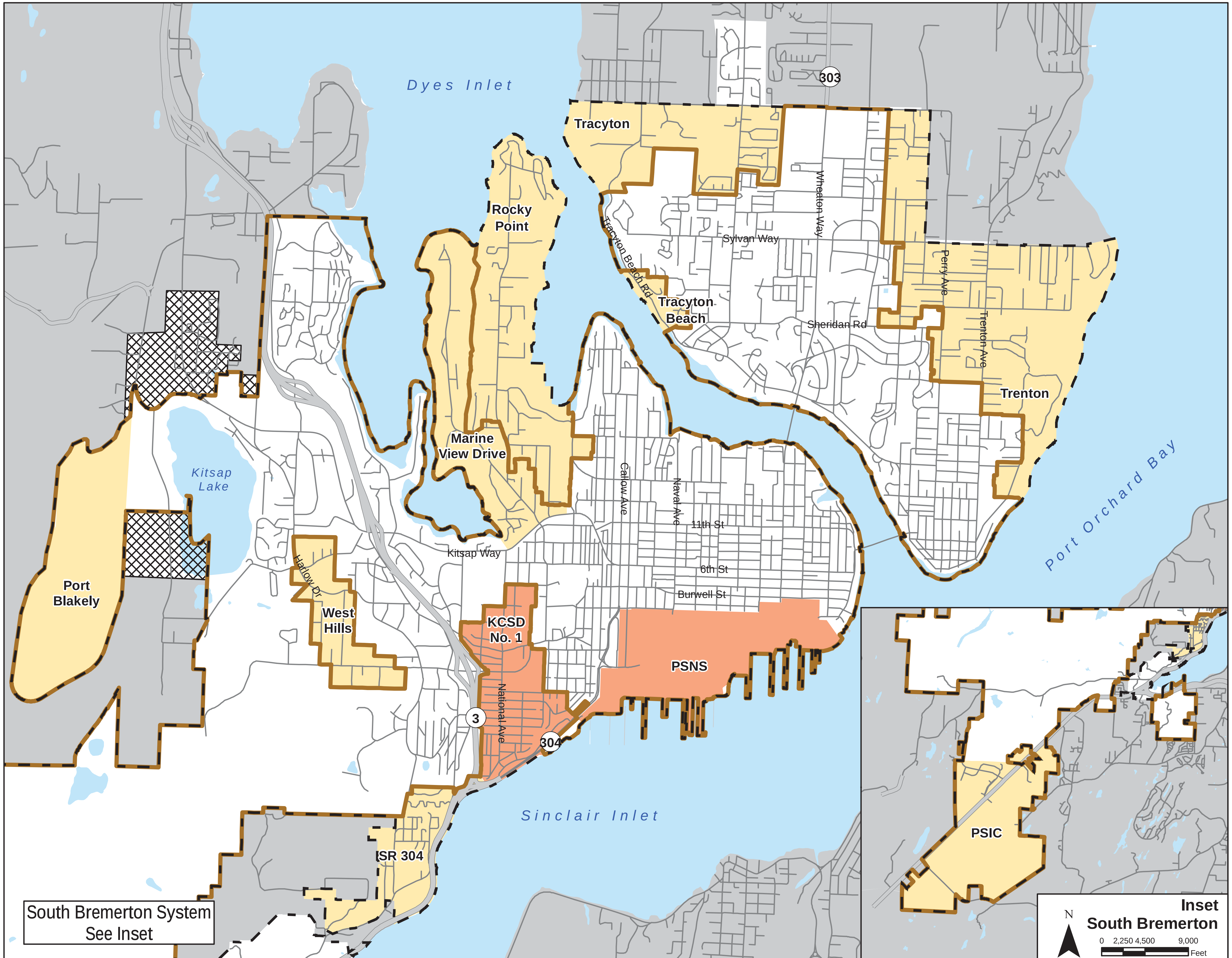

Document Path: D:\GISDATA\Projects\wash\Bremerton\Map_Docs\Comprehensive Sewer Plan\Plan Figures\Figure 3-2 - Sewer Service Area.mxd Print Date: 12/16/2014

Legend

- UGA Review Area
- Contract Customer
- New Service Area
- City of Bremerton
- Bremerton UGA
- Highway
- Streets

Note:
The City's sewer service area is indicated as a white background. It includes New Service Areas and UGA Review Areas indicated on the map.

The UGA Review Areas currently receive service, but the City has suspended selling service in these areas pending modification of the UGA Boundaries which will be evaluated during Kitsap County's 2016 Comprehensive Plan Update process.

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

HDR

CITY OF BREMERTON

Figure 3-2
Sewer Service Area

CITY OF BREMERTON
WWCP UPDATE

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Feet

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3.2.2 Service Agreements

The City has Negotiated Sewer Service Contracts with the U.S. Navy and Kitsap County Sewer District No. 1 (KCSD No. 1). The U.S. Navy agreement was updated in 2008 and the KCSD No. 1 agreement from 1992 remains in effect.

U.S. Navy

The U.S. Navy Contract includes metered discharges from the PSNS, Jackson Park family housing, and the Naval Regional Medical Center. 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 onsite sewage collection system for its 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. The Navy's contracted peak discharge is 2,500 gallons per minute (gpm) at Cambrian Avenue and 500 gpm at First Street.

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. All discharges are metered. 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. Bremerton is responsible for conveyance, treatment, and disposal of these contracted discharges from the point of connection to Bremerton's sewer system.

3.3 Infrastructure Description

3.3.1 Overview

Bremerton'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 sewer basins; six in East Bremerton with a sewered area of 1,660 acres, and sixteen in West Bremerton with a sewered area of 5,360 acres. In East Bremerton, all six basins are combined sewer systems that are partially separated with storm water facilities in the right-of-way. In West Bremerton, two basins are contract customers PSNS and KCSD No. 1, four are combined with storm water facilities in the right-of-way, and ten are separated.
- **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, concrete cylinder, and ductile iron pipe.
- **Pump Stations**: Thirty-nine sewer pump stations including the two Kitsap County Basins WB1 and WB2.
- **Odor Control Stations:** Seven odor control stations throughout the collection system.
- **CSO Outfalls:** Fifteen CSO outfalls for discharging untreated combined sewer flows into Puget Sound during extreme wet weather events.
- **Westside Wastewater Treatment Plant (WWTP):** One conventional wastewater treatment plant for treating dry weather flows and the majority of wet weather flows.
- **Eastside CSO Treatment Plant (ETP):** One high rate clarification and UV disinfection treatment facility for treating excess flows during some heavy wet weather conditions.

Since a portion of Bremerton's sewer collection system is composed of combined sewers, flows are derived from the following types of sources:

- Conventional sanitary sewage.
- Stormwater inflow.
- Groundwater infiltration, including rainfall-induced infiltration.

The hydraulic capacity of Bremerton's combined sewer collection system is sufficient to convey dry weather wastewater flows to the WWTP for treatment. Under heavy wet weather conditions, when the capacity of the conveyance system is exceeded, East Bremerton flows are directed to the ETP. The ETP has been designed to provide treatment for the East Bremerton sewer flows during wet weather storm events to meet Puget Sound water quality standards. During extreme wet weather storm events, combined sewer flows can exceed the hydraulic capacity of the combined sewer collection system, as well as both the WWTP and ETP. When this occurs, excess untreated combined sewer flows discharge to Puget Sound, which is called a combined sewer overflow (CSO).

3.3.2 Sewer Basins and Flow Routing

East Bremerton

There are six sewer basins in East Bremerton, as listed in Table 3-5 below and shown in Figure 3-4. They are combined sewer basins that are partially separated with storm water collection and conveyance installed within the right-of-way. The total basin area is 2,646 acres with an estimated sewered area of 1,660 acres.

Table 3-5. East Bremerton Sewer Basins

NAME	BASIN AREA(1)	PERCENT DEVELOPED(2)	PERCENT SEWERED(3)	SEWERED AREA(4)	COMBINED/ SEPERATED
Cherry Avenue	214	95%	82%	168	Combined
East Park	346	81%	88%	248	Combined
Pine Road	871	86%	82%	615	Combined
Stephenson Canyon	299	98%	96%	281	Combined
Tracyton Beach	187	76%	80%	114	Combined
Trenton Avenue	728	82%	39%	234	Combined
Total	2,646			1,660	

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 or way or undeveloped are excluded
4. Basin Area * % Developed * % Sewered

In the Tracyton Beach Basin, combined sewers discharge through Overflow Structure OF-6 to Pump Station EB-6 which delivers flows through an 8-inch-diameter force main to OF-1 in the Pine Road Basin. Similarly, in the Trenton Avenue Basin, the combined flow transits through OF-7 to Pump Station EB-3 and to Pump Station EB-2 which discharge to the beach main. During high flow events the East Bremerton beach main changes from gravity to pressure.

The Stephenson Canyon basin flows are conveyed directly to the 24-inch beach main through piping at Lent Landing (OF-2). As flows increase and surcharge the beach main, flow backs up to the ETP and OF-1. If the system begins to surcharge at OF-2, a tipping manhole along Lebo Boulevard allows reverse flow back to the ETP before an overflow occurs. There is approximately 100,000 gallons of storage win the piping between Lebo Boulevard and the ETP.

During low flow periods, all flow from East Bremerton is conveyed through the 16-inch and 24-inch inverted siphons under the Port Washington Narrows to pump station CE-1 for subsequent conveyance to the WWTP. Sluice gates have been installed on the inverted siphons at pump station CE-1. These sluice gates have the ability to isolate the flow from the siphons to ensure that inflow to pump station CE-1 does not exceed the station capacity, causing overflows at OF-13. As flows in the East Bremerton beach main increase, the limited capacity of the inverted siphons and throttling at CE-1 increase the hydraulic grade (HGL) in the beach main. The HGL will rise to the point that the flow north of the inverted siphons will reverse, conveying the surcharged flow to a storage facility located at the ETP. When the storage vault fills and the HGL rises to the overflow into the ETP, sewer flow is treated and discharged through the old Manette Primary Plant outfall to the Port Washington Narrows.

West Bremerton

There are sixteen sewer basins in West Bremerton, as listed in Table 3-6 and shown in Figure 3-4. 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 basin of the West Bremerton sewer basins is 10,100 acres with an estimated sewered area of 5,360 acres.

Table 3-6. West Bremerton Sewer Basins

NAME	BASIN AREA(1)	PERCENT DEVELOPED(2)	PERCENT SEWERED(3)	SEWERED AREA(4)	COMBINED/ SEPERATED/ CONTRACT
Anderson Cove	385	97%	98%	368	Combined
Anderson Hill Road	470	67%	18%	58	Separate
Callow Basin	644	95%	93%	566	Combined
Gorst	333	48%	57%	91	Separate
Kitsap Lake	996	57%	71%	400	Separate
Marine Drive	244	92%	22%	49	Separate
Oyster Bay	958	90%	86%	742	Separate
Pacific Basin	78	93%	83%	60	Combined
Phinney Bay	86	90%	94%	72	Separate
PSNS	385	100%	98%	377	Contract
KCSD No. 1	275	85%	71%	165	Contract
Rocky Point	423	86%	0%	0	Separate
Sherman Heights	209	54%	44%	50	Separate
Sinclair Park	875	54%	75%	351	Separate
PSIC	3,430	52%	97%	1,738	Separate
Warren Avenue	309	96%	92%	274	Combined
Total	10,100			5,360	

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 or way or undeveloped are excluded
4. Basin Area * % Developed * % Sewered

In West Bremerton, combined sewer flows from the Pacific Avenue, Warren Avenue, Anderson Cove, and Callow Avenue Basins, as well as from East Bremerton. It is pumped into the Crosstown Pipeline, which conveys flow to the WWTP. Flows from the Warren Avenue Basin are delivered to Pump Station CE-1, which pumps Warren Avenue, some Pacific Avenue, and all of the East Bremerton flows to the beginning of the Crosstown Pipeline through a 24-inch-diameter force main.

Pacific Avenue Basin combined sewer flows are directed to Pump Stations CE-4 and CE-6. Pump station CE-4 discharges into the 14-inch-diameter Central Bremerton force main, which discharges to the Crosstown Pipeline. Pump station CE-6 discharges into the Warren Avenue basin on Park Avenue and the flow is conveyed to CE-1.

In the Anderson Cove Basin, combined sewer flows are divided into five sub basins. Flows from four of these sub basins are conveyed to Pump Station CW-1, which discharges to the Crosstown Pipeline via the 12-inch-diameter Naval Avenue Force main. Flows from the CW-2 sub basin are delivered to the Callow Avenue Basin. During low flow periods a diversion can be used to send flow from CW-2 to CW-1.

In the Callow Avenue Basin, combined sewer flows and PSNS flow discharge to WB-3 which discharges to the Crosstown Pipeline. The basin receives flows from the Phinney Bay Basin via a discharge at 15th and Cambrian, as well as those from CW-2. To limit the occurrence of CSO in the Callow Avenue Basin, Bremerton has completed the construction of wet-weather Pump Station WB-6 near Pump Station WB-3. Wet-weather flows that exceed the capacity of WB-3 are diverted to Pump Station WB-6 and pumped to the Crosstown Pipeline.

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.

Marine Drive is a residential area within the City adjacent to Ostrich, Oyster, and Mud Bay and mostly unsewered. The southern portion of the basin is served by gravity mains which discharge to pump station MD-1, and ultimately flow to pump station OB-1 in the Oyster Bay Basin. Development of Marine Drive Basin would require improvements to the conveyance system in Kitsap Way and upgrades to pump station OB-1

The Rocky Point Basin is within Bremerton’s UGA and currently unsewered. This basin would be served by a combination of low pressure sewer systems, gravity mains, and pump stations.

The Sherman Heights Basin is located within Bremerton’s UGA. The north portion of the basin is located within the Kitsap County Sewer District 1 boundary. The south portion of the basin is unsewered. The southern portion of the basin will be served by gravity sewers that direct flow to the Sewer District 1 system, through pump station WB-1, and then to the WWTP.

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.

The Anderson Hill Road Basin is located on the south side of Sinclair Inlet and is served by a gravity system that discharges to pump station SB-1. There is currently only one development which is served by this system so the flows in the basin are extremely low.

The Puget Sound Industrial Center Basin is located around the Bremerton National Airport. Bremerton does not currently have infrastructure in place to provide sewer service to this area although there is a small sewer system in place that is owned by the Port of Bremerton. The system provides service to the Olympic View Industrial Park and treatment is provided by a lagoon and infiltration system.

3.3.3 Pump Stations

Bremerton has 39 pump stations, which are summarized in Table 3-7. The pump stations ranging from 5-horsepower pumps to 400-horsepower pumps capable of pumping from tens to thousands of gpm. In most cases, the pump stations have emergency power supplies in the event that commercial power is lost.

There and many individual grinder pumps in the sewer system where gravity sewer connections are not possible, particularly along the shoreline if no beach main is present. The City does not own or maintain the grinder pumps. The current policy is to require homeowners to sign a service contract that provides maintenance through a third party entity.

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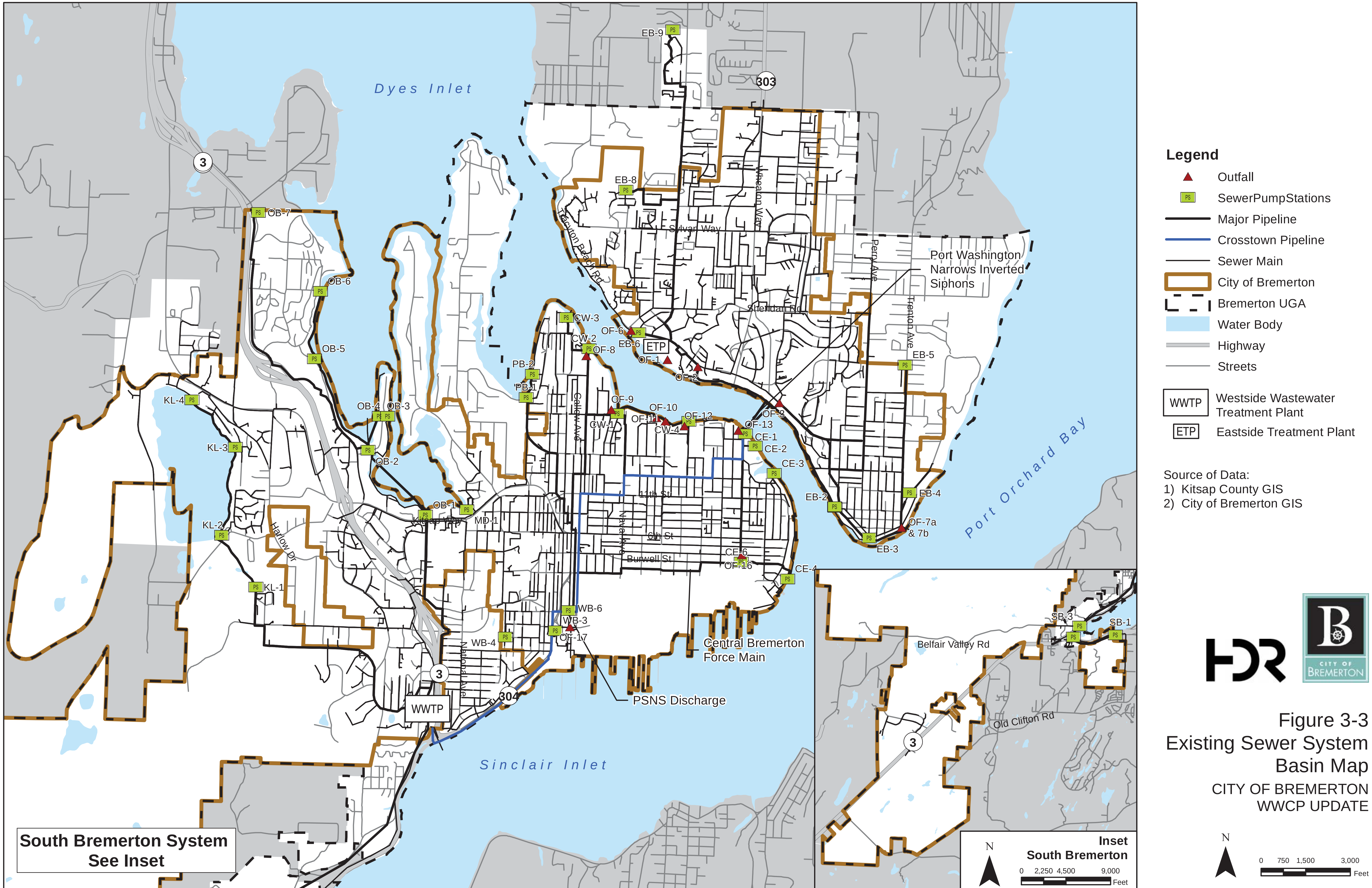

Figure 3-3
Existing Sewer System Basin Map

CITY OF BREMERTON
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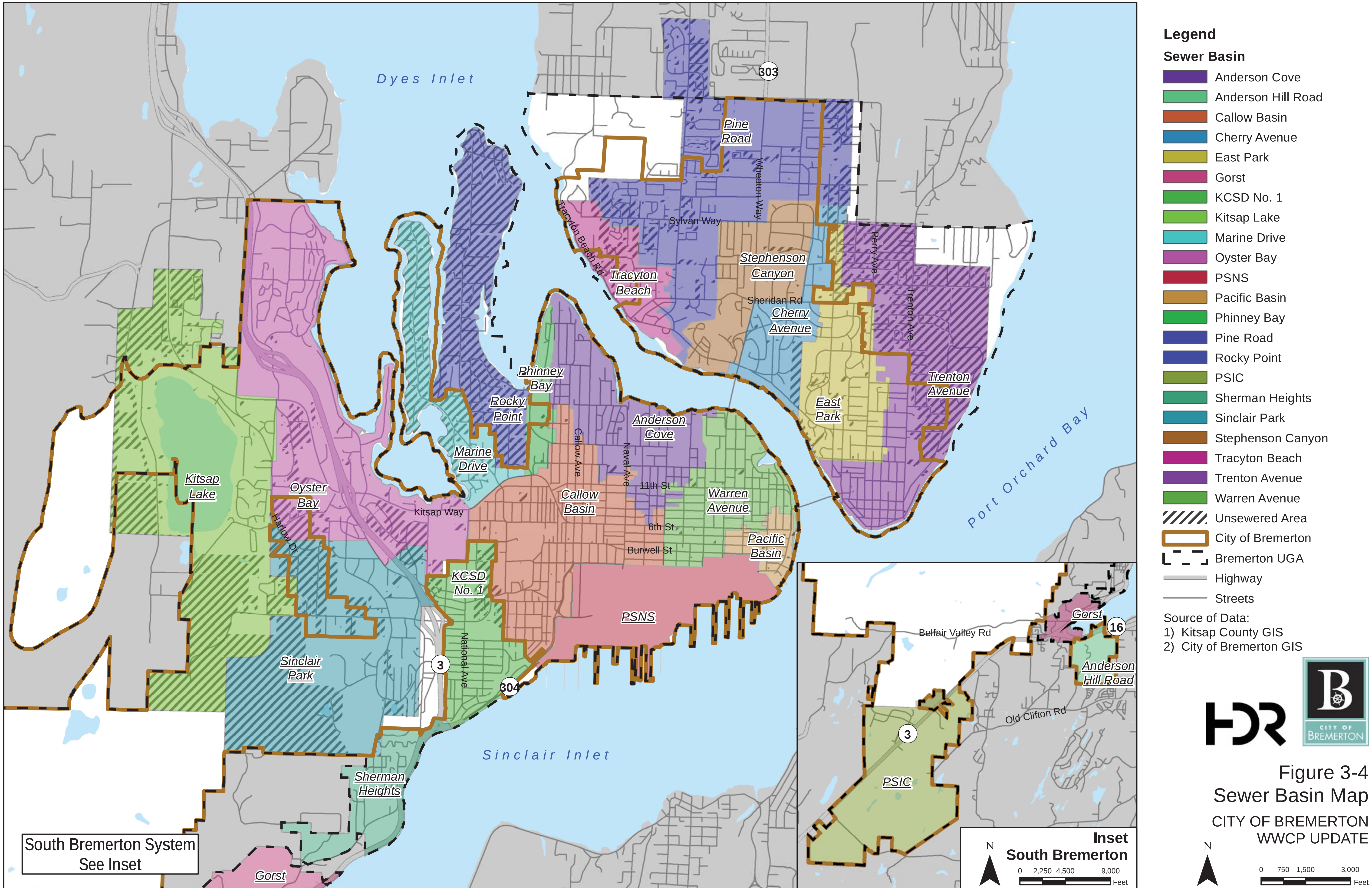

Figure 3-4
Sewer Basin Map

CITY OF BREMERTON
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Table 3-7. Pump Stations

PUMP STATION	TYPE	OPERATING CAPACITY (GPM)	PUMP CONTROLS	BACK-UP POWER	TRIBUTARY AREAS / CSO OUTFALL	DISCHARGE LOCATION / FORCE MAIN
West Bremerton						
CE-1	Wet well dry well, caisson, constructed 1985. VFDs replaced with Magna Drive units in 2001. Sluice gates and small pumps upgraded in 2011.	Two variable speed pumps and two Magna Drive; Pumps #1 and #4 rated for 7,000 gpm at 167 feet TDH. Pumps #2 and #3 rated for 2,100 gpm at 167 feet TDH. Station pumping capacity = 10,000 gpm.	Lead-Lag. Fourth pump on standby if a pump fails.	Yes	Warren Avenue Basin & East Bremerton. CSOs are controlled by OF-13 and OF-14.	Crosstown Pipeline.
CE-2	Package pump station, constructed in 1973.	Two pumps rated for 200 gpm at 51 feet TDH.	Lead-Lag. Two pumps total.	Portable	Warren Avenue Basin.	Park Avenue Conveyance Line which flows to pump station CE-1.
CE-3	Custom built pump station, constructed in 1973.	Two pumps rated for 200 gpm at 62 feet TDH.	Lead-Lag. Two pumps total. Pump station controls upgraded in 2002.	Portable	Warren Avenue Basin.	To pump station CE-1.
CE-4	Wet well dry well, caisson, constructed in 1989.	Three pumps; two rated for 1,940 gpm at 238 feet TDH; the third is rated for 200 gpm and is used to flush the 6-inch beach force main.	Lead-Lag. Two pumps total. Third pump to flush line to CE-3.	Yes	Pacific Avenue Basin, PSNS.	Central Bremerton Force Main to the Crosstown Pipeline.
CE-6	Wet well dry well, 10-feet diameter, metal dry well, constructed in 1989. Upgraded in 2006 for CSO compliance.	Three pumps; each rated for 970 gpm at 33 feet TDH. Station pumping capacity = 1,600 gpm.	Lead-Lag; Third pump on standby if pump fails.	Yes	Pacific Avenue Basin. CSOs controlled by OF-16.	To Park Avenue, discharging to CE-1.
CW-1	Wet well dry well, caisson, constructed 1984. Updated in 2001. Upgraded in 2007 for CSO compliance.	Three VFD-operated pumps with PLC, each pump rated at 2,592 gpm at 186 ft TDH. Total station capacity = 3,500 gpm.	Lead-Lag with pump and level controls. Third pump is strictly standby if one of the other pumps fails.	Yes	Anderson Cove Basin, CSOs controlled by OF-9, OF-10A, OF-11 and OF-12.	Naval Avenue Force Main to Crosstown Pipeline.

PUMP STATION	TYPE	OPERATING CAPACITY (GPM)	PUMP CONTROLS	BACK-UP POWER	TRIBUTARY AREAS / CSO OUTFALL	DISCHARGE LOCATION / FORCE MAIN
CW-2	Submersible, cast in place, constructed 1949. Reconstructed in 1999.	Three submersible pumps, each rated at 1,050 gpm at 142 feet TDH.	Two pumps operate; third pump on standby if a pump fails.	Yes	Anderson Cove Basin. CSOs controlled by OF-8.	Callow Avenue sewer system with inner-tie to discharge to Anderson Cove CW-1.
CW-3	Submersible grinder pumps, constructed in 1970s; upgraded in 2003.	Two submersible pumps, each rated for 50 gpm at 40 feet TDH.	Lead-Lag. Second pump is strictly standby.	Portable	Anderson Cove Basin. CSOs controlled by OF-8.	To pump station CW-2.
CW-4	Duplex submersible, constructed in 1984. Upgraded in 2000's.	Two submersible pumps, one is rated at 450 gpm at 45 feet TDH and the other is rated at 250 gpm at 45 feet TDH.	Lead-Lag. Second pump is strictly standby.	Portable	Anderson Cove Basin. CSOs controlled by OF-12.	Anderson Cove Basin High Avenue. Gravity Sewer.
KL-1	Custom pump station constructed in 1970s. Upgraded 2013. Drywell converted to wet well.	Two wet pit pumps. Each pump is rated for 950 gpm at 88 feet TDH.	Lead-Standby. Two pumps total. Pump controls upgraded in 2013.	Yes	Kitsap Lake Basin.	16-inch Conveyance Line leading to WWTP.
KL-2	Custom pump station constructed in 1970s. Upgraded in 2005. Will be upgraded in 2015 to mirror KL-1.	Two pumps. Each pump is rated for 1,150 gpm at 148 feet TDH.	Lead-Standby. Two pumps total. Pump controls upgraded in 2001.	Yes	Kitsap Lake Basin.	16-inch Conveyance Line leading to WWTP.
KL-3	Custom pump station constructed in 1970s. Two new dry-pit submersible pumps installed in 2002.	Two pumps. Each pump is 500 gpm at 14 feet TDH.	Lead-Lag. Two pumps total. Pump controls upgraded in 2001.	Yes	Kitsap Lake Basin.	16 – inch Conveyance Line leading to WWTP
KL-4	Custom pump station constructed in 1970s. One new dry-pit submersible pump installed in 2003.	Two pumps. Each rated at 450 gpm and 16 feet TDH.	Lead-Lag. Two pumps total.	Yes	Kitsap Lake Basin.	16-inch Conveyance Line leading to WWTP.
MD-1	Constructed in 1994.	Two pumps. Each rated for 475 gpm at 136 feet TDH.	Lead-Lag. Two pumps total.	Portable	Marine Drive Basin.	To OB-1 pump station.

PUMP STATION	TYPE	OPERATING CAPACITY (GPM)	PUMP CONTROLS	BACK-UP POWER	TRIBUTARY AREAS / CSO OUTFALL	DISCHARGE LOCATION / FORCE MAIN
OB-1	Wet well, dry well; constructed 1966. Upgraded in 1984, upgraded in 2005. Pumps upgraded in 2012 and 2013	Three Dry-pit submersible pumps; each rated at 950 gpm at 212 feet TDH.	Lead-Lag. Third pump on standby if a pump fails. Station controls currently being upgraded.	Yes	Oyster Bay Basin & Marine Drive Basin.	Gravity Sewer at Bremerton Blvd. & Arsenal Way.
OB-2	Wet well, dry well; custom pump station, constructed in 1966.	Two pumps. Each rated for 750 gpm at 65 feet TDH.	Lead-Lag. Two pumps total. Pump controls upgraded in 2002.	Yes	Oyster Bay Basin.	Oyster Bay Force Main.
OB-3	Wet well, dry well; custom pump station, constructed in 1970. Pumps replaced in 2000.	Two dry-pit submersible pumps. Each rated for 400 gpm at 13 feet TDH.	Lead-Lag. Two pumps total. Pump controls upgraded in 2002.	Portable	Oyster Bay Basin.	Oyster Bay Force Main.
OB-4	Wet well, dry well; custom pump station, constructed in 1970. Pumps replaced in 2001.	Two dry-pit submersible pumps. Each rated for 150 gpm at 46 feet TDH.	Lead-Lag. Two pumps total. Pump controls upgraded in 2002.	Portable	Oyster Bay Basin.	Oyster Bay Force Main.
OB-5	Wet well, dry well; custom pump station, constructed in 1966.	Two pumps. Each rated for 550 gpm at 47 feet TDH.	Lead-Lag. Two pumps total. Pump controls upgraded in 2002.	Portable	Oyster Bay Basin.	Oyster Bay Force Main.
OB-6	Wet well, dry well; custom pump station, constructed in 1966.	Two pumps. Each rated for 490 gpm at 40 feet TDH.	Lead-Lag. Two pumps total. Pump controls upgraded in 2002.	Portable	Oyster Bay Basin.	Oyster Bay Force Main.
OB-7	Constructed in 1993.	Two pumps. Each rated for 375 gpm at 70 feet TDH.	Lead-Lag. Two pumps total. Pump controls upgraded in 2002.	No	Oyster Bay Basin.	Oyster Bay Force Main.
PB-1	Wet well, dry well. Package pump station. Constructed in 1970s. Control system upgraded in 2005.	Two pumps. Each rated for 150 gpm at 100 feet TDH.	Lead-Lag. Two pumps total.	Portable	Phinney Bay Basin.	Callow Avenue Basin Pipeline.
PB-2	Wet well, dry well. Package pump station. Constructed in 1970s.	Two pumps. Each rated for 100 gpm at 20 feet TDH.	Lead-Lag. Two pumps total.	Portable	Phinney Bay Basin.	To pump station PB-1.

PUMP STATION	TYPE	OPERATING CAPACITY (GPM)	PUMP CONTROLS	BACK-UP POWER	TRIBUTARY AREAS / CSO OUTFALL	DISCHARGE LOCATION / FORCE MAIN
PP-1	Custom-built submersible constructed in 1990s.	One pump, 133 gpm at 43.7' TDH. Two pumps 143 gpm at 45.3 TDH.	Lead-Lag. Two pumps total.	No	Serves Pendergast Park only.	Pipeline from KL-1 to WWTP.
SB-1	Constructed in 2010.	Two pumps rated for 1,652 gpm at 178 feet TDH	Lead-Lag. Two pumps total.	Yes	Anderson Hill Road Basin	South Bremerton Force Main
SB-3	Constructed in 2010	Two pumps rated for 250 gpm at 150 feet TDH	Lead-Lag. Two pumps total.	Yes	Gorst Basin	South Bremerton Force Main
SB-4	Constructed in 2010	Two pumps rated for 250 gpm at 150 feet TDH	Lead-Lag. Two pumps total.	Yes	Gorst Basin	South Bremerton Force Main
WB-1	Owned by Kitsap Co. Wet well, mounted; constructed in 1989.	230 gpm at 50 feet TDH with two pumps operating.	Lead-Lag. Two pumps total.	No	Sinclair Park Beach-front Properties.	Crosstown Pipeline.
WB-2	Owned by Kitsap Co. Wet well dry well, constructed of 96-inch-diameter precast concrete manhole sections. Constructed in 1989.	780 gpm at 70 feet TDH with two pumps operating.	Lead-Lag. Third pump on standby if a pump fails.	No	KCSD No. 1.	Crosstown Pipeline.
WB-3	Custom pump station built in 1984. Belowground wet and dry wells and aboveground motor and engine generator room. Reconstructed in 2002/2003.	The 2 smaller pumps are each rated at 950 gpm at 55 feet TDH. The other three pumps are each rated at 5,300 gpm at 110 feet TDH. A maximum flow of 10,000 gpm.	Lead-Lag with level control. Two smaller pumps operate together based on wet-well level. The smaller pumps will turn off when flow increases and two of the three larger pumps will turn on. Third pump on standby if a pump fails.	Yes	Callow Avenue Basin, PSNS, Phinney Bay, Anderson Cove Basin 8. CSOs controlled by OF-17.	Crosstown Pipeline.
WB-4	Package pump station built in 1971.	Two pumps each rated at 100 gpm at 42 feet TDH.	Lead-Lag. Two pumps total.	Portable	Callow Avenue Basin.	Gravity sewer that goes to Crosstown Pipeline.

PUMP STATION	TYPE	OPERATING CAPACITY (GPM)	PUMP CONTROLS	BACK-UP POWER	TRIBUTARY AREAS / CSO OUTFALL	DISCHARGE LOCATION / FORCE MAIN
WB-6	Constructed in early 2003.	Three submersible pumps, each pump is rated at 3,750 gpm at 130 feet TDH.	Lead/Lag with level control; third pump is standby.	Yes	Callow Avenue Basin, Phinney Bay, Anderson Cove Basin 8. CSOs controlled by OF-17.	Crosstown Pipeline.
			East Bremerton			
EB-2	Custom station constructed in 1973. Split wet wells, one for local/low flow and one for stormwater/high flow. Reconstructed in 2003.	Two small pumps; each rated for 450 gpm at 30 feet TDH for lower flows. Three larger pumps; each rated for 2,175 gpm at 91 feet TDH for larger flows. Total pumping capacity = 4,100 gpm.	Lead-Lag with level control. Two smaller pumps operate together based on level. Two smaller pumps will turn off when flow increases and 2 of the 3 larger pumps will turn on. Third pump on standby if a pump fails.	Yes	Trenton Avenue Basin, CSOs controlled by OF-7.	East Park Basin. Upgrade will pump directly into East Bremerton Beach Main.
EB-3	Wet well dry well; constructed 1972. Upgraded in 1984 and completely updated in 2005.	Pumps were converted to dry-pit submersible pumps and are rated at 750 gpm at 64 feet TDH.	Second pump on standby if first pump fails. Pump controls upgraded in 2002.	Portable	Trenton Avenue Basin, CSOs controlled by OF-7.	East Park Basin Beach Main.
EB-4	Wet well mounted station constructed in 1940s, later converted to submersible pump station.	Two pumps. Each rated for 100 gpm at 80 feet of TDH.	Lead-Lag. Two pumps total. Electrical service, pump controls, and panel upgraded in 2003.	Portable	Trenton Avenue Basin.	East Bremerton Beach Main.
EB-5	Ejector pump station constructed in late 1970s, upgraded to submersible pump station in 1995.	Two pumps. Each rated for 245 gpm at 50 feet of TDH.	Lead-Lag. Two pumps total.	Portable	Trenton Avenue Basin.	East Bremerton Beach Main.
EB-6	Wet well dry well; cast in place; constructed in 1947; were upgraded in 2004.	Three pumps Each rated for 650 gpm at 102 feet TDH. Peak capacity of 1,200 gpm with two pumps running.	Pumps alternate; Two pumps operate at peak flow. New pump controls and electrical service upgraded in 2004.	Yes	Tracyton Beach Basin.	East Bremerton Beach Main.

PUMP STATION	TYPE	OPERATING CAPACITY (GPM)	PUMP CONTROLS	BACK-UP POWER	TRIBUTARY AREAS / CSO OUTFALL	DISCHARGE LOCATION / FORCE MAIN
EB-8	Package pump station constructed in 1971.	Two pumps. Each rated for 200 gpm at 51 feet of TDH.	Lead-Lag. Two pumps total.	Portable	Pine Road Basin.	East Bremerton Beach Main.
EB-9	Wet well mounted pump station constructed in early 1970s.	Two pumps. Each rated for 100 gpm at 75 feet of TDH.	Lead-Lag. Two pumps total.	Portable	Pine Road Basin.	East Bremerton Beach Main.

Source: 1996 Wastewater Comprehensive Plan, 2000 CSO Reduction Plan Update, and information provided by Patric Coxon, City of Bremerton.

3.3.4 Sewer Pipelines

Bremerton's sewer collection system mains range in size from 6 to 42 inches in diameter for gravity mains and from 4 to 36 inches in diameter for force mains. The sewers have been constructed with a variety of materials including clay, concrete, PVC, asbestos cement, cast iron, ductile iron, and HDPE. Some portions of the system date from 1910 to 1920. The major conveyance, overflow, treatment facilities, and wholesale connection points are shown in Figure 3-3.

In most of the sewer basins, the distance from the farthest point in the basin to the bottom of the basin is relatively short. The longest piped distance within each basin is less than 11,000 feet. Typical sewer grades range from 0.5 to 12 percent. These slopes provide for varied flows from very low to high collection system flow velocities. The time of concentration, or the time it takes water to flow through the system once introduced, varies from minutes to more than 24 hours.

Descriptions of the major pipelines are provided below.

East Bremerton Beach Main

The East Bremerton beach main conveys wastewater from the East Bremerton basins to the inverted siphons and/or the ETP. Entry points to the beach main include at the ETP (OF-1), Lent Landing (OF-2), Riptide Condominiums, Wheaton Way at OF-3, East 16th Street, and from EB-2. The size, material and lengths of various sections of the beach main are listed in Table 3-8. The beach main is approximately 7,500 feet in length.

Table 3-8. East Bremerton Beach Main

LOCATION	SIZE (INCHES)	MATERIAL	APPROX. LENGTH (FT.)
OF-1 (ETP) to OF-3 (inverted siphons)	24"	HDPE	3,350
OF-3 to 16th Street	20" and 16"	DI	2,650
16th Street to EB-2	18"	HDPE	1,510

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. They include a 16-inch-diameter cast iron line constructed in 1946 and a 24-inch concrete lined ductile iron line constructed in 1983.

In 2011, Bremerton installed stainless steel knife gates on the discharge of the inverted siphons at Pump Station CE-1. These gates provide for increased regulatory compliance by allowing Bremerton to prevent East Bremerton flows from causing overflows at OF-13 (at CE-1). During major storm events, excess East Bremerton flows can be treated and released at the ETP allowing more capacity for west side flows in the Crosstown Pipeline.

Crosstown Pipeline

The Crosstown Pipeline (CTP) transports flows from various East and West Bremerton pump stations across Bremerton to the WWTP. Pump Station CE-1, the primary feeder of the CTP, receives all the flow from East Bremerton, as well as flow from the Park Avenue sewer, including CE-6 flow. Pump Station CW-1 discharges to the CTP at the Naval Avenue force main. Pump Station CE-4 pumps into the Central Bremerton force main and Pump Stations WB-3, WB-6, and WB-2 discharge directly into the Crosstown Pipeline as it nears the WWTP. SB-1, SB-3, and SB-4 discharge to the Southwest Bremerton Sewer which in turn discharges into the Crosstown Pipeline.

The alignment of the CTP is shown in Figure 3-3. The pipeline is constructed from concrete cylinder pipe (CCP), polyethylene lined ductile iron, HDPE, and cement-lined ductile iron. The first length of the pipeline from Pump Station CE-1 (at the north end of Park Avenue) is a 24-inch force main that discharges to the HDPE 13th and Naval Avenue surge chamber. Pump Station CW-1 discharges into the CTP at the surge chamber. Downstream of the surge chamber the pipeline is a gravity-pressure main that operates as an inverted siphon. The diameter increases to 36 inch HDPE, then reduces to 30- inch CCP near 9th and Montgomery, and then increases again to 36 inches in diameter near Pump Station WB-3. The Central Bremerton force main from pump station CE-4 discharges into the Crosstown Pipeline at First and Montgomery. The Southwest Bremerton sewer force main discharges to the Crosstown Pipeline inside the WWTP boundary just prior to the Headworks.

3.3.5 Combined Sewer Overflow Outfalls

The City's wastewater collection system contains 15 combined sewer overflow sites. These structures are in an older portion of the collection system and allow combined sewage to discharge to the Puget Sound during extreme wet weather events. All CSOs have outfall numbers assigned in the WWTP's NPDES Permit which are listed in Table 3-9.

Table 3-9. 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-12	Anderson Cove	Port Washington Narrows
OF-13	Warren Avenue	Port Washington Narrows
OF-16	Pacific Avenue	Sinclair Inlet
OF-17	Callow Avenue	Sinclair Inlet

The City began CSO compliance efforts in 1992 with the development of a CSO Reduction Plan. A consent decree resulting from a settlement with the Puget Sound Keepers Alliance in 1993 accelerated the implementation schedule; the City was required to comply with the requirement of no more than one overflow per outfall per year by 2009. The first major project consisted of installing approximately 4 miles of piping in the Warren Avenue Basin in 1994. Subsequent projects in the latter half of the 1990s included major piping construction and separation in the Callow Avenue Basin, the City's largest basin, and some of the other smaller basins. The City also worked closely with homeowners and businesses to educate the public on stormwater pollution prevention and removal of illicit connections, such as disconnecting roof downspouts from the sanitary system. The improvements were immediate and dramatic; by 2000, the number of CSO events was a fraction of what they were only 5 years previous.

In 1999, the City retained HDR Engineering to revise the CSO plan and develop new plans for Anderson Cove and Pacific Avenue Basins. These planning documents were completed in 2000 and years immediately following. Final implementation of the plan was achieved in 2009 with the completion of improvements in the Pacific Avenue Basin.

From the year 1994 to the completion of all construction efforts in 2009, the City spent approximately $50M constructing and upgrading facilities and separating the combined sewer system in both East and West Bremerton.

According to the City's 2012 CSO Annual Report (submitted to the Department of Ecology on May 31, 2013), the City of Bremerton:

- Is in compliance with CSO reduction requirements at all 15 sites.
- Reduced overflow volume by 99 percent.
- Reduced frequency of events by 99 percent.
- Experienced a 25-yr precipitation event that resulted in CSOs at 7 sites.
- Continued its public education and assistance program to involve citizens of Bremerton with CSO Reduction and provided education on water pollution prevention.

3.3.6 Collection System Odor Control Stations

Bremerton has seven odor control stations to address odor in the collection system, as shown in Table 3-10. Odor Control Stations (OCS) 1 through 3 are packed tower scrubbers that use sodium hypochlorite and caustic soda. The tanks are refilled approximately three times per year. OCS-4 through 7 are Granulated Activated Carbon (GAC) towers installed on the wet wells.

Table 3-10. Collection System Odor Control Stations

STATION NAME	LOCATION	TYPE OF FACILITY	CHEMICAL STORAGE TANK SIZE (GALLON)	PUMP STATION OR AREA SERVED[a]	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	Junction of CW-1 and CE-1 at transition from pressure sewer to gravity sewer	1996
OCS-2	200 High Ave.	Packed tower scrubber with sodium hypochlorite and caustic injection	750-gallon storage tanks for sodium hypochlorite and caustic soda	CE-4, at transition from pressure sewer to gravity sewer	1996
OCS-3	1740 Park Ave.	Packed tower scrubber with sodium hypochlorite and caustic injection	750-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	1989
OCS-7	622 Burwell Street	Carbon tower scrubber	GAC Tower	CE-6	1989

[a] The locations of these pump stations are shown in Figure 3-3.

3.3.7 Treatment Facilities

The City owns, operates, and maintains two wastewater treatment facilities as shown in Figure 3-3. 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 (WWTP)

The WWTP provides secondary wastewater treatment for the entire service area. It has a peak hydraulic capacity of 65 mgd, and uses a conventional activated sludge secondary treatment process. A site plan is shown in Figure 3-5 and a treatment process diagram is shown in Figure 3-6. The WWTP is located in West Bremerton and discharges to Sinclair inlet.

Wastewater sludges are collected at the WWTP, anaerobically digested, treated to Class B standards, dewatered, and applied to Bremerton's silviculture site for reuse.

Odor control measures and facilities at the WWTP include:

- Odor containment enclosures, buildings, and covers for major plant facilities.
- Conveyance of foul air to packed tower scrubbers for treatment.
- Two-stage, packed tower air treatment for screenings and grit removal facilities, primary clarifiers, the old headworks, the overflow chambers for the primary effluent pump station wet well, the gravity thickener and overflow chamber for the gravity thickener when in service, the rotary drum thickeners, digester vents, the centrifuge area, and the sludge loading facility.
- Odor control enclosures for grit removal system.

- Single stage packed tower for the Biofilter, BF wetwell, aeration basin headworks, RAS wetwell, and secondary clarifier scum pits.
- BF wetwell.
- Aeration basin.
- RAS wetwell.
- Secondary clarifier scum pits.

Eastside CSO Treatment Facility (ETP)

ETP was built to reduce the number of CSO discharges. It provides treatment for wet weather combined sewer flows in East Bremerton. It has a peak hydraulic capacity of 20 mgd and uses high rate clarification followed by ultraviolet (UV) disinfection to treat to secondary water quality standards. A site plan is shown in Figure 3-7 and a treatment process flow diagram is provided in Figure 3-8. The ETP is located in the Pine Road Basin in East Bremerton and discharges to Port Washington Narrows, which is a contiguous water body to Sinclair and Dyes Inlets.

The outfall is a 36-inch diameter pipe that was built for the Manette Primary Treatment Plant which was demolished in 1985. The outfall is approximately 480 feet long. The first 200 feet is the original 20-inch diameter concrete pipe. The remaining outfall pipe and diffuser is 36-inch diameter reinforced concrete pipe constructed in 1971. The 20-inch section limits the discharge to approximately 14 mgd at extreme high tide. The diffuser is 36-inches in diameter and 84 feet long. The terminal portion of the outfall consists of a 21-port diffuser with 5-3/4-inch-diameter openings. Diffuser ports discharge horizontally in alternating directions at a depth of –24 feet MLLW.

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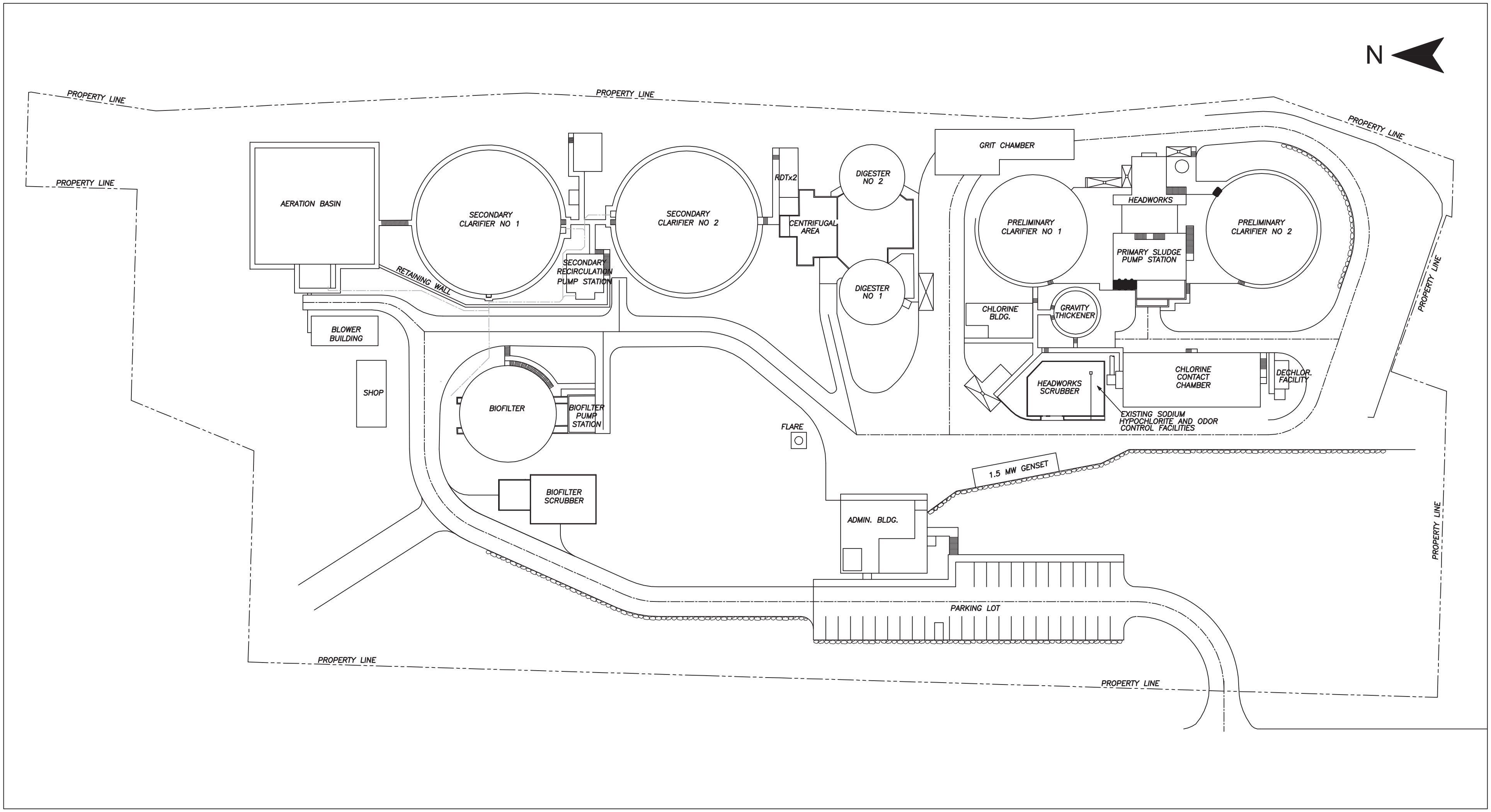

Figure 3-5
Westside Wastewater Treatment Plan
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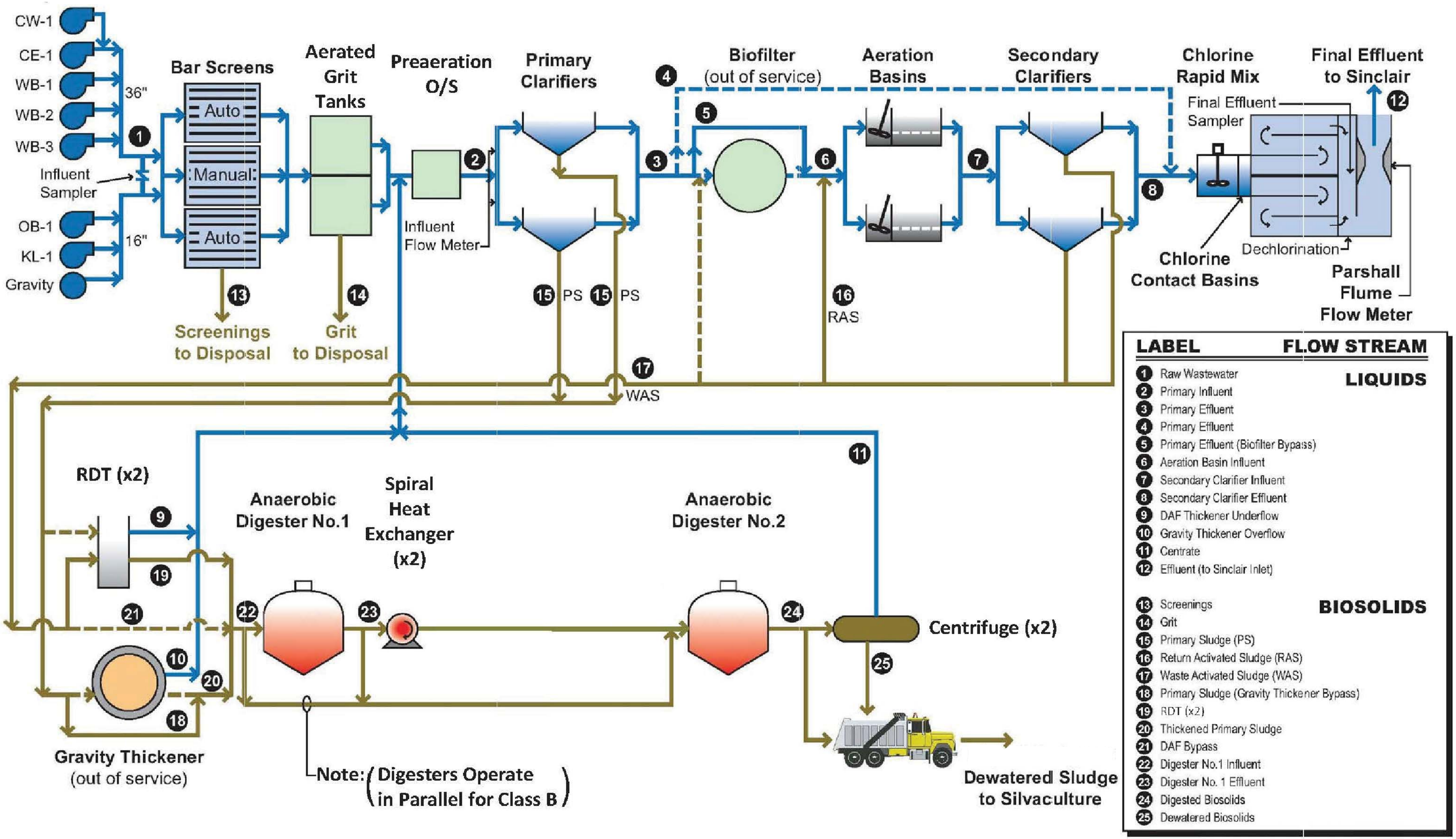

Figure 3-6
Westside Treatment Process Diagram

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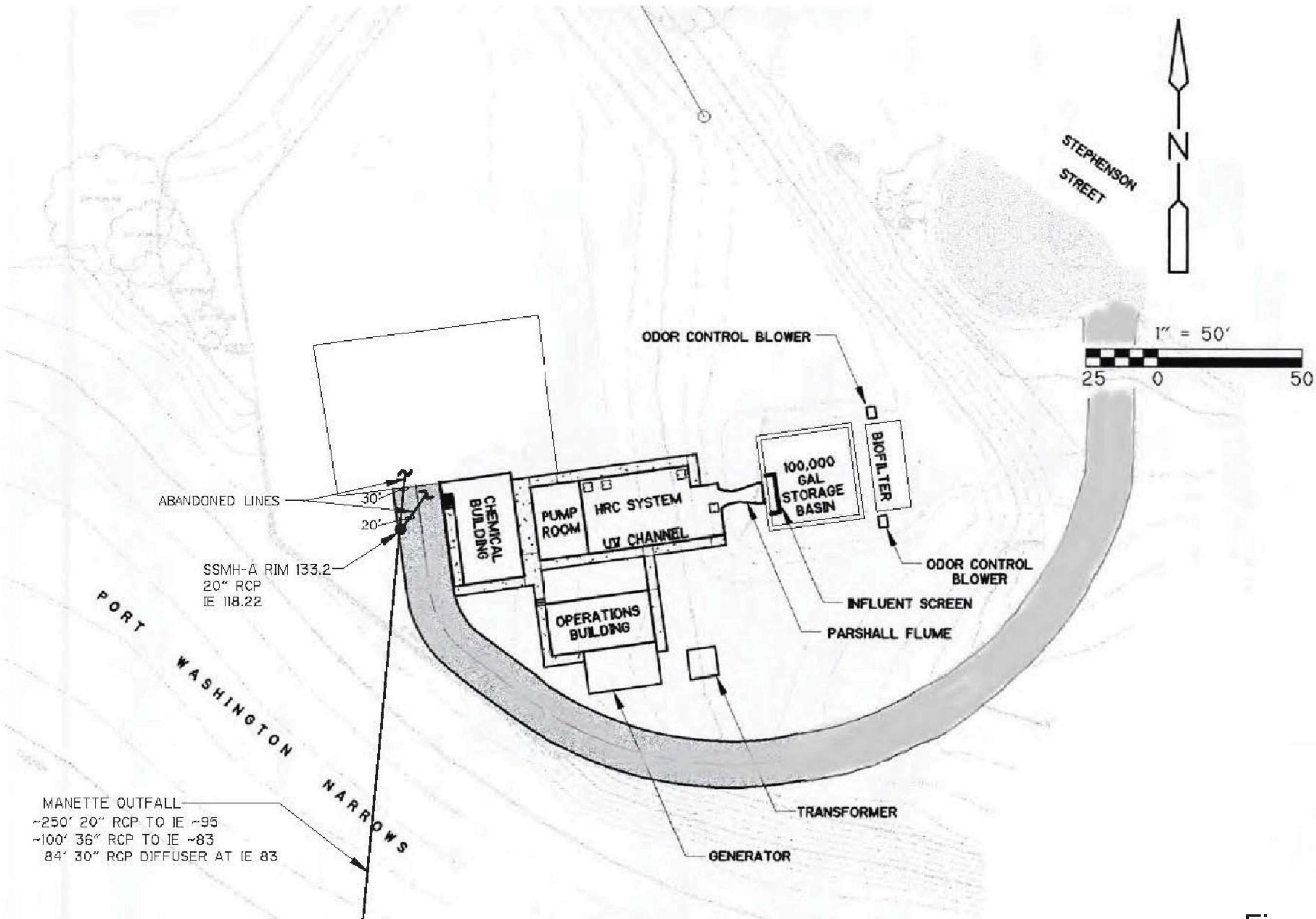

Figure 3-7
Eastside Wastewater Treatment Facility

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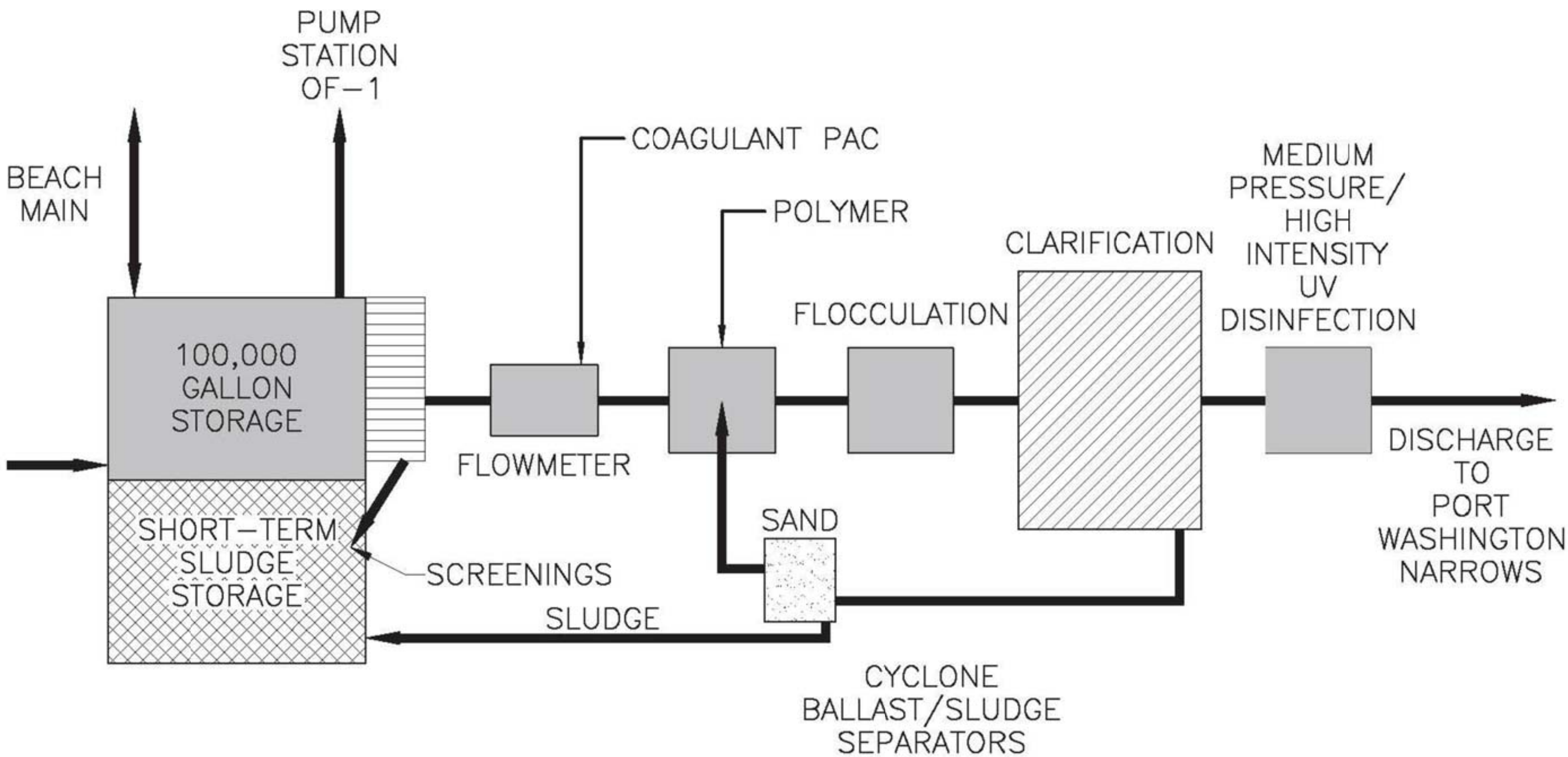

Figure 3-8
Eastside Treatment Process Diagram

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Section 4 Historical and Projected Flows and Loads

Planning for wastewater infrastructure involves determining flow rate and mass loading variations that a system must accommodate. Quantifying these variations is important in design and operation of treatment and conveyance facilities. This section discusses historical and projected wastewater loads, seasonal influence on flow and loads, average daily and maximum month flows, influent peaking factors, and influent BOD_5 and TSS characterization.

4.1 Historical Sewer Flows and Loads

4.1.1 Seasonal Influence on Flows and Loads

High flows during winter months have made it necessary to characterize the waste stream seasonally. Flows for the two permitted seasons are characterized as follows:

- **Dry/Summer Season** – This is the period between May 1 and September 30. The main contribution during this period is from residential and commercial sanitary sewage, as well as contract flows.
- **Wet/Winter Season** – This is the period between October 1 and April 30.
- **Average Annual** – The average flow or loading condition taken over the whole year.

For each of these periods, the flow is further characterized into the parameters described below. This characterization allows plant performance to be evaluated under various operating conditions. The flow parameters correspond to typical plant design criteria:

- **Average Dry Weather** – Average of total daily influent flow for the dry/summer season.
- **Maximum Month** – Highest monthly average of total daily influent flow occurring during the stated period.
- **Maximum Day** – Highest daily average of total influent flow for the given period.

4.1.2 WWTP Historical Influent Flow

Historical data from 2010 through 2012 were analyzed to determine the average daily and maximum month flows for the whole-year and seasonal conditions. The results are shown in Figure 4-1.

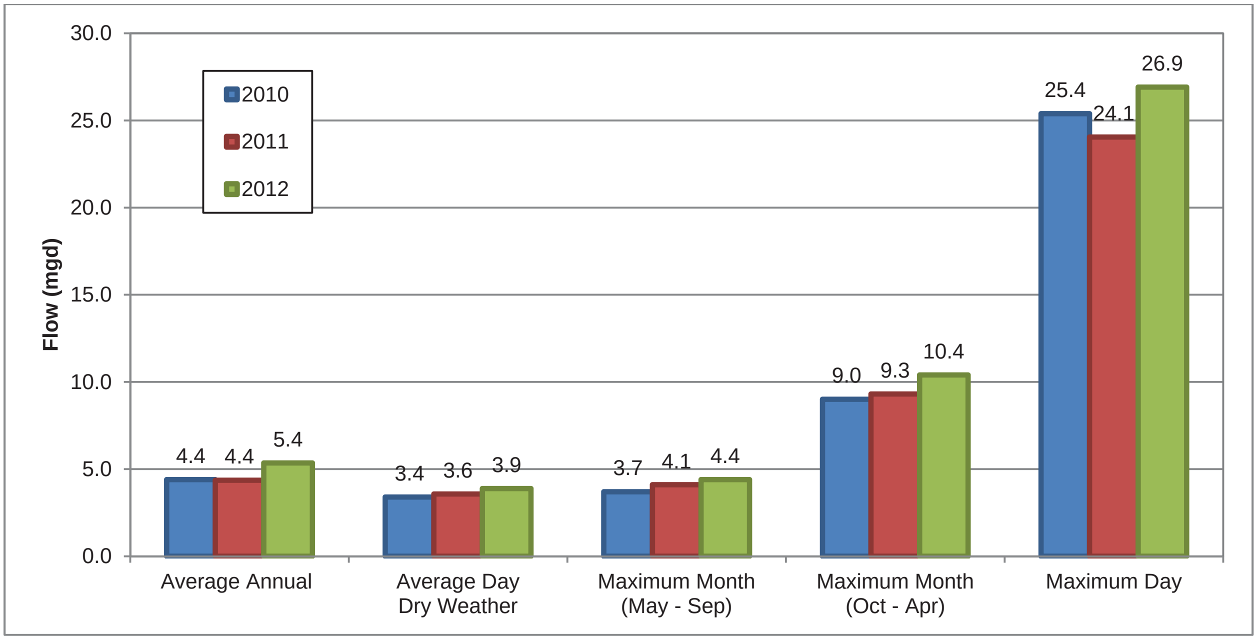


Figure 4-1. Historical WWTP Flows (2010-2012)

The WWTP plant flow recordings are taken off the two influent flow meters which were each designed to record a maximum flow of 32.5 mgd. The plant effluent flow meter allows staff to record flows up to 32.5 mgd. Plant staff has observed instantaneous flow rates as high as 65 mgd by reviewing instantaneous flow readings from the two influent parshall flumes. These meter readings have recently been incorporated into the plant's Supervisory Control and Data Acquisition (SCADA) system. Flows at the ETP are recorded separately and discussed in Section 4.1.4.

4.1.3 WWTP Historical Loads

BOD_5 and TSS samples collected between 2010 and 2012 comprise the historical load presented in this section, which is summarized in Table 4-1.

Table 4-1. WWTP Historical Influent Loads (2010 – 2012)

YEAR	FLOW			BIOCHEMICAL OXYGEN DEMAND		TOTAL SUSPENDED SOLIDS	
	Average Daily	Max Month (May-Sep)	Max Month (Oct-Apr)	Average Daily	Max Month	Average Daily	Max Month
	mgd	mgd	mgd	lb	lb	lb	lb
Permit Limit	NA	11.0	15.5	NA	18,100	NA	22,600
2010	4.4	3.7	9.0	6,500	7,400	6,800	7,800
2011	4.5	4.1	9.3	7,000	8,600	8,100	10,100
2012	5.4	4.4	10.4	8,200	9,600	8,800	10,700
Average	4.8	4.1	9.6	7,300	8,500	7,900	9,500

4.1.4 Eastside Treatment Plant Historical Influent Flow and Loads

The Eastside Treatment Plant (ETP) was completed in December 2001 with a design capacity of 20 mgd. During extreme high tides, the outfall capacity is limited to 14 mgd. For the period between January 2010 and December 2012, the ETP was activated for 15 events. Table 4-2 summarizes the plant's operation data recorded during those events. The total flow shown in the table for each day is the volume of flow treated for that specific operation of the ETP.

Table 4-2. ETP Discharge Data

DATE	FLOW		FECAL COLIFORM (COUNT/100MLS) EFFLUENT
	Total Flow (MG)	Peak Flow (mgd)	
1/11/2010	0.59	6.2	10
1/15/2010	0.84	7.5	21
12/8/2010	0.27	2.8	10
12/11/2010	8.48	12.8	12
3/9/2011	0.89	7.9	10
3/14/2011	3.70	10.3	524
3/15/2011	1.23	4.2	10
3/15/2012	0.26	7.1	627
3/29/2012	0.27	6.4	33
10/30/2012	0.26	5.6	12
10/31/2012	0.25	7.9	148
11/19/2012	0.55	6.2	627
11/21/2012	0.03	3.0	37
11/30/2012	0.17	4.3	21
12/4/2012	0.05	3.0	12

4.2 Sanitary Sewer Flow and Load Projections

Sanitary sewer flow projections were developed using a demographic projection for Bremerton's sewer service area to estimate the sanitary flows based on water use factors. The projections were generated for each sewer basin level and for two sectors (residential and non-residential), and the results were aggregated to the entire sewer service area and to total flows.

4.2.1 Demographics

Demographics developed for Bremerton's sewer service area are based on two key documents from the County and the City. The first document is the *Kitsap County Comprehensive Plan*, which was adopted in 2006, with the most recent updates being reflected in the *2012 Kitsap County UGA Sizing and Composition Remand*. This plan is referred to as the County Comprehensive Plan. The second document is the *Bremerton Comprehensive Plan*, which was adopted in 2004 and most recently updated in 2010. This plan is referred to as the City Comprehensive Plan.

The demographic data used in the WWCP is comprised of two categories: population is used to represent the residential sector and employment is used to represent the non-residential sector. The first year of the demographic projection is the base year, 2013, with projections for milestone years 2018, 2025, and 2033.

Population projections are based on the Preferred Alternative of the *2012 Kitsap County UGA Sizing and Composition Remand*. The Preferred Alternative provides population estimates for the milestone years 2010, 2018, and 2025. Base year (2013) population estimates are interpolated between the County milestone years 2010 and 2018. The population numbers in the WWCP used the same numbers as in the County Comprehensive Plan through 2025 and then extrapolated out to 2033 using an annual growth rate of 1.85 percent, which was the annual growth rate between the 2010 and 2025 County population estimates (251,133 to 331,571).

Employment projections are based on employment forecasts in the City and County Comprehensive Plans. The City Comprehensive Plan includes planning milestone years of 2003 and 2023. The County Comprehensive Plan includes planning milestone years of 2004, 2010, and 2025 and shows an annual 0.4 percent growth rate between 2004 and 2010 and an annual 3.1 percent growth rate between 2010 and 2025. The employment forecasts in the WWCP were developed as follows. The 2004 employment number from the City Comprehensive Plan was used as a starting point and then increased annually by 0.4 percent (the County Comprehensive Plan growth between 2004 and 2010) to estimate 2010 employment. The 2023 employment number was taken directly from the City Comprehensive Plan and then the employment between 2010 and 2023 was interpolated. Employment was extrapolated from 2023 to 2033 based on the 3.1 percent annual growth rate from the County Comprehensive Plan.

The demographic projections from the County and City are allocated to small geographic areas called Traffic Analysis Zones (TAZs) developed by Kitsap County to estimate population and employment throughout the County. The TAZ boundaries are independent of Bremerton's sewer service area. Therefore, GIS analysis was used to determine which TAZs, or portions thereof, are in Bremerton's sewer service area. The TAZ boundaries were overlain on Bremerton's sewer service area and sewer basins. For TAZs fully in the sewer service area, all of the TAZ's demographics were assigned to the appropriate sewer basin. For TAZ's only partially in the sewer service area, a portion of the TAZ's demographics were assigned to the appropriate sewer basin, based on the percent of the TAZ in the service area and sewer basin. For example, if 40 percent of the TAZ's area is in a sewer basin, then 40 percent of the demographics were assigned to the sewer basin. Sewered population is based on an overlay of the TAZ demographic projections with parcels that indicate if sewer service is present. The TAZ and sewer service information combined with the employment and population projections was used to generate the information in Table 4-3 for the 2013, 2018, 2025, and 2033 planning years.

Table 4-3. Population and Employment Projections for Sewer Service Area

	YEAR 2013	YEAR 2018	YEAR 2025	YEAR 2033
	Population			
Total Population	50,221	54,764	65,160	75,156
Within City Limits	38,709	42,157	50,580	58,339
Outside City Limits	11,512	12,607	14,580	16,817
Sewered	38,308	41,579	49,240	56,803
Unsewered	11,913	13,185	15,920	18,353
	Employment			
Total Employees	35,974	40,752	44,932	57,363
Within City Limits	34,693	39,172	43,092	55,013
Outside City Limits	1,282	1,579	1,840	2,349
Sewered Employees	34,302	38,764	42,660	54,467
Unsewered Employees	1,672	1,988	2,272	2,896

4.2.2 Sanitary Sewer Flow Factors

Sanitary sewer flow factors are estimated based on the proportion of water usage recorded for the residential and non-residential sectors.

The *2005 City of Bremerton Water System Plan* estimates water usage at 200 gallons per day per household. Bremerton estimates an average of 2.37 persons per household in the City Comprehensive Plan. Therefore, the residential sector water use is estimated to be 84 gallons per day per person.

The *2005 Bremerton Comprehensive Water System Plan* documents that the average commercial water usage from 1999 to 2004 was 925,000 gallons per day which does not include water use by the Naval Shipyard. The City Comprehensive Plan estimates the total number of employees in 2000 was 22,026 excluding the Naval Shipyard. Therefore, the non-residential sector water use is estimated to be 42 gallons per day per employee.

When the water use factors are applied to the 2013 population and employment estimates, a total water use of 4.7 mgd is calculated. The average dry weather flow in 2012 was 3.9 mgd. A portion of the water use is assumed to not enter the sewer collection system, as it is used for irrigation or other purposes. To calculate the sanitary sewer flow factors, the water use factors are reduced by 17 percent so that if applied to the 2013 population and employment estimates, the resulting flow equates to the historical 2012 average dry weather flow.

The calculated sanitary sewer flow factors are below:

- **Residential sector:** 71 gallons per day per person.
- **Non-residential sector:** 35 gallons per day per person.

4.2.3 Sanitary Sewer Flow Projections

Sanitary sewer flow projections were developed for the existing sewer service area, as well as for future service areas.

For the existing sewer service area, the sanitary sewer flow projections were generated by multiplying the demographic projections (for the sewered areas) by the sanitary sewer flow factors. These sanitary sewer flow projections are provided in Table 4-4.

Table 4-4. Sanitary Sewer Flow Projections - Existing Service Area

BASIN	FLOW ESTIMATE - SEWERED AREA (GPD)			
	2013	2018	2025	2033
East Bremerton				
Cherry Avenue	172,000	195,000	224,000	273,000
East Park	249,000	275,000	316,000	370,000
Pine Road	419,000	493,000	630,000	742,000
Stephenson Canyon	209,000	242,000	345,000	403,000
Tracyton Beach	57,000	59,000	63,000	74,000
Trenton Avenue	191,000	219,000	262,000	307,000
Total East Bremerton	1,297,000	1,483,000	1,839,000	2,169,000
West Bremerton				
Anderson Cove	360,000	375,000	396,000	470,000
Anderson Hill Road	6,000	6,000	7,000	8,000
Callow Basin	456,000	490,000	536,000	630,000
Gorst	12,000	13,000	16,000	18,000
Kitsap Lake	107,000	112,000	119,000	139,000
Marine Drive	11,000	12,000	13,000	15,000
KCSD No. 1	90,000	94,000	99,000	114,000
Oyster Bay	318,000	351,000	428,000	503,000
Pacific Basin	120,000	157,000	216,000	263,000
Phinney Bay	52,000	55,000	59,000	69,000
PSNS	635,000	644,000	653,000	815,000
Rocky Point	0	0	0	0
Sinclair Park	88,000	105,000	137,000	165,000
Sherman Heights	37,000	41,000	46,000	54,000

BASIN	FLOW ESTIMATE - SEWERED AREA (GPD)			
	2013	2018	2025	2033
PSIC	28,000	30,000	31,000	38,000
Warren Avenue	373,000	416,000	477,000	566,000
Total West Bremerton	2,693,000	2,901,000	3,233,000	3,869,000
Total Service Area	3,990,000	4,384,000	5,073,000	6,038,000

Bremerton anticipates providing sewer to areas that are currently unsewered. These areas are Marine Drive, Port Blakely, Rocky Point, West Hills, SR 304 (Sherman Heights), Trenton, Tracyton, Tracyton Beach, and PSIC. New service area plans have been developed for each of these areas.

Flow estimates from the new service area plans were used for this WWCP. The sanitary sewer flow projection from each new service area is listed in Table 4-5.

Table 4-5. Sanitary Sewer Flow Projections - New Service Areas

	SERVICE AREA	BUILD-OUT FLOW ESTIMATE (GPD)
East Bremerton	Tracyton(1)	143,000
	Tracyton Beach(1)	24,000
	Trenton(1)	380,000
West Bremerton	Marine Drive(2)	125,000
	Port Blakely(3)	442,000
	Rocky Point(4)	176,000
	West Hills(1)	81,000
	SR 304(4)	37,000
PSIC	PSIC(6)	500,000
	Total	1,910,000
	Total ERUs(7)	11,400

1. Source: City of Bremerton Sewer Planning - East Bremerton and West Hills (Feb 2014).
2. Source: City of Bremerton Sewer Planning - Marine Drive (Sep 2008).
3. Source: Port Blakely Sanitary Sewer Evaluation (Mar 2003).
4. Source: City of Bremerton Sewer Urban Growth Area Planning (Feb 2008).
5. Source: City of Bremerton Sewer Planning - SKIA (Sep 2008).
6. Source: South Kitsap Industrial Area Subarea Plan (Aug, 2012).
7. Total ERUs is total flow estimate divided by ERU value 168 gpd/ERU.

The total sanitary sewer projections from both the existing service area and the future service area are shown in Figure 4-2.

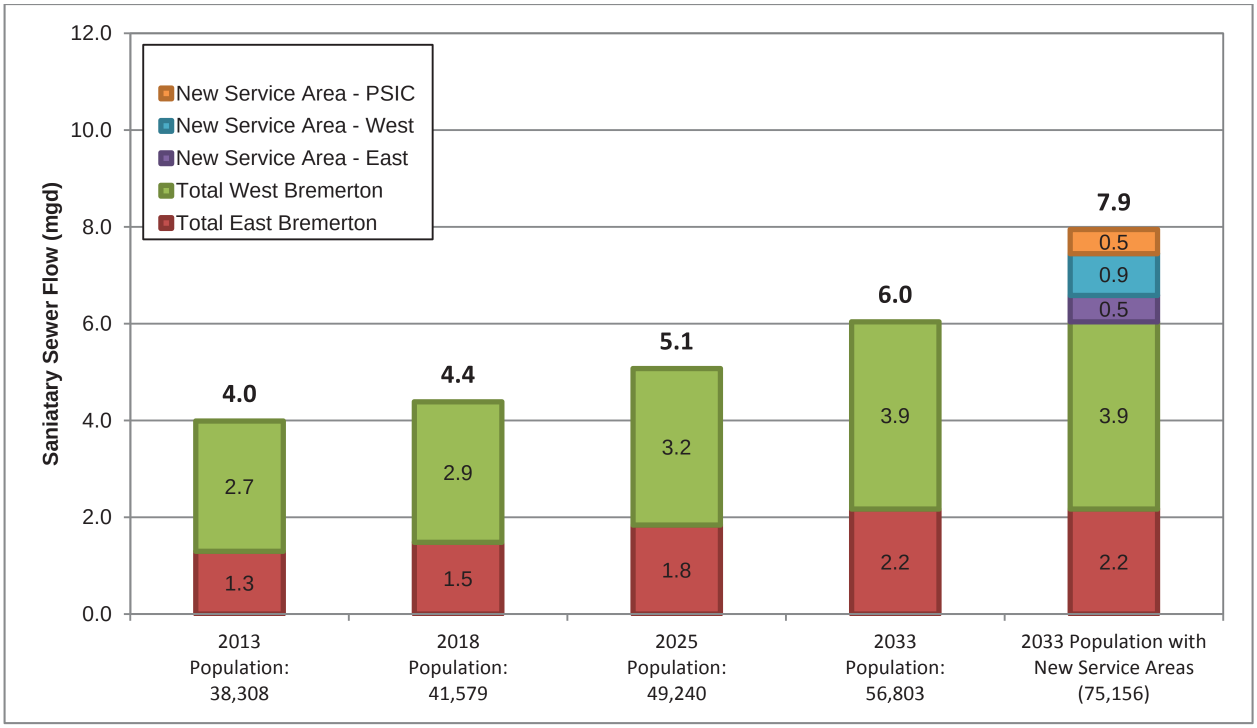


Figure 4-2. Sanitary Sewer Flow Projections

4.2.4 WWTP Projected Infiltration and Inflow

Infiltration and inflow (I&I) is surface water and groundwater that enters the sewer collection system through cracks in the piping and manholes, sump pumps, roof drains, catch basins, or other sources. An estimate of (I&I) in the sewer collection system is calculated by subtracting the average dry weather flow from the annual average, maximum month, and maximum day flows. For the average annual and maximum month periods, an I&I factor is calculated by dividing the I&I values by the total sewered area of the existing collection system (5,282 acres from Table 3-5 and Table 3-6). For the maximum day period, separate factors for the combined and separated basins are calculated from pump station flow data which is further explained in the following paragraph. These estimates for annual average, maximum month, and maximum day I&I are presented in Table 4-6.

Table 4-6. 2010 – 2012 Infiltration and Inflow

	2010 - 2012 AVERAGE (MGD)	I&I (MGD)[1]	I&I FACTOR[2] (GPD/AC)
Average Day Dry Weather	3.6	0	N/A
Average Annual	4.8	1.2	230
Maximum Month (May – Sep)	4.1	0.5	90
Maximum Month (Oct – Apr)	9.6	6.0	1,130
Maximum Day	26.9	23.0	See Table 4-7

1. I&I is estimated as the 2010 – 2012 Average Flow less average day dry weather flow.
2. I& Factor is the I&I divided by the total sewered area of the existing collection system less the area in PSIC (5,282 acres).

An estimate of the maximum day I&I is calculated from pump station flow data from November 19, 2012. This storm event produced the maximum 24-hour flow observed between 2010 and 2012. On that day, the total influent flow to the WWTP was 26.9 mgd. From pump station flow data for combined sewer basins CE-1, CE-4, CW-1, WB-3, and WB-6, the total flow was 21.4 mgd. The remainder of the flow is assumed to be from the separated basins. Based on these flows, the sewer basin areas from Table 3-5 and Table 3-6, and the sanitary flow for either the combined or separated basins from Table 4-4, the maximum 24-hour I&I rate in gallons per day per acre is calculated for combined and separated areas and shown in Table 4-7.

Table 4-7. Maximum Day (24 hour period) Infiltration and Inflow for Combined and Separated Basins

2012 MAXIMUM DAY	MAXIMUM DAY FLOW (MGD)[1]	SEWERED BASIN AREA (AC)[2]	SANITARY FLOW (MGD)[3]	I&I (MGD)[4]	I&I FACTOR (GPD/AC)[5]
WWTP	26.9	5,282	3.9	23.0	n/a
Combined Basins	21.4	3,305	3.2	18.2	5,500
Separated Basins	5.6	1,978	0.7	4.8	2,400

1. Based on flow recorded on November 19th, 2012. Flow in the combined basins is estimated based on pump station data from CE-1, CE-4, CW-1, WB-3, and WB-6. The remaining flow is assumed to be from separated basins.
2. From Tables 3-5 and 3-6 excluding basin area for PSIC.
3. Sanitary flow is the total average day dry weather flow from 2012 (3.9 mgd). The proportion of sanitary flow in the combined and separated basins is estimated based on projected flows in each. Projected flows are based on population and employment estimates within each basin.
4. I&I is the maximum day flow les the sanitary flow.
5. I&I Factor is the I&I divided by the combined and separated basin areas.

4.2.5 WWTP Projected Influent Flows

The projected influent flows to the WWTP consist of the sanitary sewer flow projections presented in Figure 4-2 and I&I that defines the annual average, maximum month, and maximum day flows. It is assumed that I&I would remain constant within the existing sewer collection area. Flow projections for the new service areas assume that the I&I factors calculated in Table 4-6 and the separated basins I&I factor in Table 4-7 would be applied to a total new service area of 2,321 acres which does not include PSIC. The maximum day I&I for the new service area assumes that the separated I&I factor from Table 4-7 would be applied. The projected influent flows to the WWTP are presented in Table 4-8.

Table 4-8. WWTP Influent Flow Projections

YEAR	FLOW				
	Average Day Dry Weather(1)	Average Annual(2)	Max Month (May-Sep)(3)	Max Month (Oct-Apr)(4)	Max Day(5)
	Mgd	mgd	Mgd	mgd	mgd
Permit Limit	NA	NA	11.0	15.5	NA
2013	4.0	5.2	4.5	10.0	27.0
2018	4.4	5.6	4.9	10.4	27.4
2025	5.1	6.3	5.6	11.1	28.1
2033	6.0	7.2	6.5	12.0	29.0
2033 with New Service Area	7.4	9.2	8.1	15.4	36.0

1. Population and employment projections from Table 4-3 multiplied by sewer flow factors 71 gpd/person and 35 gpd/employee.
2. Average day dry weather plus average annual I&I (1.2 mgd). Additional I&I in new service area is estimated at 230 gpd/ac for 2,321 acres (0.5 mgd).
3. Average day dry weather plus Max Month (May – Sep) I&I (0.5 mgd). Additional I&I in new service area is estimated at 90 gpd/ac for 2,321 acres (0.2 mgd)
4. Average day dry weather plus Max Month (Oct – Apr) I&I (6.0 mgd). Additional I&I in new service area is estimated at 1,130 gpd/ac for 2,321 acres (2.0 mgd)
5. Average day dry weather plus Max Day I&I (23.0 mgd). Additional I&I in new service area estimated at 2,400 gpd/ac for 2,321 acres (5.6 mgd)

The WWTP is rated for a maximum month flow of 11.0 mgd between May – Sept (dry season) and 15.5 mgd between Oct–Apr (wet season). The 2033 projected dry weather flow is 6.0 mgd. With the addition of new service areas, it increases to 7.4 mgd. The projected dry weather flow does not exceed the rated maximum month dry season flow.

The 2033 projected maximum month wet weather flow (Oct – Apr) is 12.0 mgd. With the additional of new service areas, it increases to 15.4 mgd. PSIC is not included because all flow would be treated by membrane bioreactor and re-use facilities. The flow projection suggests the maximum month flow may approach the permitted limit of 15.5 mgd by the year 2033; however, it is unlikely that that the projected flow will reach this level within 20 years for the following reasons:

- The population projection based on the Kitsap County Remand predicts the City of Bremerton population will increase 50 percent by the year 2033. The actual population growth between 2000 and 2010 was 1.2 percent. The population projections developed by the County may be conservative when considering the population growth between 2000 and 2010.
- Water usage has declined in the City of Bremerton due to conservation. The flow projections developed for the new service areas utilized conservative flow factors.

- The expansion of new service areas is dependent on Grant and or ULID funding. The total cost of constructing sewage facilities for the new service areas is $122 million and it is likely that only a fraction of the projects will be completed by 2033.

A determination of future improvements for the WWTP should be made by monitoring growth in the system, and when flows reach 85 percent of the design capacity (13.2 mgd) for three consecutive months, a facility plan would be developed.

4.3 Sanitary Sewer Projected Loads

4.3.1 WWTP Projected Influent Loads

The WWTP influent flow projections were multiplied by the average annual BOD and TSS concentrations from Table 4-1. The average daily and maximum month BOD and TSS loads are calculated by a ratio of the projected average daily flow over the average annual flow (2010 – 2012) of 4.8 mgd. This assumes the average day and maximum month BOD and TSS will increase in proportion to the average annual flow. Table 4-9 presents the projected loads to the WWTP. The maximum month BOD and TSS loads are not projected to exceed the permit limit.

Table 4-9. WWTP Influent Load Projections

YEAR	FLOW	BIOCHEMICAL OXYGEN DEMAND		TOTAL SUSPENDED SOLIDS	
	Average Annual	Average Daily BOD(1)	Max Month BOD(2)	Average Daily TSS(3)	Max Month TSS(4)
	mgd	lb	lb	lb	lb
Permit Limit	NA	NA	18,100	NA	22,600
2013	5.2	7,900	9,200	8,600	10,300
2018	5.6	8,500	10,000	9,200	11,100
2025	6.3	9,500	11,200	10,400	12,500
2033	7.2	10,900	12,800	11,900	14,300
2033 and New Service Area	9.2	13,900	16,400	15,100	18,300

1. 2010 – 2012 Average Daily BOD from Table 4-1 multiplied by the ratio of the average annual flow to the 2010 – 2012 average annual flow (4.8 mgd).
2. 2010 – 2012 average Max Month BOD from Table 4-1 multiplied by the ratio of the average annual flow to the 2010 – 2012 average annual flow (4.8 mgd).
3. 2010 – 2012 Average Daily TSS from Table 4-1 multiplied by the ratio of the average annual flow to the 2010 – 2012 average annual flow (4.8 mgd).
4. 2010 – 2012 average Max Month TSS from Table 4-1 multiplied by the ratio of the average annual flow to the 2010 – 2012 average annual flow (4.8 mgd).

4.4 WWTP ERU Estimate

This section provides an estimated equivalent residential unit (ERU) capacity of the WWTP. An ERU is a representative metric of flow or loads from an average residential household. The WWTP capacity can be characterized in terms of the number of ERUs that can be served. There are four methods by which the WWTP ERU capacity can be characterized according to the following flow and loading permit limits. An additional consideration is made for 85 percent of the permit limit based on the permit requirement to begin evaluating a facility expansion once flows and loads reach 85 percent of the permit limit for 3 consecutive months.

- Average Day Maximum Month flow (May – Sep): 11.0 mgd (9.4 at 85 percent permit limit). A facility plan is required once flows reach this limit for three consecutive months from May to September.
- Average Day Maximum Month flow (Oct – Apr): 15.0 mgd (13.2 at 85 percent permit limit). A facility plan is required once flows reach this limit for three consecutive months from October to April.
- Average Day Maximum Month BOD: 18,100 lb (15,400 lb at 85 percent permit limit)
- Average Day Maximum Month TSS: 22,600 lb (19,200 lb at 85 percent permit limit)

An ERU estimate for each of the four capacity limits is provided in Table 4-10.

Table 4-10. WWTP ERU Estimate

	CAPACITY LIMIT		ERU VALUE	TOTAL ERUS
	Total Flow	Dry Weather Flow (Less I&I)		
Max Month (May – Sep)	11.0 mgd	10.3 mgd (1)	168 gpd (3)	61,300
85% Max Month (May – Sep)	*9.4 mgd*	*8.7 mgd (1)*		*51,800*
Max Month (Oct – Apr)	15.0 mgd	7.0 mgd (2)		41,700
85% Max Month (Oct – Apr)	*13.2 mgd*	*5.2 mgd (2)*		*31,000*
Max Month BOD	18,100 lb		0.47 lb/day BOD (4)	38,500
85% Max Month BOD	*15,400 lb*			*32,800*
Max Month TSS	22,600 lb		0.47 lb/day TSS (5)	48,100
85% Max Month TSS	*19,200 lb*			*40,900*

1. Dry Weather Flow is estimated by subtracting I&I from the Average Day Max Month (May – Sep) flow. I&I is estimated at 0.7 mgd based on Table 4-6 (0.5 mgd for the service area and 0.2 mgd for new service areas).
2. Dry Weather Flow is estimated by subtracting I&I from the Average Day Max Month (Oct – Apr) flow. I&I is estimated at 8.0 mgd based on Table 4-6 (6.0 mgd for the service area and 2.0 mgd for new service areas).
3. ERU value is 71 gpd per person (Residential Sanitary Sewer Flow Factor) multiplied by 2.37 (average housing density for the City): 168 gpd per ERU.
4. ERU value is 0.2 lb BOD per day per person (from Table G2-2 of Criteria for Sewage Works Design by the DOE) multiplied by 2.37 (average housing density for the City): 0.47 lb BOD per ERU.
5. ERU value is 0.2 lb TSS per day per person (from Table G2-2 of Criteria for Sewage Works Design by the DOE) multiplied by 2.37 (average housing density for the City): 0.47 lb TSS per ERU.

The limiting ERU estimate for the WWTP is 31,000 ERUs based on 85 percent of the Average Day Maximum Month (Oct – Apr) permit limit. At the permit limit, the limiting ERU estimate is 38,500 based on the Max Month BOD permit limit.

Section 5 WWTP Collection System Evaluation

This section describes necessary improvements to the sewer collection system as a result of population growth and expansion of the sewer collection system to new service areas.

5.1 Planning Criteria and Regulations

Planning criteria for the design, construction, operation, and maintenance of gravity and low-pressure sewers and manholes as well as sewage pump stations and force mains are defined in Section C1 and C2 of the Ecology Criteria for Sewage Works Design. The criteria stipulate requirements such as location and site selection, design flow rates and hydraulics, odor control specifics, reliability factors, and special design details for pump stations.

5.2 Capacity Requirements and Limitations

The wastewater collection system capacity requirements are different for the combined and separated sewer basins. In the combined basins, combined sewer overflows are permitted less than one event per year per outfall. In the separated basins, sanitary sewer overflows (SSO) are not permitted. The capacity of existing facilities is required to satisfy these requirements.

Generally, the existing facilities have sufficient capacity for current wastewater flows but may be exceeded as a result of future development, growth, or extension of the sewer service collection boundaries. Improvements may be necessary to increase the capacity of existing conveyance facilities to accommodate projected flows.

The City has identified 9 new service areas that may impact their existing system. These areas include annexations of areas sewered by the County, extensions of sewer service to unsewered areas, and future developments. Projected flows from these areas are reported in Table 4-5.

This chapter presents an evaluation of the capacity of the existing facilities to accommodate future growth and sewer service expansion. The following sections describe the development of the City's hydraulic model, a summary of the analysis conducted, and alternatives for facility improvements.

5.3 Model Development

A hydraulic model is a representation of the sewer system used to predict the system's response and adequacy under operating conditions. A hydraulic model includes information about the network of physical structures and appurtenances that convey sewage in the sewer service area to the treatment facilities. A hydraulic model also contains information about sewage flows.

The City's sewer model has not been updated since it was first developed in 2000. The model was validated and updated with as-built drawings, GIS, and other information provided by the City. The model version used for the analysis is Infoworks CS v13.5.

Analysis of the separated basins was not conducted in the hydraulic model. It was conducted using spreadsheet calculations of the projected flow response at pump stations, force mains, and interceptors. The sanitary sewer flow projections and recent monitoring of flow response due to infiltration and inflow provided sufficient information to determine the impact from future growth and expansion to the separated basins.

5.3.1 Model Flow Input

Flow inputs consist of a base flow component and a rainfall-derived infiltration/inflow (RDII) component. These components are defined for small sub basins called “catchments” in the model. The City’s model is divided into 770 catchments with an average area of 6 acres.

The base flow component is comprised of sanitary flow (i.e., residential, commercial, and industrial sewage) and groundwater infiltration during dry periods. The methodology to develop that component is described in Section 4.2.3. Sanitary flows are defined for each basin. GIS analysis was conducted to determine the percentage of the total basin area for each model catchment. Sanitary flows for each catchment were applied based on the area percentage of the basin.

The RDII component addresses groundwater and stormwater conveyed by the collection system. Infiltration is groundwater that enters the sewer system through broken pipes, defective pipe joints, or connections from foundation drains. Inflow is stormwater runoff that enters the sewer system through manhole covers, cross connections between storm sewers and sanitary sewers, and connection of roof leaders, cellar drains, yard drains, or catch basins.

The City’s Infoworks model utilizes the stormwater management model (SWMM) for the RDII component. It is a dynamic model widely used in the United States to simulate rainfall and estimate runoff volume and flow rate for drainage catchments in the model. RDII is estimated based on the land use, basin area, and topography characteristics for each model catchment.

5.3.2 Model Calibration

The model was calibrated by simulating the rainfall data and comparing the model results with monitored flow at pump stations, outfalls, and the ETP. Global adjustments were made to catchments in the areas tributary to CE-1, CW-1, and WB-3/WB-6 to adjust the model simulated flows to match the monitored flows. Three calibration storm events were selected that occurred in the fall of 2012. Rainfall data was recorded during those events by City’s rain gauge stations 1 and 2 and the manual gauges at Gorst, McKenna, Twin Lakes, and the maintenance shop.

5.3.3 Design Storm Event

The City of Bremerton’s Design Storm event represents an annual frequency storm event that is used to design facilities in the combined basins. It is simulated in the model to determine the flow response conveyed to the existing major facilities. Where the sanitary flow from projected growth and future development combined with wet weather flow simulated from the Design Storm exceeds the capacity of existing sewer mains or pump stations, alternatives are presented to improve the existing collection system.

5.4 Analysis

Analysis in the collection system is based on determining when the capacity of existing facilities would be exceeded due to growth or expansion of the sewer system. Capacity is defined differently for the combined and separated sewer areas.

In the combined basins, the capacity of the systems is determined by the frequency of combined sewer overflows (CSO). Facilities are sized to limit CSO events to less than one event per outfall per year. The simulated flows from the design storm event are used to evaluate if a CSO event would occur more frequently than one event per year per outfall.

In the separated basins, sanitary sewer overflows (SSO) are not permitted and the capacity of sewer conveyance facilities is designed to prevent any overflow from occurring. The capacity should not be exceeded by the peak sanitary flow plus I&I. rate of 3,000 gallons per day per acre. Results from the *2001/2002 King County Regional Infiltration/Inflow Control Program Wet Weather Technical Memorandum* document that nearly 50-percent of all basins exceeded an I&I rate of 3,000 gal/Ac/d over ten measured storms. It is reasonable to assume 3,000 gal/Ac/d as the I/I rate for this study. When the peak sanitary flow and wet weather flow estimated by the I&I rate 3,000 gal/Ac/d exceeds the capacity of the existing facilities, alternatives are presented to improve the existing collection system.

The following sections provide a summary of the evaluation of the combined and separated basin's major facilities. Within each section, improvements are identified to accommodate growth and the addition future service areas. Appendix G documents preliminary alternatives evaluated for the conveyance facilities in the following sections.

5.4.1 Cross Town Pipeline

The Cross-Town Pipeline (CTP) receives flow from the CE-1, CW-1, CE-4, WB-3, WB-6, WB-1, WB-2, SB-1, SB-3, and SB-4 pump stations. At the highest elevation of the CTP, 247.6 feet, there is a surge chamber at 13th Street and Naval Avenue that was recently upgraded and now has the capability to be pressurized. The only gravity connection to the CTP is through a pressurized pipe from the Central Bremerton Force Main surge chamber located at Gregory Way and High Avenue. The surge chamber cannot be pressurized so the HGL in the CTP cannot exceed the invert of the structure (IE = 267.25 ft).

The capacity of the CTP was evaluated based on the peak flow from each pump station. Peak flow for each pump station is estimated as follows:

- CE-1 – Peak flow is the pump station capacity, 10,000 gpm, assuming excess flow is diverted to the ETP.
- CW-1, WB-3, and WB-6 – Peak flow is based on the modeled flow response to each pump station based on the Design Storm event described in Section 5.3.3.
- CE-4 – Peak flow is based on the metered flow data recorded during a 25-year storm event on November 19th, 2012 as there is no CSO outfall near the facility.
- WB-1 and WB-2 – Peak flow is the pump station capacity, 780 gpm and 230 gpm respectively. These pump stations are operated by KCSD No 1 and the total capacity is assumed as a conservative estimate of peak flow.
- SB-1, SB-3, and SB-4 – Peak flow is based on flow meter data recorded during a storm event on March 8 and 9, 2014. The combined flow from the pump stations is 1,980 gpm, 900, 498, and 583 gpm respectively.

The capacity of the CTP was evaluated for four scenarios which include the Year 2013 and Year 2033 peak flow estimates, Year 2033 plus Rocky Point and Marine Drive peak flow estimates, and the full capacity of all tributary pump stations. The peak flow estimates simulated in the hydraulic model for each scenario are listed in Table 5-1. Figure 5-1 depicts the hydraulic grade line estimated from the simulated flows.

Table 5-1. Cross Town Pipeline Modeling Analysis Results

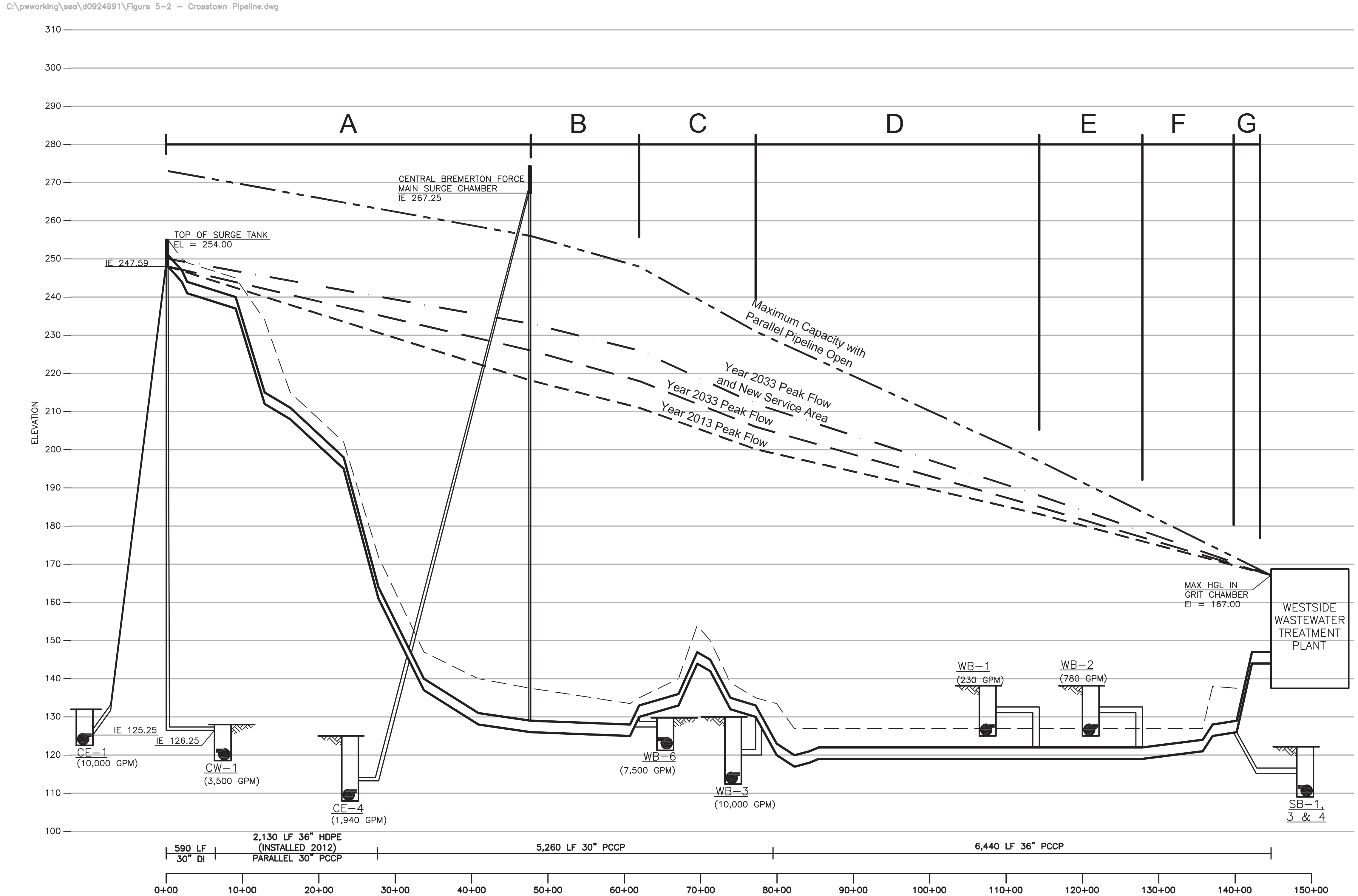
FACILITY	YEAR 2013 PEAK FLOW (GPM)	YEAR 2033 PEAK FLOW (GPM)	YEAR 2033 AND NEW SERVICE AREA PEAK FLOW (GPM)	MAXIMUM CAPACITY (GPM)
CE-1	10,000	10,000	10,000	10,000
CE-4	1480	1,780	1,780	1,940
CW-1	3,500	3,500	3.500	3.500
WB-1	230	230	230	230
WB-2	780	780	780	780
WB-3	4,880	5,490	6,690	10,000
WB-6	3,220	4,220	5,150	7,500
SB-1, 3, and 4	1,980	2,010	2,010	2,650
Combined	26,070	28,010	30,140	36,600

The CTP has capacity to convey the projected Year 2033 peak flow estimates including the additional flow from Rocky Point and Marine Drive new service areas through WB-3 and WB-6.

The maximum capacity scenario considers all pump stations operating at their full capacity. The resulting HGL would pressurize the CTP surge chamber (13th Street and Naval Avenue) with approximately 25 feet of head. At the Central Bremerton force main surge chamber (Gregory Way and High Avenue), the resulting HGL is 266 feet which is approaching the invert of the surge chamber (IE = 267.25 feet).

Recommendations

It is recommended that additional pumping capacity is not added to the CTP without further evaluation or improvements. The CTP has capacity to convey the full capacity of each pump station. Monitoring should be conducted on the CTP and contributing pump stations to verify the modeling analysis.



CROSSTOWN PIPELINE PROFILE

(APPROXIMATE HORIZONTAL SCALE 1"=1,500 FEET)

Legend

- Year 2013 Peak Flow
- Year 2033 Peak Flow
- Year 2033 Peak Flow and New Service Area
- Maximum Capacity with Parallel Pipeline Open
- Grade

Pump Station	Pump Station Peak Flow Estimate (gpm)			
	2013 (gpm)	2033 (gpm)	2033 w/ New Service Area (gpm)	Maximum Capacity (gpm)
CE-1	10,000	10,000	10,000	10,000
CW-1	3,500	3,500	3,500	3,500
CE-4	1,480	1,780	1,780	1,940
WB-6	3,220	4,220	5,150	7,500
WB-3	4,880	5,490	6,690	10,000
WB-1	230	230	230	230
WB-2	780	780	780	780
SB 1, 3 & 4	1,980	2,010	2,010	2,650

Pipe Segment	Description	Crosstown Pipeline Peak Flow Estimate (gpm)			
		2013 (gpm)	2033 (gpm)	2033 w/ New Service Area (gpm)	Maximum Capacity (gpm)
A	Surge Chamber to CE-4	13,500	13,500	13,500	13,500
B	CE-4 to WB-6	14,980	15,280	15,280	15,440
C	WB-6 to WB-3	18,200	19,500	20,430	22,940
D	WB-3 to WB-1	23,080	24,990	27,120	32,940
E	WB-1 to WB-2	23,310	25,220	27,350	33,170
F	WB-2 to SB-1, 3, and 4	24,090	26,000	28,130	33,950
G	SB-1, 3, and 4 to WWTP	26,070	28,010	30,140	36,600

Notes:

1. The range of water surface in the grit chamber is between 163.50 ft (weir elevation at the end of the grit chamber) and 167.00 ft (based on reported estimate of maximum water surface by plant personnel of 0.5 feet below grating upstream of the bar screen. The initial setting is 167.00 feet and provides the most conservative estimate of the HGL in the Crosstown Pipeline.

2. Peak flow estimates for CE-1 assume the pump station is operating at full capacity with excess flow diverted to the Eastside Treatment Plant.

3. Peak Flow estimates for CW-1, WB-6, and WB-3 are based on a hydraulic model simulation of the City's Design Storm event for Year 2013 and Year 2033 sanitary flow estimates.

4. Peak Flow estimate for CE-4 is based on metered flow data during a storm event on Nov 19, 2012.

5. Peak Flow estimates for WB-1 and WB-2 assumes each pump station is operating at full capacity.

6. Peak Flow estimates for the SB-1, 3, and 4 pump stations (900 gpm, 498 gpm, and 582 gpm) are based on metered flow data during a storm event on March 8 and 9, 2014.

7. Maximum capacity of the Crosstown Pipeline is limited by the HGL cannot exceed the invert of the Central Bremerton Force Main surge chamber (IE = 267.25 feet). With all pump stations operating at 100% capacity, the HGL is 266.3 feet in the surge chamber.

HDR

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Figure 5-1
Crosstown Pipeline Capacity Analysis

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5.4.2 CE-4 Pump Station

The CE-4 pump station is located in the downtown area near the Bremerton ferry terminal. It receives flow from the Pacific and PSNS basins and discharges to the Central Bremerton force main. The pump station is located within a combined sewer area. The nearest CSO outfall is OF-16; however, it is not hydraulically possible for CE-4 to overflow at OF-16. Therefore, the pump station must provide capacity for combined sewer flows during very large storm events in excess of the design storm event.

The peak flow estimate is based on observed flow data collected from the pump meter during a storm event on November 19th, 2012 estimated to be a 25-year storm event. The Year 2033 peak flow estimate is based on demographic growth in the pump station basin due to redevelopment of the Downtown Core. Table 5-2 lists the estimated peak flow estimates for CE-4.

Table 5-2. CE-4 Peak Design Flows Estimates

FACILITY	TOTAL CAPACITY (GPM)	YEAR 2013 PEAK FLOW (GPM)	YEAR 2033 PEAK FLOW (GPM)
CE-4	1,940	1,480	1,780

During the storm event on November 19th, 2012, CE-4 operated at 76 percent (1,480 gpm) of its total capacity. By Year 2033, the peak flow to CE-4 is estimated to approach the total capacity of the station.

Recommendations

It is recommended that if flow to CE-4 is increased, both pumping and Crosstown Pipeline improvements are evaluated. Additional flow conveyed to the pump station would likely require a pumping capacity upgrade, which would increase flow to the Crosstown Pipeline. There is limited available capacity of the CTP as described in the previous section. It is recommended that monitoring is conducted to confirm the modeling analysis of the CTP and improvements are evaluated before increasing the pumping capacity of CE-4.

5.4.3 Trenton, Tracyton, and Tracyton Beach

Eastside Treatment Plant and CE-1

The Eastside Treatment Plant, CE-1, and the East Bremerton Beach Main are the major conveyance facilities for the East Bremerton basins. The Eastside Treatment Plant is design to treat flows in excess of the capacity of CE-1 and discharge to Sinclair inlet. There are four overflows along the East Bremerton Beach Main: OF-1, OF-2, OF-3, and OF-4. Currently, these overflows experience less than one CSO event per year. The ETP capacity is sufficient for treating current combined sewer flows.

The Trenton, Tracyton Beach, and Tracyton new service areas would increase flow to these facilities. Table 5-3 lists the predicted peak design flow for each new service area documented in the *New Service Area Plans – East Bremerton and West Hills* (Feb, 2014).

Table 5-3. New Service Area Peak Design Flows Estimates Tributary to CE-1 and ETP

NEW SERVICE AREA	PEAK DESIGN FLOW, INCLUDING I&I (GPM)
Trenton	2,713
Tracyton Beach	159
Tracyton	1,109
Total	3,981

The simulated flows from the design storm plus Year 2013 population, Year 2033 population, and Year 2033 population with new service area peak sanitary flow are reported in Table 5-4. This is the predicted flow to the CE-1 and ETP facilities.

Table 5-4. CE-1 and ETP Modeling Analysis Results

FACILITY	TOTAL CAPACITY (GPM)	YEAR 2013 PEAK FLOW (GPM)	YEAR 2033 PEAK FLOW (GPM)	YEAR 2033 PEAK FLOW + NEW SERVICE AREA (GPM)
CE-1 and ETP*	23,800	11,220	12,640	16,620

* Peak flow estimates for Year 2013 are based on flow meter data collected at CE-1 and ETP.

The total capacity of CE-1 and ETP combined is 23,800 gpm. Based on the model simulated flows, the CE-1 and ETP facilities have sufficient capacity to accommodate flows from the East Bremerton new service areas during the design storm event.

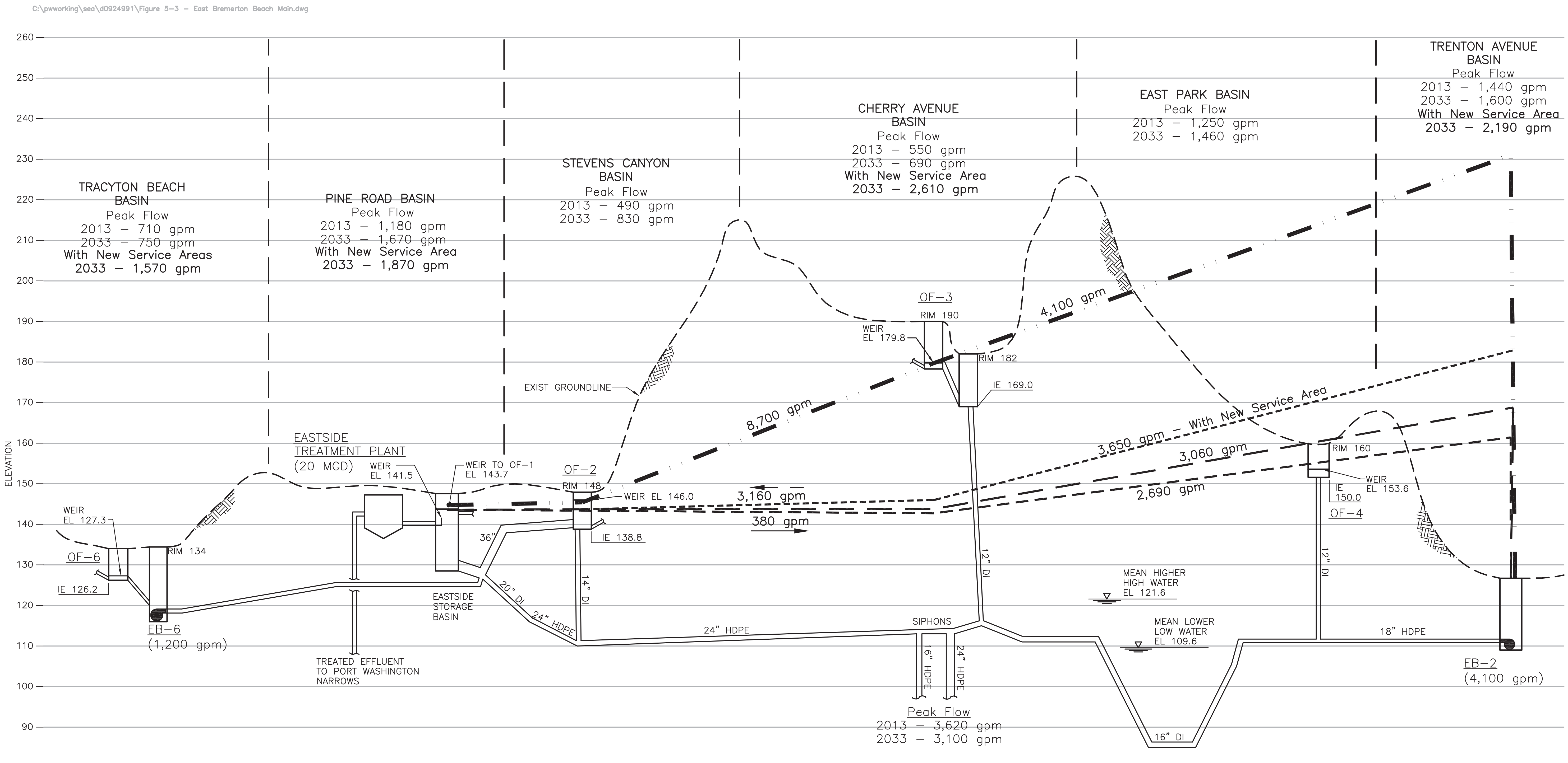
Dry weather flow from the new service areas is less than the design storm event flow and the existing system has capacity to accommodate dry weather flow.

East Bremerton Beach Main

Flows to the East Bremerton Beach Main were simulated in the hydraulic model. The Year 2013 and Year 2033 design storm flows were simulated along with the new service area alternatives described in the section discussing impacts to EB-2 and EB-3. The flows in the beach main were simulated in two conditions where one siphon is open and both siphons are closed. The predicted HGL from the model is depicted in Figure 5-2 and Figure 5-3.

Planned Improvements

The capacity of the East Bremerton Beach Main from the siphons to the ETP is approximately 8,700 gpm without causing an overflow at OF-3. Based on the model predicted flow rates during the design storm, the East Bremerton Beach Main could accommodate flow from the new service areas. No capacity related improvements are planned for the East Bremerton Beach Main.



EAST BREMERTON BEACH MAIN PROFILE

(APPROXIMATE HORIZONTAL SCALE 1"= 900 FEET)

Legend

- Beach Main Capacity
- Design Storm + 2013 Flow
- Design Storm + 2033 Flow
- Design Storm + 2033 Flow + New Service Area

Note:
1. Beach Main capacity is defined as the maximum flow rate that would not cause an overflow at OF-1, OF-2, or OF-3

Figure 5-2
East Bremerton Beach Main
16" Siphon Open
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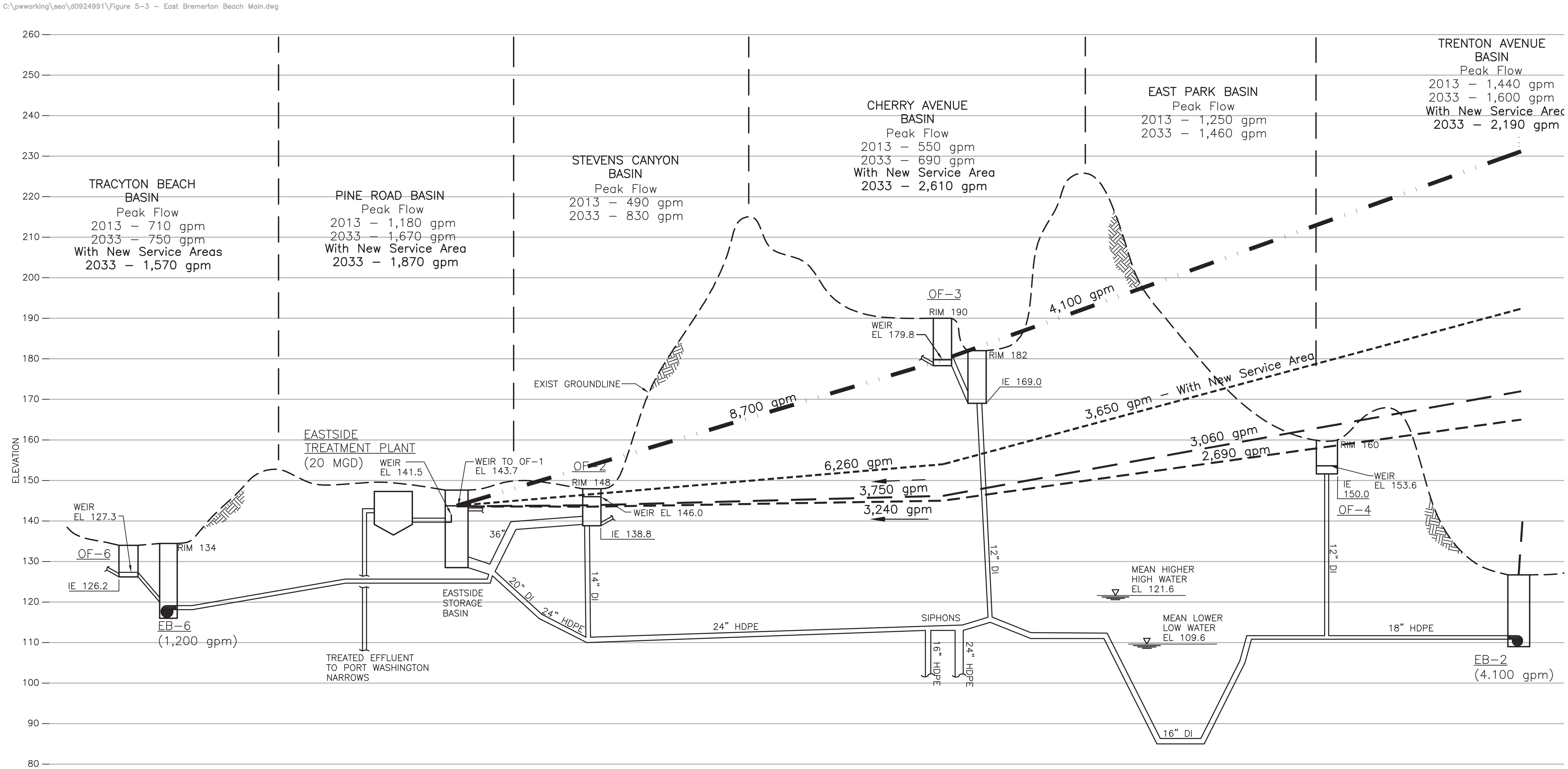

EAST BREMERTON BEACH MAIN PROFILE

(APPROXIMATE HORIZONTAL SCALE 1"= 900 FEET)

Legend

- Beach Main Capacity
- Design Storm + 2013 Flow
- Design Storm + 2033 Flow
- Design Storm + 2033 Flow + New Service Area

Note:
1. Beach Main capacity is defined as the maximum flow rate that would not cause an overflow at OF-1, OF-2, or OF-3

Figure 5-3
East Bremerton Beach Main
Siphons Closed

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Pump Station EB-2

Pump Station EB-2 receives flow from the Trenton Avenue Basin and the East Park Basin during wet weather events. A sub-basin of the Trenton new service area is proposed to be added upstream of EB-2. The sub-basin identified in the new service area plan is TRT-1. Flow from basins TRT-2, 3, 4, 5, 6 and 7 would be pumped to the Cherry Avenue Basin from proposed pump stations TA-1, TA-2, and TA-4. Table 5-5 lists the estimated peak design flow for each new Trenton service area documented in the *Sewer Planning – East Bremerton and West Hills* (Feb, 2014).

Table 5-5. New Service Area Peak Design Flow Estimates Tributary to EB-2

NEW SERVICE AREA	PEAK DESIGN FLOW, INCLUDING I&I (GPM)
Trenton - TRT-1	587

The simulated flows from the Design Storm plus Year 2013 population, Year 2033 population, and Year 2033 population with new service area peak sanitary flow are reported in Table 5-6.

Table 5-6. EB-2 Modeling Analysis Results

FACILITY	TOTAL CAPACITY (GPM)	YEAR 2013 PEAK FLOW (GPM)	YEAR 2033 PEAK FLOW (GPM)	YEAR 2033 PEAK FLOW + NEW SERVICE AREA (GPM)
EB-2	4,100	2,690	3,060	3,650

Planned Improvements

The City plans to convey flow from the Trenton sub basin TRT-1, pumped from proposed pump station TA-3, to discharge to an existing 15-inch gravity main on Perry Avenue. Approximately 3,600 LF of 8-inch force main would be installed from TA-3 along Holman Street to Perry Avenue. The existing gravity conveyance system would convey dry weather flow to the Cherry Avenue Basin along 8th Street and Lower Wheaton Way. Wet weather flow would be conveyed through existing weir manholes on 8th Street to EB-2 and pumped through the East Bremerton beach main. This evaluation indicates that EB-2 has capacity for the expansion of service to this sub-basin and no additional improvement to the pump station is needed.

Figure 5-4 depicts the conveyance facilities, modeling results, and proposed improvements for the Trenton service area.

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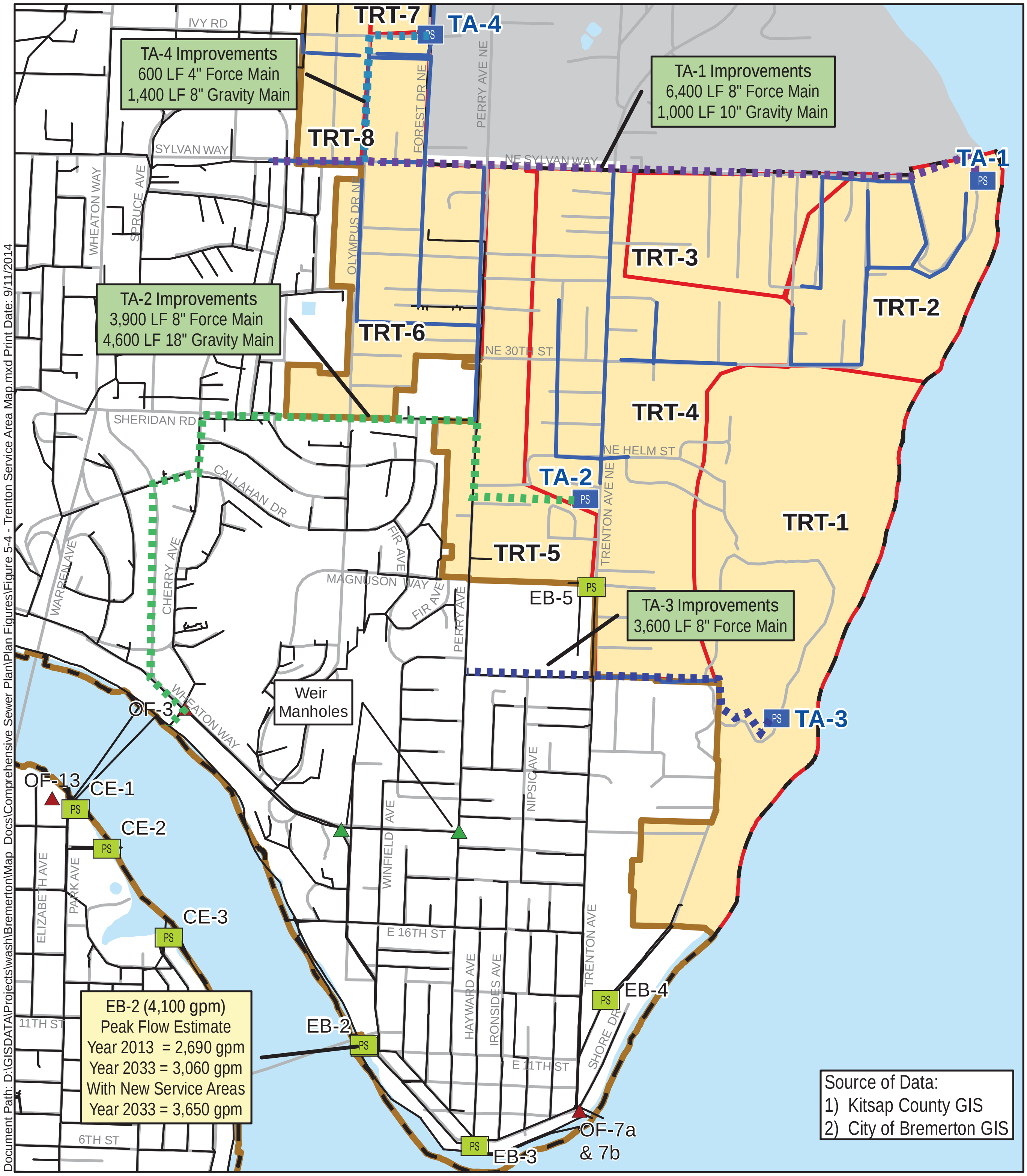

Legend

- TA-1 Improvements
- TA-2 Improvements
- TA-3 Improvements
- TA-4 Improvements
- Proposed Sewer Main
- Proposed Pump Station
- New Service Area Basin
- Sewer Main
- Pump Station
- Outfall
- Weir_MH
- City of Bremerton
- Bremerton UGA
- Water Body
- Highway
- Streets

Figure 5-4
Trenton Service Area Map
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Pump Station EB-6

EB-6 pump station serves the Tracyton Beach sewer basin and pumps to the East Bremerton Beach Main. Overflow OF-6 is at that the pump station in the event that combined flow exceeds the capacity of the pump station. The Tracyton Beach and portion of the Tracyton new service areas are proposed to be added upstream of EB-6. The new service areas would increase flows to EB-6. Table 5-7 lists the estimated peak design flow for each new service area documented in the *New Service Area Plans – East Bremerton and West Hills* (Feb, 2014).

Table 5-7. New Service Area Peak Design Flow Estimates Tributary to EB-6

NEW SERVICE AREA	PEAK DESIGN FLOW, INCLUDING I&I (GPM)
Tracyton Beach	159
Tracyton - TRC-2	345
Tracyton - TRC-3	213
Tracyton - TRC-4	103
Total	820

The simulated flows from the Design Storm plus Year 2013 population, Year 2033 population, and Year 2033 population with new service area peak sanitary flow are reported in Table 5-8.

Table 5-8. EB-6 Modeling Analysis Results

FACILITY	TOTAL CAPACITY (GPM)	YEAR 2013 PEAK FLOW (GPM)	YEAR 2033 PEAK FLOW (GPM)	YEAR 2033 PEAK FLOW + NEW SERVICE AREA (GPM)
EB-6*	1,200 (2 of 3)	710	750	1,570

* Peak flow estimates for Year 2013 are based on flow meter data collected at the pump station.

EB-6 has a total capacity of 1,200 gpm with two pumps in operation, and there is less than one CSO event per year at OF-6. As the service area expands, an upgrade to the pumping capacity of EB-6 would be evaluated as flows approach the total capacity. Based on the projected flows above, the existing force main could accommodate a pumping capacity upgrade.

Planned Improvements

The City plans to convert the existing 8" ductile iron pipe along Tracyton Beach Road into a force main to convey flows from the Tracyton service area. City staff reported that the main is oversized. Due to its length and uneven alignment, sewage is often retained in the pipeline, and converting it to a force main would improve flushing. The proposed pump station TB-2 serving the TRC-2, 3, and 4 sub basins would connect to the existing main with a 1,200 lineal foot (LF) 8" force main and pump flow to EB-6. Existing gravity connections to the 8" sewer main would be connected to new gravity mains that would convey flow to either EB-6 and or TB-2.

Figure 5-5 depicts the conveyance facilities, modeling results, and proposed improvements.

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Figure 5-5
Tracyton Service Area Map
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Legend

TB-2 Improvements	City of Bremerton
Proposed Sewer Main	Bremerton UGA
PS Proposed Pump Station	Water Body
New Service Area Basin	Highway
Sewer Main	Streets
PS Pump Station	
Outfall	

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0 375 750 1,500 Feet

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5.4.4 Port Blakely

Port Blakely is an undeveloped property west of the Kitsap Lake Basin within the City's service area. A development plan was submitted to the City and flow estimates were evaluated in Appendix C of the *2005 Wastewater Comprehensive Plan Update* (Aug 2005). Since 2005, the ownership of the property has changed and the zoning revised to low density residential. Currently, no development plan is being pursued at the property.

The City recognizes that the property could be developed in the future and request sewer service in the Kitsap Lake Basin. The flow estimates developed in the 2005 WWCP are no longer valid and would need to be updated once a new development plan has been submitted to the City. The following section discusses the existing capacity of the Kitsap Lake system, available capacity for additional service area, and improvements necessary to provide service to the Port Blakely property.

Flow from the Kitsap Lake Basin is conveyed through 4 pump stations connected in series. KL-4 pumps to KL-3, KL-3 pumps to KL-2, and KL-2 pumps to KL-1 which pumps out of the basin. Table 5-9 lists the capacity of each pump station and current and projected peak flow estimates. The peak flow estimates for KL-2, KL-3, and KL-4 is based on flow meter data collected at each pump station. The flow estimate for KL-1 is estimated based on a combination of demographic information and flow from KL-2.

Table 5-9. Kitsap Lake Pump Stations Projected Peak Flows

FACILITY	TOTAL CAPACITY (GPM)	YEAR 2013 PEAK FLOW (GPM)	YEAR 2033 PEAK FLOW (GPM)
KL-1	950 (1 of 2)	1,440	1,560
KL-2*	1,150 (1 of 2)	1,380	1,490
KL-3*	500 (1 of 2)	660	700
KL-4*	450 (1 of 2)	280	300

* Peak flow estimates for Year 2013 are based on flow meter data collected at the pump station.

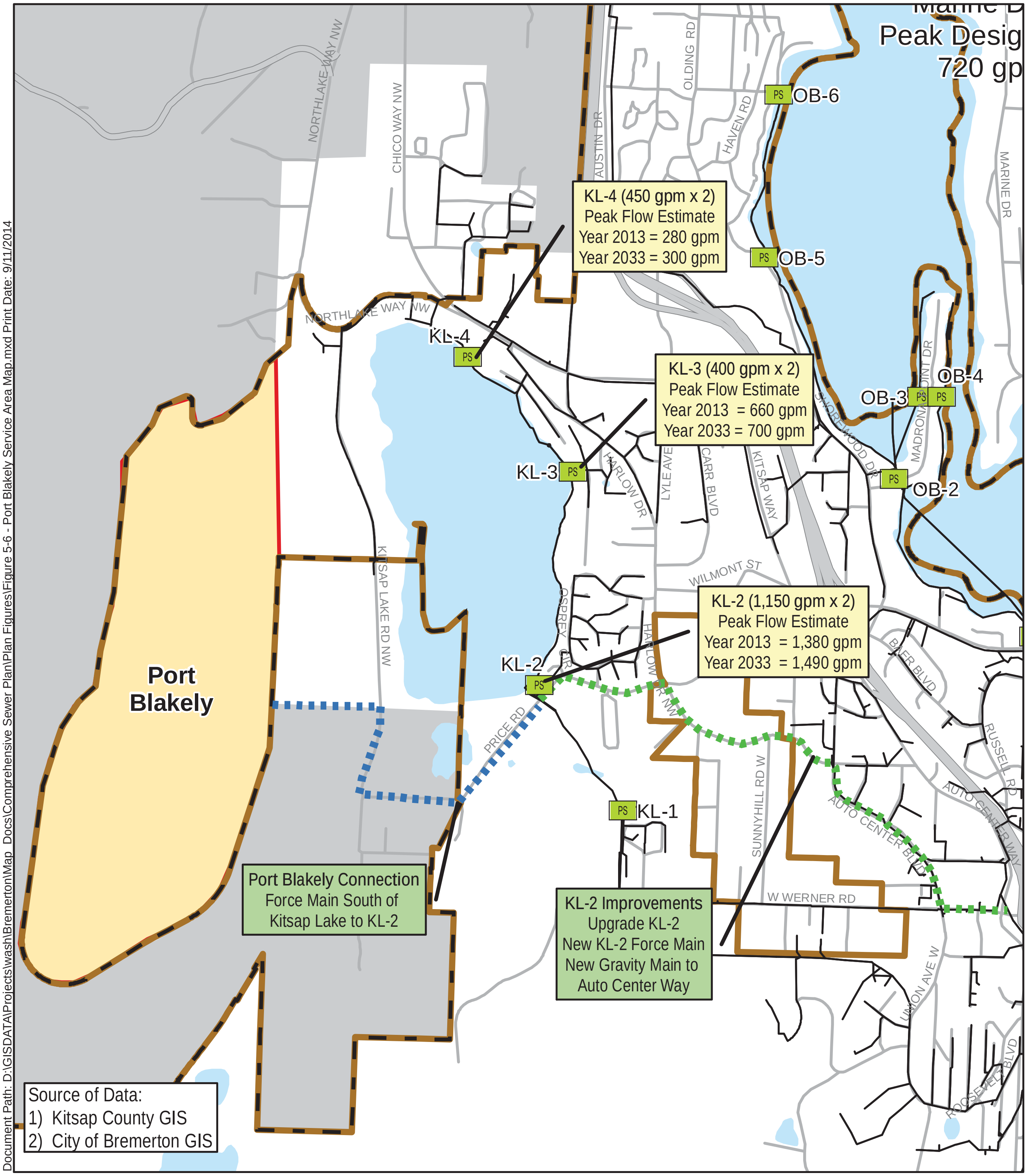
There is limited available capacity in the Kitsap Lake system. KL-1, KL-2, and KL-3 operate both pumps during peak wet weather flow events. This limits reliability in the system as there is no redundant pumping at these pump stations during wet weather events.

Planned Improvements

The City plans to implement the following improvements if development occurs at the Port Blakely property and depending on the type of development. Figure 5-6 depicts the conveyance facilities, modeling results, and alternatives.

- **Port Blakely Connection** – 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.
- **KL-2 Improvements –** The KL-2 pump would be upgraded or replaced to accommodate the additional flows from the Port Blakely development. It is currently approaching its peak capacity during peak flow events. A new force main would be installed bypassing the KL-1 pump station. Approximately 3,700 LF of force main would be installed along

Price Road and Harlow Drive to discharging to a gravity sewer at Sunnyhill Road. The existing 8" sewer main along Harlow Drive would be replaced with approximately 4,600 LF of 24" gravity main from Sunnyhill Road to Keen Street, along Keen Street from Harlow Road to Werner Road, and along Werner Road from Keen Street to Auto Center Way. It would connect to an existing 24" sewer main on Auto Center Way.



Legend

- Port Blakely Connection
- KL-2 Improvements
- Proposed Pump Station
- New Service Area Basin
- Sewer Main
- Pump Station
- Outfall
- Bremerton UGA
- City of Bremerton
- Water Body
- Highway
- Streets

N

0 500 1,000 2,000 Feet

Figure 5-6
Port Blakely Service Area Map

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5.4.5 Rocky Point and Marine Drive

Pump Station WB-3 and WB-6

Flows from the expansion of service in the Rocky Point and Marine Drive new service areas would be conveyed to pump stations WB-3 and WB-6 in the Callow Basin. Table 5-10 lists the estimated peak design flow for the Rocky Point and Marine Drive new service areas. Both areas are documented in the *Sewer Planning – Marine Drive Area* (Sep, 2008) and *Sewer Urban Growth Area Planning* (Feb, 2008).

Table 5-10. New Service Area Flows Tributary to WB-3 and WB-6

NEW SERVICE AREA	PEAK DESIGN FLOW, INCLUDING I&I (GPM)
Marine Drive	720
Rocky Point	1,411
Total	2,131

The simulated flows from the Design Storm plus Year 2013 population, Year 2033 population, and Year 2033 population with new service area peak sanitary flow are reported in Table 5-11.

Table 5-11. WB-3 and WB-6 Projected Peak Flows

FACILITY	TOTAL CAPACITY (GPM)	YEAR 2013 PEAK FLOW (GPM)	YEAR 2033 PEAK FLOW (GPM)	YEAR 2033 PEAK FLOW + NEW SERVICE AREA (GPM)
WB-3 and WB-6*	17,500 (combined)	8,100	9,710	11,840

* Peak flow estimates for Year 2013 are based on flow meter data collected at the pump station.

There is available capacity in pump stations WB-3 and WB-6 to convey flows from the Rocky Point and Marine Drive service areas.

Planned Improvements

The City plans to extend the force main from MD-2 to the Callow Basin with a possible discharge location to the existing 30" sewer main at Wycoff Avenue and 11th Street. Figure 5-7 depicts the conveyance facilities, modeling results, and proposed improvements.

Pump Station PB-1

Two sub-basins of the Rocky Point new service area are proposed to discharge upstream of the PB-1 pump station. Table 5-12 lists the peak sanitary and design flow for each new service area.

Table 5-12. New Service Area Flows Tributary to PB-1

NEW SERVICE AREA	PEAK SANITARY FLOW ESTIMATE (GPM)	PEAK DESIGN FLOW, INCLUDING I&I (GPM)
Rocky Point - RP-3	77	211
Rocky Point - RP-6	40	119
Total	117	330

I&I in the existing service area is estimated at 3,000 gal/Ac/d. Peak sanitary flows for Year 2013 and Year 2033 are estimated by demographics and flow factors from Section 4.2. Table 5-13 shows the estimated peak flow to the PB-1 pump station.

Table 5-13. PB-1 Projected Peak Flows

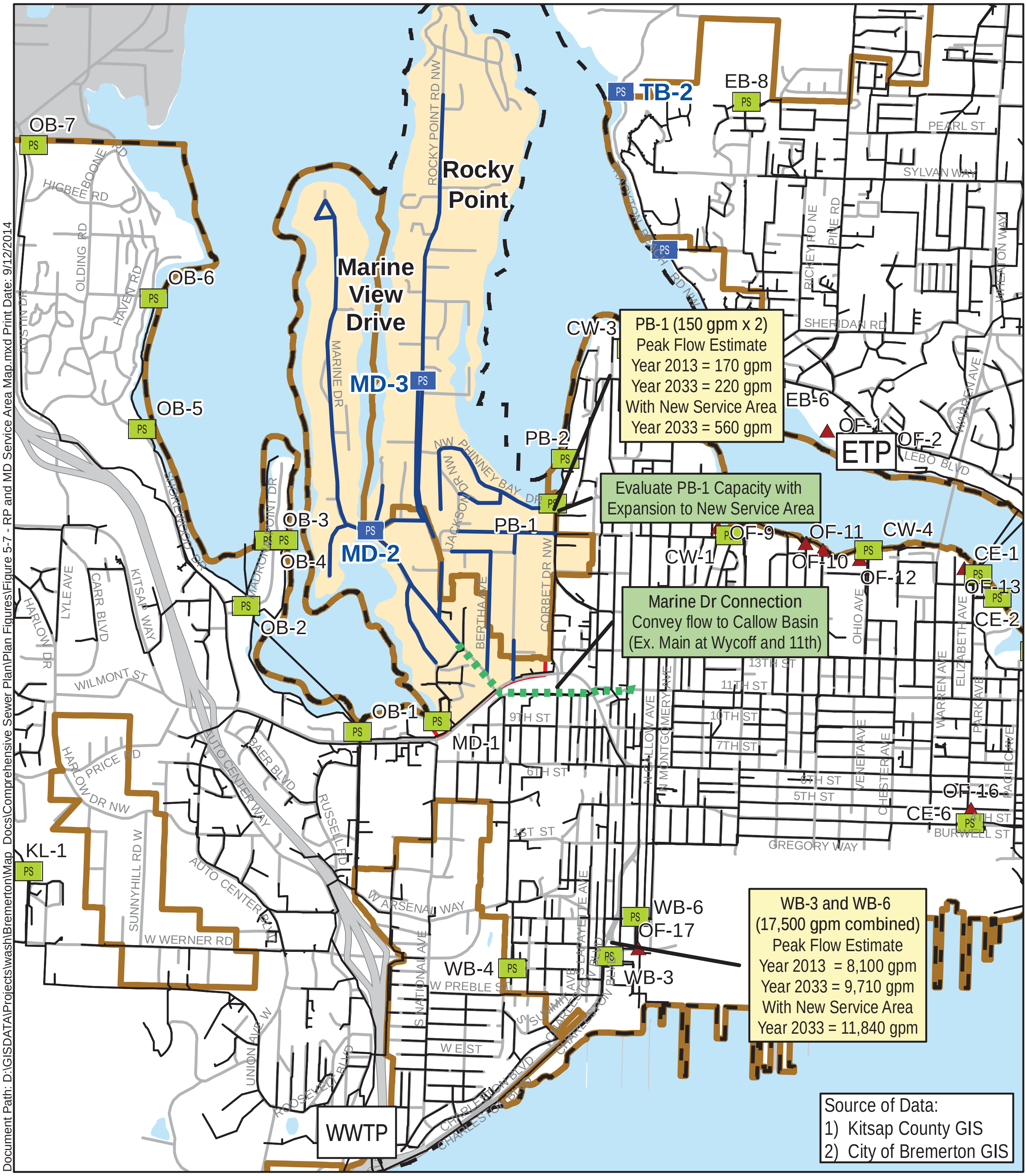
Facility	Total Capacity (gpm)	Year 2013 Peak Flow (gpm)	Year 2033 Peak Flow (gpm)	Year 2033 Peak Flow + New Service Area (gpm)
PB-1	150 (1 of 2)	170	220	560

The PB-1 pump station contains 2 pumps that can operate simultaneous during peak flows. The existing peak wet weather flows are estimated to exceed the capacity of a single pump in operation. With the additional flows estimated for the RP-3 and RP-6 sub-basins, it is likely an upgrade to PB-1 would be need. It is estimated that the Year 2033 sewer flows would require a pumping capacity of 600 gpm.

Planned Improvements

The City plans to monitor flows at PB-1 as service expands in the Rocky Point service area to determine if and when a capacity upgrade at PB-1 is necessary.

Figure 5-7 depicts the conveyance facilities, modeling results, and proposed improvements.



Legend

- Marine Dr Connection
- Proposed Pump Station
- Proposed Sewer Main
- New Service Area Basin
- Sewer Main
- Pump Station
- Outfall
- City of Bremerton
- Bremerton UGA
- Water Body
- Highway
- Streets

Figure 5-7
Rocky Point and Marine Drive
Service Area Map
CITY OF BREMERTON
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N

0 750 1,500 3,000 Feet

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5.5 Summary of Planned Improvements

The following is a summary of proposed improvements from the subsequent sections:

- **Cross Town Pipeline:** It is recommended that the City confirm the modeling analysis by monitoring pressure and flow data in the CTP. Modeling analysis suggests that the current capacity of the CTP can convey the maximum simultaneous operation of the tributary pump stations. Under this condition, the HGL is predicted to pressurize the surge chamber located at 13th Street and Naval Avenue and approach the invert of the Central Bremerton Force Main surge chamber located at Gregory Street and High Avenue, which cannot be pressurized.
- **CE-1 and ETP:** There are no planned improvements to CE-1 or the ETP. The projected sanitary flow from future growth and expansion of the sewer system to new service areas is not anticipated to exceed the capacity of CE-1.
- **East Bremerton Beach Main:** There are no capacity related improvements planned for the East Bremerton Beach Main. Projected flows to the East Bremerton Beach Main were simulated in the hydraulic model, and the results indicated there is sufficient capacity in the Beach Main.
- **EB-2:** There are no capacity related improvements planned for pump station EB-2. Only one sub-basin, TRT-1, would be conveyed to EB-2 through the existing collection system. Flow from this sub-basin is not projected to exceed the capacity of the EB-2. The City plans to convey flow from proposed pump stations TA-1, TA-2, and TA-4, which constitute a majority of the service area, to the Cherry Avenue basin to avoid impacting pump station EB-2.
- **EB-6:** Upgrading pumping and electrical equipment may be necessary as growth occurs. The pump station currently has available capacity for growth in the new service area, and the expansion of sewer service to the Tracyton and Tracyton Beach new service areas would increase flow to EB-6. The City will monitor growth in tributary to EB-6 and evaluate when and if pumping capacity improvements are necessary.

  The City plans to convert the existing 8" main along Tracyton Beach Road to a force main in order to convey flows from the Tracyton service area and improve flushing. New gravity sewer mains would be installed to accommodate flows from existing gravity connections to the 8" main along Tracyton Beach Road. The new gravity mains would convey flows to either EB-6 or the proposed pump station TB-2.
- **Kitsap Lake Pump Stations:** The City plans to convey flow from a development at Port Blakley area through a new pump station and force main south of Kitsap Lake to discharge to pump station KL-2. There is currently no active plan for a Port Blakely development, however, it is possible in the future. Depending on the size of the development, pump station KL-2 and force main would be upgraded to accommodate the additional flows.
- **PB-1:** The City plans to monitor and evaluate flow to pump station PB-1 and determine if and when a pumping capacity upgrade is necessary. Expansion of sewer service in the Marine Drive area would increase flow to PB-1 and is projected exceed its capacity at full build out. .

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Section 6 Treatment Facilities Evaluation

This section examines the capacity needs of the existing WWTP and the ETP. The section is divided into liquid treatment facilities, biosolids management, and future improvements.

6.1 Liquid Stream Performance

The following subsections detail the capacity, requirements and performance associated with each plant's liquid processing units.

6.1.1 WWTP Effluent Standards

The WWTP is currently permitted for a maximum month average flow of 11.0 mgd (May-September) and 15.5 mgd (October- April). Table 6-1 lists the current NPDES permit limits for the WWTP. The current NPDES Permit was issued on June 21, 2013 and is in effect from August 1, 2013 thru July 31, 2018. The current permit requirements are summarized in Table 6-1.

Table 6-1. WWTP NPDES Permit Requirements

PERMIT PARAMETER		
Influent	Daily	Maximum Month
Flow, mgd	N/A	11.0 May-Sept/15.5 Oct-Apr
BOD_5 Loading, lb/day	N/A	18,100
TSS Loading, lb/day	N/A	22,600
Effluent	Weekly	Monthly
BOD_5 concentration, mg/L (average)	45	30
BOD mass loading, lb/day (average)	4,128 May-Sept 5,817 Oct-Apr	2,752 May-Sept 85% removal 3,878 Oct-Apr 65% removal
TSS concentration, mg/L (average)	45	30
TSS mass loading, lb/day (average)	4,128 May-Sept 5,817 Oct-Apr	2,752 May-Sept 85% removal 3,878 Oct-Apr 65% removal
pH	6.0-9.0 (daily)	
Fecal coliform, cfu/100ml (geometric mean)	400	200
Total residual chlorine, mg/L (max limit)	0.3 (daily)	0.1

The NPDES permit also requires that average monthly effluent concentrations for BOD_5 and TSS not exceed 15 percent of the respective monthly average influent concentrations except during the wet weather months of October through April. The waiver of the federal 85 percent removal requirement recognizes that the Bremerton system collects CSO and the WWTP treats CSO flows to current water quality standards.

6.1.2 WWTP NPDES Compliance

The WWTP has been in compliance with all discharge standards since 2005. The plant has received an Outstanding Performance Award from Ecology for eight consecutive years (2005-2012). Compliance with CSO issues is addressed in the CSO Plan and City's annual CSO compliance reports.

The NPDES Permit requires Bremerton to begin planning for expansion when the actual flow and/or load reaches 85 percent of the permit capacity for three consecutive months. With the exception of extreme wet weather months, actual flow does not reach the 11.0/15.5 mgd capacity during the WWCP planning period. With expansion into new service areas, the projected average monthly flow between Oct to Apr could exceed the current permit parameters. The expansion of the sewer system is dependent on funding for sewerage of the new service areas. The timing of these new service areas will determine when and if additional improvements are necessary at the WWTP.

6.1.3 ETP Permit

The ETP began treatment of combined sewer overflows (CSOs) in December 2001. The current NPDES Permit was issued June 21, 2013, and is effective August 1, 2013 thru July 31, 2018. The current permit requirements are summarized in Table 6-2.

Table 6-2. ETP NPDES Permit Requirements

PARAMETER	AVERAGE YEARLY
TSS Removal Efficiency	Equal to or greater than 50% removal of influent TSS
Settleable Solids	0.3mL/L
Parameter	Monthly Geometric Mean
Fecal Coliform Bacteria	400/100 mL
Parameter	Monthly
Number of Discharge Events	Report
Discharge Volume	Report

6.2 Biosolids Management

The City has used biosolids to fertilize City-owned forest land since 1989. From 1992 to present, 100 percent of the annual biosolids production (approximately 770 dry tons) is utilized on forest lands owned by the Bremerton Water Utility. Hauling from the plant to the application sites is performed by a Contractor which is currently Waste Management.

Historical records were obtained for 2005 though 2012. The estimated biosolids quantities are shown in Table 6-3.

Table 6-3 Historical Annual Biosolids Quantities

YEAR	DRY TONS/YEAR
2005	659
2006	577
2007	601
2008	608
2009	678
2010	-
2011	-
2012	770

No data present in years 2010 and 2011.

6.2.1 Future Biosolids Management Alternatives

Two alternatives were evaluated for the future management of biosolids. A detailed cost evaluation is provided within Appendix F. The following is a description of the two alternatives for Bremerton's biosolids management program:

- Alternative 1 - Continue current forest application program:
  - City-managed application on City forest land.
  - Contractor hauling to sites.
  - City application.
- Alternative 2 - Agricultural or other land application at a nearby Beneficial Use Facility (BUF):
  - Fire Mountain Farms.
  - Cascade Materials.
  - Contractor hauling to BUF.

6.2.2 Alternative 1: Continue Current Forestry Program

Bremerton has been successfully operating its forest land application program since 1989. Application onto two sites with a combined area of about 800 acres approximately five miles southwest of Bremerton. Application is managed by the Bremerton Water Utility. An Aero-Spread solids spreader mounted on an International truck chassis is used for dewatered cake application. The City also has covered storage facilities. Hauling from the plant to the application sites is performed by a Contractor, currently Waste Management. This alternative would require no changes to the current program.

6.2.3 Alternative 2: Agricultural Land Application at a Contract-Operated Beneficial Use Facility (BUF)

This alternative would require the City to either re-negotiate or re-bid a biosolids hauling contract to haul biosolids to a Beneficial Use Facility (BUF). A contract with a BUF for contract land application and management would also be required.

The closest BUFs to Bremerton are Fire Mountain Farms (FMF) in the Centralia area and Cascade Materials in Snohomish. FMF is a large BUF that accepts biosolids from a number of large and small wastewater utilities, including the LOTT Clean Water Alliance. Cascade Materials is a much smaller BUF and has recently had problems permitting a field storage site for biosolids. Both Fire Mountain Farms and Cascade Materials were contacted regarding the potential to accept Bremerton's biosolids. FMF indicated that they would likely charge approximately $28 per wet ton, but that currently they are having some issues with field storage in general, which may prohibit a near-term contract for accepting biosolids in winter months. Cascade Materials indicated that they did not have much capacity to accept Bremerton's biosolids at this time and would charge $80 per wet ton.

Field storage is recommended due to weather conditions during much of the year that prohibit biosolids application. Given wet weather and agricultural land application limitations in winter months, the City already has covered storage facilities. In addition, some BUFs have storage facilities. Shared costs for storage facilities at a BUF could be negotiated in exchange for long-term contracts that could benefit both parties if additional storage is needed.

6.2.4 Cost Estimate Assumptions

The annual operations and maintenance costs were estimated based on the City's current costs as well as HDR experience. Assumptions for the cost estimates are as follows:

- Average annual biosolids application site timber revenue - $119,989 (from 2000-2013).
- Alternative 1:
  - Increase in timber yield from biosolids application – 100 percent.
  - Estimated value of City application equipment - $200,000.
- Alternative 2:
  - Contractor hauling - $76.67 per wet ton solids.
  - Contractor (BUF) management/application - $28 per wet ton solids.

6.2.5 Annual Operations and Maintenance Costs

Table 6-4 presents the annual O&M cost estimates for the two biosolids management alternatives. The forest alternative includes timber revenue but has equipment replacement and maintenance materials costs due to the City application of biosolids. Estimates are provided for both the Year 2014 estimated biosolids quantities and the Year 2033 projected biosolids quantities with the addition of new service areas.

Table 6-4. Estimated Annual Operations and Maintenance Costs for Biosolids Management Alternatives

	ALT 1: CONTINUE FOREST APPLICATION PROGRAM	ALT 1: CONTINUE FOREST APPLICATION PROGRAM	ALT 2: AGRICULTURE APPLICATION AT A BUF	ALT 2: AGRICULTURE APPLICATION AT A BUF
	2014	2033 With New Service Area	2014	2033 With New Service Area
Hauling	$93,000	$176,800	$366,300	$696,700
Forest/Agricultural Application	$56,700	$107,900	$98,000	$186,400
General Permit, Administration, Sampling/Analysis	$17,500	$37,000	$17,500	$37,000
Equipment Replacement	$10,000	$10,000	$0	$0
Maintenance Materials	$4,000	$4,000	$0	$0
Revenue	($60,000) (1)	($127,000)	$0	$0
Total Annual O&M Cost	$121,200	$208,700	$481,800	$920,100

(1). Calculated by taking the annual revenue of $119,989 and dividing by 2 as the biosolids application accounts for half of the yield (100% increase, or doubling the yield).

6.2.6 Life Cycle Costs

Table 6-5 presents the estimated life cycle costs. Life cycle costs sum the project cost and present value of future O&M costs. For this analysis, a 20-year period at a discount rate of 6 percent was assumed. The forest alternative includes timber revenue but has equipment replacement and maintenance materials costs due to the City application of biosolids. Results, presented in Table 6-5, indicate that Alternative 1 would have a lower life cycle cost.

Table 6-5. Life Cycle Cost Estimates for Biosolids Management Alternatives

	ALT 1: CONTINUE FOREST APPLICATION PROGRAM	ALT 2: AGRICULTURE APPLICATION AT A BUF
Annual O&M (1)	$164,950	$700,950
Life Cycle	$1,892,000	$8,040,000

(1). Costs are calculated using the average of 2013 and 2033 projected biosolids quantities.

In additional to a higher life cycle cost of Alternative 2, there are intangible risks associated with hauling biosolids offsite. There is a risk of the BUF changes the land use, risk of joint liability if someone sues the BUF over adjacent property impacts, and/or risk of BUF not accepting biosolids on short notice. By maintaining the existing forest application program, these risks would be avoided.

6.3 Future Improvements to the West WWTP

Information in this section is based primarily on data and information contained in the 2009 Westside WWTP Rerating Study (Rerating Study), which was prepared by Richwine Environmental for the City of Bremerton.

6.3.1 WWTP

Rerating Study

The Rerating Study was accepted by Ecology in 2009, and was incorporated into the newly issued NPDES permit. The Plant's permitted maximum month flows were increased to 15.5 MGD (October – April) and 11.0 MGD (May – September).

6.3.2 Projected Flows and Loads

Flow and load projections were updated in Section 4.3 to include updated population information from Kitsap County and new service areas identified by the City.

6.3.3 Condition Assessment

A condition assessment was conducted by staff and CDM, and was incorporated into the 2005 WWCP. This was used to identify improvements to the existing facilities to assure reliable plant operation.

In 2009 the WWTP underwent a major facilities upgrade, in which the following process equipment were replaced or added:

> Plant emergency generator, Plant Boiler, Centrifuge, Influent Fine Screen, Plant Air-Gap Water System, RDT (rotating drum thickeners), Centrifuge Feed Pumps and Grinders, Thickened Waste Activated Sludge (TWAS) Pumps, WAS Pumps, Motorized Headworks Sluice Gates, Motorized RAS Return Activated Sludge (RAS) Sluice Gates, Motorized Aeration Basin Effluent Gates, Motorized Primary Clarifier Influent Gates and Motorized Chlorine Contact Chamber Influent Gates.

In 2013 the WWTP replaced the five Primary Effluent Pumps, Controls, and Influent and Effluent Gates. The existing pumps were replaced with energy efficient Flygt dry-pit submersible pumps with VFD controls. The existing influent and effluent gates were replaced with motorized knife gates.

The plant equipment is well maintained, and is in good condition. The primary and secondary clarifier drives are over 28 years old, and are scheduled to be replaced in 2015 and 2016 respectively. These are identified in the six year CIP described in Section 7.0.

6.3.4 Capacity Analysis

A plant capacity evaluation was completed as part of the Rerating Study. Subsequently the WWTP was rerated to a maximum month capacity of 15.5 MGD (Oct-April) and 11.0 MGD (May-Sept). The annual average flow to the treatment plant has been an aggregate average between the two seasons of 4.8 MGD, which shows that the plant has adequate capacity.

From Section 4.3, the projected dry weather flow in 2033 is 6.0 mgd. With the addition of new service areas, it increases to 7.4 mgd. The projected dry weather flow does not exceed the rated maximum month dry season flow.

The projected maximum month wet weather flow in 2033 is 12.0 mgd. With the additional of new service areas, it increases to 15.4 mgd. PSIC is not included because all flow would be treated by membrane bioreactor and re-use facilities. The flow projection suggests the maximum month flow would approach the permitted limit of 15.5 mgd by the year 2033; however, it is unlikely that that the projected flow will reach this level within 20 years for the following reasons:

- The population projection based on the Kitsap County Remand predicts the City of Bremerton population will increase 50 percent by the year 2033. The actual population growth between 2000 and 2010 was 1.2 percent. The population projections developed by the County may be conservative when considering the population growth between 2000 and 2010.
- Water usage has declined in the City of Bremerton due to conservation. The flow projections developed for the new service areas utilized conservative flow factors.
- The expansion of new service areas is dependent on grant and/or ULID funding. The total cost of constructing sewage facilities for the new service areas is $108 million and it is likely that only a fraction of the projects will be completed by 2033.

A determination of future improvements for the WWTP should be made by monitoring growth in the system, and when flows reach 85 percent of the design capacity (13.2 mgd) for three consecutive months, a facility plan would be developed.

BOD and TSS loads are not projected to exceed plant capacity due to population growth and the addition of new service areas.

6.3.5 Recommended Improvements

Recommended improvements and equipment replacements are shown in the wastewater CIP (capital improvement program). The WWCP CIP is a six year rolling event horizon, and is updated on an annual basis. See Section 7.0 for the list of WWTP improvements.

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Section 7 Capital Improvement Program

This section describes the Capital Improvements Program (CIP) for the Wastewater Utility, including recommended improvements, cost estimates development for the CIP, and funding sources.

7.1 Recommended System Improvements

Improvements are presented in multiple categories below: Sewer Conveyance, New Service Area, Facility and Equipment, Treatment, and Operation and Maintenance improvements. The project naming convention uses a suffix for each improvement category: "C" for Conveyance, "NS" for new service area, "F" for facilities and equipment, "T" for treatment, and "M" for Operations and Maintenance.

7.1.1 Sewer Conveyance Improvements

C-1-Replace or Rehabilitate 10-inch Sanitary Sewer under Secondary Clarifier:

Replace 1,500 LF of 10-inch gravity sewer under secondary clarifier. This project is located in Southwest Bremerton within the WWTP. This line creates a system bottleneck which is causing a collection system surcharge. This project relates to project C-11 "WWTP Outfall". This project would be funded by the User Fee Assessment fund.

C-2-Jones Street Main Replacement:

Install approximately 700 LF of 12-inch gravity sewer to replace the existing 8-inch gravity sewer along Jones Street between Cottman Avenue and Oyster Bay Road. In January 2012, an overflow on private property occurred from the existing gravity sewer. This project would increase the capacity of the gravity sewer to reduce the risk of flooding.

C-3-Replace Crosstown Pipeline:

Install approximately 10,000 LF of 36-inch HDPE pressure-gravity line from Montgomery Avenue and Burwell Street to the WWTP to provide redundancy for the CTP. The CTP is critical infrastructure for the combined sewer system. Currently, there is no bypass or redundancy if the pipeline is shut down for maintenance or repairs. This project would install a redundant pipeline to increase reliability of the existing pipeline.

C-4-Central Bremerton Force Main:

Replace or rehabilitate the existing 8,000 LF Central Bremerton force main from North Montgomery Avenue to the surge chamber, install cleaning ports and isolation valves, and replace the surge chamber with a HDPE manhole. The force main will be inspected and evaluated to determine if any section or all of the force main needs replacement or rehabilitation. The purpose of this project is to address hydrogen sulfide corrosion and issues with the surge chamber and vents on the pipeline.

C-5-Oyster Bay - Beach Sewer between OB-6 and OB-1:

Design low pressure sewer conversion from the OB-6 to OB-1 pump stations. Install individual grinder pump stations on private properties which would pump to upland gravity sewers. Modify beach main to serve as force main and evaluate upstream hydraulics. This project would be funded by the User Fee Assessment fund.

C-6-Abandon Beach Sewer North of Manette Bridge:

Install package pump station at the end of East 16th Street to Wheaton Way. Install grinder pumps on all residences (20+/-) tributary to the gravity beach main and pump to Marlow

Avenue and Wheaton Way. Some low pressure sewer main construction may be required. Upon completion the beach main will be abandoned.

C-7-Washington Avenue Phase 2:

Design and obtain access rights for low pressure sewer replacement along Washington Avenue. This project would be funded by the User Fee Assessment fund.

C-8-Kitsap Lake Main Replacement:

Construct approximately 6,200 LF of new force main to replace the existing lake main. The force main alignment would be moved outside of the lake and the gravity connections into the beach main would be either routed with new gravity sewers to KL-2, KL-3, or KL-4 or utilize grinder pumps. KL-3 and KL-4 would be upgraded based on the design of the force main. The existing lake main is inaccessible for maintenance between KL-2 and KL-4 due to its location in Kitsap Lake. During extreme high lake levels, the water surface exceeds the rim elevations and contributes to excessive inflow. Also, the gravity sewer north of KL-4 is deteriorating and needs replacement.

C-9-McClaim Improvements:

Construct approximately 2,200 LF of 18-inch sanitary sewer line following an alignment from McClain Avenue and Sheridan Avenue, along Sheridan Avenue, Elm Street, and Hefner Street to Lebo Boulevard. This diverted route will eliminate a downstream surcharge and address blockages in the area due to root intrusions. The existing 8-inch line will be abandoned.

C-10-Kean Street Trunk Sewer:

Install approximately 3,700 LF of 24-inch gravity sewer along Harlow Drive from Sunnyhill Road to Kean Street, along Kean Street from Harlow Drive to Werner Road, and along Werner Road from Kean Street to Auto Center Way. This project would increase the capacity along Kean Street to convey flow from the proposed force main from KL-2 that would discharge at Sunnyhill Road and Harlow Drive. This project would be required with the implementation of project F-4 “KL-2 pump station upgrade”.

C-11-Westside Wastewater Treatment Plant (WWTP) Outfall:

This project would be coordinated with the Washington Department of Transportation (WSDOT) SR3/SR304 interchange remodel. There is a capacity bottle neck located under the SR3 overpass. This project is contingent on WSDOT modifying the SR3 overpass and lease renewal activities. This project would be funded by the User Fee Assessment fund.

C-12-Eastside Treatment Plant (ETP) Outfall:

Replace approximately 250 LF of 20-inch concrete line between two sections of 36-inch lines in the outfall to eliminate a bottle neck. This project would be funded by the User Fee Assessment fund.

C-13- WSDOT Culvert Replacement – Sewer Main Relocation:

A sewer line over the existing culvert for Anderson Creek will be relayed through a sleeve in a new box culvert WSDOT is planning to install as part of a fish passage improvement project.

C-14- Cottman/Jones Sewer

Evaluation to determine project scope. The project will need to look at replacing a storm drain from Roosevelt to Bayview.

C-15- Cherry Ave Sanitary Sewer:

The City just installed CIPP in 2014 along all of Cherry Avenue from Callahan to Wheaton Way. This project would CIPP a last remaining segment.

C-16- CIPP repair of failing sewer:

CIPP construction of laterals and installation of cleanouts where needed. The scope will be determined based on maintenance inspections of gravity sewers. This project will also include the following improvements:

- **Improvement between Schley and Fir Street:**

  Replace gravity sewer line in the gully between Schley and Fir Streets to eliminate a belly in the line. This project is in response to extensive root intrusion. This project would be funded by the User Fee Assessment fund.

- **Improvement on Homer Jones**

  CIPP Installation of approximately 500-feet of pipe to eliminate root intrusion.

C-17- CIPP or other rehabilitation existing 54-inch SD under Secondary Clarifier:

Inspect the storm drain to confirm improvement need. This is a stormwater project.

C-18- Grout Annular Space of Southwest Bremerton Force Main:

This project would grout the annular space of the southwest Bremerton forcemain that contains three slip-lined force mains from pump stations SB-1, SB-3, and SB-4.

C-19- East Bremerton Beach Main Replacement:

This project would replace a segment of the East Bremerton Beach Main. Approximately 2,700 LF of 16-inch ductile iron piping would be replaced with 18-inch HDPE pipe from OF-4 to the Port Washington Narrows Siphons.

7.1.2 New Service Area Improvements

This section describes the capital improvement projects related to the expansion of sewer service to unsewered areas. Previous planning studies were developed for these improvements with a detailed description of each area and service requirements. The following are the plans that are referenced for all the projects discussed in this section: *New Service Area Plans – East Bremerton and West Hills* (Feb, 2014); *South Kitsap Industrial Subarea Plan* (Aug, 2012); Appendix C of the *2005 Wastewater Comprehensive Plan Update* (Aug, 2005); *Sewer Planning – Marine Drive Area* (Sep, 2008); *Sewer Urban Growth Area Planning* (Feb, 2008); and *Sewer Planning – South Kitsap Industrial Area (*Sep, 2008).

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). Funding in 2016 would support stakeholder engagement to begin ULID development and identify improvements described in projects NS-1 through NS-8. Two million dollars per year in 2017 and 2018 would be allocated for the development of infrastructure as presented to Kitsap County.

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. 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:

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. 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:

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. 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).

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. A plan developed to extend sewer service to the area is described in *New Service Area Plans – East Bremerton and West Hills* (Feb, 2014).

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. A plan to extend sewer service to this service area is described in *New Service Area Plans – East Bremerton and West Hills* (Feb, 2014). 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. 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). 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-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 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. 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.

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.

NS-9-Puget Sound Industrial Center (PSIC):

The Puget Sound Industrial Center (PSIC) formerly referred to as the South Kitsap Industrial Area (SKIA) is projected to be a major industrial growth area. A conceptual plan was developed for the City to implement sewer service to the area and documented in *South Kitsap Industrial Area Subarea Plan* (Aug, 2012). The improvements described in the plan and summarized below:

NS-9A – E-PSIC Sewer Design and Construction – ULID Design and Construct:

ULID funding would be used for the expansion of sewer service to PSIC as development occurs. This funding would support the infrastructure improvements described in the following five projects.

NS-9A-Secondary 8” and 10” gravity sewer:

- Install secondary 8-inch and 10-inch gravity sewer along local access roads.

NS-9B-Sewer Service for Northeast PSIC:

- NS-9B.1 - Pump Station 1 (Sanitary sewer).
- NS-9B.2 - 4” Force Main (PS 1 to NS-4B.3 gravity main at SR 3 and Barney White Rd).
- NS-9B.3 - 8” – 10” Gravity Sewer.

NS-9C-New Membrane Bioreactor (MBR) Plant No. 1 with Re-Use and Sewer Service for Central PSIC (areas A (partial) and B):

- NS-9C.1 - MBR Plant.
- NS-9C.2 - Pump Station 2 (Reclaimed water).
- NS-9C.3 - 6” Force Main (PS 2 to NS-4C.4 groundwater recharge site along SR 3).
- NS-9C.4 - Winter Sewage Disposal / Groundwater Recharge.
- NS-9C.5 - Re-Use ex. 8” AC Water for Reclaimed Water Effluent to Golf Course.
- NS-9C.6 - 8” – 10” Gravity Sewer.

NS-9D-New Membrane Bioreactor Plant No. 2 with Re-Use:

- NS-9D.1 - MBR Plant.
- NS-9D.2 - Pump Station 3 (Reclaimed water).
- NS-9D.3 - 6” Force Main (PS 3 to PS 2 force main along Lake Flora Rd and SR 3).
- NS-9D.4 - 8” – 10” Gravity Sewer.
- NS-9D.5 - Winter Sewage Disposal / Groundwater Recharge.

NS-9E-Sewer Service for South PSIC:

- NS-9E.1 - Pump Station 4 (Sanitary sewer).
- NS-9E.2 - 4” Force Main (PS 4 to NS-4E.3 gravity main along Lake Flora Rd).
- NS-9E.3 - 8” – 10” Gravity Sewer.

7.1.3 Facilities and Equipment Improvements

This section describes the capital improvement plans related to building and equipment, and facility improvements.

F-1-Storage Warehouse at WWTP:

Construct storage warehouse for materials in the upper land north of the WWTP (next to Parr Ford). This project would be funded by the User Fee Assessment fund.

F-2-Emergency Generator Installation at EB-3:

Install an emergency generator at the EB-3 pump station on Shore Drive. This project would be funded by the User Fee Assessment fund.

F-3-Emergency Generator Installation at OB-6:

Install an emergency generator at the OB-6 pump station located on Shore Road. This project would be funded by the User Fee Assessment fund.

F-4-KL-2 Pump Station Upgrade:

Convert the KL-2 dry pit/wet well pump station into a wet well pump station. Replace pumps to increase the pump station capacity to approximately 2,000 gpm in order to accommodate increased flow from a development in the new Port Blakely service area. Install approximately 3,700 LF of force main along Price Road and Harlow Drive to Sunnyhill Road. This project would be partially contingent on development in the Port Blakely service area.

F-5-Pump Station CE-1 Pumps 1 and 4 Replacement:

Replace the 30+ year old 400 hp motors, pumps and eddy current drives, with dry-pit submersible pumps and VFDs. This project may be partially funded by PSE or DES grants.

F-6-Pump Station CE-4 Pumps 1 and 2 Replacement:

Replace the 30+ year old pumps, motors and VFDs with dry-pit submersible pumps and upgraded VFDs. This project may be partially funded by PSE or DES grants.

F-7-Odor Control System Upgrade, OCS 1 and 3:

Replace the undersized odor control systems.

7.1.4 Treatment Improvements

This section discusses the capital improvements and long-term needs of treatment plant infrastructure.

T-1-Primary Clarifier No. 1 & 2 Drive Replacement:

Replace primary clarifier drives 1 and 2. This project would be funded under the Wastewater Maintenance Budget.

T-2-Secondary Clarifier No. 1 & 2 Drive Replacement:

Replace the secondary clarifier drives 1 and 2. This project would be funded under the Wastewater Maintenance Budget.

T-3-Biofilter Odor Control Fan Replacement

Replace the existing 25 horsepower biofilter with a 10 horsepower direct drive fan at the WWTP. This project may be partially funded by grants from PSE or DES.

T-4-Primary Effluent Line Rehabilitation:

Replace the primary effluent line. Replacement will be needed due to reaching its service life in the future.

T-5-Replace Drives on RAS Pumps:

Install variable-frequency drives on RAS pumps. This project will replace aging equipment and improve efficiency. This project would be funded by the User Fee Assessment fund and other grants.

T-6-Recoat Aluminum Covers on the Primary Clarifiers and Biofilter:

Re-coat the aluminum covers on the underside of the primary clarifiers and biofilter.

T-7-Biofilter Upgrade:

Replace media and purchase and install two feed pumps.

T-8-Replace RAS Pumps:

Replace the three RAS pumps with dry pit submersible pumps.

T-9-Surge Tank Repair and Hypo Tank Replacement:

Repair existing surge tank and replace hypo tank at the WWTP.

T-10-Wastewater Reuse:

Pre-design developed for wastewater treatment and conveyance of reused wastewater to the gateway. Install approximately 140 feet HDD under SR3 and connect to “purple pipe” with a total pipe length of 500 feet. This project will be constructed with the WSDOT SR304 project.

T-11-Headworks Odor Control Fan Replacement:

Replace the existing 75 horse power headworks odor control fan with a 20 horse power direct drive fan and variable frequency drive (VFD). This project may be partially funded by grants from PSE or DES.

T-12-Aeration Basin Turbo Blower:

Replace the existing 200 horse power aeration basin turbo blower with a 100 horse power Neuros blower. This project may be partially funded by grants from PSE or DES.

T-13-Digester Recirculation Pumps:

Replace existing digester recirculation pumps by converting two sludge loading pumps into recirculation pumps. This project may be partially funded by grants from PSE or DES.

T-14-RAS Pumps and VFDs:

Replace the existing RAS pumps, eddy current drives, and valves with new Flygt pumps, VFDs, and new valves. This project may be partially funded by grants from PSE or DES.

T-15-Chlorine Contact Chamber Upgrade:

Sandblast, grout, and coat the chlorine contact chambers #1 & 2 walls.

T-16-Aeration Basins 1 and 2 Membrane Diffuser Replacement:

Replace of the diffuser membranes (288) in aeration basins #1 & 2.

T-17- Influent Fine Screen 1 and 2 Upgrade:

Complete overhaul and upgrade to the influent fine screens at the WWTP.

T-18-Digester Domes 1 and 2 Replacement:

Replacement of the 35+ year old steel digester domes. This project would be broken out into two successive years.

T-19-Westside WWTP Boiler Replacement:

Purchase and installation of an additional methane/natural gas boiler. The current boiler is plagued with numerous mechanical issues, and would be kept as a back-up.

7.1.5 Operations and Maintenance Improvements

This section describes operation and maintenance improvement plans.

M-1-Substandard Main Replacement Program:

Replace substandard sewer mains. This is an annual program to fund cured-in-place pipe (CIPP) improvements to rehabilitate the condition of aging sewer mains in the collection system. This project would be funded by the User Fee Assessment fund.

M-2-Beach Main and Critical Force Main Cleaning:

Clean the beach main and critical force main at pump station CE-1. This project would be funded by the User Fee Assessment fund.

M-3-Machinery/Equipment – Utility Operations Manager:

This project would be funded by the User Fee Assessment fund.

M-4- SCADA Lifecycle Improvements:

Expand the fiber optic network and install blade servers to upgrade the SCADA system at the WWTP.

M-5-Metering System Upgrade:

Install new antenna based water meter reading hardware.

M-6-WWTP and Pump Station Improvement Program:

Annual replacement and rehabilitation of infrastructure and equipment. This project would be funded by the User Fee Assessment fund. Additionally, Puget Sound Energy will provide a 50 percent funding match for energy efficiency upgrades.

M-7-Model Calibration and Update:

This is a project to update and calibrate the City's sewer model. It will involve flow monitoring at selected sites throughout the sewer collection system and a validation of sewer main diameters and inverts, manhole dimensions, pump station and wet well dimensions, and regulator structures. An outside consultant would be contracted to update the model with GIS and flow monitoring data.

M-8-Oyster Bay Public Works Consolidation:

Remodel and improve the Oyster Bay Public Works Building and upgrade parking facilities to support the relocation of the engineering department to the building.

M-9-Sewer Main Replacement with Pavement Reconstruction:

This program supports sewer main upgrades associated with road improvements.

7.2 CIP Development and Cost Estimates

The CIP was developed to address infrastructure needs to meet growth, environmental regulations, and improvements in existing operations and reliability. A 6-year Capital Improvement Plan and schedule have been developed outlining the project requirements from 2014 through 2019. The Capital Improvement Plan and schedule are summarized in Table 7-1. Figure 7-1 is a map of the proposed improvements.

Costs are based on engineering estimates and actual costs from similar engineering and construction work. Costs include project construction bid estimates, a construction contingency factor of 40 percent, and an allowance for engineering, taxes, legal, and administrative fees of 20 percent. Estimated costs are in 2013 dollars and based on Engineering News-Record's (ENR) material and building cost indexes.

Table 7-1. Capital Improvement Program

Project No.	Sub-Category	Description	Comprehensive Plan Element[1]	Financing Source[2]	Spending Category[3]	Schedule of Improvements (2014 $1,000s)								
						Base Project Cost	2015	2016	2017	2018	2019	2020	6-yr CIP Total	Beyond 2020
Collection System														
C-1		Replace or rehabilitate 10-inch Sanitary Sewer under Secondary Clarifier	Deficiency	UFA	P/C	$650		$150	$500				$650	$0
C-2		Jones Street Main Replacement	Deficiency	UFA	C	$300			$300				$300	$0
C-3		Replace Crosstown Pipeline	Deficiency	UFA	P/C	$8,600							$0	$8,600
C-4		Central Bremerton Force Main	Deficiency	UFA	C	$500							$0	$500
C-5		Oyster Bay - Beach Sewer between OB-6 and OB-1	Deficiency	UFA	P	$2,250	$250	$2,000					$2,250	$0
C-6		Abandon beach sewer north of Manette Bridge	Deficiency	UFA	P/C	$2,200		$200	$2,000				$2,200	$0
C-7		Washington Avenue Phase 2	Deficiency	UFA	P	$1,100	$1,100						$1,100	$0
C-8		Kitsap Lake Main Replacement	Deficiency	UFA	P/C	$4,310							$0	$4,310
C-9		McClain Improvements	Deficiency	UFA	P/C	$1,400							$0	$1,400
C-10		Kean Street Trunk Sewer	Deficiency	UFA	P/C	$3,100							$0	$3,100
C-11	Outfalls	Westside WWTP Outfall	Deficiency	UFA	P/C	$2,650					$150	$2,500	$2,650	$0
C-12		Eastside Treatment Plant Outfall	Deficiency	UFA	C	$600		$100	$500				$600	$0
C-13		WSDOT Culvert Replacement - Sewer Main Relocation	Deficiency	UFA	C	$20	$20						$20	$0
C-14		Cottman/Jones Sewers	Deficiency	UFA	C	$15	$15						$15	$0
C-15		Cherry Ave Sanitary Sewer	Deficiency	UFA	C	$25		$25					$25	$0
C-16		CIPP repair of failing sewers	Deficiency	UFA	C	$525	$525						$525	$0
C-17		CIPP or other rehabilitation existing 54-inch SD under Secondary Clarifier	Deficiency	UFA	C	$300		$50	$250				$300	$0
C-18		Grout Annular Space of SW Bremerton Force Main	Deficiency	UFA	C	$200						$200	$200	$0
C-19		East Bremerton Beach Main Replacement	Deficiency	UFA	C	$1,250							$0	$1,250
New Service Areas														
NS-1 - 8		East & West Bremerton UGA Sewerage – ULID [5]	UGA	UFA/G	P/C	$4,050		$50	$2,000	$2,000			$4,050	$0
NS-1A	Marine Drive	Sewer Collection - Sub Basin MD-1	UGA	UFA/G	P/C	$2,550							$0	$2,550
NS-1B		Sewer Collection - Sub Basin MD-2	UGA	UFA/G	P/C	$1,320							$0	$1,320
NS-2A	Rocky Point	Phinney Bay Extension (Sub Basin RP-3)	UGA	UFA/G	P/C	$1,960		$290	$1,670				$1,960	$0
NS-2B		Pump Station MD-2	UGA	UFA/G	P/C	$4,730							$0	$4,730
NS-2C		Pump Station MD-3	UGA	UFA/G	P/C	$2,830							$0	$2,830
NS-2D		Sewer Collection - Sub Basin RP-1	UGA	UFA/G	P/C	$1,220							$0	$1,220
NS-2E		Sewer Collection - Sub Basin RP-2	UGA	UFA/G	P/C	$2,180							$0	$2,180
NS-2F		Jackson to Corbet Drive (Sub Basin RP-3)	UGA	UFA/G	P/C	$830			$120	$710			$830	$0
NS-2G		Sewer Collection - Sub Basin RP-4	UGA	UFA/G	P/C	$820							$0	$820
NS-2H		Sewer Collection - Sub Basin RP-5	UGA	UFA/G	P/C	$1,910				$290	$810	$810	$1,910	$0
NS-3	SR 304	SR 304 Sewer Collection	UGA	UFA/G	P/C	$4,280							$0	$4,280
NS-4A	West Hills	Ostrich Bay Extension	UGA	UFA/G	P/C	$3,720				$560	$1,580	$1,580	$3,720	$0
NS-4B		North Extension	UGA	UFA/G	P/C	$1,450							$0	$1,450
NS-5A	Trenton	Pump Station TA-1	UGA	UFA/G	P/C	$6,100							$0	$6,100
NS-5B		Pump Station TA-2	UGA	UFA/G	P/C	$9,480							$0	$9,480
NS-5C		Pump Station TA-3	UGA	UFA/G	P/C	$6,000							$0	$6,000
NS-5D		Pump Station TA-4	UGA	UFA/G	P/C	$2,760							$0	$2,760
NS-5E		Sewer Collection - Sub Basin TRT-1	UGA	UFA/G	P/C	$1,630							$0	$1,630
NS-5F		Sewer Collection - Sub Basin TRT-2	UGA	UFA/G	P/C	$3,290							$0	$3,290
NS-5G		Sewer Collection - Sub Basin TRT-4	UGA	UFA/G	P/C	$3,370							$0	$3,370

Project No.	Sub-Category	Description	Comprehensive Plan Element[1]	Financing Source[2]	Spending Category[3]	Schedule of Improvements (2014 $1,000s)								
						Base Project Cost	2015	2016	2017	2018	2019	2020	6-yr CIP Total	Beyond 2020
NS-5H		Sewer Collection - Sub Basin TRT-6	UGA	UFA/G	P/C	$4,200							$0	$4,200
NS-5I		Sewer Collection - Sub Basin TRT-7	UGA	UFA/G	P/C	$1,520							$0	$1,520
NS-5J		Sewer Collection - Sub Basin TRT-8	UGA	UFA/G	P/C	$1,840							$0	$1,840
NS-6A	Tracyton	Pump Station TB-1	UGA	UFA/G	P/C	$3,620							$0	$3,620
NS-6B	Tracyton	Pump Station TB-2	UGA	UFA/G	P/C	$4,690		$460	$1,280	$1,280			$3,020	$1,670
NS-6C	Tracyton	Tracyton Beach Rd Main Conversion	UGA	UFA/G	P/C	$1,580		$240	$670	$670			$1,580	$0
NS-6D	Tracyton	Sewer Collection - Sub Basin TRC-2	UGA	UFA/G	P/C	$3,500							$0	$3,500
NS-6E	Tracyton	Sewer Collection - Sub Basin TRC-4	UGA	UFA/G	P/C	$740							$0	$740
NS-7	Tracyton Beach	Tracyton Beach Sewer Collection	UGA	UFA/G	P/C	$580							$0	$580
NS-8	Port Blakely	Port Blakely Connection	UGA	UFA/G	P/C	$2,730							$0	$2,730
NS-9A - E	Puget Sound Industrial Center (PSIC)	PSIC Sewer Design & Construction - ULID Dgn & Const [6]	UGA	UFA/G	P/C			$725	$4,750				$5,475	$29,849
NS-9A	Puget Sound Industrial Center (PSIC)	Secondary 8" and 10" gravity sewer	UGA	UFA/G	P/C	$2,080								
NS-9B	Puget Sound Industrial Center (PSIC)	Sewer Service for Northeast PSIC	UGA	UFA/G	P/C	$4,921								
NS-9C	Puget Sound Industrial Center (PSIC)	MBR No. 1, Re-Use and Sewer Service for Central PSIC	UGA	UFA/G	P/C	$13,499								
NS-9D	Puget Sound Industrial Center (PSIC)	MBR No. 2 with Re-Use	UGA	UFA/G	P/C	$12,391								
NS-9E	Puget Sound Industrial Center (PSIC)	Sewer Service for South PSIC	UGA	UFA/G	P/C	$2,433								
Facilities and Equipment														
F-1	Equipment	Storage Warehouse at WWTP	None	UFA	E	$500		$500					$500	$0
F-2	Equipment	Emergency Generator Installation at EB-3	Deficiency	UFA	E	$50	$50						$50	$0
F-3	Equipment	Emergency Generator Installation at OB-6	Deficiency	UFA	E	$50	$50						$50	$0
F-4	Equipment	KL-2 Pump Station Upgrade	Deficiency	UFA	Z	$4,500							$0	$4,500
F-5	Equipment	Pump Station CE-1 Pumps 1 & 4 Replacement	Repair	UFA/G	E	$700		$700					$700	$0
F-6	Equipment	Pump Station CE-4 Pumps 1 & 2 Replacement	Repair	UFA/G	E	$400			$400				$400	$0
F-7	Equipment	Odor Control System Upgrade, OCS 1 & 3	Repair	UFA/G	E	$400		$200	$200				$400	$0
Wastewater Treatment Plant														
T-1		Primary Clarifier #1 & 2 Drive Replacement	Repair	UFA/G	E	$150		$150					$150	$0
T-2		Secondary Clarifier #1 & 2 Drive Replacement	Repair	UFA/G	E	$150			$150				$150	$0
T-3		Biofilter Odor Control Fan Replacement	Repair	UFA	E	$50	$50						$50	$0
T-4		Primary Effluent Line Rehabilitation	Repair	UFA	E	$450					$50	$400	$450	$0
T-5		Replace Drives on RAS Pumps	Repair	UFA/G	E	$100	$100						$100	$0
T-6		Recoat Aluminum Covers on the Primary Clarifiers and Biofilter	Repair	UFA	E	$275		$275					$275	$0
T-7		Biofilter Upgrade	Repair	UFA/G	E	$800	$800						$800	$0
T-8		Replace RAS Pumps	Repair	UFA/G	E	$275	$275						$275	$0
T-9		Surge Tank Repair and Hypo Tank Replacement	Repair	UFA	E	$100	$100						$100	$0
T-10	Re-use	Wastewater Reuse	None	UFA	Z	$250						$250	$250	$0
T-11		Headworks Odor Control Fan Replacement	Repair	UFA/G	E	$90	$90						$90	$0
T-12		Aeration Basin Turbo Blower	Repair	UFA/G	E	$230	$230						$230	$0
T-13		Digester Recirculation Pumps	Repair	UFA/G	E	$60	$60						$60	$0
T-14		RAS Pumps and VFDs	Repair	UFA/G	E	$1,000	$1,000						$1,000	$0
T-15		Chlorine Contact Chamber Upgrade	Repair	UFA	E	$100			$100				$100	$0
T-16		Aeration Basins 1 & 2 Membrane Diffuser Replacement	Repair	UFA	E	$100		$100					$100	$0
T-17		Influent Fine Screen 1 & 2 Upgrade	Repair	UFA	E	$100	$100						$100	$0
T-18		Digester Domes 1 & 2 Replacement	Repair	UFA	E	$2,000						$2,000	$2,000	$0
T-19		Westside WWTP Boiler Replacement	Repair	UFA	E	$500						$500	$500	$0
Operations and Maintenance														

Project No.	Sub-Category	Description	Comprehensive Plan Element[1]	Financing Source[2]	Spending Category[3]	Schedule of Improvements (2014 $1,000s)								
						Base Project Cost	2015	2016	2017	2018	2019	2020	6-yr CIP Total	Beyond 2020
M-1	O&M	Substandard Main Replacement Program	Deficiency	UFA	C	Annual	$450	$450	$450	$450	$450	$450	$2,700	$450 [4]
M-2	O&M	Beach main and Critical Force main Cleaning	Repair/None	UFA	P	Annual	$75	$200	$200	$200	$200	$200	$1,075	$310 [4]
M-3	O&M	Machinery/Equipment - Utility Operations Manager	Repair	UFA	E	Annual	$20	$20	$20	$20	$20	$20	$120	$20[4]
M-4	O&M	SCADA Lifecycle Improvements	None	UFA	E	$150	$150	$150	$150	$150	$150	$150	$900	$150[4]
M-5	O&M	Metering System Upgrade	None	UFA	E	Annual	$250	$250	$250	$216	$216		$1,182	
M-6	O&M	WWTP and Pump Station Improvement Program	Deficiency	UFA	C	Annual	$350	$700	$700	$700	$700	$700	$3,850	$700 [4]
M-7	O&M	Model Calibration and Update	None	UFA	P	$250							$0	$250
M-8	O&M	Oyster Bay Public Works Consolidation	None	UFA	P	$250	$250						$250	$0
M-9	O&M	Sewer Main Replacement with Pavement Reconstruction	Deficiency	UFA	C	$900	$150	$150	$150	$150	$150	$150	$900	$150[4]
					Total Cost of Improvements:		$6,510	$8,135	$16,810	$7,396	$4,476	$9,910	$53,237	$129,949

(1) UGA = Construction of new infrastructure - support of Comp Plan UGA Growth.
Center = Construction of new infrastructure - support of Comp Plan "Centers" Growth.
Deficiency = Construction of new infrastructure to correct system deficiencies - support current development patterns.
Repair = Repair existing infrastructure - support current development patterns.
None = Not integral to the Comprehensive Plan.
(2) UFA = User fee assessment; G = Grants & ULID.
(3) P = Planning; L = Land & ROW; C = Construction; E = Equipment; O = Other; Z = Out years (2012-2016).
(4) Average annual cost of ongoing Operations and Maintenance Program.
(5) Kitsap County ULID funding would be used for the expansion of sewer service to the East and West Bremerton UGA areas. Funding would be prioritized as needed for projects NS-1 through NS-8.
(6) ULID funding would be used for the expansion of sewer service to PSIC as development occurs. Funding would be prioritized as needed for projects NS-9A through NS-9E.

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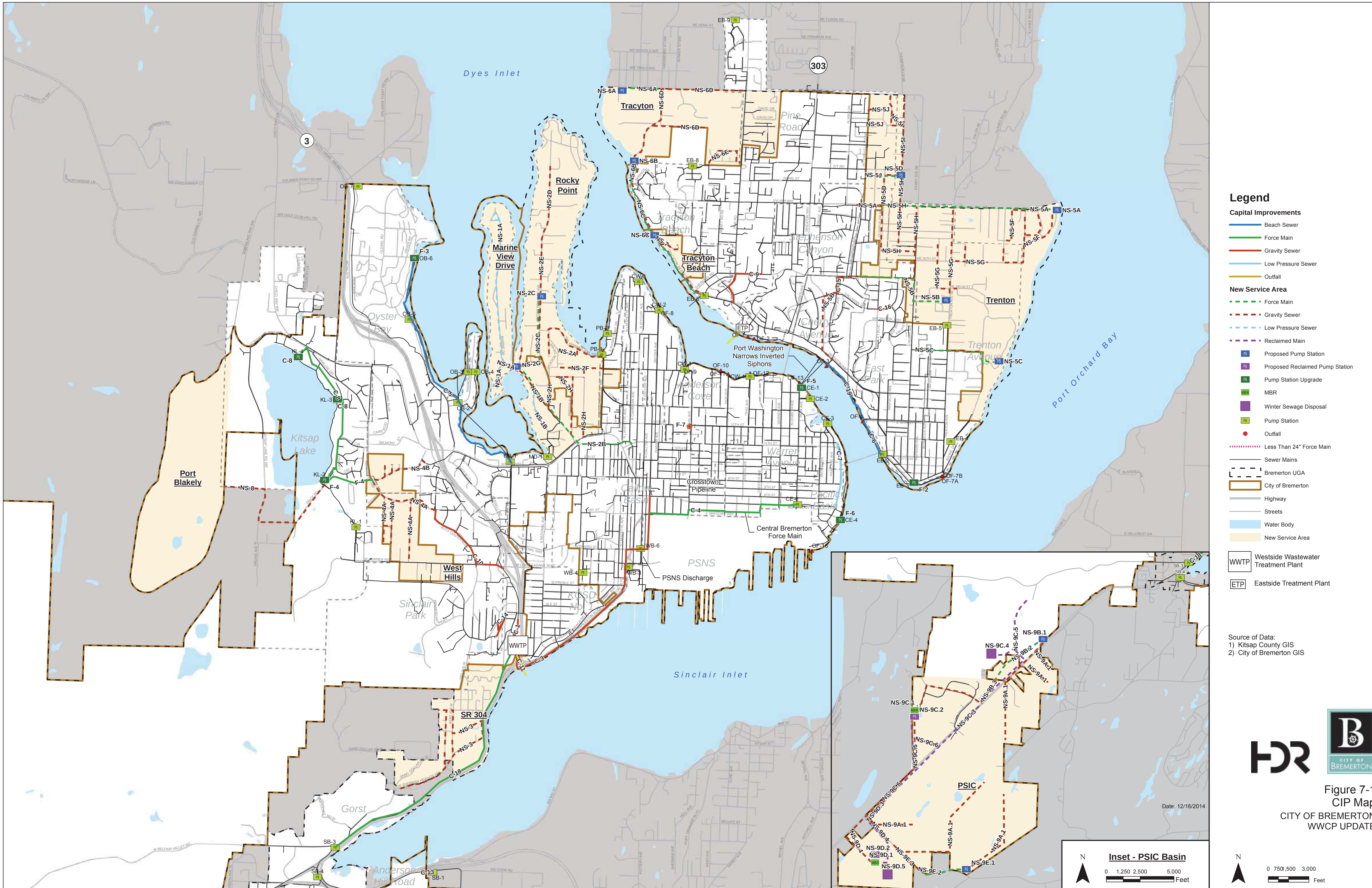

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7.3 Financial Analysis

7.3.1 Introduction

This section presents a financial plan review of the revenues and expenses for the City's sewer system. The capital costs contained within the financial plan are based on the CIP shown in Table 7-1 adjusted for inflation at an annual rate of 3.5 percent. The development of the financial plan is based on the CIP and the annual operating and maintenance costs for the sewer system. The results of the analysis determine if the current sewer utility revenues are sufficient to cover operating and capital costs over a multi-year time period.

Key Assumptions

The financial analysis is based on rate study completed by FCSG in late 2013. All the findings of this review are based on the assumptions developed as part of the rate study and subsequent approved rate increases.

Given the changes in the CIP, as compared to the rate study, the capital funding plan has been developed separately from the rate study. Given this change, the results of the analysis will update the rate study results and recommendations.

7.3.2 Development of Financial Plan

A financial projection was developed to determine the City's ability to meet its sewer CIP as well as the O&M needs over the next five years. The previous rate study completed in 2013 was used as a starting point to analyze the financial viability going forward. Also included in the variables considered above was the operating and capital fund balances (reserve levels).

As noted, the basis for the analysis was the rate study completed in late 2013. The rate study provided the projection of revenues and expenses for the time period of 2015 through 2019. The analysis then projected revenues and expenses for 2020 to reflect the time period reviewed in the CSP. The focus of the analysis was on the 2015 through 2020 time period.

Future Revenues

The first component in developing the financial analysis is a review of the sources of revenue for the sewer system. The different revenues received from operations are:

- Rate revenues – sewer sales to customer accounts.
- Other revenues – permits, interest income, and other miscellaneous sources.

The starting point in revenue projection for future years is from the 2013 rate study. The sewer rate revenues are projected to be approximately $13.1 million in 2015 and are estimated to reach $13.6 million in 2020 based on assumed customer growth of 0.7 percent annually.

Other revenues for 2015 total approximately $456,000 are projected to increase slightly over the test period to around $473,000 by 2020. The total revenue available is $13.6 million in 2015 and is projected to increase to $14.1 million by 2020.

Future Expenses

The next step in the development of the financial analysis was to project the operating and maintenance expenses incurred to provide sewer service. The projection of future operating expenses is based on 2013 actual expenses, forecasted through 2020.

O&M Expenses: The O&M expenses in 2015 are projected to be $6.7 million and increases to $8.0 Million in 2020. The total revenue requirement (or expenses) including O&M, taxes, and debt service is approximately $14.0 million in 2015 and increases to approximately $17.2 million by 2020 due to assumed new long-term debt issues and inflation. After reviewing the utilities' revenues and expenses, a deficit of $394,000 occurs in 2015 and that figure increases to $3.1 million in 2020.

Capital Expenses: A key component of setting rates, and the main focal point of this review, is the capital improvement funding plan. The CIP used in this review is shown in Table 7-1. The CIP costs are inflated at 3.5 percent annually for the financial analysis. The inflation adjusted costs of the CIP total $6.7 million in 2015, increasing to a maximum level in 2017 at $20.0 million, and is $12.2 million in 2020.

Grant Funding: Grant funding plays a major role in the funding of the CIP and it is assumed that the City will obtain about $22.1 million in grants and customer contributions from 2015 – 2020. If there are grants or customer contributions are not secured, the City will need to either eliminate capital projects, increase rates, or issue additional long-term debt to fund projects.

Provided below is a more detailed discussion of the grant/developer contributions for the capital improvement projects. Table 7-2 lists the inflation adjusted amount and schedule of the following outside funding sources:

- **Oyster Bay Beach Sewer – 50% grant funding for construction:** The Oyster Bay Beach Sewer improvement (C-5) will rely on grant funding for construction. It is assumed that grants will be obtained for 50 percent of the construction cost.
- **Phinney Bay & Ostrich Bay SS Extensions – Grant or ULID:** This funding source is for projects NS-2A, 2F, 2H, 4A, the Phinney Bay and Ostrich Bay Sewer Extensions. These projects are a concern to correct FC contamination identified in the TMDL. The funding source would either be Grant or Kitsap County ULID funding.
- **East & West Bremerton UGA Sewerage – ULID:** Kitsap County Utility Local Improvement (ULID) funding for the expansion of sewer service to the East and West Bremerton UGA areas. It assumes 100 percent reimbursement for design and construction costs. This funding source is designated for projects that expand sewer service to East and West Bremerton new service areas.
- **PSIC Sewer Design & Construction – ULID:** Kitsap County Utility Local Improvement (ULID) funding for expansion of sewer service to the Puget Sound Industrial Center (PSIC). It assumes 100 percent reimbursement for design and construction costs. Project NS-9 would utilize this funding source.
- **Projected funding from Department of Enterprise Services (DES) or Puget Sound Energy (PSE):** Grant funding obtained from the DES or PSE would be used to support equipment upgrade improvements described in projects F-5, F-6, T-3, T-11, T-12, T-13, and T-14.
- **Replace Drives on RAS Pumps –PSE Matching Funds:** PSE provides a 50 percent match for energy efficiency upgrades. Project T-5 that would replace the RAS pump drives would seek qualification for PSE matching funds.

Table 7-2. Outside Funding Source Table

PROJECT ID	FUNDING DESCRIPTION	2015	2016	2017	2018	2019	2020	6-YR CIP TOTAL
C-5	Oyster Bay Beach Sewer Construction - 50% Grant Funding for Construction	$0	$1,071	$0	$0	$0	$0	$1,071
NS-2A, 2F, 2H, 4A	Phinney Bay & Ostrich Bay SS Extensions – Grant/ULID	$0	$311	$1,985	$1,790	$2,839	$2,938	$9,862
NS-1 - 8	East & West Brem UGA Sewerage - ULID	$0	$0	$2,217	$2,295	$0	$0	$4,512
NS-9	PSIC Sewer Design & Construction - ULID	$0	$777	$5,266	$0	$0	$0	$6,043
F-5 & 6, T-3, 11, 12, 13, & 14	Projected funding from Commerce or PSE	$518	$0	$0	$0	$0	$0	$518
T-5	Replace Drives on RAS Pumps - PSE	$52	$0	$0	$0	$0	$0	$52
Total Outside Funding:		$569	$2,159	$9,468	$4,085	$2,839	$2,938	$22,058

Debt Issuance: The previous rate study suggested issuing $18.5 million over the period, but due to the increase of CIP expenditures, the required debt issuance increased. It is assumed that Bremerton will issue $3.5 million in 2015, $5.0 million in 2016, $9.0 million in 2016, and $8.0 million of debt in 2019.

Provided below in Table 7-3 is a summary of the proposed capital funding program with capital expenses, grant funding, and new revenue bonds all adjusted for inflation.

Table 7-3. Summary of Capital Funding Program ($1,000s)

	2015	2016	2017	2018	2019	2020
Capital Improvements						
Total Collection System CIP	$1,977	$2,705	$3,936	$0	$178	$3,319
Total New Service Areas CIP	$0	$1,891	$11,630	$6,323	$2,839	$2,938
Total Facilities & Equipment CIP	$104	$1,500	$665	$0	$0	$0
Total Wastewater Treatment Plant CIP	$2,903	$562	$277	$0	$59	$3,872
Total O & M CIP	$1,754	$2,057	$2,129	$2,164	$2,240	$2,053
Total CIP Projects	$6,738	$8,714	$18,638	$8,487	$5,316	$12,182
Transfer to Capital Reserves	$0	$0	$1,338	$0	$7,338	$0
Unidentified Future Projects	$0	$0	$0	$0	$0	$0
Total Capital Improvements	$6,738	$8,714	$19,976	$8,487	$12,654	$12,182
Funding Sources						
Capital Fund Reserves	$1,369	$253	$0	$2,590	$0	$7,210
Operating Reserves	$0	$0	$0	$0	$0	$0
General Facilities Charges	$499	$503	$507	$511	$516	$534
Grant Funding/Developer Contributions	$569	$2,159	$9,468	$4,085	$2,839	$2,938
New Low Interest Loans	$0	$0	$0	$0	$0	$0
Assumed New Revenue Bonds	$3,500	$5,000	$9,000	$0	$8,000	$0
Additional Bonds	$0	$0	$0	$0	$0	$0
Total Funding Sources	$5,938	$7,914	$18,976	$7,187	$11,354	$10,682
Capital Funded by Rates	$800	$800	$1,000	$1,300	$1,300	$1,500

Proposed Rate Increases: The recent rate study resulted in similar rate deficiencies and proposed annual rate increases of 3.5 percent through 2016 and 3.0 percent through 2019. HDR has maintained these proposed rate increases in the financial model for 2015 – 2016. However, due to the increased level of capital improvement expenditures and long-term debt, the results of the analysis show the need for annual rate adjustments of 4.0 percent in 2017-2020. After the proposed rate adjustments, there is a surplus of $320,000 in 2015 which declines over the remaining four years.

Based on the assumed borrowing and proposed rate increases, it appears that no additional measures will need to be taken to adequately fund expenses and maintain prudent reserves minimum targets. Reserve targets are put in place for a number of reasons but two major reasons are to safeguard the City should there be a one-time catastrophic event whereby large amounts of cash are need immediately and second is to cover operating costs should there be revenue shortfalls.

7.3.3 Summary of the Financial Plan

A summary of the financial analysis for Bremerton's sewer system is provided below in Table 7-4 based on the revenues, expenses, and capital funding plan described above.

Table 7-4. Summary Sewer Utility Financial Plan ($1,000s)

SOURCES OF REVENUE	2015	2016	2017	2018	2019	2020
Sources of Revenue						
Rate Revenue	$13,159	$13,258	$13,357	$13,457	$13,548	$13,643
Miscellaneous Revenue	454	456	466	468	470	473
Total Revenue	$13,614	$13,714	$13,823	$13,925	$14,019	$14,116
Expenses						
O&M Expenses	$6,747	$6,971	$7,207	$7,454	$7,715	$7,985
Taxes	3,067	3,089	3,112	3,135	3,156	3,266
Debt Service (P+I)	3,394	3,679	4,222	4,164	4,507	4,453
Rate Funded Capital	800	800	1,000	1,300	1,300	1,500
Total Revenue Required	$14,007	$14,540	$15,540	$16,053	$16,678	$17,204
Balance/(Deficiency)	(394)	(745)	(1,637)	(2,048)	(2,659)	(3,088)
Rate Adjustment	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%
Additional Revenue	$714	$1,098	$1,577	$2,041	$2,550	$3,086
End Balance/(Deficit)	$320	$352	($80)	($7)	($109)	($2)

It is important to note that the financial plan presented in this section is predicated upon an assumed level of growth on the system, assumptions related to inflation, and a level of debt financing at certain terms. The assumptions were based on the recent rate study completed in 2013. Should these assumptions change (e.g. growth increase, slow down, or not occur) the level of rate adjustment required will be affected.

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Section 8 Operation and Maintenance

This Chapter addresses the operation and maintenance components of the City's wastewater collection and treatment systems. The components include the sewer gravity pipelines, pump stations, force mains, odor control facilities, and wastewater treatment facilities. The items addressed in this chapter will include responsibility and authority, normal system operation, routine and preventative maintenance, current and projected staffing needs, new construction, safety, and emergency response.

8.1 Responsibility and Authority

The Wastewater Utility falls under the authority of the Director of Public Works and Utilities. The operations and maintenance responsibilities have been divided between the Wastewater Manager and the Utilities Operations Manager who both report to the Director.

The Wastewater Manager oversees the Wastewater Division which includes operations and maintenance of the sewer pump stations, odor control stations, and wastewater treatment facilities. The Utilities Operations Manager oversees the Utilities Operations Division which is responsible for the operation and maintenance of the water distribution system, storm water and wastewater transmission and collection systems, and City facilities maintenance. The responsibility for the infrastructure is more clearly defined in Table 8-1 below:

Table 8-1. 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
ETP	Wastewater Division
CSO Outfalls	Wastewater Division

8.2 Utility Organization

The Director of Public Works and Utilities 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 on Figure 8-1.

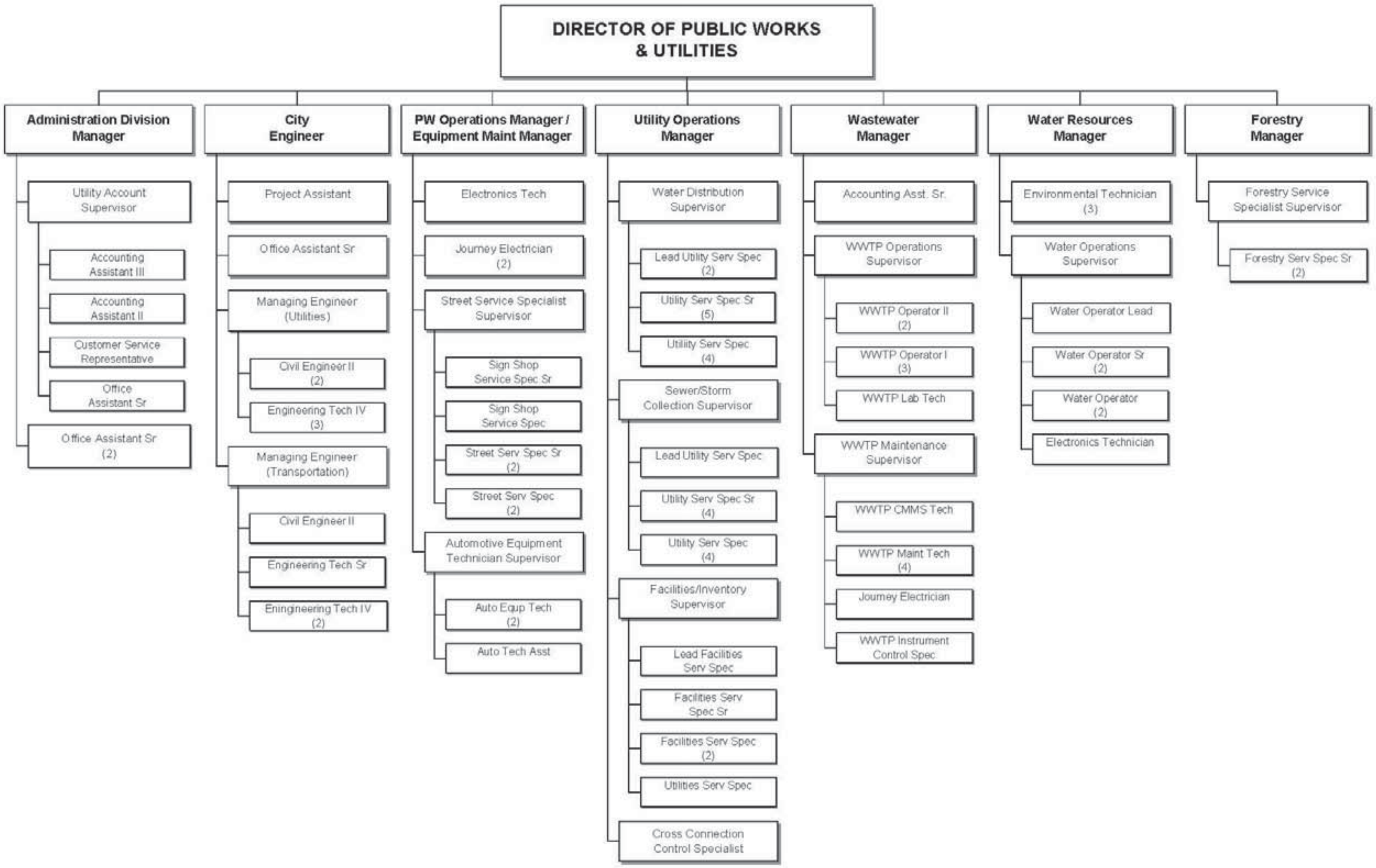

Figure 8-1. Department of Public Works and Utilities Organizational Chart

8.2.1 WWTP Personnel

There are 16 personnel that work under the supervision of the Wastewater Manager. There are currently 7 employees, who have the responsibility for plant operations, and 8 employees that are responsible for pump station and plant maintenance. 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 certifications is outlined in the following table.

Table 8-2. Wastewater Treatment Plant Staff Certifications

TITLE	CERTIFICATION
WW Manager	WWTPO Group IV
Lab Technician	WWTPO Group IV
Operations Supervisor	WWTPO Group IV
Operator II	WWTPO Group IV
Operator II	WWTPO Group II
Operator II	WWTPO Group II
Operator II	WWTPO Group II
Operator Trainee	Operator-in-Training

8.2.2 Collection System Personnel

There are 10 personnel that work under the supervision of the Utility Operations Manager that are responsible for the maintenance of both the wastewater and stormwater collection systems. The crew's time is divided equally between the two utilities and there are two FTE's which are dedicated to street sweeping. As a result there are essentially 4 FTEs conducting maintenance activities and capital improvements for the wastewater collection system each year.

8.3 Existing Operation and Maintenance Activities

Operation and maintenance of the wastewater system is typically completed by City staff with City-owned equipment. Bremerton owns and maintains the necessary equipment for the system's normal operation and emergency needs. Complex or unusual repairs may be completed by a contractor.

8.3.1 Collection System

The Utility Operations Division is responsible for operation and maintenance of both the wastewater and stormwater collection systems. The CSO sites are monitored by the Wastewater division. The Utility Operations Division's many duties include video inspection, street sweeping, responding to citizen complaints, cleaning catch basins, manholes, etc., investigating problems with the collection system; repairing failing facilities; supporting capital construction projects (design assistance, locates, constructability assistance, potholing, etc.); supporting other departments in operations, maintenance, and construction; and construction of extensions to the collection system.

The City has initiated a program for video inspection of the entire wastewater collection system. There are currently two employees dedicated to that effort for 12 months of the year, and additional staff are required at times for traffic control. The videos are being stored on a server and will ultimately be linked to the GIS mapping system so that they are readily accessible for viewing. This effort requires 2.25 FTEs annually.

The crew cleans the sewer collection system each year with the goal of having the entire system cleaned on an annual cycle. There are also problem areas in the collection system prone to clogging, root intrusion and grease buildup. The crew jets these areas on a regular schedule to ensure that pipes remain free flowing. This effort requires an ongoing dedication of 2.25-2.5 FTEs per year.

As the Utility Operations Division is also responsible for maintenance of the stormwater collection system it should be noted that there are also 2.5 FTEs dedicated to stormwater system cleaning and 2 FTEs dedicated solely to street sweeping.

Capital construction improvements include small main replacement projects, manhole lining, and lining of failing sewer laterals. This requires approximately 0.5 FTEs annually.

8.3.2 Treatment Facilities and Pump Stations

Since the 2005 WWCP was completed, the City has added three new pump stations. The maintenance staff typically visit each pump station once a week and visit the larger pump stations once a day. This effort requires 1.5 FTEs annually.

8.3.3 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 an MP-2 computer software package purchased by the City. The software allows for documentation and management of preventative maintenance, corrective maintenance, predictive maintenance, inventory control, and purchase orders. The software resides on the WWTP intranet system, and is backed up automatically on a daily basis. This is done thru the two mirror drive servers.

Collection system maintenance data and customer complaints are also tracked using Cartograph software. The Cartograph system is stored on a fault protected server using a RAID disc configuration which is backed up nightly.

8.4 Staffing Needs Related to New and Expanded Facilities

Since 2005, Bremerton has constructed three new pump stations (SB-1, SB-3, and SB-4), and expanded the collection system by over 25 miles. No additional staff have been added to operate and maintain these new and expanded facilities; therefore, overall operations and maintenance of the utility infrastructure will be affected. Staff has scaled back maintenance activities in order to meet typical day-to-day operational demands. While it is difficult to identify a threshold for adding staff on the basis of growth, this section includes a recommendation to be used for planning and budgeting purposes.

As presented earlier, the Wastewater Division operates and maintains Bremerton’s pump stations, odor control stations, and the treatment facilities. The Wastewater Division currently has sufficient staff to operate and maintain these facilities during dry weather; however, since both the WWTP and the ETP require 24-hour staffing during high/wet weather flows, operations must rely heavily on overtime to operate and maintain these facilities. This is illustrated by the creation of an additional standby/on-call schedule utilizing existing operations staff for the ETP, and response to startups during the wet weather months of October through April. During high flow wet weather events, a staffing reduction of two full-time employees (FTEs) is created at the WWTP. Maintaining the equipment at the ETP also requires 8 hours (0.2 FTE) spent each week throughout the year.

The Utility Operations Division has 10 available FTEs to conduct both wastewater and stormwater maintenance. The FTEs are fully allocated to currently planned activities which are primarily addressing system evaluation and ongoing maintenance.

An increase of two FTEs for the Wastewater Division (treatment facilities/pump stations) and one FTE for the Utility Operations Division (storm/sewer collection system maintenance) is required to provide adequate staffing to maintain the current infrastructure.

8.5 Proposed Programs and Associated Staffing Needs

8.5.1 Collection System Evaluation

Given the age of Bremerton's collection system, many areas of the system are known or suspected to be in disrepair. Bremerton has video equipment to perform pipeline inspections and assess condition.

Staff have established a program to perform a systematic inspection of all pipes and structures within the collection system to identify structural deficiencies and develop rehabilitation actions. The primary benefit of this program is to ensure that structures requiring major rehabilitation or replacement are identified and addressed before a failure occurs. The program will also help to ensure proper management and prioritization of the Capital Improvement Program. Inspection work associated with meeting the goal entails vactor cleaning of the utility line to be inspected, immediately followed by video inspection of the main and condition assessment. The product of this investigation is a prioritized list of substandard mains, manholes, and associated appurtenances that require rehabilitation or replacement. While this program has been implemented, it was done so without any increase in the 2005 staffing level.

A total of approximately 23 miles of collection system has been inspected annually between 2009 and 2012. At the current rate of inspection it will take approximately 5 years to video the entire collection system.

8.5.2 Inflow and Infiltration Reduction

To obtain CSO reduction for compliance with 173-245 WAC, Bremerton separated inflow to the combined system from right-of-way and many private sources, and additionally increased the flow conveyed to its WWTP by increasing pump station capacities. As a result of these activities, the conveyance system for the combined basins is currently at capacity during the CSO design storm. To allow for growth, reduce pumping and treatment costs, and provide a "buffer" or "safety factor" that will ensure continued compliance with CSO regulations, it is recommended that Bremerton implement an inflow and infiltration reduction program with the goal of reducing peak sanitary flows to the combined system. The recommended program would utilize the video inspection data to identify areas with large amounts of infiltration, and repair leaking sanitary laterals using a combination of cure-in-place pipe, lateral replacement, or point repairs. Projects will be identified and prioritized. Projects have been added to the capital projects list and will be constructed by contractors.

8.6 Cleaning of Beach Mains and Inverted Siphons

Several critical components of Bremerton's conveyance system were installed without cleaning and maintenance provisions incorporated into the original design. These system components include the various beach mains, the two inverted siphons that convey combined flow under the Port Washington Narrows to West Bremerton, the Naval Avenue force main, the Central Bremerton Pipeline, and the Crosstown Pipeline.

During model development and calibration associated with CSO reduction, it became evident that portions of the East Bremerton beach main had become partially obstructed with rocks and debris. Since cleaning facilities for the beach main were not considered during the original design, removal of the debris is currently not possible. Since 2005, the City has installed pig launch ports on the two inverted siphons, replaced the siphon isolation valves at CE-1, and replaced the upper reach of the Crosstown Pipeline. The significance of the siphon isolation valve replacement became apparent during the first subsequent CSO event. When the gates shut, velocities increased in the Eastside beach main between EB-2 and the ETP as there was no longer any leakage past the valves at CE-1. After the event there was a large amount of sand and grit in the storage tank at the ETP which indicated that cleaning velocities were achieved in the pipeline. As part of the beach main replacement project in 2013, a gravel access pad was constructed next to the ETP storage facility to facilitate vactor removal of the sand and gravel after a CSO storm event.

As a component of the Trenton and Cherry Avenue CSO reduction project, a document entitled "Bremerton Beach Main Pigging Technical Memorandum" was developed. The purpose of this document was to identify a cleaning strategy for the East Bremerton beach main and inverted siphons, and to identify necessary access locations and isolation valves.

Bremerton anticipates cleaning the beach mains and siphons between 2015 and 2019. This is anticipated to be a very costly undertaking that could involve anchoring barges at the inverted siphon connections to the beach main during pigging operations. Follow-on cleaning of the other critical components of the conveyance system (critical force mains and gravity-pressure sewers) should also be scheduled. After this initial cleaning has been accomplished, regular cleaning of these critical pipelines should be scheduled at a frequency of once every 5 years.

Section 9 Implementation

Adoption of a WWCP must be coordinated with Ecology and Kitsap County, and correspond with State Environmental Policy Act (SEPA) requirements. The steps associated with plan implementation are discussed below, along with recommended future updates to the WWCP.

9.1 Plan Adoption

The preparation, review, and adoption of WWCPs are determined by local and state procedures. A WWCP should be produced every 5 years. The WWCP is then reviewed by Ecology. Other parties that will have access to the WWCP are Kitsap County, nearby sewer systems, water purveyors, local libraries, and other interested parties. The WWCP should be adopted by the City Council before implementation.

9.2 Coordination with Kitsap County

Kitsap County has a similar plan on a county-wide scale. The Kitsap County Comprehensive Plan was most recently updated in August 2012. Bremerton supports Kitsap County objectives; therefore, the City's Director of Public Works and Utilities will continue being involved in the County Utility Coordinating Committee.

Bremerton believes that the County Comprehensive Plan should apply the following guidelines:

- Environmental impacts, regulatory concerns, and public health and safety be addressed and funded using a common approach.
- Sound engineering and economic principles be used to delineate service boundaries, project future use and capacity, manage growth, and select infrastructure and service standards.
- The plan be area wide, incorporating urban areas of the County.

9.3 Environmental Impact

According to SEPA (RCW 43.21C), environmental documentation must be prepared on proposals for legislation and other major actions having a probable significant, adverse environmental impact. Going forward, it is anticipated that National Environmental Policy Act (NEPA) and SEPA will be addressed on a project-by-project basis. It is anticipated that new developers would fund environmental impacts studies as required.

9.4 Future Additions to the WWCP

This WWCP addresses system additions and improvements that will be required to fully develop the service area. Potential projects are recommended through the year 2033.

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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Section 10 References

HDR Engineering Inc., 2014. *New Service Area Plans – East Bremerton and West Hills,* February, 2014

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Appendix A

NPDES Permit

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Issuance Date: June 21, 2013
Effective Date: August 1, 2013
Expiration Date: July 31, 2018

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, Washington 98337-1873

is authorized to discharge in accordance with the Special and General Conditions that follow.

Plant Name	**West Plant**	**East Plant – CSO Treatment Plant**
Plant Location	1600 Oyster Bay Avenue South Bremerton, WA 98312	2475 Stephenson Avenue Bremerton, WA 98310
Receiving Water	Activated Sludge, Secondary Treatment Plant	High Rate (Ballasted Sand) Clarification
Treatment Type	Sinclair Inlet, Puget Sound	Port Washington Narrows, Puget Sound

Kevin C. Fitzpatrick
Water Quality Section Manager
Northwest Regional Office
Washington State Department of Ecology

Table of Contents

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(1)	Monthly Discharge Monitoring Report (DMR) for Parameters in S2.A(1), (2), (3), and (4) and S2.B(1), (2), and (3)	Monthly	September 15, 2013
S3.A(1)	Monthly DMR for Parameters in S2.A(1), (2), (3), and (4) and S2.B(1), (2), and (3) on WQWebDMR beginning with June 2014 DMR	Monthly	July 15, 2014
S3.A (10)	Permit Renewal Application Requirements for Parameters listed in S2.A(6) and S2.B(4)	Testing 3/permit cycle	February 1, 2018 - with the next permit renewal application
S3.E	Reporting Permit Violations	As necessary	
S3.F	Other Reporting	As necessary	
S4.B	Plans for Maintaining Adequate Capacity	As necessary	
S4.D	Notification of New or Altered Sources	As necessary	
S5.E	Bypass Notification	As necessary	
S5.F (a)(2)	Operations and Maintenance Manual Substantial Changes or Update	As necessary	
S6.E	Industrial User Survey	1/permit cycle	February 1, 2018 - with the next permit renewal application
S8.	Application for Permit Renewal	1/permit cycle	February 1, 2018
S10.A	Sediment Sampling and Analysis Plan	1/permit cycle	October 1, 2014, in conjunction with the CSO Post Construction Monitoring Plan
S10.B	Sediment Data Report	1/permit cycle	February 1, 2018, with the next permit renewal application
S11.C	CSO Annual Report	Annually	May 31, 2014
S11.D(d)	CSO Post Construction Monitoring Plan	1/permit cycle	October 1, 2014
S11.D(e)	CSO Post Construction Monitoring Data Report	1/permit cycle	February 1, 2018, with the next permit renewal application
S12.C	Acute Toxicity: Compliance Monitoring Reports	Quarterly from January 2014 through July 2017	April 30, 2014
S12.D	Acute Toxicity: Response to Noncompliance Reporting	As necessary	
S12.D	Acute Toxicity: "Causes and Preventative Measures for Transient Events"	As necessary	
S12.D	Acute Toxicity: TI/TRE Plan	As necessary	
S13.A	Chronic Toxicity Effluent Test Results with Permit Renewal Application	Testing during: April 2017 July 2017	Report submittal by February 1, 2018, with the next permit renewal application
G1	Notice of Change in Authorization	As necessary	

Permit Section	Submittal	Frequency	First Submittal Date
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	
G13	Payment of Fees	As assessed	
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 municipal wastewater to Sinclair Inlet, Puget Sound, at the permitted location subject to compliance with the following limits:

Effluent Limits: Outfall 001 Latitude 47.544670° Longitude -122.669907°		
Parameter	**Average Monthly [a]**	**Average Weekly [b]**
Biochemical Oxygen Demand (5-day) (BOD_5) (May through September)	30 mg/L, 2752 lbs/day 85% removal of influent BOD_5	45 mg/L, 4128 lbs/day
BOD_5 (October through April)	30 mg/L, 3878 lbs/day 65% removal of influent BOD_5	45 mg/L, 5817 lbs/day
Total Suspended Solids (TSS) (May through September)	30 mg/L, 2752 lbs/day 85% removal of influent TSS	45 mg/L, 4128 lbs/day
TSS (October through April)	30 mg/L, 3878 lbs/day 65% removal of influent TSS	45 mg/L, 5817 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 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 S10 for more information.	
a	Average monthly effluent limit for BOD_5 and TSS means the highest allowable (arithmetic) average of daily discharges over a calendar month.	
b	Average weekly effluent limit for BOD_5 and TSS means the highest allowable (arithmetic) average of daily discharges over a calendar week.	
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: http://www.ecy.wa.gov/pubs/0410020.pdf	
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.	

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 municipal wastewater to Port Washington Narrows, Puget Sound at the permitted location subject to compliance with the following limits:

Effluent Limits: Outfall 002 Latitude 47.581606° Longitude -122.637978°	
Parameter	**Average Yearly [a]**
TSS Removal Efficiency [b]	Equal to or greater than 50% removal of influent TSS
Settleable Solids	0.3 mL/L
Parameter	**Monthly Geometric Mean**
Fecal Coliform Bacteria	400/100 mL
Parameter	**Monthly**
Number of Discharge Events	Report
Discharge Volume	Report
a	The yearly 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 yearly averages 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 S11.C.
b	The TSS removal efficiency shall be calculated on a mass balance basis as the percent of solids removed at the plant.

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 mixing zone is a circle with radius of 229 feet measured from the center of each discharge port. The mixing zone extends from the discharge ports to the top of the water surface at mean lower low water (MLLW). 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 acute mixing zone is a circle with radius of 22.9 feet measured from the center of each discharge port. The mixing zone extends from the discharge ports to the top of the water surface at MLLW. 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 mixing zone is a circle with radius of 224 feet measured from the center of each discharge port. The mixing zone extends from the discharge ports to the top of the water surface at MLLW. 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 acute mixing zone is a circle with radius of 22.4 feet measured from the center of each discharge port. The mixing zone extends from the discharge ports to the top of the water surface at MLLW. 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 – Sept	Oct – April	
Acute Aquatic Life Criteria	37	20	51
Chronic Aquatic Life Criteria	141	127	467
Human Health Criteria – Non-carcinogen	141	127	467

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) [a]	MGD	Continuous [b]	Metered
BOD_5	mg/L	3/week	24-hr composite [c]
	lbs/day		Calculate [d]
TSS	mg/L	3/week	24-hr composite [c]
	lbs/day		Calculate [d]
(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 analysis before or after the disinfection process. If taken after, the Permittee must dechlorinate and reseed the sample.			
BOD_5	mg/L	3/week	24-hr composite [c]
	lbs/day		Calculate [d]
	% removal		Calculate [e]

Parameter	Units & Speciation	Minimum Sampling Frequency	Sample Type
TSS	mg/L	3/week	24-hr composite [c]
	lbs/day		Calculate [d]
	% removal		Calculate [e]
Chlorine (Total Residual)	mg/L	Daily	Grab [f]
Fecal Coliform [g]	# /100 ml	5/week	Grab [f]
pH [h]	Standard Units	Daily	Grab [f]
(3) CSO Related Secondary Treatment Bypass			
As specified in Special Conditions S9.1.			
Plant Flow Rate at the Time of the Bypass	MGD	Per Event [i]	Metered
Volume Bypassed	MG	Per Event [i]	Calculate
Bypass Duration	Hours	Per Event [i]	Measurement
Storm Duration	Hours	Per Event [i]	Measurement [j]
Precipitation	Inches	Per Event [i]	Measurement [k]
(4) Effluent Characterization – Final Wastewater Effluent			
Total Ammonia	mg/L as N	Monthly	24-hr composite [c]
Nitrate plus Nitrite Nitrogen			
Total Kjeldahl Nitrogen (TKN)			
Total Phosphorus	mg/L as P		
Soluble Reactive Phosphorus (SRP)			
(5) Whole Effluent Toxicity Testing – Final Wastewater Effluent			
As specified in Special Conditions S12 and S13.			
Acute Toxicity Testing	See condition S12 for specific testing requirements	4/year from January 2014 through July 2017 [l]	24-hr composite [c]
Chronic Toxicity Testing	See condition S13 for specific testing requirements	2/permit cycle: April 2017 and July 2017	24-hr composite [c]
(6) 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.			
Dissolved Oxygen	mg/L	3/permit cycle	Grab [f]
Oil and Grease			
Total Dissolved Solids			
Temperature	°C		
Cyanide	µg/L	3/permit cycle: July 2014 January 2015 July 2016	Grab [f]
Total Phenolic Compounds	µg/L		Grab [f]
Priority Pollutants (PP) – Total Metals	µg/L; nanograms (ng/L) for mercury		24-hour composite [c] Grab for mercury [f]

Parameter	Units & Speciation	Minimum Sampling Frequency	Sample Type
PP – Volatile Organic Compounds	µg/L		Grab [f]
PP – Acid-extractable Compounds	µg/L		24-hour composite [c]
PP – Base-neutral Compounds	µg/L		24-hour composite [c]
(7) Sediment Study			
As specified in Special Condition S10.			

a	Influent flow to the primary clarifiers shall be measured and reported as the wastewater influent flow to the plant.
b	Continuous means uninterrupted except for brief lengths of time for calibration, for power failure, or for unanticipated equipment repair or maintenance.
c	24-hour composite means a series of individual samples collected over a 24-hour period into a single container, and analyzed as one sample.
d	Calculate lbs/day using the following equation: Concentration (mg/L) X Flow (MGD) X Conversion Factor (8.34) = lbs/day
e	Calculate the percent (%) removal of BOD_5 and TSS using the following equation: % removal = $\frac{\text{[Influent concentration (mg/L) – Effluent concentration (mg/L)]}}{\text{Influent concentration (mg/L)}}$ x 100
f	Grab means an individual sample collected over a fifteen (15) minute, or less, period.
g	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: http://www.ecy.wa.gov/programs/wq/permits/guidance.html . Do not report a result as too numerous to count (TNTC).
h	Report the daily pH and the minimum and maximum for the monitoring period.
i	"Event" means a secondary treatment bypass event caused due to precipitation.
j	Storm duration is the amount of total time when precipitation occurred that contributed to a bypass event.
k	Precipitation must be measured by the nearest possible precipitation-measuring device and actively monitored during the period of interest.
l	If the Lowest Observed Effects Concentration (LOEC) is equal to or greater than 100% for all the tests performed from January 2014 through October 2015, the Permittee may reduce acute toxicity testing to 2/year (January and July) through the rest of the permit term, beginning January 2016.

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.			
BOD_5	mg/L	Per Event [b]	Composite [c]
TSS	mg/L	Per Event [b]	Composite [c]
(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 disinfection process.			

Parameter	Units & Speciation	Minimum Sampling Frequency	Sample Type
Flow	MGD	Continuous during discharge event [a]	Measurement
Volume	MG	Per Event [b]	Calculation
Discharge Duration	Hours	Per Event [b]	Measurement
Number of Discharge Events [b]	Number	Monthly during discharge event [a]	Measurement
BOD_5	mg/L	Per Event [b]	Composite [c]
TSS	mg/L	Per Event [b]	Composite [c]
	% removal		Calculate [e]
Settleable Solids	mL/L	Per Event [b]	Composite [c]
Fecal Coliform [e]	# /100 ml	Per Event [b]	Grab [d]
pH	Standard Units	Per Event [b]	Grab [d]
(3) Ambient Monitoring			
Storm Duration	Hours	Per Event [b]	Measurement
Precipitation	Inches	Per Event [b]	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	mg/L as N	3/permit cycle [f]	Composite [c]
Nitrate plus Nitrite Nitrogen			
Total Kjeldahl Nitrogen (TKN)			
Total Phosphorus	mg/L as P		
Dissolved Oxygen	mg/L	3/permit cycle [f]	Grab [d]
Oil and Grease			
Total Dissolved Solids			
Temperature	°C		
Cyanide	µg/L	3/permit cycle [f]	Grab [d]
Total Phenolic Compounds	µg/L		Grab [d]
Priority Pollutants (PP) – Total Metals	µg/L; nanograms (ng/L) for mercury		Composite [c] or Grab [d] Grab [d] for mercury
PP – Volatile Organic Compounds	µg/L		Grab [d]
PP – Acid-extractable Compounds	µg/L		Composite [c] or Grab [d]
PP – Base-neutral Compounds	µg/L		Composite [c] or Grab [d]
[a] Continuous means uninterrupted except for brief lengths of time for calibration, for power failure, or for unanticipated equipment repair or maintenance.			

Parameter	Units & Speciation	Minimum Sampling Frequency	Sample Type
b	"Per Event" means a unique flow event as defined in Ecology's *Permit Writer's Manual,* p. V-17. Ecology defines the minimum inter-event period 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.		
c	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.		
d	Grab means an individual sample collected over a fifteen (15) minute, or less, period.		
e	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: http://www.ecy.wa.gov/programs/wq/permits/guidance.html . Do not report a result as too numerous to count (TNTC).		
f	A minimum of three rounds of sampling per permit cycle must be analyzed, provided there are three or more treated CSO discharge events from East plant during the permit cycle. Each round of sampling must be from a separate, treated CSO discharge event.		

S2.C. Combined Sewer Overflow (CSO) Monitoring Schedule

The Permittee must monitor all discharges from CSO outfalls listed in Special Condition S11.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 S11.C.

The Permittee must use automatic flow monitoring equipment to collect the information required below. The 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]
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 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 Ecology's *Permit Writer's Manual,* p. V-17. Ecology defines the minimum inter-event period 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 Devices*

The Permittee must:

1. Select and use appropriate flow measurement device 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 and the manufacturer’s recommendation for that type of device.
3. Calibrate these devices at the frequency recommended by the manufacturer and at a minimum frequency of at least one calibration per year.
4. 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, pH, and internal process control parameters are exempt from this requirement. The Permittee must obtain accreditation for 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. Reporting

The first monitoring period begins on the effective date of the permit. The Permittee must:

1. Summarize, report, and submit monitoring data obtained during each monitoring period on a Discharge Monitoring Report (DMR) form provided, or otherwise approved, by Ecology. Include a summary listing daily results for the parameters tabulated in Special Conditions S2.A(1), (2), (3), and (4), and S2.B(1), (2), and (3).

   Beginning with the reporting of June 2014 monitoring results, the Permittee must summarize, report, and submit monitoring data obtained during each monitoring period on the electronic Discharge Monitoring Report (DMR) form provided by Ecology within WQWebDMR. Include data for each of the parameters tabulated in Special Conditions S2.A(1), (2), (3), and (4), and S2.B(1), (2), and (3), 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.

   To find out more information and to sign up for WQWebDMR go to: http://www.ecy.wa.gov/programs/wq/permits/paris/webdmr.html
2. Submit the form as required with the words "no discharge" entered in place of the monitoring results, if the facility did not discharge during a given monitoring period.
3. If submitting DMRs electronically, 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.
4. 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.
5. Report the test method, the DL, and the QL on the discharge monitoring report or in the required report, if the Permittee used an alternative method not specified in the permit and as allowed in Appendix A.
6. Calculate average values (unless otherwise specified in the permit) using:
   a. The reported numeric value for all parameters measured between the agency-required detection value and the agency-required quantitation value.

b. One-half the detection value (for values reported below detection) if the lab detected the parameter in another sample 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.

7. Ensure that DMR forms for the parameters tabulated in Special Conditions S2.A(1), (2), (3), and (4), and S2.B(1), (2), and (3) are postmarked or received by Ecology no later than the 15th day of the following month.

8. If submitting DMRs electronically, submit **monthly** DMRs for parameters with the monitoring frequencies specified in Special Conditions S2.A(1), (2), (3), and (4), and S2.B(1), (2), and (3) by the 15th day of the following month.

9. Submit reports to Ecology online using Ecology's electronic WQWebDMR submittal forms (electronic DMRs) as required above. Send paper reports to Ecology at:

   Water Quality Permit Coordinator
   Department of Ecology
   Northwest Regional Office
   3190 160th Avenue SE
   Bellevue, WA 98008-5452

10. Submit permit renewal application monitoring data [Parameters listed in Conditions S2.A(6) and S2.B(4)] in the next permit renewal application form. For the priority pollutants analyses required in these conditions, the Permittee must submit an electronic PDF copy of the laboratory report, when submitting the next permit renewal application form.

11. Include the following information (for priority pollutant organic and metal parameters lab reports): sampling date, sample location, date of analysis, parameter name, CAS number, analytical method/number, method detection limit (MDL), laboratory practical quantitation limit (PQL), reporting units, and concentration detected. The Permittee must submit a copy of the contract laboratory report to provide this information. Analytical results from samples sent to a contract laboratory must also include information on the chain of custody, QA/QC results, and documentation of accreditation for the parameter.

S3.B. 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.C. 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.D. Additional Monitoring by the Permittee

If the Permittee monitors any pollutant more frequently than required by Special Conditions S2.A and S2.B 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.

S3.E. 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 Kitsap Public Health District (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	360-337-5235 (business hours) 360-415-2005 (after business hours)

b. Twenty-four-hour Reporting

The Permittee must report the following occurrences of noncompliance by telephone, to Ecology at the telephone number 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.

f. Report Submittal

The Permittee must submit reports to the address shown below:

Water Quality Permit Coordinator
Department of Ecology
Northwest Regional Office
3190 160th Avenue SE
Bellevue, WA 98008-5452

S3.F. 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: http://www.ecy.wa.gov/programs/spills/other/reportaspill.htm .

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.G. 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 – West Plant

S4.A. Design Criteria

The flows or waste loads for the permitted facility must not exceed the following design criteria:

Maximum Month Design Flow (May through September)	11.0 MGD
Maximum Month Design Flow (October through April)	15.5 MGD
BOD_5 Influent Loading for Maximum Month	18,100 lb/day
TSS Influent Loading for Maximum Month	22,600 lb/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 –West Plant*

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.

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 in a manner 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 430/9-74-001) at the wastewater treatment plants. 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. Bypass Procedures

This permit prohibits a bypass, which is the intentional diversion of waste streams from any portion of a treatment facility. Ecology may take enforcement action against a Permittee for a bypass unless one of the following circumstances (1, 2, or 3) applies.

1. Bypass for essential maintenance without the potential to cause violation of permit limits or conditions.

   This permit authorizes a bypass if it allows for essential maintenance and does not have the potential to cause violations of limits or other conditions of this permit, or adversely impact public health as determined by Ecology prior to the bypass. The Permittee must submit prior notice, if possible, at least ten (10) days before the date of the bypass.

2. Bypass which is unavoidable, unanticipated, and results in noncompliance of this permit.

   This permit authorizes such a bypass only if:

   a. 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.

   b. No feasible alternatives to the bypass exist, such as:

      - The use of auxiliary treatment facilities.
      - Retention of untreated wastes.
      - 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.
      - Transport of untreated wastes to another treatment facility or preventative maintenance), or transport of untreated wastes to another treatment facility.

   c. Ecology is properly notified of the bypass as required in Special Condition S3.E of this permit.

3. If bypass is anticipated and has the potential to result in noncompliance of this permit.

   a. The Permittee must notify Ecology at least thirty (30) days before the planned date of bypass. The notice must contain:

      - A description of the bypass and its cause.
      - An analysis of all known alternatives which would eliminate, reduce, or mitigate the need for bypassing.
      - A cost-effectiveness analysis of alternatives including comparative resource damage assessment.

- 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 reoccurrence 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 preparation of the engineering report or facilities plan and plans and specifications and must include these 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 consider the following prior to issuing an administrative order for this type of bypass:

- If the bypass is necessary to perform construction or maintenance-related activities essential to meet the requirements of this permit.
- If feasible alternatives to bypass exist, such as the use of auxiliary treatment facilities, retention of untreated wastes, stopping production, maintenance during normal periods of equipment down time, or transport of untreated wastes to another treatment facility.
- If the Permittee planned and scheduled the bypass to minimize adverse effects on the public and the environment.

After consideration of the above and the adverse effects of the proposed bypass and any other relevant factors, Ecology will approve or deny the request. Ecology will give the public an opportunity to comment on bypass incidents of significant duration, to the extent feasible. Ecology will approve a request to bypass by issuing an administrative order under RCW 90.48.120.

S5.F. Operations and Maintenance (O&M) Manual

a. O&M Manual Submittal and Requirements

The Permittee must:

1. Review the O&M Manual at least annually.

2. Submit to Ecology for review and approval substantial changes or updates to the O&M Manual whenever it incorporates them into the manual. The Permittee must submit a paper copy and an electronic copy (preferably as a PDF).
3. Keep the approved O&M Manual at the permitted facility.
4. Follow the instructions and procedures of this manual.

b. O&M Manual Components

When the Permittee updates the O&M manual for the permitted facilities, the updated manual must meet the content requirements of WAC 173-240-080 (4) and be consistent with the guidance in Table G1-3 in the *Criteria for Sewage Works Design* (Orange Book), 2008 Version. 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.
8. Specify other items on case-by-case basis such as O&M for collection systems pump stations, etc.

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(t)(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 with the next permit renewal application; submit a paper copy and an electronic copy (preferably as a PDF). 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. Application for Permit Renewal or Modification for Facility Changes

The Permittee must submit an application for renewal of this permit by February 1, 2018. The Permittee must submit a paper copy and an electronic copy (preferably as a PDF).

The Permittee must also submit a new application or supplement 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.

S9. Wet Weather Operation – West Plant

CSO-related bypass of the secondary treatment portion of the West Plant is authorized when the instantaneous flow rate to the plant 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 Special Condition S5.F. 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 time meet the effluent limits of this permit as listed in Special Condition S1. A.

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 as follows:

1. Report each bypass event on the monthly discharge monitoring report for the month a bypass event occurs. For each bypass event, report the plant flow rate at the time of the bypass, volume and duration of the bypass, and the magnitude and duration of the precipitation event triggering the bypass.
2. Include a summary of the above data for all bypasses that occur during each calendar year in the CSO Annual Reports submitted in accordance with Special Condition S11.C.

S10. Sediment Monitoring

S10.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 at the treatment plants and CSO outfalls locations, by October 1, 2014. This plan is to be submitted in conjunction with the CSO Post Construction Monitoring Plan required under Special Condition S11.E(d). The Permittee must follow the guidance provided in the *Sediment Source Control Standards User Manual*, Appendix B: sediment sampling and analysis plan (Ecology, 2008).

S10.B. Sediment Data Report

Following Ecology approval of the sediment sampling and analysis plan, the Permittee must implement the plan. The Permittee must submit the results of the sediment monitoring with the next permit renewal application.

S11. Combined Sewer Overflows

S11.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.

Outfall Number	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	Warren Avenue 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°

S11.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 S11.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 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).

S11.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 S11 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. Summary of all data collected according to the monitoring schedule in Special Conditions S2.A (3) and S2.C.

S11.D. Requirements for Controlled Combined Sewer Overflows

a. CSOs Identified as Controlled

The Permittee has identified that all the CSO outfalls listed in S11.A 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.

b. Performance Standards for Controlled CSO Outfalls

The performance standard for each controlled CSO outfall is no more than one discharge event per outfall per year on average, due to precipitation. Ecology will evaluate compliance with the performance standard annually based on a 20 year moving average, including past years and the current year. 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 Condition S11.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 submit to Ecology for review and approval a CSO Post Construction Monitoring Plan no later than October 1, 2014. The plan must describe the monitoring protocols to be followed, including effluent monitoring, and as appropriate, other monitoring protocols such as ambient monitoring, biological assessments, and whole effluent toxicity testing.

The plan should identify instances where uncontrolled outfalls in the system may influence or adversely interfere with the water quality assessment of controlled outfalls.

e. CSO Post Construction Monitoring Data Report

Following Ecology approval of the CSO Post Construction Monitoring Plan, the Permittee must implement the plan. The Permittee must submit to Ecology a data report containing the results of the monitoring and analysis with the next permit renewal application. The data report must conform to the approved CSO Post Construction Monitoring Plan.

S12. Acute Toxicity – West Plant

S12.A. Effluent Limit for Acute Toxicity

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% effluent (October through April).

S12.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 S12.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, the test does not comply with the effluent limit for acute toxicity. The Permittee must then immediately conduct the additional testing described in Section S12.D. The Permittee will comply with the requirements of this section by meeting the requirements of Section S12.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.

S12.C. Compliance Testing for Acute Toxicity

The Permittee must:

1. Conduct compliance testing during the months shown in the following table.
2. 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).
3. Submit written reports of the test results to Ecology by the dates shown in the following table. Further instructions on testing conditions and test report content are in Section S12.E below.
4. Perform compliance tests using each of the species and protocols listed in the following table:

Acute Toxicity Tests	Species	Method	Test Date	Written Report Submittal Date
Topsmelt 96-hour survival test	*Atherinops affinis*	EPA-821-R-02-012	January 2014 July 2014 January 2015 July 2015 January 2016 July 2016 January 2017 July 2017	April 30, 2014 October 31, 2014 April 30, 2015 October 31, 2015 April 30, 2016 October 31, 2016 April 30, 2017 October 31, 2017
Mysid shrimp 48-hour survival test	*Americamysis bahia* (formerly *Mysidopsis bahia*)	EPA-821-R-02-012	April 2014 October 2014 April 2015 October 2015 April 2016 October 2016 April 2017	July 31, 2014 January 31, 2015 July 31, 2015 January 31, 2016 July 31, 2016 January 31, 2017 July 31, 2017

5. If the Lowest Observed Effects Concentration (LOEC) is equal to or greater than 100% for all the tests performed from January 2014 through October 2015, the Permittee may reduce acute toxicity testing to two per year (January and July) through the rest of the permit term, beginning January 2016.

S12.D. Response to Noncompliance with the Effluent Limit for Acute Toxicity

If a toxicity test conducted under Section S12.C determines a statistically significant difference in response between the ACEC and the control, using the statistical test described in Section S12.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 S12.B.
3. Return to the original monitoring frequency in Section S12.C after completion of the additional compliance monitoring.

Anomalous Test Results: If a toxicity test conducted under Section S12.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.

If all of the additional testing in this section 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)).

S12.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 bench sheets and reference toxicant results for test methods. If the lab provides the toxicity test data in electronic format for entry into Ecology's database, then the Permittee must send the data to Ecology along with the test report, bench sheets, and reference toxicant results.
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 S12.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.C 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.

S13. Chronic Toxicity – West Plant

S13.A. Testing When There is No Permit Limit for Chronic Toxicity

The Permittee must:

1. Conduct chronic toxicity testing on final effluent during the months shown in the following table.
2. Submit the results to Ecology with the permit renewal application.
3. 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).
4. 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.
5. Perform chronic toxicity tests with all of the following species and the most recent version of the following protocols:

Saltwater Chronic Test	Species	Method	Test Date	Written Report Submittal Date
Mysid shrimp survival and growth	*Americamysis bahia* (formerly *Mysidopsis bahia*)	EPA-821-R-02-014	April 2017	February 1, 2018 - with the next permit renewal application
Topsmelt survival and growth	*Atherinops affinis*	EPA/600/R-95/136	July 2017	

S13.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 bench sheets and reference toxicant results for test methods. If the lab provides the toxicity test data in electronic format for entry into Ecology's database, then the Permittee must send the data to Ecology along with the test report, bench sheets, and reference toxicant results.
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 S13.A 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 S13.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 ACEC equals 2.7 % effluent (May through September) and 5% effluent (October through April). The CCEC equals 0.7 % effluent (May through September) and 0.8% 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.

General Conditions

G1. Signatory Requirements

1. All applications, reports, or information 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.E.
4. The Permittee complied with any remedial measures required under S3.E 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, OR
- 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.

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.

CONVENTIONAL PARAMETERS

Pollutant & CAS No. ***(if available)***	**Recommended Analytical Protocol**	**Detection Level (DL)[1]** ***µg/L unless specified***	**Quantitation Level (QL)[2]** ***µg/L unless specified***
Biochemical Oxygen Demand	SM5210-B		2 mg/L
Total Suspended Solids	SM2540-D		5 mg/L
Total Ammonia (as N)	SM4500-NH3-B/C/D/E		20
Dissolved oxygen	SM4500-OC/OG		0.2 mg/L
pH	SM4500-H^+ B	N/A	N/A

NONCONVENTIONAL PARAMETERS

Pollutant & CAS No. *(if available)*	Recommended Analytical Protocol	Detection Level (DL)[1] *µg/L unless specified*	Quantitation Level (QL)[2] *µg/L unless specified*
Fecal Coliform	SM9221E and 9222	N/A	1 MF, and 1.1 MPN
Nitrate-Nitrite (as N)	SM4500-NO3- E/F/H		100
Nitrogen, Total Kjeldahl (as N)	SM4500-N_{org}-B/C, and SM4500-NH3- B/C/D/E		300
Soluble Reactive Phosphorus (as P)	SM4500-PE/PF	3	10
Phosphorus, Total (as P)	SM 4500 PB followed by SM4500-PE/PF	3	10
Oil and Grease (HEM)	1664 A or B	1,400	5,000
Total dissolved solids	SM2540 C		20 mg/L
Total Hardness (as $CaCO_3$)	SM2340B		200 as CaCO3

PRIORITY POLLUTANTS

Pollutant & CAS No. *(if available)*	Recommended Analytical Protocol	Detection Level (DL)[1] *µg/L unless specified*	Quantitation Level (QL)[2] *µg/L unless specified*
METALS, CYANIDE & TOTAL PHENOLS			
Antimony, Total (7440-36-0)	200.8	0.3	1.0
Arsenic, Total (7440-38-2)	200.8	0.1	0.5
Beryllium, Total (7440-41-7)	200.8	0.1	0.5
Cadmium, Total (7440-43-9)	200.8	0.05	0.25
Chromium, Total (7440-47-3)	200.8	0.2	1.0
Copper, Total (7440-50-8)	200.8	0.4	2.0
Lead, Total (7439-92-1)	200.8	0.1	0.5
Mercury, Total (7439-97-6)	1631E	0.0002	0.0005
Nickel, Total (7440-02-0)	200.8	0.1	0.5
Selenium, Total (7782-49-2)	200.8	1.0	1.0
Silver, Total (7440-22-4)	200.8	0.04	0.2
Thallium, Total (7440-28-0)	200.8	0.09	0.36
Zinc, Total (7440-66-6)	200.8	0.5	2.5
Cyanide, Total (57-12-5)	335.4	5	10
Total Phenolic Compounds	EPA 420.1		50
VOLATILE ORGANIC COMPOUNDS			
Acrolein (107-02-8)	624	5	10
Acrylonitrile (107-13-1)	624	1.0	2.0
Benzene (71-43-2)	624	1.0	2.0
Bromoform (75-25-2)	624	1.0	2.0

Pollutant & CAS No. *(if available)*	Recommended Analytical Protocol	Detection Level (DL)[1] *µg/L unless specified*	Quantitation Level (QL)[2] *µg/L unless specified*
Carbon tetrachloride (56-23-5)	624/601 or SM6230B	1.0	2.0
Chlorobenzene (108-90-7)	624	1.0	2.0
Chlorodibromo-methane (124-48-1)	624	1.0	2.0
Chloroethane (75-00-3)	624/601	1.0	2.0
2-Chloroethylvinyl Ether (110-75-8)	624	1.0	2.0
Chloroform (67-66-3)	624 or SM6210B	1.0	2.0
Dichlorobromo-methane (75-27-4)	624	1.0	2.0
1,1-Dichloroethane (75-34-3)	624	1.0	2.0
1,2-Dichloroethane (107-06-2)	624	1.0	2.0
1,2-Trans-Dichloroethylene (156-60-5)	624	1.0	2.0
1,1-Dichloroethylene (75-35-4)	624	1.0	2.0
1,2-Dichloropropane (78-87-5)	624	1.0	2.0
1,3-dichloroproppylene (542-75-6)	624	1.0	2.0
Ethylbenzene (100-41-4)	624	1.0	2.0
Methyl bromide (74-83-9)	624/601	5.0	10.0
Methyl chloride (74-87-3)	624	1.0	2.0
Methylene chloride (75-09-2)	624	5.0	10.0
1,1,2,2-Tetrachloroethane (79-34-5)	624	1.9	2.0
Tetrachloroethylene (127-18-4)	624	1.0	2.0
Toluene (108-88-3)	624	1.0	2.0
1,1,1-Trichloroethane (71-55-6)	624	1.0	2.0
1,1,2-Trichloroethane (79-00-5)	624	1.0	2.0
Trichloroethylene (79-01-6)	624	1.0	2.0
Vinyl chloride (75-01-4)	624/SM6200B	1.0	2.0
ACID-EXTRACTABLE COMPOUNDS			
Parachlorometa cresol (59-50-7)	625	1.0	2.0
2-Chlorophenol (95-57-8)	625	1.0	2.0
2,4-Dichlorophenol (120-83-2)	625	0.5	1.0
2,4-Dimethylphenol (105-67-9)	625	0.5	1.0
4,6-dinitro-o-cresol (534-52-1)	625/1625B	1.0	2.0
2,4 dinitrophenol (51-28-5)	625	1.0	2.0
2-Nitrophenol (88-75-5)	625	0.5	1.0
4-nitrophenol (100-02-7)	625	0.5	1.0
Pentachlorophenol (87-86-5)	625	0.5	1.0
Phenol (108-95-2)	625	2.0	4.0
2,4,6-Trichlorophenol (88-06-2)	625	2.0	4.0

BASE-NEUTRAL COMPOUNDS			
Acenaphthene (83-32-9)	625	0.2	0.4
Acenaphthylene (208-96-8)	625	0.3	0.6
Anthracene (120-12-7)	625	0.3	0.6
Benzidine (92-87-5)	625	12	24
Benzo(*a*)anthracene (56-55-3)	625	0.3	0.6
Benzo(*a*)pyrene (50-32-8)	610/625	0.5	1.0
3,4 Benzo-fluoranthene (205-99-2)[3]	610/625	0.8	1.6
Benzo(*ghi*)Perylene (191-24-2)	610/625	0.5	1.0
Benzo(k)fluoranthene (207-08-9) [3]	610/625	0.8	1.6
Bis (*2- chloroethoxy)* methane (111-91-1)	625	5.3	21.2
Bis (*2-chloroethyl*) ether (111-44-4)	611/625	0.3	1.0
Bis (*2- chloroisopropyl*) ether (39638-32-9)	625	0.3	0.6
Bis (*2-ethylhexyl*) phthalate (117-81-7)	625	0.1	0.5
4-Bromophenyl phenyl ether (101-55-3)	625	0.2	0.4
Butyl benzyl phthalate (85-68-7)	625	0.3	0.6
2-Chloronaphthalene (91-58-7)	625	0.3	0.6
4-Chlorophenyl phenyl ether (7005-72-3)	625	0.3	0.5
Chrysene (218-01-9)	610/625	0.3	0.6
Di-n-butyl phthalate (84-74-2)	625	0.5	1.0
Di-n-octyl phthalate (117-84-0)	625	0.3	0.6
Dibenzo(a,*h*)anthracene (53-70-3)	625	0.8	1.6
1,2-Dichlorobenzene (95-50-1)	624	1.9	7.6
1,3-Dichlorobenzene (541-73-1)	624	1.9	7.6
1,4-Dichlorobenzene (106-46-7)	624	4.4	17.6
3,3-Dichlorobenzidine (91-94-1)	605/625	0.5	1.0
Diethyl phthalate (84-66-2)	625	1.9	7.6
Dimethyl phthalate (131-11-3)	625	1.6	6.4
2,4-dinitrotoluene (121-14-2)	609/625	0.2	0.4
2,6-dinitrotoluene (606-20-2)	609/625	0.2	0.4
1,2-Diphenylhydrazine (122-66-7)	1625B	5.0	20
Fluoranthene (206-44-0)	625	0.3	0.6
Fluorene (86-73-7)	625	0.3	0.6
Hexachlorobenzene (118-74-1)	612/625	0.3	0.6
Hexachlorobutadiene (87-68-3)	625	0.5	1.0

Pollutant & CAS No. ***(if available)***	**Recommended Analytical Protocol**	**Detection Level (DL)[1] *µg/L unless specified***	**Quantitation Level (QL)[2] *µg/L unless specified***
Hexachlorocyclopentadiene (77-47-4)	1625B/625	0.5	1.0
Hexachloroethane (67-72-1)	625	0.5	1.0
Indeno(*1,2,3-cd*)Pyrene (193-39-5)	610/625	0.5	1.0
Isophorone (78-59-1)	625	0.5	1.0
Naphthalene (91-20-3)	625	0.3	0.6
Nitrobenzene (98-95-3)	625	0.5	1.0
N-Nitrosodi-n-propylamine (621-64-7)	607/625	0.5	1.0
N-Nitrosodimethylamine (62-75-9)	607/625	2.0	4.0
N-Nitrosodiphenylamine (86-30-6)	625	0.5	1.0
Phenanthrene (85-01-8)	625	0.3	0.6
Pyrene (129-00-0)	625	0.3	0.6
1,2,4-Trichlorobenzene (120-82-1)	625	0.3	0.6

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.

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).

Total Benzofluoranthenes – Because Benzo(b)fluoranthene, Benzo(j)fluoranthene and Benzo(k)fluoranthene co-elute you may report these three isomers as total benzofluoranthenes.

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Appendix B

Modeling Report

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1.0 Introduction and Purpose

The City of Bremerton (City), located in the central part of Kitsap County, is surrounded by two waterways, Sinclair Inlet and Dyes Inlet, which separate the City into two portions: West Bremerton and East Bremerton. The

The City's sewer service area and collection system is divided into nine West Bremerton and six East Bremerton sewer drainage basins. The six East Bremerton drainage basins are serviced by a combined sewer, in which the sanitary sewage and a portion of the stormwater are collected in the same conveyance system. Four of the nine West Bremerton drainage basins are also on a combined sewer system. The other drainage basins have a dedicated separate sanitary sewers and stormwater is conveyed and handled separately.

The City's sewer collection system serves a population of approximately 38,300. The area of the City's sewer drainage basins is approximately 8,600 acres. There are 39 lift stations, 15 outfalls, and 176 miles of gravity and pressure sewer mains. Sewer mains range in size from 6 to 42 inches in diameter for gravity mains and 4 to 36 inches in diameter for force mains.

The City of Bremerton tasked HDR Engineering, Inc. (HDR) with developing a trunk/interceptor model of the wastewater collection system. The model would be used to evaluate the existing system and alternatives for upgrading the existing system to provide capacity to accommodate growth in new service areas.

To prepare the model, HDR utilized GIS data sets, as-built drawings, and field data provided by City staff. The field data obtained was combined with rain gauge data to construct a calibrated model based on three rain events that were observed during the study period.

Analysis conducted in the model focuses on the combined portion of the City's collection system only. The continuous simulation model was utilized to simulate rainfall events and evaluate the collection system response. An evaluation of the separated potion of the City's collection system was not conducted in the model. An analysis could be conducted with available flow data, demographic information applied to the tributary area to each pump station with GIS, and hand calculations to determine the impact from expansion of the City's collection system to existing pump stations.

2.0 Model Development

A hydraulic model of a portion of the City's wastewater collection system was originally developed in 2000 in the software application, Hydra by Pizer, Inc. The existing model was converted from Hydra to the software package Infoworks CS v13.5 by Innovyze to accomplish the objectives of this modeling task.

The model has not been updated since 2000. Verification of the existing model information and development to include the entire system are needed. HDR was tasked with updating and developing the major collection trunks, interceptors, regulators, and pump stations based on information provided by the City. The full development of model is scheduled as a future project.

The following text describes the information provided by the City for the purpose of updating the model.

As-built drawings were requested for major interceptors and wastewater facilities. The City provided drawings sets in November 2012. Table 2-1 lists the as-built drawings provided by the City. The information contained in the as-built drawings was used to update the model.

Table 2-1. As-Built Drawings Provided by the City of Bremerton

PROJECT NAME	YEAR
Beach Pipelines and Narrows Crossing	1983
Pump Station CE-1	1983
Central Bremerton Wastewater Improvements	1990
Crosstown Pipeline Upper Reach Repair	2012
East 18th Street Diversion	2001
Pine Road Basin CSO Reduction Facility	2000
Eastside Treatment Facility	2001
Sewage Pump Station EB-2 2002 Modifications	2002
EB-6 Pump Station 2002 Modifications	2002
Gorst UGA Sewerage Project Pump Station SB3	2009
Gorst UGA Sewerage Project Pump Station SB4	2009
Kitsap Lake Interceptor	1970
Crosstown Pipeline	1983
Pump Stations WB-3, WB-2, WB-1 and Overflow 17	1983
Relocation of 42" combined Sewer and 24" Watermain at Callow Avenue and Rodgers Street	1995
Southwest Bremerton Residential Sewer Extension Pump Station (SB-1)	2008
Southwest Bremerton residential sewer extension forcemain	2008
WB-6 Pump Station	2002

The City provided HDR with its water, sewer, and storm GIS information during October, 2012. The information available for pipe and manhole invert elevations is limited at this time. Any information that was available was used to verify or update the model's pipe and manhole geometry.

2.1 Pump Stations

Pump station operating capacities were updated based on Table 2-4 from the City of Bremerton 2013 Wastewater Comprehensive Plan (WWCP). The table includes the operating capacity of each pump at a given hydraulic head. The pumps in the model were updated to operate at the capacity listed in the table. Pump curves were not provided during this task.

Information on the pump start and stop wet well levels were provided for all lift stations. Table 2-2 shows the information that was received January, 2013. The pump controls were only included for pumps stations where as-built drawings were available to up verify the wet well geometries. Where information was not available, the geometry on the wet wells was assumed and would need to be updated with information as-built drawings or field survey.

Table 2-2. Pump Start/Stop Operating Controls

PUMP STATION	WET WELL LEVEL (FT)	
	ON	OFF
SB-1	4.5’	1.5’
SB-2	6.5’	2.0’
SB-3	6.5’	2.0’
KL-1	6.5’	3.5’
KL-2	5.0’	2.5’
KL-3	5.0’	2.5’
KL-4	5.0’	2.5’
OB-1	8.0’	4.0’
OB-2	5.5’	3.0’
OB-3	6.0’	1.5’
OB-4	6.0’	1.5’
OB-5	7.0’	3.0’
OB-6	7.0’	3.0’
OB-7	7.5’	2.5’
MD-1	7.0’	3.0’
PF-1	5	2.0’
PB-1	5.0’	3.0’
PB-2	5.5’	2.5’
CW-1	6.0’	2.5’
CW-2	4.5’	2.0’
CW-3	6.0’	2.5’
CW-4	5.0’	2.0’

PUMP STATION	WET WELL LEVEL (FT)	
	ON	OFF
CE-1	4.5’ (SM PMP)	1.5’ (SM PMP)
	6.0’ (LRG PMP)	2.0’ (LRG PMP)
CE-2	4.5’	2.0’
CE-3	7.0’	3.0’
CE-4	5.0’	1.5’
CE-6	5.5’	2.0’
CE-7[1]	5.0’	2.0’
CE-8[2]	4.0’	1.5’
EB-2	5.0’ (SM PMP)	1.5’ (SM PMP)
	12.0’ (LRG PMP)	5.0’ (LRG PMP)
EB-3	10.0’	4.0’
EB-4	4.5’	3.0’
EB-5	5.0’	2.0’
EB-6	6.0’	1.5’
EB-8	4.5’	2.0’
EB-9	3.0’	1.5’
WB-3	4.0’ (SM PMP)	2.5’ (SM PMP)
	7.0' (LRG PMP)	4.0’ (LRG PMP)
WB-4	3.5’	1.5’
WB-6	8.0’	4.5’

(1) Located at the Park Plaza Parking Garage
(2) Located at the Ferry Tunnel

2.2 Operation Data

Flow data was provided for selected pump stations, the Eastside and Westside Wastewater treatment plants, and CSO outfalls. Table 2-3 lists each facility and the period for which flow data was provided.

Data for all pump station flow meters is given in 1 minute intervals. The data values represent instantaneous not average flow. The only exception for the data interval is for CE-1 and CE-6 for the period from June to August.

The Eastside Treatment Plant (ETP) operates only during wet weather events. The flow data provided for 2012 contains 4 events during which the facility operated.

The flow data at the Westside Wastewater Treatment Plant (WWTP) is given as a daily average flow in million gallons per day (mgd).

Flow data for the CSO outfalls is recorded at the outfall structures during the storm events on November 19, 2012 and December 19, 2012 when CSOs occurred.

Table 2-3. Monitoring Flow Data

PUMP STATION	VALUE	BEGIN	END	NOTES
CE-1	(gpm)	6/1/2012	12/10/2012	Data in 10 min intervals from Jun - Aug. 1 minute intervals from Sep - Dec.
CE-4	(gpm)	6/1/2012	12/15/2012	Data in 1 minute intervals.
CE-6	(gpm)	6/1/2012	12/10/2012	Data in 10 min intervals from Jun - Aug. 1 minute intervals from Sep - Dec.
CW-1	(gpm)	6/1/2012	12/15/2012	Data in 1 minute intervals.
EB-6	(gpm)	9/1/2012	12/31/2012	Data in 1 minute intervals.
KL-2	(gpm)	9/1/2012	12/31/2012	Data in 1 minute intervals.
OB-1	(gpm)	6/1/2012	12/15/2012	Data in 1 minute intervals.
WB-3	(gpm)	6/1/2012	12/15/2012	Data in 1 minute intervals.
WB-6	(gpm)	6/1/2012	12/15/2012	Data in 1 minute intervals.
Treatment Plant				
Eastside Treatment Plant	(gpm)	3/15/2012	11/19/2012	Data in 1 minute intervals.
Westside Wastewater Treatment Plant	(mgd)	12/1/2010	12/6/2012	Data in daily average
Combined Sewer Overflow				
OF3	(gpm)	11/19/2012	12/19/2012	Data in 1 minute intervals
OF9	(gpm)	11/19/2012	12/19/2012	Data in 1 minute intervals
OF10	(gpm)	11/19/2012	12/19/2012	Data in 1 minute intervals
OF11	(gpm)	11/19/2012	12/19/2012	Data in 1 minute intervals
OF13	(gpm)	11/19/2012	12/19/2012	Data in 1 minute intervals
OF17	(gpm)	11/19/2012	12/19/2012	Data in 1 minute intervals

2.3 Rainfall Data

Rainfall data was provided by the City for two City rain gauges monitored in one minute intervals for the period of record listed below. A second set of rainfall data was provided for the water operators manual rain gauges which are monitored once a day.

- Station 1 – 3027 Olympus Drive – 11/13/12 to 1/7/13

- Station 2 – 4801 Roosevelt Boulevard – 9/22/12 to 1/7/13
- Manual Gauges – Gorst, McKenna, Twin Lakes, and Maintenance Shop – 6/1/12 to 12/31/12

Based on a review of the rainfall data, three rainfall events were selected in order to evaluate the wastewater collection system response. Table 2-4 and Table 2-5 list the details of each rainfall event. These rainfall events were simulated in the model and the results were compared with the operation data listed in Table 2-3.

Table 2-4. Rain Gauge Station 1

EVENT	START	END	TOTAL RAINFALL (IN)	PEAK INTENSITY (IN/HR)	DATE TIME	PEAK 24 HOUR VOLUME (IN)	DATE
1	10/28/12	11/2/12	NA	NA	NA	NA	NA
2	11/18/12	11/23/12	NA	NA	NA	NA	NA
3	11/29/12	12/3/12	3.59	0.25	11/30/12 22:34	2.27	11/30/12

Table 2-5. Rain Gauge Station 2

EVENT	START	END	TOTAL RAINFALL (IN)	PEAK INTENSITY (IN/HR)	DATE TIME	PEAK 24 HOUR VOLUME (IN)	DATE
1	10/28/12	11/2/12	5.31	0.56	10/31/12 13:20	3.06	10/31/12
2	11/18/12	11/23/12	5.76	0.53	11/19/12 11:11	3.71	11/19/12
3	11/29/12	12/3/12	3.88	0.31	11/30/12 22:30	2.48	11/30/12

2.4 Wastewater Loading

2.4.1 Sanitary Sewer Flows

The methodology used to develop sanitary sewer flow projections was to develop a demographic projection for Bremerton's sewer service area and then estimate the sanitary flow based on water use factors. The projections were generated at the sewer basin level and for two sectors (residential and non-residential). Section 4.2 in the WWCP describes the demographic projection which is based on City and County comprehensive planning documents.

Sanitary sewer flow factors for residential and non-residential sectors are described in Section 4.2.2 in the WWCP. 71 gallons per capita per day is estimated for residential sector sanitary flow. 35 gallons per employee per day is estimated for non-residential sector sanitary flow. The sanitary flow factors were applied to the demographic projection for each basin to develop the sanitary sewer flow projections.

The sanitary sewer flows were loaded into model basins called “subcatchments.” A subcatchment is a model feature that resembles a sub-basin. It represents a geographic area that contributes flow into the modeled collection system. A flow loading manhole is designated for each subcatchment. There are 770 subcatchments in the existing model. The sanitary flow projections developed in Section 3.2 were allocated to each subcatchment by the percentage of the subcatchment area to the total area in each basin.

2.4.2 Peak Sanitary Sewer Flow

The pump station CE-1, CW-1, and WB-3 are major pump stations whose tributary area comprises a majority of the combined system. Sanitary sewer flow peaking factors are estimated from the operation data at these pump stations for the months July and August of 2012. There was an extended period without rainfall during that period and the peaking factor observed during that period is assumed to represent the peak sanitary flow in the system. These peaking factors were applied to the sanitary sewer flow estimate in the tributary area of each pump station. For areas where pump station data was not available, the peaking factors were applied from nearest tributary area to one of the three pump stations. Table 2-6 lists the peaking factors estimated from the operation data.

Table 2-6. Sanitary Flow Peaking Factor

PUMP STATION	AVERAGE SANITARY FLOW (GPM)	PEAK HOUR SANITARY FLOW (GPM)	PEAKING FACTOR
CE-1	1,004	1589	1.6
CW-1	124	289	2.3
WB-3	625	1,473	2.4

2.4.3 Wet Weather Flows

The Bremerton model was divided into 770 drainage catchments with an average size of under 6 acres. A catchment is an area that drains to a single point that contains the dry-weather sanitary flow and wet-weather runoff flow contribution from the area. The catchments can contain multiple land uses. With each catchment, different land uses will be delineated. Each land use can contain multiple runoff surface types.

Runoff Volume Model

The runoff volume model defines how much precipitation falling on each surface type will be converted to runoff that will enter the combined sewer system. The model used Horton model to simulate infiltrations on either pervious or semi-pervious surface areas. Horton model calculates infiltrations based on the initial infiltration rate, the limiting infiltration rate and the decay coefficient. The above parameters were assigned to the model based on soil group D in Table 2-7.

Table 2-7. Typical Values for Horton's Infiltration Model

SCS SOIL GROUP	INITIAL INFILTRATION RATE (IN/HR)	LIMITING INFILTRATION RATE (IN/HR)	DECAY COEFFICIENT (/HR)
A	9.84	1	2
B	7.87	0.5	2
C	4.92	0.25	2
D	2.99	0.1	2

Source: Innovyze InfoWorks CS

The rapid runoff response on impervious surface types was simulated by using Soil Conservation Service (SCS) runoff method (a.k.a. Natural Resource Conservative Service, NRCS). SCS runoff is a simple runoff model that allows for variation in the runoff coefficient depending on the catchment wetness. The parameters that define the SCS method within a runoff surface are: initial loss, manning's N, and SCS depth.

- ***Initial Loss (SCS)*** - The initial loss is the quantity of rainfall required to just cause overland flow. The initial part of a rainstorm is assumed to cause no runoff because it's lost in wetting the ground surface and informing puddles. The initial loss is set to be calculated based on catchment slope.
- ***SCS Depth (SCS)*** – The maximum potential storage depth of 0.5 feet was assigned for the impervious runoff surface.
- ***Initial Loss Porosity (SCS)*** - The initial loss porosity can be used to represent a runoff surface where the initial storage volume actually contains some sort of fill material such as sand, gravel or rocks. The initial loss porosity of 0.3 was assigned to all surfaces representing 30% air volume in the structure.

Runoff Routing Model

Runoff routing model determine how quickly the rainfall enters the drainage system from the catchment. InfoWorks CS provides eight different potential models for routing stormwater runoff. SWMM was selected for the Bremerton model due to its wide application the United States. This routing method uses a combination of a non-linear reservoir and kinematic wave routing to move the runoff over the ground surface to the inlet node. Manning's N value 0.011 for impervious areas was assigned for all tributary areas. Typical Manning's N values are listed in Table 2-8.

Table 2-8. Typical Manning's N Values

SURFACE TYPE	MANNING'S N
Smooth asphalt	0.011
Smooth concrete	0.012
Ordinary concrete lining	0.013
Good wood	0.014

SURFACE TYPE	MANNING'S N
Brick with cement mortar	0.014
Vitrified clay	0.015
Cast iron	0.015
Corrugated metal pipes	0.024
Cement rubble surface	0.024
Fallow soils (no residue)	0.05
Cultivated soils	
Residue cover < 20%	0.06
Residue cover > 20%	0.17
Range (natural)	0.13
Grass	
Short, prairie	0.15
Dense	0.24
Bermuda grass	0.41
Woods	
Light underbrush	0.40
Dense underbrush	0.80

Source: McCuen, R. et al. (1996), Hydrology, FHWA-SA-96-067, Federal Highway Administration, Washington, DC

2.4.4 Subcatchment Definition

A subcatchment is an area used by the model to define the contributing WWF area for loading manholes. Catchment parameters define rainfall-runoff WWF generation. An area is defined in the model for each loading manhole with rainfall-runoff parameters to describe how rainfall is factored into runoff and how the runoff enters the sewer network. The following parameters and data sources are used in the model to describe the characteristics of each subcatchment:

- ***Tributary Area –*** The full are of the catchment, including those parts that do not drain into the system.
- ***Contributing Area*** – The area of the catchment that drains into the system.
- ***Gradient and Width*** – The average gradient is the slope at which the catchment drains to the node. Gradient and Width are automatically calculated by InfoWorks CS program.
- ***Curve Number (CN)*** – Curve number represents the combined influence of soil type, land management practices, vegetation, urban development and antecedent moisture conditions on hydrologic response. CN varies between 0 and 100, with 0 corresponding to no runoff and 100 to 100 percent runoff.

2.5 Calibration

The model was calibrated by simulating the rainfall events listed in Table 2-4 and Table 2-5 and comparing the modeled wet weather flows with the observed flow at pumps stations, outfalls, and the ETP during those events. Due to the limited data available, calibration adjustments were made in the areas tributary to the monitoring locations are CE-1, CW-1, and WB-3 and WB-6 globally. Calibration settings were applied to similar pump station basins where no operation data was reviewed. Calibration modifications included:

- Reducing the percentage of contributing area for subcatchments upstream of the pump station
- Adjusting percent impervious to increase/decrease the peak flow response.

Table 2-9 lists the settings for the pump station basins and calibrated percentage of contributing area and percentage of impervious.

Table 2-9. Modeling Calibration Settings

MONITORING LOCATION	TOTAL SEWERED AREA (ACRE)	PERCENTAGE OF CONTRIBUTING AREA	PERCENT IMPERVIOUS
CE-1, ETP, East Bremerton CSO Outfalls	1281	10	29
CW-1, OF-9, OF-10, OF-11	80	100	58
WB-3 and WB-6	445	60	31

The percentage of contributing area in East Bremerton is set at 10% in the model. Separate stormwater collection facilities are present that convey runoff and runoff entering the sewer may be limited to flow from individual properties.

The calibration effort is limited by the available pump station operation. The flow response in upstream sub-basins may vary within a larger collection area. However the data is not present at this time to develop those areas. For the purpose of this evaluation, the available data is sufficient to estimate the increase in flow response major wastewater facilities such as the Crosstown Pipeline, East Bremerton Beach Main, Eastside Treatment Plant, and other pump stations.

The following sections describe the modeling results and the pump station operation.

2.5.1 Calibration Storm Event 1 – Oct 28 to Nov 2, 2012

The storm event observed by the City of Bremerton rain gauge 2 measured a peak intensity of 0.56 inches per hour with a peak 24-hour volume of 3.06 inches. The peak flow response occurred on October 31, 2012. Table 2-10 lists the observed and modeled 15 minute peak flows. Figures 2-1, 2-2, and 2-3 depict the modeled and observed flow hydrographs.

Table 2-10. Calibration Event 1 – Oct 28 to Nov 2, 2012

MONITORING LOCATION	OBSERVED 15 MIN PEAK FLOW (GPM)	MODELED 15 MINUTE PEAK FLOW (GPM)
CE-1, ETP, East Bremerton CSO Outfalls	8,409	10,000
CW-1, OF-9, OF-10, OF-11	3,020	3,500
WB-3 and WB-6	13,265	13,568

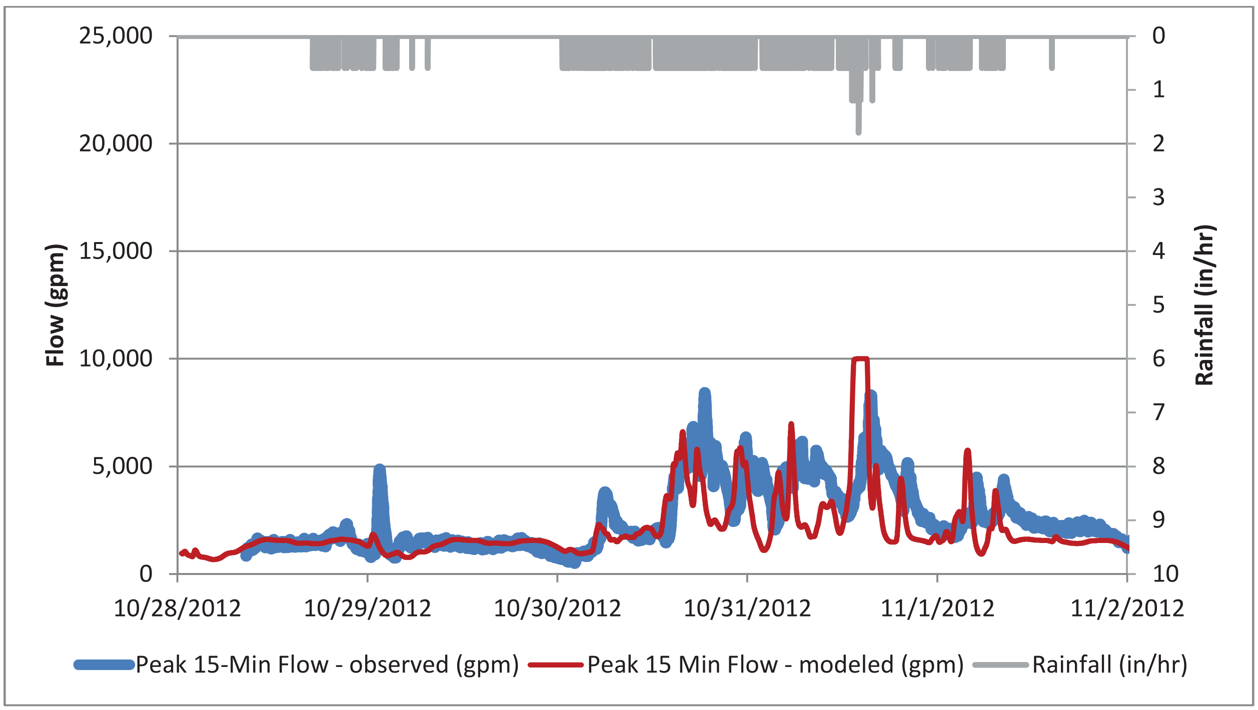

Figure 2-1. Calibration Event 1 Hydrograph – CE-1, ETP, and East Bremerton Outfalls

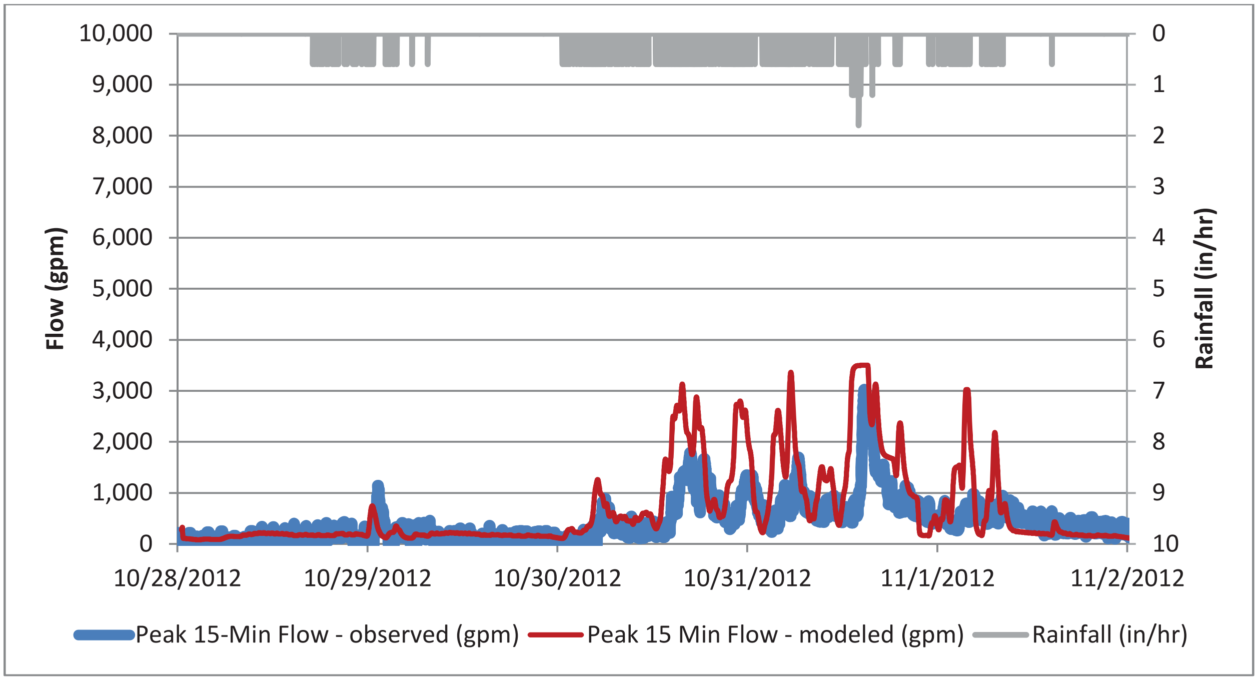

Figure 2-2. Calibration Event 1 Hydrograph – CW-1, OF-9, OF-10, and OF-11

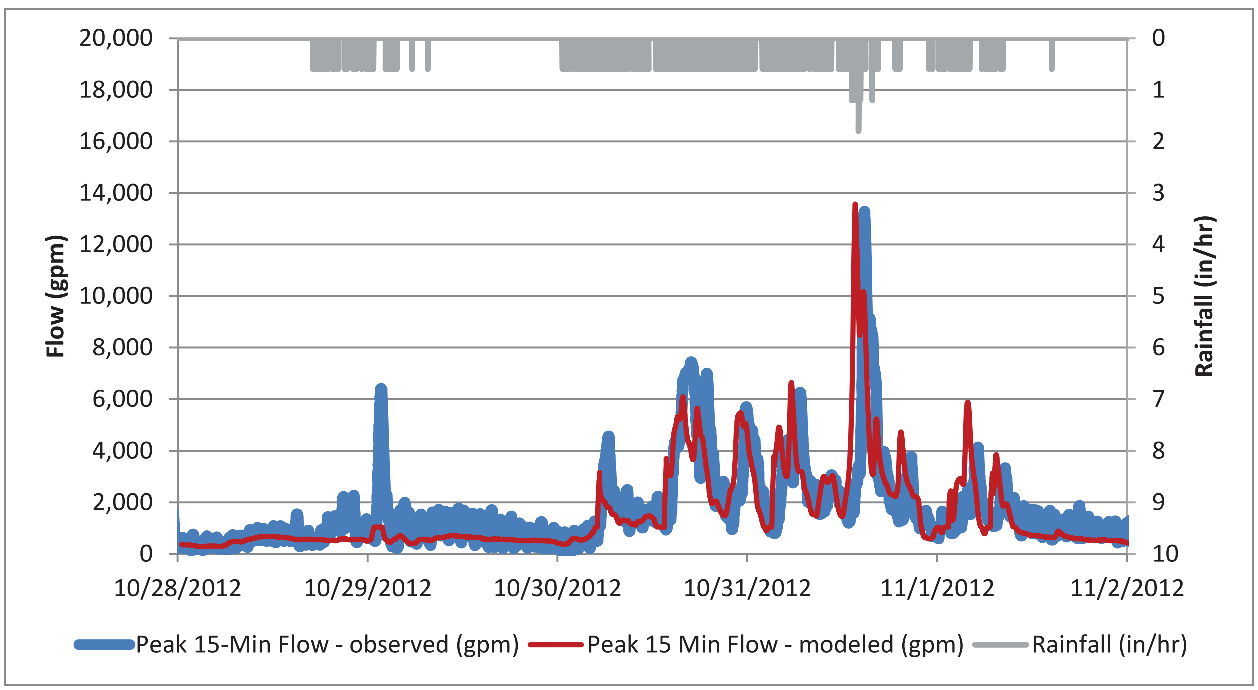

Figure 2-3. Calibration Event 1 Hydrograph – WB-3 and WB-6

2.5.2 Calibration Storm Event 2 – Nov 18 to Nov 23, 2012

The storm event observed by the City of Bremerton rain gauge 2 measured a peak intensity of 0.53 inches per hour with a peak 24-hour volume of 3.71 inches. The peak flow response occurred on November 19, 2012. Table 2-11 lists the observed and modeled 15 minute average flows. Figures 2-4, 2-5, and 2-6 depicts the model and observed flow hydrographs.

Table 2-11. Calibration Event 2 – Nov 18 to Nov 23, 2012

MONITORING LOCATION	OBSERVED 15 MIN PEAK FLOW (GPM)	MODELED 15 MINUTE PEAK FLOW (GPM)
CE-1, ETP, East Bremerton CSO Outfalls	20,445	21,011
CW-1, OF-9, OF-10, OF-11	6,406	5,056
WB-3 and WB-6	15,588	17,286

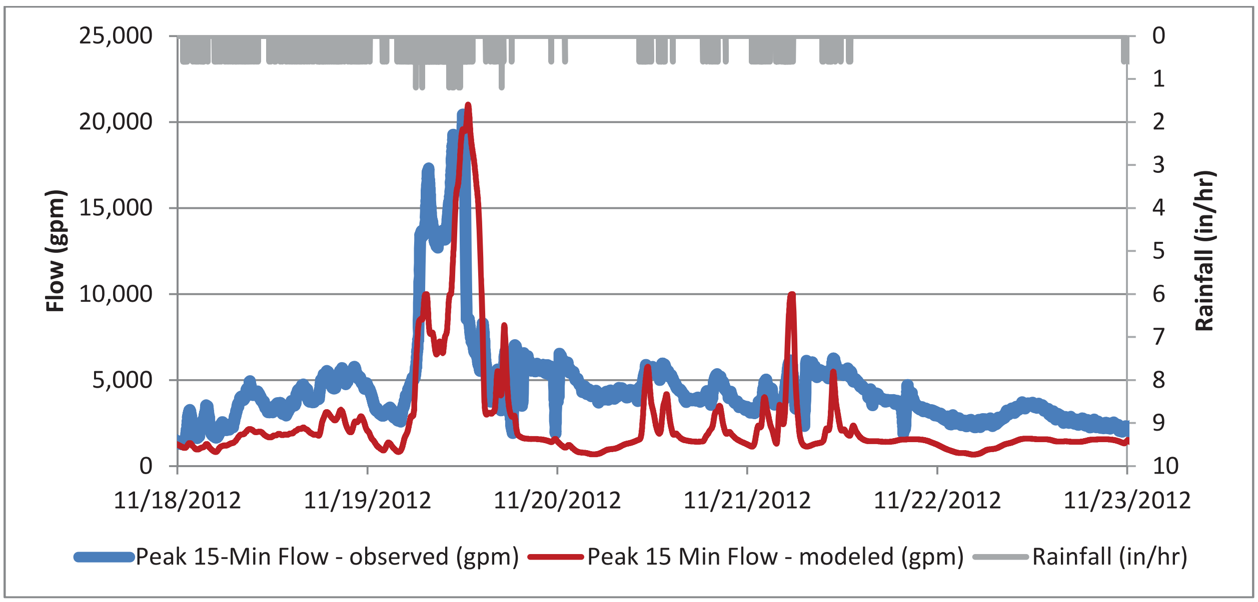

Figure 2-4. Calibration Event 2 Hydrograph – CE-1, ETP, and East Bremerton Outfalls

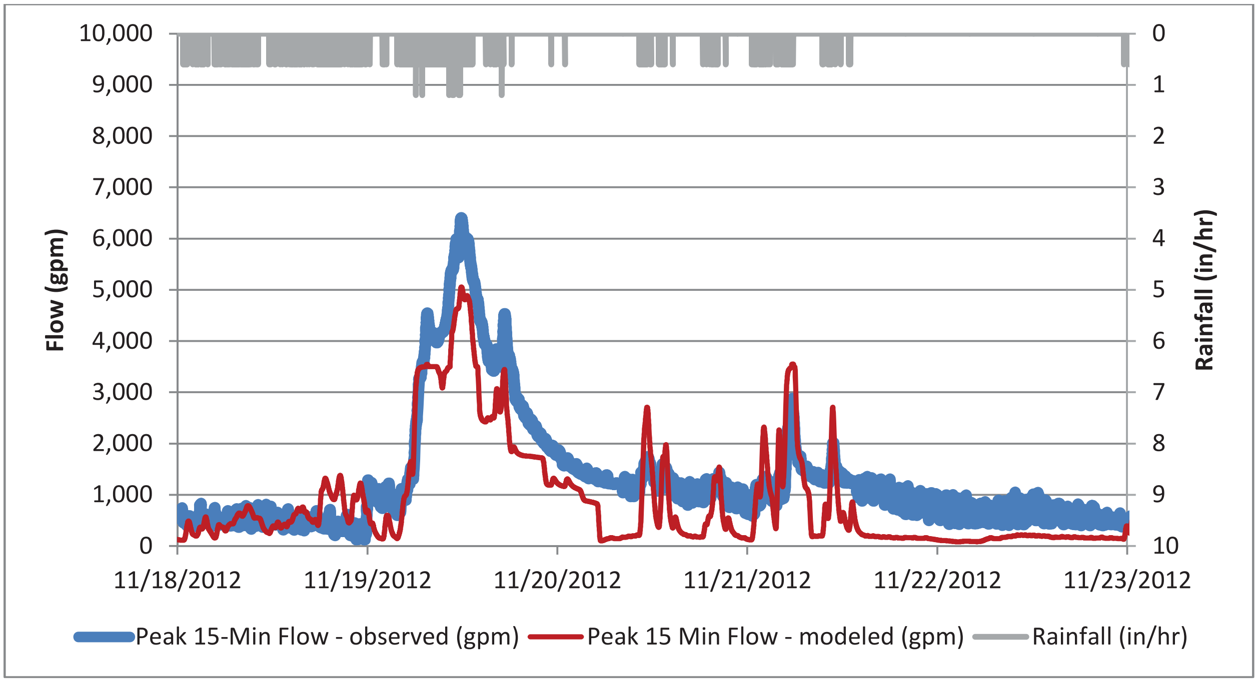

Figure 2-5. Calibration Event 2 Hydrograph – CW-1, OF-9, OF-10, and OF-11

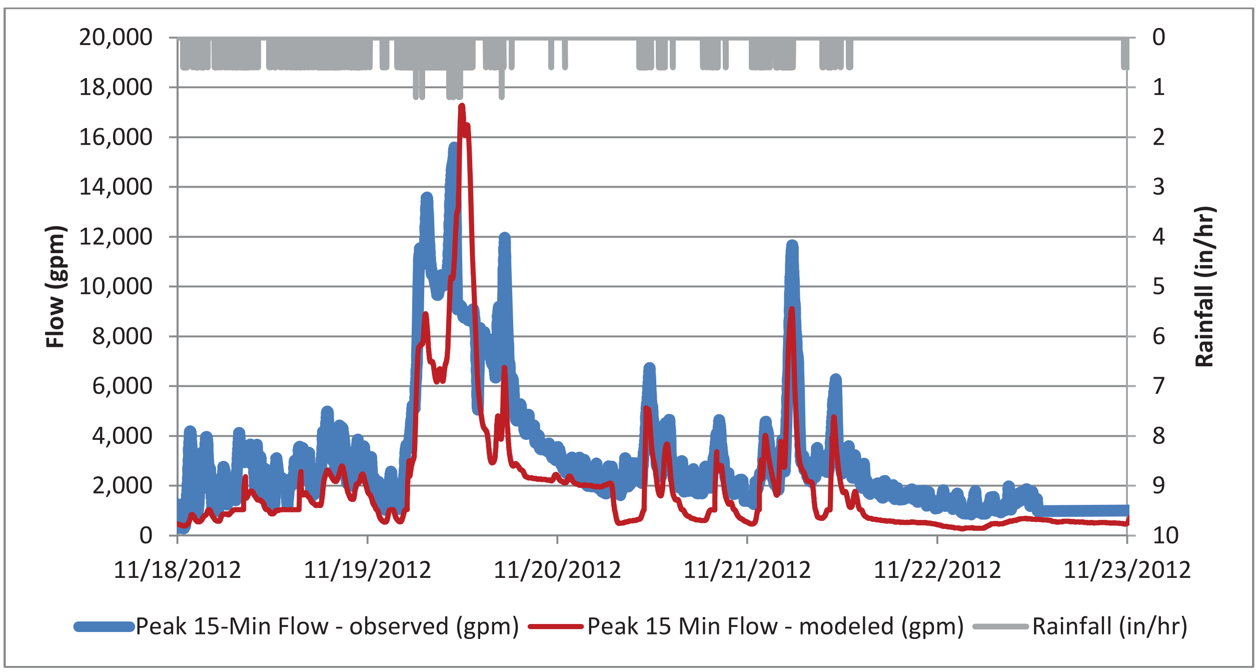

Figure 2-6. Calibration Event 2 Hydrograph – WB-3 and WB-6

2.5.3 Calibration Storm Event 3 – Nov 29 to Dec 3, 2012

The storm event observed by the City of Bremerton rain gauge 2 measured a peak intensity of 0.31 inches per hour with a peak 24-hour volume of 2.48 inches. The peak flow response occurred on December 1, 2012. Table 2-12 lists the observed and modeled 15 minute peak flows. Figures 2-7, 2-8, and 2-9 depicts the model and observed flow hydrographs.

Table 2-12. Calibration Event 3 – Nov 29 to Dec 3, 2012

MONITORING LOCATION	OBSERVED 15 MIN PEAK FLOW (GPM)	MODELED 15 MINUTE PEAK FLOW (GPM)
CE-1, ETP, East Bremerton CSO Outfalls	7,021	9,540
CW-1, OF-9, OF-10, OF-11	2,975	3,488
WB-3 and WB-6	7,613	8,319

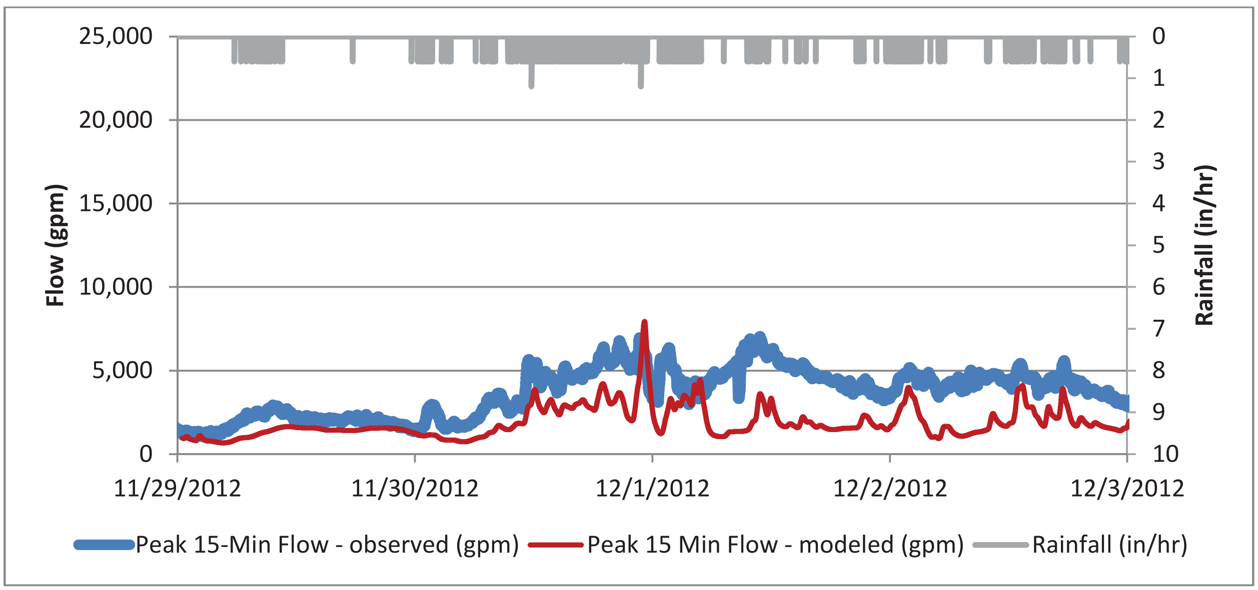

Figure 2-7. Calibration Event 3 Hydrograph – CE-1, ETP, and East Bremerton Outfalls

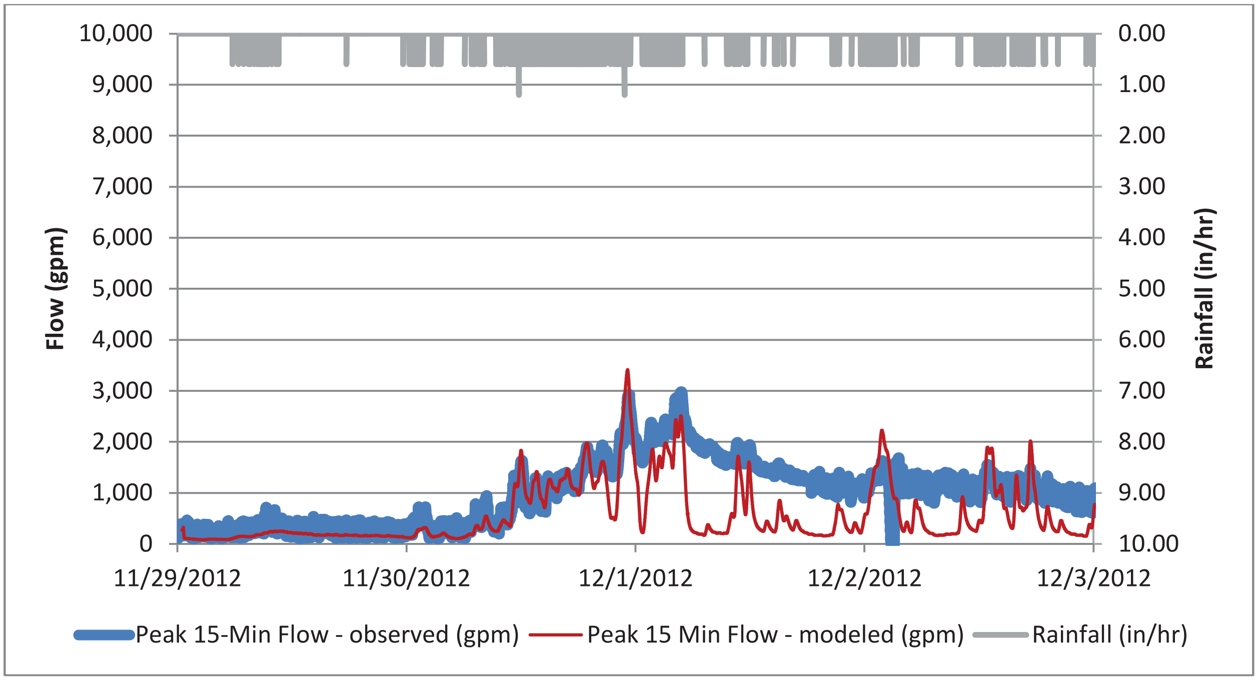

Figure 2-8. Calibration Event 3 Hydrograph – CW-1, OF-9, OF-10, and OF-11

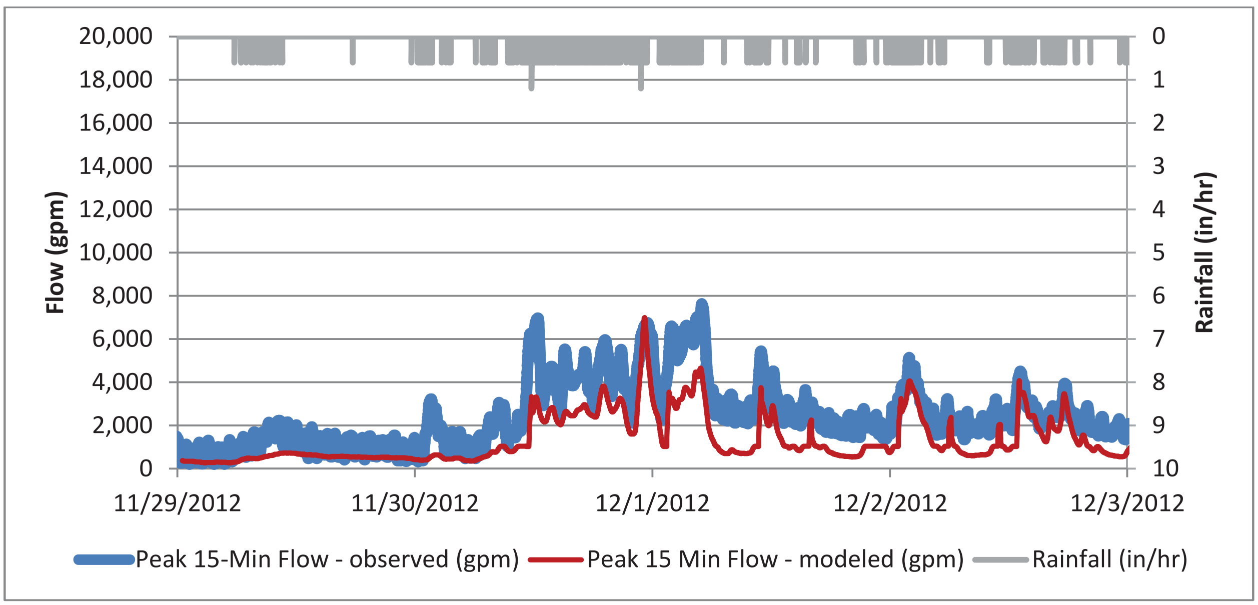

Figure 2-9. Calibration Event 3 Hydrograph – WB-3 and WB-6

Appendix C

Basin Plans

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1.0 Introduction

The City of Bremerton 2014 Wastewater Comprehensive Plan Update (WWCP) Basin Plans (Basin Plans) encompasses the basin descriptions, wastewater system and facility information, and the recommended capital improvement program (CIP) projects for each basin in the City of Bremerton's sewer system.

The City of Bremerton wastewater service area is divided into 22 drainage basins, as shown in Figure C-1. These basins represent drainage areas where a gravity mains and pump stations collect sewer flows and convey them to receiving facilities. Figure C-2 shows a schematic of the basins and depicts connectivity among the basins. It should be noted that Kitsap County owns and operates the sewer collection infrastructure that serves the Navy City Yard Basin; as such this service area is not addressed in the WWCP or the Basin Plans. The basin descriptions, information, and CIP projects are presented in the sections that follow.

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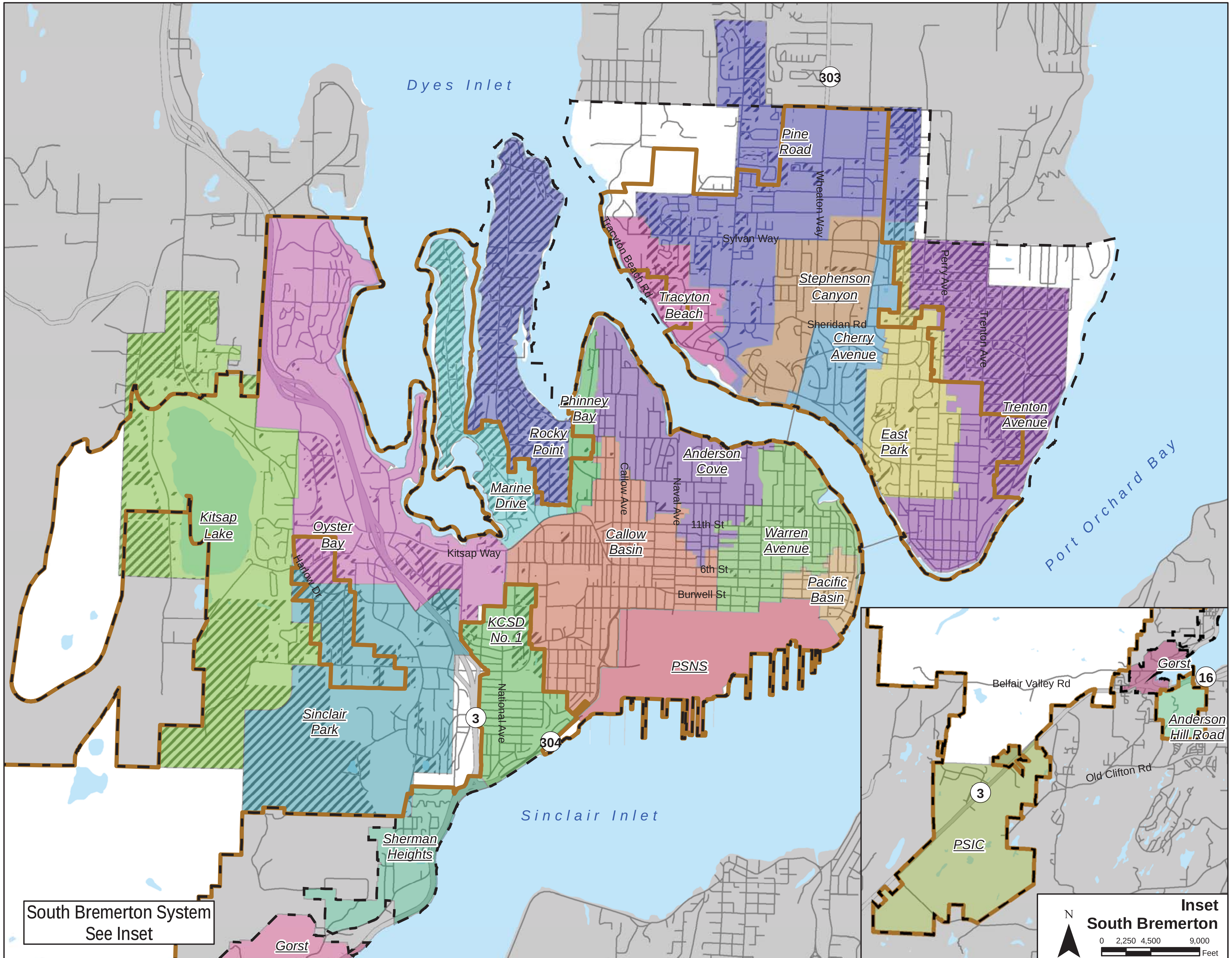

Legend

Sewer Basin

- Anderson Cove
- Anderson Hill Road
- Callow Basin
- Cherry Avenue
- East Park
- Gorst
- KCSD No. 1
- Kitsap Lake
- Marine Drive
- Oyster Bay
- PSNS
- Pacific Basin
- Phinney Bay
- Pine Road
- Rocky Point
- PSIC
- Sherman Heights
- Sinclair Park
- Stephenson Canyon
- Tracyton Beach
- Trenton Avenue
- Warren Avenue
- Unsewered Area
- City of Bremerton
- Bremerton UGA
- Highway
- Streets

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

Figure C-1
Sewer Service Area

CITY OF BREMERTON
WWCP UPDATE

N

0 750 1,500 3,000
Feet

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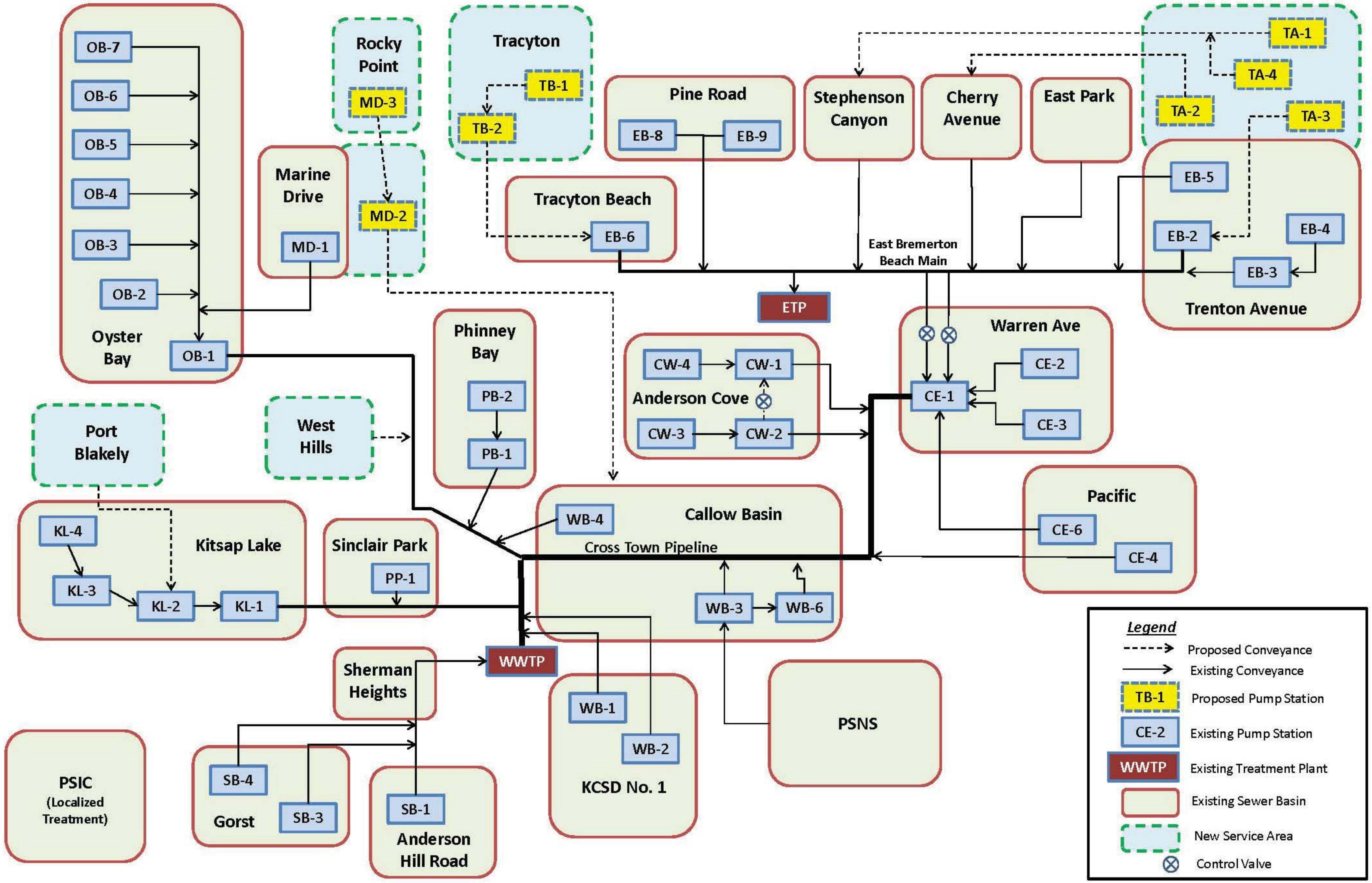

Figure C-2. City of Bremerton Sewer System Schematic

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2.0 Basin Plan Format

Each basin table is divided into six sections:

- Basin Description.
- Sewer Flows.
- Existing System.
- Pump Stations.
- CIP Projects.
- Basin Map.

2.1 Basin Description

The basin description section of each basin table summarizes descriptive information about that basin. Information presented in this section includes basin area, land uses, location, and discussion of system features and identifying characteristics.

The land use description outlines existing land uses and zoning information. The location component identifies the basin's region within the City, approximate boundaries, and any neighboring bodies of water. The description of system features and identifying characteristics vary by basin; however this component generally includes details about system conveyance, key facilities, development plans, and any noteworthy issues.

2.2 Sewer Flows

The sewer flows section summarizes the basin's existing and future flow estimate. This section also includes the percent of developed area within the basin as well as the percent of developed area with sewer service within the basin.

Sanitary sewer flow projections were developed for the existing and future sewer service areas. Flow projections were calculated out to 2033 and based on demographic projections for Bremerton's sewer service area and water use factors. Demographic projections were developed consistent with the County Comprehensive Plan and the City Comprehensive Plan. Water use factors were based on water usage recorded for Bremerton's residential and non-residential sectors. Water use factors were used to convert demographic projections into sewer flow estimates for each basin. Greater detail on sewer flows and load assumptions as well as calculations is provided in Section 4 of the WWCP.

2.3 Existing System

This section provides details on each basin's existing sewer system facilities. Details outlined in this section include type of sewer system (combined or separated), receiving facilities, existing pump stations, and combined sewer outfall facilities in the basin.

The majority of developed areas in Bremerton are served by the sewer system. However, plans have been developed to extend sewer service to unsewered areas in the East and West Bremerton UGA as well as in the PSIC service area[1].

---

[1] Previous planning studies were developed for new service area improvements with a detailed description of each area and service requirements. The following are the plans for all of the new service area projects: *New Service Area Plans – East Bremerton and West Hills, (*Feb, 2014), *South Kitsap*

2.4 Pump Stations

The pump station section outlines details about the basin's existing pump stations. Information presented in this section include pump station capacity, existing and future flow rate estimates, the percent of developed area served by the pump station, and the percent of developed area that is sewered within the pump station's service area. Pump station information was provided by City personnel. Flow projections were estimated using demographic projections.

2.5 Improvement Program

This section describes the Capital Improvements Program (CIP) for the Wastewater Utility, including recommended improvements, funding sources, project purpose, and cost estimates. CIP projects were identified based on analysis of the collection system's existing and future sewage flow estimates, available condition assessment information, and other maintenance and operational improvements to provide an acceptable level of service to Bremerton's current and future sewer ratepayers.

A hydraulic model of the wastewater collection system to assess the system's response and adequacy under varying operating conditions and to evaluate existing facility's ability to accommodate future growth and sewer service expansion. The model was developed using sewage flow data and rainfall-derived infiltration/inflow estimates. Greater detail on model inputs, calibration, and analysis is provided in Chapter 5 of the WWCP. Results of the modeling analysis contributed to the identification of system improvements.

The CIP was developed to achieve the following primary objectives:

- Identify, categorize, and prioritize sewer system needs and propose projects that would deliver the maximum benefit to address system needs.
- Develop improvement projects in relation to anticipated growth within the existing service areas and newly incorporated service areas.
- Recommend and prepare a schedule of improvements that will provide an acceptable level of service within Bremerton's financial ability to fund improvement projects.

Improvements were identified for multiple categories; Sewer Conveyance, New Service Area, Facility and Equipment, Treatment, and Operation and Maintenance improvements. The project naming convention uses a suffix for each improvement category: “C” for conveyance, “NS” for new service area, “F” for facilities and equipment, “T” for treatment, and “M” for operations and maintenance.

Projects presented in the CIP section are broken into two subsections; projects scheduled within the 6-year planning period (between year 2014-2019) and projects scheduled for beyond the 6-year planning period (year 2019+). In general, higher priority projects are scheduled within the 6-year planning period.

Information presented in the CIP section is organized into subcomponents for each project. For each project number, information about the project's timeline, funding sources, purpose, related projects, cost estimate, and further description are presented.

2.5.1 Timeline

This subsection provides a general indication of project timing and requirements to initiate the project. For example, a project may be dependent on acquiring grant funding.

Industrial Area Subarea Plan (Aug, 2012), *Sewer Urban Growth Area Planning (*Feb, 2008), *Sewer Planning – Marine Drive Area* (Sep, 2008), and *Port Blakely Sanitary Sewer Evaluation* (Mar, 2003).

2.5.2 Funding Source

This subsection identifies the funding source that would be put toward the capital improvement project which include user fee assessment (UFA) funds, Kitsap County Utility Local Improvement (ULID) funds, insurance revenue, grants, and PSE matching funds. UFA funds are obtained through a portion of customer rate payments that have been slated for system maintenance and repair projects. ULID funds are those from the County that are intended for sewer service expansion projects to urban growth areas in East and West Bremerton as well as the PSIC new service area. Insurance revenue funds are those earnings from insurance revenue sources that are used for particular improvement projects. PSE 50 percent matching funds are those provided by PSE for energy efficiency upgrade projects. Projects receiving these funding sources are discussed further in Chapter 7 of the WWCP.

2.5.3 Purpose

This subsection indicates the general reason or need for the improvement project. Purpose categories identified in this section include, construction of new infrastructure to support UGA expansion (UGA), construction of new infrastructure to correct system deficiencies and support current development (deficiency), repair of existing infrastructure to support system operation and current development (repair), and other recommended projects that are not integral to the comprehensive plan (none).

2.5.4 Related Projects

The related projects subsection identifies other projects that would be constructed in conjunction with or are associated with a given project. Often related projects would need to be constructed before a given project could be completed or become operational.

2.5.5 Cost Estimates

The cost estimate subsection identifies the estimated cost for the project. Costs are based on engineering estimates and actual costs from comparable engineering and construction work. Costs include project construction bid estimates, a construction contingency factor of 40 percent, and an allowance for engineering, taxes, legal, and administrative fees of 20 percent. Estimated costs are in 2013 dollars and based on ENR's material and building cost indexes. Cost estimates shown in this subcategory represent the total cost over the project lifetime. Table 7-1 in the WWCP provides an annual breakdown of costs for projects within the 6-year planning period.

2.5.6 Project Description

The project description subsection provides greater detail about project features. This subsection generally outlines the replacement, installation, or construction work required, project location, greater explanation of project purpose, and other noteworthy information.

2.6 Basin Map

Each basin table is accompanied with a basin map which details the basin location and boundaries as well as any existing pump stations, overflow stations, pipe network, and receiving facilities. The basin map also identifies the recommended capital improvement project locations and features.

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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. Flows from the Anderson Cove Basin are conveyed from CW-1 to the WWTP via the Naval Avenue Force Main to the CTP. A capacity upgrade was constructed for CW-2 and CW-1 in 1999 and 2007, respectively. Both of these upgrades are for CSO reduction. A force main was installed in 1999 from CW-4 to 13th Street. The pipe is 8-inch ductile iron, and is capped at both ends. There is currently no plan to upgrade CW-4; therefore, this pipe may be used for other purposes.				
SEWER FLOWS					
Existing GPD (2013)	360,000				
Future GPD (2033)	470,000				
Percent Developed[1] (%)	97%				
Percent Sewered[2] (%)	98%				
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, and OF-12				
PUMP STATIONS					
Pump Station	**Capacity (gpm)**	**2013 Peak Flow (gpm)**	**2033 Peak Flow (gpm)**	**Percent Developed[1]**	**Percent of Developed Sewered[2]**
CW-1 (3)	3,500	5,360	5,450	97%	98%
CW-2	1,050	2,280	2,340	95%	100%
CW-3	50	390	400	95%	100%
CW-4	450	780	870	98%	99%
CIP					
CIP ID	**Timeline**	**Funding Source**	**Purpose**	**Related Projects**	**Cost ($1,000)**
CIP Year 2015-2020					
F-7	Odor Control System Upgrade, OCS 1 & 3				
	2016 - 2017	UFA/G	Repair	n/a	$ 400
	Replace the undersized odor control systems.				
CIP Year 2020+					
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, and 12					

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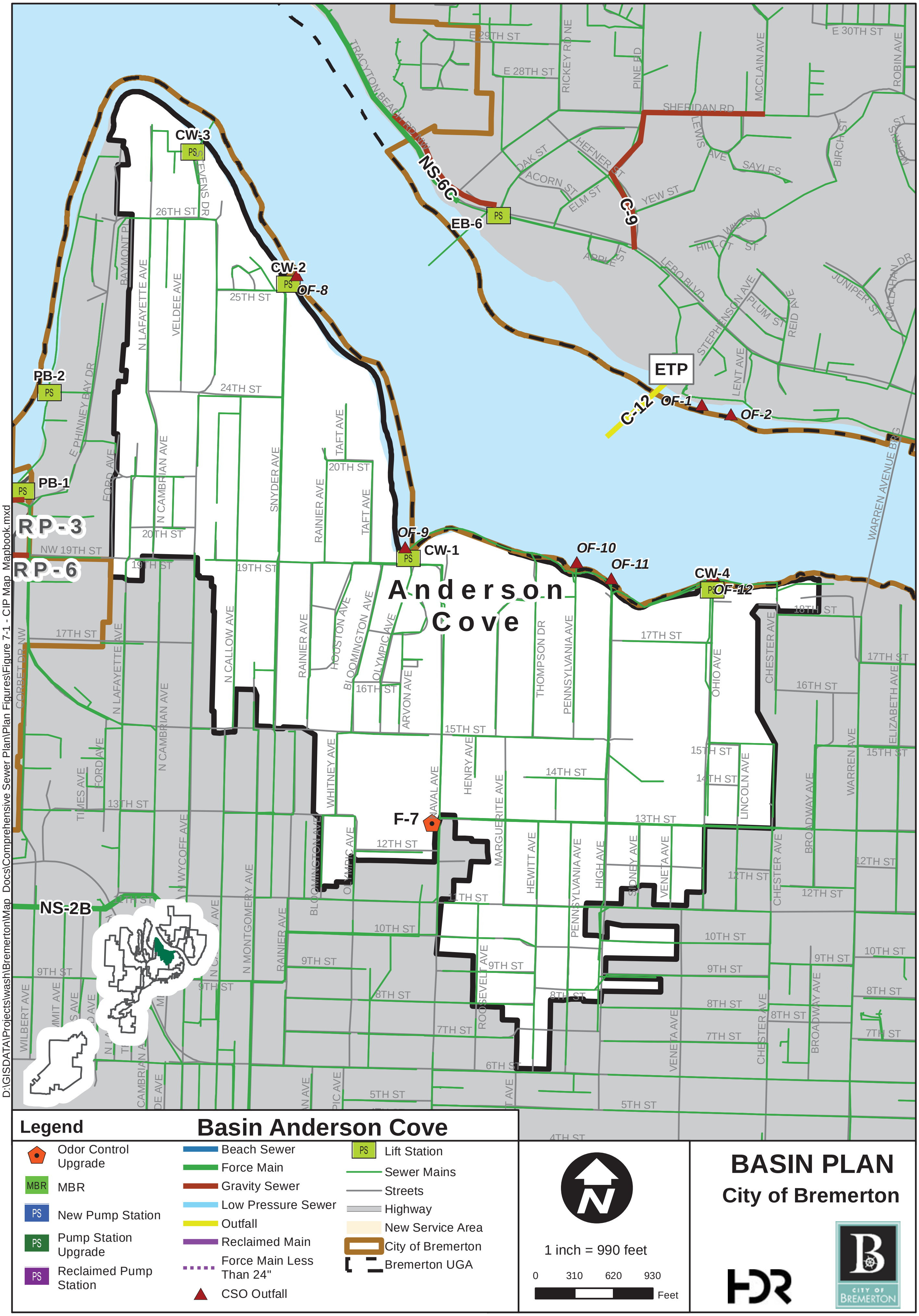

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Anderson Hill Road Basin

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 one development which is served by this system so the flows in the basin are extremely low. Flows are conveyed via the Southwest Bremerton Sewer Force Main to the WWTP.
SEWER FLOWS	
Existing GPD (2013)	6,000
Future GPD (2033)	8,000
Percent Developed[1] (%)	67%
Percent Sewered[2] (%)	18%
EXISTING SYSTEM	
Combined/Separated	Separate
Receiving Facilities	Southwest Bremerton Sewer Force Main
Existing Pump Stations	SB-1
Combined Sewer Outfall	

PUMP STATIONS

Pump Station	Capacity (gpm)	2013 Peak Flow (gpm)	2033 Peak Flow (gpm)	Percent Developed[1]	Percent of Developed Sewered[2]
SB-1	1,652	900	910	67%	18%

CIP

CIP ID	Timeline	Funding Source	Purpose	Related Projects	Cost ($1,000)
CIP Year 2015-2020					
C-13	WSDOT Culvert Replacement - Sewer Main Relocation				
	2015	UFA	Deficiency	n/a	$ 20
	A sewer line over the existing culvert for Anderson Creek will be relayed through a sleeve in a new box culvert WSDOT is planning to install as part of a fish passage improvement project.				
CIP Year 2020+					

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
- 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 = 1,060 feet

0 330 660 990 Feet

BASIN PLAN

City of Bremerton

HDR

City of Bremerton

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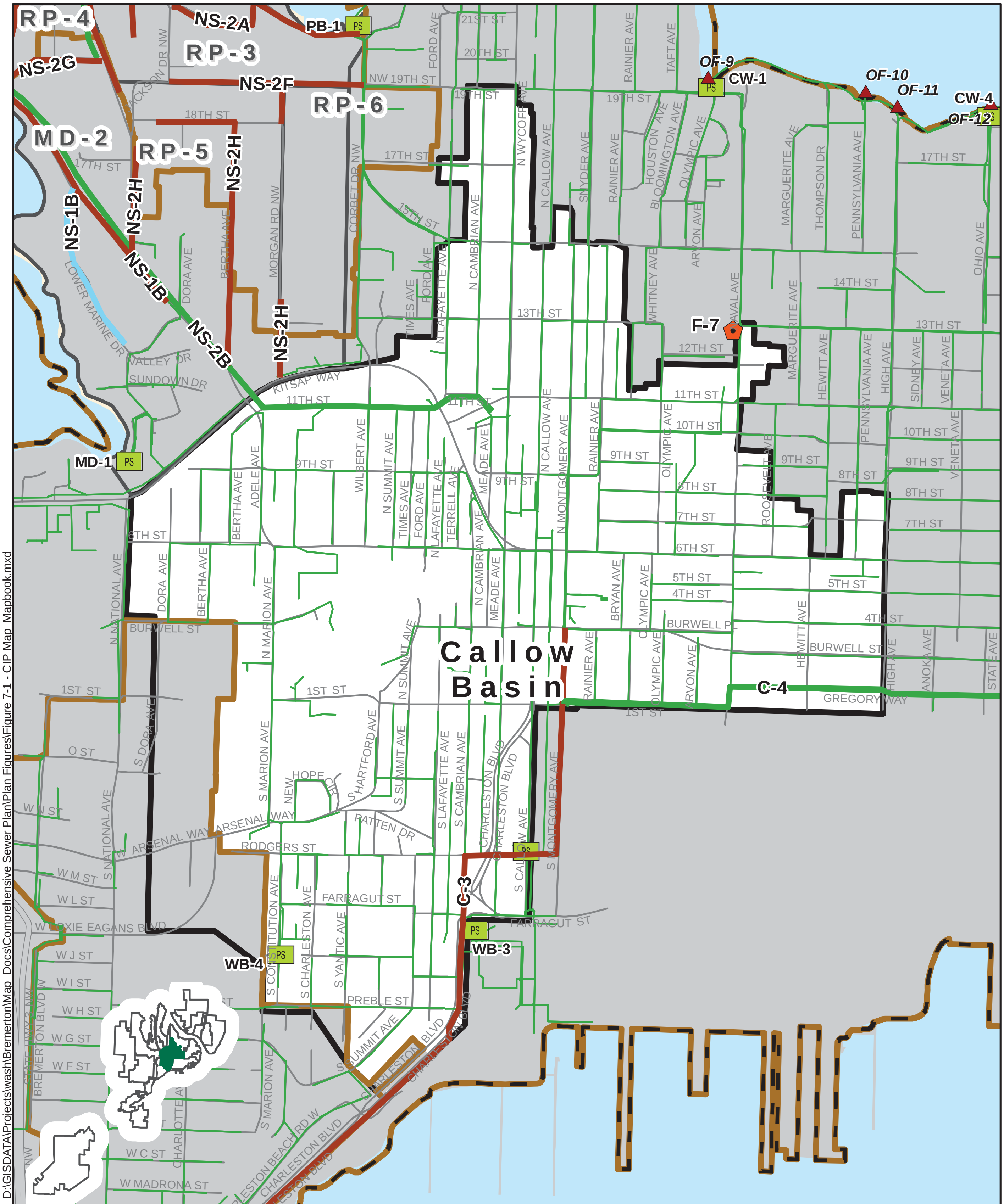
Callow Avenue Basin					
BASIN DESCRIPTION					
Area (acres)	644				
Land Use	Residential and Commercial				
Location	West Bremerton area, bordered by Kitsap Way, S. Constitution Avenue, High Avenue, and the Puget Sound Naval Shipyard.				
Description	The Callow Avenue Basin, the City's largest basin, 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 (2013)	456,000				
Future GPD (2033)	630,000				
Percent Developed[1] (%)	95%				
Percent Sewered[2] (%)	93%				
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]	**Capacity (gpm)**	**2013 Peak Flow (gpm)**	**2033 Peak Flow (gpm)**	**Percent Developed[1]**	**Percent of Developed Sewered[2]**
WB-3	10,000	8,100	9,710	94%	98%
WB-6	7,500	same as WB-3	same as WB-3	same as WB-3	same as WB-3
WB-4	100	20	20	86%	100%
CIP					
CIP ID	**Timeline**	**Funding Source**	**Purpose**	**Related Projects**	**Cost ($1,000)**
CIP Year 2015-2020					
CIP Year 2020+					
C-3	Replace Crosstown Pipeline				
	>2020	UFA	Deficiency	n/a	$ 8,600
	Install approximately 10,000 LF of 36-inch HDPE pressure-gravity line from Montgomery Avenue and Burwell Street to the WWTP to provide redundancy for the CTP. The CTP is critical infrastructure for the combined sewer system. Currently, there is no bypass or redundancy if the pipeline is shut down for maintenance or repairs. This project would install a redundant pipeline to increase reliability of the existing pipeline.				
C-4	Central Bremerton Force Main				
	>2020	UFA	Deficiency	n/a	$ 500
	Replace or rehabilitate the existing 8,000 LF Central Bremerton force main from North Montgomery Avenue to the surge chamber, install cleaning ports and isolation valves, and replace the surge chamber with a HDPE manhole. The force main will be inspected and evaluated to determine if any section or all of the force main needs replacement or rehabilitation. The purpose of this project is to address hydrogen sulfide corrosion and issues with the surge chamber and vents on the pipeline.				

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

HDR

CITY OF BREMERTON

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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 CTP. The sewers in Cherry Avenue from Ash Street to Cherry Place become overloaded during large storms, resulting in flooding of commercial businesses. Backwater valves have been installed at the right-of-way for businesses on Cherry Avenue in this vicinity.
SEWER FLOWS	
Existing GPD (2013)	172,000
Future GPD (2033)	273,000
Percent Developed[1] (%)	95%
Percent Sewered[2] (%)	82%
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	Capacity (gpm)	2013 Peak Flow (gpm)	2033 Peak Flow (gpm)	Percent Developed[1]	Percent of Developed Sewered[2]

CIP

CIP ID	Timeline	Funding Source	Purpose	Related Projects	Cost ($1,000)
CIP Year 2015-2020					
C-15	Cherry Ave Sanitary Sewer				
	2016	UFA	Deficiency	n/a	$ 25
	The City just installed CIPP in 2014 along all of Cherry Avenue from Callahan to Wheaton Way. This project would CIPP a last remaining segment.				
CIP Year 2020+					

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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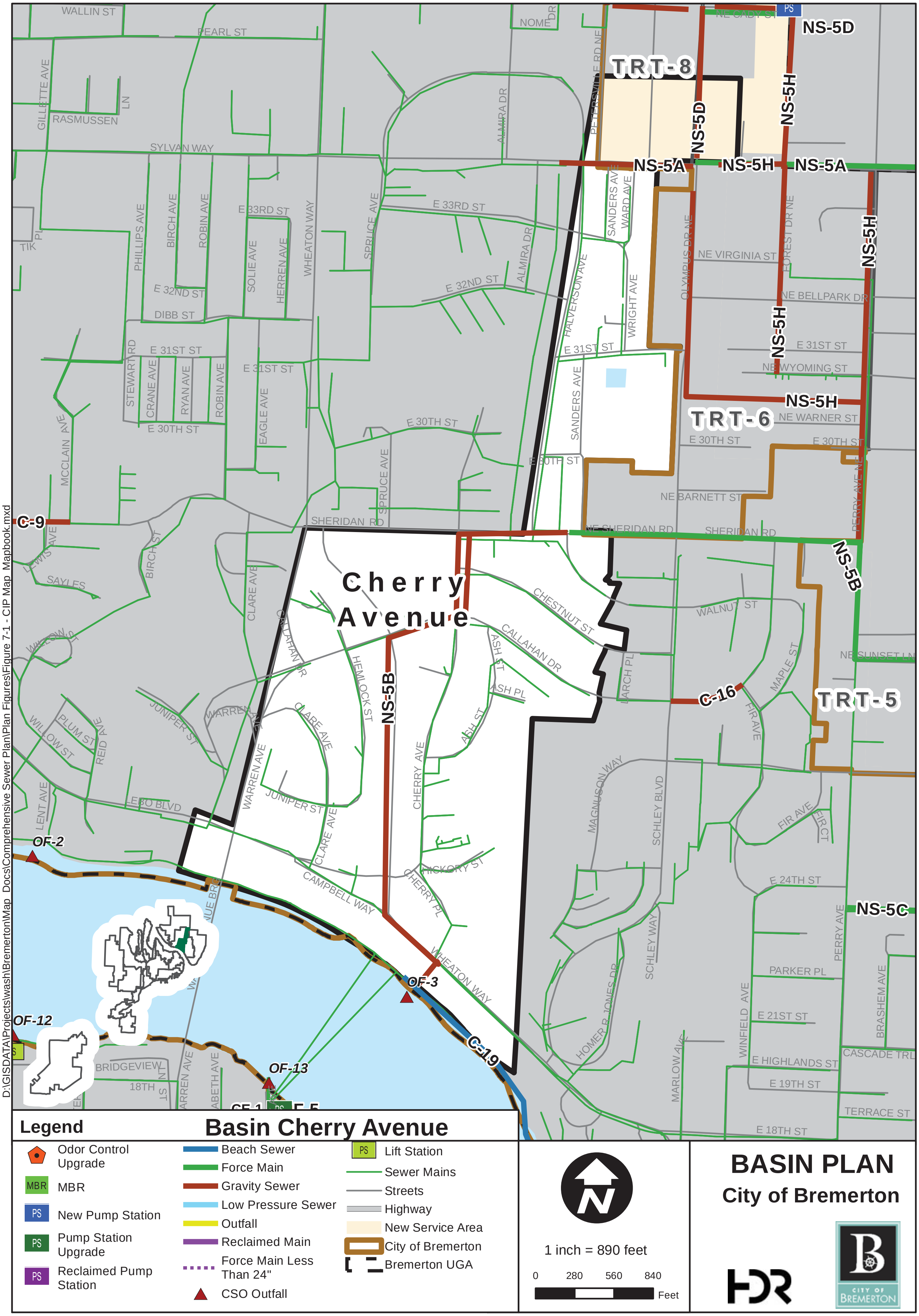

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East Park Basin

BASIN DESCRIPTION	
Area (acres)	346
Land Use	Residential
Location	East Bremerton area, bordered by E 116th 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 (2013)	249,000
Future GPD (2033)	370,000
Percent Developed[1] (%)	81%
Percent Sewered[2] (%)	88%
EXISTING SYSTEM	
Combined/Separated	Combined
Receiving Facilities	East Bremerton Beach Main to the Crosstown Pipeline
Existing Pump Stations	
Combined Sewer Outfall	

PUMP STATIONS

Pump Station	Capacity (gpm)	2013 Peak Flow (gpm)	2033 Peak Flow (gpm)	Percent Developed[1]	Percent of Developed Sewered[2]

CIP

CIP ID	Timeline	Funding Source	Purpose	Related Projects	Cost ($1,000)
CIP Year 2015-2020					
C-16	CIPP repair of failing sewers				
	2015	UFA	Deficiency	n/a	$ 525
	CIPP construction of laterals and installation of cleanouts where needed. CIPP sewer mains. The scope will be determined based on maintenance inspections of gravity sewers. This project will also include the following improvements: 1) Improvement between Schley and Fir Street:Replace gravity sewer line in the gully between Schley and Fir Streets to eliminate a belly in the line. This project is in response to extensive root intrusion. This project would be funded by the User Fee Assessment fund. 2) Improvement on Homer Jones: CIPP Installation of approximately 500-feet of pipe to eliminate root intrusion.				
CIP Year 2020+					
C-19	East Bremerton Beach Main Replacment				
	>2020	UFA	Deficiency	n/a	$ 1,250
	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.				

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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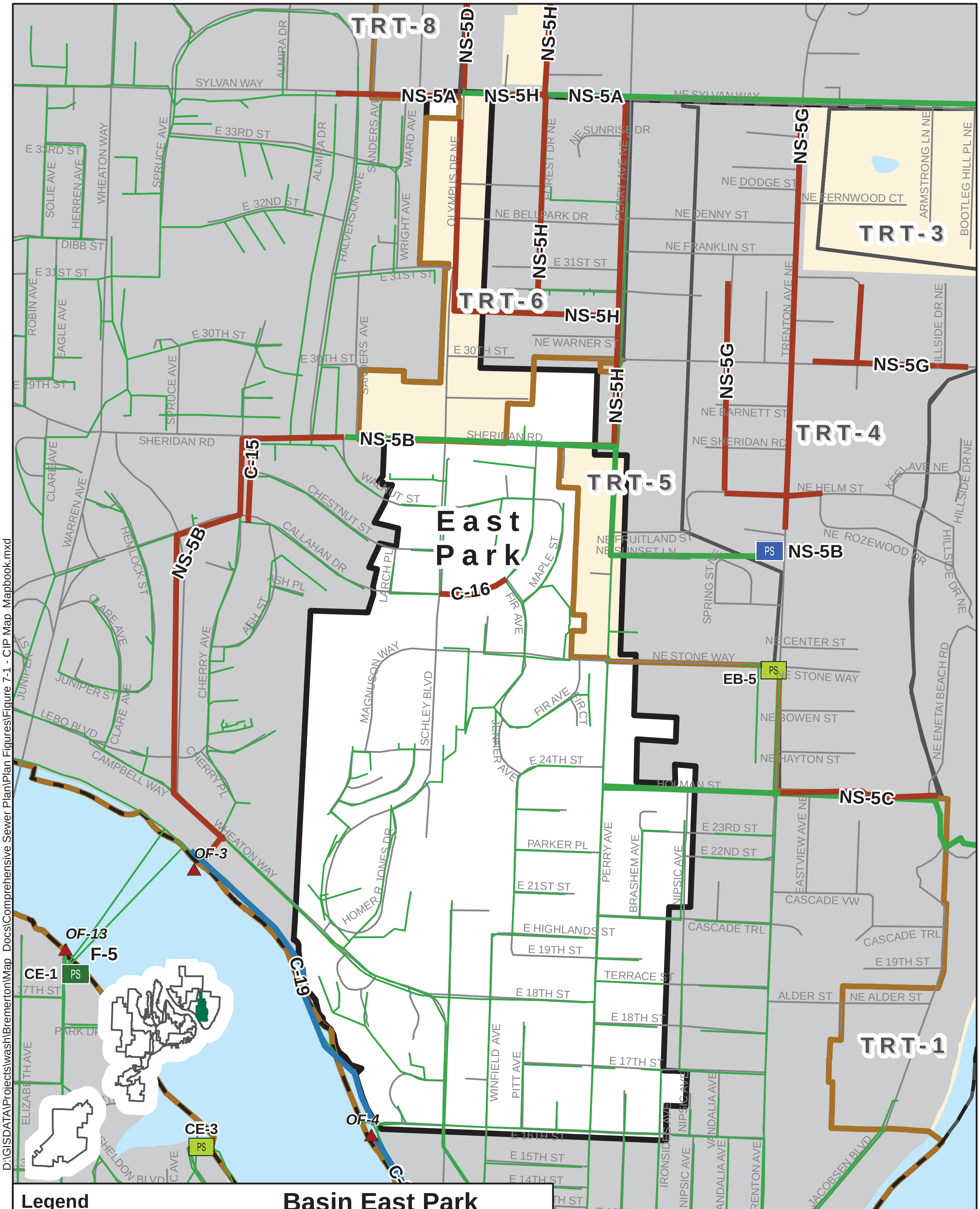

Legend

Basin East Park

- Odor Control Upgrade
- MBR 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

N

1 inch = 1,020 feet

0 320 640 960 Feet

BASIN PLAN

City of Bremerton

HDR

CITY OF BREMERTON

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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 (2013)	12,000
Future GPD (2033)	18,000
Percent Developed[1] (%)	48%
Percent Sewered[2] (%)	57%

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	Capacity (gpm)	2013 Peak Flow (gpm)	2033 Peak Flow (gpm)	Percent Developed[1]	Percent of Developed Sewered[2]
SB-3	500	500	510	43%	54%
SB-4	500	580	590	94%	62%

CIP

CIP ID	Timeline	Funding Source	Purpose	Related Projects	Cost ($1,000)
CIP Year 2015-2020					
CIP Year 2020+					

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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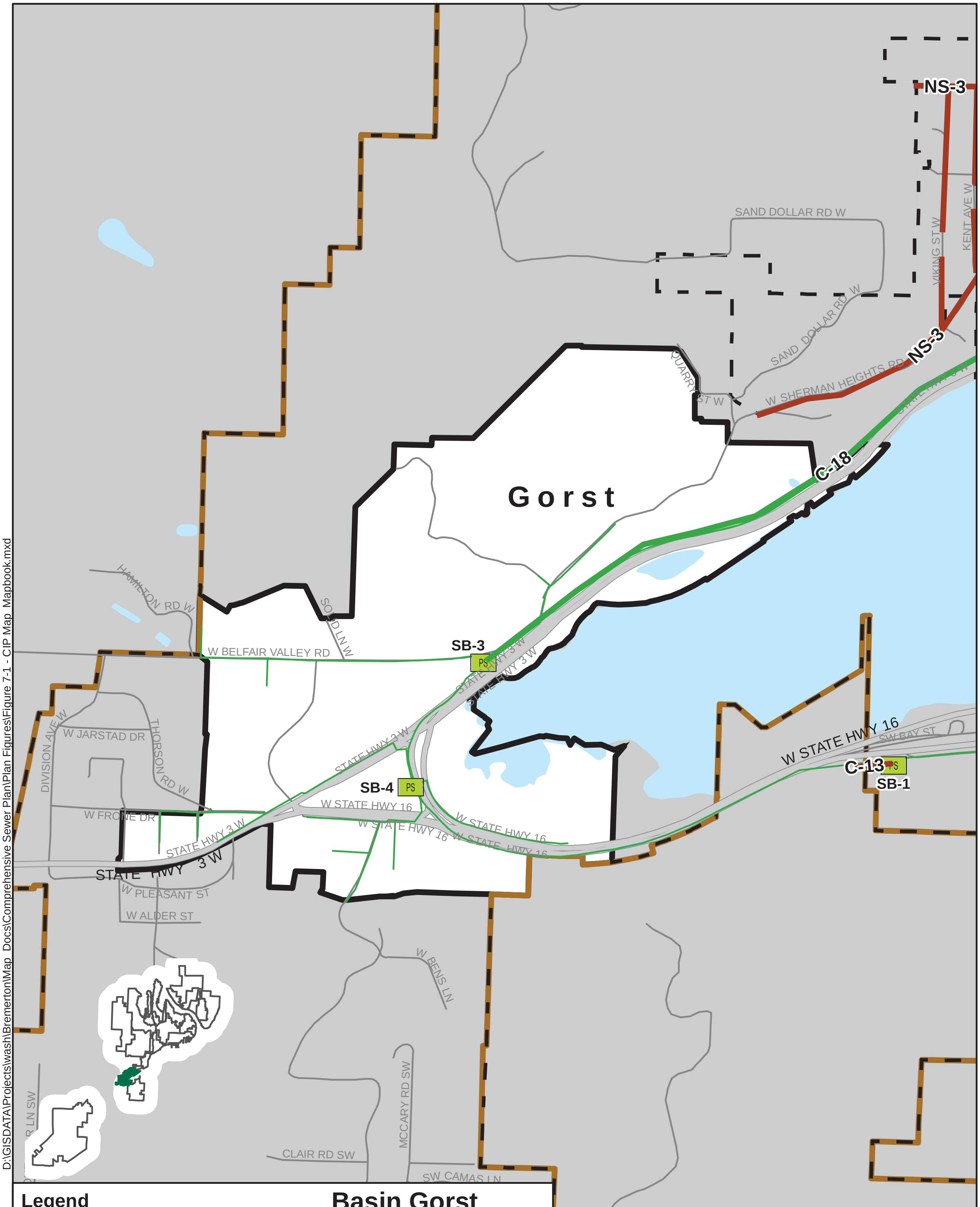

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Legend

Basin Gorst

- 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 = 1,170 feet

0 370 740 1,110 Feet

BASIN PLAN

City of Bremerton

HDR

City of Bremerton

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Kitsap Lake Basin

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. A potential development at Port Blakely, located on the west side of Kitsap Lake in the Kitsap Lake Basin, would require additional sewer conveyance facilities including pump stations and gravity and pressure mains. It is assumed that sewer facilities within the development would be installed by a developer. The current plan is to construct the development in several stages and progressively amend the conveyance and sewer system. Flows are currently within the capacity of the existing sewer, although pump station KL-1 discharges to overloaded sewers in the Sinclair Park Basin.
SEWER FLOWS	
Existing GPD (2013)	107,000
Future GPD (2033)	139,000
Percent Developed¹ (%)	57%
Percent Sewered² (%)	71%
EXISTING SYSTEM	
Combined/Separated	Separate
Receiving Facilities	16-inch Conveyance Line to WWTP
Existing Pump Stations	KL-1, KL-2, KL-3, and KL-4
Combined Sewer Outfall	

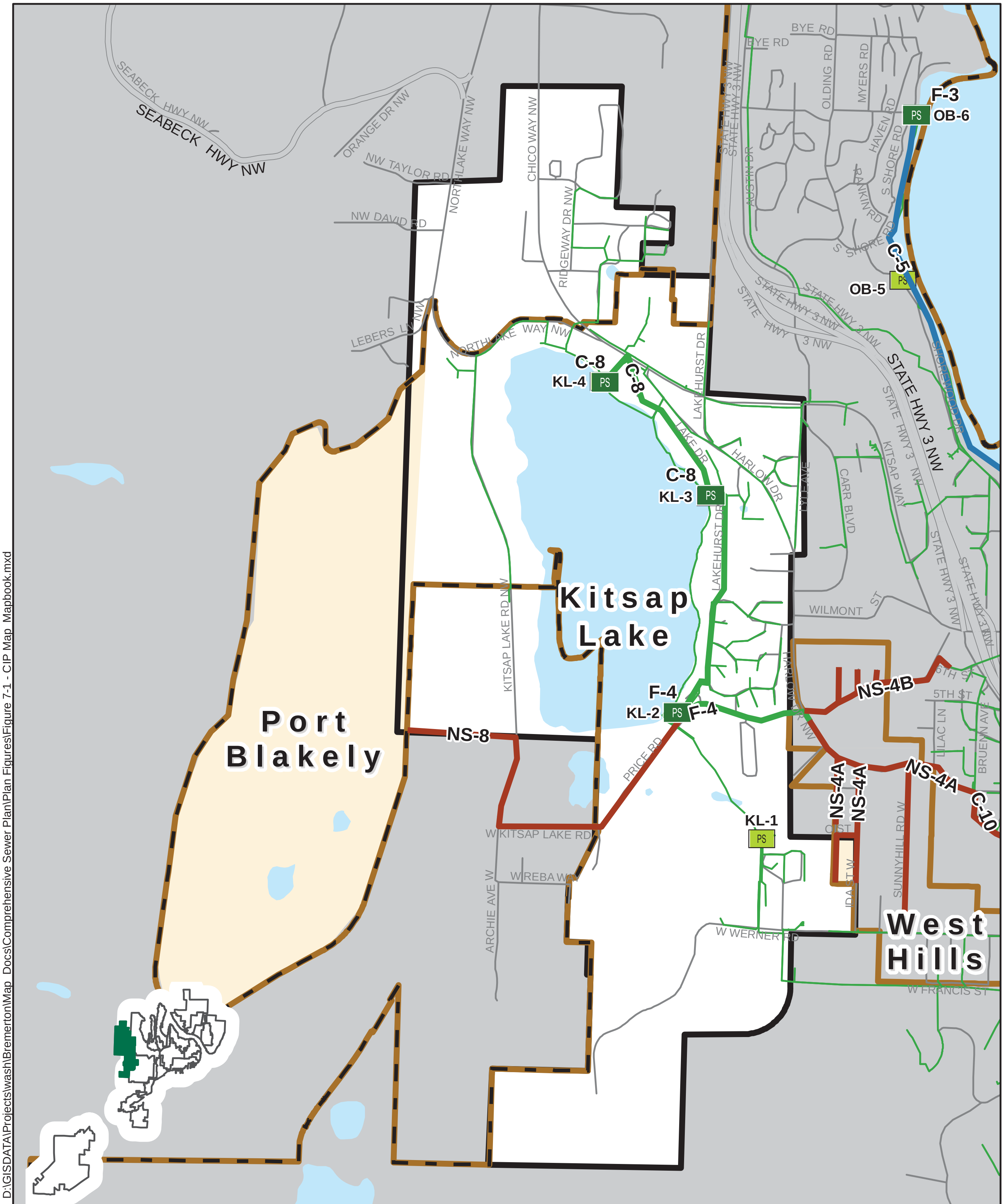
PUMP STATIONS

Pump Station (3)	Capacity (gpm)	2013 Peak Flow (gpm)	2033 Peak Flow (gpm)	Percent Developed¹	Percent of Developed Sewered²
KL-1	950	1,090	1,200	55%	72%
KL-2	1,150	1,030	1,150	71%	73%
KL-3	500	660	700	72%	69%
KL-4	450	280	300	65%	55%

CIP

CIP ID	Timeline	Funding Source	Purpose	Related Projects	Cost ($1,000)
CIP Year 2015-2020					

CIP Year 2020+					
C-8	Kitsap Lake Main Replacement				
	>2020	UFA	Deficiency	n/a	$ 4,310
	Construct approximately 6,200 LF of new force main to replace the existing lake main. The force main alignment would be moved outside of the lake and the gravity connections into the beach main would be either routed with new gravity sewers to KL-2, KL-3, or KL-4 or utilize grinder pumps. KL-3 and KL-4 would be upgraded based on the design of the force main. The existing lake main is inaccessible for maintenance between KL-2 and KL-4 due to its location in Kitsap Lake. During extreme high lake levels, the water surface exceeds the rim elevations and contributes to excessive inflow. Also, the gravity sewer north of KL-4 is deteriorating and needs replacement.				
NS-8	Port Blakely Connection				
	>2020	UFA / G	UGA	C-8	$ 2,730
	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.				
F-4	KL-2 Pump Station Upgrade				
	>2020	UFA	Deficiency	n/a	$ 4,500
	Convert the KL-2 dry pit/wet well pump station into a wet well pump station. Replace pumps to increase the pump station capacity to approximately 2,000 gpm in order to accommodate increased flow from a development in the new Port Blakely service area. Install approximately 3,700 LF of force main along Price Road and Harlow Drive to Sunnyhill Road. This project would be partially contingent on development in the Port Blakely service area.				
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.					



Legend

Basin Kitsap Lake

Odor Control Upgrade	Beach Sewer	Lift Station
MBR	Force Main	Sewer Mains
New Pump Station	Gravity Sewer	Streets
Pump Station Upgrade	Low Pressure Sewer	Highway
Reclaimed Pump Station	Outfall	New Service Area
	Reclaimed Main	City of Bremerton
	Force Main Less Than 24"	Bremerton UGA
	CSO Outfall	

1 inch = 1,870 feet

0 590 1,180 1,770 Feet

BASIN PLAN

City of Bremerton

HDR

CITY OF BREMERTON

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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 (2013)	11,000				
Future GPD (2033)	15,000				
Percent Developed[1] (%)	92%				
Percent Sewered[2] (%)	22%				
EXISTING SYSTEM					
Combined/Separated	Separate				
Receiving Facilities	OB-1 Pump Station				
Existing Pump Stations	MD-1				
Combined Sewer Outfall					
PUMP STATIONS					
Pump Station	**Capacity (gpm)**	**2013 Peak Flow (gpm)**	**2033 Peak Flow (gpm)**	**Percent Developed[1]**	**Percent of Developed Sewered[2]**
MD-1	475	100	110	94%	71%
CIP					
CIP ID	**Timeline**	**Funding Source**	**Purpose**	**Related Projects**	**Cost ($1,000)**
CIP Year 2015-2020					
CIP Year 2020+					
NS-1A	Sewer Collection - Sub Basin MD-1				
	>2020	UFA / G	UGA	NS-2C	$ 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				
	>2020	UFA / G	UGA	NS-2C	$ 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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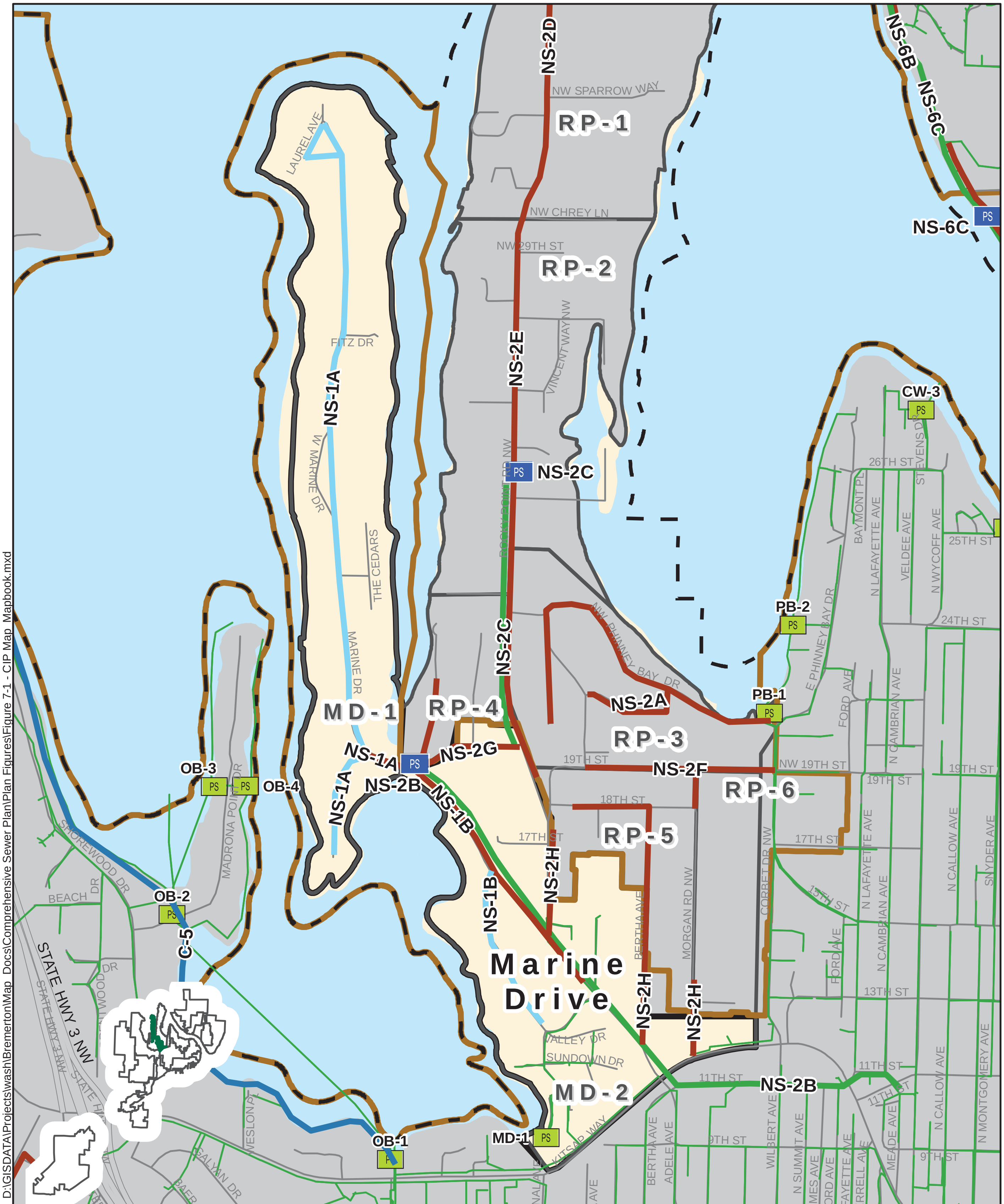

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Legend

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

HDR

CITY OF BREMERTON

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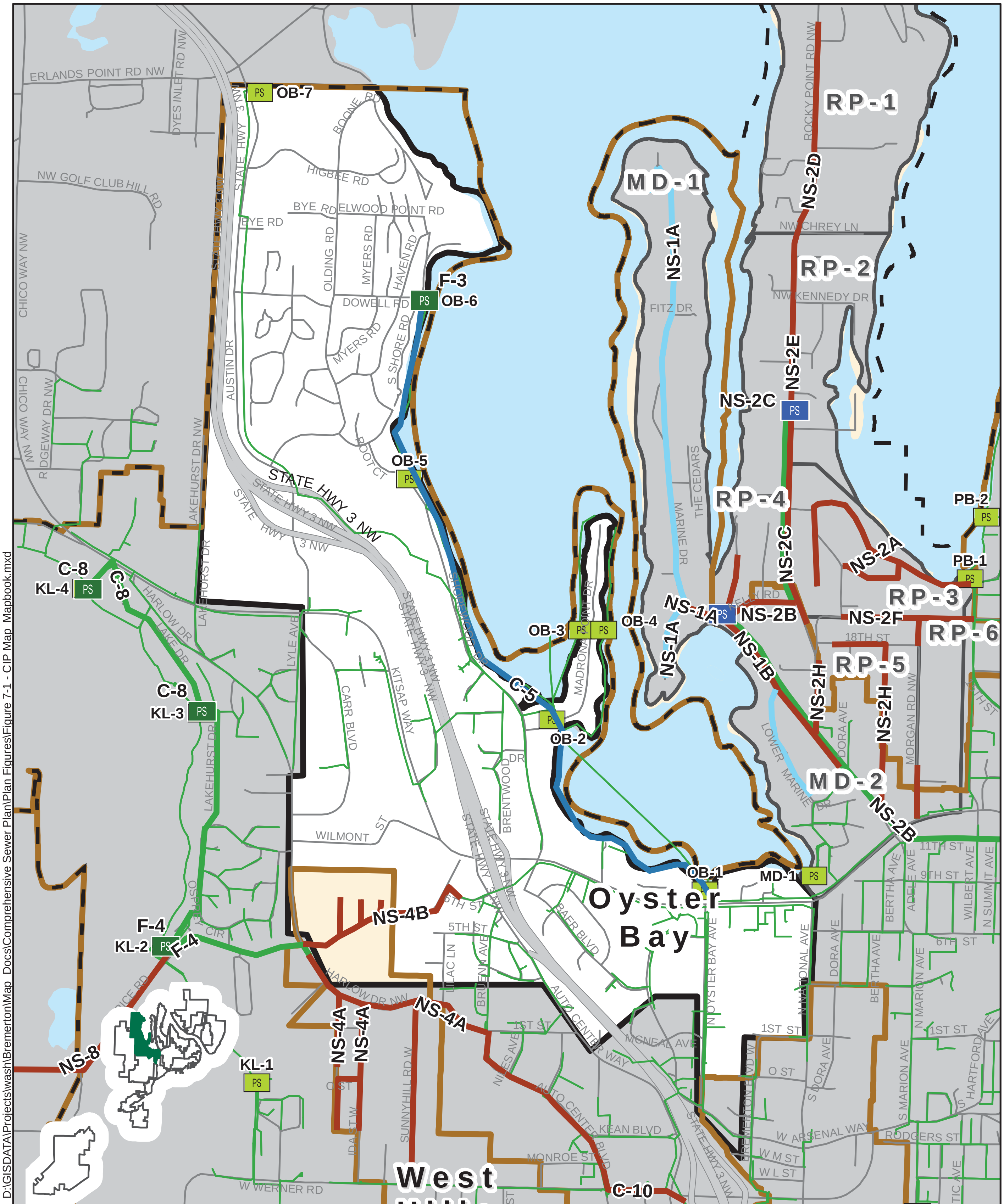
Oyster Bay Basin					
BASIN DESCRIPTION					
Area (acres)	958				
Land Use	Residential, Commercial, General Industrial, Industrial Park				
Location	West Bremerton area, bordered by Harlow Drive, SR 3, the Puget Sound Dyes Inlet, and National Avenue.				
Description	The Oyster Bay Basin has seven pump stations (OB-1 through OB-7) along the collection system. Current and projected flows are within the capacity of the current sewer system. OB-7 and the force main were constructed so the military reservation sewer system in this area would not have to support the new development. Undeveloped areas currently include the southwest portion of the military reservation, which can be served in the future by the new gravity sewer conveyed to OB-7.				
SEWER FLOWS					
Existing GPD (2013)	318,000				
Future GPD (2033)	503,000				
Percent Developed[1] (%)	90%				
Percent Sewered[2] (%)	86%				
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	**Capacity (gpm)**	**2013 Peak Flow (gpm)**	**2033 Peak Flow (gpm)**	**Percent Developed[1]**	**Percent of Developed Sewered[2]**
OB-1	1,900	1,880	2,290	90%	89%
OB-2	750	570	660	90%	84%
OB-3	400	20	20	94%	99%
OB-4	150	20	20	96%	100%
OB-5	550	180	200	100%	96%
OB-6	490	690	780	100%	97%
OB-7	375	190	220	100%	100%
CIP					
CIP ID	**Timeline**	**Funding Source**	**Purpose**	**Related Projects**	**Cost ($1,000)**
CIP Year 2015-2020					
C-5	Oyster Bay - Beach Sewer between OB-6 and OB-1				
	2015 - 2016	UFA	Deficiency	n/a	$ 2,250
	Design low pressure sewer conversion from the OB-6 to OB-1 pump stations. Install individual grinder pump stations on private properties which would pump to upland gravity sewers. Modify beach main to serve as force main and evaluate upstream hydraulics. This project would be funded by the User Fee Assessment fund.				
F-3	Emergency Generator Installation at OB-6				
	2015	UFA	Deficiency	n/a	$ 50
	Install an emergency generator at the OB-6 pump station located on Shore Road. This project would be funded by the User Fee Assessment fund.				
CIP Year 2020+					

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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Basin Oyster Bay

Legend

- 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 = 1,730 feet

0 550 1,100 1,650 Feet

BASIN PLAN

City of Bremerton

HDR

CITY OF BREMERTON

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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 (2013)	120,000				
Future GPD (2033)	263,000				
Percent Developed[1] (%)	93%				
Percent Sewered[2] (%)	83%				
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	**Capacity (gpm)**	**2013 Peak Flow (gpm)**	**2033 Peak Flow (gpm)**	**Percent Developed[1]**	**Percent of Developed Sewered[2]**
CE-4	1,940	1,480	1,790	91%	87%
CE-6	1,600	1,300	1,430	97%	77%
CIP					
CIP ID	**Timeline**	**Funding Source**	**Purpose**	**Related Projects**	**Cost ($1,000)**
CIP Year 2015-2020					
F-6	Pump Station CE-4 Pumps 1 & 2 Replacement				
	2017	UFA/G	Repair	n/a	$ 400
	Replace the 30+ year old pumps, motors and VFDs with dry-pit submersible pumps and upgraded VFDs. This project may be partially funded by PSE or DES grants.				
CIP Year 2020+					
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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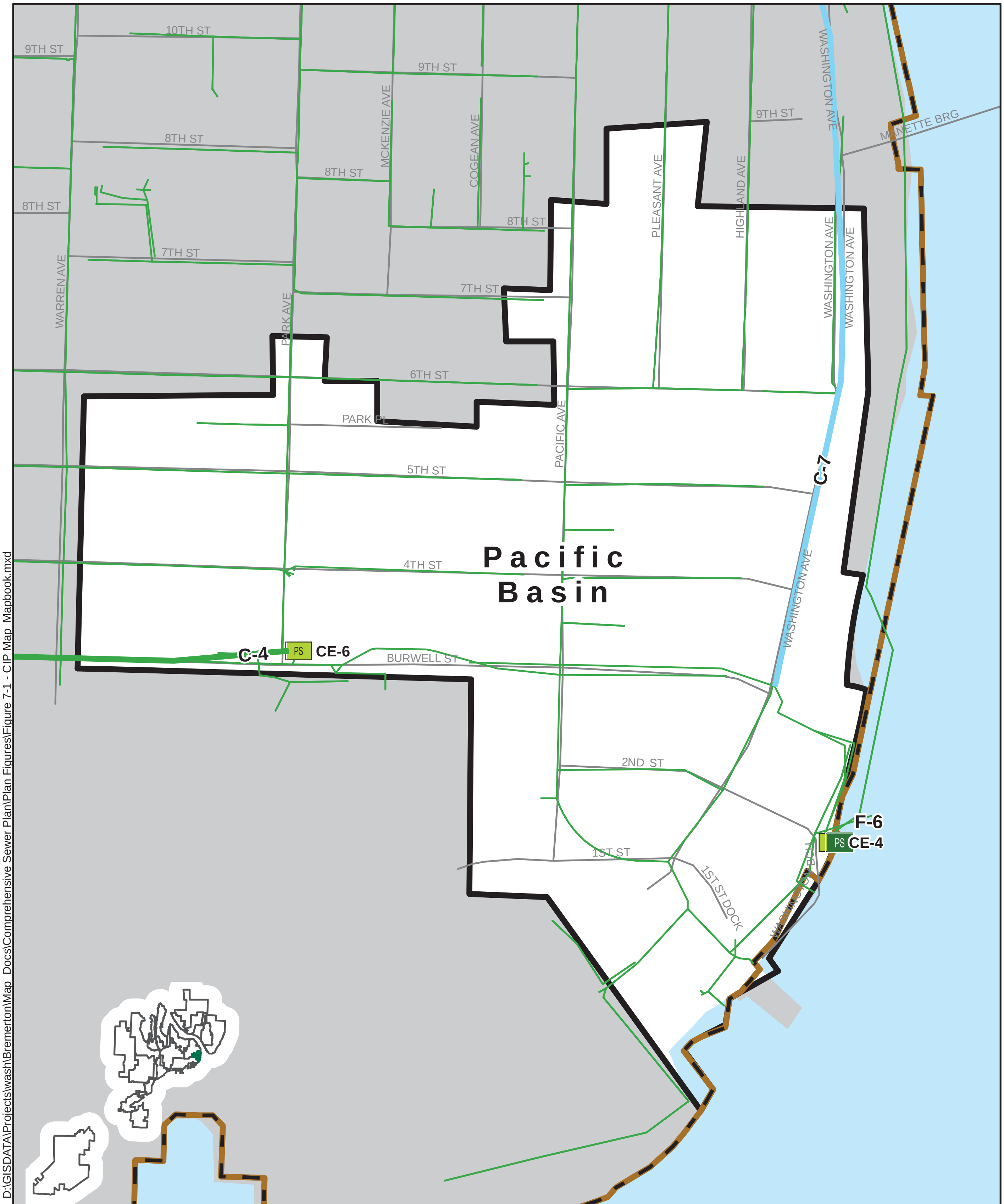

Legend

Basin Pacific Basin

Odor Control Upgrade	Beach Sewer	PS Lift Station
MBR MBR	Force Main	Sewer Mains
PS New Pump Station	Gravity Sewer	Streets
PS Pump Station Upgrade	Low Pressure Sewer	Highway
PS Reclaimed Pump Station	Outfall	New Service Area
	Reclaimed Main	City of Bremerton
	Force Main Less Than 24"	Bremerton UGA
	CSO Outfall	

1 inch = 400 feet

0 125 250 375 Feet

BASIN PLAN

City of Bremerton

HDR

CITY OF BREMERTON

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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 (2013)	52,000				
Future GPD (2033)	69,000				
Percent Developed[1] (%)	90%				
Percent Sewered[2] (%)	94%				
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	**Capacity (gpm)**	**2013 Peak Flow (gpm)**	**2033 Peak Flow (gpm)**	**Percent Developed[1]**	**Percent of Developed Sewered[2]**
PB-1	150	170	220	91%	93%
PB-2	100	90	100	97%	100%
CIP					
CIP ID	**Timeline**	**Funding Source**	**Purpose**	**Related Projects**	**Cost ($1,000)**
CIP Year 2015-2020					
CIP Year 2020+					
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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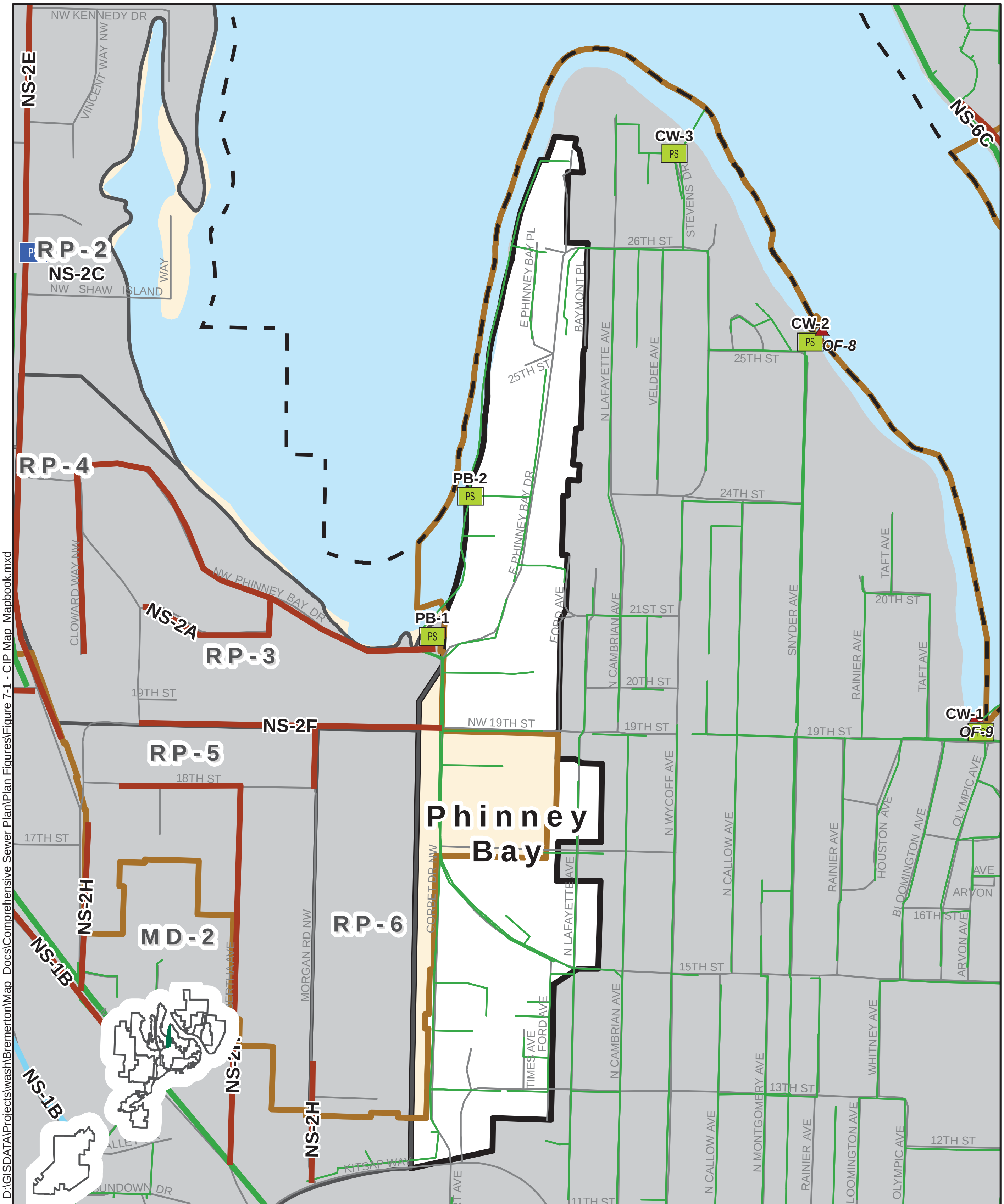

Legend

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

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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 (2013)	419,000				
Future GPD (2033)	742,000				
Percent Developed[1] (%)	86%				
Percent Sewered[2] (%)	82%				
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	**Capacity (gpm)**	**2013 Peak Flow (gpm)**	**2033 Peak Flow (gpm)**	**Percent Developed[1]**	**Percent of Developed Sewered[2]**
EB-8	200	30	40	62%	62%
EB-9	100	60	70	89%	65%
CIP					
CIP ID	**Timeline**	**Funding Source**	**Purpose**	**Related Projects**	**Cost ($1,000)**
CIP Year 2015-2020					
CIP Year 2020+					
C-9	McClain Improvements				
	>2020	UFA	Deficiency	n/a	$ 1,400
	Construct approximately 2,200 LF of 10-inch sanitary sewer line following an alignment from McClain Avenue and Sheridan Avenue, along Sheridan Avenue, Elm Street, and Hefner Street to Lebo Boulevard. This diverted route will eliminate a downstream surcharge and address blockages in the area due to root intrusions.				
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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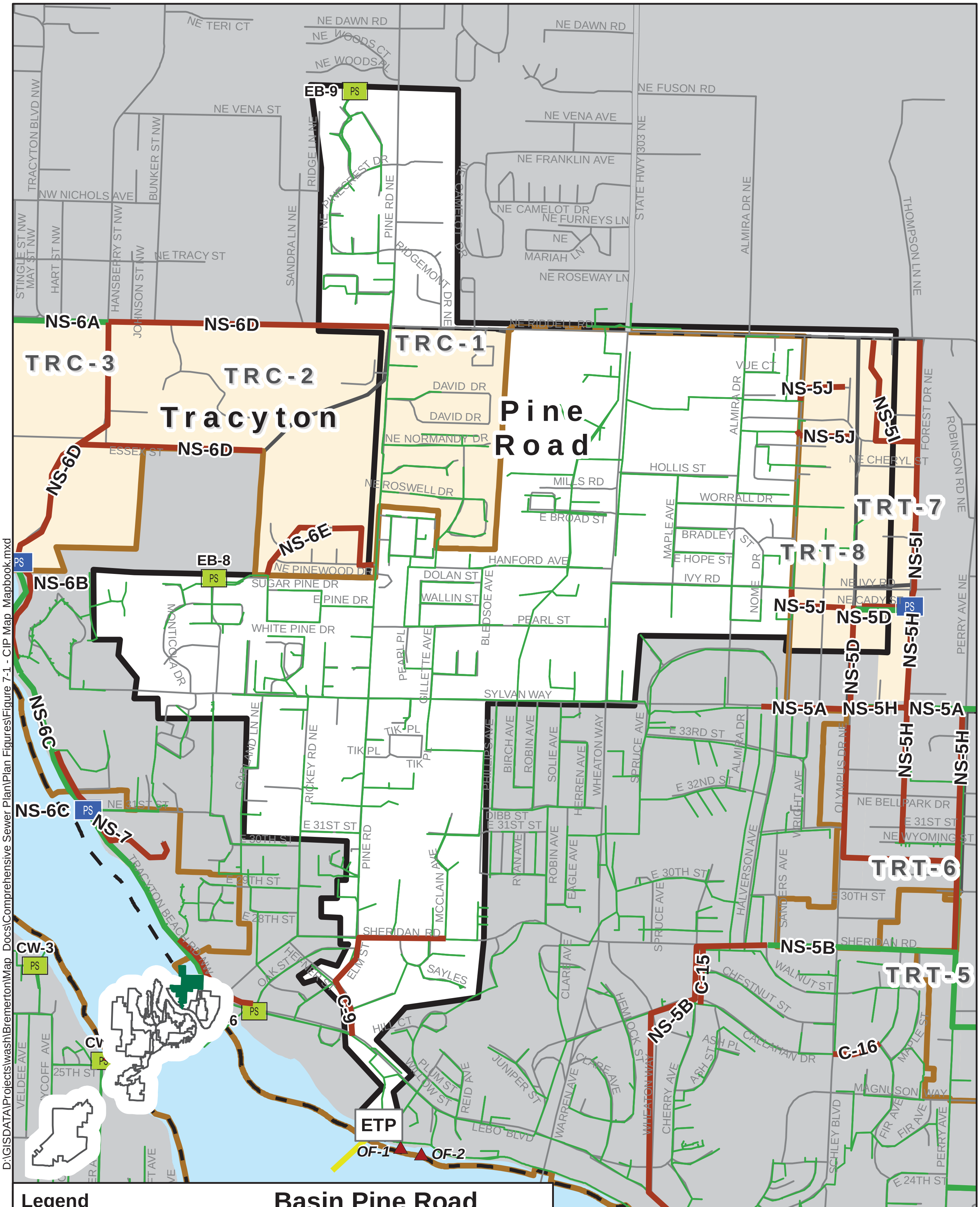

Basin Pine Road

Legend

- 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

HDR

CITY OF BREMERTON

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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's system at designated locations. Combined sewer from the PSNS area flow to pump station WB-3, which discharges to the CTP and on to the WWTP.				
SEWER FLOWS					
Existing GPD (2013)	635,000				
Future GPD (2033)	815,000				
Percent Developed[1] (%)	100%				
Percent Sewered[2] (%)	98%				
EXISTING SYSTEM					
Combined/Separated	Contract				
Receiving Facilities	Crosstown Pipeline				
Existing Pump Stations					
Combined Sewer Outfall					
PUMP STATIONS					
Pump Station	**Capacity (gpm)**	**2013 Peak Flow (gpm)**	**2033 Peak Flow (gpm)**	**Percent Developed[1]**	**Percent of Developed Sewered[2]**
CIP					
CIP ID	**Timeline**	**Funding Source**	**Purpose**	**Related Projects**	**Cost ($1,000)**
CIP Year 2015-2020					
CIP Year 2020+					
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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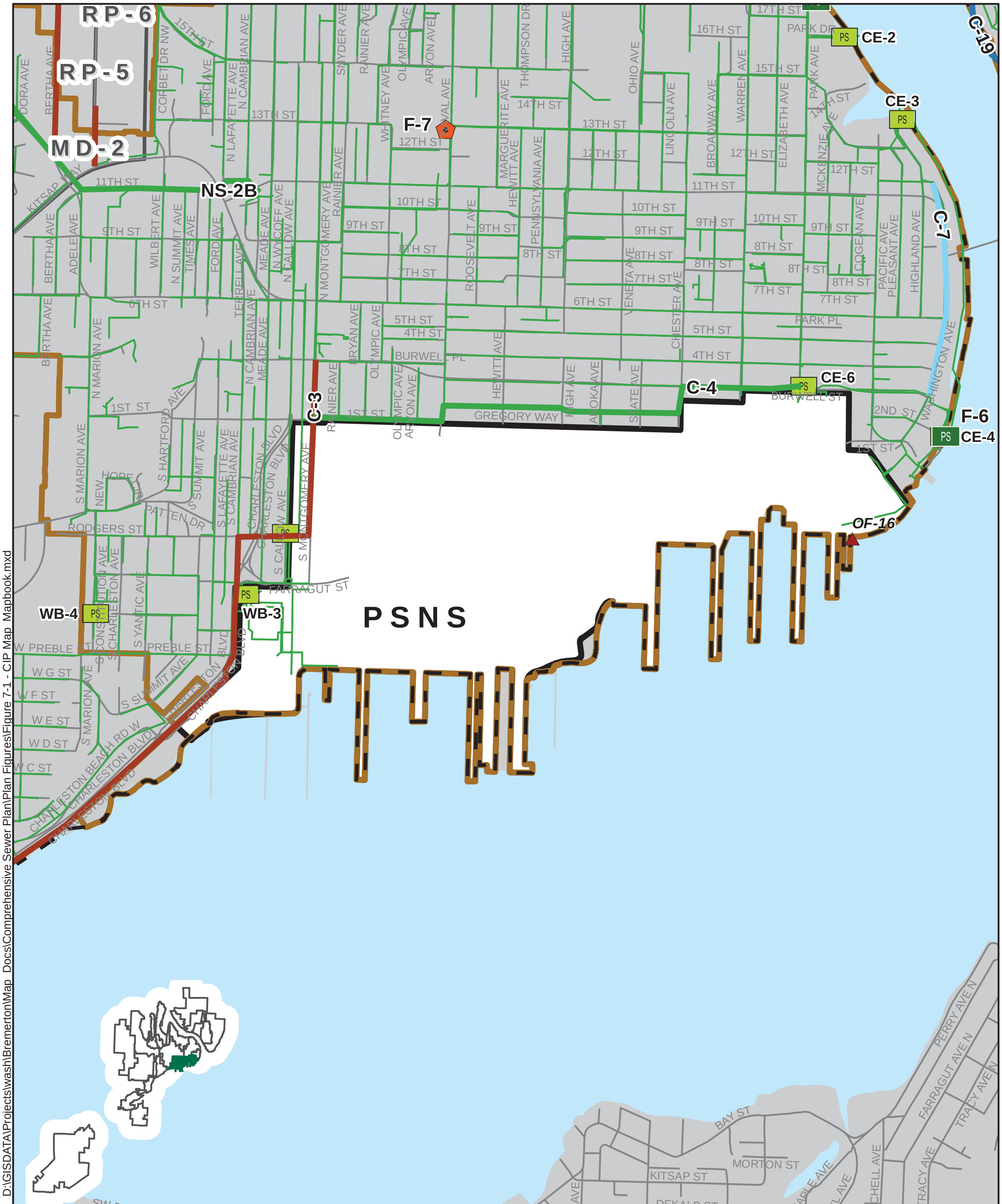

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Basin PSNS

Legend

- Odor Control Upgrade
- 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

N

1 inch = 1,520 feet

0 480 960 1,440 Feet

BASIN PLAN

City of Bremerton

HDR

CITY OF BREMERTON

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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 (2013)	0				
Future GPD (2033)	0				
Percent Developed[1] (%)	86%				
Percent Sewered[2] (%)	0%				
EXISTING SYSTEM					
Combined/Separated	Separate				
Receiving Facilities					
Existing Pump Stations					
Combined Sewer Outfall					
PUMP STATIONS					
Pump Station	**Capacity (gpm)**	**2013 Peak Flow (gpm)**	**2033 Peak Flow (gpm)**	**Percent Developed[1]**	**Percent of Developed Sewered[2]**
CIP					
CIP ID	**Timeline**	**Funding Source**	**Purpose**	**Related Projects**	**Cost ($1,000)**
CIP Year 2015-2020					
NS-2A	Phinney Bay Extension (Sub Basin RP-3)				
	2016 - 2020 Grant Dependent	UFA / G	UGA	NS-2F	$ 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)				
	2017 - 2018 Grant Dependent	UFA / G	UGA	NS-2A & NS-2D	$ 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				
	2018 - 2020 Grant Dependent	UFA / G	UGA	NS-1B	$ 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".				
CIP Year 2020+					
NS-2B	Pump Station MD-2				
	>2020	UFA / G	UGA	n/a	$ 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				
	>2020	UFA / G	UGA	n/a	$ 2,830
	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				
	>2020	UFA / G	UGA	NS-2F	$ 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				
	>2020	UFA / G	UGA	NS-2C	$ 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				
	>2020	UFA / G	UGA	NS-2B	$ 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.					

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Basin Rocky Point

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

1 inch = 1,440 feet

0 450 900 1,350 Feet

BASIN PLAN

City of Bremerton

HDR

CITY OF BREMERTON

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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 Sewer District 1 system, through pump station WB-1, and then to the WWTP via the Southwest Bremerton Sewer Force Main.				
SEWER FLOWS					
Existing GPD (2013)	37,000				
Future GPD (2033)	54,000				
Percent Developed[1] (%)	54%				
Percent Sewered[2] (%)	44%				
EXISTING SYSTEM					
Combined/Separated	Separate				
Receiving Facilities	Southwest Bremerton Sewer Force Main				
Existing Pump Stations					
Combined Sewer Outfall					
PUMP STATIONS					
Pump Station	**Capacity (gpm)**	**2013 Peak Flow (gpm)**	**2033 Peak Flow (gpm)**	**Percent Developed[1]**	**Percent of Developed Sewered[2]**
CIP					
CIP ID	**Timeline**	**Funding Source**	**Purpose**	**Related Projects**	**Cost ($1,000)**
CIP Year 2015-2020					
C-18	Grout Annular Space of SW Bremerton Force Main				
	2020	UFA	Deficiency	n/a	$ 200
	This project would grout the annular space of the southwest Bremerton forcemain that contains three slip-lined force mains from pump stations SB-1, SB-3, and SB-4.				
CIP Year 2020+					
NS-3	SR 304 Sewer Collection				
	>2020	UFA / G	UGA	n/a	$ 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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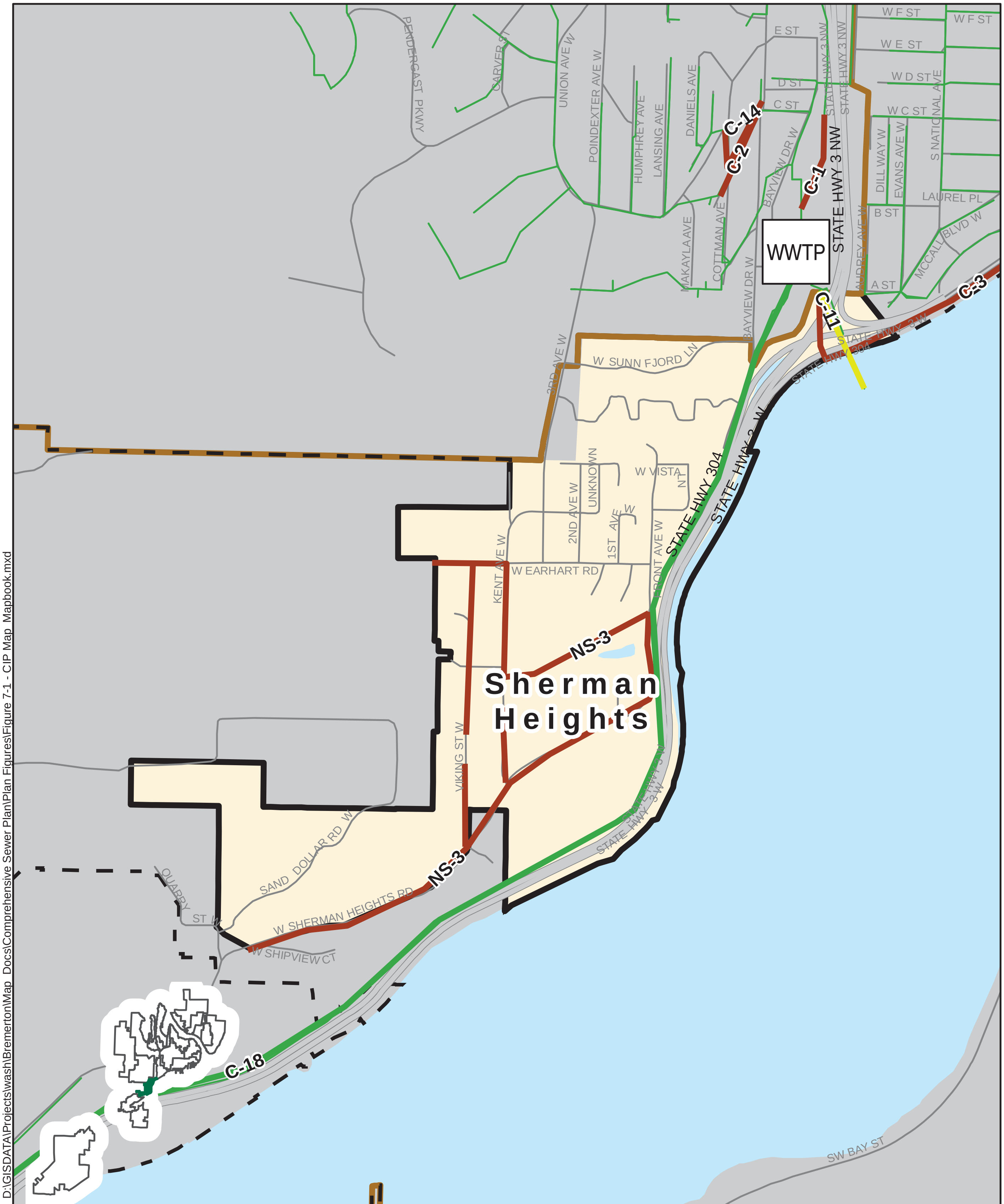

Legend

Basin Sherman Heights

- 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 = 1,020 feet

0 320 640 960 Feet

BASIN PLAN

City of Bremerton

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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 (2013)	88,000
Future GPD (2033)	165,000
Percent Developed[1] (%)	54%
Percent Sewered[2] (%)	75%
EXISTING SYSTEM	
Combined/Separated	Separate
Receiving Facilities	Pipeline from KL-1 to WWTP
Existing Pump Stations	PP-1
Combined Sewer Outfall	

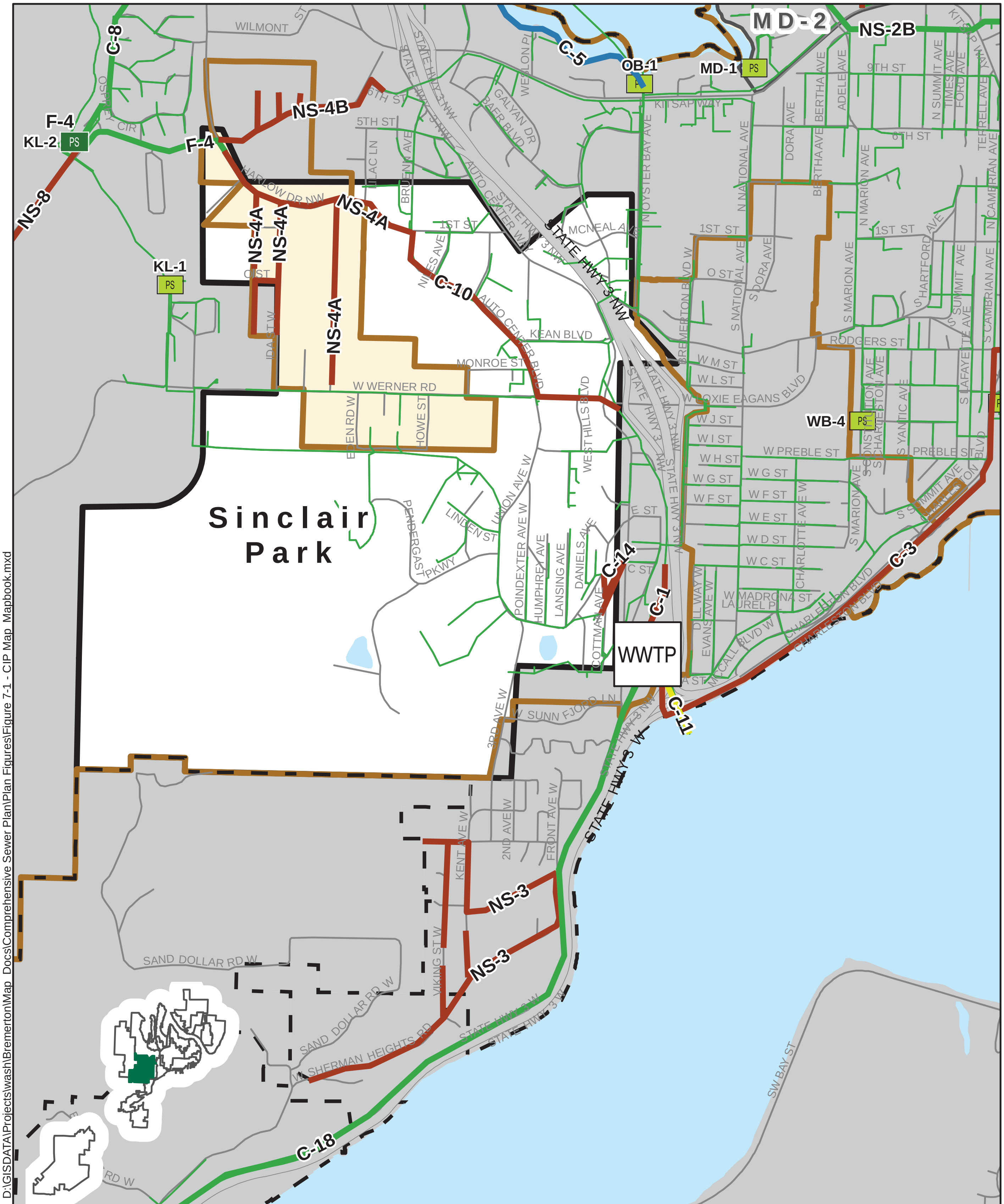
PUMP STATIONS

Pump Station	Capacity (gpm)	2013 Peak Flow (gpm)	2033 Peak Flow (gpm)	Percent Developed[1]	Percent of Developed Sewered[2]
PP-1	143	100	110	100%	100%

CIP

CIP ID	Timeline	Funding Source	Purpose	Related Projects	Cost ($1,000)
CIP Year 2015-2020					
C-1	Replace or rehabilitate 10-inch Sanitary Sewer under Secondary Clarifier				
	2016 - 2017	UFA	Deficiency	C-11	$ 650
	Replace 1,500 LF of 10-inch gravity sewer under secondary clarifier. This project is located in Southwest Bremerton within the WWTP. This line creates a system bottleneck which is causing a collection system surcharge. This project relates to project C-11 "WWTP Outfall". This project would be funded by the User Fee Assessment fund.				
C-2	Jones Street Main Replacement				
	2017	UFA	Deficiency	n/a	$ 300
	Install approximately 700 LF of 12-inch gravity sewer to replace the existing 8-inch gravity sewer along Jones Street between Cottman Avenue and Oyster Bay Road. In January 2012, an overflow on private property occurred from the existing gravity sewer. This project would increase the capacity of the gravity sewer to reduce the risk of flooding.				
C-14	Cottman/Jones Sewers				
	2015	UFA	Deficiency	n/a	$ 15
	Evaluation to determine project scope. The project will need to look at replacing a storm drain from Roosevelt to Bayview.				

NS-4A	Ostrich Bay Extension				
	2018 - 2020 Grant Dependent	UFA / G	UGA	n/a	$ 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.				
CIP Year 2020+					
C-10	Kean Street Trunk Sewer				
	>2020	UFA	Deficiency	F-4	$ 3,100
	Install approximately 3,700 LF of 24-inch gravity sewer along Harlow Drive from Sunnyhill Road to Kean Street, along Kean Street from Harlow Drive to Werner Road, and along Werner Road from Kean Street to Auto Center Way. This project would increase the capacity along Kean Street to convey flow from the proposed force main from KL-2 that would discharge at Sunnyhill Road and Harlow Drive . This project would be required with the implementation of project F-4 “KL-2 pump station upgrade”.				
NS-4B	North Extension				
	>2020	UFA / G	UGA	n/a	$ 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.					



Legend

Odor Control Upgrade	Beach Sewer	PS Lift Station
MBR MBR	Force Main	Sewer Mains
PS New Pump Station	Gravity Sewer	Streets
PS Pump Station Upgrade	Low Pressure Sewer	Highway
PS Reclaimed Pump Station	Outfall	New Service Area
	Reclaimed Main	City of Bremerton
	Force Main Less Than 24"	Bremerton UGA
	CSO Outfall	

Basin Sinclair Park

1 inch = 1,650 feet

0 520 1,040 1,560 Feet

BASIN PLAN

City of Bremerton

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CITY OF BREMERTON

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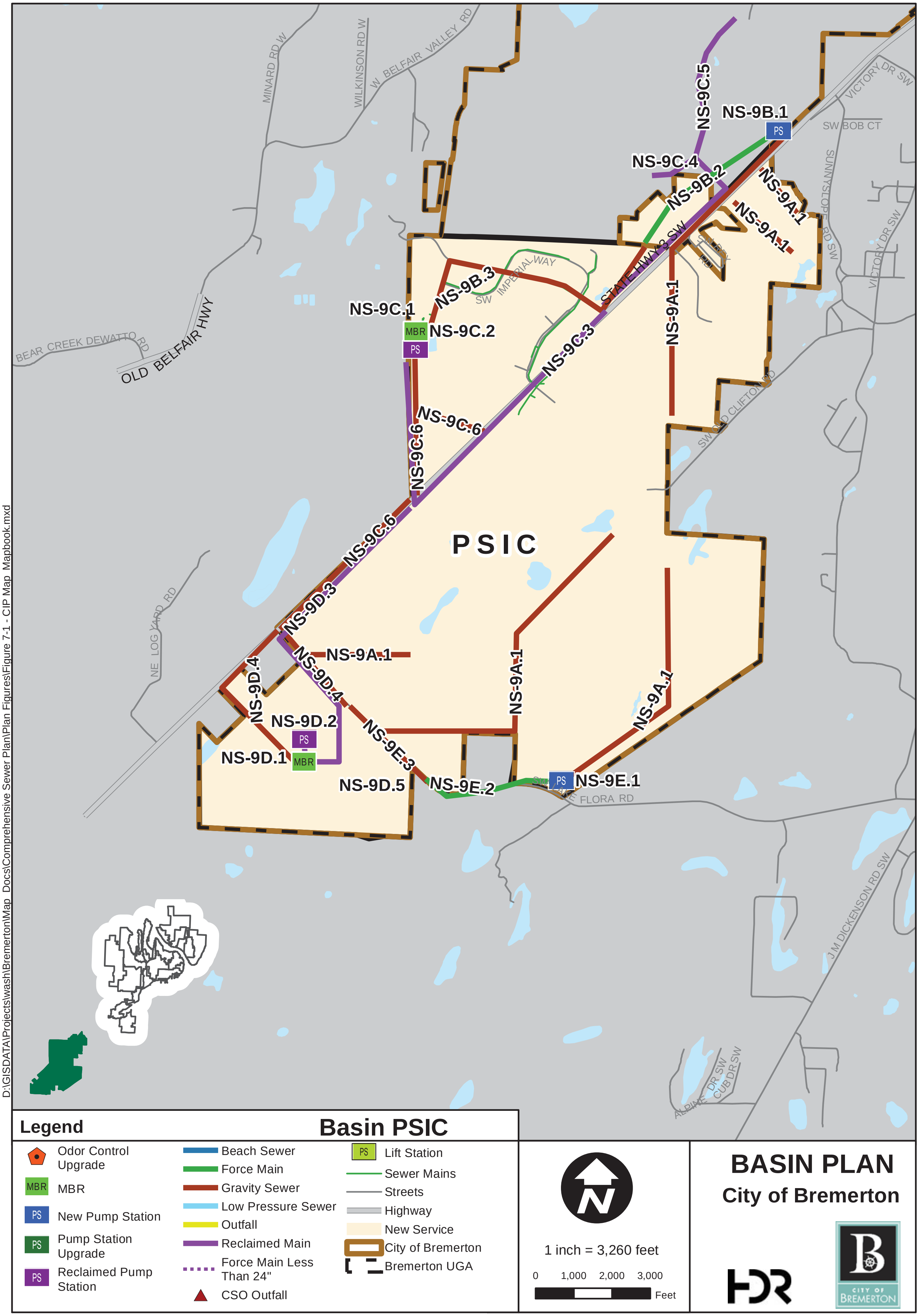
PSIC Basin					
BASIN DESCRIPTION					
Area (acres)	3430				
Land Use	Undeveloped area with low-density residential and some industrial.				
Location	South Bremerton area, bordered by SW. Lake Flora Road, State Highway 3, Sunnyslope Road, and SW. Old Clifton Road.				
Description	The Puget Sound Industrial Center (PSIC), currently unincorporated, is projected to be a major industrial growth area. Ultimately, this area will be served by a combination of gravity sewers and force mains that will convey flows north through the Gorst and Sherman Heights Basins to the WWTP via the Southwest Bremerton Force Main. A strategy for providing sewer service to the area was developed and is described in Sewer Planning – South Kitsap Industrial Area (Sept, 2008). An updated plan for service was presented in the South Kitsap Industrial Area Subarea Plan (Aug 2012). The improvements described in the plan have been sub-divided into 5 project groups that are described below.				
SEWER FLOWS					
Existing GPD (2013)	28,000				
Future GPD (2033)	38,000				
Percent Developed[1] (%)	52%				
Percent Sewered[2] (%)	97%				
EXISTING SYSTEM					
Combined/Separated	Separate				
Receiving Facilities	Southwest Bremerton Force Main				
Existing Pump Stations					
Combined Sewer Outfall					
PUMP STATIONS					
Pump Station	**Capacity (gpm)**	**2013 Peak Flow (gpm)**	**2033 Peak Flow (gpm)**	**Percent Developed[1]**	**Percent of Developed Sewered[2]**
CIP					
CIP ID	**Timeline**	**Funding Source**	**Purpose**	**Related Projects**	**Cost ($1,000)**
CIP Year 2015-2020					
NS-9 A-E	PSIC Sewer Design & Construction - ULID Dgn & Const				
	2016 - 2017 Grant Dependent	UFA / G	UGA	n/a	$ 5,475
	ULID funding would be used for the expansion of sewer service to PSIC as development occurs. This funding would support the infrastructure improvements described in the following five projects. A portion of this work will occur between 2015 and 2020. The remainder will occur after 2020.				
CIP Year 2020+					
NS-9 A-E	PSIC Sewer Design & Construction - ULID Dgn & Const				
	>2020	UFA / G	UGA	n/a	$ 29,849
	ULID funding would be used for the expansion of sewer service to PSIC as development occurs. This funding would support the infrastructure improvements described in the following five projects. A portion of this work will occur between 2015 and 2020. The remainder will occur after 2020.				
NS-9A	Secondary 8” and 10” gravity sewer				
	>2020	UFA / G	UGA	n/a	$ 2,080
	Install secondary 8-inch and 10-inch gravity sewer along local access roads.				

NS-9B	Sewer Service for Northeast PSIC				
	>2020	UFA / G	UGA	n/a	$ 4,921
	NS-9B.1 - Pump Station 1 (Sanitary sewer) NS-9B.2 - 4” Force Main (PS 1 to NS-4B.3 gravity main at SR 3 and Barney White Rd) NS-9B.3 - 8” – 10” Gravity Sewer				
NS-9C	MBR No. 1, Re-Use and Sewer Service for Central PSIC				
	>2020	UFA / G	UGA	n/a	$ 13,499
	NS-9C.1 - MBR Plant NS-9C.2 - Pump Station 2 (Reclaimed water) NS-9C.3 - 6” Force Main (PS 2 to NS-4C.4 groundwater recharge site along SR 3) NS-9C.4 - Winter Sewage Disposal / Groundwater Recharge NS-9C.5 - Re-Use ex. 8” AC Water for Reclaimed Water Effluent to Golf Course NS-9C.6 - 8” – 10” Gravity Sewer				
NS-9D	MBR No. 2 with Re-Use				
	>2020	UFA / G	UGA	n/a	$ 12,391
	NS-9D.2 - Pump Station 3 (Reclaimed water) NS-9D.3 - 6” Force Main (PS 3 to PS 2 force main along Lake Flora Rd and SR 3) NS-9D.4 - 8” – 10” Gravity Sewer NS-9D.5 - Winter Sewage Disposal / Groundwater Recharge				
NS-9E	Sewer Service for South PSIC				
	>2020	UFA / G	UGA	n/a	$ 2,433
	NS-9E.1 - Pump Station 4 (Sanitary sewer) NS-9E.2 - 4” Force Main (PS 4 to NS-4E.3 gravity main along Lake Flora Rd) NS-9E.3 - 8” – 10” 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.					


PSIC
NS-9A.1
NS-9B.1
NS-9B.2
NS-9B.3
NS-9C.1
NS-9C.2
NS-9C.3
NS-9C.4
NS-9C.5
NS-9C.6
NS-9D.1
NS-9D.2
NS-9D.3
NS-9D.4
NS-9D.5
NS-9E.1
NS-9E.2
NS-9E.3
MBR
PS
STATE HWY 3 SW
SW IMPERIAL WAY
OLD BELFAIR HWY
BEAR CREEK DEWATTO RD
MINARD RD W
WILKINSON RD W
W BELFAIR VALLEY RD
NE LOG YARD RD
SW OLD CLIFTON RD
SW BOB CT
VICTORY DR SW
SUNNYSLOPE RD SW
FLORA RD
J M DICKENSON RD SW
ALPINE DR SW
CUB DR SW
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

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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 (2013)	209,000				
Future GPD (2033)	403,000				
Percent Developed[1] (%)	98%				
Percent Sewered[2] (%)	96%				
EXISTING SYSTEM					
Combined/Separated	Combined				
Receiving Facilities	East Bremerton Beach Main				
Existing Pump Stations					
Combined Sewer Outfall	OF-2				
PUMP STATIONS					
Pump Station	**Capacity (gpm)**	**2013 Peak Flow (gpm)**	**2033 Peak Flow (gpm)**	**Percent Developed[1]**	**Percent of Developed Sewered[2]**
CIP					
CIP ID	**Timeline**	**Funding Source**	**Purpose**	**Related Projects**	**Cost ($1,000)**
CIP Year 2015-2020					
CIP Year 2020+					
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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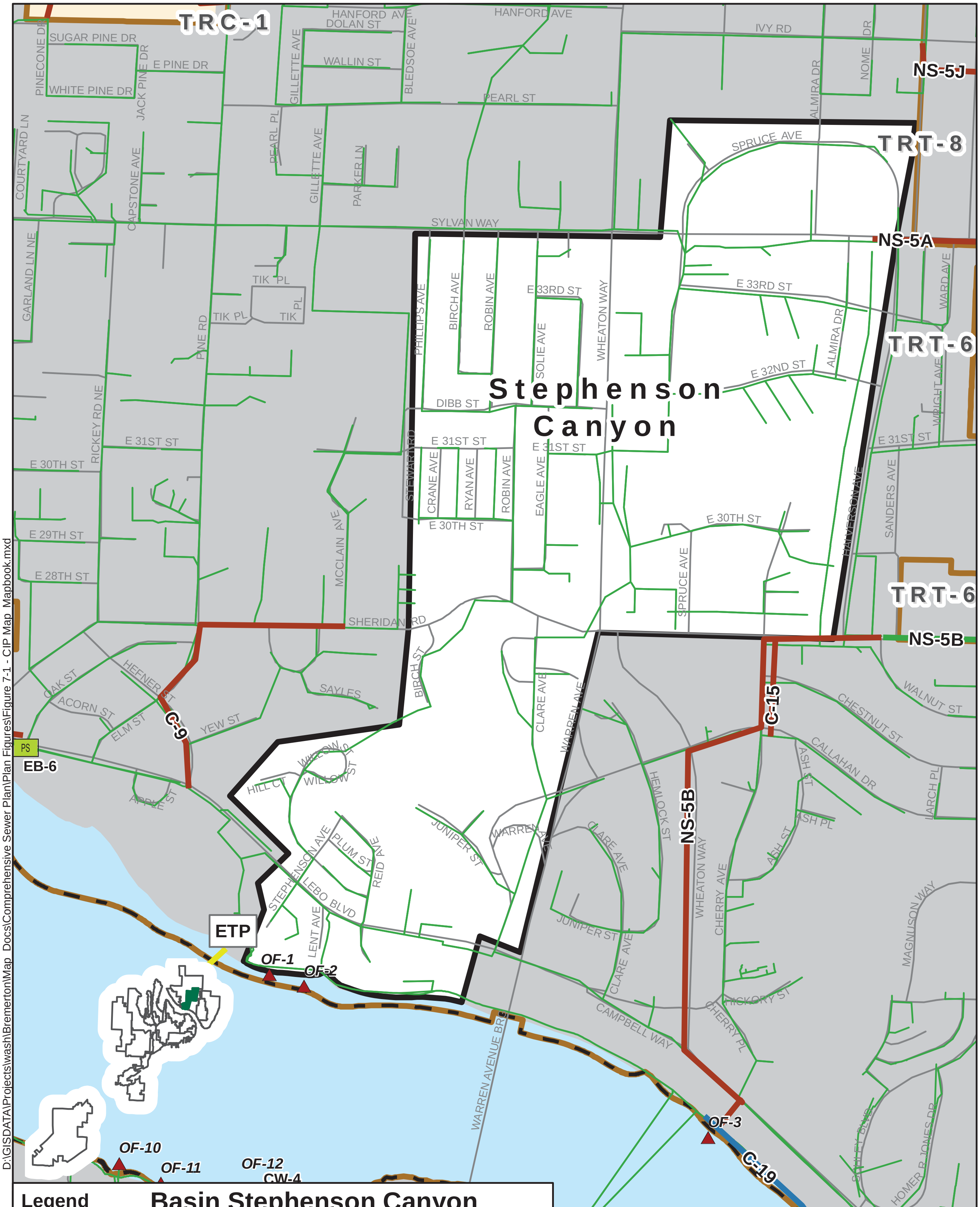

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Legend — **Basin Stephenson Canyon**

- 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
- City of Bremerton
- Bremerton UGA

N

1 inch = 880 feet

0 275 550 825 Feet

BASIN PLAN

City of Bremerton

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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 (2013)	57,000
Future GPD (2033)	74,000
Percent Developed[1] (%)	76%
Percent Sewered[2] (%)	80%
EXISTING SYSTEM	
Combined/Separated	Combined
Receiving Facilities	East Bremerton Beach Main
Existing Pump Stations	EB-6
Combined Sewer Outfall	OF-6

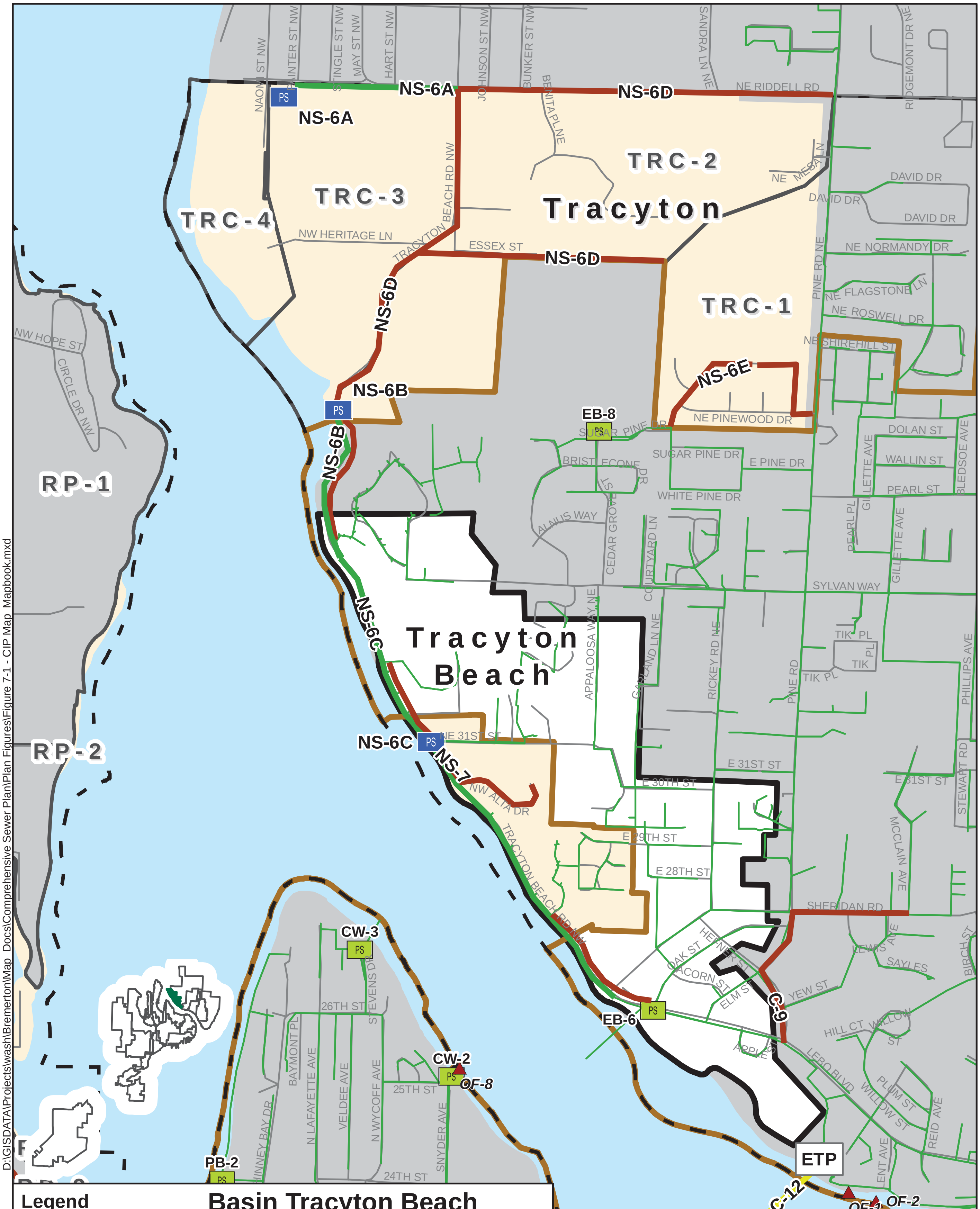
PUMP STATIONS

Pump Station	Capacity (gpm)	2013 Peak Flow (gpm)	2033 Peak Flow (gpm)	Percent Developed[1]	Percent of Developed Sewered[2]
EB-6	1,200	710	750	67%	79%

CIP

CIP ID	Timeline	Funding Source	Purpose	Related Projects	Cost ($1,000)
CIP Year 2015-2020					
C-12	Eastside Treatment Plant Outfall				
	2016 - 2017	UFA	Deficiency	n/a	$ 600
	Replace approximately 250 LF of 20-inch concrete line between two sections of 36-inch lines in the outfall to eliminate a bottle neck. This project would be funded by the User Fee Assessment fund.				
NS-6B	Pump Station TB-2				
	2016 - 2018 Grant Dependent	UFA / G	UGA	n/a	$ 3,020
	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				
	2016 - 2020	UFA / G	UGA	n/a	$ 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.				
CIP Year 2020+					
NS-6A	Pump Station TB-1				
	>2020	UFA / G	UGA	NS-6D	$ 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 projected flows in the sub-basins. An estimated 1,350 gallon wet well volume would be needed.				
NS-6B	Pump Station TB-2				
	2016 - 2018 Grant Dependent	UFA / G	UGA	n/a	$ 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-6D	Sewer Collection - Sub Basin TRC-2				
	>2020	UFA / G	UGA	NS-6B	$ 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				
	>2020	UFA / G	UGA	n/a	$ 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				
	>2020	UFA / G	UGA	n/a	$ 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.					



Basin Tracyton Beach

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

1 inch = 1,100 feet

0 340 680 1,020 Feet

BASIN PLAN

City of Bremerton

HDR

CITY OF BREMERTON

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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 (2013)	191,000
Future GPD (2033)	307,000
Percent Developed[1] (%)	82%
Percent Sewered[2] (%)	39%
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	Capacity (gpm)	2013 Peak Flow (gpm)	2033 Peak Flow (gpm)	Percent Developed[1]	Percent of Developed Sewered[2]
EB-2 DW	450	180	340	93%	96%
EB-2 WW	4,100	2,690	3,060	91%	88%
EB-3	750	760	890	92%	82%
EB-4	100	20	20	95%	91%
EB-5	245	90	100	100%	100%

CIP

CIP ID	Timeline	Funding Source	Purpose	Related Projects	Cost ($1,000)
CIP Year 2015-2020					
C-6	Abandon beach sewer north of Manette Bridge				
	2016 - 2017	UFA	Deficiency	n/a	$ 2,200
	Install package pump station at the end of East 16th Street to Wheaton Way. Install grinder pumps on all residences (20+/-) tributary to the gravity beach main and pump to Marlow Avenue and Wheaton Way. Some low pressure sewer main construction may be required. Upon completion the beach main will be abandoned.				
F-2	Emergency Generator Installation at EB-3				
	2015	UFA	Deficiency	n/a	$ 50
	Install an emergency generator at the EB-3 pump station on Shore Drive. This project would be funded by the User Fee Assessment fund.				

CIP Year 2015-2020					
C-6	Abandon beach sewer north of Manette Bridge				
	2016 - 2017	UFA	Deficiency	n/a	$ 2,200
	Install package pump station at the end of East 16th Street to Wheaton Way. Install grinder pumps on all residences (20+/-) tributary to the gravity beach main and pump to Marlow Avenue and Wheaton Way. Some low pressure sewer main construction may be required. Upon completion the beach main will be abandoned.				
F-2	Emergency Generator Installation at EB-3				
	2015	UFA	Deficiency	n/a	$ 50
	Install an emergency generator at the EB-3 pump station on Shore Drive. This project would be funded by the User Fee Assessment fund.				
CIP Year 2020+					
NS-5A	Pump Station TA-1				
	>2020	UFA / G	UGA	n/a	$ 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				
	>2020	UFA / G	UGA	n/a	$ 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				
	>2020	UFA / G	UGA	n/a	$ 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				
	>2020	UFA / G	UGA	n/a	$ 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				
	>2020	UFA / G	UGA	NS-5C	$ 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				
	>2020	UFA / G	UGA	NS-5A	$ 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				
	>2020	UFA / G	UGA	NS-5B	$ 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				
	>2020	UFA / G	UGA	n/a	$ 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				
	>2020	UFA / G	UGA	NS-5D	$ 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				
	>2020	UFA / G	UGA	n/a	$ 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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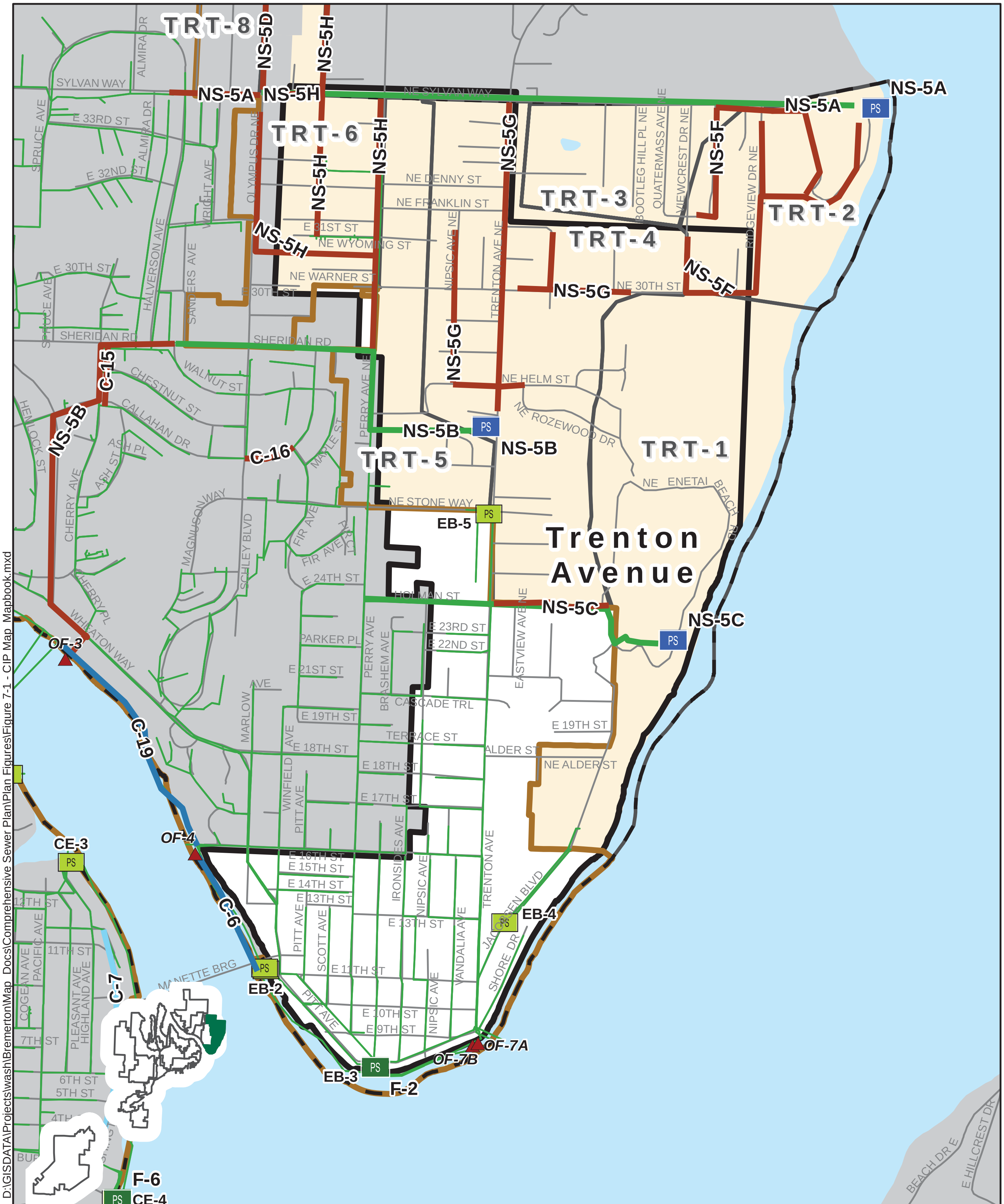

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Legend

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

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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 three pump stations (CE-1, CE-2, and CE-3) within the Warren Avenue Basin. Pump stations CE-2 and CE-3 convey flows to CE-1. Pump station CE-6, located in the the Pacific Avenue Basin, also pumps to CE-1. CE-1 conveys dry weather flows from all of 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 (2013)	373,000				
Future GPD (2033)	566,000				
Percent Developed[1] (%)	96%				
Percent Sewered[2] (%)	92%				
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	**Capacity (gpm)**	**2013 Peak Flow (gpm)**	**2033 Peak Flow (gpm)**	**Percent Developed[1]**	**Percent of Developed Sewered[2]**
CE-1 [3]	10,000	11,230	12,640	86%	89%
CE-2	200	60	70	100%	100%
CE-3	200	130	240	88%	92%
CIP					
CIP ID	**Timeline**	**Funding Source**	**Purpose**	**Related Projects**	**Cost ($1,000)**
CIP Year 2015-2020					
C-7	Washington Avenue Phase 2				
	2015	UFA	Deficiency	n/a	$ 1,100
	Design and obtain access rights for low pressure sewer replacement along Washington Avenue. This project would be funded by the User Fee Assessment fund.				
F-5	Pump Station CE-1 Pumps 1 & 4 Replacement				
	2016	UFA/G	Repair	n/a	$ 700
	Replace the 30+ year old 400 hp motors, pumps and eddy current drives, with dry-pit submersible pumps and VFDs. This project may be partially funded by PSE or DES grants.				
CIP Year 2020+					
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 that exceeds the capacity of CE-1 is treated at the Eastside Treatment Plant.					

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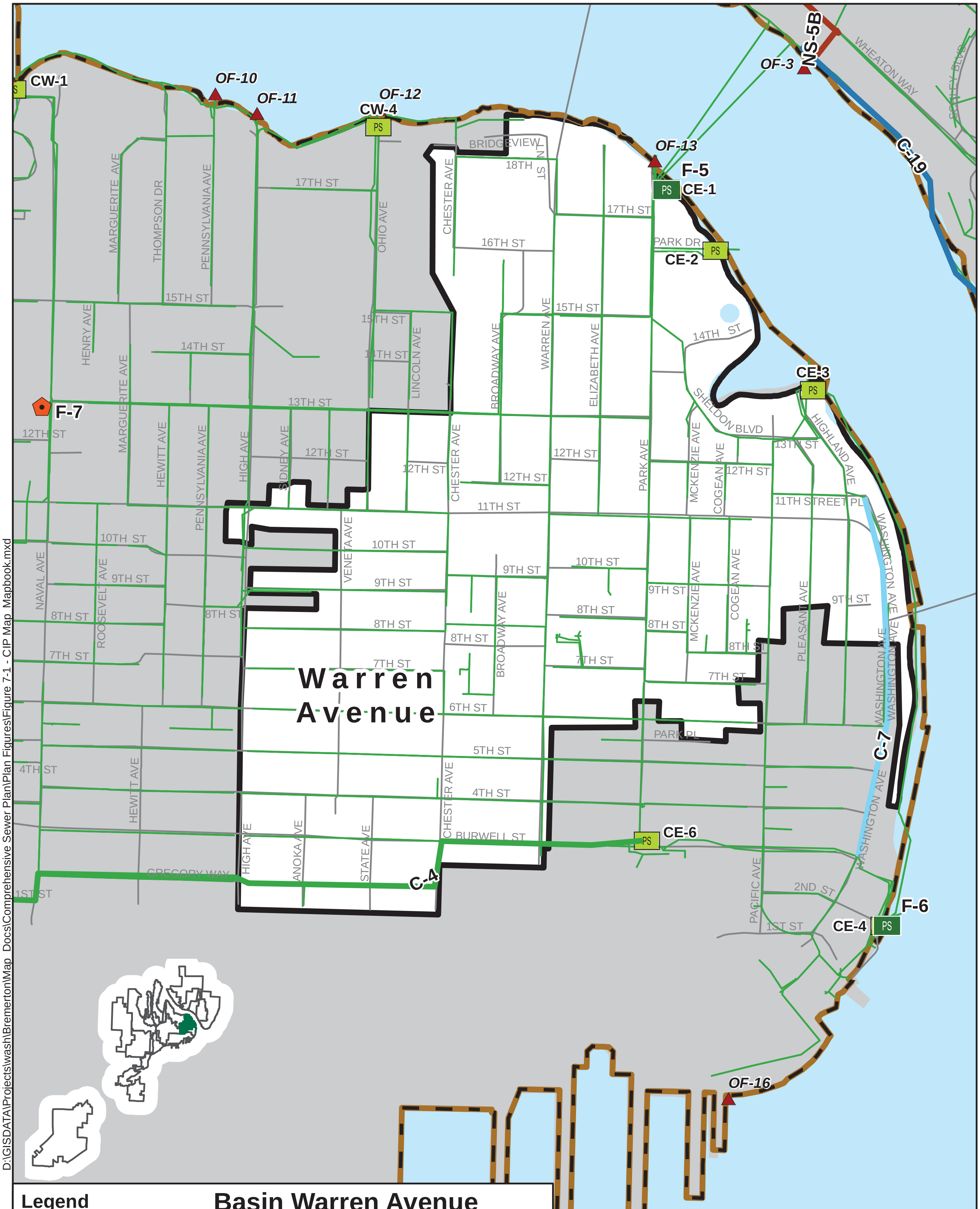

Legend

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

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Treatment Plants

TREATMENT DESCRIPTION

Description	Bremerton currently operates two wastewater treatment facilities. The Westside Wastewater Treatment Plant (WWTP) in West Bremerton is the main treatment plant and provides secondary treatment for the entire wastewater system service area and discharges to Sinclair Inlet. The WWTP currently has a peak hydraulic capacity of 65 mgd, and operates as a conventional activated sludge secondary treatment process. Wastewater sludges are collected at the WWTP, anaerobically digested, treated to Class B standards, dewatered, and applied to Bremerton's silviculture site for reuse. The Eastside CSO Treatment Plant (ETP) was built to reduce the number of CSO discharges. The ETP provides treatment for wet weather combined sewer flows in East Bremerton. This facility discharges to Port Washington Narrows and has a maximum hydraulic capacity of 20 mgd. Processes at the ETP include high rate clarification followed by ultraviolet (UV) disinfection. A network of gravity combined and sanitary sewer pipelines, pump stations, and force mains delivers flows from the collection system to these treatment facilities.

WWTP Projected Flows

	Averaage Dry Weather Projected Flows (gpd)	Average Annual Projected Flows (gpd)	Maximum Monthly Projected Flows (gpd)	Maximum Day Projected Flows (gpd)
Existing (2013)	3,990,000	5,133,000	9,947,000	25,450,000
Future (2033)	6,038,000	7,181,000	11,995,000	27,871,000
Future (2033 + New Service Area)	7,446,000	9,100,000	16,072,000	33,940,000

WWTP CIP

CIP ID	Timeline	Funding Source	Purpose	Related Projects	Cost ($1,000)
CIP Year 2015-2020					
C-11	Westside WWTP Outfall				
	2019 - 2020	UFA	Deficiency	n/a	$ 2,650
	This project would be coordinated with the Washington Department of Transportation (WSDOT) SR3/SR304 interchange remodel. There is a capacity bottle neck located under the SR3 overpass. This project is contingent on WSDOT modifying the SR3 overpass and lease renewal activities. This project would be funded by the User Fee Assessment fund.				
C-17	CIPP or other rehabilitation existing 54-inch SD under Secondary Clarifier				
	2016 - 2017	UFA	Deficiency	n/a	$ 300
	Inspect the storm drain to confirm improvement need. This is a stormwater project.				
F-1	Storage Warehouse at WWTP				
	2016	UFA	None	n/a	$ 500
	Construct storage warehouse for materials in the upper land north of the WWTP (next to Parr Ford). This project would be funded by the User Fee Assessment fund.				
T-1	Primary Clarifier #1 & 2 Drive Replacement				
	2016	UFA/G	Repair	n/a	$ 150
	Replace primary clarifier drives 1 and 2. This project would be funded under the Wastewater Maintenance Budget.				
T-2	Secondary Clarifier #1 & 2 Drive Replacement				
	2017	UFA/G	Repair	n/a	$ 150
	Replace the secondary clarifier drives 1 and 2. This project would be funded under the Wastewater Maintenance Budget.				

T-3	Biofilter Odor Control Fan Replacement				
	2015	UFA	Repair	n/a	$ 50
	Replace the existing 25 horsepower biofilter with a 10 horsepower direct drive fan at the WWTP. This project may be partially funded by grants from PSE or DES.				
T-4	Primary Effluent Line Rehabilitation				
	2019 - 2020	UFA	Repair	n/a	$ 450
	Replace the primary effluent line. Replacement will be needed due to reaching its service life in the future.				
T-5	Replace Drives on RAS Pumps				
	2015	UFA / G	Repair	n/a	$ 100
	Install variable-frequency drives on RAS pumps. This project will replace aging equipment and improve efficiency. This project would be funded by the User Fee Assessment fund and other grants.				
T-6	Recoat Aluminum Covers on the Primary Clarifiers and Biofilter				
	2016	UFA	Repair	n/a	$ 275
	Re-coat the aluminum covers on the underside of the primary clarifiers and biofilter.				
T-7	Biofilter Upgrade				
	2015	UFA/G	Repair	n/a	$ 800
	Replace media and purchase and install two feed pumps.				
T-8	Replace RAS Pumps				
	2015	UFA/G	Repair	n/a	$ 275
	Replace the three RAS pumps with dry pit submersible pumps.				
T-9	Surge Tank Repair and Hypo Tank Replacement				
	2015	UFA	Repair	n/a	$ 100
	Repair existing surge tank and replace hypo tank at the WWTP.				
T-10	Wastewater Reuse				
	2020	UFA	None	n/a	$ 250
	Pre-design developed for wastewater treatment and conveyance of reused wastewater to the gateway. Install approximately 140 feet HDD under SR3 and connect to “purple pipe” with a total pipe length of 500 feet. This project will be constructed with the WSDOT SR304 project.				
T-11	Headworks Odor Control Fan Replacement				
	2015	UFA/G	Repair	n/a	$ 90
	Replace the existing 75 horse power headworks odor control fan with a 20 horse power direct drive fan and variable frequency drive (VFD). This project may be partially funded by grants from PSE or DES.				
T-12	Aeration Basin Turbo Blower				
	2015	UFA/G	Repair	n/a	$ 230
	Replace the existing 200 horse power aeration basin turbo blower with a 100 horse power Neuros blower. This project may be partially funded by grants from PSE or DES.				
T-13	Digester Recirculation Pumps				
	2015	UFA/G	Repair	n/a	$ 60
	Replace existing digester recirculation pumps by converting two sludge loading pumps into recirculation pumps. This project may be partially funded by grants from PSE or DES.				
T-14	RAS Pumps and VFDs				
	2015	UFA/G	Repair	n/a	$ 1,000
	Replace the existing RAS pumps, eddy current drives, and valves with new Flygt pumps, VFDs, and new valves. This project may be partially funded by grants from PSE or DES.				

T-15	Chlorine Contact Chamber Upgrade				
	2017	UFA	Repair	n/a	$ 100
	Sandblast, grout, and coat the chlorine contact chambers #1 & 2 walls.				
T-16	Aeration Basins 1 & 2 Membrane Diffuser Replacement				
	2016	UFA	Repair	n/a	$ 100
	Replace of the diffuser membranes (288) in aeration basins #1 & 2				
T-17	Influent Fine Screen 1 & 2 Upgrade				
	2015	UFA	Repair	n/a	$ 100
	Complete overhaul and upgrade to the influent fine screens at the WWTP				
T-18	Digester Domes 1 & 2 Replacement				
	2020	UFA	Repair	n/a	$ 2,000
	Replacement of the 35+ year old steel digester domes. This project would be broken out into two successive years				
T-19	Westside WWTP Boiler Replacement				
	2020	UFA	Repair	n/a	$ 500
	Purchase and installation of an additional methane/natural gas boiler. The current boiler is plagued with numerous mechanical issues, and would be kept as a back-up.				
M-4	SCADA Lifecycle Improvements				
	Annual	UFA	None	n/a	$ 900
	Expand the fiber optic network and install blade servers to upgrade the SCADA system at the WWTP.				
CIP Year 2020+					

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Operations and Maintenance

O&M DESCRIPTION					
Description	This section describes operation and maintenance improvement plans that are scheduled to occur throughout the City of Bremerton.				
CIP					
CIP ID	**Timeline**	**Funding Source**	**Purpose**	**Related Projects**	**Cost ($1,000)**
CIP Year 2015-2020					
M-1	Substandard Main Replacement Program				
	Annual	UFA	Deficiency	n/a	$ 2,700
	Replace substandard sewer mains. This is an annual program to fund cured-in-place pipe (CIPP) improvements to rehabilitate the condition of aging sewer mains in the collection system. This project would be funded by the User Fee Assessment fund.				
M-2	Beach main and Critical Force main Cleaning				
	Annual	UFA	Repair/None	n/a	$ 1,075
	Clean the beach main and critical force main at pump station CE-1. This project would be funded by the User Fee Assessment fund.				
M-3	Machinery/Equipment - Utility Operations Manager				
	Annual	UFA	Repair	n/a	$ 120
	This project would be funded by the User Fee Assessment fund.				
M-5	Metering System Upgrade				
	2015 - 2019	UFA	None	n/a	$ 1,182
	Install new antenna based water meter reading hardware.				
M-6	WWTP and Pump Station Improvement Program				
	Annual	UFA	Deficiency	n/a	$ 3,850
	Annual replacement and rehabilitation of infrastructure and equipment. This project would be funded by the User Fee Assessment fund. Additionally, Puget Sound Energy will provide a 50% funding match for energy efficiency upgrades.				
M-8	Oyster Bay Public Works Consolidation				
	2015	UFA	None	n/a	$ 250
	Remodel and improve the Oyster Bay Public Works Building and upgrade parking facilities to support the relocation of the engineering department to the building.				
M-9	Sewer Main Replacement with Pavement Reconstruction				
	Annual	UFA	Deficiency	n/a	$ 900
	This program supports sewer main upgrades associated with road improvements.				
CIP Year 2020+					
M-7	Model Calibration and Update				
	>2020	UFA	None	n/a	$ 250
	This is a project to update and calibrate the City's sewer model. It will involve flow monitoring at selected sites throughout the sewer collection system and a validation of sewer main diameters and inverts, manhole dimensions, pump station and wet well dimensions, and regulator structures. An outside consultant would be contracted to update the model with GIS and flow monitoring data.				

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Appendix D

Interagency Agreements

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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.~~ 8/13/92 8/13/92 8/13/92 WD Ken

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

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: [signature]
LOUIS MENTOR, Mayor

ATTEST:

[signature]
KATHLEEN L. McCLUSKEY, Clerk

DEPARTMENT APPROVAL:

BY: [signature]
WILLIAM DUFFY,
Utilities Director

APPROVED AS TO FORM:

[signature]
IAN R. SIEVERS, City Attorney

KITSAP COUNTY SEWER DISTRICT #1

BY: [signature]
[signature]
[signature]

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 Herrmann
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: 12/15/92.

RUSSELL W. ... NOTARY PUBLIC ... DEC. 15, 19... STATE OF WA...

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Contract Number:	4757
Vendor:	NAVY - DEPT OF
Subject:	Utility Services - Water/Wastewater/Stormwater
Department:	PW Admin
File Class:	LEG 12-1
Begin Date:	08/01/2008
End Date:	07/31/2018
Review Date:	07/01/2017
Vault Date:	
Comments:	N44255-08-C-3005 Rates subject to annual escalation As amended 5/08 - 8/08 - 1/09

AMENDMENT OF SOLICITATION/MODIFICATION OF CONTRACT			1. CONTRACT ID CODE J	PAGE OF PAGES 1 3
2. AMENDMENT/MODIFICATION NO. P00002	3. EFFECTIVE DATE 01-Jan-2009	4. REQUISITION/PURCHASE REQ. NO.		5. PROJECT NO. (If applicable)
6. ISSUED BY CODE N44255 NAVFAC NORTHWEST 1101 TAUTOG CIRCLE, SUITE 203 SILVERDALE WA 98315-1101		7. ADMINISTERED BY (If other than item 6) CODE See Item 6		

8. NAME AND ADDRESS OF CONTRACTOR (No., Street, County, State and Zip Code)		9A. AMENDMENT OF SOLICITATION NO.
CITY OF BREMERTON 3027 OLYMPUS DR BREMERTON WA 98310-4799		9B. DATED (SEE ITEM 11)
	X	10A. MOD. OF CONTRACT/ORDER NO. N44255-08-C-3005
CODE 04DN7 FACILITY CODE 04DN7	X	10B. DATED (SEE ITEM 13) 30-Jul-2008

11. THIS ITEM ONLY APPLIES TO AMENDMENTS OF SOLICITATIONS

☐ The above numbered solicitation is amended as set forth in Item 14. The hour and date specified for receipt of Offer ☐ is extended, ☐ is not extended.

Offer must acknowledge receipt of this amendment prior to the hour and date specified in the solicitation or as amended by one of the following methods: (a) By completing Items 8 and 15, and returning ______ copies of the amendment; (b) By acknowledging receipt of this amendment on each copy of the offer submitted; or (c) By separate letter or telegram which includes a reference to the solicitation and amendment numbers. FAILURE OF YOUR ACKNOWLEDGMENT TO BE RECEIVED AT THE PLACE DESIGNATED FOR THE RECEIPT OF OFFERS PRIOR TO THE HOUR AND DATE SPECIFIED MAY RESULT IN REJECTION OF YOUR OFFER. If by virtue of this amendment you desire to change an offer already submitted, such change may be made by telegram or letter, provided each telegram or letter makes reference to the solicitation and this amendment, and is received prior to the opening hour and date specified.

12. ACCOUNTING AND APPROPRIATION DATA (If required)

13. THIS ITEM APPLIES ONLY TO MODIFICATIONS OF CONTRACTS/ORDERS.
IT MODIFIES THE CONTRACT/ORDER NO. AS DESCRIBED IN ITEM 14.

	A. THIS CHANGE ORDER IS ISSUED PURSUANT TO: (Specify authority) THE CHANGES SET FORTH IN ITEM 14 ARE MADE IN THE CONTRACT ORDER NO. IN ITEM 10A.
	B. THE ABOVE NUMBERED CONTRACT/ORDER IS MODIFIED TO REFLECT THE ADMINISTRATIVE CHANGES (such as changes in paying office, appropriation date, etc.) SET FORTH IN ITEM 14, PURSUANT TO THE AUTHORITY OF FAR 43.103(B).
X	C. THIS SUPPLEMENTAL AGREEMENT IS ENTERED INTO PURSUANT TO AUTHORITY OF: FAR 52.241-8
	D. OTHER (Specify type of modification and authority)

E. IMPORTANT: Contractor ☐ is not, ☒ is required to sign this document and return 1 copies to the issuing office.

14. DESCRIPTION OF AMENDMENT/MODIFICATION (Organized by UCF section headings, including solicitation/contract subject matter where feasible.)

Modification Control Number: begleyb09245

This modification incorporates the City of Bremerton's Ordinance No. 5070 and Attachment J2 (Rev 1 dated 1-12-09 - Rate Escalation Calculations) for Year 2 (FY09) of the contract effective 1 January 2009. Also incorporated is the document labeled "Methodology for Adjustment of Water and Wastewater Rates, CLIN 0001 and CLIN 0002" Rev 1 dated 1-12-09. Please see Block 14 Continuation Pages 2 and 3 for additional details.

Except as provided herein, all terms and conditions of the document referenced in Item 9A or 10A, as heretofore changed, remains unchanged and in full force and effect.

15A. NAME AND TITLE OF SIGNER (Type or print)		16A. NAME AND TITLE OF CONTRACTING OFFICER (Type or print)	
PHIL WILLIAMS, DIRECTOR PW/U		PAUL R. ANISHANSLIN, CONTRACT SPECIALIST TEL: 360-396-0230 EMAIL: PAUL.ANISHANSLIN@NAVY.MIL	
15B. CONTRACTOR/OFFEROR [signature] (Signature of person authorized to sign)	15C. DATE SIGNED 1/30/09	16B. UNITED STATES OF AMERICA BY Paul R. Anishanslin (Signature of Contracting Officer)	16C. DATE SIGNED 30 Jan 2009

AMENDMENT OF SOLICITATION/MODIFICATION OF CONTRACT

1. CONTRACT ID CODE	PAGE OF PAGES
J	1 of 3

2. AMENDMENT/MODIFICATION NO.	3. EFFECTIVE DATE	4. REQUISITION/PURCHASE REQ. NO.	5. PROJECT NO.(If applicable)
P00002	01-Jan-2009		

6. ISSUED BY CODE N44255	7. ADMINISTERED BY (If other than item 6) CODE
NAVFAC NORTHWEST 1101 TAUTOG CIRCLE, SUITE 203 SILVERDALE WA 98315-1101	See Item 6

8. NAME AND ADDRESS OF CONTRACTOR (No., Street, County, State and Zip Code)
CITY OF BREMERTON
3027 OLYMPUS DR
BREMERTON WA 98310-4799

CODE 04DN7 FACILITY CODE 04DN7

	9A. AMENDMENT OF SOLICITATION NO.
	9B. DATED (SEE ITEM 11)
X	10A. MOD. OF CONTRACT/ORDER NO. N44255-08-C-3005
X	10B. DATED (SEE ITEM 13) 30-Jul-2008

11. THIS ITEM ONLY APPLIES TO AMENDMENTS OF SOLICITATIONS

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Offer must acknowledge receipt of this amendment prior to the hour and date specified in the solicitation or as amended by one of the following methods: (a) By completing Items 8 and 15, and returning ____ copies of the amendment; (b) By acknowledging receipt of this amendment on each copy of the offer submitted; or (c) By separate letter or telegram which includes a reference to the solicitation and amendment numbers. FAILURE OF YOUR ACKNOWLEDGMENT TO BE RECEIVED AT THE PLACE DESIGNATED FOR THE RECEIPT OF OFFERS PRIOR TO THE HOUR AND DATE SPECIFIED MAY RESULT IN REJECTION OF YOUR OFFER. If by virtue of this amendment you desire to change an offer already submitted, such change may be made by telegram or letter, provided each telegram or letter makes reference to the solicitation and this amendment, and is received prior to the opening hour and date specified.

12. ACCOUNTING AND APPROPRIATION DATA (If required)

13. THIS ITEM APPLIES ONLY TO MODIFICATIONS OF CONTRACTS/ORDERS.
IT MODIFIES THE CONTRACT/ORDER NO. AS DESCRIBED IN ITEM 14.

	A. THIS CHANGE ORDER IS ISSUED PURSUANT TO: (Specify authority) THE CHANGES SET FORTH IN ITEM 14 ARE MADE IN THE CONTRACT ORDER NO. IN ITEM 10A.
	B. THE ABOVE NUMBERED CONTRACT/ORDER IS MODIFIED TO REFLECT THE ADMINISTRATIVE CHANGES (such as changes in paying office, appropriation date, etc.) SET FORTH IN ITEM 14, PURSUANT TO THE AUTHORITY OF FAR 43.103(B).
X	C. THIS SUPPLEMENTAL AGREEMENT IS ENTERED INTO PURSUANT TO AUTHORITY OF: FAR 52.241-8
	D. OTHER (Specify type of modification and authority)

E. IMPORTANT: Contractor ☐ is not, ☒ is required to sign this document and return 1 copies to the issuing office.

14. DESCRIPTION OF AMENDMENT/MODIFICATION (Organized by UCF section headings, including solicitation/contract subject matter where feasible.)
Modification Control Number: begleyb09245

This modification incorporates the City of Bremerton's Ordinance No. 5070 and Attachment J2 (Rev 1 dated 1-12-09 - Rate Escalation Calculations) for Year 2 (FY09) of the contract effective 1 January 2009. Also incorporated is the document labeled "Methodology for Adjustment of Water and Wastewater Rates, CLIN 0001 and CLIN 0002" Rev 1 dated 1-12-09. Please see Block 14 Continuation Pages 2 and 3 for additional details.

Except as provided herein, all terms and conditions of the document referenced in Item 9A or 10A, as heretofore changed, remains unchanged and in full force and effect.

15A. NAME AND TITLE OF SIGNER (Type or print)		16A. NAME AND TITLE OF CONTRACTING OFFICER (Type or print)	
		PAUL R ANISHANSLIN / LEAD CONTRACT SPECIALIST TEL: (360) 396-0230 EMAIL: Paul.Anishanslin@navy.mil	
15B. CONTRACTOR/OFFEROR	15C. DATE SIGNED	16B. UNITED STATES OF AMERICA	16C. DATE SIGNED
(Signature of person authorized to sign)		BY Paul R. Anishanslin (Signature of Contracting Officer)	30-Jan-2009

SECTION SF 30 BLOCK 14 CONTINUATION PAGE

SUMMARY OF CHANGES

In accordance with contract Section B.4, Future Rate Adjustments, the purpose of this modification is to incorporate rate adjustments for Contract Line Items (CLINs) 0001, 0002, 0003, and 0004 for the second rate period of subject contract.

This modification incorporates the City of Bremerton Ordinance No. 5070, as passed by the Bremerton City Council on 19 November 2008, with an effective date of 01 January 2009.

This modification further incorporates Attachment J2 (Rev. 1), dated 12 January 2009 which establishes the Rate Escalation Calculations for Rate Period 2 for CLINs 0001 and 0002 of subject contract to be effective 01 January 2009. Attachment J2 (Rev. 1) supersedes and replaces Attachment J which was incorporated into basic contract award on 30 July 2008.

CLINs 0003 and 0004 are revised in accordance with City of Bremerton Ordinance No. 5070 and the applicable revisions to the Bremerton Municipal Code (BMC) for Utilities, Appendix A, BMC 15.06 effective 01 January 2009.

As a result of this modification, the following rates shall be in effect for the period of 1/1/09 to 12/31/09 which incorporates a 5.78% escalation increase for CLIN 0001, a 5.81% escalation increase for CLIN 0002, and a 5.8% escalation increase for CLINS 0003-0004:

CLIN 0001 (Potable Water – BNC): $41,252.96 / month and volumetric charge- $1.32 / hundred cubic feet (hcf)
CLIN 0002 (Sewage Services – BNC): $86,126.25 / month and volumetric charge- $3.26 / hundred cubic feet (hcf)
CLIN 0003 (Water and Sewer – Bldg 981 – BNC): Water: $22.97 / month (2-inch, Within City Limits) and volumetric charge - $1.24/hcf (Non-Residential, Within City Limits); Sewer $42.21/mo (Commercial I, Within City Limits) and $4.32/hcf (Commercial I, Within City Limits).
CLIN 0004 (Storm Water Service – Montgomery Ave): $2,125.00 / month ($8.50 / month * 250 ISU's) (Commercial I, Within City Limits)

This modification clarifies that CLIN 0004 (Storm Water Service – Montgomery Ave) as added through modification P0001 to subject contract on 18 August 2008 shall be in accordance with the most recent applicable version of the Bremerton Municipal Code (BMC) for Utilities, Appendix A, BMC 15.06, and as may be amended in the future.

This modification also incorporates the attached document "Methodology for Adjustment of Water and Wastewater Rates - CLIN 0001 and CLIN 0002 (Rev 1. Dated 1-12-09). As part of this revised document, the parties agree that rounding of new navy rates will be to the nearest cent using conventional rounding methods, i.e., amounts of 0.5 cent or greater will be rounded up, amounts less than 0.5 cent will be rounded down. In addition, the parties agree to use the term "rate period" vice "year" with regards to any future rate adjustments in this contract.

SECTION G - CONTRACT ADMINISTRATION DATA

The following have been modified:

ACCOUNTING INSTRUCTIONS

G. 2 INVOICES: The below table under section G.2 has been updated to include ALL applicable Governmment Account Numbers.

U.S Navy
(Insert Government Account Number)
P.O. Box 30088
College Station, Texas 77842-3088

Utility Account Number	GOVERNMENT ACCOUNT NUMBER	Contract No.	Service Location	Site Name
1300030	NW_43_**FW_0007**	N44255-08-C-3005	1st and Pacific	Bremerton
1300040	NW_43_ **FW_0007**	N44255-08-C-3005	Charleston Gate	Bremerton
1300050	NW_43_FW_00007	N44255-08-C-3005	1st Street & Rainier Ave.	Bremerton
1300090	NW_43_**SE_0004**	N44255-08-C-3005	143 1st Avenue - MS5	Bremerton
1300100	NW_43_SE_00004	N44255-08-C-3005	416 S. Cambrian Avenue – MS4	Bremerton
1300120	NW_43_ **SE_0004**	N44255-08-C-3005	416 S. Cambrian Avenue – MS4	Bremerton
4655650	NW_43_SE_00002	N44255-08-C-3005	State Highway 304 Pass & ID Bldg 981	Bremerton
4655650	NW_43_FW_00002	N44255-08-C-3005	State Highway 304 Pass & ID Bldg 981	Bremerton

All other terms and conditions remain unchanged.

(End of Summary of Changes)

Contract Number:	4757
Vendor:	U S NAVY
Subject:	Utility Services - Water/Wastewater/Stormwater
Department:	PW Admin
File Class:	LEG 12-1
Begin Date:	08/01/2008
End Date:	07/31/2018
Review Date:	07/01/2017
Vault Date:	
Comments:	N44255-08-C-3005 Rates subject to annual escalation As amended 5/08 - 8/08

AMENDMENT OF SOLICITATION/MODIFICATION OF CONTRACT

1. CONTRACT ID CODE	J
PAGE OF PAGES	1 of 4
2. AMENDMENT/MODIFICATION NO.	P00001
3. EFFECTIVE DATE	01-Aug-2008
4. REQUISITION/PURCHASE REQ. NO.	
5. PROJECT NO.(If applicable)	
6. ISSUED BY	CODE N44255 NAVFAC NORTHWEST 1101 TAUTOG CIRCLE, SUITE 203 SILVERDALE WA 98315-1101
7. ADMINISTERED BY (If other than item 6)	CODE See Item 6
8. NAME AND ADDRESS OF CONTRACTOR (No., Street, County, State and Zip Code)	CITY OF BREMERTON 3027 OLYMPUS DR BREMERTON WA 98310-4799
9A. AMENDMENT OF SOLICITATION NO.	
9B. DATED (SEE ITEM 11)	
10A. MOD. OF CONTRACT/ORDER NO.	X N44255-08-C-3005
10B. DATED (SEE ITEM 13)	X 30-Jul-2008
CODE	04DN7
FACILITY CODE	04DN7

11. THIS ITEM ONLY APPLIES TO AMENDMENTS OF SOLICITATIONS

☐ The above numbered solicitation is amended as set forth in Item 14. The hour and date specified for receipt of Offer ☐ is extended, ☐ is not extended.

Offer must acknowledge receipt of this amendment prior to the hour and date specified in the solicitation or as amended by one of the following methods: (a) By completing Items 8 and 15, and returning ______ copies of the amendment; (b) By acknowledging receipt of this amendment on each copy of the offer submitted; or (c) By separate letter or telegram which includes a reference to the solicitation and amendment numbers. FAILURE OF YOUR ACKNOWLEDGMENT TO BE RECEIVED AT THE PLACE DESIGNATED FOR THE RECEIPT OF OFFERS PRIOR TO THE HOUR AND DATE SPECIFIED MAY RESULT IN REJECTION OF YOUR OFFER. If by virtue of this amendment you desire to change an offer already submitted, such change may be made by telegram or letter, provided each telegram or letter makes reference to the solicitation and this amendment, and is received prior to the opening hour and date specified.

12. ACCOUNTING AND APPROPRIATION DATA (If required)

13. THIS ITEM APPLIES ONLY TO MODIFICATIONS OF CONTRACTS/ORDERS. IT MODIFIES THE CONTRACT/ORDER NO. AS DESCRIBED IN ITEM 14.

☐ A. THIS CHANGE ORDER IS ISSUED PURSUANT TO: (Specify authority) THE CHANGES SET FORTH IN ITEM 14 ARE MADE IN THE CONTRACT ORDER NO. IN ITEM 10A.

☐ B. THE ABOVE NUMBERED CONTRACT/ORDER IS MODIFIED TO REFLECT THE ADMINISTRATIVE CHANGES (such as changes in paying office, appropriation date, etc.) SET FORTH IN ITEM 14, PURSUANT TO THE AUTHORITY OF FAR 43.103(B).

X C. THIS SUPPLEMENTAL AGREEMENT IS ENTERED INTO PURSUANT TO AUTHORITY OF:
FAR 52.243-1 Alternate 1 (Aug 1987)

☐ D. OTHER (Specify type of modification and authority)

E. IMPORTANT: Contractor ☐ is not, ☒ is required to sign this document and return ______ copies to the issuing office.

14. DESCRIPTION OF AMENDMENT/MODIFICATION (Organized by UCF section headings, including solicitation/contract subject matter where feasible.)
Modification Control Number: anishapr08949

(1) Addition of City of Bremerton stormwater services at Montgomery Avenue. (2) addition of 5 contract clauses to basic contract. (3) Administrative corrections to numbering of contract provisions.

Except as provided herein, all terms and conditions of the document referenced in Item 9A or 10A, as heretofore changed, remains unchanged and in full force and effect.

15A. NAME AND TITLE OF SIGNER (Type or print)	Phil Williams, Director of PW&U
16A. NAME AND TITLE OF CONTRACTING OFFICER (Type or print)	PAUL R. ANISHANSLIN, CONTRACT SPECIALIST TEL: 360-396-0230 EMAIL: PAUL.ANISHANSLIN@NAVY.MIL
15B. CONTRACTOR/OFFEROR	(signature) (Signature of person authorized to sign)
15C. DATE SIGNED	8/14/08
16B. UNITED STATES OF AMERICA	BY Paul R. Anishanslin (Signature of Contracting Officer)
16C. DATE SIGNED	18 Aug 2008

EXCEPTION TO SF 30
APPROVED BY OIRM 11-84

30-105-04

STANDARD FORM 30 (Rev. 10-83)
Prescribed by GSA
FAR (48 CFR) 53.243

SECTION SF 30 BLOCK 14 CONTINUATION PAGE

SUMMARY OF CHANGES

SECTION B - SUPPLIES OR SERVICES AND PRICES

CLIN 0004 is added as follows:

ITEM NO	SUPPLIES/SERVICES	QUANTITY	UNIT	UNIT PRICE	AMOUNT
0004		10	Years	$0.00	$0.00

STORMWATER
FFP
This CLIN is established to add the Navy property located on Montgomery Avenue that directly contributes stormwater to a City-owned and maintained stormwater collection system. The monthly rate will be based on the amount of impervious surface units (ISU) contributing run-off to the City collection system. One ISU is equivalent to 2,500 square feet. The rate for one ISU is $8.03/month. The parties agreee that 250 ISU's are applicable to the Navy property located on Montgomery Ave. The stormwater charges for this area will be added to the City of Bremerton utility account #2502301.
FOB: Destination

NET AMT $0.00

The following have been added by full text:
CORRECT PROVISION NUMBERING
The following administrative corrections are made to the provision numbering in Section B:

There are currently two provisions numbered B.3. To correct this inadvertent duplication, the following renumbering is implemented:

Provision B.3, CLIN 0002. ACCOUNT #1300100. ADDITION OF ESTIMATED SEWAGE FLOW FROM THE NAVY'S MONTGOMERY AVENUE GUARD SHACK INTO CITY'S WASTEWATER STREAM (WEST END OF BNC) **remains unchanged as Provision B.3.**

Provision B.3, FUTURE RATE ADJUSTMENTS, **is changed to read B.4,** FUTURE RATE ADJUSTMENTS.

Provision B.4, CONTRACT EFFECTIVE DATE, **is changed to read B.5,** CONTRACT EFFECTIVE DATE.

Provision B.1 RATE STRUCTURE. Under subparagraph, CLIN 0001, the last sentence is changed from "Any future adjustment of CLIN 0001 rates shall be in accordance with provision **B.3, Future Adjustment of Rates"** to read "Any future adjustment of CLIN 0001 rates shall be in accordance with provision **B.4, Future Rate Adjustments.**

Provision B.1 RATE STRUCTURE. Under subparagraph, CLIN 0002, the last sentence is changed from "Any future adjustment of CLIN 0002 rates shall be in accordance with provision **B.3, Future Adjustment of Rates,** to read "Any future adjustment of CLIN 0002 rates shall be in accordance with **provision B.4. Future Rate "Adjustments.**

All other terms and conditions in Section B remain unchanged.

SECTION E - INSPECTION AND ACCEPTANCE

The following Acceptance/Inspection Schedule was added for CLIN 0004:

INSPECT AT	INSPECT BY	ACCEPT AT	ACCEPT BY
N/A	N/A	N/A	Government

SECTION F - DELIVERIES OR PERFORMANCE

The following Delivery Schedule item for CLIN 0001 has been changed from:

DELIVERY DATE	QUANTITY	SHIP TO ADDRESS	UIC
31-JUL-2018	10	N/A FOB: Destination	

To:

DELIVERY DATE	QUANTITY	SHIP TO ADDRESS	UIC
31-JUL-2018		N/A FOB: Destination	

The following Delivery Schedule item has been added to CLIN 0004:

DELIVERY DATE	QUANTITY	SHIP TO ADDRESS	UIC
31-JUL-2018	10	N/A FOB: Destination	

SECTION I - CONTRACT CLAUSES

The following have been added by full text:
<u>CONTRACT CLAUSES</u>
The parties mutually agree that the following contract clause is added in full text to subject contract:

1. FAR 52.216-1. TYPE OF CONTRACT. (APR 1984). The Government contemplates award of a fixed-price utility services contract resulting from this solicitation. (End of Provision).

The parties mutually agree that the following contract clauses are added by reference to subject contract:

1. FAR 52.229-3. FEDERAL, STATE, AND LOCAL TAXES (APR 2003)
2. FAR 52.242-14. SUSPENSION OF WORK (APR 1984)
3. DFARS 252.201-7000 CONTRACTING OFFICER'S REPRESENTATIVE (DEC 1991).
4. DFARS 252-223-7004 DRUG-FREE WORK FORCE (SEP 1988)

All other terms and conditions of Section I remain unchanged.

(End of Summary of Changes)

Contract Number:	4757
Vendor:	U S NAVY
Subject:	Utility Services - Water/Wastewater/Stormwater
Department:	PW Admin
File Class:	LEG 12-1
Begin Date:	08/01/2008
End Date:	07/31/2018
Review Date:	07/01/2017
Vault Date:	
Comments:	N44255-08-C-3005 Rates subject to annual escalation As amended 5/08

AMENDMENT OF SOLICITATION/MODIFICATION OF CONTRACT

1. CONTRACT ID CODE	PAGE OF PAGES	
J	1	2

2. AMENDMENT/MODIFICATION NO.	3. EFFECTIVE DATE	4. REQUISITION/PURCHASE REQ. NO.	5. PROJECT NO (If applicable)
P00002	13-May-2008		

6. ISSUED BY CODE N44255	7. ADMINISTERED BY (If other than item 6) CODE
NAVFAC NORTHWEST 1101 TAUTOG CIRCLE, SUITE 203 SILVERDALE WA 98315-1101	See Item 6

8. NAME AND ADDRESS OF CONTRACTOR (No., Street, County, State and Zip Code)
CITY OF BREMERTON
3027 OLYMPUS DR
BREMERTON WA 98310-4799

CODE 04DN7 FACILITY CODE

	9A. AMENDMENT OF SOLICITATION NO.
	9B. DATED (SEE ITEM 11)
X	10A. MOD. OF CONTRACT/ORDER NO. N44255-08-C-3001
X	10B. DATED (SEE ITEM 13) 01-Dec-2007

11. THIS ITEM ONLY APPLIES TO AMENDMENTS OF SOLICITATIONS

☐ The above numbered solicitation is amended as set forth in Item 14. The hour and date specified for receipt of Offer ☐ is extended, ☐ is not extended.

Offer must acknowledge receipt of this amendment prior to the hour and date specified in the solicitation or as amended by one of the following methods.
(a) By completing Items 8 and 15, and returning ______ copies of the amendment; (b) By acknowledging receipt of this amendment on each copy of the offer submitted; or (c) By separate letter or telegram which includes a reference to the solicitation and amendment numbers. FAILURE OF YOUR ACKNOWLEDGMENT TO BE RECEIVED AT THE PLACE DESIGNATED FOR THE RECEIPT OF OFFERS PRIOR TO THE HOUR AND DATE SPECIFIED MAY RESULT IN REJECTION OF YOUR OFFER. If by virtue of this amendment you desire to change an offer already submitted, such change may be made by telegram or letter, provided each telegram or letter makes reference to the solicitation and this amendment, and is received prior to the opening hour and date specified

12. ACCOUNTING AND APPROPRIATION DATA (If required)

13. THIS ITEM APPLIES ONLY TO MODIFICATIONS OF CONTRACTS/ORDERS.
IT MODIFIES THE CONTRACT/ORDER NO. AS DESCRIBED IN ITEM 14.

	A. THIS CHANGE ORDER IS ISSUED PURSUANT TO: (Specify authority) THE CHANGES SET FORTH IN ITEM 14 ARE MADE IN THE CONTRACT ORDER NO. IN ITEM 10A.
X	B. THE ABOVE NUMBERED CONTRACT/ORDER IS MODIFIED TO REFLECT THE ADMINISTRATIVE CHANGES (such as changes in paying office, appropriation date, etc.) SET FORTH IN ITEM 14, PURSUANT TO THE AUTHORITY OF FAR 43.103(B).
	C. THIS SUPPLEMENTAL AGREEMENT IS ENTERED INTO PURSUANT TO AUTHORITY OF:
	D. OTHER (Specify type of modification and authority)

E. IMPORTANT: Contractor [X] is not, ☐ is required to sign this document and return ______ copies to the issuing office.

14. DESCRIPTION OF AMENDMENT/MODIFICATION (Organized by UCF section headings, including solicitation/contract subject matter where feasible.)
Modification Control Number: murphyc08675

Effective 13 May 2008, change invoicing address for accounts 5352200, 5352000, and 5352050 to:
CNIC-FSC
1837 Morris Street
Code: INV
Norfolk, VA 23511

Except as provided herein, all terms and conditions of the document referenced in Item 9A or 10A, as heretofore changed, remains unchanged and in full force and effect.

15A. NAME AND TITLE OF SIGNER (Type or print)		16A. NAME AND TITLE OF CONTRACTING OFFICER (Type or print) CHARLES D. BENSON / CONTRACT SPECIALIST TEL: 360-396-0052 EMAIL: chuck.benson@navy.mil	
15B. CONTRACTOR/OFFEROR ______________________ (Signature of person authorized to sign)	15C. DATE SIGNED	16B. UNITED STATES OF AMERICA BY Charles D. Benson (Signature of Contracting Officer)	16C. DATE SIGNED 13-May-2008

SECTION SF 30 BLOCK 14 CONTINUATION PAGE

SUMMARY OF CHANGES

SECTION B - SUPPLIES OR SERVICES AND PRICES

CLIN 0001
The FSC code has changed from S114 to S222.

CLIN 0002
The NAICS code has changed from 221320 to 221310.

(End of Summary of Changes)

SOLICITATION, OFFER AND AWARD

SOLICITATION, OFFER AND AWARD	1. THIS CONTRACT IS A RATED ORDER UNDER DPAS (15 CFR 700)	RATING	PAGE OF PAGES 1 24	
2. CONTRACT NO. N44255-08-C-3005	3. SOLICITATION NO.	4. TYPE OF SOLICITATION [ ] SEALED BID (IFB) [ ] NEGOTIATED (RFP)	5. DATE ISSUED	6. REQUISITION/PURCHASE NO.
7. ISSUED BY NAVFAC NORTHWEST 1101 TAUTOG CIRCLE, SUITE 203 SILVERDALE WA 98315-1101 CODE N44255 TEL: FAX:		8. ADDRESS OFFER TO (If other than Item 7) CODE 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

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 CITY OF BREMERTON 3027 OLYMPUS DR BREMERTON WA 98310-4799		16. NAME AND TITLE OF PERSON AUTHORIZED TO SIGN OFFER (Type or print) CARY BOZEMAN MAYOR
15B. TELEPHONE NO (Include area code) 360-473-5315	15C. CHECK IF REMITTANCE ADDRESS IS DIFFERENT FROM ABOVE - ENTER SUCH ADDRESS IN SCHEDULE. [ ]	17. SIGNATURE [signature] 18. OFFER DATE 07/22/2008

AWARD (To be completed by Government)

19. ACCEPTED AS TO ITEMS NUMBERED	20. AMOUNT $0.00	21. ACCOUNTING AND APPROPRIATION
22. AUTHORITY FOR USING OTHER THAN FULL AND OPEN COMPETITION: [X] 10 U.S.C. 2304(c)( ) [ ] 41 U.S.C. 253(c)( )		23. SUBMIT INVOICES TO ADDRESS SHOWN IN (4 copies unless otherwise specified) ITEM
24. ADMINISTERED BY (If other than Item 7) CODE See item 7		25. PAYMENT WILL BE MADE BY CODE
26. NAME OF CONTRACTING OFFICER (Type or print) MARY LANGFELDT TEL: EMAIL:		27. UNITED STATES OF AMERICA Mary Langfeldt (Signature of Contracting Officer) 28. AWARD DATE 30 JUN 08

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		10	Years		

POTABLE WATER - BNC
FFP
Provide potable water to Bremerton Naval Complex (BNC), Bremerton, Washington. Water flow volume shall be measured through City of Bremerton meter located at 1st and Pacific; City of Bremerton meter located at Charleston Gate; and City of Bremerton meter located at lst and Rainier Avenue. City of Bremerton utility accounts 1300030, 1300040, and 1300050 apply to this CLIN. CLIN 0001 rate design is based on mutually negotiated cost of service study. CLIN 0001 estimated component rates for 2008 are found at contract provision B.1, Rate Structure.
FOB: Destination

NET AMT $0.00

ITEM NO	SUPPLIES/SERVICES	QUANTITY	UNIT	UNIT PRICE	AMOUNT
0002		10	Years		

SEWAGE SERVICE - BNC
FFP
Provide sewage disposal and treatment for Bremerton Naval Complex (BNC), Bremerton, Washington. Sewage flow volume will be measured through City of Bremerton meter located at 143 lst Street; and City of Bremerton meter located at 416 S. Cambrian Avenue. City of Bremerton utility accounts 1300090, 1300100, and 1300120 apply to this CLIN. CLIN 0002 rate design is based on mutually negotiated cost of service study. CLIN 0002 component rates for 2008 are found at contract provision B.1, Rate Structure. Deductions from account 1300090 to address City water flow into Navy sewage system shall be applied as described in contract provision B.2. Addition of Navy sewage flow from Mongomery Guard Shack into City sewer system shall be applied to account 1300010 as described in contract provision B.3.
FOB: Destination

NET AMT $0.00

ITEM NO	SUPPLIES/SERVICES	QUANTITY	UNIT	UNIT PRICE	AMOUNT
0003		10	Years		

WATER AND SEWER, BLDG 981 BNC
FFP
Provide potable water and sewage service for Building 981, Pass and ID, Bremerton Naval Complex (BNC), Bremerton, Washington. Water flow volume is measured through City of Bremerton water meter. City of Bremerton utility account 4655650 applies to this CLIN. Price for metered water shall be based on City of Bremerton within city 2" meters size as found in City of Bremerton Municipal Code 15.06, Appendix A, Retail Water Service Rates. Price for sewage is based on City of Bremerton Commercial 1 within city rates as found in City of Bremerton Municipal Code 15.06, Appendix A, Retail Wastewater Service Rates. Sewer flow is equivalent to water flow for the CLIN.
FOB: Destination

NET AMT $0.00

CLIN DESCRIPTION

B. 1 RATE STRUCTURE. The base period water and sewer rates shall be in accordance with the mutually negotiated structures and formulas as found in Attachment J.1, Summary of Final Negotiations and Rate Analysis for the City of Bremerton and U.S. Navy Wholesale Water and Sewer Rates, March 2008. As found in Attachment J.1, the rate design used to establish the base period rate for CLIN 0001 assumed a 30% fixed component and a 70% variable component. The rate design used to establish the base period rate for CLIN 0002 assumed a 50% fixed component and a 50% variable component. The actual ratio of fixed to variable revenues is a function of the Navy's volumetric use, which may vary over time during the contract term. Water and sewer rates established for the base period of subject contract beginning 01 August 2008 are:

CLIN 0001: Price for metered water shall be a fixed monthly charge of $39,000 and a volumetric charge of $1.25/hundred cubic feet (hcf). The volumetric charge is applied to total of all billable units upon approval of the invoices. Any Future adjustment of CLIN 0001 rates shall be in accordance with provision B.3, Future Adjustment of Rates.

CLIN 0002: Price for metered sewage shall be a fixed monthly charge of $81,400 and a volumetric charge of $3.08/hundred cubic feet (hcf). The volumetric charge is applied to total of all billable units upon approval of the invoices. Any future adjustment of CLIN 0002 rates shall be in accordance with contract provision B.3, Future Adjustment of Rates.

CLIN 0003: Price for metered water and sewer service shall be in accordance with the City of Bremerton (City) Commercial 1 within-city water rate for 2" meter and Commercial 1 within-city wastewater rate based on measured flow through 2" meter in accordance with Attachment J.3., Appendix A to City of Bremerton Municipal Code 15.06, Assessments, Rates, Fees and Charges. Future adjustment of CLIN 0003 rates shall be based on new ordinance rates as approved by City for Commercial 1 water and wastewater within-city rates.

B.2 CLIN 0002. CITY ACCOUNT #1300090. DEDUCTIONS FOR CITY WATER FLOW INTO NAVY SEWAGE SYSTEM PRIOR TO EXIT OF NAVY WASTEWATER DISCHARGE THROUGH CITY METER LOCATED AT 143 1ST STREET (EAST END OF BNC).

The parties mutually agree to the following deductions:

(1) The City has installed a water meter that measures full flow from the Naval Museum and Fountain Room. This measured flow will be deducted from CLIN 0002 on each monthly invoice for City Account #1300090.
(2) The City will install a water meter to measure flow from the Harborside public restrooms. This measured flow will be deducted from CLIN 0002 on each monthly invoice for City Account #1300090.
(3) The City shall deduct an estimated water discharge from the Harborside Fountain Park pump room overflow. The parties mutually agree that a monthly average of 18 hundred cubic feet (hcf) shall be deducted from CLIN 0002 on each monthly invoice for City Account #1300090.

B.3 CLIN 0002. ACCOUNT #1300100. ADDITION OF ESTIMATED SEWAGE FLOW FROM THE NAVY'S MONTGOMERY AVENUE GUARD SHACK INTO CITY'S WASTEWATER STREAM (WEST END OF BNC).

The parties mutually agree that sewage flow produced from the Montgomery Avenue Guard Shack has not been previously measured or properly invoiced. The parties agree to add an estimated 3 hundred cubic feet (hcf) on each monthly invoice for City Account #13000100.

B.3 FUTURE RATE ADJUSTMENTS.

CLIN 0001 and CLIN 0002: Any adjustment of CLIN 0001 and 0002 rates beyond calendar year 2008 shall be accomplished in accordance with the mutually negotiated rationale and formulas as found in attachment J.2, contract N44255-08-C-3005, Methodology For Adjustment of Water and Wastewater Rates.

The parties agree that the baseline usage provided at the beginning of the contract by the City of Bremerton shall not change during the entire contract term. Only rates and revenues as developed and incorporated into Attachment J.2 may change for purposes of future adjustments. The baseline usages for water and wastewater, respectively, are found in Attachment J.2 under the water and wastewater spreadsheets titled "Base Year Calculations ".

The City shall provide any revised rates and revenues for Navy review in accordance with Attachment J.2 no less than 30 days prior to the effective date of any such adjustments. It is anticipated that future rate adjustments will normally become effective 01 January.

CLIN 0003: Adjustment of CLIN 0003 rates beyond calendar year 2008 shall be in accordance with amended City of Bremerton Commercial 1 rates as may be codified through revisions to Appendix A to City of Bremerton Municipal Code 15.06, Assessments, Rates, Fees and Charges. It is anticipated that future rate adjustments will normally become effective 01 January.

All adjustments to CLINs 0001, 0002, and 0003, are subject to the provisions of FAR Clause 52.241-8, "Change in Rates or Terms and Conditions of Service for Unregulated Services.

B.4 CONTRACT EFFECTIVE DATE. The base year rate effective date is 01 Aug 2008 and shall continue until 31 July 2018, unless otherwise mutually agreed to by the parties through contract modification.

REST OF PAGE LEFT INTENTIONALLY BLANK

Section C - Descriptions and Specifications

STATEMENT OF WORK

C.1 GENERAL REQUIREMENTS. The City of Bremerton (City) shall provide all labor, supervision, tools, equipment, and transportation necessary to deliver the services required under this contract.

C.2 PREMISES TO BE SERVED. The premises to be served are collectively known as the Bremerton Naval Complex (BNC). For purposes of this contract, the BNC facilities to be served consist of:

Naval Base Kitsap (NBK) Bremerton
120 South Dewey Street
Bremerton, WA 98314-5020

Puget Sound Navy Shipyard (PSNS)/ Intermediate Maintenance Facility (IMF)
1400 Farragut Avenue
Bremerton, WA 98314-5001

The facilities to be provided water and sewer service under CLIN 0001, 0002, and 0003 are detailed in two Department of Navy, Facilities Engineering Command NW drawings (as may be further revised):

Naval Base Kitsap, Bremerton, WA, "Sanitary Sewer, CHT & Pressure Sewer Systems, Bremerton Naval Complex, PWD Drawing No. 57849, revised May 2, 2006, and

Naval Base Kitsap, Bremerton, WA, "Utility Map, Freshwater Distribution System, Bremerton Naval Complex, PWD Drawing No. 53935, revised March 31, 2005.

Subject to appropriate security reviews and approvals, copies of these drawings will be provided by the Navy to the City of Bremerton upon request.

C.3 ESTIMATED SERVICE. Estimated annual water consumption:

CLIN 0001 – 873,280 hundred cubic feet (hcf)
CLIN 0003 - 50 hundred cubic feet (hcf)

Estimated annual sewage capacity requirements:

CLIN 0002 – 317,304 hundred cubic feet (hcf)

C.4 POINT OF CONNECTION/LOCATION.

Water service: Water shall be delivered at the following meter locations:

1. First Street and Pacific Avenue
2. Charleston Gate
3. First Street and Rainier Avenue
4. State Highway 304, Pass and ID Building #981

Sewer Service: the City shall receive sewage at the following points of delivery:

1. 416 S. Cambrian Avenue (upstream of the City's Cambrian Avenue flow metering vault (MS4) located on the site of the City's pump station WB-3
2. 143 First Street (at the City's First Street flow metering vault (MS5)
3. State Highway 304, Pass and ID Building #981

Attachment J.4, Water and Wastewater Utility Location, Accounts and Meters, Bremerton Naval Complex, is provided as further reference. Should the City replace any meter providing water or wastewater services to the Navy, the City shall notify the Contracting Officer of such replacement, including the new meter number, within 30 days of initiation of use of the replacement meter. The Contracting Officer shall revise, through modification to the contract, the applicable meter numbers cited in Section B, Section C, and Attachment J.4 of this contract.

C.5 DESCRIPTION OF SERVICE.

(a) 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 NBK Bremerton and PSNS/IMF. The City shall take all reasonable efforts to continuously provide 2,500 gallons per minute of water at a pressure of 75 pounds per square inch gauge (psig) at each of the three points of delivery. Water shall be measured through three 10" meters. The water supplied will be clear, potable, and safe for human consumption and in accordance with the applicable standards as promulgated by, and as may be revised by, Federal, state, and local agencies having regulatory authority.

(b) SEWER:

The City shall provide at its expense all necessary facilities and permits required to receive, carry, treat, and dispose of sewage from NBK Bremerton and PSNS/IMF at the points 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.

The amount of sewage discharged by the Navy to the City for treatment, reclamation, or disposal through the Cambrian Avenue discharge points shall not exceed a daily average flow of 1,800 gallons per minute (gpm) or a total daily volume of 2.59 million gallons a day (mgd) except that a peak discharge of 2,500 gpm will be allowable. The amount of sewage discharged to the City for treatment, reclamation, or disposal through the First Street discharge point shall not exceed an average daily flow of 300 gpm or a total daily volume of 0.43 mgd except that a peak discharge of 500 gpm will be allowable. Flow shall be measured through two 6" meters and one 10" meter.

C.6 The Navy hereby grants to the City of Bremerton a revocable permit to enter the service location for any work related to the requirements under this contract. Authorized representatives of the City will be allowed access to the facility at suitable times to perform the obligations of the utility service contract. It is expressly understood that the Navy may limit or restrict the right of access herein granted in any manner considered to be necessary for the national security. City personnel requiring base access will obtain appropriate badging and identification as may be required by the Government.

C.7 OPERATIONAL COORDINATION MEETINGS.

The parties agree that an operational coordination meeting will be held between the City and Navy no less than every six months during the term of the contract. More frequent meetings may be scheduled as appropriate. The purpose of these meetings is to facilitate increased communication and coordination among the parties on such issues as significant changes to operational procedures, planned outages or flushing operations, maintenance requirements, review of key technical criteria or data associated with utility operations, upgrade or replacement of equipment or infrastructure, conservation initiatives, and other issues that may substantially impact the quality or level of service requirements. The meetings will be scheduled by the Utilities Program Manager of Naval Facilities Engineering Command Northwest – Bremerton (NAVFACNW – Bremerton) and will be co-chaired by the Utilities Program Manager of NAVFACNW Bremerton and the City of Bremerton Public Works Director or their designated representatives.

C.8 CONTACT AND NOTIFICATION LISTS.

The parties agree that a contact and notification list of key personnel for the Navy and City shall be maintained. This list of personnel is found at Attachment J.5, Key Utility Personnel Contact List, Bremerton Naval Complex and City of Bremerton. This list will be revised as necessary but no less than once every six months. Update of this list will be a part of the agenda for the bi-annual Operational Coordination Meetings.

C.9 TERM.

This contract shall continue in effect for a period of 10 years beginning 01 August 2008 or until terminated at the option of the Government by giving written notice not less than 30 days in advance of the effective date of termination.

CLAUSES INCORPORATED BY REFERENCE

52.232-18	Availability Of Funds	APR 1984

Section D - Packaging and Marking

PACKAGING AND MARKING

SECTION D – PACKAGING AND MARKING

This section is not applicable

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Section F - Deliveries or Performance

DELIVERY INFORMATION

CLIN	DELIVERY DATE	QUANTITY	SHIP TO ADDRESS	UIC
0001	31-JUL-2018	10	N/A FOB: Destination	
0002	31-JUL-2018	10	N/A FOB: Destination	
0003	31-JUL-2018	10	N/A FOB: Destination	

Section G - Contract Administration Data

ACCOUNTING INSTRUCTIONS

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, 0002, and 0003 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 invoice shall contain the Navy contract number, N44255-08-C-3005; the individual city utility account; and applicable meter numbers. The fixed and volumetric components of the appropriate rate(s) shall be clearly identified for each account. Deductions and Additions to CLIN 0002 in accordance with contract provisions B.2 and B.3 shall be clearly identified. Water and sewage billing shall be on a monthly basis. Submit invoices to:

U.S Navy
(Insert Government Account Number)
P.O. Box 30088
College Station, Texas 77842-3088

Utility Account Number	GOVERNMENT ACCOUNT NUMBER	Contract No.	Service Location	Site Name
1300030	NW_43_(TBD)	N44255-08-C-3005	1st and Pacific	Bremerton
1300040	NW_43_(TBD)	N44255-08-C-3005	Charleston Gate	Bremerton
1300050	NW_43_FW_00007	N44255-08-C-3005	1st Street & Rainier Ave.	Bremerton
1300090	NW_43_(TBD)	N44255-08-C-3005	143 1st Avenue - MS5	Bremerton
1300100	NW_43_SE_00004	N44255-08-C-3005	416 S. Cambrian Avenue – MS4	Bremerton
1300120	NW_43_(TBD)	N44255-08-C-3005	416 S. Cambrian Avenue – MS4	Bremerton
4655650	NW_43_SE_00002	N44255-08-C-3005	State Highway 304 Pass & ID Bldg 981	Bremerton
4655650	NW_43_FW_00002	N44255-08-C-3005	State Highway 304 Pass & ID Bldg 981	Bremerton

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 3027 Olympus Drive Bremerton, WA 98310-4799
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 ACCOUNTING PROCEDURES.

The City shall comply with the requirements of the latest revised Office of Management and Budget (OMB) Circular A-87, "Cost Principles for State, Local, and Indian Tribe Governments". Compliance with OMB Circular A-87 will be monitored through Navy review of the periodic reports generated by the Budgeting, Accounting, and Reporting System (BARS) of the Washington State Auditor's Office.

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

NAVFAC 5252.201-9300 CONTRACTING OFFICER AUTHORITY (JUN 1994)

In no event shall any understanding or agreement between the Contractor and any Government employee other than the Contracting Officer on any contract, modification, change order, letter or verbal direction to the Contractor be effective or binding upon the Government. All such actions must be formalized by a proper contractual document executed by an appointed Contracting Officer. The Contractor is hereby put on notice that in the event a Government employee other than the Contracting Officer directs a change in the work to be performed or increases the scope of the work to be performed, it is the Contractor's responsibility to make inquiry of the Contracting Officer before making the deviation. Payments will not be made without being authorized by an appointed Contracting Officer with the legal authority to bind the Government. (End of clause)

Section H - Special Contract Requirements

SPECIAL CONTRACT REQUIREMENTS

H.1 SEWAGE SAMPLING. The City shall comply with all applicable federal, state, and local requirements for sewage monitoring and sampling. The City, at a minimum, shall conduct sewage sampling on a monthly basis. Copies of reports of sampling analyses shall be provided to BNC, Code 106.

H.2 ANNUAL RATE REVIEWS. Annual rate reviews may be conducted by the Government in accordance with the Federal Acquisition Regulation (FAR) Part 41.401, "Monthly and Annual Review". Notwithstanding mutually negotiated rates for this contract, these annual rate reviews may constitute grounds for rate redetermination in accordance with the requirements of FAR Part 41.401.

H.3 METERS. The parties agree that the City shall furnish, install, maintain, repair, calibrate, and read all meters associated with the City's performance requirements under this contract in accordance with FAR Clause 52.241-6, Service Provisions,. The parties agree that in the event any meter is determined through inspection, testing, or other means to not be operable or otherwise not in compliance, the City shall either repair or replace such meter within 60 days. Should such repair or replacement not be feasible, the parties shall negotiate a mutually agreeable estimate of flow to be used for billing purposes. Estimated flow calculations must be negotiated within 60 days from date meter has been determined to be noncompliant or inoperable.

H.4 COST OF SERVICE STUDY. The parties agree that the Summary of the Final Negotiations and Rate Analyses for the City of Bremerton and the U.S. Navy Wholesale Water and Sewer Rates, Attachment J.1, constitutes the basis for development of the 2008 base year rates for this contract. It is further contemplated by the parties that a follow-up cost of service study will be completed and available for mutual review by the parties not less than one year from the end of this contract term.

Section I - Contract Clauses

CLAUSES INCORPORATED BY REFERENCE

52.202-1	Definitions	JUL 2004
52.203-3	Gratuities	APR 1984
52.203-5	Covenant Against Contingent Fees	APR 1984
52.203-7	Anti-Kickback Procedures	JUL 1995
52.203-8	Cancellation, Rescission, and Recovery of Funds for Illegal or Improper Activity	JAN 1997
52.203-10	Price Or Fee Adjustment For Illegal Or Improper Activity	JAN 1997
52.203-12	Limitation On Payments To Influence Certain Federal Transactions	SEP 2005
52.204-4	Printed or Copied Double-Sided on Recycled Paper	AUG 2000
52.204-7	Central Contractor Registration	JUL 2006
52.209-6	Protecting the Government's Interest When Subcontracting With Contractors Debarred, Suspended, or Proposed for Debarment	SEP 2006
52.215-17	Waiver of Facilities Capital Cost of Money	OCT 1997
52.215-21	Requirements for Cost or Pricing Data or Information Other Than Cost or Pricing Data--Modifications	OCT 1997
52.219-8	Utilization of Small Business Concerns	MAY 2004
52.222-1	Notice To The Government Of Labor Disputes	FEB 1997
52.222-3	Convict Labor	JUN 2003
52.222-4	Contract Work Hours and Safety Standards Act - Overtime Compensation	JUL 2005
52.222-21	Prohibition Of Segregated Facilities	FEB 1999
52.222-35	Equal Opportunity For Special Disabled Veterans, Veterans of the Vietnam Era, and Other Eligible Veterans	SEP 2006
52.222-36	Affirmative Action For Workers With Disabilities	JUN 1998
52.222-37	Employment Reports On Special Disabled Veterans, Veterans Of The Vietnam Era, and Other Eligible Veterans	SEP 2006
52.222-39	Notification of Employee Rights Concerning Payment of Union Dues or Fees	DEC 2004
52.223-5	Pollution Prevention and Right-to-Know Information	AUG 2003
52.223-6	Drug-Free Workplace	MAY 2001
52.225-13	Restrictions on Certain Foreign Purchases	FEB 2006
52.232-1	Payments	APR 1984
52.232-11	Extras	APR 1984
52.232-17	Interest	JUN 1996
52.232-23	Assignment Of Claims	JAN 1986
52.232-25	Prompt Payment	MAR 2001
52.232-33	Payment by Electronic Funds Transfer--Central Contractor Registration	OCT 2003
52.233-1	Disputes	JUL 2002
52.233-3	Protest After Award	AUG 1996
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
52.242-1	Notice of Intent to Disallow Costs	APR 1984
52.242-13	Bankruptcy	JUL 1995
52.243-1 Alt I	Changes--Fixed Price (Aug 1987) - Alternate I	APR 1984
52.244-5	Competition In Subcontracting	DEC 1996
52.244-6	Subcontracts for Commercial Items	MAR 2007
52.247-64	Preference for Privately Owned U.S. - Flag Commercial Vessels	FEB 2006
52.249-2 Alt II	Termination For Convenience Of The Government (Fixed Price) (May 2004) - Alternate II	SEP 1996
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 2004
252.203-7002	Display Of DOD Hotline Poster	DEC 1991
252.204-7003	Control Of Government Personnel Work Product	APR 1992
252.204-7004 Alt A	Central Contractor Registration (52.204-7) Alternate A	NOV 2003
252.209-7004	Subcontracting With Firms That Are Owned or Controlled By The Government of a Terrorist Country	MAR 1998
252.215-7000	Pricing Adjustments	DEC 1991
252.223-7006	Prohibition On Storage And Disposal Of Toxic And Hazardous Materials	APR 1993
252.241-7001	Government Access	DEC 1991
252.243-7001	Pricing Of Contract Modifications	DEC 1991
252.243-7002	Requests for Equitable Adjustment	MAR 1998
252.247-7023	Transportation of Supplies by Sea	MAY 2002

CLAUSES INCORPORATED BY FULL TEXT

52.215-8 ORDER OF PRECEDENCE--UNIFORM CONTRACT FORMAT (OCT 1997)

Any inconsistency in this solicitation or contract shall be resolved by giving precedence in the following order:

(a) The Schedule (excluding the specifications).

(b) Representations and other instructions.

(c) Contract clauses.

(d) Other documents, exhibits, and attachments.

(e) The specifications.

(End of clause)

52.222-26 EQUAL OPPORTUNITY (MAR 2007) ALTERNATE I (FEB 1999)

Notice. The following terms of this clause are waived for this contract: No Terms Are Waived.

Definition. United States, as used in this clause, 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, 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, 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, or national origin.

(5) 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.

(6) The Contractor shall comply with Executive Order 11246, as amended, and the rules, regulations, and orders of the Secretary of Labor.

(7) 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.

(8) 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.

(9) 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.

(10) 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.

(11) The Contractor shall take such action with respect to any subcontract or purchase order as the contracting officer 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.

(c) Notwithstanding any other clause in this contract, disputes relative to this clause will be governed by the procedures in 41 CFR 60-1.1.

(End of clause)

52.241-3 SCOPE AND DURATION OF CONTRACT (FEB 1995)

(a) For the period 01 August 2008 through 31 July 2018 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 shorter duration than the normal billing cycle shall be prorated accordingly.

(b) Meter test. (1) The Contractor, at its expense, shall periodically inspect and test Contractor-installed meters larger than 3" diameter every two (2) years, meters 1 ½ " to 2" diameter at intervals not exceeding four (4) years. Meters 1" diameter and smaller shall be inspected and tested at intervals not exceeding five (5) years. 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 8 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 hundred eighty (180) days, 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)

52.241-9 CONNECTION CHARGE (FEB 1995)

(a) Charge. In consideration of the Contractor furnishing and installing at its expense the new connection facilities described herein, the Government shall pay the Contractor a connection charge. The payment shall be in the form of progress payments, advance payments or as a lump sum, as agreed to by the parties and as permitted by applicable law. The total amount payable shall be either the estimated cost of $(As negotiated for each modification applicable to connection charges) less the agreed to salvage value of $(as negotiated for each modification applicable to connection charges), or the actual cost less the salvage value, whichever is less. As a condition precedent to final payment, the Contractor shall execute a release of any claims against the Government arising under or by the virtue of such installation.

(b) Ownership, operation, maintenance and repair of new facilities to be provided. The facilities to be supplied by the Contractor under this clause, notwithstanding the payment by the Government of a connection charge, shall be and remain the property of the Contractor and shall, at all times during the life of this contract or any renewals thereof, be operated, maintained, and repaired by the Contractor at its expense. All taxes and other charges in connection therewith, together with all liability arising out of the construction, operations, maintenance, or repair of such facilities, shall be the obligation of the Contractor.

(c) Credits. (1) The Contractor agrees to allow the Government, on each monthly bill for service furnished under this contract to the service location, a credit of (as negotiated for each modification applicable to connection charges) percent of the amount of each such bill as rendered until the accumulation of credits shall equal the amount of such connection charge, provided that the Contractor may at any time allow a credit up to 100 percent of the amount of each such bill.

(2) In the event the Contractor, before any termination of this contract but after completion of the facilities provided for in this clause, serves any customer other than the Government (regardless of whether the Government is being served simultaneously, intermittently, or not at all) by means of these facilities, the Contractor shall promptly notify the Government in writing. Unless otherwise agreed by the parties in writing at that time, the Contractor shall promptly accelerate the credits provided for under subparagraph (c)(1) of this clause, up to 100 percent of each monthly bill until there is refunded the amount that reflects the Government's connection costs for that portion of the facilities used in serving others.

(3) In the event the Contractor terminates this contract, or defaults in performance, prior to full credit of any connection charge paid by the Government, the Contractor shall pay to the Government an amount equal to the uncredited balance of the connection charge as of the date of the termination or default.

(d) Termination before completion of facilities. The Government reserves the right to terminate this contract at any time before completion of the facilities with respect to which the Government is to pay a connection charge. In the event the Government exercises this right, the Contractor shall be paid the cost of any work accomplished, including direct and indirect costs reasonably allocable to the completed work prior to the time of termination by the Government, plus the cost of removal, less the salvage value.

(e) Termination after completion of facilities. In the event the Government terminates this contract after completion of the facilities with respect to which the Government has paid a connection charge, but before the crediting in full by the Contractor of any connection charge in accordance with the terms of this contract, the Contractor shall have the following options:

(1) To retain in place for (as negotiated for each modification applicable to connection charges) months after the notice of termination by the Government such facilities on condition that–

(i) If, during such (as negotiated for each modification for applicable connection charges) month period, the Contractor serves any other customer by means of such facilities, the Contractor, shall, in lieu of allowing credits, pay the Government during such period installments in like amount, manner, and extent as the credit provided for under paragraph (c) of this clause before such termination; and

(ii) Immediately after such (as negotiated for each modification applicable to connection charges) month period the Contractor shall promptly pay in full to the Government the uncredited balance of the connection charge.

(2) To remove such facilities at the Contractor's own expense within (as negotiated for each modification applicable to connection charges) months after the effective date of the termination by the Government. If the Contractor elects to remove such facilities, the Government shall then have the option of purchasing such facilities at the agreed salvage value set forth herein; and provided further, that the Contractor shall, at the direction of the Government, leave in place such facilities located on Government property which the Government elects to purchase at the agreed salvage value.

(End of clause)

52.241-10 TERMINATION LIABILITY (FEB 1995)

(a) If the Government discontinues utility service under this contract before completion of the facilities cost recovery period specified in paragraph (b) of this clause, in consideration of the Contractor furnishing and installing at its expense, the new facility described herein, the Government shall pay termination charges, calculated as set forth in this clause.

(b) Facility cost recovery period. The period of time, not exceeding the term of this contract, during which the net cost of the new facility, shall be recovered by the Contractor is–

(As mutually negotiated by the parties)

(c) Net facility cost. The cost of the new facility, less the agreed upon salvage value of such facility, is–

$(As mutually negotiated by the parties)

(d) Monthly facility cost recovery rate. The monthly facility cost recovery rate which the Government shall pay the Contractor whether or not service is received is–

$(As mutually negotiated by the parties)

(e) Termination charges. Termination charges = $(As mutually negotiated by the parties)

(f) If the Contractor has recovered its capital costs at the time of termination there will be no termination liability charge.

(End of clause)

52.241-12 NONREFUNDABLE, NONRECURRING SERVICE CHARGE (FEB 1995)

As provided herein, the Government will pay a nonrefundable, nonrecurring charge when the rules and regulations of a Contractor require that a customer pay (1) a charge for the initiation of service, (2) a contribution in aid of construction, or (3) a nonrefundable membership fee. This charge may be in addition to or in lieu of a connection charge. Therefore, there is hereby added to the Contractor's schedule a nonrefundable, nonrecurring charge for (as mutually negotiated for each modification applicable to connection charges) negotiated in the amount of $ (as mutually negotiated for each modification applicable to connection charges). dollars payable.

(End of clause)

52.241-13 CAPITAL CREDITS (FEB 1995)

(a) The Government is a member of the (NOT APPLICABLE) and as any other member, is entitled to capital credits consistent with the bylaws of the cooperative, which states the obligation of the Contractor to pay capital credits and which specifies the method and time of payment.

(b) The Contractor shall furnish to the Contracting Officer, or the designated representative of the Contracting Officer, in writing, on a (NOT APPLICABLE) basis a list of accrued credits by contract number, year, and delivery point.

(c) Payment of capital credits will be made by check, payable to the (NOT APPLICABLE), and forwarded to the Contracting Officer at (NOT APPLICABLE) unless otherwise directed in writing by the Contracting Officer. Checks shall cite the current or last contract number and indicate whether the check is partial or final payment for all capital credits accrued.

(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):

http://www.arnet.gov/far/facframe.html

(end of clause)

252.241-7000 SUPERSEDING CONTRACT. (DEC 1991)

This contract supersedes contract No. N44255-96-C-2288, dated 01 December 1997, and N44255-08-C-3006, awarded 30 November 2007, which provided similar services. Any capital credits accrued to the Government, any remaining credits due to the Government under the connection charge, or any termination liability are transferred to this contract, as follows:

Capital Credits: None Outstanding

Outstanding Connection Charge Credits: None Outstanding

Termination Liability Charges: None Outstanding.

(End of clause)

Section J - List of Documents, Exhibits and Other Attachments

ATTACHMENTS

J.1 Summary of Final Negotiations and Rate Analyses for the City of Bremerton and U.S.Navy Wholesale Water and Sewer Rates, 11 March 2008
J.2 Methodology For Adjustment Water and Wastewater Rates, 21 June 2008 (Includes Narrative and Spreadsheets)
J.3 Bremerton Municipal Code 15.06, Appendix A, Assessments, Rates, Fees, and Charges, Effective January 1, 2008.
J.4 Water and Wastewater Utility Locations, Accounts, and Metering For Bremerton Naval Complex, 14 March 2008
J.5 Key Utility Personnel Contact List, Bremerton Naval Complex and City of Bremerton, 04 April 2008

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Appendix E

Sewer Planning – East Bremerton and West Hills

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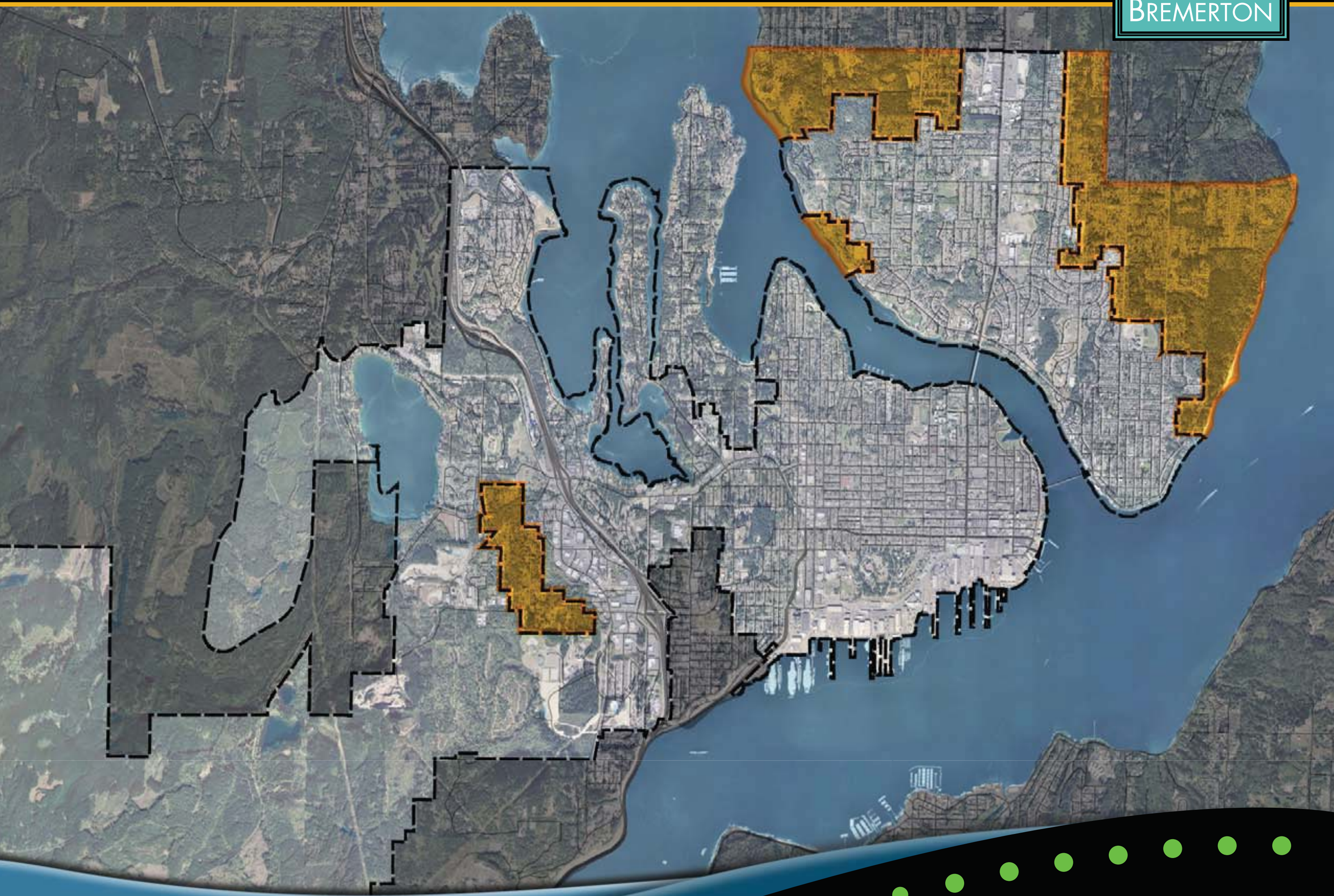

City of Bremerton
Sewer Planning

East Bremerton and West Hills

October 2014

City of Bremerton

2014 Sewer Plan

C E R T I F I C A T I O N

This 2014 Sewer Plan for the City of Bremerton has been prepared under the direction of the following Registered Professional Engineer.

Eric Habermeyer, P.E.
HDR Engineering, Inc.
Suite 1200
500-108th Avenue NE
Bellevue, WA 98004-5549
(425) 450-6200

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1.0 Introduction

This report documents a strategy for providing sanitary sewer service for additions to the West Bremerton Urban Growth Area (UGA) and the East Bremerton UGA.

The purpose of this report is to meet the requirements of the Central Puget Sound Growth Management Hearings Board Order of Continuing Non-Compliance (KCRP VI v. Kitsap County, case 07-3-0019C) by developing a sanitary sewer strategy for additions to the West Bremerton UGA and East Bremerton UGA as shown on Figure 1 (Planning Area Vicinity Map). This amendment provides the City of Bremerton (City) with proposed infrastructure improvements and associated cost estimates for identified service areas within each UGA. The analysis was completed by assessing the capacity of the existing sewer system, identifying capacity limitations within the system, and identifying capital improvements to meet future growth demands.

Due to the existing topography of the study areas, a conventional gravity-flow sewer system is not feasible. An alternative conventional gravity system is presented for regions of the East Bremerton UGA. Modifications to the existing system that may be required under this plan are addressed; however, the City's existing treatment and conveyance systems were assumed to have adequate capacity for additional flow. As with most sewer planning, this document is based on information available at the time of creation, including the 2014 City Wastewater Comprehensive Plan (City Comprehensive Plan), the Kitsap County (County) Comprehensive Plan, City contours (5-foot intervals), and other previous City planning documents provided by the City. During preliminary design of the proposed infrastructure improvements, it is recommended that the City review and update, as required, survey, population projections, and the future planning horizon.

The 2006 County Comprehensive Plan has been appealed as it relates to the UGA boundaries and the population densities used to establish the UGA's. Revised densities were provided to the City for review with three options for developed area and density that correlate to Year 2025 population projections. The County identified a preferred option for the population projection which has been assumed in this report for planning purposes. The population projections presented in this plan correspond to the County's planning Year for 2025.

1.1 Description of UGAs

Three areas in the East Bremerton UGA and one area in West Bremerton UGA were identified for sanitary sewer infrastructure improvements. These areas include: Trenton, Tracyton, and Tracyton Beach (East Bremerton); along with West Hills (West Bremerton) service area, as illustrated in Figure 1. Infrastructure improvements for each area were identified based upon existing site topography, the existing sewer conveyance system, and projected future land use.

1.1.1 Trenton Service Area

The Trenton service area (currently unincorporated) is located within the East Bremerton UGA between the eastern limits of the City of Bremerton and Port Orchard Bay. Trenton is approximately 600-acres of urban low-density residential, 50-acres of urban medium-density residential, 60-acres of Illahee greenbelt, 30-acres of mixed use, and 75-acres of urban restricted zoning. The City's current sanitary sewer system has a network of gravity sewer piping that extend just beyond the western edge of the service area. The east portion of the service area is mostly undeveloped.

1.1.2 Tracyton Service Area

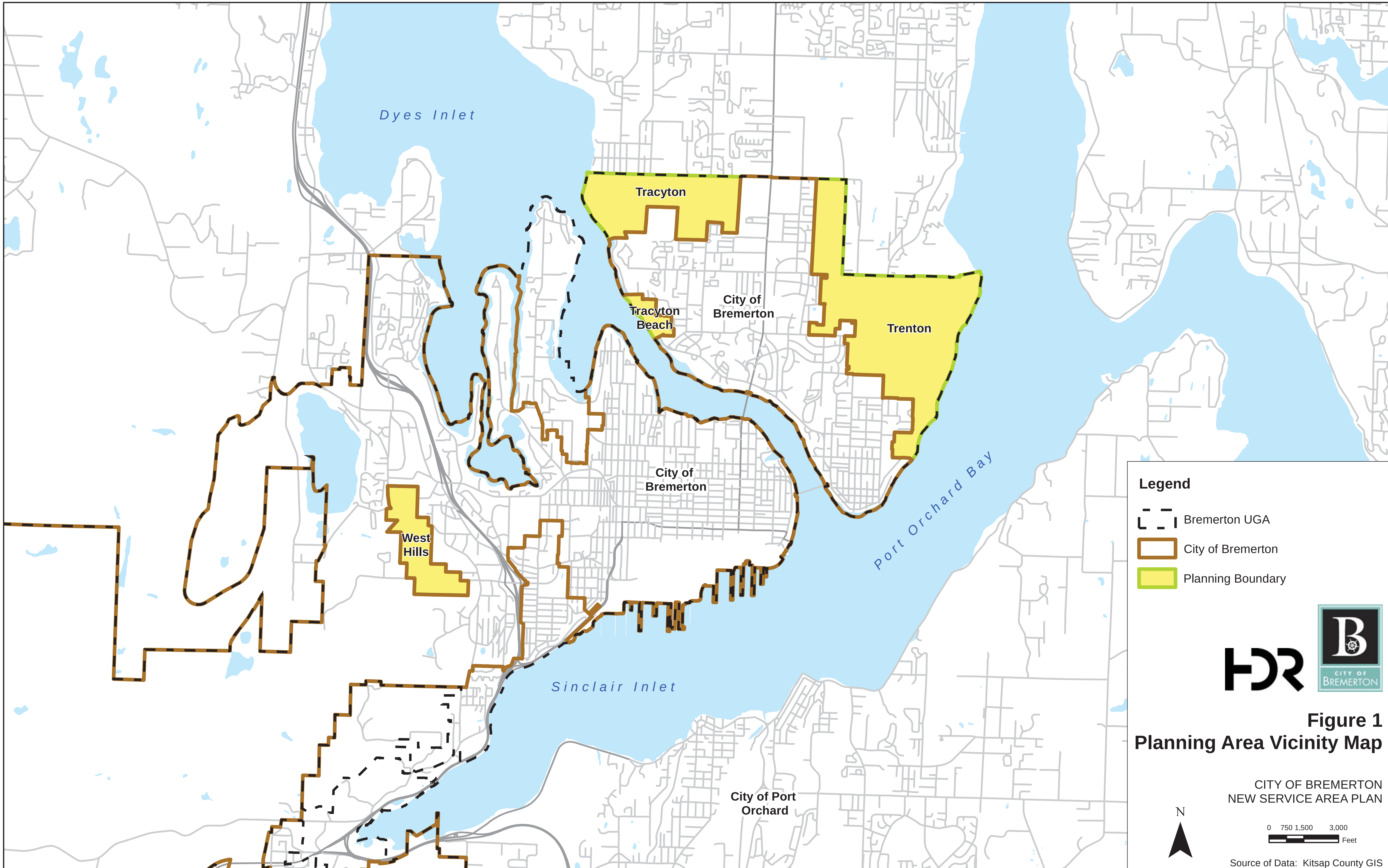
The Tracyton service area (currently unincorporated) is located within the East Bremerton UGA, north of the Tracyton Beach planning area along the east bank of the Port Washington Narrows. Tracyton is approximately 280-acres of urban low-density residential, 50-acres of urban medium-density residential, 10-acres of urban high-density residential, and 10-acres of urban restricted zoning. The City's existing sanitary sewer system consists of gravity sewer piping that collects wastewater flows within the eastern portion of the service area.

1.1.3 Tracyton Beach Service Area

The Tracyton Beach service area (currently unincorporated) is located within the East Bremerton UGA, along the east bank of the Port Washington Narrows. Tracyton Beach is approximately 40-acres of urban low-density residential zoning. The City's existing sanitary sewer system consists of gravity sewer piping that collects a majority of the service area's sewer demand.

1.1.4 West Hills Service Area

The West Hills service area (currently unincorporated) is located within the West Bremerton UGA between Dyes Inlet and Sinclair Inlet. West Hills is approximately 130-acres of urban low-density residential, 30-acres of urban medium-density residential, and 10-acres of industrial zoning. The City's existing sanitary sewer system consists of gravity sewer piping located in a small southern section of the service area.



Document Path: D:\Projects\wash\Bremerton\Map_Docs\Comprehensive Sewer Plan\New Service Area\Updated\Figure 1 - Planning Area Vicinity Map.mxd

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2.0 Planning Criteria

The planning criteria are based upon flow projections, infrastructure assumptions and population projections described below.

2.1 Flow Projections

Flow projections include sanitary flow and infiltration/inflow (I/I). The sum of the peak diurnal sanitary flow and the I/I flow is the peak design flow.

2.1.1 Sanitary Projections

The *City's Wastewater Comprehensive Plan* estimates residential sanitary flow at 71 gallons per day per capita (gpdc). Sanitary flow estimates for commercial and industrial land uses are based on area based flow factors. The sanitary flow assumptions are provided in Table 1.

Table 1. Sanitary Flow Assumptions

DEMOGRAPHICS	ASSUMED UNIT WASTEWATER FLOWS	SOURCE
Residential (Single & Multi-family)	71 gal/capita/day	*ity of Bremerton 2014 astewater omprehensive lan*
Commercial	1,500 gal/Ac/d	*astewater ngineering Treatment and* euse, Fourth Edition, 2003
Industrial	3,000 gal/Ac/d	*astewater ngineering Treatment and* euse, Fourth Edition, 2003

The Department of Ecology (DOE) Criteria for Sewage Works Design (Ecology's Orange Book) recommends Equation 1 for calculating the ratio of the peak hourly sanitary flow to design sanitary flow (see Figure 2). Peak hourly sanitary flow varies by population; larger populated areas will have smaller peaking factors than smaller areas.

Equation 1

$$\frac{Q_{Peak}}{Q_{Design}} = \frac{18+\sqrt{P}}{4+\sqrt{P}}$$

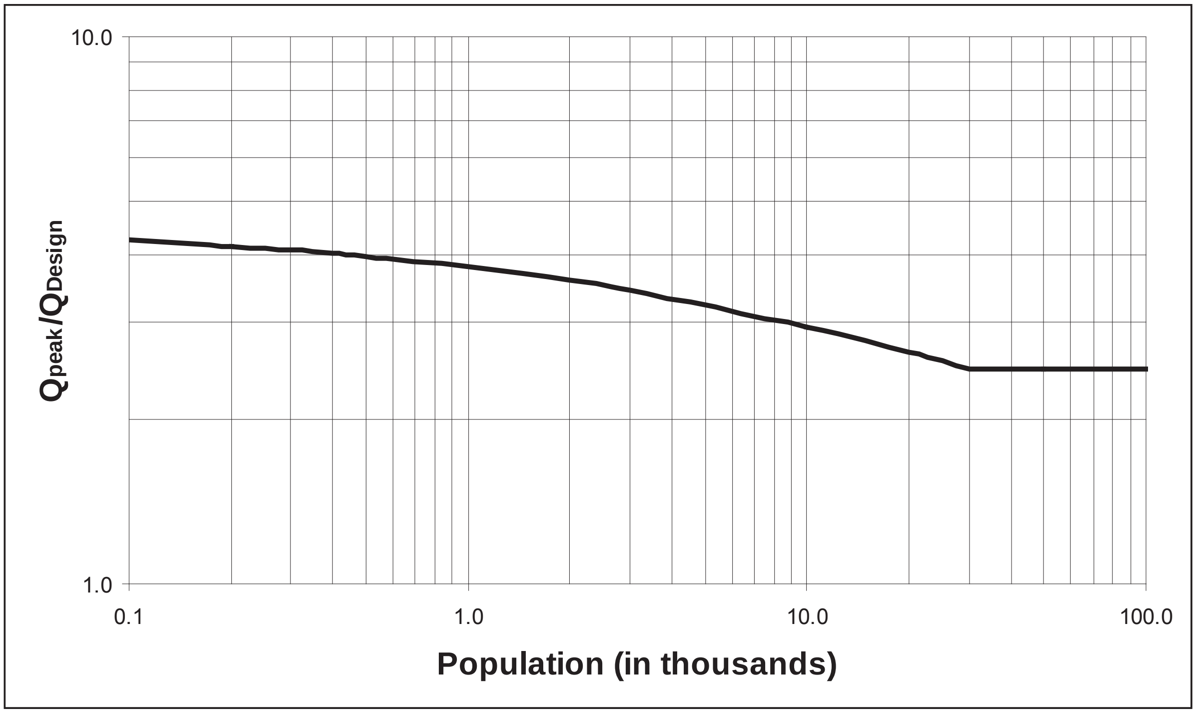
Where:

Q_{Peak} is the maximum peak hourly flow,

Q_{Design} is the design average daily wastewater flow, and

P is the population in thousands.

From Ecology's Orange Book calculation, the peaking factor used in this planning study should never be below 2.5.



Adapted from: Washington State Department of Ecology. *riteria for Sewage orks Design*. November 2007.

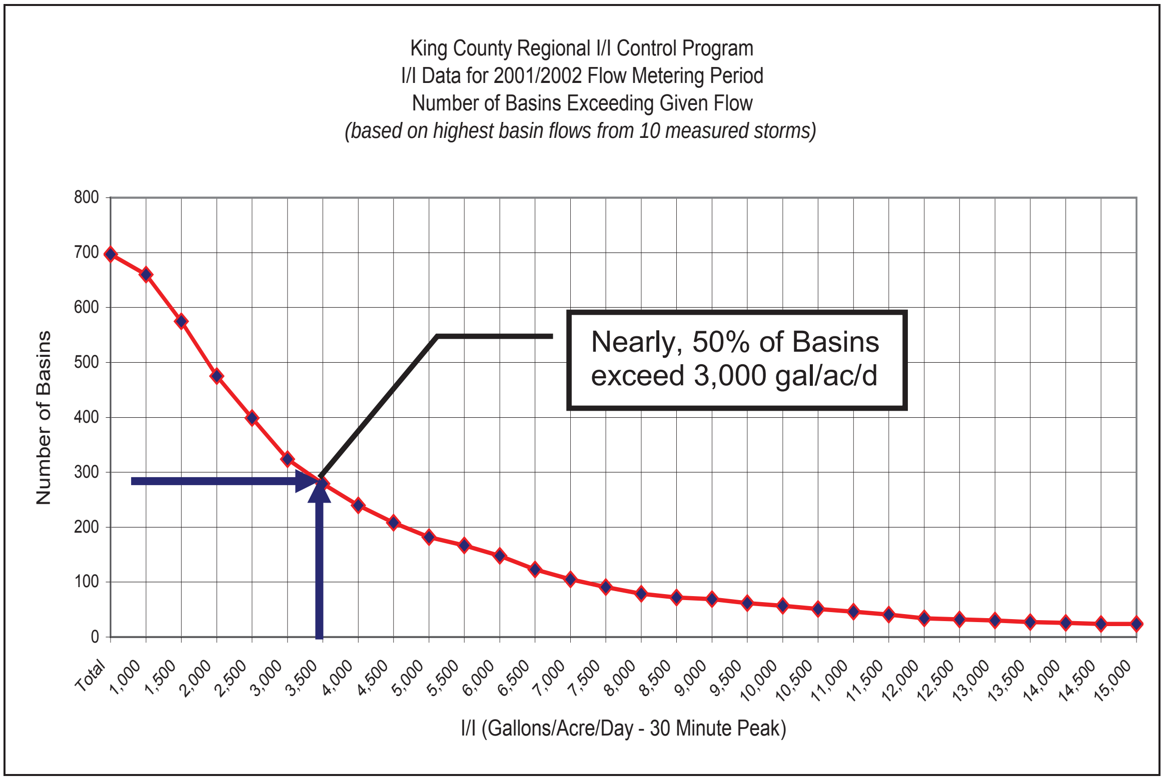
Figure 2. Ratio of Peak Hourly Flow to Design Average Flow

2.1.2 Inflow and Infiltration Projections

The definitions of I/I from the *Joint WEF Manual of Practice FD2 – ASCE Manual and Report on Engineering Practice No. 62 are*:

- *Infiltration is water that enters a sewer system from the ground through defective pipes, pipe joints, damaged lateral connections or manhole walls.*
- *Inflow is extraneous storm water that enters a sanitary sewer system through roof leaders, cleanouts, foundation drains sump pumps and cellar, yard and area drains.*

I/I creates a measurable increase in flow during storm events. Results from the 2001/2002 King County Regional Infiltration/Inflow Control Program Wet Weather Technical Memorandum documents that nearly 50-percent of all basins exceeded an I/I rate of 3,000 gal/Ac/d over ten measured storms, as shown in Figure 3. It is assumed that the I/I rate for this study is 3,000 gal/ac/d.



Adopted from: King County. 2001/2002 King County Regional Infiltration/Inflow Control Program Wet Weather Technical Memorandum

Figure 3. Total Basins Exceeding a Given I/I Rate

2.2 Proposed Infrastructure Assumptions

In order to provide sanitary sewer service to both the East and West Bremerton UGAs, a combination of gravity sewer piping, force mains, pump stations, and low-pressure grinder pumps will be required.

Gravity sewer evaluation/sizing criteria are based upon the following design requirements provided in Table 2.

Table 2. Gravity Sewer Assumptions

PVC pipe, gasket joint
Minimum 8-inch pipe
Minimum design velocity of 2.0 fps
Maximum design velocity of 15.0 fps
Minimum pipe slope of 0.004 ft/ft
Maximum pipe slope of 0.05 ft/ft
Manning's roughness coefficient of 0.013
Pipe capacity is 80% of full capacity

Force main evaluation/sizing criteria are based upon the following design requirements provided in Table 3.

Table 3. Pump Station/Force Main Assumptions

HDPE pipe
Minimum 4-inch pipe
Design velocity between 2.0 and 8.0 fps
Hazen-Williams Coefficient of 150
4 pump cycles per hour
Pump redundancy
Design flow based on 20-year peak hour flow

The 2025 projected population was utilized for the sizing of all infrastructure improvements. Gravity sewer piping, pump stations, and force mains were evaluated based upon the population projections provided by the County. Pipe capacity is considered to be met at 80% of the full pipe capacity because gravity sewers are considered surcharged at this point.

The proposed pump station wet wells were sized based upon the wet well sizing criteria required from Ecology's Orange Book. Submersible pumps were selected to accommodate total dynamic head loss (TDH), which includes losses from force main friction (dynamic loss) and static head at the peak hour flow rate. A duplex system is assumed for all pump stations; however, in order for the pump station to provide the peak design flow with the largest pump out of service, a single pump was selected to meet the peak design flow. Since no formal pump station site analysis has been completed, at the time of design, the City will need to select a location based on the availability of land and reevaluate the wet well/pump sizing criteria.

2.3 Population Projection

The County's Comprehensive Plan has been appealed as it relates to the established UGA boundaries and the population densities used to establish the UGA's. Revised densities have been previously provided to the City for review with three options for the developed area and density. Population projections were calculated for each Kitsap County Traffic Analysis Zone (TAZ). These boundaries were used to allocate projections into each service area boundary based on the overlapping area for each TAZ.

The population projections provided are for the Year 2025 planning horizon. As previously described, this sewer planning document assumes these population projections.

3.0 Planning Areas and Proposed Improvements

The Trenton, Tracyton, Tracyton Beach, and West Hills service areas are divided into sub-basins for sizing the gravity sewer and pressure force mains based on the following criteria:

- Presence of existing infrastructure inside and outside of the UGAs.
- The use of existing rights-of-way (ROWs) as future locations for gravity and force mains.
- Existing Site Topography.

- Tax parcels. Wastewater flows generated from each tax parcel will discharge to a single sewer main.
- The design for portions of the Trenton and Tracyton service area involve the use of low pressure sewer (LPS) systems using residential grinder pumps.

The sub-basins used for planning in the Trenton, Tracyton, Tracyton Beach, and West Hills service areas are shown in Figures 4, 6, 8, and 10 respectively. These areas are within the City of Bremerton's UGA. Table 4 illustrates the distribution of 2025 projected population for all the service areas.

Table 4. Service Area Aggregate Population

SERVICE AREA	2025 PROJECTED POPULATION
Trenton	4,372
Tracyton	1,987
Tracyton Beach	344
West Hills	651

Population estimates based on the 2012 Kitsap County UGA Sizing and Composition Remand

3.1 Trenton – East Bremerton UGA

3.1.1 Population Projection

The design population for flow projections for the Trenton service area assumes a Year 2025 total population of 4,372. The allocation of population to each sub-basin was determined based upon the County's TAZ mapping in GIS. The acreage and population of each sub-basin (Figure 4) is illustrated in Table 5.

Table 5. Population Projection for the Trenton Area

SUB-BASIN ID	PREDOMINANT ZONING	AREA (ACRES)	2025 PROJECTED POPULATION
TRT-1	Urban Low Residential	197	621
TRT-2	Urban High Residential	91	360
TRT-3	Urban Restricted	51	198
TRT-4	Urban Low Residential	184	1013
TRT-5	Urban Low Residential	79	688
TRT-6	Urban Low Residential	104	913
TRT-7	Urban Low Residential	42	221
TRT-8	Urban Low Residential	62	358
Totals	--	810	4,372

3.1.2 Sewer Flow Projection

Peak design flow is the sum of the peak sanitary flow and I/I. The proposed infrastructure evaluation and design is based upon the peak design flow provided in Table 6.

Table 6. Sanitary Flow Projections for Trenton

SUB-BASIN ID	2025 PROJECTED POPULATION	SANITARY FLOW ESTIMATE (GPD)[1]	PEAK SANITARY FLOW ESTIMATE (GPM)[2]	PEAK DESIGN FLOW, INCLUDING I/I (GPM)[3]
TRT-1	621	44,100	120	530
TRT-2	360	25,600	72	261
TRT-3	198	14,100	41	146
TRT-4	1013	73,500	194	578
TRT-5	688	83,200	225	390
TRT-6	913	75,700	201	417
TRT-7	221	15,700	45	132
TRT-8	358	25,400	71	202
Totals	4,372	357,300	969	2,656

SUB-BASIN ID	2025 PROJECTED POPULATION	SANITARY FLOW ESTIMATE (GPD)[1]	PEAK SANITARY FLOW ESTIMATE (GPM)[2]	PEAK DESIGN FLOW, INCLUDING I/I (GPM)[3]

[1] The Sanitary Flow Estimate (GPD) is the sum of the residential, commercial, and industrial sanitary flow estimates. The commercial flow estimate is the product of the number of acres of commercial land use in the sub-basin and 1,500 gal/Ac/d. The industrial flow estimate is the product of the number of acres of industrial land use in the sub-basin and 3,000 gal/Ac/d. The residential flow estimate is the product of the projected population (capita) of the sub-basin and 71 gal/capita/d. Sanitary Flow Assumptions rounded to the nearest 100.

[2] The Peak Sanitary Flow Estimate (GPM) is the product of the Sanitary Flow Estimate (GPD) and the Peaking Factor. This product is divided by 1,440 minutes/day to convert to GPM. Refer to Equation 1 for Peaking Factor calculations.

[3] The Peak Design Flow (GPM) is the sum of the Peak Sanitary Flow Estimate (GPM) and the Inflow/Infiltration (GPM). The Inflow/Infiltration (GPM) is the product of the assumed I/I rate of 3,000 (gal/ac/d) and the total area of the service area (ac). This product is divided by 1,440 to convert to GPM.

3.1.3 Sewer System Layout and Sizing

The recommended sewer system layout for Trenton is shown in Figure 5. Based upon the elevations and preliminary planning, the design includes the use of two low pressure sewer systems (TRT-3 and TRT-5) with grinder pumps and pressure service connections (side sewers). Service connections will use a grinder pump to connect to low-pressure force mains.

Sanitary sewer flows in sub-basin TRT-1 will be collected by an 8-inch gravity sewer main and conveyed to a proposed pump station (TA-3) located near the intersection of East 19th Street and Jacobsen Boulevard. TA-3 will pump flow through approximately 3,900 LF of 8-inch force main and discharge into an existing 15-inch gravity sewer main along Perry Avenue.

Sanitary sewer flows in sub-basin TRT-2 will be collected by 8-inch gravity sewer mains and conveyed to a proposed pump station (TA-1) located at the end of NE Bahia Vista Drive. TA-1 will pump flow to the east via through approximately 6,400 LF of 6-inch force main piping along NE Sylvan Way discharging to a proposed 8-inch gravity main near the intersection of Olympus Drive and NE Sylvan way connecting to the existing sewer system to the west. Sanitary sewer flow in sub-basin TRT-3 will be conveyed to the TA-1 force main by a low pressure sewer system.

Sanitary sewer flows in sub-basins TRT-4, 5, and 6 will be collected by 8 and 10-inch gravity mains and conveyed to a proposed pump station (TA-2) located near the intersection of Trenton Avenue and NE Fruitland Drive. TA-2 pump station will discharge flow east through approximately 3,900 LF of 10-inch force main located along Sheridan Road to a proposed 18-inch gravity main near the intersection of Sanders Avenue and Sheridan Road that replaces approximately 4,800 LF of existing 8-inch sewer main along Sheridan Road and Wheaton Way. A low pressure sewer system will convey flows from TRT-5 due to topographic constraints to a proposed 10-inch gravity sewer line along Perry Avenue conveying sewer flow from TRT-6 to TA-2.

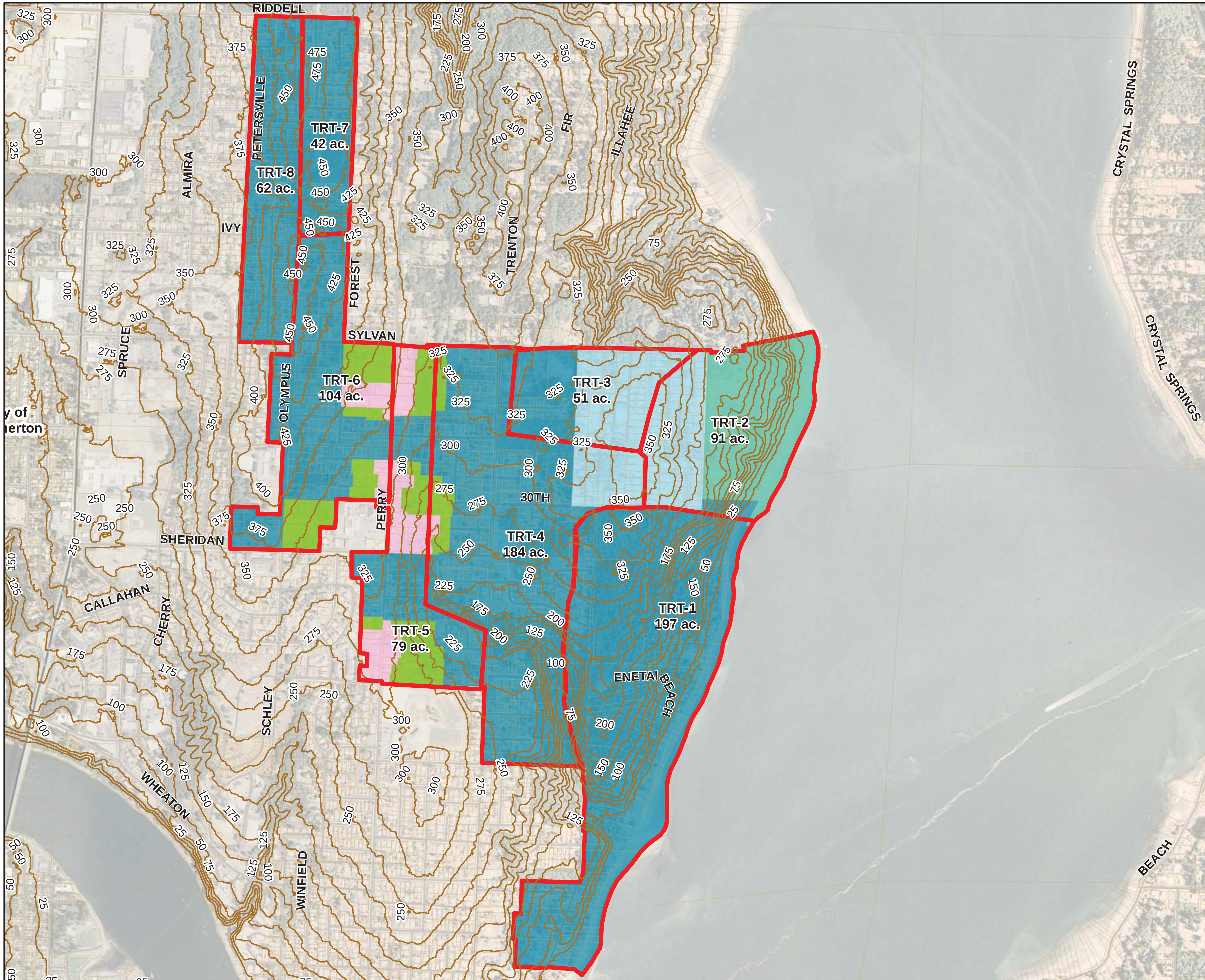
Sewer flows generated from sub-basin TRT-7 will be collected within a series of 8-inch gravity sewer collection piping and discharge to the south to a proposed pump station (TA-4). TA-4 will pump flow to the east through a 4-inch force main along NE Ivy Road to a proposed 8-inch gravity sewer along Olympus Drive. Sewer flows generated from sub-basin TRT-8 will be collected within 8-inch gravity sewer mains and conveyed to the west to existing gravity sewer mains.

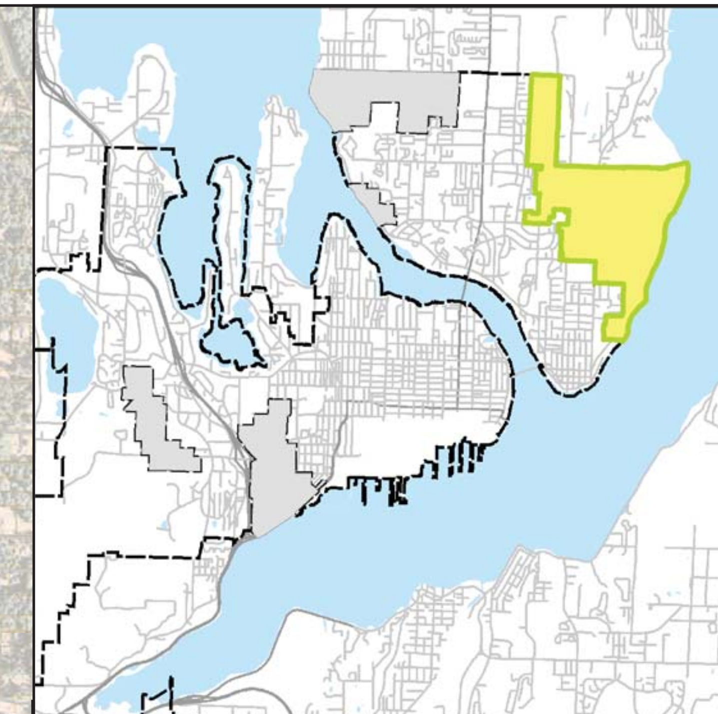
The following table summarizes the preliminary sizing of the TA-1, TA-2, TA-3, and TA-4 pump stations. Wet well volumes are based on the DOE Orange Book.

Table 7. Pump Station Sizing for Trenton

PUMP STATION	WET WELL OPERATING VOLUME (GALLONS)[1]	TOTAL DYNAMIC HEAD (FT)	DISCHARGE (GPM)	STATION HORSEPOWER (HP)
TA-1	1,350	500	350	210
TA-2	5,000	210	1,350	120
TA-3	3,300	230	900	85
TA-4	500	40	140	5

1. Wet Well Operating Volume (Gallons) is calculated from the DOE Orange book equation for the minimum volume between pump on and off levels. $V = tQ/4$, where V = minimum volume (gallons), t = minimum time between pump starts, and Q = pump capacity (gallons/minute).





Legend

- Sub-Basin Boundary
- Contour (~25)
- Parcel Boundary
- Mixed Use (10-30 DU/Ac)
- Urban Med Residential (10-18 DU/Ac)
- Urban Low Residential (5-9 DU/Ac)
- Illahee Greenbelt (1-4 DU/Ac)
- Urban Restricted (1-5 DU/Ac)

HDR

CITY OF BREMERTON

Figure 4
Trenton Sub-Basins

CITY OF BREMERTON
NEW SERVICE AREA PLAN

N

0 500 1,000 2,000 Feet

Source of Data: Kitsap County GIS

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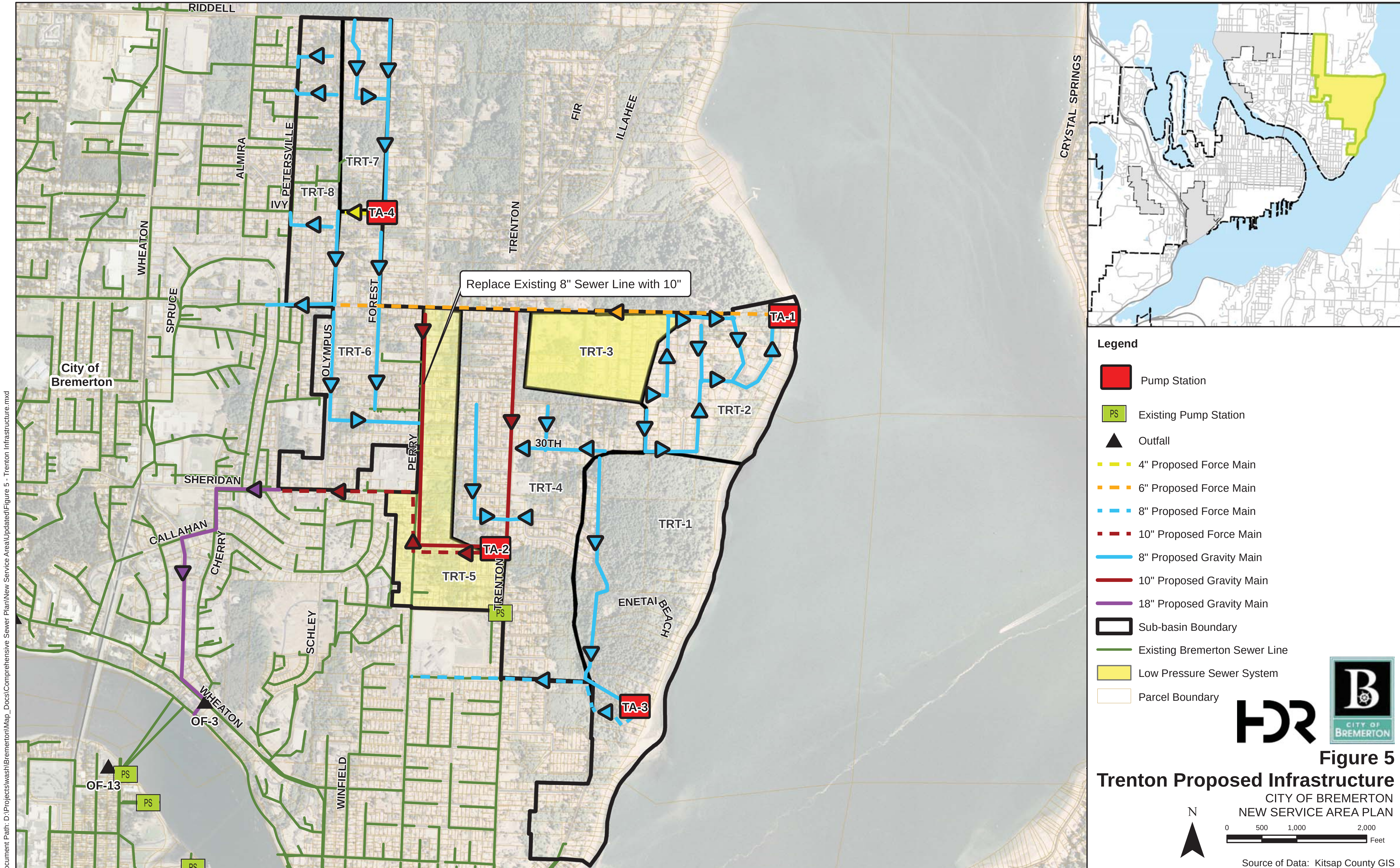

Figure 5
Trenton Proposed Infrastructure
CITY OF BREMERTON
NEW SERVICE AREA PLAN

Source of Data: Kitsap County GIS

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3.2 Tracyton – East Bremerton UGA

3.2.1 Population Projection

The design population for flow projections for the Tracyton service area assumes a Year 2025 total population of 1,987. The allocation of population to each sub-basin was determined based on the County's TAZ mapping in GIS. The acreage and population for each sub-basin (Figure 6) is illustrated in Table 8.

Table 8. Population Projection for the Tracyton Area

SUB-BASIN ID	PREDOMINANT ZONING	AREA (ACRES)	2025 PROJECTED POPULATION
TRC-1	Urban Low Residential	123	1,004
TRC-2	Urban Low Residential	114	546
TRC-3	Urban Low Residential	74	296
TRC-4	Urban Low Residential	35	141
Totals	--	346	1,987

3.2.2 Sewer Flow Projection

Peak design flow is the sum of the peak sanitary flow and I/I. Design of proposed infrastructure improvements is based on the peak design flow provided in Table 9.

Table 9. Sanitary Flow Projections for Tracyton

SUB-BASIN ID	2025 PROJECTED POPULATION	SANITARY FLOW ESTIMATE (GPD)[1]	PEAK SANITARY FLOW ESTIMATE (GPM)[2]	PEAK DESIGN FLOW, INCLUDING I/I (GPM)[3]
TRC-1	1,004	72,800	192	448
TRC-2	546	38,800	106	345
TRC-3	296	21,000	60	213
TRC-4	141	10,000	29	103
Total	1,987	142,600	387	1,109

[1] The Sanitary Flow Estimate (GPD) is the sum of the residential, commercial, and industrial sanitary flow estimates. The commercial flow estimate is the product of the number of acres of commercial land use in the sub-basin and 1,500 gal/Ac/d. The industrial flow estimate is the product of the number of acres of industrial land use in the sub-basin and 3,000 gal/Ac/d. The residential flow estimate is the product of the projected population (capita) of the sub-basin and 71 gal/capita/d. Sanitary Flow Assumptions rounded to the nearest 100.

[2] The Peak Sanitary Flow Estimate (GPM) is the product of the Sanitary Flow Estimate (GPD) and the Peaking Factor. This product is divided by 1,440 minutes/day to convert to GPM. Refer to Equation 1 for Peaking Factor calculations.

[3] The Peak Design Flow (GPM) is the sum of the Peak Sanitary Flow Estimate (GPM) and the Inflow/Infiltration (GPM). The Inflow/Infiltration (GPM) is the product of the assumed I/I rate of 3,000 (gal/ac/d) and the total area of the service area (ac). This product is divided by 1,440 to convert to GPM.

3.2.3 Sewer System Schematic and Sizing

The proposed sanitary sewer system infrastructure for Tracyton is illustrated in Figure 7. Based upon existing topography and preliminary planning, this layout includes the use of a low pressure sewer system with grinder pumps and pressure service connections (side sewers). The low-pressure side sewers will convey the sewage to a gravity sewer main.

Sanitary sewer flows from sub-basins TRC-2, 3 and 4 will be collected by 8-inch gravity sewer mains and conveyed to pump station (TB-2) located along Tracyton Beach Road. Pump station TB-2 will pump flow to existing pump station EB-6 through approximately 1,200 LF of 8-inch force main (see Figure 7) to an existing 8-inch ductile iron pressure gravity main on Tracyton Beach Road that will be converted into a force main. Gravity connections to the existing main will be disconnected, and proposed gravity sewer mains will convey flow to TB-2 and EB-6. A small package pump station will be installed to discharge flow from services along Sulphur Springs Lane to the force main along Tracyton Beach Road. Grinder pump stations for private properties may also be installed once the existing sewer main is converted to a force main.

Sewer flows generated from sub-basins TRC-3 and TRC-4 will be conveyed to a proposed pump station TB-1 located at a low point near the intersection of NW Riddell Road and Naomi Street NW. The proposed pump station will pump flow through a 6-inch force main to a proposed 10-inch gravity sewer main located on the border of sub-basins TRC-2 and TRC-3 and discharge to TB-2.

The following table summarizes the preliminary sizing of the TB-1 and TB-2 pump stations. Wet well volumes are based on the DOE Orange Book.

Table 10. Pump Station Sizing for Tracyton

PUMP STATION	WET WELL VOLUME (GALLONS)[1]	TOTAL DYNAMIC HEAD (FT)	DISCHARGE (GPM)	STATION HORSEPOWER (HP)
TB-1	1,350	130	350	20
TB-2	2,650	100	700	30

[1] Wet Well Operating Volume (Gallons) is calculated from the DOE Orange book equation for the minimum volume between pump on and off levels. $V = tQ/4$, where V = minimum volume (gallons), t = minimum time between pump starts, and Q = pump capacity (gallons/minute).

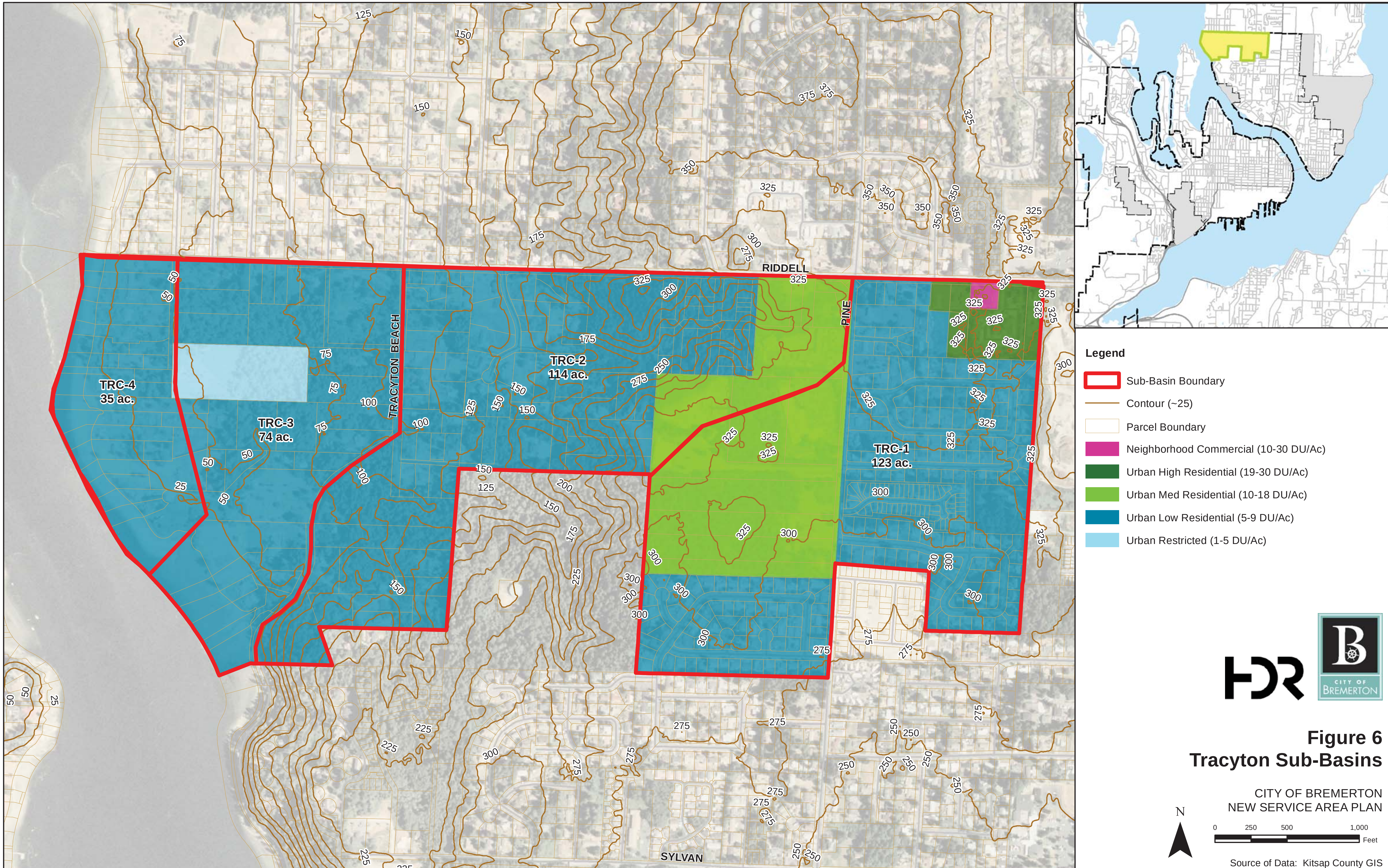

Figure 6
Tracyton Sub-Basins

CITY OF BREMERTON
NEW SERVICE AREA PLAN

Source of Data: Kitsap County GIS

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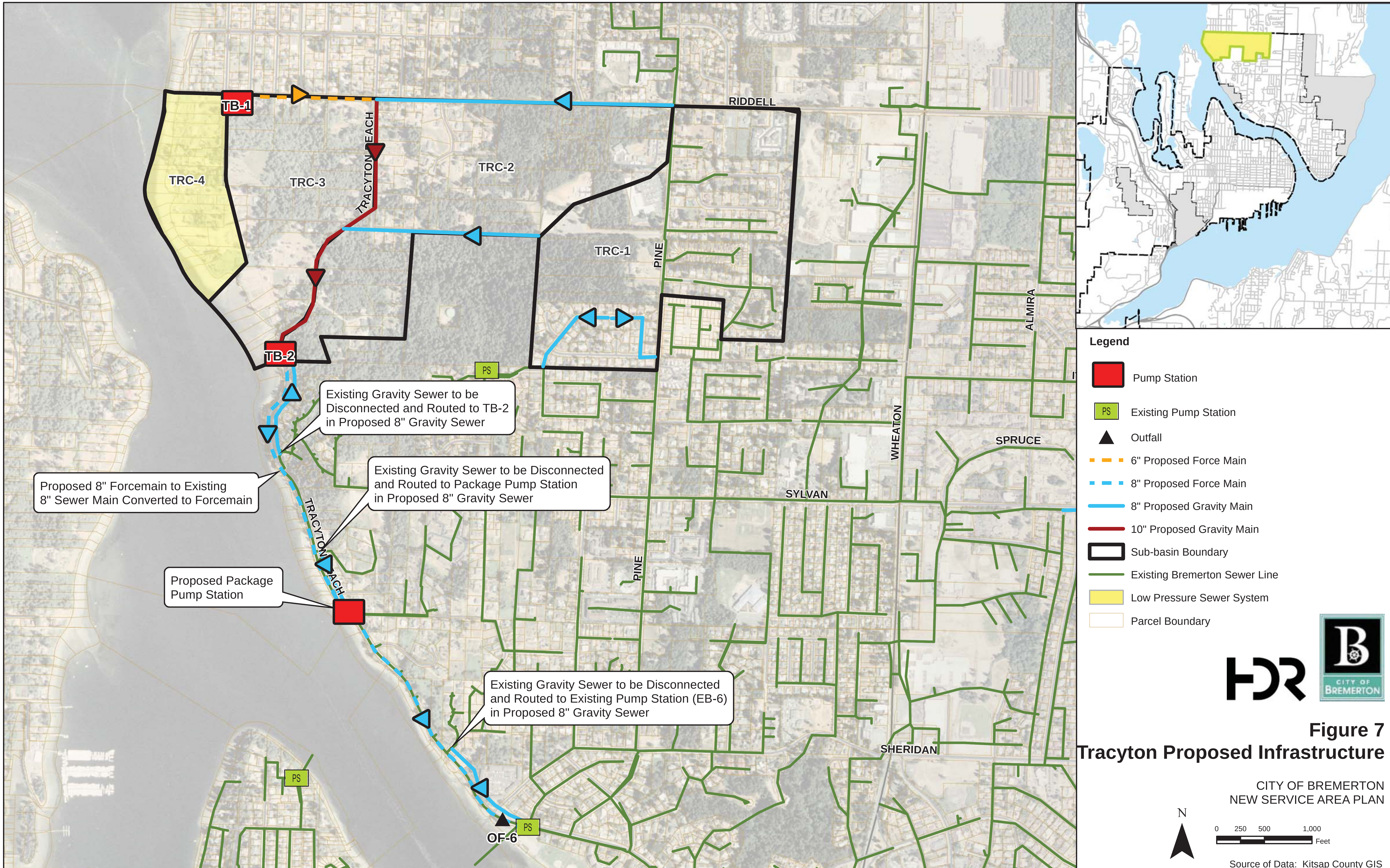

Figure 7
Tracyton Proposed Infrastructure

CITY OF BREMERTON
NEW SERVICE AREA PLAN

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3.3 Tracyton Beach

3.3.1 Population Projection

The design population for flow projections for the Tracyton Beach service area assumes a Year 2025 total population of 344. The allocation of population was determined based on the County's TAZ mapping in GIS. The acreage and populations for the sub-basin (Figure 8) is illustrated in Table 11.

Table 11. Population Projection for the Tracyton Beach Area

SUB-BASIN ID	PREDOMINANT ZONING	AREA (ACRES)	2025 PROJECTED POPULATION
TRB-1	Urban Low Residential	43	344
Totals	--	43	344

3.3.2 Sewer Flow Projection

Peak design flow is the sum of the peak sanitary flow and I/I. The proposed infrastructure is designed based upon the peak design flow provided in Table 12.

Table 12. Sanitary Flow Projections for Tracyton Beach

SUB-BASIN ID	PROJECTED POPULATION	SANITARY FLOW ESTIMATE (GPD)[1]	PEAK SANITARY FLOW ESTIMATE (GPM)[2]	PEAK DESIGN FLOW, INCLUDING I/I (GPM)[3]
TRB-1	344	24,400	69	159
Totals	344	24,400	69	159

1 The Sanitary Flow Estimate (GPD) is the sum of the residential, commercial, and industrial sanitary flow estimates. The commercial flow estimate is the product of the number of acres of commercial land use in the sub-basin and 1,500 gal/Ac/d. The industrial flow estimate is the product of the number of acres of industrial land use in the sub-basin and 3,000 gal/Ac/d. The residential flow estimate is the product of the projected population (capita) of the sub-basin and 71 gal/capita/d. Sanitary Flow Assumptions rounded to the nearest 100.

2 The Peak Sanitary Flow Estimate (GPM) is the product of the Sanitary Flow Estimate (GPD) and the Peaking Factor. This product is divided by 1,440 minutes/day to convert to GPM. Refer to Equation 1 for Peaking Factor calculations.

3 The Peak Design Flow (GPM) is the sum of the Peak Sanitary Flow Estimate (GPM) and the Inflow/Infiltration (GPM). The Inflow/Infiltration (GPM) is the product of the assumed I/I rate of 3,000 (gal/ac/d) and the total area of the service area (ac). This product is divided by 1,440 to convert to GPM.

3.3.3 Sewer System Schematic and Sizing

The recommended sanitary sewer system infrastructure improvements for Tracyton Beach are illustrated in Figure 9. The sewer flows will be collected by the existing gravity sewer system and conveyed south to the existing pump station EB-6 through a proposed 8-inch gravity main. Flows from the northern portion of the basin will be collect with an 8-inch gravity sewer main and conveyed to a proposed package pump station discharging to the converted force main along Tracyton Beach Road.

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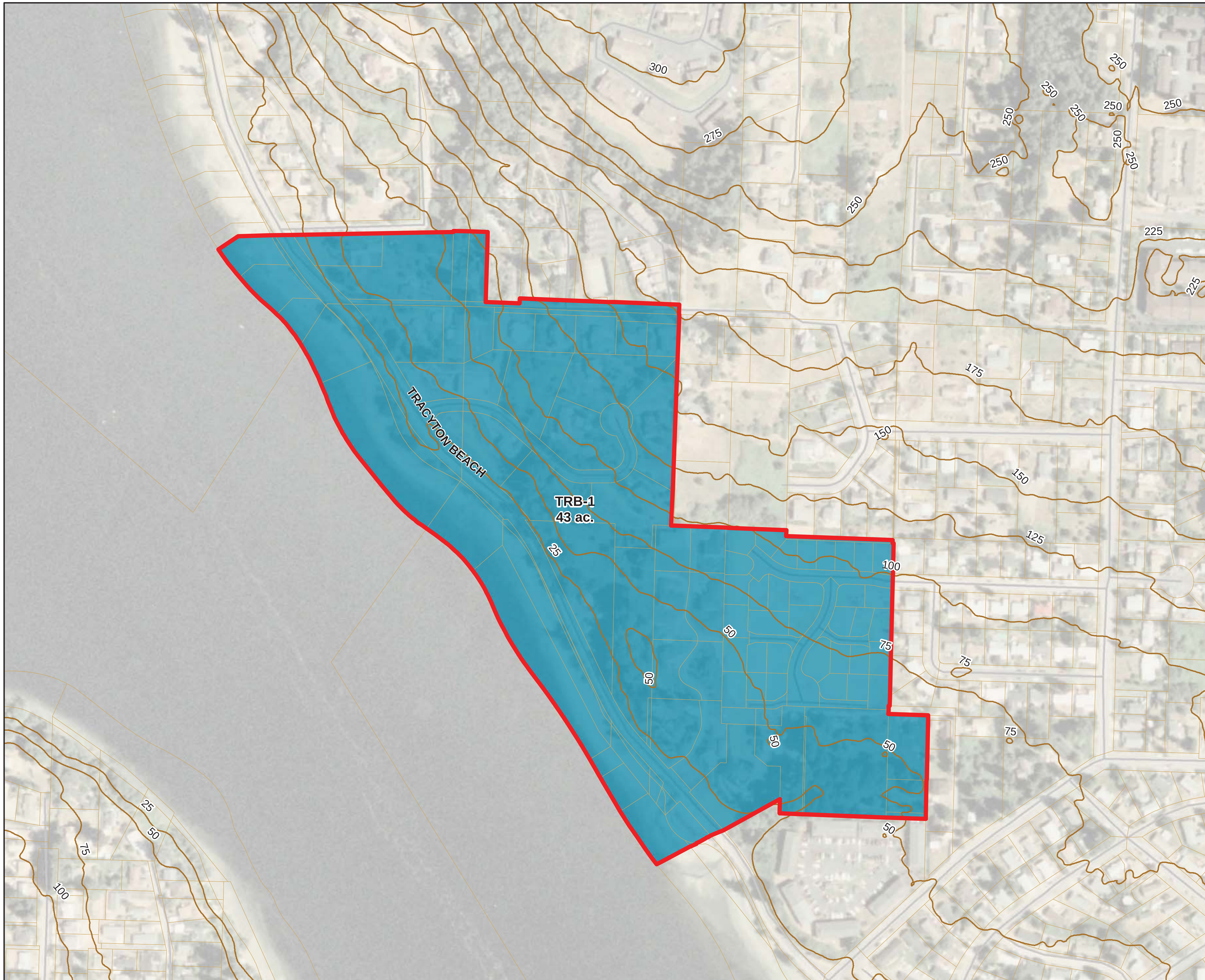

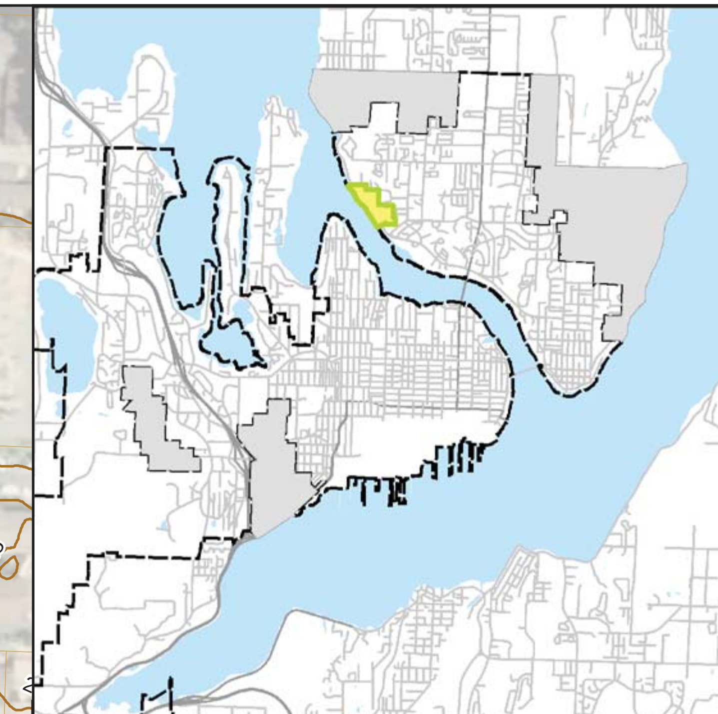

Legend

- Sub-Basin Boundary
- Contour (~25)
- Parcel Boundary
- Urban Low Residential (5-9 DU/Ac)

HDR

CITY OF BREMERTON

Figure 8
Tracyton Beach Sub-Basins

CITY OF BREMERTON
NEW SERVICE AREA PLAN

N

0 125 250 500 Feet

Source of Data: Kitsap County GIS

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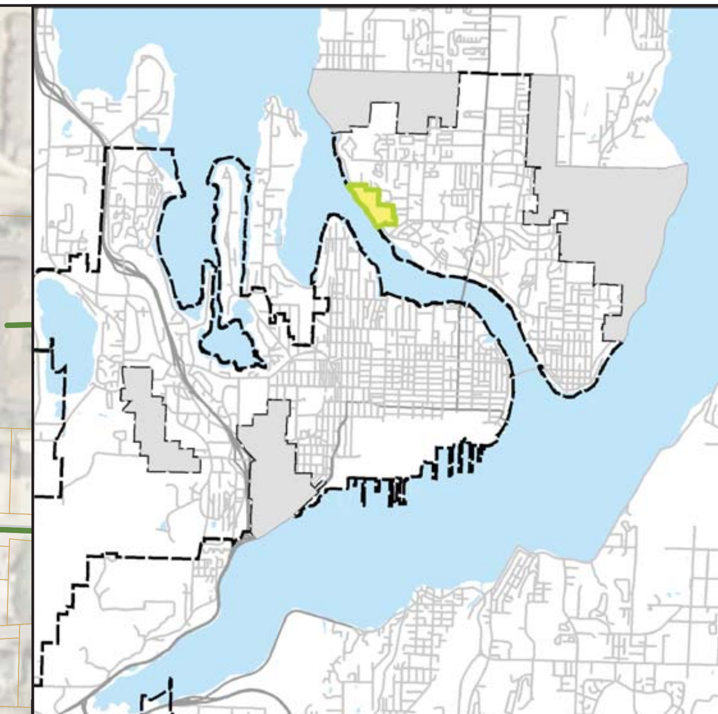

Legend

Pump Station
PS Existing Pump Station
Outfall
8" Proposed Force Main
8" Proposed Gravity Main
Sub-basin Boundary
Existing Bremerton Sewer Line
Parcel Boundary

HDR
CITY OF BREMERTON

Figure 9
Tracyton Beach Proposed Infrastructure

CITY OF BREMERTON
NEW SERVICE AREA PLAN

N
0 125 250 500 Feet

Source of Data: Kitsap County GIS

Document Path: D:\Projects\wash\Bremerton\Map_Docs\Comprehensive Sewer Plan\New Service Area\Updated\Figure 9 - Tracyton Beach Infrastructure.mxd

3.4 West Hills – West Bremerton UGA

3.4.1 Population Projection

The design population for flow projections for the West Hills service area assumes a Year 2025 total population of 651. The allocation of population to each sub-basin was determined based on the County's TAZ mapping in GIS. The acreage and populations for the sub-basin (Figure 10) is illustrated in Table 13.

Table 13. Population Projection for the West Hills Area

SUB-BASIN ID	PREDOMINANT ZONING	AREA (ACRES)	2025 PROJECTED POPULATION
WHS-1	Urban Low Residential	171	651
Total	--	171	651

3.4.2 Sewer Flow Projection

Peak design flow is the sum of the peak sanitary flow and I/I. The proposed infrastructure improvements are based upon the peak design flow provided in Table 14.

Table 14. Sanitary Flow Projections for West Hills

SUB-BASIN ID	PROJECTED POPULATION	SANITARY FLOW ESTIMATE (GPD)[1]	PEAK SANITARY FLOW ESTIMATE (GPM)[2]	PEAK DESIGN FLOW, INCLUDING I/I (GPM)[3]
WHS-1	767	80,900	220	576
Total	767	80,900	220	576

[1] The Sanitary Flow Estimate (GPD) is the sum of the residential, commercial, and industrial sanitary flow estimates. The commercial flow estimate is the product of the number of acres of commercial land use in the sub-basin and 1,500 gal/Ac/d. The industrial flow estimate is the product of the number of acres of industrial land use in the sub-basin and 3,000 gal/Ac/d. The residential flow estimate is the product of the projected population (capita) of the sub-basin and 71 gal/capita/d. Sanitary Flow Assumptions rounded to the nearest 100.

[2] The Peak Sanitary Flow Estimate (GPM) is the product of the Sanitary Flow Estimate (GPD) and the Peaking Factor. This product is divided by 1,440 minutes/day to convert to GPM. Refer to Equation 1 for Peaking Factor calculations.

[3] The Peak Design Flow (GPM) is the sum of the Peak Sanitary Flow Estimate (GPM) and the Inflow/Infiltration (GPM). The Inflow/Infiltration (GPM) is the product of the assumed I/I rate of 3,000 (gal/ac/d) and the total area of the service area (ac). This product is divided by 1,440 to convert to GPM.

3.4.3 Sewer System Schematic and Sizing

The recommended sanitary sewer system design for West Hills is illustrated in Figure 11. Sewer flows generated north of Price Road within sub-basin WHS-1 will be collected in a series of 8-inch gravity sewer mains and conveyed to an existing gravity sewer main along 6th Street. The sewer flows generated in the southern portion of sub-basin WHS-1 will be collected by 8-inch gravity sewer mains and conveyed to an18-inch gravity sewer main along Harlow Drive that connects to the existing gravity sewer main along Auto Center Way.

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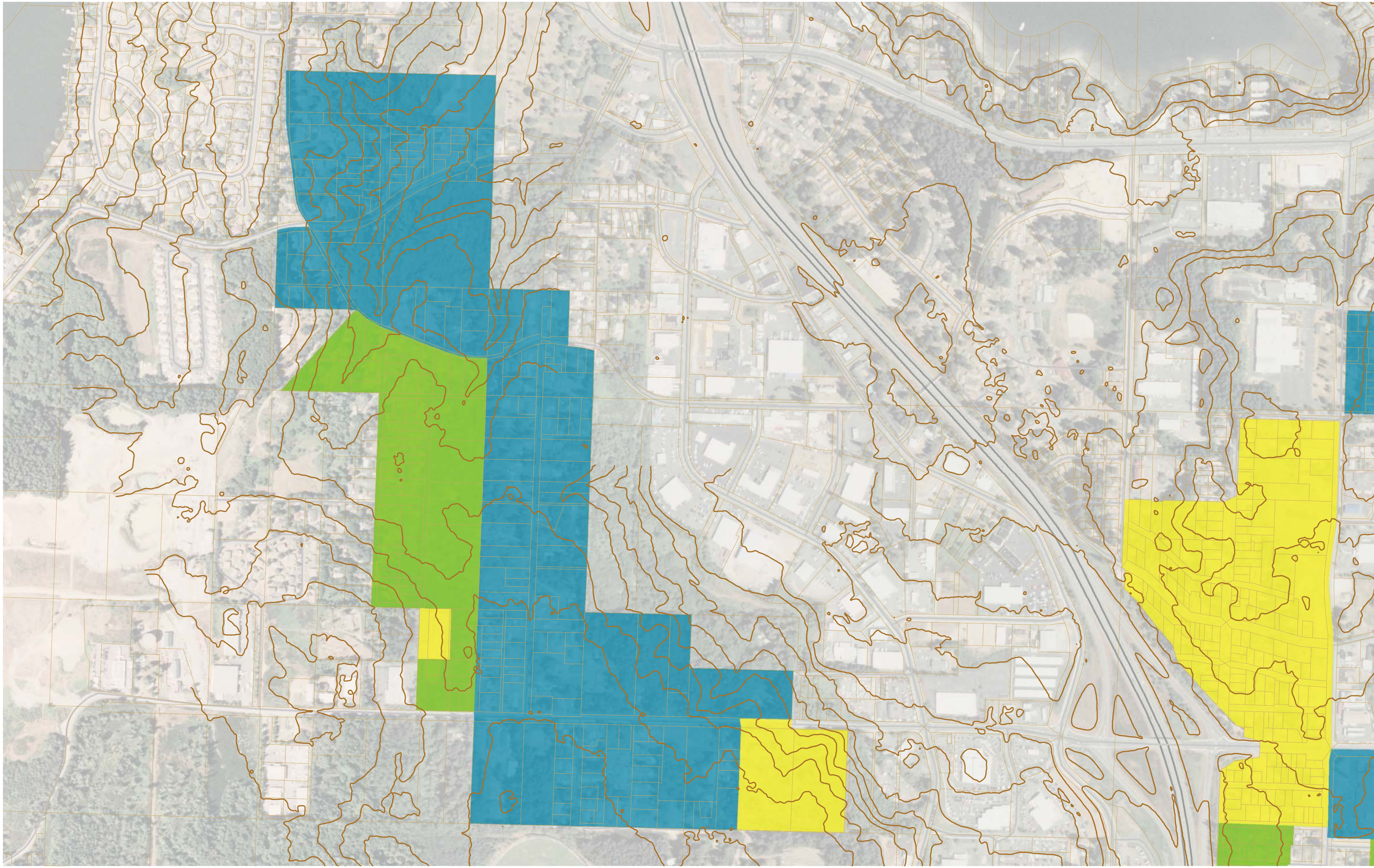

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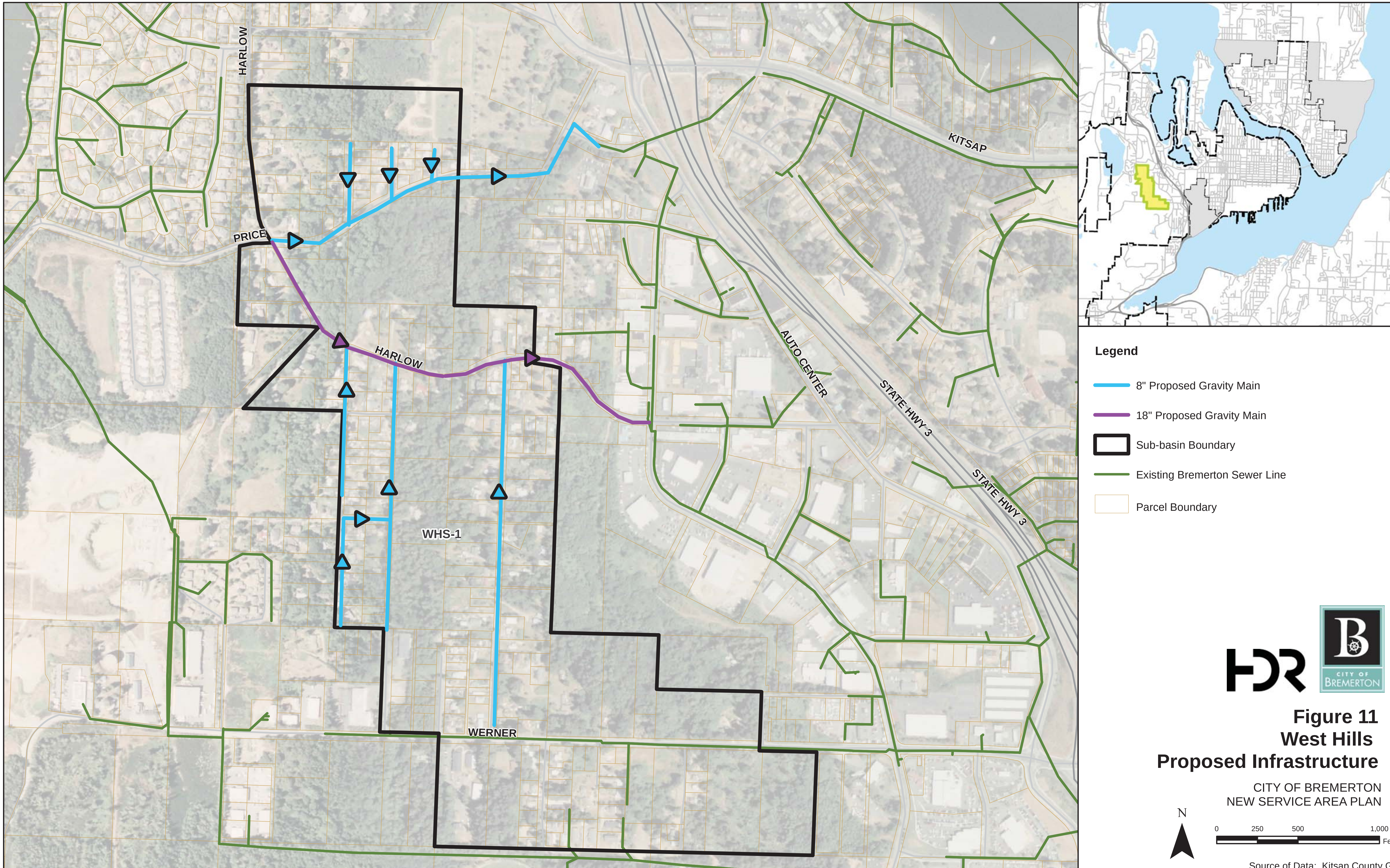

HDR

CITY OF BREMERTON

Figure 11
West Hills
Proposed Infrastructure

CITY OF BREMERTON
NEW SERVICE AREA PLAN

Source of Data: Kitsap County GIS

Document Path: D:\Projects\wash\Bremerton\Map_Docs\Comprehensive Sewer Plan\New Service Area\Updated\Figure 11 - West Hills Infrastructure.mxd

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4.0 Engineer's Opinion of Probable Construction Cost

A total estimated project budget, including both direct and indirect costs, for each portion of the West Bremerton UGA and East Bremerton UGA are presented in this section.

The cost estimate basis was developed from contractor bid estimates for similar improvements constructed as part of the Gorst sewer collection improvement in 2009. The bid estimates were increased to 2014 dollars based on the Seattle Construction Cost Index (CCI) reported by Engineering News Record (ENR). Construction cost multipliers are included for mobilization/demobilization (5%), temporary erosion/sedimentation control (3%), and traffic control (10%). A construction cost contingency (40%) is included for undefined scope of work. Sales tax (8.6%) and engineering, permitting, and construction administration (20%) are included in the total project cost.

The East Bremerton UGA may require the use of a low pressure sewer system to serve portions of the area. The costs for the low pressure sewer system will be the responsibility of the homeowner or developer. A preliminary opinion of construction and connection cost is presented for individual owners of low pressure grinder systems. Each lot connecting to the City sewer system within the area designated as low pressure must design and construct grinder pump stations at their own cost. Once construction of the low pressure grinder pump station is installed, the homeowner will be required to provide an access easement to the City. Once the easement is completed, the City will take over maintenance and operation of the low pressure grinder pump station.

4.1 East Bremerton UGA – Trenton Service Area

An engineer's opinion of probable construction cost for the recommended conveyance system for the full build-out of Trenton is presented in Table 15.

Table 15. Opinion of Probable Cost for the Trenton Service Area

ITEM	QUANTITY	UNIT	UNIT COST	TOTAL COST
8-in Gravity PVC Pipe	30,600	LF	$170	$5,202,000
10-inch Gravity PVC Pipe	7,900	LF	$200	$1,580,000
18-in Gravity PVC Pipe	4,800	LF	$250	$1,200,000
4-in HDPE Sewer Force Main	700	LF	$120	$84,000
6-in HDPE Sewer Force Main	6,400	LF	$150	$585,000
8-in HDPE Sewer Force Main	3,900	LF	$180	$702,000
48-in Manhole	130	EA	$4,500	$585,000
TA-1 Pump Station	1	LS	$2,000,000	$2,000,000
TA-2 Pump Station	1	LS	$2,500,000	$2,500,000
TA-3 Pump Station	1	LS	$2,200,000	$2,200,000
TA-4 Pump Station	1	LS	$1,200,000	$1,200,000
Mobilization/Demobilization	1	LS	5%	$933,600
Temporary Erosion/Sedimentation Control	1	LS	3%	$560,100
Traffic Control	1	LS	10%	$1,867,100
Subtotal				$22,030,700
Construction Contingency	1	LS	40%	$8,812,300
Subtotal - Construction Costs				$30,843,000
Sales Tax	1	LS	8.6%	$2,652,500
Construction Budget - Preliminary Design Estimate				$33,495,500
Engineering, permitting, and construction administration	1	LS	20%	$6,669,100
Total Estimated Project Budget				$40,194,600

Notes:
1. Pipe prices per linear foot include all bedding, backfill, excavation, soil removal, surface trench restoration, existing utility relocation/avoidance allowance, removal of structures and obstructions, pipe material, and dewatering costs.
2. No easements or land acquisition costs have been included. Pipelines and pump stations assumed to be located within existing right of way.
3. For certain properties, the landowner would be required to install a low-pressure grinder pump to connect to City services. Costs for the grinder pumps are not included as part of this estimate.
4. Pump station construction cost estimates are based on bid tabs from the Gorst sewer collection improvements inflated to 2014 dollars. Adjustments were made depending on the size of the pump station in terms of horsepower.

4.2 East Bremerton UGA – Tracyton Service Area

An opinion of probable construction and engineering cost for the recommended conveyance system for the Trenton area in the East Bremerton UGA is presented in Table 16.

Table 16. Opinion of Probable Cost for the Tracyton Service Area

ITEM	QUANTITY	UNIT	UNIT COST	TOTAL COST
8-in Gravity PVC Pipe	10,100	LF	$170	$1,717,000
10-in Gravity PVC Pipe	3,100	LF	$200	$620,000
6-in HDPE Sewer Force Main	1,400	LF	$130	$182,000
8-in HDPE Sewer Force Main	1,200	LF	$150	$180,000
48-in Manhole	25	EA	$4,500	$112,500
TB-1 Pump Station	1	LS	$1,500,000	$1,500,000
TB-2 Pump Station	1	LS	$2,000,000	$2,000,000
Package Pump Station	1	LS	$250,000	$250,000
Mobilization/Demobilization	1	LS	5%	$328,100
Temporary Erosion/Sedimentation Control	1	LS	3%	$196,800
Traffic Control	1	LS	10%	$656,200
Subtotal				$7,742,600
Construction Contingency	1	LS	40%	$3,097,000
Subtotal - Construction Costs				$10,839,600
Sales Tax	1	LS	8.6%	$932,200
Construction Budget - Preliminary Design Estimate				$11,771,800
Engineering Design	1	LS	20%	$2,354,400
Total Estimated Project Budget				$14,126,200

Notes:

1. Pipe prices per linear foot include all bedding, backfill, excavation, soil removal, surface trench restoration, existing utility relocation/avoidance allowance, pipe material, dewatering costs.
2. No easements or land acquisition costs included. Pipelines and pump stations assumed in public rights of way.
3. For certain properties, the landowner would be required to install a low-pressure grinder pump to connect to City services. Costs for the grinder pumps are not included.
4. Pump station construction cost estimates are based on bid tabs from the Gorst sewer collection improvements inflated to 2013 dollars. Adjustments were made depending on the size of the pump station in terms of horsepower.

4.3 East Bremerton UGA – Tracyton Beach Service Area

An opinion of probable construction and engineering cost for the recommended conveyance system for the Tracyton Beach Service area is presented in Table 17.

Table 17. Opinion of Probable Cost for the Tracyton Beach Service Area

ITEM	QUANTITY	UNIT	UNIT COST	TOTAL COST
8-in Gravity PVC Pipe	1,200	LF	$170	$204,000
48-in Manhole	15	EA	$4,500	$67,500
Mobilization/Demobilization	1	LS	5%	$13,600
Temporary Erosion/Sedimentation Control	1	LS	3%	$8,100
Traffic Control	1	LS	10%	$27,200
Subtotal				$320,400
Construction Contingency	1	LS	40%	$128,200
Subtotal - Construction Costs				$448,600
Sales Tax	1	LS	8.6%	$38,600
Construction Budget - Preliminary Design Estimate				$487,200
Engineering Design	1	LS	20%	$97,400
Total Estimated Project Budget				$584,600

Notes:

1. Pipe prices per linear foot include all bedding, backfill, excavation, soil removal, surface trench restoration, existing utility relocation/avoidance allowance, pipe material, and dewatering costs.
2. No easements or land acquisition costs included. Pipelines and pump stations assumed in public rights of way.
3. For certain properties, the landowner would be required to install a low-pressure grinder pump to connect to City services. Costs for the grinder pumps are not included.

4.4 West Bremerton UGA – West Hills Service Area

An opinion of probable construction and engineering cost for the recommended conveyance system for the West Hills service area in the West Bremerton UGA is presented in Table 18.

Table 18. Opinion of Probable Cost for the West Hills Service Area

ITEM	QUANTITY	UNIT	UNIT COST	TOTAL COST
8-in Gravity PVC Pipe	9,150	LF	$170	$1,555,500
18-inch Gravity PVC Pipe	2,850	LF	$250	$712,500
48-in Manhole	30	EA	$4,500	$135,000
Mobilization/Demobilization	1	LS	5%	$120,200
Temporary Erosion/Sedimentation Control	1	LS	3%	$72,100
Traffic Control	1	LS	10%	$240,300
Subtotal				$2,835,600
Construction Contingency	1	LS	40%	$1,134,200
Subtotal - Construction Costs				$3,969,800
Sales Tax	1	LS	8.6%	$341,400
Construction Budget - Preliminary Design Estimate				$4,311,200
Engineering Design	1	LS	20%	$862,200
Total Estimated Project Budget				$5,173,400

Notes:

1. Pipe prices per linear foot include all bedding, backfill, excavation, soil removal, surface trench restoration, existing utility relocation/avoidance allowance, pipe material, and dewatering costs.
2. No easements or land acquisition costs included. Pipelines and pump stations assumed in public rights of way.
3. For certain properties, the landowner would be required to install a low-pressure grinder pump to connect to City services. Costs for the grinder pumps are not included.

4.5 Homeowner / Developer Extension Costs

An opinion of probable construction costs to be borne by the homeowner or developer of land for the recommended low-pressure grinder pump connection fees is presented in Table 19.

Table 19. Homeowner / Developer Extension Cost Estimate

ITEM	QUANTITY	UNIT	UNIT COST	TOTAL COST
Package Grinder Station	1	EA	$8,300	$8,300
1-1/4" Pipeline	100	LF	$30	$3,000
Decommission Existing Septic Tank	1	LS	$600	$600
Subtotal				$11,900
Construction Contingency	1	LS	10%	$1,200
Subtotal - Construction Costs				$13,100
Sales Tax	1	LS	8.6%	$1,100
Construction Budget - Preliminary Design Estimate				$14,200
City of Bremerton General Facility Charge	1	LS	$3,800	$3,800
Total Estimated Project Budget				$18,000

Notes:
1. Pipe prices per linear foot include all bedding, backfill, excavation, soil removal, surface trench restoration, existing utility relocation/avoidance allowance, pipe material, and dewatering costs.
2. Package grinder station costs include engineering design, excavation, uplift protection, pump station, pumps, electrical connections, and minor landscaping.
3. Pipeline length will vary for each property. 100-LF is an assumed length.
4. Upon completion of landowner built grinder pump station, landowner will provide City with an access easement, and turn over maintenance and operation of the grinder pump station to the City.

Appendix F

Biosolids Management Evaluation

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City of Bremerton

Biosolids Management Evaluation

February 2014

HDR

500 108th Avenue NE
Suite 1200
Bellevue, WA 98004-5549
(425) 450-6200

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List of Acronyms

BUFs	Beneficial Use Facilities
CFR	Code of Federal Regulations
CWA	Clean Water Act
EPA	US Environmental Protection Agency
EQ	Exceptional Quality
NAS	National Academies of Science
NEBRA	North East Biosolids and Residuals Association
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resources Conservation Service
O&M	Operations and Maintenance
PC	pollutant concentration
TS	Total Solids
USEPA	US Environmental Protection Agency
VAR	Vector Attraction Reduction
VS	Volatile Solids
WERF	Water Environment Research Foundation
WPCP	Water Pollution Control Plant

1.0 Introduction and Background

The City of Bremerton, Washington has contracted with HDR Engineering, Inc. to evaluate biosolids management alternatives, including the existing program. Presently the City's processing of biosolids generates an end product that is managed by recycling on forestlands owned by the Bremerton Water Utility to improve forest yield.

Section 6 of the Wastewater Comprehensive Plan provides background information on the City of Bremerton's sewer utility, the facilities and processes currently used to treat wastewater at the City's Westside Wastewater Treatment Plant (WWTP). A brief discussion of biosolids regulations and trends is also presented, and will be discussed in more detail in this technical memorandum.

1.1 Bremerton Solids Handling and Biosolids Management Program

1.1.1 Solids Handling

Sludge produced from the wastewater treatment process at the WWTP consists of primary sludge (PS) and waste activated sludge (WAS). Primary sludge and primary scum are pumped directly from primary clarifiers to the anaerobic digesters. The dissolved air flotation thickener (DAFT) thickens WAS and secondary scum. A portion of the sludge was treated to what were considered to be Class A standards (discussed below) with a Pathogen Reduction Heat Treatment system, which includes treatment by a mesophilic anaerobic digester, heating by spiral and serpentine heat exchangers, detention in a holding tank, and cooling in a second anaerobic digester. This equipment is not in use as the Washington State Department of Ecology (Ecology) found that at other utilities, the process did not comply with Class A biosolids requirements. The sludge is dewatered by a centrifuge to approximate 23 percent solids. The resulting biosolids are land applied in nearby forests owned by Bremerton.

1.1.1 Biosolids Management

Since 1989, the City has used biosolids to fertilize City-owned forest land. From 1992 to present, 100% of the annual biosolids production (approximately 770 dry tons) is utilized on forest lands owned by the Bremerton Water Utility. An Aero-Spread solids spreader mounted on an International truck chassis is used for dewatered cake application. The City has covered storage facilities at Site 1. Hauling from the plant to the application sites is performed by a Contractor, currently Waste Management.

1.2 Biosolids Quantity Estimates

Historical records were obtained for 2005 though 2012. The estimated biosolids quantities are shown in Table 1. The WWCP projects that in 2033 with the addition of new service areas, the flows and loads will increase by 112 percent. Therefore, the projected annual biosolids production in 2033 is 1,630 dry tons per year.

Table 1: Historical Annual Biosolids Quantities

YEAR	DRY TONS/YEAR
2005	659
2006	577

YEAR	DRY TONS/YEAR
2007	601
2008	608
2009	678
2010	--
2011	--
2012	770

2.0 Biosolids Management Regulations and Trends

2.1 General Overview

Biosolids have many characteristics that make them a valuable fertilizer: plant nutrients (nitrogen, phosphorus, and other micronutrients), carbon, and water. When used as an agricultural fertilizer, biosolids provide essential nutrients and improve soil tilth. Biosolids are typically less expensive than commercial fertilizers, with much of the biosolids in the US being provided at no cost to the end user. Biosolids nutrients release slowly, a desirable characteristic in many fertilizer applications. Biosolids and biosolids mixtures have water-retention capabilities, which are particularly valuable in erosion control, landscaping, and disturbed land reclamation applications.

Many scientific studies have demonstrated the benefits of biosolids and biosolids mixtures in agriculture, forestry, reclamation, erosion control, landscaping, and other applications. Biosolids research has been ongoing at local universities for decades, producing valuable information to farmers and other biosolids users on proper application rates, effective application practices, and in proving the safety and utility of biosolids. Figure 1 and Figure 2 show the positive impact that biosolids has had in agricultural and forestry applications, respectively.

Figure 1. Photo Showing Crops Grown with Biosolids (left) and without Biosolids (right) (courtesy of King County, WA)

Figure 2. Photo of Tree Showing Increase in Growth after Biosolids Application (courtesy of King County, WA)

The US Environmental Protection Agency (USEPA) and the Northeast Biosolids and Residual Association (NEBRA) have published reports that provide the most wide-ranging look at trends in biosolids management in the US (USEPA, 1999; NEBRA, 2007). Figure 3 shows the breakdown of biosolids use/disposal in the US in 2004. Land application and advanced treatment (Class A or similar processing) represent over half of the biosolids use in the US.

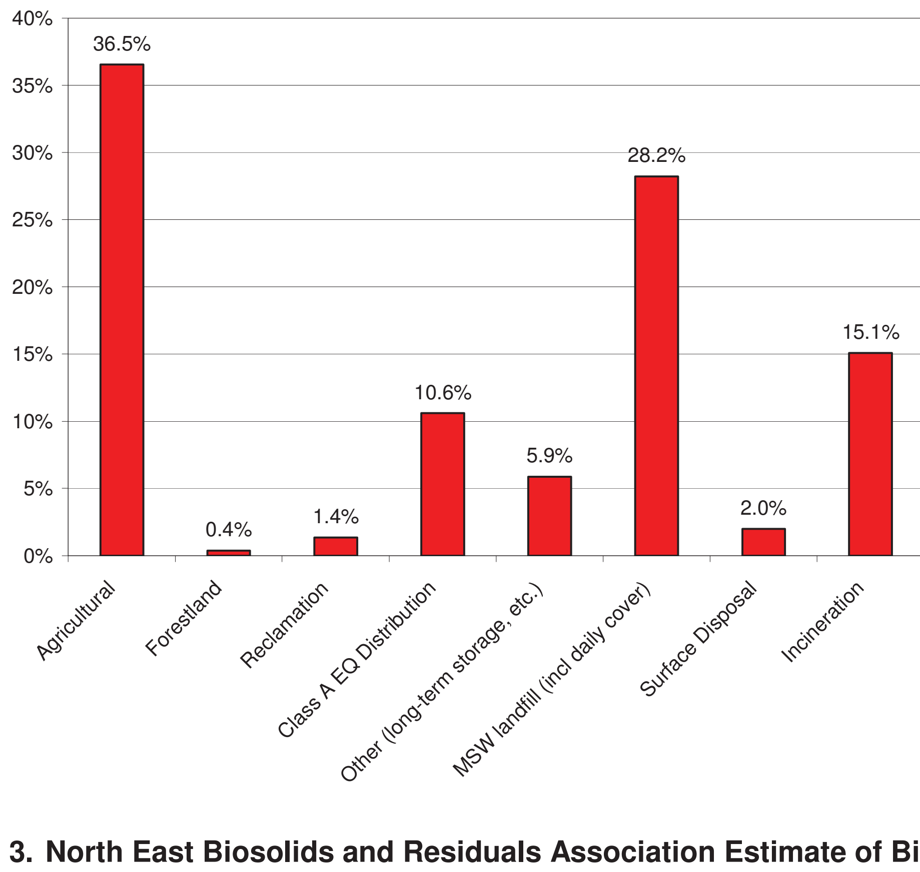

Figure 3. North East Biosolids and Residuals Association Estimate of Biosolids Use/Disposal in the US in 2004 (NEBRA, 2007; EQ = Exceptional Quality, MSW = Municipal Solid Waste).

In Washington, a number of utilities produce Class A biosolids (see definition in next paragraph). Most biosolids in Washington are applied on agricultural land as Class B biosolids, as shown in Figure 4. Class B biosolids are typically used for agricultural, forestland, and reclamation uses.

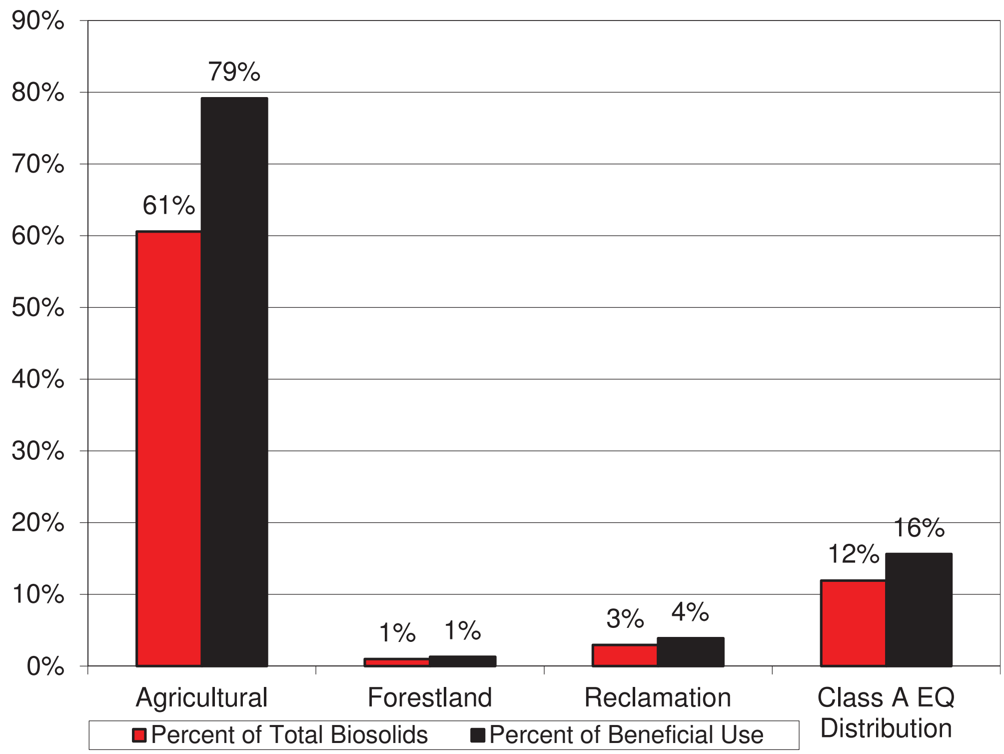

Figure 4. NEBRA Estimate of Biosolids Use/Disposal in Washington in 2004 (NEBRA, 2007).

2.2 Federal Regulations

The policy of the US Environmental Protection Agency (EPA) is to promote the beneficial use of biosolids while maintaining environmental quality and protecting public health (EPA, 2003). The Clean Water Act (CWA) Amendments of 1987 required the EPA to develop new regulations pertaining to sewage sludge/biosolids. In February, 1993, EPA published 40 CFR Part 503 (i.e., Part 503). The Part 503 Rule is a complex, risk-based assessment of potential environmental effects of pollutants that may be present in biosolids (USEPA, 1995). These guidelines regulate pollutant and pathogen concentrations as well as vector attraction reduction (VAR). The guideline defines biosolids as Class A or Class B, depending on the potential level of pathogens. Class A biosolids must meet strict pathogen standards and can be used with no restrictions, while Class B biosolids must meet less stringent pathogen requirements, with application restricted to crops with limited human and animal exposure. Biosolids in both classes must meet VAR requirements.

The Part 503 Rule applies to biosolids applied to agricultural and forest lands, biosolids placed in or on surface disposal sites, and biosolids that are incinerated. Biosolids that are disposed of in a landfill or used as a cover material at a landfill are subject to federal requirements in 40 CFR Part 258. The general provisions of the Part 503 Rule provide basic requirements for biosolids applied to land including pollutant limits, management practices, operational standards, monitoring, record keeping, and reporting. As Washington State requires "beneficial use" of biosolids pursuant to the requirements of WAC 173-308, which is typically interpreted by the Department of Ecology as recycling, options for surface disposal, landfill disposal, and incineration will not be considered in this document.

2.2.1 Pollutants

Part 503 also requires that limits for certain pollutants, such as metals, not be exceeded. Two approaches to meeting the Part 503 metals limits are allowed: (1) a maximum concentration must be met, or (2) a maximum cumulative amount of metals added to the soil via biosolids must be met. Biosolids meeting the Part 503 requirements by maximum concentration levels are called pollutant concentration (PC) biosolids, and limits are shown in Table 2. If biosolids metals meet these concentrations, no record keeping of cumulative loading to soils is required. The City currently meets all maximum allowable concentration limits for PC biosolids. An effective industrial pretreatment program is the key to complying with Part 503 metals limits, as industrial inputs into the collection system are usually the primary source of metals.

Table 2. Pollutant Concentration (PC) Biosolids

POLLUTANT	ALLOWABLE CONCENTRATION (MG/KG MONTHLY AVERAGE)[1]	BREMERTON 2012 AVERAGE CONCENTRATION (MG/KG)
Arsenic (As)	41	4.1
Cadmium (Cd)	39	2.1
Copper (Cu)	1,500	531
Lead (Pb)	300	44
Mercury (Hg)	17	1.0
Molybdenum (Mo)	75 [2]	8.7
Nickel (Ni)	420	89.5
Selenium (Se)	100	5.2
Zinc (Zn)	2,800	1113

Notes:
1. *Source: Table 3 of 40 Code of Federal Regulations (CFR) 503.13*
2. *Ceiling concentration. Source: Table 1 of Washington Administrative Code (WAC) 173-308*

2.2.2 Pathogens

As described above, two classes of biosolids suitable for land application are defined by EPA, Class A and Class B. Class A biosolids are pathogen-free for all practical purposes and can be used without any additional public contact restrictions. Class B biosolids may have low levels of pathogens, and restrictions are imposed on public access and crop harvesting after land application, which are described in the following sections. It should be noted that the restrictions and limits for Class A and Class B biosolids provide equal public health protection.

2.2.3 Vector Attraction Reduction

Vector attraction reduction (VAR) requirements minimize the likelihood of environmental transport by vectors. These requirements are the same for Class A and Class B biosolids. Alternatives depend on the method of treatment. Options for compliance include, but are not limited to, 38 percent volatile solids (VS) destruction, a specific oxygen uptake rate of less than 1.5 mg oxygen per hour per gram TS, and aerobic or anaerobic bench tests showing limited additional volatiles destruction. Only one of these is necessary.

2.2.4 Management Practices

A number of management practices are required by the Part 503 regulations and apply to bulk application of biosolids, both Class A and Class B.

2.2.4.1 General

General management practices required for land application include providing buffer zones around wells, surface water, and property boundaries; not causing any adverse impact to threatened or endangered species; and not applying biosolids to flooded, frozen, or snow-covered land. Management practices are required to limit public and animal contact after Class B biosolids are applied and to allow natural processes to further inactivate potential pathogens.

2.2.4.2 Application Rate

Biosolids must be applied at an agronomic rate, and nitrogen is most commonly used to determine the agronomic rate for biosolids application. Excess nitrogen applied to land could result in nitrate contamination of groundwater. The agronomic rate must be determined by considering total and available nitrogen in the biosolids and the expected yield of the crop or vegetation.

In some states the application rate of nitrogen “shall not exceed the agronomic rate for the particular cultivar grown,” with agronomic rate defined as “a rate of biosolids or domestic septage which matches *nutrient* requirements for a specific crop on an annual basis.” Rates also must be applied so that runoff, erosion, leaching, nuisance conditions, or groundwater contamination are prevented.

Agronomic rates for the City’s forest application program are calculated from information available through the Northwest Biosolids Management Association (NBMA), the University of Washington, and Washington State University. Nitrogen application rates consider silvicultural nutrition, stand age and conditions, soil types, and understory vegetation (Bremerton Annual Biosolids Annual Report, 2012).

Changing policy in the preparation of NPDES permits has resulted in inclusion of conditions that specify agronomic rates of phosphorus. USEPA may ultimately implement regulations that many states have adopted - a Phosphorus Index to manage phosphorus loading on land application sites. The Phosphorus Index is a risk management-based approach that takes into account transport and source factors to estimate the potential for off-site movement of phosphorus from a given site. It is not clear how this will impact forest application sites as the initial focus has been on agriculture and golf courses.

Additional research is being conducted regarding the use of phosphorus indices. Agronomic phosphorus loading limitations have the potential to increase land requirements two to three times beyond that required based on agronomic nitrogen loadings. Washington State does not currently require that a Phosphorus Index be used, but Ecology has recently indicated that it may require this in the near future. In addition, a recent legislative was passed that prohibits the use of requires elimination of phosphorus-containing fertilizers on turf.

2.2.5 Monitoring

Microbiological monitoring for either fecal coliforms or Salmonella sp. is required for all Class B biosolids except Class B Alternative 2. Monitoring must be at the time of biosolids use. Monitoring requirements vary by the size of the wastewater utility and the method of sludge processing. Bremerton is required to monitors biosolids once per quarter.

2.3 Washington State Regulations

Washington State regulates biosolids under Chapter 70.95J of the Revised Code of Washington (RCW). Washington does not have fully delegated authority from the EPA, but has the authority to issue separate state permits for biosolids management. Chapter 70.95J recognizes biosolids as a valuable commodity, and specifies implementation of a program that maximizes beneficial use. The state requirements are found in Chapter 173-308 of the Washington Administrative Code (WAC). The state program meets federal minimum requirements and has added requirements including, but not limited to, the following:

- Biosolids must not contain a significant amount of manufactured inerts (e.g. plastics, debris). Typically, this requirement is met by screening the wastewater at the municipality's treatment plant.
- For all practical purposes, the state rule does not allow biosolids to be disposed of (e.g. landfill) on a long-term basis.
- Biosolids generators and all entities managing biosolids must obtain a state permit and pay permit fees.
- The state rule has certain exemptions for research.

Each entity must submit an annual report to the Department of Ecology.

2.4 Bremerton Biosolids Regulatory Compliance

The City meets the most stringent criteria for regulated pollutants as shown in Table 2. Vector attraction reduction requirements are met by anaerobic bench-scale testing, although in two instances in 2012 the tests failed. Anaerobic digestion is used to achieve Class B pathogen standards for the City's biosolids.

2.5 Non-Regulatory Issues

The National Academies of Science (NAS) completed an assessment of the science that supports the Part 503 Rule, and concluded that there is no evidence that current biosolids management practices under existing regulations are not safe, but that more research is required to update the science behind the regulations (National Research Council, 2002). NAS concerns included the synergistic effects of chemical pollutants and pathogens, and pathogens and chemical pollutants not considered in the risk assessment of the Part 503 Rule. As a result of NAS recommendations, USEPA may begin a review of the Part 503 Rule every five years, similar to reviews of other USEPA-promulgated rules. USEPA is currently reviewing the Part 503 regulations and is expected to issue an updated version in the near future.

2.5.1 Pathogen Re-growth and Reactivation

Recent Water Environment Research Foundation (WERF) research has shown that fecal coliform, the indicator organism commonly used for pathogens, sometimes reactivates and/or re-grows after mechanical dewatering of solids. This has occurred with a variety of anaerobic digestion processes, both Class B and Class A. Research is ongoing to further understand the mechanisms and causes of this phenomenon. Research to date has shown that high solids centrifuges have the most potential to reactivate or re-grow fecal coliform.

2.5.2 Trace Organic Compounds

Pharmaceuticals, personal care products, their intermediates, and other organic compounds have been found at very low levels in the environment, including in biosolids. Risks from current biosolids management practices are not completely known, but to date no increased risk from current biosolids management practices has been demonstrated. A recent Water Environment Research Foundation report (WERF, 2010) addresses the status of the science, risks, and public perception surrounding this complex issue.

2.5.3 Public Perception

Increasing urbanization and development are making it increasingly difficult to identify and permit sites for land application of biosolids. Although land application is still a relatively economical method, the availability of suitable local agricultural and forest land is decreasing.

Political divisions and conflicts have emerged over the management of biosolids around the US. Growing and more organized opposition to current biosolids management practices, particularly land application of Class B biosolids on agricultural land, are forcing some utilities to manage biosolids in more remote areas or further process solids in order to manage biosolids in alternative ways.

Local ordinances have been passed banning either Class B or all biosolids land application. Wahkaikam County in southwest Washington approved a ban on biosolids land application after complaints about a local farmer's application of septage.

Forest application programs are typically less visible and less likely to be noticed by the public, depending on their proximity to hiking trails and other public uses. Bremerton has a very successful, low profile biosolids management program.

3.0 Biosolids Management Alternatives

3.1 Alternatives Analysis

The following alternatives will be evaluated for Bremerton's biosolids management program:

- Continue current forest application program:
  - City-managed application on City forest land.
  - Contractor hauling to sites.
  - City application.
- Agricultural or other land application at a nearby Beneficial Use Facility (BUF):
  - Fire Mountain Farms.
  - Cascade Materials.
  - Contractor hauling to BUF.

3.1.1 Alternative 1: Continue Current Forestry Program

Bremerton has been successfully operating its forest land application program since 1989. Application onto two sites with a combined area of about 800 acres approximately five miles southwest of Bremerton. Application is managed by the Bremerton Water Utility. An Aero-Spread solids spreader mounted on an International truck chassis is used for dewatered cake application. The City also has covered storage facilities. Hauling from the plant to the application sites is performed by a Contractor, currently Waste Management. This alternative would require no changes to the current program.

3.1.2 Alternative 2: Agricultural Land Application at a Contract-Operated Beneficial Use Facility (BUF)

This alternative would require the City to either re-negotiate or re-bid a biosolids hauling contract to haul biosolids to a Beneficial Use Facility (BUF). A contract with a BUF for contract land application and management would also be required.

The closest BUFs to Bremerton are Fire Mountain Farms (FMF) in the Centralia area and Cascade Materials in Snohomish. FMF is a large BUF that accepts biosolids from a number of large and small wastewater utilities, including the LOTT Clean Water Alliance. Cascade Materials is a much smaller BUF and has recently had problems permitting a field storage site for biosolids. Both Fire Mountain Farms and Cascade Materials were contacted regarding the potential to accept Bremerton’s biosolids. FMF indicated that they would likely charge approximately $28 per wet ton, but that currently they are having some issues with field storage in general, which may prohibit a near-term contract for accepting biosolids in winter months. Cascade Materials indicated that they did not have much capacity to accept Bremerton’s biosolids at this time and would charge $80 per wet ton.

Field storage is recommended due to weather conditions during much of the year that prohibit biosolids application. Given wet weather and agricultural land application limitations in winter months, storage is required. The City already has covered storage facilities at Site 1, and some BUFs have storage facilities. Shared costs for storage facilities at a BUF could be negotiated in exchange for long-term contracts that could benefit both parties if additional storage is needed.

3.2 Cost Estimate Assumptions

Annual operations and maintenance costs were estimated based on the City’s current costs and well as HDR experience. Assumptions for the cost estimates are as follows:

- Average annual timber revenue - $119,989 (from 2000-2013).
- Increase in timber yield from biosolids application – 100%.
- Estimated value of City application equipment - $200,000.
- Alternative 2:
  - Contractor hauling - $76.67 per wet ton solids.
  - Contractor (BUF) management/application - $28 per wet ton solids.

3.3 Construction Costs

Construction cost estimates were not developed as most services would be contracted and the City would not need to purchase new equipment nor construct new facilities, for either alternative. This assumes that field storage would be provided by the contract BUF.

3.4 Annual Operations and Maintenance Costs

Table 3 presents the annual O&M cost estimates for the two biosolids management alternatives. The forest alternative includes timber revenue but has equipment replacement and maintenance materials costs due to the City application of biosolids.

Table 3. Estimated Annual Operations and Maintenance Costs for Biosolids Management Alternatives

	ALT 1: CONTINUE FOREST APPLICATION PROGRAM	ALT 1: CONTINUE FOREST APPLICATION PROGRAM	ALT 2: AGRICULTURE APPLICATION AT A BUF	ALT 2: AGRICULTURE APPLICATION AT A BUF
	2014	2033 With New Service Area	2014	2033 With New Service Area
Hauling	$93,000	$176,800	$366,300	$696,700
Forest/Agricultural Application	$56,700	$107,900	$98,000	$186,400
General Permit, Administration, Sampling/Analysis	$17,500	$37,000	$17,500	$37,000
Equipment Replacement	$10,000	$10,000	$0	$0
Maintenance Materials	$4,000	$4,000	$0	$0
Revenue	($60,000)(1)	($127,000)	$0	$0
Total Annual O&M Cost	$121,200	$208,700	$481,800	$920,100

(1) Calculated by taking the annual revenue of $119,989 and dividing by 2 as the biosolids application accounts for half of the yield (100% increase, or doubling the yield).

3.5 Life Cycle Costs

Life cycle cost, which add the project cost and present value of O&M costs, provides the best overall economic comparison of alternatives. For this analysis, a 20 year period at a discount rate of 6 percent was assumed. Table 4 presents the estimated life cycle costs.

Table 4. Life Cycle Cost Estimates for Dewatering Alternatives

	ALT 1: CONTINUE FOREST APPLICATION PROGRAM	ALT 2: AGRICULTURE APPLICATION AT A BUF
Annual O&M	$164,950	$700,950
Life Cycle	$1,892,000	$8,040,000

1. Costs are calculated using the average of 2012 and 2033 projected biosolids quantities.

3.6 Non-Cost Criteria Evaluation

Non-cost evaluation criteria were developed to capture issues that are hard to quantify in cost terms. The following non-cost criteria were evaluated:

- Sustainable.
- Flexibility.
- Public Perception.
- Complexity of Operations and Maintenance.
- Reliability.
- Truck Spill Potential.
- Odor Potential.

Table 5 presented the ratings for alternates for each criterion.

Table 5. Non-Cost Criteria Weighting and Rating

CRITERIA	ALTERNATIVE 1: CONTINUE FOREST APPLICATION PROGRAM	ALTERNATIVE 2: AGRICULTURE APPLICATION AT A BUF
Sustainability	3	3
Flexibility	2	3
Public Perception	3	2
Complexity of Operations and Maintenance	2	3
Reliability	3	2
Truck Spill Potential	3	2
Odor Potential	3	2
Sum	19	17

Alternatives rated 1 (worst) through 3 (best) for all criteria.

4.0 Conclusions and Recommendations

In summary, the City currently has a successful and cost-effective biosolids management program. Continuation of the current forest application program (Alternative 1) has a significantly lower cost and a higher non-economic criteria rating, and therefore is recommended for Bremerton's biosolids management program.

5.0 References

King County, 2008 Biosolids Summary brochure, 2009.

National Research Council (2002), *Biosolids Applied to Land, Advancing Standards and Practices*.

North East Biosolids and Residuals Association (NEBRA, 2007), *A National Biosolids Regulation, Quality, End Use and Disposal Survey, Preliminary Report*.

USEPA (1999), *Biosolids Generation, Use, and Disposal in the United States*, Publication EPA530-R-99-009.

USEPA (2003), *Environmental Regulations and Technology, Control of Pathogens and Vector Attraction in Sewage Sludge*, Publication 625R82013.

University of Washington, (1981), Municipal Sludge Application to Pacific Northwest Forest Lands.

Water Environment Research Foundation (WERF, 2010), *Trace Organic Chemicals in Biosolids-Amended Soils: State-of-the-Science Review.*

Appendix G

Service Area Alternatives

1.1 Analysis

Analysis in the collection system is based on determining when the capacity of existing facilities would be exceeded due to growth or expansion of the sewer system. Capacity is defined differently for the combined and separated sewer areas.

In the combined basins, the capacity of the systems is determined by the frequency of combined sewer overflows (CSO). Facilities are sized to limit CSO events to less than one event per outfall per year. The simulated flows from the design storm event are used to evaluate if a CSO event would occur more frequently that one event per year per outfall.

In the separated basins, sanitary sewer overflows (SSO) are not permitted and the capacity of sewer conveyance facilities is designed to prevent any overflow from occurring. The capacity should not be exceeded by the peak sanitary flow plus I/I. rate of 3,000 gallons per day per acre. Results from the *2001/2002 King County Regional Infiltration/Inflow Control Program Wet Weather Technical Memorandum* document that nearly 50-percent of all basins exceeded an I/I rate of 3,000 gal/Ac/d over ten measured storms. It is reasonable to assume 3,000 gal/Ac/d as the I/I rate for this study. When the peak sanitary flow and wet weather flow estimated by the I/I rate 3,000 gal/Ac/d exceeds the capacity of the existing facilities, alternatives are presented to improve the existing collection system.

The following sections provide a summary of the evaluation of the combined and separated basin's major facilities

The following sections describe preliminary alternatives for extending sewer service to new service areas. A list of the proposed alternatives is described below

- **Trenton Service Area**
- **Tracyton and Tracyton Beach Service Area**
- **Rocky Point and Marine Drive Service Area**
- **Port Blakely Service Area**

Pump Stations EB-2

Pump Station EB-2 receives flow from the Trenton Avenue Basin and the East Park Basin during wet weather events. A portion of the Trenton new service area is proposed to be added upstream of the Trenton and East Park basins. The sub-basins identified in the new service area plan are TRT-1 - TRT-6. Table 1 lists the estimated peak design flow for each new Trenton service area documented in the *Sewer Planning – East Bremerton and West Hills* (Feb, 2014).

Table 1 New Service Area Peak Design Flow Estimates Tributary to EB-2

NEW SERVICE AREA	PEAK DESIGN FLOW, INCLUDING I/I (GPM)
Trenton - TRT-1	587
Trenton - TRT-2	261
Trenton - TRT-3	146
Trenton - TRT-4	578
Trenton - TRT-5	390
Trenton - TRT-6	417
Total	2,379

The existing and projected peak flows to pump station EB-2 are estimated by simulating the Design Storm in the City's hydraulic model. Table 2 depicts the estimated peak flow to pump station EB-2 based on the Year 2013 population and Year 2033 population.

Table 2 EB-2 Modeling Analysis Results

FACILITY	TOTAL CAPACITY (GPM)	YEAR 2013 PEAK FLOW (GPM)	YEAR 2033 PEAK FLOW (GPM)
EB-2	4,100	2,690	3,060

There are several alternatives for how flow is routed from the service for basins and pump stations proposed for the Trenton Service Area. Two options were evaluated for each of the following which could be combined into a myriad of different routing alternatives.

- **TA-1 Pump Station –** There are possible alignments for flow from TA-1 serving TRT-2. One alignment could route flow to discharge to new gravity main along Trenton Avenue to the TA-2 pump station. Another alignment could route flow along Slyvan Way to the Cherry Avenue Basin. TRT-3 is a low pressure area that would utilize the force main from TA-1 to either of the two discharge locations.
- **TA-3 Pump Station** – There are three possible alignments for flow from TA-3 serving TRT-1. Two are force main alignment to Perry Avenue or to Trenton Avenue. Both would discharge to the wet weather basin area for pump station EB-2. However, an alignment discharging to Trenton Avenue would be routed through pump station EB-3. A third alignment would be to TA-2 which would pump flow to the Cherry Avenue Basin.
- **TA-2 Pump Station** – There are two possible alignments for flow from TA-2 serving TRT-4. One alignment conveys flow to Perry Avenue in the East Park Basin and requires upsizing an existing gravity main to pump station EB-2. Another alignment would route flow along Sheridan Avenue to the Cherry Avenue Basin and require a new gravity main to the East Bremerton Beach Main.
- **TRT-5 and TRT-6** – It is possible for these areas to flow by gravity to an existing main along Perry Avenue. Another routing option is to convey flow to TA-2 to pump flow over to the Cherry Avenue Basin.

The City selected a preffered alternative from the routing options described above. That would convey a majority of the flow to the Cherry Avenue Basin to avoid exceeding the capacity of the EB-2 pump station. The following are the components of the preferred alternative with a brief explanation.

TA-1 force main along Sylvan Way to the Cherry Avenue Basin. The benefit of this alignment is that it avoids relying on the installation of pump station TA-2 providing flexibility in the phasing of sewer service extension. This alignment also avoids increasing flow to EB-2.

TA-2 force main along Sheridan Avenue to the Cherry Avenue Basin. The benefit of this alignment is that it avoids increasing flow to pump station EB-2 during wet weather events.

TA-3 force main to Perry Avenue. While this alignment would increase flow to EB-2, there is available capacity in the pump station for this sub-basin if all others are routed to the Cherry Avenue Basin. Flow from basin would increase the peak flow to EB-2 from 3,060 to 3,650 gpm. The benefit of this alignment is that it avoids impacting pump station EB-3 and other capacity limited sewer identified downstream of Trenton Avenue, and it avoids relying on the installation of pump station TA-2 allowing flexibility in the phasing of sewer service.

TRT-5 and 6 are conveyed to pump station TA-2 to pump to the Cherry Avenue Basin. The benefit of conveying flow from these basins to TA-2 is that it avoids increasing flow to EB-2. If flow were routed to EB-2 from these basins (807 gpm) along with flow from sub-basin TRT-1 (587 gpm), the resulting peak flow would be 4,454 exceeding the capacity of pump station EB-2.

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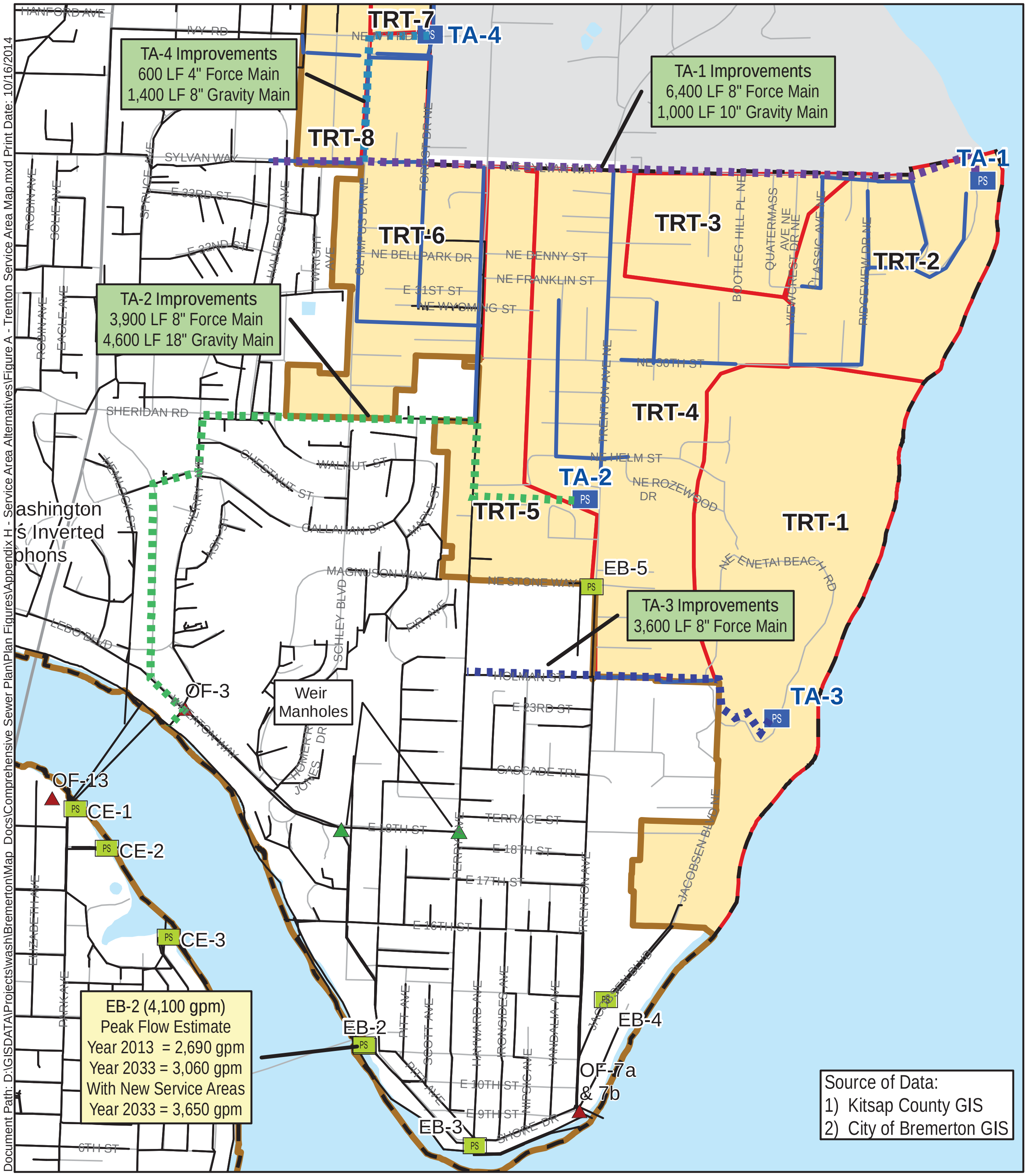

Legend

- TA-1 Improvements
- TA-2 Improvements
- TA-3 Improvements
- TA-4 Improvements
- Proposed Sewer Main
- Proposed Pump Station
- New Service Area Basin
- Sewer Main
- Pump Station
- Outfall
- Weir_MH
- City of Bremerton
- Bremerton UGA
- Major Road/Highway
- Street
- Water Body

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Figure A
Trenton Service Area Map
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Pump Station EB-6

EB-6 pump station serves the Tracyton Beach sewer basin and pumps to the East Bremerton Beach Main. Overflow OF-6 is at that the pump station in the event that combined flow exceeds the capacity of the pump station.

The Tracyton Beach and the Tracyton new service areas are proposed to be added upstream of EB-6. The new service areas would increase flows to EB-6. Table 3 lists the estimated peak design flow for each new service area documented in the *New Service Area Plans – East Bremerton and West Hills* (Feb, 2014).

Table 3 New Service Area Peak Design Flow Estimates Tributary to EB-6

NEW SERVICE AREA	PEAK DESIGN FLOW, INCLUDING I/I (GPM)
Tracyton Beach	159
Tracyton - TRC-2	345
Tracyton - TRC-3	213
Tracyton - TRC-4	103
Total	820

The existing and projected peak flows to pump station EB-6 are estimated by simulating the Design Storm in the City's hydraulic model. Table 4 depicts the estimated peak flow to pump station EB-6 based on the Year 2013 population and Year 2033 population.

Table 4 EB-6 Modeling Analysis Results

FACILITY	TOTAL CAPACITY (GPM)	YEAR 2013 PEAK FLOW (GPM)	YEAR 2033 PEAK FLOW (GPM)
EB-6*	1,200 (2 of 3)	710	750

The City plans to convert the existing 8" ductile iron pipe along Tracyton Beach Road to a force main. City staff reported that the main is oversized, and due to its length and uneven alignment, sewage is often retained in the pipeline. Converting it to a force main would increase the flow and improve flushing of the main. The proposed pump station TB-2 serving the TRC-2, 3, and 4 sub basin would connect to the existing main with a 1,200 lineal foot (LF) force main and pump flow to EB-6. There are gravity connections to the existing 8" sewer main that would no longer be able to discharge to the existing 8" main if it is converted to a force main. New gravity mains would be installed to convey flow to EB-6 and or TB-2 from these service connections.

EB-6 has a total capacity of 1,200 gpm and there is less than one CSO event per year at OF-6. The expansion of sewer service to the Tracyton and Tracyton Beach service areas would increase flow to the pump station and is projected to exceed the capacity of the pump station at full build-out. There were two alternatives considered for pump station EB-6.

- **Tracyton Alternative 1** – The EB-6 pump station would be upgraded to accommodate the additional flows from the new service area.

- **Tracyton Alternative 2** – Approximately 2,000 LF of 8” force main would be installed to extend the TB-2 force main to an existing main at Lebo Boulevard and Hefner Avenue and discharge to CE-1 by gravity. This would bypass EB-6 and no upgrade to the pump station is anticipated

The selected its preferred alternative to upgrade EB-6 as flows increase to the pump station. There is available capacity in the EB-2 force main and upgrading the pump station if and when flows begin to approach the pumping capacity would involve replacing the pumps and upgrading electrical equipment. The existing 8” force main from EB-6 could accommodate an increase in pumping capacity. At a flow rate of 1,570 gpm, the projected Year 2033 peak flow with the Tracyton service areas results in a pipe velocity of approximately 10 feet per second in the force main.

Figure 5-6 depicts the conveyance facilities, modeling results, and alternatives.

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Legend

- TB-2 Improvements
- Proposed Sewer Main
- Proposed Pump Station
- New Service Area Basin
- Sewer Main
- Pump Station
- Outfall
- City of Bremerton
- Bremerton UGA
- Major Road/Highway
- Street
- Water Body

Figure B
Tracyton Service Area Map

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Port Blakely

Port Blakely is an undeveloped property west of the Kitsap Lake Basin within the City's service area. A development plan was submitted to the City and flow estimates were evaluated in Appendix C of the *2005 Wastewater Comprehensive Plan Update* (Aug 2005). Since 2005, the ownership of the property has changed and the zoning revised to low density residential. Currently, no development plan is being pursued at the property.

The City recognized that the property could be developed in the future and request sewer service in the Kitsap Lake Basin. The flow estimates developed in the 2005 WWCP are no longer valid, but would need to be updated once a new development plan has been submitted to the City. The following section discusses the existing capacity of the Kitsap Lake system, available capacity for additional service area, and improvements necessary to provide service to the Port Blakely property.

Flow from the Kitsap Lake Basin is conveyed through 4 pump stations connected in series. KL-4 pumps to KL-3, KL-3 pumps to KL-2, and KL-2 pumps to KL-1 which pumps out of the basin. Table 5 lists the capacity of each pump station and current and projected peak flow estimates. The peak flow estimates for KL-2, KL-3, and KL-4 is based on flow meter data collected at each pump station. The flow estimate for KL-1 is estimated based on a combination of demographic information and flow from KL-2.

Table 5 Kitsap Lake Pump Stations Projected Peak Flows

FACILITY	TOTAL CAPACITY (GPM)	YEAR 2013 PEAK FLOW (GPM)	YEAR 2033 PEAK FLOW (GPM)
KL-4*	450 (1 of 2)	280	300
KL-3*	500 (1 of 2)	660	700
KL-2*	1,150 (1 of 2)	1,380	1,490
KL-1	950 (1 of 2)	1,440	1,560

* Peak flow estimates for Year 2013 are based on flow meter data collected at the pump station.

There is limited available capacity in the Kitsap Lake system. KL-1, KL-2, and KL-3 operate both pumps during peak wet weather flow events. There are two alternatives identified for routing flow from a development at Port Blakely either north of Kitsap Lake or South of Kitsap Lake. In either alternative, a pumping upgrade at KL-2 would be required. The two alternatives and KL-2 pump station improvements are described below:

- **Port Blakely Alternative 1 –** A sewer main from the Port Blakely development would convey flow north of Kitsap Lake to KL-4. The alignment would be approximately 4,000 LF of sewer main with the diameter based on the scale of the development.

  The Kitsap Lake Main Replacement project would replace the existing Kitsap Lake Beach Main with a new force main and install gravity sewers to convey flow to either KL-3 or KL-4 and eliminate all gravity connections to the beach main. With additional flow from Port Blakely, the size of the new force main would increase and require upgrades to KL-4 and or KL-3 if both pump stations continue to pump in series.

- **Port Blakely Alternative 2 –** A sewer main from the Port Blakely development would convey flow directly to KL-2 south of Kitsap Lake. The alignment would be approximately 10,000 LF of sewer main with the diameter based on the scale of the development. Given the length of the alignment and the relatively flat grade, a pump station in the Port Blakely development may be needed to convey flows to KL-2.

The Kitsap Lake Main Replacement project is still necessary but it would not be impacted by the flows from Port Blakely. It would install a new force main and gravity sewers to abandon the beach main. Upgrades to KL-3 and KL-4 may be necessary and would be determined during the pre-design phase of the improvements.

- **KL-2 Improvements (Both Alternatives) –** The KL-2 pump would need an upgrade or replacement to accommodate the additional flows from the Port Blakely development. It is currently approaching its peak capacity during peak flow events. An approximately 3,700 LF force main would be installed along Price Road and Harlow Drive to Sunnyhill Road. The diameter of the force main would be evaluated along with preliminary design of the KL-2 pump station improvements. The existing 8” sewer main on Harlow Drive would be replaced with approximately 4,600 LF of 24” gravity main along Harlow Drive from Sunnyhill Road to Keen Street, along Keen Street from Harlow Road to Werner Road, and along Werner Road from Keen Street to Auto Center Way where it would connect to an existing 24” sewer main. This alignment would bypass the KL-1 pump station so there would be no improvements at this pump station due to development in Port Blakely.

The City selected a preferred alternative to route flow south of Kitsap Lake (Alternative 2). This would avoid impacting pump stations KL-3 and KL-4 and the Kitsap Lake line which are all limited in capacity for additional flow. Flow would be pumped from the Port Blakely area through a force main to the KL-2 pump station. The KL-2 pump station would be upgraded with a new force main alignment that would bypass KL-1 avoiding improvements to the pump station. These improvements are dependent on the timing and magnitude of development plans at the Port Blakely property.

Figure 5-7 depicts the conveyance facilities, modeling results, and alternatives:

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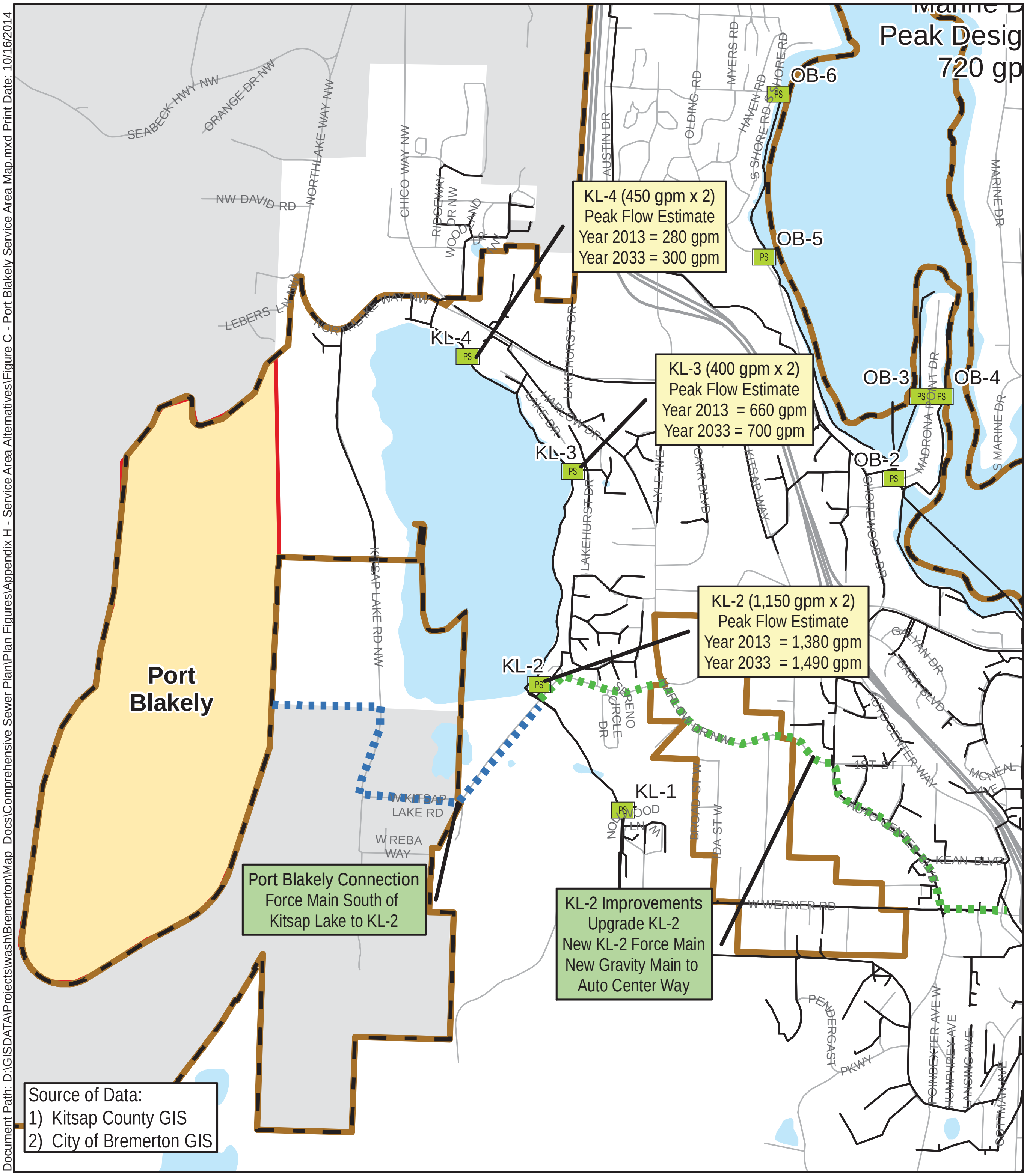

Legend

- Port Blakely Connection
- KL-2 Improvements
- PS Proposed Pump Station
- New Service Area Basin
- Sewer Main
- PS Pump Station
- Outfall
- Bremerton UGA
- City of Bremerton
- Major Road/Highway
- Street
- Water Body

Figure C
Port Blakely Service Area Map

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Rocky Point and Marine Drive

The expansion of sewer service to the Marine Drive and Rocky Point service areas would increase flow to the existing collection system. Table 6 lists the estimated peak design flow for the Marine Drive new service are documented in the *Sewer Planning – Marine Drive Area* (Sep, 2008) and the Rocky Point new service area documented in the *Sewer Urban Growth Area Planning* (Feb, 2008).

Table 6 New Service Area Flows Tributary to OB-1

NEW SERVICE AREA	PEAK DESIGN FLOW, INCLUDING I/I (GPM)
Marine Drive	720
Rocky Point	1,411
Total	2,131

Two alternatives were evaluated to convey from flow from the service areas to either pump station OB-1 or pump stations WB-3 and WB-6. Table 7 shows the estimated peak flow to each pump station for current and projected conditions. The peak flow estimate for the OB-1 pump station is based on I&I flows observed in flow meter data at the pump station during a large storm event on November 19, 2012. The peak flow estimate for WB-3 and WB-6 is based on simulating the Design Storm in the City's hydraulic model.

Table 7 OB-1 Projected Peak Flows

FACILITY	TOTAL CAPACITY (GPM)	YEAR 2013 PEAK FLOW (GPM)	YEAR 2033 PEAK FLOW (GPM)
OB-1*	1,800 (2 of 3)	1,880	2,290
WB-3 and WB-6*	17,500 (combined)	8,100	9,710

* Flow meter data is available for this pump station to verify 2013 peak flow estimates.

If flow is routed to OB-1, peak wet weather flows would exceed the capacity of the pump station. If flow is routed to the Callow Basin, there is available capacity in the WB-3 and WB-6 pump stations to convey the additional flow. Both routing options are possible and described in the following Alternatives.

Figure 5-8 depicts the conveyance facilities, modeling results, and alternatives:

- **Rocky Point and Marine Drive Alternative 1** – This alternative would route flow from the Rocky Point and Marine Drive service areas to the Callow Basin. One possible discharge location is to an existing 30" sewer main on Wycoff Avenue and 11th Street. This would bypass the OB-1 pump station.
- **Rocky Point and Marine Drive Alternative 2** – This alternative would convey all flow from the Rocky Point and Marine Drive service areas to OB-1. To accommodate the additional flow, OB-1 would need to increase its capacity and install a new force main with a larger diameter pipe. The future capacity of OB-1 and its force main would be determined during a pre-design phase.

The City selected a preferred alternative to convey flow to WB-3 and WB-6 in the Callow Basin. The benefit is that there is pumping capacity available in the pump stations and it would avoid increasing flow to pump station OB-1 which is would need a capacity upgrade of both the pump station and force main. There is limited space available at the OB-1 pump station property and constructing an upgraded pump station there would be difficult.

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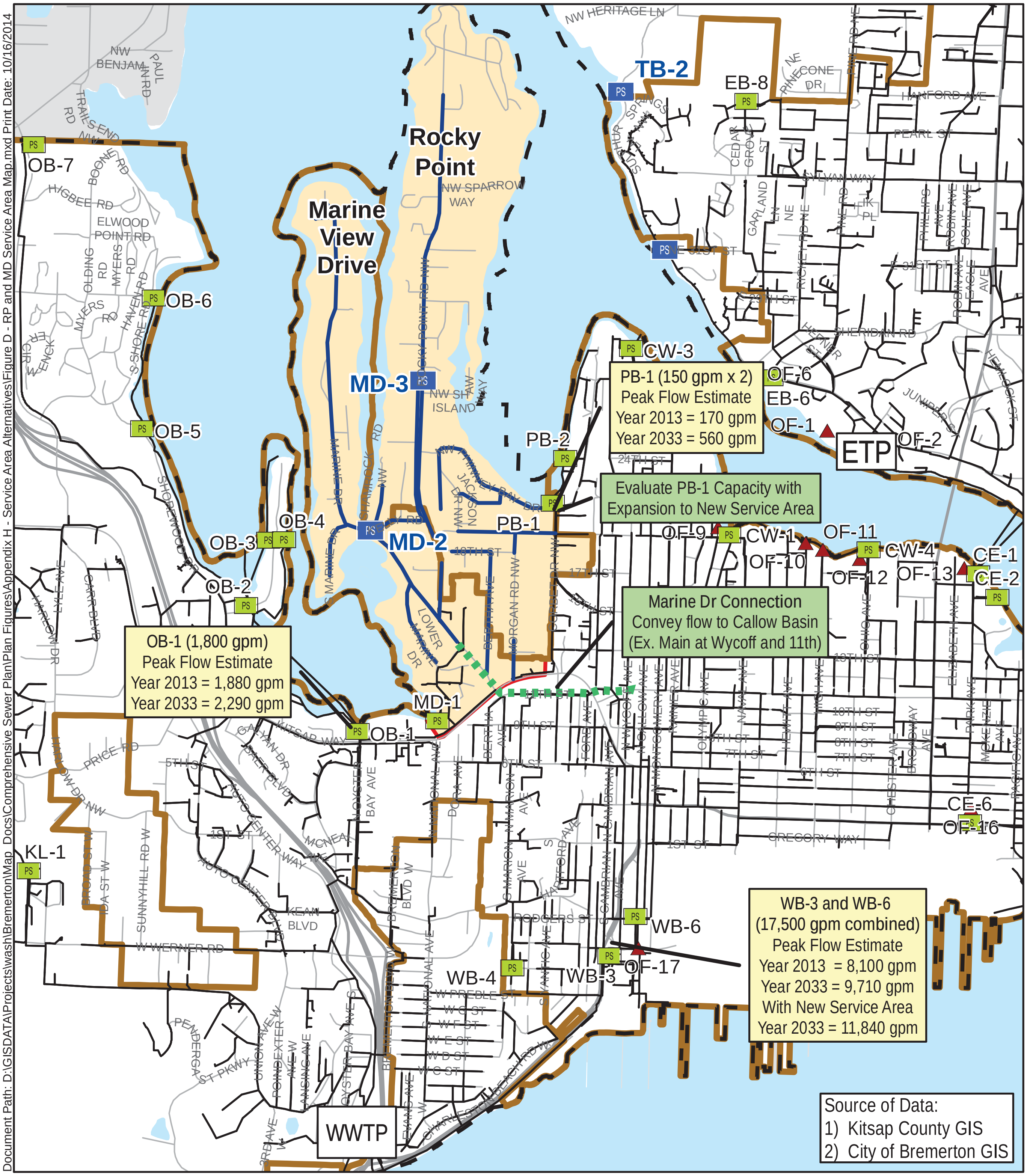

Legend

- Marine Dr Connection
- Proposed Pump Station
- Proposed Sewer Main
- New Service Area Basin
- Sewer Main
- Pump Station
- Outfall
- City of Bremerton
- Bremerton UGA
- Major Road/Highway
- Street
- Water Body

Figure D

Rocky Point and Marine Drive Service Area Map

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Appendix H

SEPA Documentation

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City of Bremerton
Department of Community Development

DETERMINATION OF NONSIGNIFICANCE

PROPOSAL: The Bremerton Public Works Department is updating the 2005 Wastewater Comprehensive Plan. The update will identify sewer maintenance and capital improvement capacities, evaluate conveyance and treatment capacities, and identify programmatic changes that should be implemented through the year 2033.

FILE NUMBER: BP14 00020

LOCATION: Citywide

PROPONENT: City of Bremerton, Department of Public Works

Lead Agency: City of Bremerton, Department of Community Development

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). The 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.

The DNS is issued pursuant to WAC 197-11-340(2)(a)(v); the lead agency will not act on this proposal for 14 days from the date of issue.

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, Planner (360) 473-5245**
DATE OF ISSUE: **April 17, 2014**
COMMENT DEADLINE: **May 1, 2014**

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 Permit Center, 345 6th Street, Suite 600, Bremerton, WA. 98337. Appeals must be filed by the date indicated above as "Administrative Appeal Deadline." If you appeal, you should be prepared to make specific factual objections.

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.

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