City of Everett

2014 Comprehensive Sewer Plan

VOLUME 1

Sewer Plan

November 2014

EVERETT

HDR

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City of Everett

2014 Comprehensive Sewer Plan

CERTIFICATION

This 2014 Comprehensive Sewer Plan for the City of Everett has been prepared under the direction of the following Registered Professional Engineer.

Souheil Nasr, P.E.
City of Everett
(425) 257-8800

James Peterson, P.E.
HDR Engineering, Inc.
(425) 450-6200

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Resolution No. 6805

A Resolution Adopting the 2014 Comprehensive Sewer Plan

WHEREAS, the Washington State Department of Ecology recommends that the City update its Comprehensive Sewer Plan every six years; and,

WHEREAS, the previous Comprehensive Sewer Plan was approved in 2007; and,

WHEREAS, the City has prepared a 2014 Comprehensive Sewer Plan in accordance with the Department of Ecology Guidelines; and,

WHEREAS, the City Council finds that the 2014 Comprehensive Sewer Plan meets the needs of the City and the State;

NOW THEREFORE BE IT RESOLVED, that the City Council of the City of Everett adopts the 2014 Comprehensive Sewer Plan.

Councilperson Introducing Resolution

Passed and Approved this 17th day of December, 2014.

Council President

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STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
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PUBLIC WORKS

July10, 2015

Ray Stephanson, Mayor
City of Everett
2930 Wetmore Avenue
Everett, WA 98201-4067

Re: City of Everett 2014 Comprehensive Sewer Plan
City of Everett 2014 CSO Control Plan Update

Dear Mayor Stephason:

The Department of Ecology has reviewed the City of Everett's Comprehensive Sewer Plan and CSO Control Plan Update documents referenced above. Pursuant to RCW 90.48.110, WAC 173-240-030, and WAC 173-245-090, Ecology hereby approves the documents.

The City's design and construction of sewage facilities within the planning area boundary described in the comprehensive plan must conform to the general descriptions presented in the approved plan or in subsequent amendments to the plan. Before constructing or modifying any wastewater treatment or disposal facility identified in the plan, the City must first submit engineering reports and design documents (plans and specifications) to Ecology for review and approval. This requirement applies to all projects at the Water Pollution Control Facility and all CSO control projects identified in the approved CSO Control Plan Update.

The approved general sewer plan includes the City's standard design details for collection system components. As such, WAC 173-240-030(5) waives the requirement for the City to submit engineering reports and design documents for most sewer line extensions, including pump stations. Prior to construction, the City must submit to Ecology a written description of the project and written assurance that the extension conforms to the approved general sewer plan and the City's standard design. Ecology must review and approve engineering documents if proposed collection system projects include the following situations:

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 Shawn McKone at (425) 649-7037 or via email at shawn.mckone@ecy.wa.gov.

Sincerely,

Kevin C. Fitzpatrick
Water Quality Section Manager

cc: Dave Davis, Public Works Director, Everett
Mark Sadler, Maintenance Superintendent
Jim Miller, Engineering Superintendent
Souhiel Nasr, Principal Engineer
Grant Moen, Senior Engineer
Shawn McKone, Facility Manager, Ecology

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F Alderwood Water and Wastewater District (WWD) Agreements

G Mukilteo Water and Wastewater District (WWD) Agreements

H Summary of Trunk Sewers

I NPDES Permit and Fact Sheet

J Sanitary Sewer Flow Projections

K Hydraulic Modeling Technical Memorandum

L 2012 Annual CSO Report

M CIP Support Documentation

N Stormwater Policy Technical Memorandum

O Inflow and Infiltration Technical Memorandums

P Level of Service Technical Memorandums

Q City of Everett Design Rainfall Series

List of Acronyms

2006 Sewer Plan	2006 Comprehensive Sewer Plan
2014 Sewer Plan	2014 Comprehensive Sewer Plan
AACE	American Association of Cost Engineers
B&O	Business and occupation
BOD	Biochemical oxygen demand
CBOD	Carbonaceous BOD
CCC	Chlorine contact channel
CCTV	Closed Circuit Television
CDBG	Community Development Block Grant
CIP	Capital Improvement Program
CIPP	Cured in place pipe
CMMS	Computerized Maintenance Management System
CMOM	Capacity, Management, Operations, and Maintenance
Corps	Corps of Engineers
CSO	Combined sewer overflow
CWA	Clean Water Act
DEIS	Draft Environmental Impact Statement
DMR	Discharge Monitoring Report
DO	Dissolved oxygen
DOH	Washington State Department of Health
DWO	Deep Water Outfall
Ecology	Washington State Department of Ecology
EFH	Essential fish habitat
EIS	Environmental Impact Statement
EMC	Everett Municipal Code
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
Everett	City of Everett
F	Fahrenheit
FOG	Fats, oils, and grease
Ft	Feet
FTE	Full-time equivalent
GIS	Geographical Information System
GMA	Growth Management Act
GO	General Obligation
Gpad	Gallons per acre per day
Gpcd	Gallons per capita per day
Gpd	Gallons per day
Gpm	Gallons per minute
HDPE	High-density polyethylene
I/I	Infiltration/inflow
In	Inches
IPT	Industrial pretreatment

LBS	Pounds
LOS	Level of service
LS	Lift stations
MG	Million gallons
MGD	Million gallons per day
MLLW	Mean lower low water
MOUSE	Modeling Urban Sewers
NAVD	North American Vertical Datum
NEPA	National Environmental Policy Act
NMFS	National Marine Fisheries Service
NPDES	National Pollutant Discharge Elimination System
NRCS	National Resources Conservation Service
O&M	Operations and maintenance
PDI	Planning Director's Interpretation
POTW	Publicly Owned Treatment Works
PS	Puget Sound
PSRC	Puget Sound Regional Council
PVC	Polyvinyl chloride
PWTF	Public Works Trust Fund
SCT	Snohomish County Tomorrow
SEPA	State Environmental Policy Act
SEPS	South Effluent Pump Station
SERP	State Environmental Review Process
SHPO	State Historic Preservation Officer
SOP	Standard operating procedures
SR	Snohomish River
SSO	Sanitary sewer overflow
TAZ	Traffic analysis zone
TF/SC	Trickling Filter/Solids Contact
TMDL	Total maximum daily load
TSG	Technical Services Group
TSS	Total suspended solids
UGA	Urban growth area
USFWS	U.S. Fish and Wildlife Service
VFD	Variable frequency drive
WFP	Water Filtration Plant
WPCF	Water Pollution Control Facility
WRIA	Water Resources Inventory Area
WSD	Water and Sewer District
WSDOT	Washington State Department of Transportation
WWD	Water and Wastewater District

Executive Summary

ES.1 Introduction

The City of Everett, Washington (Everett) has developed this 2014 Comprehensive Sewer Plan (2014 Sewer Plan) to provide guidance on implementing infrastructure improvements to Everett's existing sewer facilities. The planning period is 24 years from 2013 to 2036. The primary focus is the first six years (2013-2018), with additional focus on six-year milestone years thereafter (e.g., Year 12 is 2024, Year 18 is 2030, Year 24 is 2036). The Capital Improvement Program has a special focus on the 10-year period between 2014 and 2023. City leaders and staff can use this 2014 Sewer Plan to assist them in decision-making to meet the various sewer service needs, including capacity and condition-related areas of concern. This 2014 Sewer Plan is an update to the 2006 Comprehensive Sewer Plan.

This 2014 Sewer Plan was prepared in accordance with the requirements of WAC 173-240-050 administered by the Washington State Department of Ecology (Ecology). Appendix A provides a checklist of the Ecology requirements and where the information can be found in the 2014 Sewer Plan. Regulations and information from other studies conducted by Everett that affect the sewer system are incorporated into this 2014 Sewer Plan.

ES.2 Service Area and Vicinity Characteristics

Everett is located in southwest Snohomish County, approximately 20 miles north of Seattle and occupies roughly 18,000 acres. Everett is bordered by Possession Sound to the west; the Snohomish River, Union Slough, and I-5 to the east; and Steamboat Slough to the north. The southern city limits extend as far south as 132nd Street SE.

Everett's "sewer service area" is the area where Everett owns infrastructure to collect and treat sewage from homes and businesses. The term "treatment service area" is used to describe areas where collected sewage is conveyed to Everett's Water Pollution Control Facility (WPCF) for treatment, because Everett also provides treatment (but not collection) for sewage generated from portions of three neighboring sewer systems: Alderwood Water and Wastewater District (WWD), Silver Lake Water and Sewer District (WSD), and Mukilteo WWD. The treatment service area includes both the Everett sewer service area and the portions of the neighboring systems that convey their sewage to Everett.

Smith and Spencer Islands are areas within the City limits with large industrial acreage and limited sewer collection system. Currently, only Langus park and Animal Shelter are sewered. As provided in the annexation agreement, the City plans to extend sewer service to these areas, but the schedule of improvements is uncertain.

ES.3 Existing Sewer System

Everett's sewer system consists of a network of pipelines, pumps, and flow control facilities that transport the collected sewage to the Everett WPCF located on Smith Island on the east side of Interstate 5, adjacent to the Snohomish River and Union Slough.

Everett's sewer system is divided into two sections: the combined system in the north and the separated system in the south. The combined system in the north, which serves approximately 6,500 acres, was the first sewer system installed in Everett and carries combined surface water drainage and sanitary flow. The separated system in the south began after 1960 and conveys only sanitary flow. The separated system serves approximately 11,500 acres within Everett and

a total of 25,000 acres, including the sewage received from Alderwood WWD, Silver Lake WSD, and Mukilteo WWD.

The main components of Everett's sewer system are as follows:

- **Pipelines:** Approximately 330 miles of 2½ to 72 inch-diameter pipelines.
- **Interceptors:** 12 interceptors, which are large diameter pipes that convey collected flows from basins towards the WPCF.
- **Sewer Basins:** 22 sewer basins, which represent drainage areas where sewer flows are collected by small and medium sized pipes and conveyed to a interceptors.
- **Lift Stations:** 31 active lift stations, which pump sewage from lower to higher elevations.
- **Regulators:** 35 major regulators, which can direct sewage to alternative routes in the sewer system when necessary.
- **Combined Sewer Overflow (CSO) Outfalls:** 13 active permitted CSO outfalls, which are locations where untreated combined sewage is discharged to receiving water bodies when flows exceed the capacity of the combined sewer system.
- **Water Pollution Control Facility (WPCF):** The City's sewer treatment plant, which consists of two parallel treatment systems: the Trickling Filter/Solids Contact (TF/SC) system and the aeration/oxidation pond or lagoon system.
- **WPCF Outfalls:** 3 outfalls, where treated water from the WPFC is discharged to receiving water bodies.

ES.4 Sewer System Evaluation

An evaluation of Everett's sewer system was conducted using Everett's hydraulic and hydrologic model. This process included updating the infrastructure in the model, developing sanitary sewer flow projections, developing estimates of inflow and infiltration (stormwater and groundwater that enters the sewer system), calibrating the model, running modeling scenarios to determine current levels of service and identify system deficiencies for the preferred level of service, and developing improvements to address the system deficiencies.

The level of service is defined as how frequently the capacity of a sewer pipe is exceeded. Everett established a level of service goal that sewer pipes should not exceed their capacity more than once every 25 years. This is a 4 percent probability of exceedance in any given year.

The alternatives evaluated with modeling include improvements related to conveyance, lift stations, CSO facilities, and other improvements. Improvements were developed based on the capacity analysis and the condition analysis. These improvements are presented in the individual Basin Plans, Volume 3.

ES.5 Operations and Maintenance

The Everett Public Works Department is responsible for the operation and maintenance of the sewer collection system and the WPCF. The Technical Services Group (TSG) is responsible for operation and maintenance of the sewer collection system facilities that involve mechanical and electrical systems, including lift stations and CSO monitoring. The Sewer/Drainage work group is responsible for the maintenance of the remainder of the sewer collection and conveyance systems as well as storm water collection, conveyance, detention and treatment facilities. This

work group has sewer crews for sewer construction, sewer cleaning, and closed circuit television (CCTV) inspections. The WPCF team is responsible for operations and maintenance of equipment and facilities at the wastewater treatment plant site, including conveyance facilities within the plant.

Collection system operation and maintenance activities fall into four main categories: 1) inspection and condition assessment, 2) preventative maintenance and repair and rehabilitation, 3) the pre-treatment program, and 4) the spill response program.

Recommendations to address operation and maintenance issues relate to pipe condition assessment, collection system SOP manual, lift stations, ragging, pipe slope, Snohomish River CSO Interceptor, and FOG. Additional staff would improve current programs and tasks (e.g., asset management) and will be needed as new facilities at the WPCF come on-line.

ES.6 Capital Improvement Program

The City's Capital Improvement Program (CIP) was developed to achieve the following main objectives:

- Identify, group, and prioritize various sewer system needs that would receive maximum level of service benefits from each proposed improvement.
- Implement improvements to achieve CSO compliance at all CSO outfalls.
- Address condition replacement of old and deteriorating sewers.
- Recommend and schedule improvements to provide an acceptable level of service within the overall financial ability of Everett to fund the improvements.
- Coordinate improvement construction scheduling with other projects and anticipated growth within the sewer service area.

The total cost of the sewer system CIP from 2015 – to 2024 is $274 million. The CIP is divided into two sections as follows:

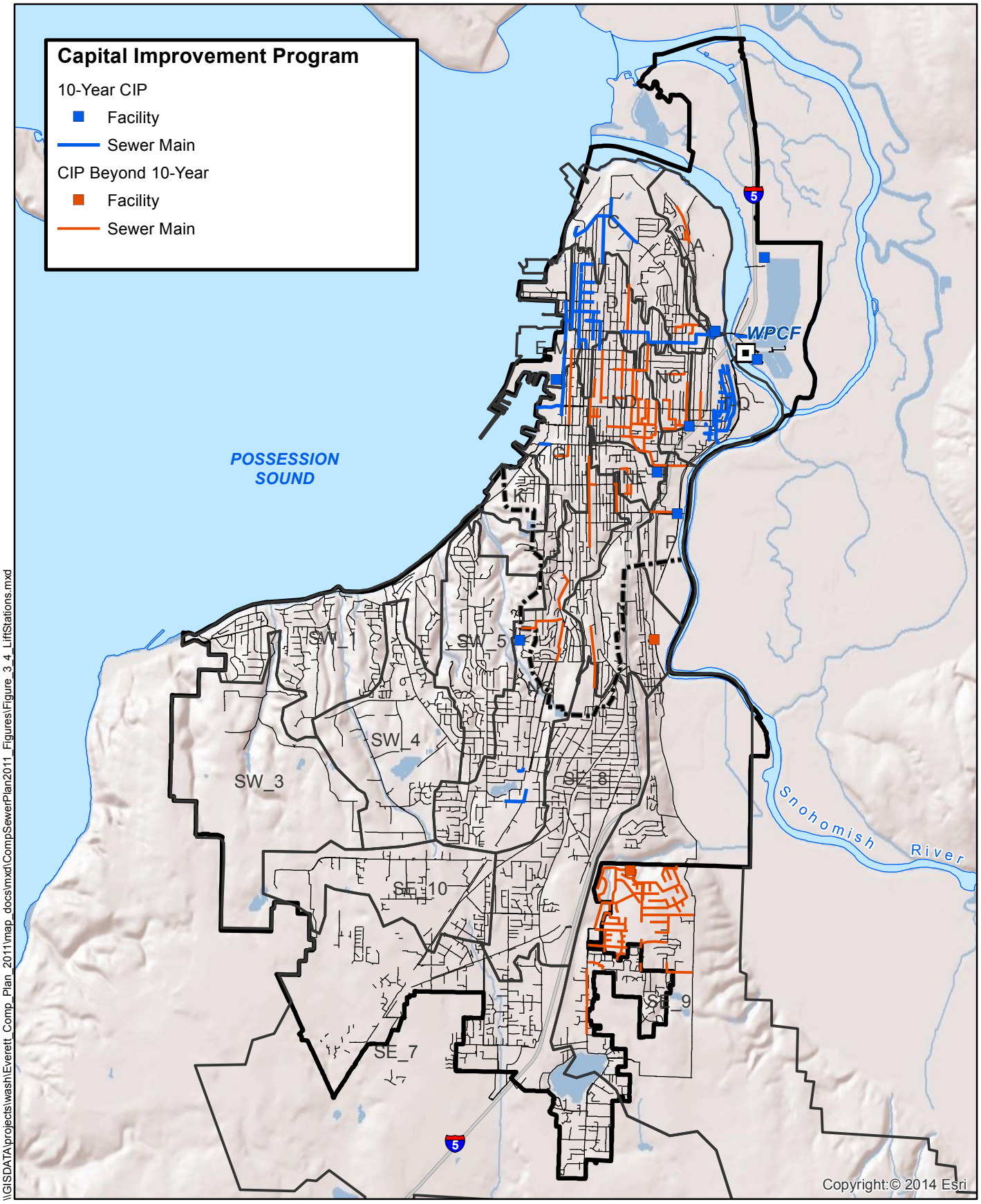
- Collection, pump station, and Interceptor Improvements: $158 million from 2015 to 2024
- Water Pollution Control Facility Improvements: $116 million from 2015 to 2024

Capital improvement projects are recommended for each sewer basin based on the capacity analysis of the collection system and available condition assessment information. The CIP projects listed in this plan are not necessarily the best or only approach for addressing a given system deficiency. Each CIP project should be evaluated for alternative approaches that might offer equal or superior results at less cost. In addition, multiple CIP projects should be grouped together if there are cost or implementation advantages in doing so. In many cases, additional modeling should be performed using more recent sewer monitoring data. Each sewer basin plan includes a description of the basin analysis results, recommended improvements to the existing system, and associated costs. The Basin Plans (Volume 3) provide detailed descriptions of each basin and improvement. Figure ES-1 provides an overview map of the proposed improvement projects.

ES.7 Financial Program

Everett has demonstrated its commitment to responsible management of the sewer utility by past rate adjustments, by conducting comprehensive rate studies, and by funding adequate levels of operating reserves. Continued prudent fiscal management will enable the sewer utility to continue to operate on a financially sound basis.

The financial analysis indicates that sewer rates for the 10-year projected time horizon of 2015 to 2024 will require significant adjustments to sufficiently fund the projected O&M, capital, and debt service requirements of the sewer utility. Based on assumptions built into the analysis, sewer rates need to be adjusted approximately 47.0 percent over the 10-year projected period, or an average of 5 percent per year. Table ES-1 provides a summary of the financial analysis for 2015-2024.



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2014 Comprehensive Sewer Plan
City of Everett

FIGURE ES-1

2014 - 2023 Capital Improvement Program

City of Everett WPCF
City of Everett Limits
Boundary Between Combined and Sanitary Systems
Sewer Lines
SewerBasins
Highways
Waterbody

0 0.5 1 2
Miles

Table ES-1. Projected Ten-Year Financial Plan ($ Millions)

	Projected									
	2015	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**
Revenue										
Rate Revenue	$30.92	$34.67	$35.01	$35.36	$35.72	$36.07	$36.43	$36.80	$37.17	$37.54
Miscellaneous Revenue	0.84	0.84	0.85	0.85	0.86	0.86	0.87	0.87	0.88	0.90
Total Revenue	**$31.76**	**$35.50**	**$35.86**	**$36.21**	**$36.58**	**$36.94**	**$37.30**	**$37.67**	**$38.05**	**$38.43**
Expenses										
O&M Expenses	$16.46	$17.02	$17.60	$18.21	$18.83	$19.48	$20.16	$20.86	$21.58	$22.34
Taxes and Transfers	5.77	5.95	6.13	6.31	6.50	6.69	6.89	7.10	7.31	7.53
Net Debt Service (P+I)	5.85	8.83	9.78	11.38	12.41	13.81	15.68	16.78	17.98	20.78
Rate Funded Capital	3.00	3.25	3.50	3.75	4.00	4.25	4.50	4.75	5.00	5.25
To/(From) Reserves	0.67	0.46	0.43	0.01	0.27	0.27	(0.09)	0.46	1.06	0.19
Total Revenue Required	**$31.76**	**$35.50**	**$37.44**	**$39.65**	**$42.01**	**$44.50**	**$47.15**	**$49.95**	**$52.93**	**$56.09**
Balance/(Deficiency)	**$0.00**	**$0.00**	**($1.58)**	**($3.44)**	**($5.43)**	**($7.57)**	**($9.84)**	**($12.28)**	**($14.88)**	**($17.66)**
Rate Adjustment[1]	**0.0%**	**0.0%**	**4.5%**	**5.0%**	**5.0%**	**5.0%**	**5.0%**	**5.0%**	**5.0%**	**5.0%**
Cumulative Rate Adjustment[2]	**0.0%**	**0.0%**	**4.50%**	**9.5%**	**15.0%**	**21.0%**	**27.0%**	**33.5%**	**40.0%**	**47.0%**

[1] Rate adjustments of 11% in 2015 and 2016 are anticipated by City staff and included in the projections of revenues. Additional rate adjustments in 2017 through 2024 are calculated to meet the revenue requirements. The City may choose to implement the CIP in a different timing schedule to be able to mitigate the rate impacts, may defer projects, may leverage rate adjustments, etc. These are not proposed rate adjustments but show the level of commitment to adjusting rates that will be necessary in order to complete the capital needs determined for the utility.

[2] Rate adjustments are cumulative, that is, any rate adjustment made in previous years would reduce the required adjustment in the following years. These rate adjustments are in addition to the rate increases already adopted for 2014-2016.

1 Introduction

The City of Everett, Washington (Everett) has developed this 2014 Comprehensive Sewer Plan (2014 Sewer Plan) to provide guidance on implementing infrastructure improvements to Everett's existing sewer facilities. The planning period is 24 years from 2013 to 2036. The primary focus is the first six years (2013-2018), with additional focus on six-year milestone years thereafter (e.g., Year 12 is 2024, Year 18 is 2030, Year 24 is 2036). The Capital Improvement Program has a special focus on the 10-year period between 2014 and 2023. City leaders and staff can use this 2014 Sewer Plan to assist them in decision-making to meet the various sewer service needs, including capacity and condition-related areas of concern. This 2014 Sewer Plan is an update to the 2006 Comprehensive Sewer Plan (2006 Sewer Plan).

This 2014 Sewer Plan was prepared in accordance with the requirements of WAC 173-240-050 administered by the Washington State Department of Ecology (Ecology). Appendix A provides a checklist of the Ecology requirements and where the information can be found in the 2014 Sewer Plan. Regulations and information from other studies conducted by Everett that affect the sewer system are incorporated into this 2014 Sewer Plan. Related documents that contain discussions of recent studies and/or guidelines are presented in Section 1.3.

1.1 Background and Goals

Everett provides wastewater collection and treatment for approximately 165,000 people in Snohomish County. Everett's sewer system plays a vital role in the protection of the public health of Everett's citizens and those of the surrounding area. In addition, the sewer system protects natural water bodies, rivers, lakes, and streams from pollutants and minimizes harmful impacts to the natural environment.

Everett's sewer system consists of approximately 330 miles of sewer pipes, 31 active lift stations, and a sewage treatment plant (Everett Water Pollution Control Facility [WPCF]). Everett serves more than 23,000 active accounts and currently treats a portion of the sewage from three neighboring sewer systems: Mukilteo Water and Wastewater District (Mukilteo WWD), Alderwood Water & Wastewater District (Alderwood WWD), and Silver Lake Water and Sewer District (Silver Lake WSD). With Everett's approval Silver Lake WSD provides sewer service in the Lowell Larimer area of Cross Valley Water District (between Lowell/Larimer Road and Silver Lake's corporate boundary). The sewer flow from this area is accounted as part of Silver Lake WSD capacity rights.

1.1.1 Everett's 2006 Comprehensive Sewer Plan

The previous version of Everett's Comprehensive Sewer Plan was completed in 2006 and included recommended capital improvement projects scheduled primarily through 2020. The plan recommended capital improvement projects for collection system repair and replacement; lift station rehabilitation and upgrades; and WPCF improvements to treat projected future flows based on the "2003 Everett Water Pollution Control Facility Engineering Report". Some projects and initiatives from the 2006 plan were updated and carried forward in this plan.

1.1.2 2014 Sewer Plan Goals

The primary purpose of this 2014 Sewer Plan is to provide a detailed and comprehensive plan that will guide improvements and management of Everett's sewer system. The 2014 Sewer Plan is consistent with the land use designations in both the City of Everett Comprehensive Plan

(City of Everett, last updated October 2012, and the City of Everett Land Use Code (City of Everett, last updated September 2012).

The goals of this 2014 Sewer Plan are to:

- Define level-of-service and CSO compliance goals
- Provide a cost-efficient and prioritized CIP
- Develop a financing plan for the recommended improvements and assess potential impacts on utility rates
- Be in compliance with WAC Chapter 173-240-050
- Be consistent with applicable federal, state, and local regulations, policies, and planning requirements

1.2 Regulatory Requirements

Wastewater system planning must address the regulations and requirements of many federal, state, and local regulatory agencies. This section summarizes applicable rules and regulations for this 2014 Sewer Plan.

1.2.1 Federal Regulations

1.2.1.1 Clean Water Act

The Federal Clean Water Act (CWA) of 1972 and later modifications of 1977, 1981, and 1987 established water quality standards for the navigable (surface) waters affecting Everett. One of the mechanisms for achieving the requirements of the CWA is the National Pollutant Discharge Elimination System (NPDES) permits. The federal regulations that affect Everett's wastewater system have been delegated to Ecology, including the responsibility to administer the NPDES permit program, which are discussed in Section 1.2.2.1.

1.2.1.2 Proposed Sanitary Sewer Overflow Rule

The proposed Sanitary Sewer Overflow (SSO) Rule is based on recommendations made by a federal advisory committee to the U.S. Environmental Protection Agency (EPA) in 1999 for policies regarding SSOs. The recommendations called for policies that would require sewer system operators to properly manage, operate and maintain all parts of collection systems under their control, provide adequate capacity to convey base and peak flows, and take all feasible steps to stop and mitigate impacts of SSOs.

A draft version of the proposed SSO Rule, which focused on expanded operation and maintenance efforts known as Capacity, Management, Operations, and Maintenance (CMOM), was prepared by the EPA in January 2001 but was never formally released to the public or sent to the Federal Register for publication. EPA held listening sessions in the summer of 2010 and a workshop in July 2011 to seek stakeholder input on the proposed SSO Rule to help determine whether and how to modify NPDES regulations as they apply to municipal sanitary sewer collection systems and SSOs. EPA has not communicated an anticipated date for the SSO Rulemaking.

In response to state and local governments seeking assistance in getting the most effective and cost-effective approaches to meet the CWA objective of keeping raw sewage and pollutants carried by stormwater out of our nation's waters, EPA introduced a voluntary Integrated Municipal Stormwater and Wastewater Planning Approach Framework in June 2012.

EPA is encouraging municipalities to consider the integrated plan approach. Responsibility to develop an integrated plan rests with the municipality and the resulting plan can provide information to inform the permit and enforcement processes and can support the development of conditions and requirements in permits and enforcement orders.

Everett, as the sewer service provider, will need to comply with the SSO Rule if it is issued, and may decide to develop an integrated plan for its wastewater and stormwater systems. The City has been proactive in taking measures to limit SSO's in anticipation of the proposed rule. These measures include an early adoption of the City's Long-Term Control Plan, implementation of the "Nine Minimum Controls," stormwater separation projects, and the pursuit of green stormwater. Although the SSO policy has not been promulgated, Appendix B contains CMOM program components and an index that indicates where these components are addressed in this 2014 Sewer Plan.

1.2.1.3 Endangered Species Act

The Endangered Species Act (ESA) is a federal regulation that requires all projects with a federal nexus to ensure that activities do not jeopardize habitat for species listed under the ESA. Anadromous salmonids that are ESA-listed are under the jurisdiction of the National Marine Fisheries Service (NMFS). Terrestrial wildlife and plant species, as well as resident fish, are under the jurisdiction of the U.S. Fish and Wildlife Service (USFWS). These federal agencies can list a species as endangered or threatened under the ESA and are required to review federally-proposed, authorized or funded actions to ensure that they do not jeopardize the continued existence of listed species. Endangered species are classified as those in danger of extinction; threatened species are considered "likely to become endangered in the foreseeable future." Both classifications are protected by the ESA upon listing. NMFS and USFWS (the Services) are allowed to issue protective regulations to ensure conservation of endangered species under Section 9 of the ESA. The same regulations can apply to threatened species, but the Section 4(d) Rule of the ESA allows the Services to provide exceptions to the Section 9 regulations.

Table 1-1 presents the federal-listed or candidate species that have potential to occur in areas of the City that Everett's sewer projects could affect. The table also includes state-listed or candidate species because, in addition to the federally listed species, the state also mandates additional protective measures for species considered to warrant special protection to ensure their continued survival. The state of Washington maintains lists of "priority species" and their habitats. Regulations governing protection of state priority species are developed and enforced by the Washington Department of Fish and Wildlife (for animal species) and the Washington Department of Natural Resources (for plant species). Activities that might affect species listed under state, but not federal, regulations are not subject to the ESA requirements described above. However, the activities are regulated through conditions applied to development under the State Environmental Policy Act (SEPA) and through state-issued permits such as the Washington Department of Fish and Wildlife's Hydraulic Project Approval.

Table 1-1. Federal and State Endangered Species Act Listed Species within the Everett Area

Common Name	Scientific Name	Federal Status	Washington State Status	Area within Everett in which species are found
Chinook Salmon	*Oncorhynchus tshawytscha*	Threatened	Candidate	Use Snohomish River for migration
Steelhead	*Oncorhynchus mykiss*	Threatened	None	Use Snohomish River for migration
Coho Salmon	*O. kisutch*	Species of concern	None	Use Snohomish River for migration
Bull Trout	*Salvelinus confluentus*	Threatened	Candidate	Snohomish River
Chum (Hood Canal)	*Oncorhynchus keta*	Threatened	Candidate	Seasonally present in the Snohomish River Estuary and Port Gardner
boccacio	*Sebastes paucispinis*	Endangered	Candidate	Low potential occurrence in marine waters
yelloweye rockfish	*Sebastes ruberrimus*	Threatened	Candidate	Low potential occurrence in marine waters
canary rockfish	*Sebastes pinniger*	Threatened	Candidate	Low potential occurrence in marine waters
Killer whale	*Orcinus orca*	Endangered	Endangered	Potential seasonal occurrence in marine waters
Marbled murrelet	*Brachyramphus marmoratus*	Threatened	Threatened	Possible fly-overs from marine foraging habitat to nesting habitat in interior forested areas.
Bald Eagle	*Haliaeetus leucocephalus*	Species of concern	Sensitive	Snohomish River Estuary
Ferruginous Hawk	*Buteo regalis*	Species of concern	Threatened	Snohomish River Estuary

Source: Salmon Overlay to the Snohomish Estuary Wetland Integration Plan (City of Everett and Pentec Environmental, 2001), Pacific Biodiversity Institute; WDFW 2012, State Species of Concern List.

Section 9 of the ESA prohibits activities that lead to intentional or unintentional harm to a listed species. Wastewater discharge is an activity that can lead to the incidental take of a listed species and is regulated under Everett's NPDES permit, subject to review by the overseeing natural resource agencies. Any wastewater overflows that occur in Everett could potentially discharge into the natural habitat of the listed species. Some of Everett's wastewater facilities have relief structures that overflow to the Snohomish River or Port Gardner Bay. Maintenance and construction activities associated with wastewater facilities that have relief structures will be scheduled so that they do not interfere with the migration, rearing, feeding, or breeding practices of any of the listed species.

For construction of any capital projects that involve work within wetlands, streams, rivers, or other navigable waters of the United States, Everett would obtain a permit from the U.S. Army Corps of Engineers (Corps) in compliance with Section 404 of the CWA. The 404 authorization would trigger the need for consultation with NMFS and USFWS under Section 7 of the ESA.

Future project and site-specific SEPA review will request species database searches from U.S. Fish and Wildlife Service and the Washington State Department of Natural Resources' Natural Heritage Program to identify any threatened or endangered species on or near each specific project site.

Everett has a number of regulatory measures in place that function to protect species listed under the ESA. These measures will apply to any construction project undertaken by Everett under this 2014 Sewer Plan.

- Protective measures are codified in Title 20 of the Everett Municipal Code (EMC). In particular, Chapter 20.04 (EMC 20.04) of the code provides general and specific policies for achieving the environmental goals of the Everett community.
- Everett Municipal Code 19.37 (EMC 19.37) defines buffers and setbacks to provide for the protection of priority species, and also regulates development in sensitive areas including wetlands, streams, rivers, and steep slopes.
- Planning Director's Interpretation 2-2000 (PDI 2-2000) prescribes an interim procedure for the review of projects that might affect Chinook salmon and bull trout. This procedure is consistent with NMFS regulations. A biological assessment is required for all projects within shoreline jurisdiction; the level of detail of the biological assessment will depend upon project and site circumstances. Resulting mitigation measures may exceed those of the sensitive areas ordinance (EMC 19.37).
- Salmon Overlay to the Snohomish Wetland Integration Plan is a planning document intended to aid jurisdictions in and around the Snohomish Estuary in responding to the needs of the ESA. This document provides a scientifically based tidal habitat model; a habitat inventory; identification of high-value habitats within the urban growth boundary; a process for comparing development impacts of different municipalities in the Estuary; recommendations for mitigation and restoration; inventory of habitat restoration opportunities; and proposed restoration scenario.

1.2.1.4 Magnuson-Stevens Fishery Conservation and Management Act

On October 11, 1996, Congress passed the Sustainable Fisheries Act (Public Law 104-297) which amended the habitat provisions of the Magnuson Act. The re-named Magnuson-Stevens Act (Act) calls for direct action to stop or reverse the continued loss of fish habitats. Toward this end, Congress mandated the identification of habitats essential to managed species and measures to conserve and enhance this habitat. The Act requires cooperation among the NMFS and Federal agencies to protect, conserve, and enhance "essential fish habitat" (EFH). Congress defined EFH for federally managed fish species as "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity."

EFH must always include the critical habitat of endangered and threatened species. The Magnuson-Stevens Act required federal agencies to provide NMFS with a written assessment of the effects on EFH of any federal action that may adversely affect EFH, except activities covered by a general concurrence.

1.2.1.5 Clean Air Act

The Federal Clean Air Act of 1992 requires that all federally funded projects be in compliance with state and regional air quality plans. Relative to wastewater facility construction, local air pollution control agencies must be notified if a building is being renovated or demolished and an asbestos survey is required. Wastewater treatment facilities are considered sources of air emissions under the Clean Air Act.

1.2.1.6 National Historic Preservation Act

The National Historic Preservation Act applies to all projects that receive funding from EPA, including pass-through funding to state water quality agencies. Designed to protect historic, cultural, and archaeological resources from damage or destruction, the Act requires that agencies undertaking projects consult with the State Historic Preservation Officer (SHPO) and local Native American tribes. In areas with a high likelihood of subsurface artifacts or other cultural resources, major capital projects involving earth disturbance typically must undertake a program of archaeological exploration to determine whether such resources are present. If resources are encountered during these investigations or during project construction, the resources must be evaluated, and a plan must be developed in conjunction with the SHPO and the affected tribe(s) for preservation, removal, or recording of the site and artifacts.

1.2.2 State Regulations

1.2.2.1 National Pollutant Discharge Elimination System Program

The State of Washington administers federal wastewater effluent criteria through the NPDES permit program. All wastewater discharges into the waters of the state must be permitted through Ecology with an NPDES permit. This permit establishes the allowable quantity of discharge from a given treatment facility as well as the allowable levels of pollutants in that discharge. The WPCF and collection system operate under NPDES permit number WA-002449-0 that was issued on September 1, 2009 and expires on October 1, 2014. The permit also authorizes 13 combined sewer outfalls.

1.2.2.2 Criteria for Sewage Works Design and Reliability Guidelines

The purpose of the Ecology-developed Criteria for Sewage Works Design (Ecology 2008), also known as the Orange Book, is to provide guidance on the design of wastewater collection and treatment systems. The primary goals of the manual are as follows:

- Ensure that the design of wastewater collection and treatment systems is consistent with state public health and water quality objectives
- Establish a basis for the design and review of plans and specifications for wastewater treatment works and sewerage systems
- Establish the minimum requirements and limiting factors for review of wastewater treatment work and sewerage system plans and specifications
- Assist the owner or the owner's authorized engineer in the preparation of plans, specifications, reports, and other data
- Guide departments in their determination of whether to issue approvals, permits, or certificates for wastewater treatment works or sewer systems

Ecology uses the Orange Book design guidelines to review and approve reports, plans, and specifications. Design guidelines presented in Chapters 3 and 4 of this 2014 Sewer Plan are based upon those in the Orange Book. Contract documents for projects constructed within Everett are prepared based on the Orange Book design guidelines.

1.2.2.3 State Environmental Policy Act

The State Environmental Policy Act (SEPA) of 1971, Chapter 43.21 RCW, requires agencies proposing actions that may affect the environment to weigh the environmental impacts of those actions along with other decision-making factors. SEPA applies to most actions undertaken by Everett, including the implementation of projects under this 2014 Sewer Plan.

SEPA includes three possible levels of review:

- Categorical exemption reserved for agency actions that are considered to have negligible environmental impact
- Environmental checklist generally used for projects that do not qualify for a categorical exclusion but are not expected to have significant impacts; also used to determine whether impacts are significant enough to warrant additional review
- Environmental impact statement (EIS) which is required when a project is determined likely to have significant impacts on the natural or built environment

This 2014 Sewer Plan is considered a “non-project” agency action and, as such, is subject to SEPA review. A SEPA environmental checklist on the plan is included as Appendix C. Individual capital projects under this plan will be subject to project-level SEPA review during the design phase in order to evaluate their potential impacts. That review will be done on a project-by-project basis and could range from categorical exemption to EIS, depending on the magnitude of the impacts involved.

1.2.2.4 State Environmental Review Process (SERP)

Washington State’s SERP was developed to compliment the SEPA process established in 1971. SERP procedures add some additional federal requirements to the SEPA process and incorporate review and concurrence by Ecology. SEPA alone does not meet all the federal requirements that projects using State Revolving Fund (SRF) financing are required to meet. Several elements must be added.

1. SEPA documentation
2. Cost effectiveness analysis
3. Public participation
4. Review and concurrence by Ecology

In addition to SERP review (which is required prior to application), an applicant awarded SRF funding for a wastewater construction project must comply with all applicable federal cross cutters. Ecology recommends that applicants coordinate cross cutter review with the overall SERP review for the project. This may not be possible in all cases.

At a minimum SERP review will include an evaluation of the protected resources the project may affect, and which cross cutters may apply to the project. The SERP Coversheet includes a series of screening questions to help Ecology staff and funding applicants determine which cross cutters apply to the project.

Everett does not typically use federal or federal pass-through funding, therefore, SERP is not used frequently.

1.2.2.5 State Waste Discharge Permit

State law requires a state waste discharge permit for regulated commercial, municipal, and industrial discharges to a treatment plant or on-site disposal system, or to groundwater or surface waters of the state.

1.2.2.6 Growth Management Act

The Growth Management Act (GMA) was adopted in 1990 by the Washington State Legislature to guide future development in the state. The GMA has been amended several times since its adoption. Part of the intent of the GMA is to ensure that areas within a designated urban growth area (UGA) are served by "urban services" including sewer service. For this reason, one of the requirements of the GMA is that cities prepare public facilities plans to fund identified utility improvements. Each facilities plan must be developed and coordinated with land use planning to support the growth projected in adopted plans at the time development occurs. This 2014 Sewer Plan will serve as the facilities plan for Everett's sewer service. Information from the City of Everett Comprehensive Plan informed this 2014 Sewer Plan.

As required by the GMA, Everett must serve the sewer needs of its planned growth unless served by other districts within the next six years of this 2014 Sewer Plan (by 2018). For Everett, the planned growth is concentrated in the south end, with smaller increases in existing housing density proposed throughout the city. Growth outside Everett's service area could also impact Everett since it is the regional treatment provider and conveys flow from neighboring collection systems to the WPCF. However, Everett's service to its wholesale sewer customers is based on purchased capacities and not necessarily on growth.

1.2.2.7 Municipal Water Law

The Municipal Water Law (officially the Municipal Water Supply - Efficiency Act) was passed in 2003 and, although the bill focused primarily on the provision of municipal water supplies, the legislation includes two sections that apply to sewer plans. Section 11 states that sewer plans must include a discussion of water conservation measures considered or underway that would reduce flows to the sewer system and an analysis of their anticipated impact on the sewer service and treatment capacity. Section 12 states that sewer plans must include consideration of opportunities for the use of reclaimed water as defined in a regional water system plan and must include a statement describing how applicable reclamation and reuse elements will be coordinated between water and sewer plans. This 2014 Sewer Plan complies with these requirements.

1.2.3 Snohomish County Requirements

Although Everett has its own policies regarding public services and land use, Everett also coordinates its planning efforts with Snohomish County.

1.2.3.1 Snohomish County Comprehensive Plan

The 2025 Snohomish County Comprehensive Plan (County Comprehensive Plan) guides growth and development in the unincorporated areas of Snohomish County for a 20-year period, through 2025. The County Comprehensive Plan was originally adopted in 1995, underwent a comprehensive update in 2005, and was last amended in November 2012.

The County Comprehensive Plan identifies the following goal and associated objectives for wastewater planning, which are supported by this 2014 Sewer Plan:

- **GOAL UT 3:** Work with cities and special districts to produce coordinated wastewater system plans for both incorporated and unincorporated areas within UGAs that are consistent with the land use element, UGA area plans, and city plans.
  - **Objective UT 3A:** Utilize wastewater system plans as a basis for orderly development or expansion within UGAs in accordance with the countywide planning policies.
  - **Objective UT 3B:** Discourage inappropriate development patterns and densities in rural areas by restricting public sewer systems outside of designated urban growth areas.

1.2.3.2 Snohomish County Tomorrow

Several municipalities in Snohomish County have planning areas that overlap. Coordination between Snohomish County and municipalities takes place through Snohomish County Tomorrow (SCT), which is a growth management advisory council. Members of SCT consist of representatives from Snohomish County, cities, towns, and tribes. SCT is intended to facilitate cooperation between Snohomish County and the cities that will eventually annex these areas. SCT is also involved in establishing municipal urban growth areas for municipalities adjacent to unincorporated areas in southwest Snohomish County. SCT provides guidance on planning for areas that will ultimately affect the treatment capacity of Everett's WPCF.

Beyond Everett's planning area boundary lie the urban growth areas of Mukilteo to the southwest, Lynnwood and Mill Creek to the south, and Marysville to the north. There is an additional area of unincorporated Snohomish County (noted by the SCT as the Silver Firs area) where a great deal of growth is occurring. The Silver Firs area and the Paine Field area are not currently within the urban growth boundary of any municipality. The SCT planning process was established to guide development in areas such as these. It is currently anticipated that sewer service to at least a portion of the Silver Firs area will be provided by Silver Lake WSD and Cross Valley Water District, with ultimate treatment provided by Everett.

1.2.4 City of Everett Requirements

Everett has written documents that address sewer-related policies, general design standards, and regulations for discharge to the sewer collection system. These documents are discussed in the sections below.

1.2.4.1 City of Everett Comprehensive Plan

The 2025 City of Everett Comprehensive Plan (Everett Comprehensive Plan) guides growth and development, including that of the sewer system, in Everett for a 20-year period, through 2025. The Everett Comprehensive Plan was originally adopted in 1994, underwent a comprehensive update in 2005, and was last amended in October 2012.

The Everett Comprehensive Plan identifies the following goals and associated objectives for wastewater planning, which are supported by this 2014 Sewer Plan:

- **Goal 6.1 Concurrency and Provision of Service:** To ensure that those public facilities and services necessary to support development, and required to be "concurrent" under GMA, are adequate to serve the development at the time it is available for occupancy and use.
  - **Objective 6.1.1:** Capital facilities in the City of Everett shall be provided to maintain existing services and to accommodate the projected growth over the next twenty years in a timely and efficient manner.
- **Goal 6.3 Consistency:** To ensure consistency among elements of the City's Comprehensive Plan and among affected agencies and neighboring jurisdictions' plans.
  - **Objective 6.3.1:** The Capital Facilities and Utilities Element of the City's Comprehensive Plan shall support the Land Use Element, be consistent with all other elements of the plan and, to the degree possible, be consistent with all other local, regional, and State capital facilities plans.

1.2.4.2 Everett Municipal Code

Title 14 of the Everett Municipal Code (EMC) deals with water and sewer infrastructure. Portions of Title 14 that pertain to the sewer system are summarized here and are provided in Appendix D.

1.2.4.2.1 Section 14.04 Sewer Rates and Regulations

This section addresses rate-related information including monthly rates, lateral construction rates, trunk construction rates, sewer charge exceptions, and review of rates.

1.2.4.2.2 Section 14.08 Sewer Connections

The section addresses topics related to connecting to the sewer system including the requirement to connect to the sewer system, obtain a permit, meet design and construction standards, submit plans to City, be subject to inspection and approval, and pay a connection charge. The section also includes information about prohibition of stormwater connections to the sewer system if a storm sewer is available, prohibitions of discharging certain materials into the sewer system, and establishes ownership of side sewers.

1.2.4.2.3 Section 14.10 Sewage Disposal System

This section addresses cases where sewage disposal systems (e.g., septic tanks) are allowed rather than having the property connected to the public sewer system.

1.2.4.2.4 Section 14.12 Cesspools, Septic Tanks, Etc.

This section addresses issues related to the disposal of waste from septic tanks (and other facilities) into the public sewer. Topics include the need for a license, points of disposal, license fees, volume fees, and disposal methods.

1.2.4.2.5 Section 14.32 Water and Sewer Utility Service Charges

This section addresses issues related to delinquent accounts including shutoff for non-payment, disputed bills, and right of appeal.

1.2.4.2.6 Section 14.36 Latecomer Agreements

This section addresses issues related to latercomer agreements whereby a developer utilizing private funds to install sewer improvements on public right-of-way may apply to Everett to establish a latecomer agreement for recovery of a pro rata share of the cost of constructing those public improvements from other parties that will later derive a benefit from those improvements.

1.2.4.2.7 Section 14.40 Wastewater Pretreatment Regulations

This section addresses preventing the discharge of industrial contaminants into the sewer system that cannot be completely removed by Everett's treatment process. Pretreatment program requirements include requiring permits, pretreatment to standards specified by Everett, sampling, reporting, and compliance monitoring.

1.2.4.2.8 Section 14.42 Grease Control

This section addresses limiting the discharge of fats, oils, and grease (known as FOG) into the sewer system. This includes establishing FOG concentration limits, requiring the presence and maintenance of grease removal systems, and enforcement remedies.

1.3 Related Documents

A number of documents related to Everett's sewer system and WPCF are relevant to the development of this 2014 Sewer Plan.

Everett Design and Construction Standards and Specifications for Development (City of Everett, 2007; updated March 2012). Provides specifications and design criteria for sewer service within Everett.

Everett Water Pollution Control Facility Engineering Report (Carollo Engineers, 2010). The document evaluated the current capacity of the WPCF, compared that capacity to current and future needs, and developed recommendations for improvements at the WPCF based on capacity needs and a conditions assessment.

2008 Combined Sewer Overflow Control Facility Plan Update (HDR, 2008). Evaluation of combined sewer overflow reduction alternatives, with an emphasis on on-site treatment.

Everett Municipal Code (Title 14, Water and Sewers). Describes requirements for wastewater service within Everett.

Snohomish County Code (Title 7, Health and Sanitation). Defines Snohomish County's sewage disposal rules and regulations.

Countywide Planning Policies for Snohomish County (Snohomish County, June 2011). Provides the framework for comprehensive plans for Snohomish County and the cities within the county.

Criteria for Sewage Works Design (Ecology, 2008). Establishes the minimum requirements for the design of sewage collection and treatment systems in the State of Washington.

Washington Administrative Code, Title 173. Defines the structure of general sewer plans.

1.4 Organization and Contents

This 2014 Sewer Plan comprises three volumes: Volume 1, Sewer Plan; Volume 2, Appendices; and Volume 3, Basin Plans. This section provides a brief summary of the contents of each chapter of Volume 1.

Chapter 2, Service Area and Vicinity Characteristics. Describes Everett's sewer service area, relationships with neighboring sewer districts, and vicinity characteristics such as land use and critical areas.

Chapter 3, Existing Sewer System. Describes the existing sewer system components and presents sewer system design criteria.

Chapter 4, Sewer System Evaluation. Presents the development and results of the sewer system hydraulic model and issues associated with the condition of the existing system.

Chapter 5, Operation and Maintenance. Presents a description of Everett's operation and maintenance practices, as well as ongoing maintenance issues.

Chapter 6, Capital Improvement Program. Summarizes the system and facility improvements identified in previous chapters of this 2014 Sewer Plan. Includes a map of proposed improvements (provided in the back of Volume 1). Provides a cost estimate (in 2014 dollars) and anticipated scheduling for those improvements.

Chapter 7, Financial Program. Presents an analysis of Everett's current sewer funding and a discussion of alternative methods for financing CIP projects.

2 Service Area and Vicinity Characteristics

This chapter describes the policies, requirements, agreements, and vicinity characteristics that define Everett's service area.

Everett is located in southwest Snohomish County, approximately 20 miles north of Seattle and occupies roughly 18,000 acres. Everett is bordered by Possession Sound to the west; the Snohomish River, Union Slough, and I-5 to the east; and Steamboat Slough to the north. The southern city limits extend as far south as 132nd Street SE. Figure 2-1 shows Everett's location and surrounding municipalities.

Everett's sewer service area is the area where Everett owns infrastructure to collect and treat sewage from homes and businesses. Everett also provides treatment for sewage from portions of three neighboring collection systems: Alderwood WWD, Silver Lake WSD, and Mukilteo WWD. The term "treatment service area" is used to describe areas where collected sewage is conveyed to Everett's WPCF for treatment. The treatment service area includes both the Everett sewer service area and the portions of the neighboring systems that convey their sewage to Everett. Figure 2-2 shows these service areas and other key boundaries.

Smith and Spencer Islands are areas within the City limits with large industrial acreage and limited sewer collection system. Currently, only Langus park and Animal Shelter are sewered. As provided in the annexation agreement, the City plans to extend sewer service to these areas, but the schedule of improvements is uncertain.

2.1 Sewer Service Area

Everett's sewer service area is divided into two sections: the combined system in the north and the separated system in the south. The combined system was the first sewer system installed in Everett and carries both surface water drainage and sanitary flow. It is bordered by Possession Sound, the Snohomish River, and Pigeon Creek Number 1. The separated system began after 1960 and was intended to convey only sanitary flow. It extends south from Pigeon Creek Number 1 to the city limits.

Everett's sewer system conveys sewage through approximately 330 miles of sewer mains, interceptors and laterals, and 31 active lift stations. The existing sewer system is described in more detail in Section 3.2.

Everett's sewer service area is the same as the Everett municipal boundary, with the following two exceptions:

- **Mukilteo WWD:** In the Southwest corner of Everett, a small portion within the Everett municipal boundary is within the official service area of Mukilteo WWD. Mukilteo WWD provides sewer collection service in this area, however that sewage is conveyed to Everett sewer system for treatment at the WPCF. It is not anticipated that Everett would take over sewer collection service in this area prior to the expiration of the general sewage agreement in 2033.
- **Eastmont:** Near the Southeast corner of Everett, a small area outside the Everett municipal limit (but within the Everett UGA) is included in Everett's sewer service area. The area is bordered by Interstate 5, 100th Street SE, Vistarama Avenue and Wood Creek (Ordinance 2281-98). On-site sewage disposal systems (septic tanks) serve a majority of the properties in this area, however some public sewer service is provided by Everett.

There are a few areas within Everett's sewer service area that are served by on-site disposal systems (septic tanks). This is the case for approximately 300 lots, which are shown on Figure 2-3, as well as for Smith Island. Per EMC Section 14.08.175, when a new public sewer abuts a property line, that property must be connected to the public sewer within 30 days. The time frame for connection can be extended to ten years for single family residential property with the approval of the Snohomish County Health District.

2.2 Treatment Service Area

As described previously, the treatment service area is the area from which collected sewage is conveyed to Everett's WPCF for treatment. The treatment service area includes both the Everett sewer service area and the portions of the neighboring systems that convey their sewage to Everett. This section describes Everett's conveyance and treatment of sewage from portions of Alderwood WWD, Silver Lake WSD, and Mukilteo WWD.

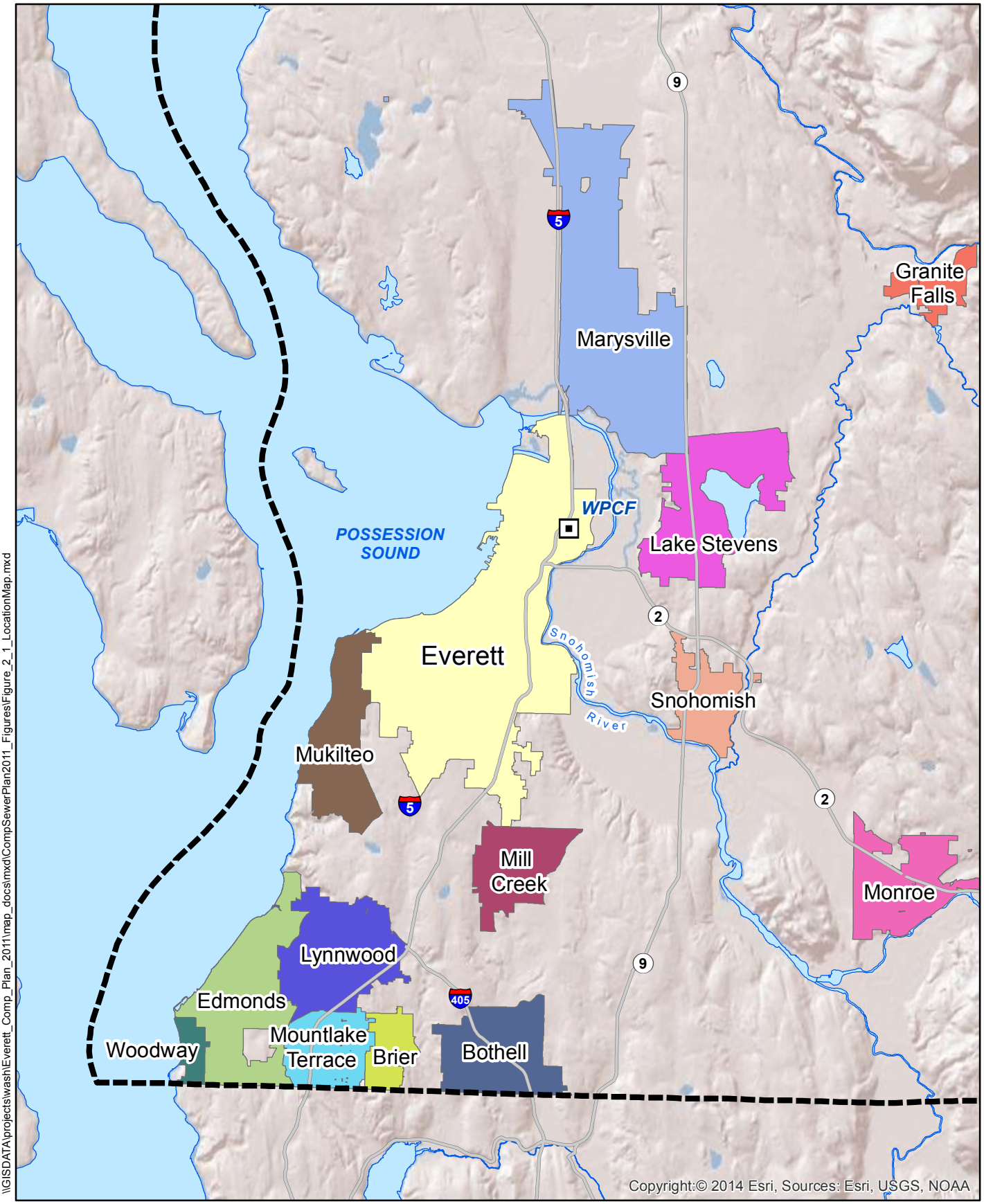
Table 2-1 presents the sizes of the sewer drainage areas and land use descriptions of the neighboring collection systems that convey sewage to the Everett system. Various Everett-owned facilities convey sewage from these neighboring systems through Everett. The capacity required to be provided by Everett is shown in Table 2-2. A map of the elements in Everett's sewer system utilized for outside agency's collection systems is shown in Figure 2-4.

Table 2-1. Size and Land Use for Collection Systems Conveying Sewage to Everett

Collection System	Total System Area (Acres)	Portion in Everett Treatment Service Area (Acres)	General Land Use Comments
Silver Lake WSD[1]	9,830	8,120	Mainly Residential
Alderwood WWD[2]	24,497	1,414	Residential / Industrial / Commercial
Mukilteo WWD[3]	5,660	1,300	Residential / Industrial / Commercial

1 From Tables 2-1, 6-8 and 6-9 in Silver Lake WSD 2011 Wastewater Comprehensive Plan.
2 From Table 5.1 in Alderwood WWD 2009 Comprehensive Sewer Plan.
3 From page 2-1 in Mukilteo WWD 2011 Wastewater Comprehensive Plan.

Alderwood WWD is planning to redirect flows from approximately 784 acres that currently flow to Everett and direct them south to the King County treatment system. This is scheduled to be completed by 2020.



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City of Everett WPCF
Highways
Waterways
Snohomish County

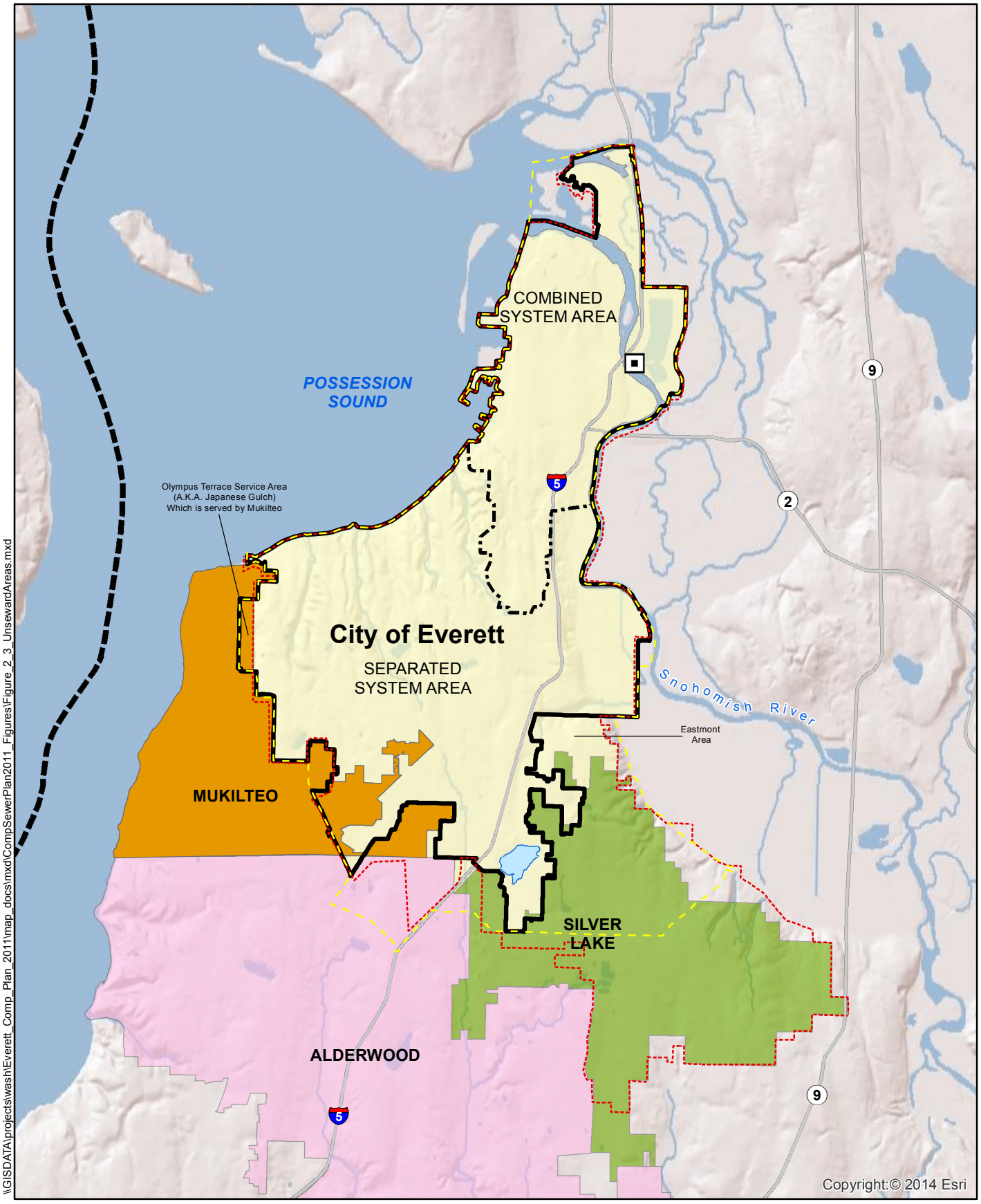
Snohomish Municipalities

Bothell
Brier
Edmonds
Everett
Granite Falls
Lake Stevens
Lynnwood
Marysville
Mill Creek
Monroe
Mountlake Terrace
Mukilteo
Snohomish
Woodway

0 1.25 2.5 5
Miles

2014 Comprehensive Sewer Plan
City of Everett

FIGURE 2-1
Location Map



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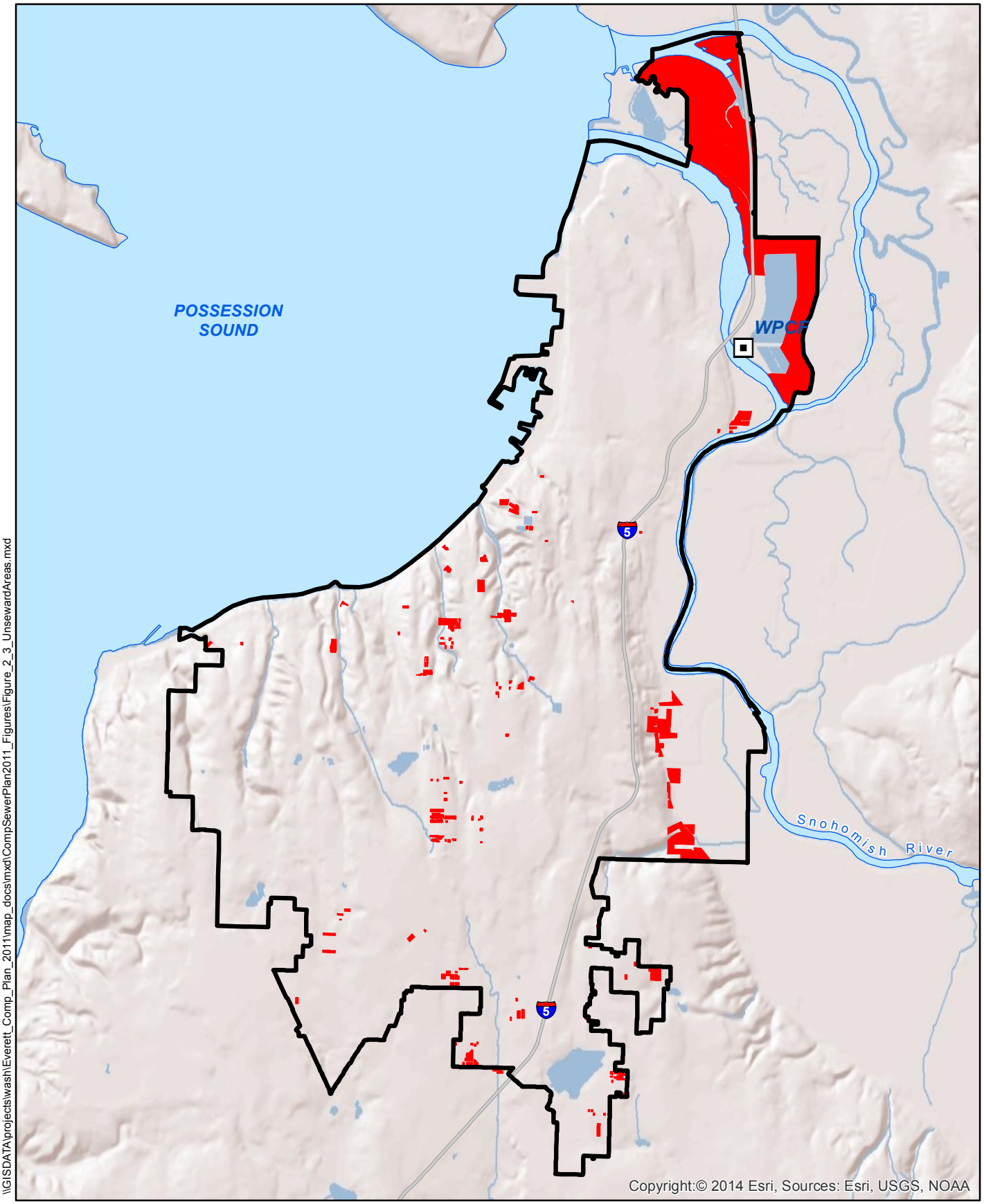
Sewer Service Areas
- City of Everett
- Alderwood Water & Wastewater District
- Mukilteo Water & Wastewater District
- Silver Lake Water & Sewer District

- Boundary Between Combined and Separated Systems
- Everett Municipal Boundary
- Everett Urban Growth Area (UGA) Boundary
- Everett Treatment Service Area
- Snohomish County Boundary

- Highway
- City of Everett WPCF
- Water

0 0.5 1 2
Miles

2014 Comprehensive Sewer Plan
City of Everett
FIGURE 2-2



City of Everett WPCF
City of Everett Limits
Highways
Waterbody
UnseweredAreas

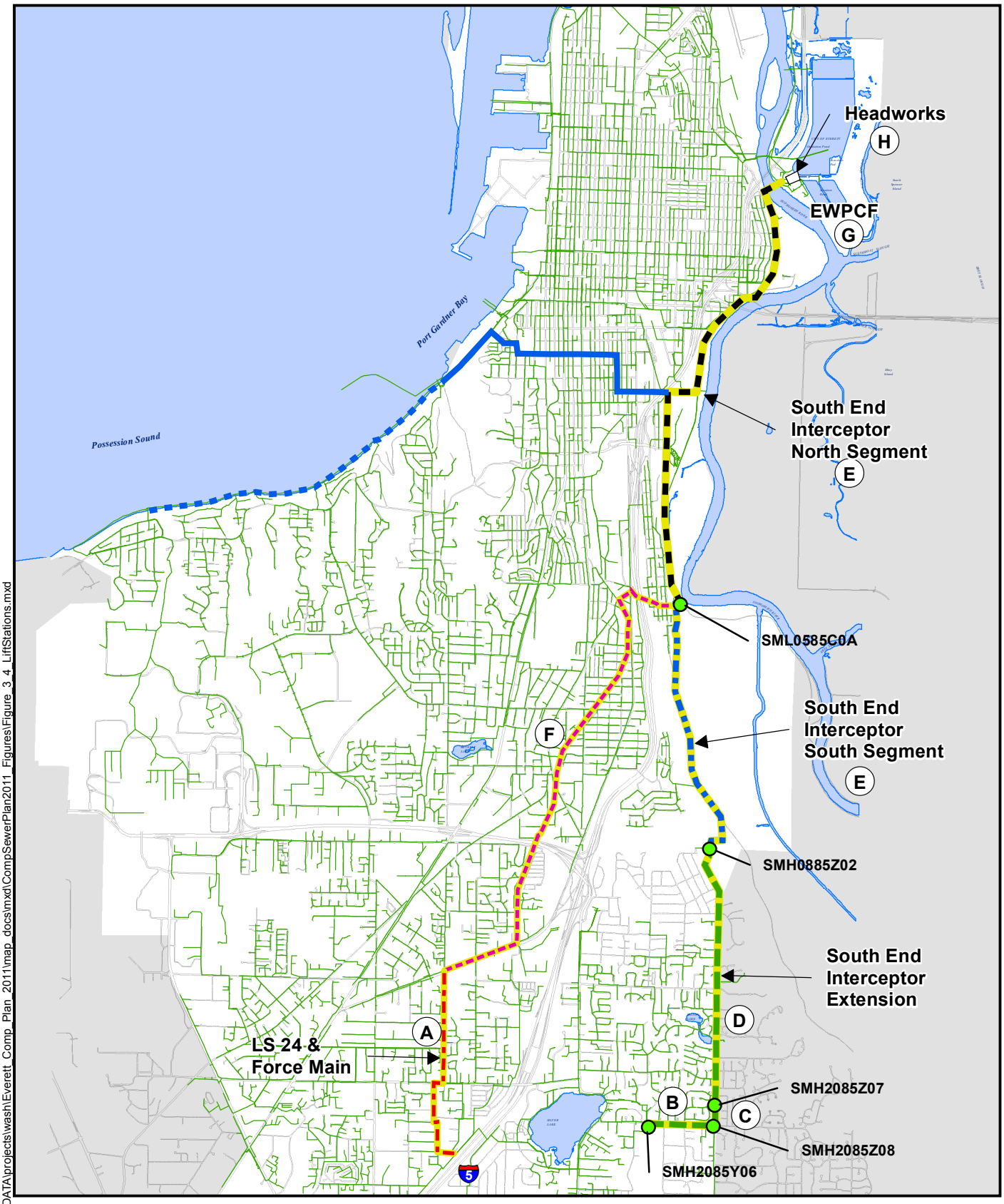
0 0.5 1 2
Miles

2014 Comprehensive Sewer Plan
City of Everett

FIGURE 2-3

Unsewered Areas

\\GISDATA\projects\wash\Everett_Comp_Plan_2011\map_docs\mxd\CompSewerPlan2011_Figures\Figure_2_3_UnsewardAreas.mxd



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LS24 Force Main
Central Interceptor
South End Interceptor Extension
South End Interceptor South Segment
South End Interceptor North Segment
Mukilteo Beach Interceptor
LS1 Force Main

0 0.5 1 2
Miles

2014 Comprehensive Sewer Plan
City of Everett

FIGURE 2-4

Elements in Everett's Sewer System
Utilized for Outside Agency's Collection System

Table 2-2. Capacity in Everett System Required for Other Collection Systems

ID	Everett Facility	Capacity Required for Silver Lake WSD[1]	Capacity Required for Alderwood WWD[3]	Capacity Required for Mukilteo WWD[2]
A	LS 24 and Force Main		2,300 gpm	
B	South End Interceptor Extension from SMH 2085Y06 to SMH 2085Z08	831 gpm		
C	South End Interceptor Extension from SMH 2085Z08 to SMH 2085Z07	5,400 gpm		
D	South End Interceptor Extension from SMH 2085Z07 to South End Interceptor South Segment SMH 0885Z02 (Shadow Wood Screen)	11,500 gpm		
E	South End Interceptor South Segment from SMH 0885Z02 (Shadow Wood Screen) to South End Interceptor North Segment (upstream end of SML 0585C0A)	11,500 gpm		
F	Central Interceptor to South End Interceptor North Segment upstream end of SML 0585C0A		2,300 gpm	2,500 gpm
G	South End Interceptor North Segment upstream end of SML 0585C0A to EWPCF's Headworks	11,500 gpm	2,300 gpm	2,500 gpm
H	EWPCF's Headworks	11,500 gpm	2,300 gpm	2,500 gpm
I	EWPCF	6.6 mgd	1.5 mgd	1.6 mgd

1 Silver Lake WSD capacity requirements are a sum of those listed in the 1982 Sewage Disposal Agreement and the 1991 Amendment.
2 Mukilteo WWD capacity requirements are those listed in the 1992 Amendment to the 1983 Sewage Disposal Agreement.
3 Alderwood WWD capacity requirements are those listed in the 1981 Sewage Disposal Agreement.
gpm = gallons per minute. Per the Sewage Disposal agreements, capacity requirements given in gpm are determined as the average maximum flow measured over a one-hour period.
mgd = million gallons per day. Per the Sewage Disposal agreements, capacity requirements given in mgd are the average daily flow over a one-year period for Mukilteo WWD and the maximum winter month for Silver Lake WSD.

2.2.1 Silver Lake Water and Sewer District

Everett provides conveyance and treatment for most of the sewage generated within Silver Lake WSD. Silver Lake WSD does not have treatment facilities and sends its sewage directly to Everett and indirectly to King County via Alderwood WWD. Everett and Silver Lake WSD have a sewage disposal agreement that was signed on June 16, 1982 (which rescinded previous agreements from 1970 and 1974) and has had subsequent amendments in 1985, 1986, 1991 and 2000. The agreement was written to continue through 2010 at a minimum, with provisions made for service to continue through 2032, at which time Everett and Silver Lake WSD would meet to negotiate continued service. A new agreement is currently being negotiated and is expected to be signed in early 2015.

In a separate agreement, Everett provides conveyance and final treatment for leachate from the Snohomish County-owned Cathcart landfill. Snohomish County pre-treats the leachate and Silver Lake WSD conveys it to Everett. This agreement between Everett, Silver Lake WSD, and Snohomish County was signed on April 5, 1989 and has had a subsequent amendment in 2008. The leachate is treated to Everett's pretreatment requirements and the discharge is required to not exceed 12,000 gallons per hour, or a maximum daily flow of 144,000 gallons per day. The agreement continues through 2010 at a minimum, with provisions made for service to continue through 2032. Snohomish County is not disposing of any more waste at this location. Snohomish County is considering other uses at this site that could be consistent with the surrounding areas and type of growth. Since this site is located within Silver Lake WSD service area, additional sewage flows from this area have been taken into account by assuming that Silver Lake WSD is conveying all of the flow allocated in their sewage disposal agreement.

Agreements between Everett and Silver Lake WSD are included in Appendix E.

2.2.2 Alderwood Water & Wastewater District

Everett provides conveyance and treatment for a portion of the sewage generated within Alderwood WWD. Alderwood WWD conveys portions of its sewage to its own treatment plant and conveys other portions to Everett and King County. Everett and Alderwood WWD have a sewage disposal agreement that was signed on December 30, 1981 (which rescinded a previous agreement from 1969). The agreement is in effect until March 31, 2020.

Agreements between Everett and Alderwood WWD are included in Appendix F.

2.2.3 Mukilteo Water and Wastewater District

The Mukilteo Water District merged with the Olympus Terrace Sewer District in November 2007 and formed the Mukilteo Water and Wastewater District. Everett previously had agreements with Mukilteo Water District and Olympus Terrace Sewer District; however they are now legally with Mukilteo WWD and these agreements are described below.

Everett provides conveyance and treatment for a portion of the sewage generated within Mukilteo WWD. Mukilteo WWD conveys portions of its sewage to its own treatment plant and conveys other portions to Everett. Everett and Mukilteo WWD have a sewage disposal agreement that was signed on May 4, 1983 (which rescinded a previous agreement from 1977) and has had subsequent amendments in 1985, 1992, and 2003. The agreement continues through 2023 at a minimum, with provisions made for service to continue through 2033, at which time Everett and Mukilteo WWD would meet to negotiate continued service. The 1992 amendment increased the capacity needed by Mukilteo WWD. The 2003 amendment sold

some of that additional capacity back to Everett because Everett annexed a portion of Mukilteo WWD's service area.

In a converse arrangement, Mukilteo WWD provides conveyance and treatment for a portion of the sewage generated within a small area of Everett. This area is officially called the Olympus Terrace Service Area and is also known as "Japanese Gulch." This is documented in an agreement that was signed in 1998. This area is within Everett city limits and has limited development potential. Sewage from this area is conveyed through Everett-owned and -operated sewers to the Mukilteo WWD trunk. Sewage flows from this area to Mukilteo WWD are not to exceed 100,000 gallons per day or a biochemical oxygen demand of 200 pounds. The agreement is in effect until March 31, 2020.

Agreements between Everett and Mukilteo WWD are included in Appendix G.

2.3 Surrounding Vicinity Characteristics

This section provides information required in sewer plans per WAC 173-240-050.

2.3.1 Land Use and Zoning

Land use and zoning are documented in the 2025 City of Everett Comprehensive Plan (Chapter 2 Land Use Element) and in the EMC (Title 19 Zoning). Land use is provided throughout the Everett UGA and zoning is provided throughout the Everett municipal boundary. The zoning is shown in Figure 2-5 and summarized in Table 2-3.

Table 2-3. Zoning Within Everett Municipal Boundary

Zoning Code, Description	Acres
A-1, Agricultural Use	685
B-1, Neighborhood Shopping	59
B-2, Community Business	237
B-2B, Office	24
B-3, Central Business District	196
BMU, Broadway Mixed-Use	175
C-1, General Commercial	291
C-1R, Regional Commercial-Office	194
C-2, Heavy Commercial-Light Industrial	120
C-2ES, Heavy Commercial-Light Industrial (Everett Station)	147
E-1, Evergreen Way	252
E-1MUO, Evergreen Way Mixed Use Overlay	330
M-1, Office and Industrial Park	1,381
M-2, Heavy Manufacturing	2,431
M-M, Business Park	561
M-S, Maritime Services	305

Zoning Code, Description	Acres
OS, Open Space	188
P, Public Park Zone	783
R-1, Single Family Detached Low Density	3,876
R-1A, Single Family Attached	33
R-2, Single Family Detached Medium Density	2,437
R-2A, Single Family Attached Medium Density	34
R-3, Multiple Family Medium Density	1,196
R-3L, Multiple Family Low Density	190
R-4, Multiple Family High Density	305
R-5, Core Residential	81
R-S, Suburban Residential	824
SPD, Special Purpose District	723
W-C, Waterfront Commercial	437
Total	**18,492**

Source: City of Everett Planning and Community Development GIS data.

2.3.2 Topography

When planning a sewer system and determining the best way to serve future areas, topography is an important factor to consider. To take advantage of gravity flow, sewer systems are generally designed to mimic the topography of the land as much as possible. Lift stations are used to overcome elevation differences, when required.

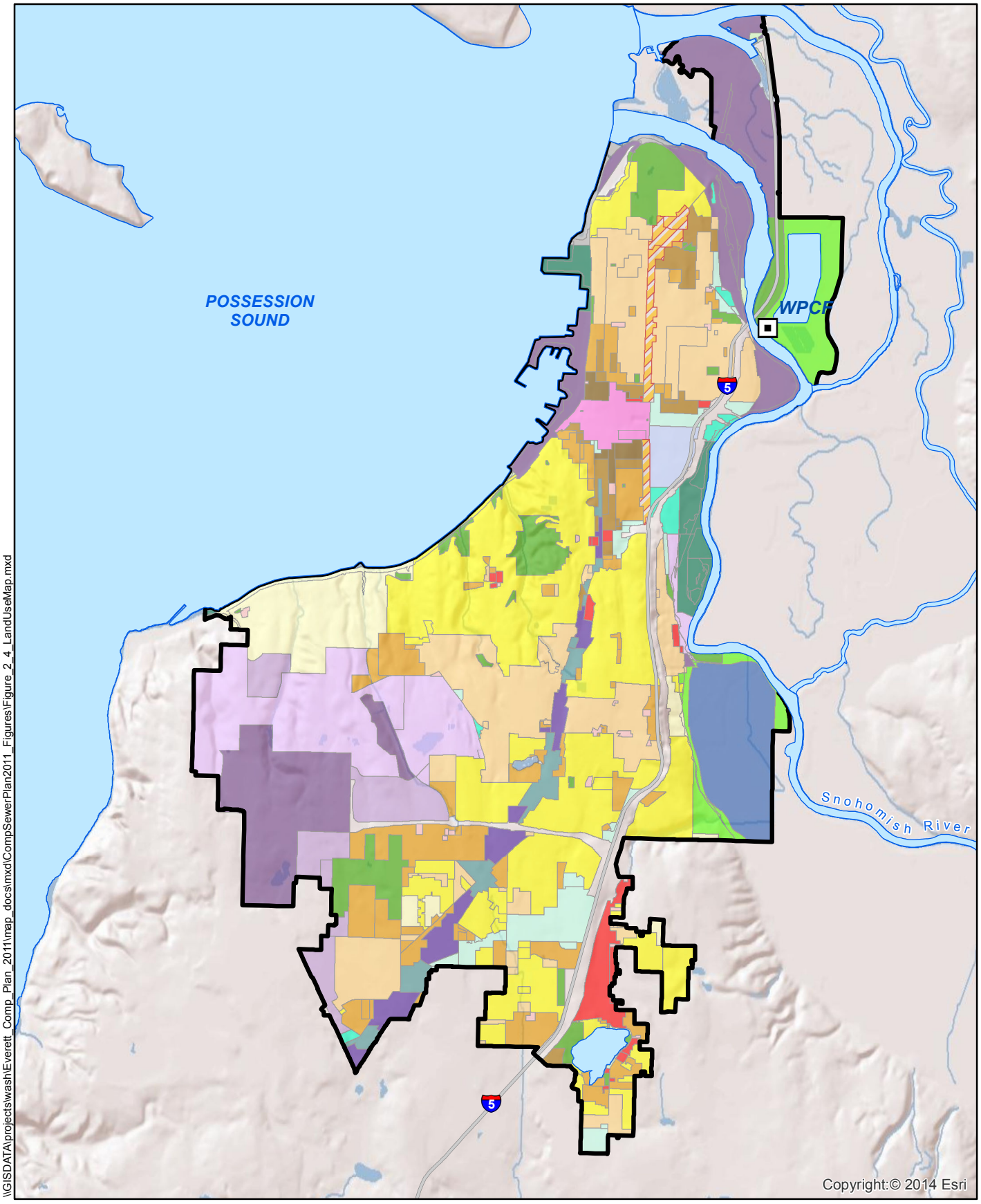
Topography in Everett is comprised of a peninsula of glacial outwash and a broad, level area surrounding the riverbeds. The peninsula at the north end of Everett slopes west to Port Gardner Bay, east to the Snohomish River, and north to the mouth of the Snohomish River. The elevation ranges from sea level to 635 feet [North American Vertical Datum (NAVD) 1988] near Casino Road and Evergreen Way, south of State Route 526 and west of Interstate 5. Tidal action influences the Snohomish River located east of the peninsula. Smith and Spencer Islands are north and east of the river. Dikes have been installed on both islands to help protect against flooding. Figure 2-6 shows the topography within Everett.

2.3.3 Critical Areas

Critical areas consist of wetlands, areas that recharge aquifers used as a potable water source, areas of recurrent flooding, geologically hazardous areas, and habitat conservation areas. Wetlands, a seismic region, and steep slopes characterize the geologically sensitive areas in Everett. The wetlands tend to be located in the areas of higher elevation in the southwest region of Everett. Wetlands are protected areas that require special considerations when facilities are to be installed in their vicinity. Figure 2-7 displays the locations of wetlands within and around Everett.

Areas of steep slopes are scattered throughout Everett. For the most part, the steep slopes are located near the waterfront on the outer perimeter of Everett. These steep slopes are important because extra precautions must be undertaken when constructing new facilities on or near them. During the winter of 2012-13 a small landslide on a steep slope in northwest Everett damaged an existing CSO pipe at PSO3. Figure 2-8 shows the locations of the steep slopes in Everett.

The areas within Everett considered to be seismically at risk are generally located along the Snohomish River. Seismic areas containing loose soils with a high ground water table are typically subject to liquefaction during seismic events. Potential areas of liquefaction should be taken into consideration for pipeline projects. A few small areas are located along the Puget Sound waterfront. Figure 2-9 shows the approximate locations of the seismic zones in Everett.



City of Everett WPCF
Highways
Waterbody
City of Everett Limits

E-1MUO
E-1
SPD
A-1
P
OS
R-S

R-1
R-1A
R-2
R-2A
R-3L
R-3
R-4

R-5
B-1
B-2
B-2B
B-3
BMU
C-1

C-1R
C-2
C-2ES
M-M
M-1
M-2
M-S
W-C

0 0.5 1 2
Miles

2014 Comprehensive Sewer Plan
City of Everett
FIGURE 2-5
Zoning Map

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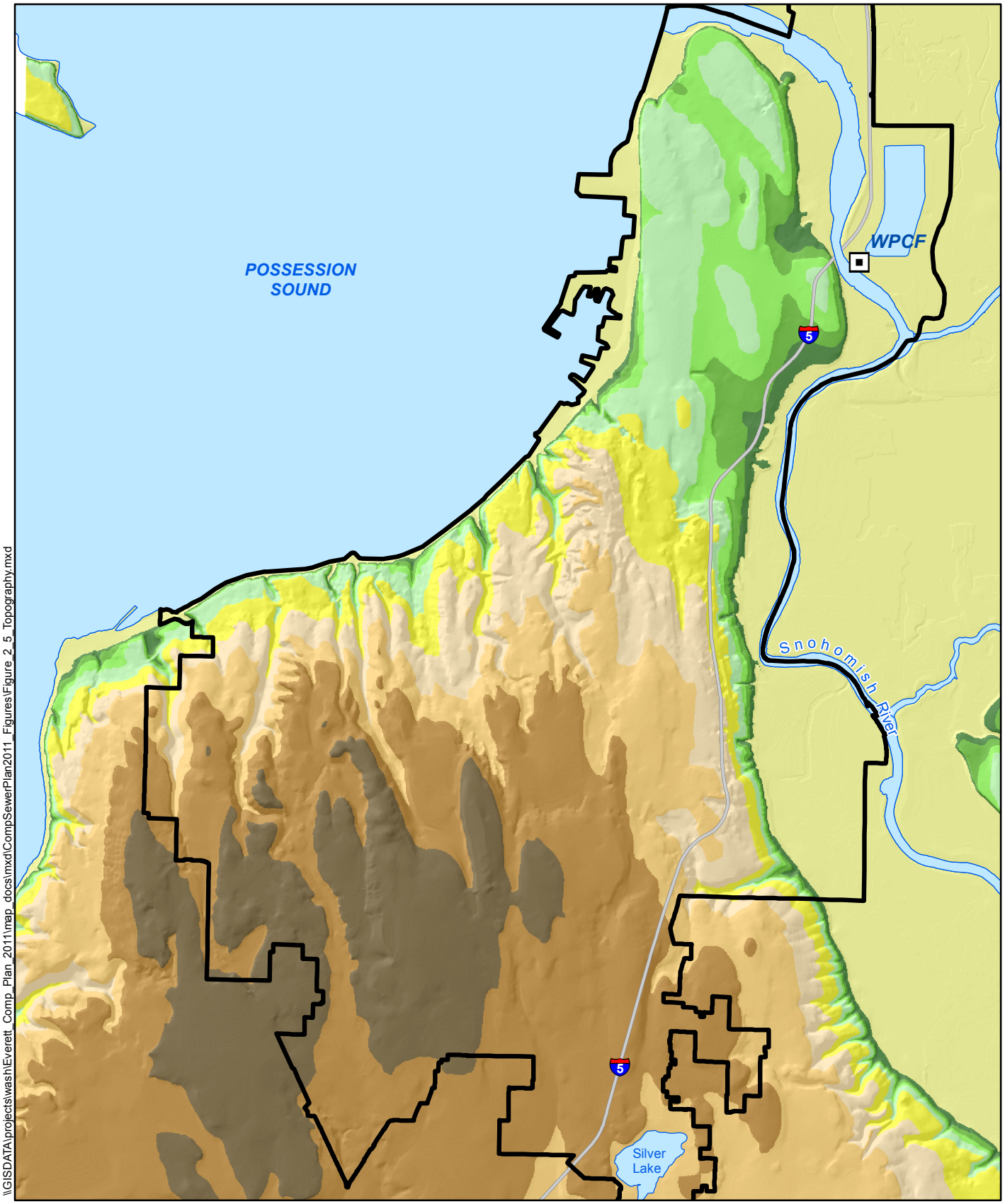


City of Everett WPCF
City of Everett Limits
Water
Highways

Topography (in feet)

-1 - 25
25 - 50
50 - 75
75 - 100
100 - 150
150 - 250
250 - 350
350 - 450
450 - 550
550 - 650

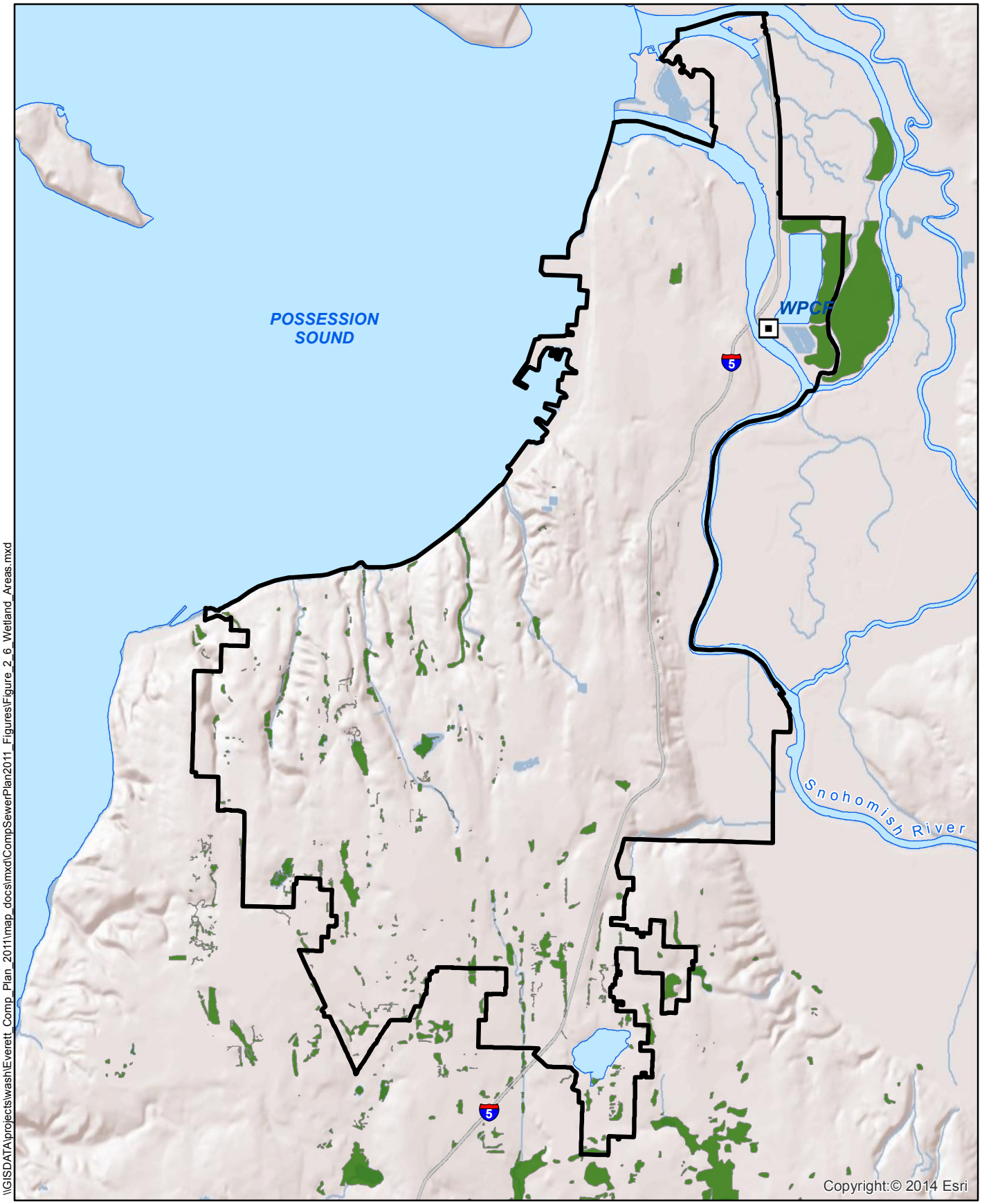
N

0 0.425 0.85 1.7
Miles

2014 Comprehensive Sewer Plan
City of Everett

FIGURE 2-6

Topography



City of Everett WPCF
City of Everett Limits
Wetlands
Waterbody
Highway

0 0.5 1 2
Miles

2014 Comprehensive Sewer Plan
City of Everett
FIGURE 2-7
Wetland Areas

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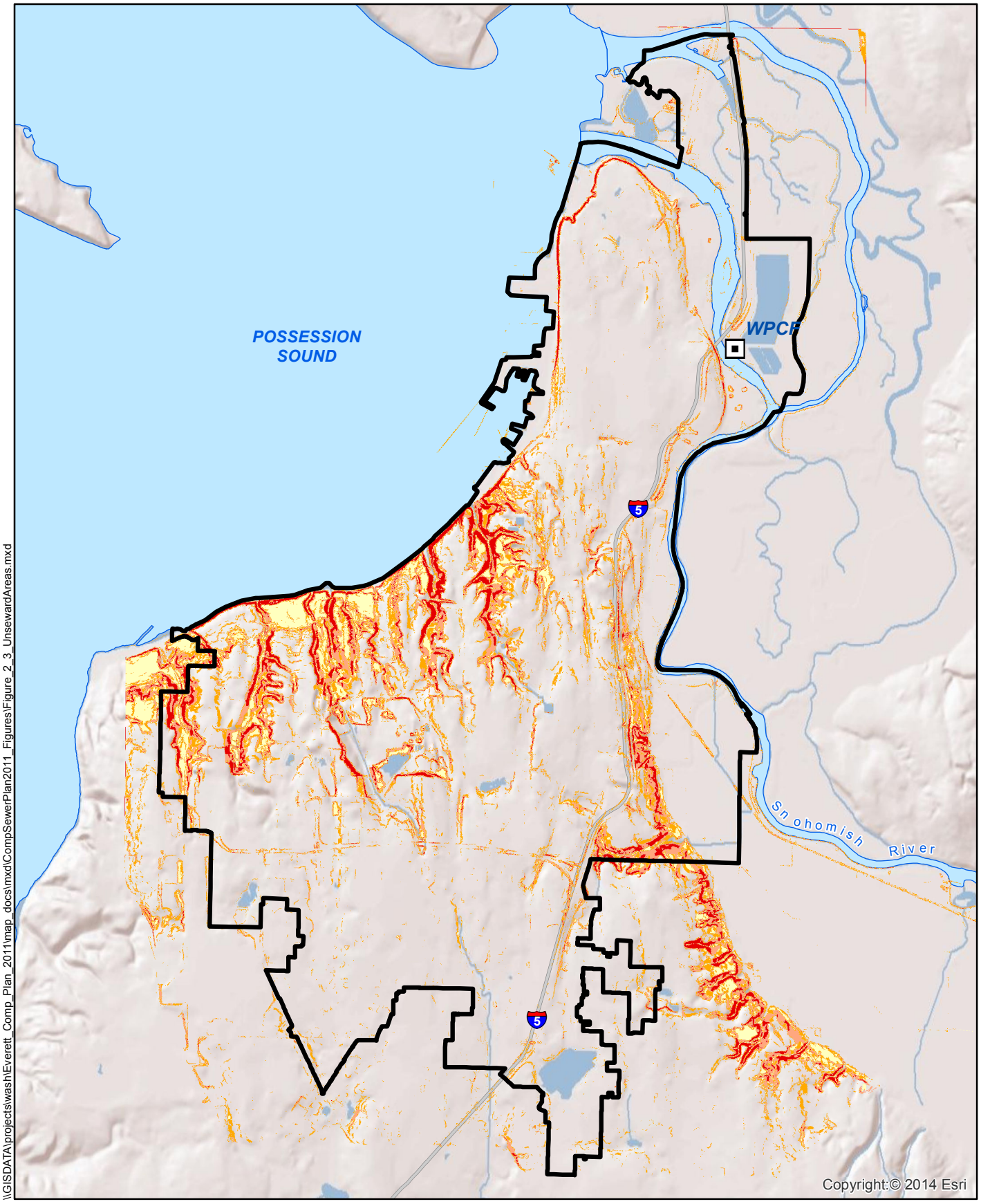

City of Everett WPCF
City of Everett Limits
Highways
Waterbody

Slope
> 0 - 15%
> 15.1 - 25%
> 25.1 - 40%
40% or greater

0 0.5 1 2
Miles

2014 Comprehensive Sewer Plan
City of Everett
FIGURE 2-8
Critical Areas - Slope

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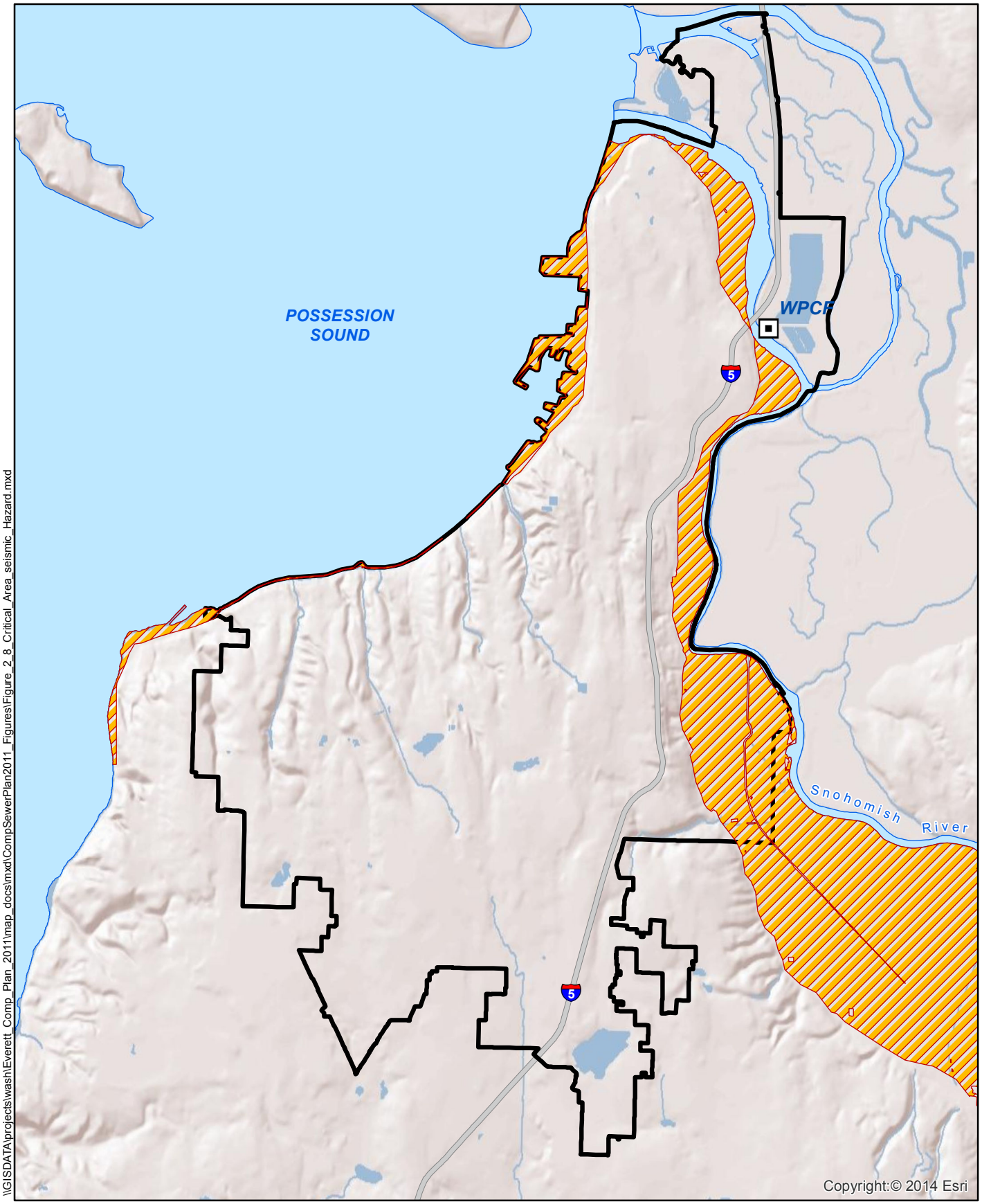

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City of Everett WPCF
Highway
City of Everett Limits
Waterbody
Seismic Hazard Area

0 0.5 1 2
Miles

2014 Comprehensive Sewer Plan
City of Everett
FIGURE 2-9
Critical Areas Seismic Hazard

2.3.4 Geology

Many of the geographic and geologic features in the Pacific Northwest are the result of glacial action. Everett sits upon a glacial drift plain. The advancing and retreating glaciers deposited the soils underneath the surface. The glaciers also shaped the flatlands and the hills in the area. With each passing ice age, the soil was exposed to immense compacting and shearing forces. Rain runoff caused the surface to erode and created the local streams, rivers, and ravines. These geologic forces created topography suitable for the establishment of a modern sewage system.

Two predominant features characterize the western third of Snohomish County: a rolling plateau of glacial outwash and a broad, level area surrounding the river beds. Glacial action and subsequent erosion from flooding formed these features. Advancing glaciers carved through the land, and as the glaciers retreated, deposits of glacial outwash were left behind. Previous deposits of glacial outwash were compacted as this cycle repeated. The resulting plateau was eroded by stream runoff. The result for Everett was a peninsula of glacial outwash with steep ravines sloping down to river beds.

2.3.5 Soils

The distribution of soils in Everett is shown on Figure 2-10 and the characteristics of the most frequently occurring soils are summarized in Table 2-4. Most of Everett is located on the plateau between the Snohomish River basin and Possession Sound. Therefore, the majority of the most frequently occurring soils are associated with the plateau. Another of the most frequently occurring soils (Puget soil type) is associated with the Snohomish River basin.

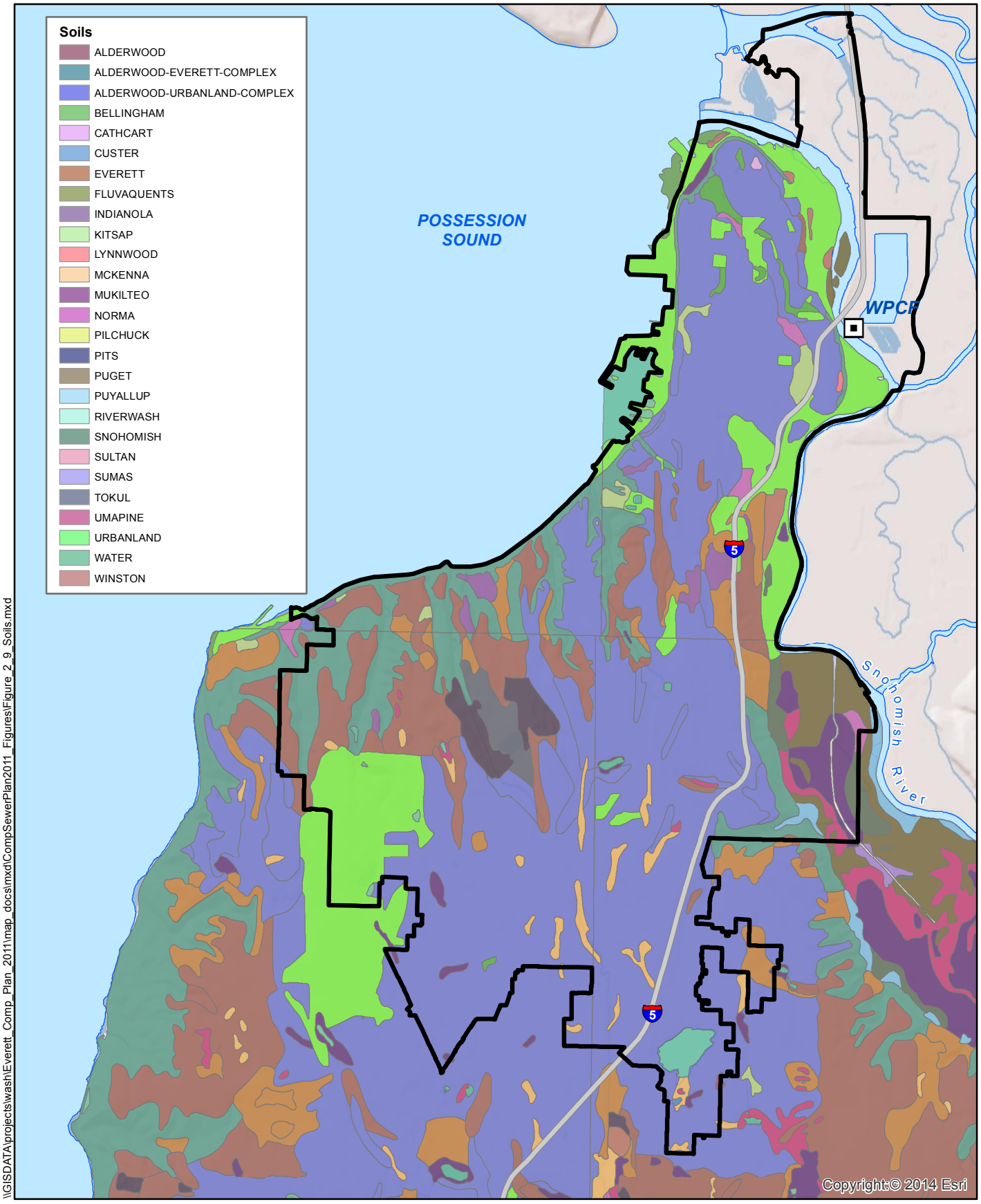
Table 2-4. Soil Characteristics

Soil Series	Parent Material	Topography	Drainage	Typical Vegetation	Potential Engineering Issues
Alderwood	Compact or cemented glacial till	Gently undulating to rolling (slope ranges from 2 – 25%)	Surface drainage good Underdrainage somewhat restricted	Coniferous	- Susceptible to frost
Alderwood-Everett Complex	Gravelly sandy loams	Nearly level to very steep (slope ranges from 25-75%)	Moderate to excessive drainage	Coniferous	- Seasonal soil moisture - Depth to hardpan - Steep slopes
Alderwood-Urbanland Complex	Glacial till	(slopes range from 2-15%)	Moderate	Coniferous and hardwoods	- Undetermined
Everett	Gravelly drift	Gently undulating (slope ranges from 0-25%)	Surface and underdrainage very fast	Coniferous	- Excellent subgrade material
Puget	Mixed, silty alluvium	Nearly level (slope ranges from 0-2%)	Flood prone	Soil formerly covered with conifers and hardwoods	- Extreme soil variations both horizontally and vertically - Flood prone
Urbanland	Glacial till	Nearly level to gently sloping	Moderate	Soil formerly covered with conifers and hardwoods	- Undetermined

Source: Soil Survey of Snohomish County Area Washington (United States Department of Agriculture Soil Conservation Service, 1983); State of Washington Engineering Soils Manual (State Council for Highway Research, 1955)

2.3.6 Climate

Maritime air from the Pacific Ocean affects the climate of the Puget Sound region. Although the prevailing wind is from the west, local winds are typically influenced by the local topography. Average annual rainfall for areas near Puget Sound is approximately 35 inches. During the winter months, average monthly precipitation is nearly 5 inches. The majority of the rain occurs as low-intensity, long-duration storms, but occasional thunderstorms do occur. High stream flows occur during the wet winter season and in the spring when the mountain snow pack begins to melt. Table 2-5 provides an overall climate summary for Everett, based on records from the Western Regional Climate Center from 1981 to 2010 (Everett Jr. College Station 452675).



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City of Everett WPCF
Highways
City of Everett Limits
Waterbody

0 0.5 1 2
Miles

2014 Comprehensive Sewer Plan
City of Everett
FIGURE 2-10
Soils

During the warm, summer months, the average temperatures in Everett are in the 70s. Average relative humidity ranges from 90 percent in the morning to 50 percent in the afternoon. Less than 5 percent of the average annual rainfall occurs during the months of July and August. On average, thunderstorms occur 5 to 10 days per year, typically during the summer. The prevailing wind is from the northwest during the spring and summer.

During the winter months, afternoon temperatures range from the mid-30s to the lower 50s, and overnight temperatures range from the mid-20s to mid-30s. The average relative humidity ranges from 90 percent to 75 percent during the day. The majority of the average annual rainfall (75 percent) occurs during the winter months of October through March. During this time, the prevailing wind is from the southwest. At the beginning of winter, the air is moist and its temperature is near that of the ocean's surface. Cooling of the incoming air masses and orographic lifting cause cloudiness and variable precipitation throughout the Puget Sound region. Orographic lifting refers to air masses that must rise when they collide with steep topography such as a mountain. During a typical winter, the ground frost level averages four to eight inches; however, it can extend as deep as 15 inches during extended cold periods with no snow cover.

Table 2-5. Climate Summary for City of Everett (1981-2010)

Month	Average Max. Temperature (F)	Average Min. Temperature (F)	Average Total Precipitation (in.)
January	47	34	4.4
February	50	35	3.4
March	54	38	3.6
April	59	41	3.0
May	64	47	2.7
June	69	51	2.4
July	74	54	1.2
August	74	54	1.2
September	69	49	2.0
October	60	43	3.6
November	50	37	5.6
December	46	34	5.4
Annual	60	43	38.5

Source: Western Regional Climate Center; Everett Jr. College Station 452675.

2.3.7 Water Resources

Everett is located within two Water Resource Inventory Areas (WRIA). The northern portion of Everett is within the Snohomish WRIA (WRIA-07) and includes areas that drain from the highest part of Everett to the Snohomish River and northwest to Port Gardner Bay. The southern portion of Everett is within the Cedar/ Sammamish WRIA (WRIA-08). This area drains from the highest part of Everett ultimately south to the Sammamish River, which in turn discharges to Lake Washington. Figure 2-11 shows major surface water resources and drainage basins.

2.3.8 Water Supply

Everett's water supply and distribution systems are described in the 2007 Everett Comprehensive Water Plan. Everett is the regional water supplier for most of Snohomish County. Everett's water supply comes from the Sultan River and Spada and Chaplain Reservoirs. The Spada Reservoir, 24 miles east of Everett, can store 50 billion gallons of water. The Chaplain Reservoir, 16 miles east of Everett, can store 4.5 billion gallons of water. Water flows from Spada Reservoir to Jackson Hydropower Plant and on to Chaplain Reservoir. Located at the south end of Chaplain Reservoir is Everett's Water Filtration Plant (WFP). The maximum filtration rate of the WFP approved by the Department of Health is 132 million gallons per day (mgd).

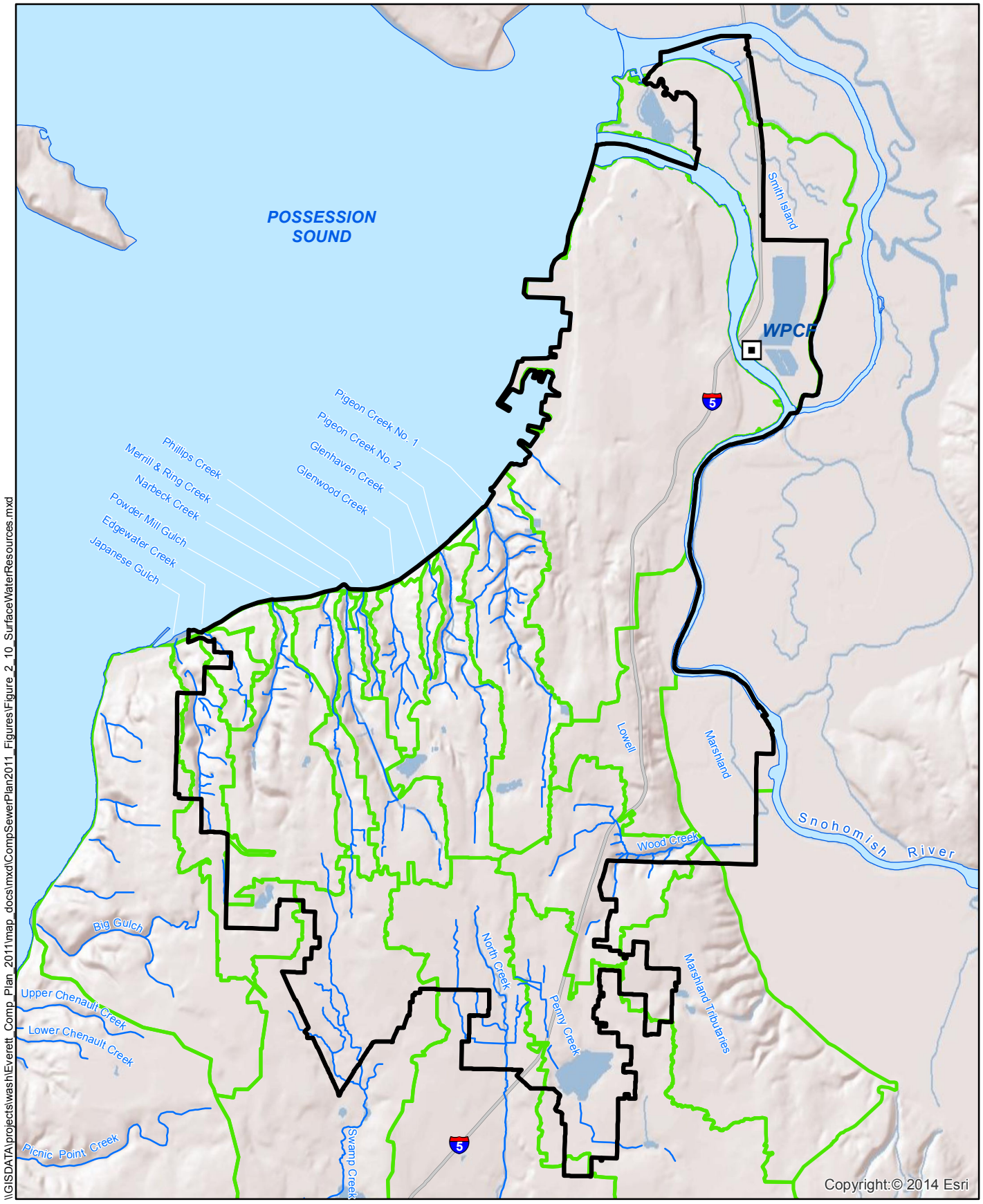
No public drinking water wells currently exist within the existing and proposed service areas. The City, however, has groundwater rights that will not be developed over the next twenty years.

Approximately 76 miles of transmission mains and tunnels convey water from the WFP to storage facilities located within Everett. Table 2-6 lists the water storage facilities located within Everett. Figure 2-12 shows the major water system facilities.

Table 2-6. Water Storage Facilities

Storage Facility	Location	Capacity (MG)
Reservoir 1 (West & East)	720 35th Street	0.75
Reservoir 2	702 Edwards Avenue	10
Reservoir 3	6107 Berkshire Road	20
Reservoir 4[1]	Tulalip Avenue and Charles Avenue	24
Reservoir 6 (North & South)	8600 10th Avenue W	20
Casino Tank	8600 10th Avenue W	2
Bridle Park Standpipe	6000 36th Avenue W	0.125
Eastmont Tank	Beverly Drive	0.1
Olympic Tank	Olympic Drive and 75th St	0.2
Panther Creek Screenhouse	Along transmission lines Nos. 2, 3 and	0.07
Filter Plant Clearwells 1 & 2	Near Chaplain Reservoir	12.6
Filter Plant Surge Tank	Near Chaplain Reservoir	0.3
Filter Plant Standpipe	Near Chaplain Reservoir	0.2
Total		**90.3**

1) Not Potable at this time



City of Everett WPCF
City of Everett Limits
Waterbody
Streams
Drainage Basin
Highways

0 0.5 1 2
Miles

2014 Comprehensive Sewer Plan
City of Everett
FIGURE 2-11
Surface Water Resources

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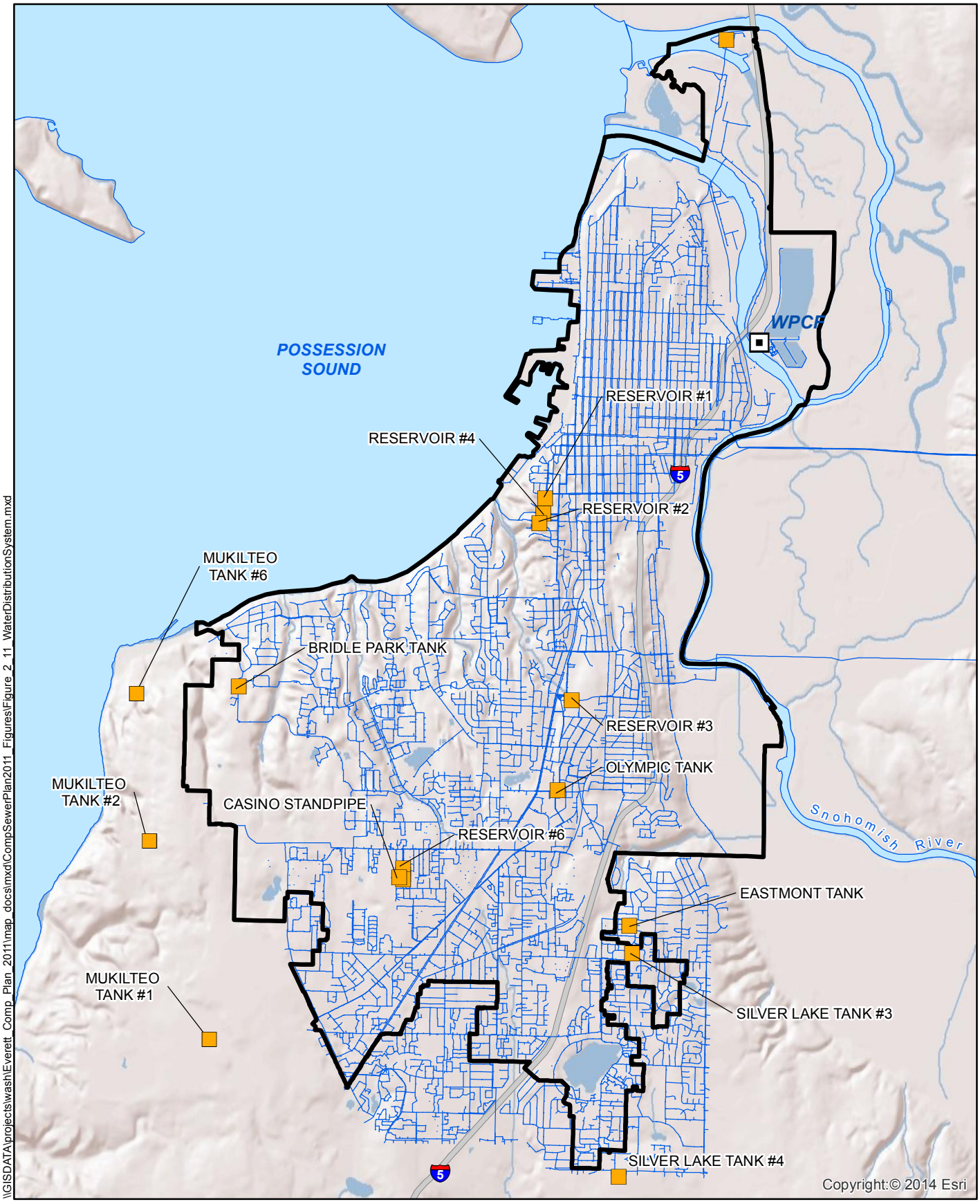

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City of Everett WPCF
Water Storage Facility
City of Everett Limits
Water Distribution Pipe
Highway
Waterbody

0 0.5 1 2
Miles

2014 Comprehensive Sewer Plan
City of Everett
FIGURE 2-12
Water Distribution System

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3 Existing Sewer System

The purpose of a sewage collection system is to convey sewage to locations where it can be treated and safely discharged. Collection systems in most cities continue to evolve over time as they expand to accommodate growth, redevelopment, and regulations change. As they deteriorate with age they are rehabilitated and upgraded. This chapter describes Everett's existing sewer system.

Everett's sewer system consists of a network of mains, interceptors (gravity and pressure), force mains, regulators, and lift stations that transport the collected sewage to the Everett WPCF located on Smith Island on the east side of Interstate 5, adjacent to the Snohomish River and Union Slough.

3.1 General History

In 1890, the first sewers were constructed three years before Everett was incorporated. In 1897, after a Sewer Bond Election passed, the construction of the citywide system began in the north end of Everett. This system is a combined system, carrying stormwater and sanitary sewage. With population growth, Everett expanded to the south and a separated system was installed in the new areas to avoid overloading sewers or the treatment plant. The existing system serves more than 165,000 people, conveying sewage through approximately 330 miles of sewer mains, interceptors and laterals, and 31 active lift stations.

Everett's sewer system originally discharged into the Snohomish River or Port Gardner Bay. In 1960, the WPCF was constructed and operated by the Snohomish County Health District to provide wastewater treatment. Everett took over operation of the facility in 1975. The facility originally consisted of oxidation ponds and an outfall to the Snohomish River. Significant improvements have been added to the plant over time. Table 3-1 summarizes these improvements. Currently, the WPCF has two parallel treatment systems: a Trickling Filter/Solids Contact (TF/SC) system and an aeration/oxidation pond or lagoon system.

Table 3-1. WPCF Improvements

Improvement	Date Completed
Aeration ponds	1971
Chlorine contact channel	1971
New headworks	1985
Trickling Filter/Solids Contact (TF/SC)	1991
South Effluent Pump Station for discharge to Outfall 100 in Port Gardner Bay	2005
Primary clarifiers	2007

3.2 Collection System

Everett relies on gravity flow for the majority of the collection system. Interceptors collect the sewage draining to the west and pump it to the east, towards the WPCF. Two main systems comprise the existing collection systems: the combined system in the north and the separated system in the south, as shown in Figure 2-2. Appendix H contains a summary table of the systems, which includes pipe size, slope, and capacity of all the existing trunk sewers.

3.2.1 Combined Sewer System

The combined system in the north end of Everett serves an area of approximately 6,500 acres. It was the first sewer system installed in Everett (original construction in the 1890s) and therefore requires a higher maintenance effort due to its age and condition. The first sewers were originally constructed of vitrified clay pipe, but since 1900 other pipe materials were used, such as concrete, cast iron, and more recently ductile iron, polyvinyl chloride (PVC), polypropylene (PP), and high-density polyethylene (HDPE).

The combined system consists of the six main interceptors listed below. Trunks A, C, D and the Summit Avenue Interceptor join in the downtown area, west of the Snohomish River and upstream of the WPCF. Figure 3-1 depicts the combined system. Table 3-2 includes a pipe inventory of the combined system.

- **Trunk A:** 18-inch to 24-inch pipeline east of Chestnut Street, conveying flows from the northeast shore area, south of Old Highway 99.
- **Trunk C:** 36-inch pipeline conveys flow from the northwest and north central area and part of the business district.
- **17th Street Interceptor (Trunk D):** 24-inch to 36-inch pipeline along Hoyt Avenue,17th and 18th Streets; this interceptor receives flow from a large portion of North Everett and collects contributions from the basins and lift stations on the Port Gardner waterfront.
- **Memorial Stadium Interceptor:** 8-inch to 60-inch pipeline along Colby Avenue
- **Summit Avenue Interceptor (Includes Summit Tunnel):** 42-inch to 60-inch pipeline along Summit Avenue; this interceptor conveys contribution from the area between 18th Street and 33rd Street, and receives flows from Memorial Stadium Interceptor. Flow from two interceptors from the south end of Everett and the Southwest Interceptor are also connected, however, flow is regulated into the interceptor through a sluice gate that is typically closed.
- **Snohomish River CSO Interceptor:** 72-inch pipeline between I-5 and the Snohomish River extending from 36th Street to the WPCF.

The combined system consists of approximately 2,785 manholes and 140 miles of 2½ to 72 inch-diameter pipelines not including side sewers.

Table 3-2. City of Everett System Pipe Inventory

Diameter	Combined System		Separated System		Total
	Feet	Miles	Feet	Miles	Miles
2.5	0.0	0.0	370	0.1	0.1
3	4,140	0.8	1,190	0.2	1.0
4	762	0.1	6,990	1.3	1.5
6	37,515	7.1	11,939	2.3	9.4
8	230,306	43.6	710,679	134.6	178.2
10	68,091	12.9	63,934	12.1	25.0
12	98,995	18.7	57,323	10.9	29.6
14	3,766	0.7	775	0.1	0.9
15	43,174	8.2	29,692	5.6	13.8
16	5,149	1.0	794	0.2	1.1
18	47,662	9.0	11,276	2.1	11.2
20	3,773	0.7	14,790	2.8	3.5
21	17,504	3.3	0.0	0.0	3.3
22	1,549	0.3	0.0	0.0	0.3
24	38,157	7.2	28,919	5.5	12.7
27	2,991	0.6	0.0	0.0	0.6
30	43,211	8.2	27,128	5.1	13.3
36	28,983	5.5	27,488	5.2	10.7
39	0.0	0.0	2,232	0.4	0.4
40	7,820	1.5	0.0	0.0	1.5
42	15,917	3.0	671	0.1	3.1
48	24,774	4.7	2,571	0.5	5.2
54	2,794	0.5	2,644	0.5	1.0
60	6,903	1.3	0.0	0.0	1.3
72	9,194	1.7	1,118	0.2	2.0
Total	**743,130**	**140.6**	**1,002,523**	**189.8**	**330.4**

3.2.2 Separated Sewer System

The separated system in the south end of Everett serves an area of 11,500 acres within Everett and a total of 25,000 acres, including the contribution received from Alderwood WWD, Silver Lake WSD, and Mukilteo WWD. Most of the system in the south end was constructed after 1963; however portions of areas that have been annexed may pre-date 1963. The sewers were originally concrete. Starting in 1982, new materials including PVC and ductile iron have been used. Pipes constructed after 1950 typically used rubber gaskets to seal the pipe joints. The separated system in the south end is where the majority of future growth within Everett is expected to occur.

The separated system consists of the five main interceptors listed below. The interceptors join upstream of the WPCF. Figure 3-2 depicts the separated system. Table 3-2 includes a pipe inventory of the separated system.

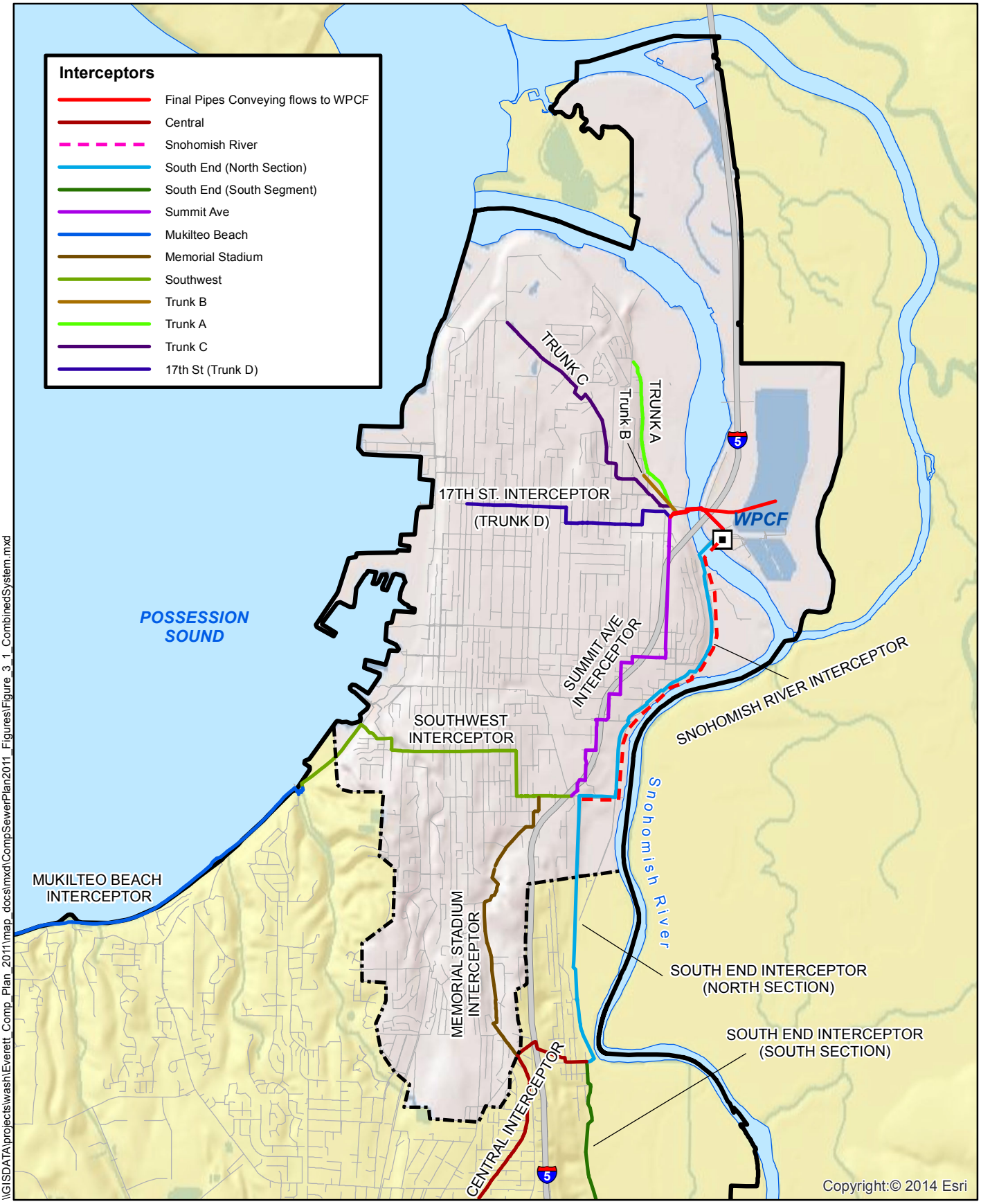
- **Mukilteo Beach Interceptor:** 20-inch to 30-inch pipeline along the shoreline conveys sewage from the western portion of the separated system including the Boeing facility.
- **Southwest Interceptor:** 30-inch pipeline along 33rd Street conveys the flows from Lift Station 01 (from the Mukilteo Beach Interceptor).
- **Central Interceptor:** 24-inch and 36-inch pipeline along Mall Drive and Commercial Avenue, west and parallel of I-5 receives flows from the south-central portion of the separated system and from Mukilteo WWD and Alderwood WWD.
- **South End Interceptor:** 30-inch and 48-inch pipeline along 35th Avenue SE, Larimer Road, and the east side of Everett on its way to the WPCF. This interceptor is divided into three segments: north segment, south segment, and extension. This trunk collects sewage from the south-east portion of the separated system and from Silver Lake WSD, Alderwood WWD, and Mukilteo WWD.
- **Lift Station 24 Force Main:** 20-inch pipeline that conveys flows from Lift Station 24 to the Central Interceptor. This pipeline collects sewage from the south portion of the separated system and from Alderwood WWD.

The separated system consists of approximately 4,379 manholes and 190 miles (not including laterals) of 6-to 48-inch-diameter pipelines.

3.2.3 Sewer Basins

Everett's sewer service area is divided into sewer basins. These basins represent areas where sewer flows are collected by a sewer collection system (pipes and lift stations) and conveyed to an interceptor. Each basin was divided into sub-basins to estimate local base flow and wet-weather hydrographs, as part of the modeling analysis described in Chapter 4. Everett's service area includes 22 sewer basins and over 400 sub-basins.

Basins in the separated sewer system are named for either the southwest or southeast portion of Everett and for the flow meter from which calibration data was used in the modeling analysis. Portions of basins SE 7 and SE 9 also include areas draining from Alderwood WWD, Silver Lake WSD, and Mukilteo WWD. Figure 3-3 delineates each of the sewer basins and Table 3-3 lists the characteristics of each basin.



City of Everett WPCF
City of Everett Limits
Boundary Between Combined and Separated Systems
Sewer Lines
Waterbody
Highways

0 0.275 0.55 1.1
Miles

2014 Comprehensive Sewer Plan
City of Everett
FIGURE 3-1
Combined System

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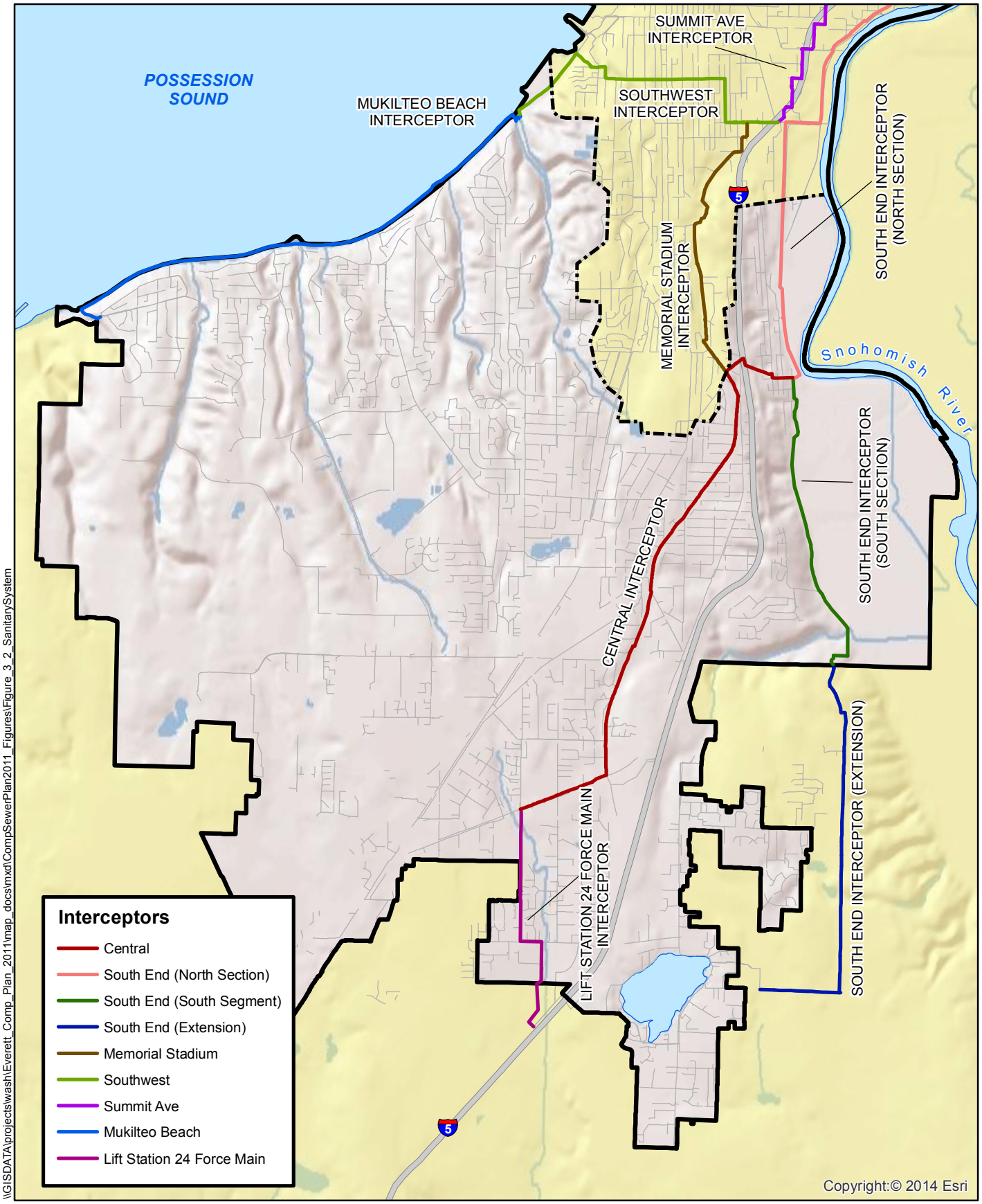

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City of Everett WPCF

City of Everett Limits

Boundary Between Combined and Separated Systems

Sewer Lines

Waterbody

Highways

0 0.475 0.95 1.9

Miles

2014 Comprehensive Sewer Plan
City of Everett
FIGURE 3-2
Separated System

Table 3-3. Sewer Drainage Basins

Combined System		Separated System	
Name	**Acres**	**Name**	**Acres**
A	381	SE 7	3,991
B	35	SE 8	1,485
C	764	SE 9	13,227
D	403	SE 10	933
E-M	327	SW 1	1,226
G	581	SW 3	1,670
K	202	SW 4	1,120
N	699	SW 5	837
NC	183		
ND	377		
NE	169		
NG	1,374		
P	350		
T-Q	482		
Total	**6,327**	**Total**	**24,489**

Source: City of Everett GIS Database (2012)

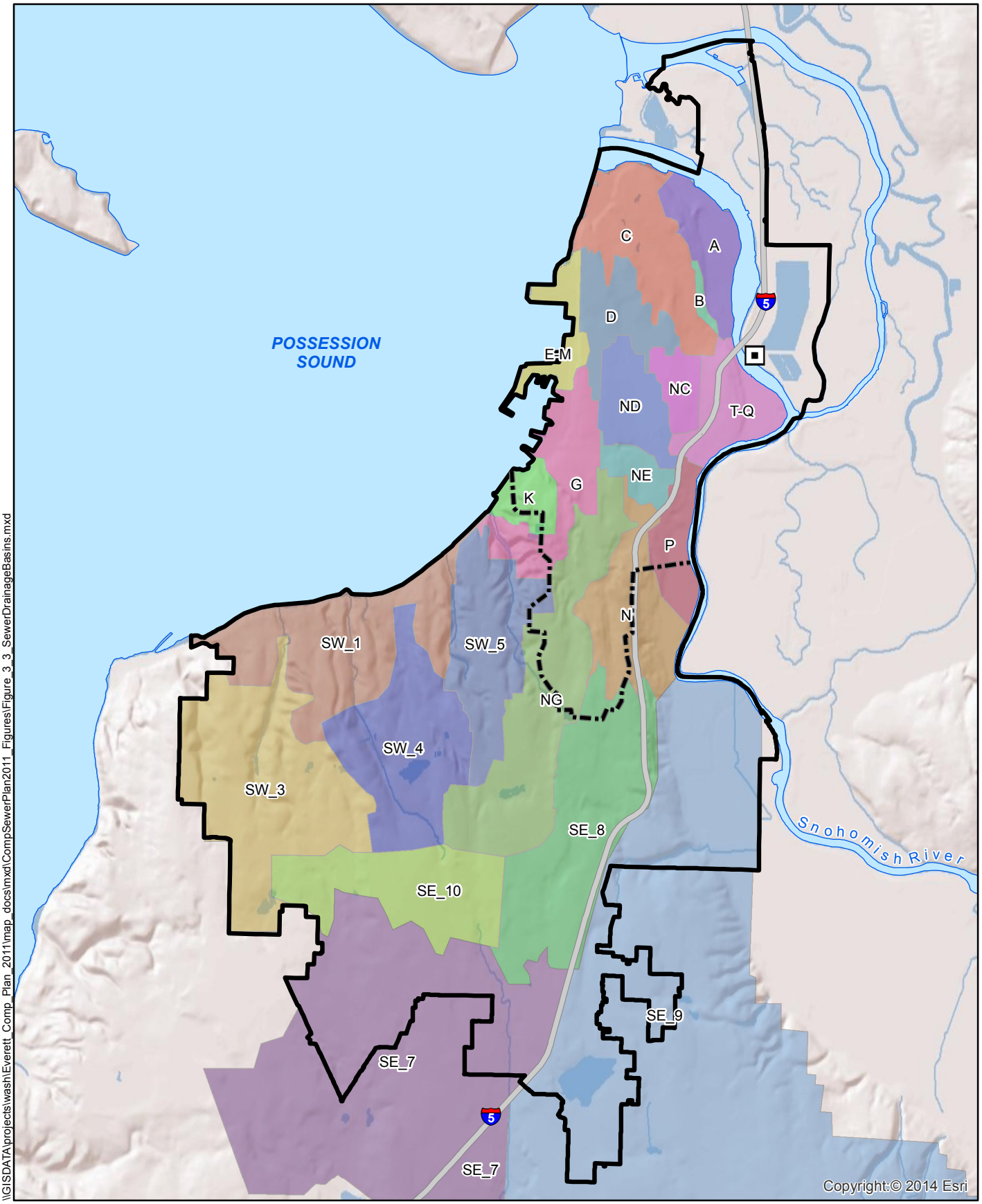
3.3 Lift Stations

Everett has 31 active lift stations (LS). Other lift stations have been abandoned as the system has been modified over time to accommodate gravity flow where possible. Nine lift stations (LS1, LS2, LS3, LS4, LS5, LS6, LS7, LS8, and LS31) are located in the west portion of the city along Port Gardner Bay lifting the sewage back east towards the WPCF. Table 3-4 lists Everett's lift stations and their characteristics. Figure 3-4 shows the locations of the lift stations, as well as the area that contributes flows to each lift station.

Table 3-4. Lift Stations

Lift Station ID	Basin	Address	Firm Capacity (GPM)	Number of Pumps	Receiving Waters	Overflow
1	SW-1	3520 Pigeon Creek Road	12,000	4	Port Gardner Bay	Direct Discharge
2(2)	G	522 Wall Street	2,400	3	Port Gardner Bay	Direct Discharge (PSO7)
3(2)	G	1111 Everett Avenue	3,900	3	Port Gardner Bay	Direct Discharge (PSO5)
4	G	2700 Grand Avenue	4,800	2	Port Gardner Bay	Indirect Discharge
5(2)	G	1200 25th Street	800	2	Port Gardner Bay	Direct Discharge (PSO4)
6	E-M	2104 W. Marine View Drive	700	2	Port Gardner Bay	Indirect Discharge
7	E-M	1331 W. Marine View Drive	1,960	2	Port Gardner Bay	Indirect Discharge
8(2)	E-M	1222 14th Street	3,500	2	Port Gardner Bay	Direct Discharge (PSO1, 2 , & 3)
9(2)	A	3427 Hayes Street	1,350	2	Snohomish River	Direct Discharge (SRO1)
11	G	704 41st Place	100	2	Wetland	Indirect Discharge
12	NG	4845 Black Forest Lane	215	2	Pigeon Creek No. 1	Indirect Discharge
13	SW-5	5400 1st Drive West	200	2	Pigeon Creek No. 2	Indirect Discharge
17	N	4919 South 2nd Avenue	1,200	2	Bigelow Creek	Indirect Discharge
18	SE-8	7600 Broadway Avenue	400	2	Wetland	Indirect Discharge
19	SE-8	2515 74th Street	400	2	Stormwater Conveyance System	Indirect Discharge
21	SW-5	2922 36th Street	350	2	Bigelow Creek	Indirect Discharge
23	SW-5	5200 1/2 East Drive	225	2	Pigeon Creek No. 1	Indirect Discharge
24	SE-7	332 120th Street SE	4,500	3	North Creek	Indirect Discharge
25	SE-9	11500 W Silver Lake Road	800	2	Silver Lake	Indirect Discharge
27	SE-9	1931 Burley Drive	240	2	Wetland	Indirect Discharge
28	SE-10	2114 W Casino Road	350	2	Wetland	Indirect Discharge
29	SE-10	2722 W Casino Road	200	2	Ditch	Indirect Discharge
30	SE-10	Kasch Park	500	2	Swamp Creek	Indirect Discharge
31	C	402 W Marine View Drive	850	3	Port Gardner Bay	Indirect Discharge
32(2)	T-Q	3520 Railway Avenue	2,700	2	Snohomish River	Direct Discharge (SRO4)
33(2)	P	3020 36th Street	800	2	Snohomish River	Direct Discharge (SRO8)
34	NG	5800 Fleming Street	300	2	Pigeon Creek No. 1	Indirect Discharge
36	SE-9	1530 121st Street S.F.	850	2	Silver Lake	Indirect Discharge
37	SW-5	4500 5th Drive SE	80	2	Pigeon Creek No. 1	Indirect Discharge
39[1]	T-Q	3702 Railway Avenue	1,100	3	Snohomish River	Indirect Discharge
41[1]	T-Q	4000 Railway Avenue	0	1	Snohomish River	Indirect Discharge

1. Pump capacity is 300 gpm with no back-up pump.
2. Lift Station with authorized CSO outfall



City of Everett WPCF

City of Everett Limits

Boundary Between Combined and Sanitary Systems

Highways

Waterbody

Sewer Basins

A, B, C, D, E-M, G, K, N, NC, ND, NE, NG, P, SE_10, SE_7, SE_8, SE_9, SW_1, SW_3, SW_4, SW_5, T-Q

0 0.5 1 2
Miles

2014 Comprehensive Sewer Plan
City of Everett
FIGURE 3-3
Sewer Basins

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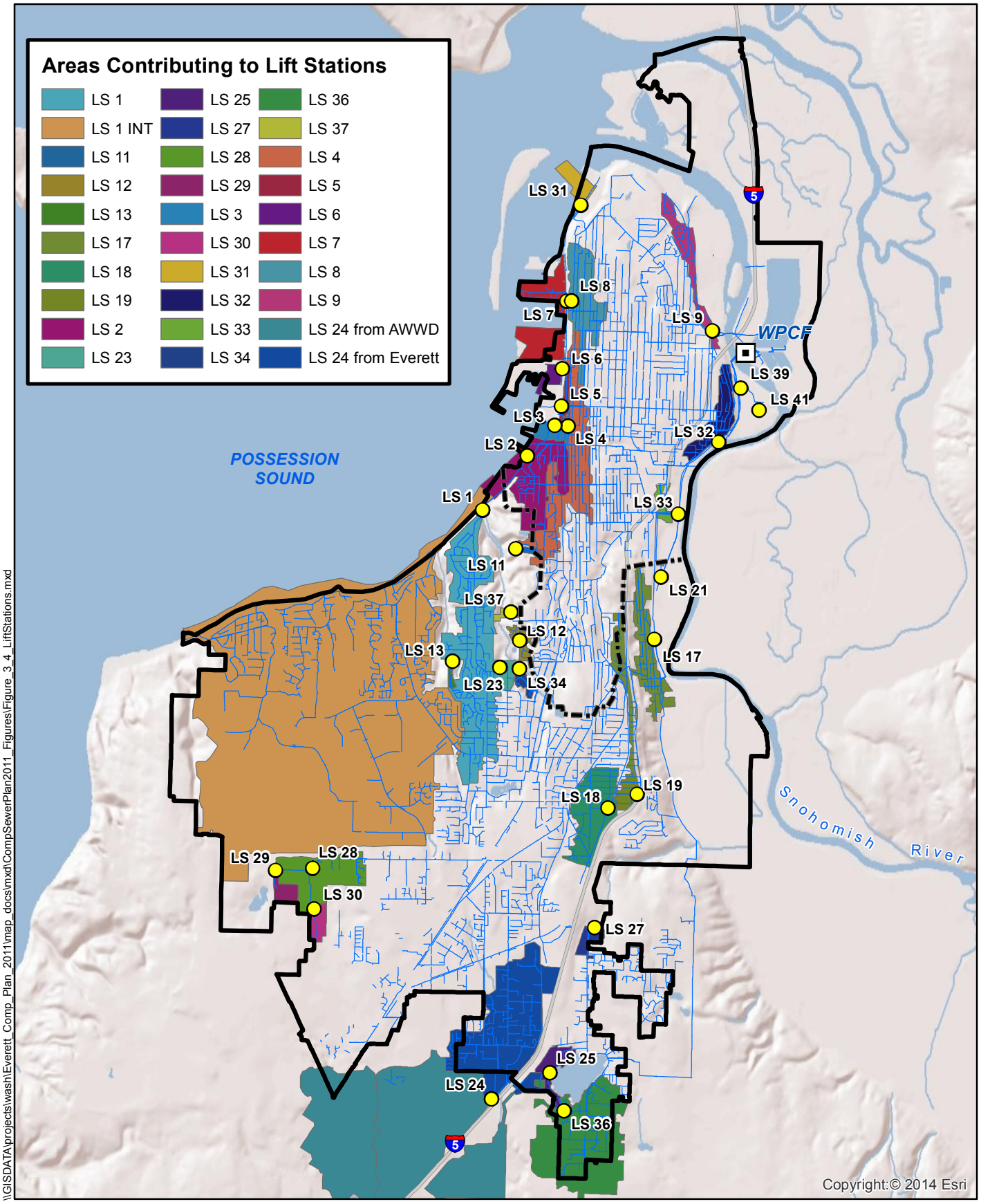

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City of Everett WPCF

City of Everett Limits

Lift Station

Boundary Between Combined and Sanitary Systems

Sewer Lines

Highways

0 0.5 1 2

Miles

2014 Comprehensive Sewer Plan
City of Everett

FIGURE 3-4

Lift Stations

3.4 Regulators

A regulator is a hydraulic structure that can direct sewage to alternative routes in the sewer system when necessary, especially during high flows to relieve the system downstream. Everett's sewer system has 35 regulators to control overflows to CSO outfalls and internal to the collection system, to divert wet weather flows in a different direction than dry weather flows. Many of these control structures were initially constructed in the early 1960s, and additional regulators were installed in the 1990s. More recently, a few old regulators have been removed and a few new ones have been built. Table 3-5 lists the regulators and their location. Figure 3-5 shows the locations of the regulators.

Regulator numbering is organized as follows:

- NESS regulators: R1-R50, Some regulators in NESS were unnumbered and have been given R-numbers as below.
- 36th St area: R60s
- Snohomish River area: R70s
- Port Gardner Waterfront area: R80s
- Miscellaneous CS Upland area: R90s
- Separated System: R100s.

Future regulators should conform to this numbering system to the extent possible.

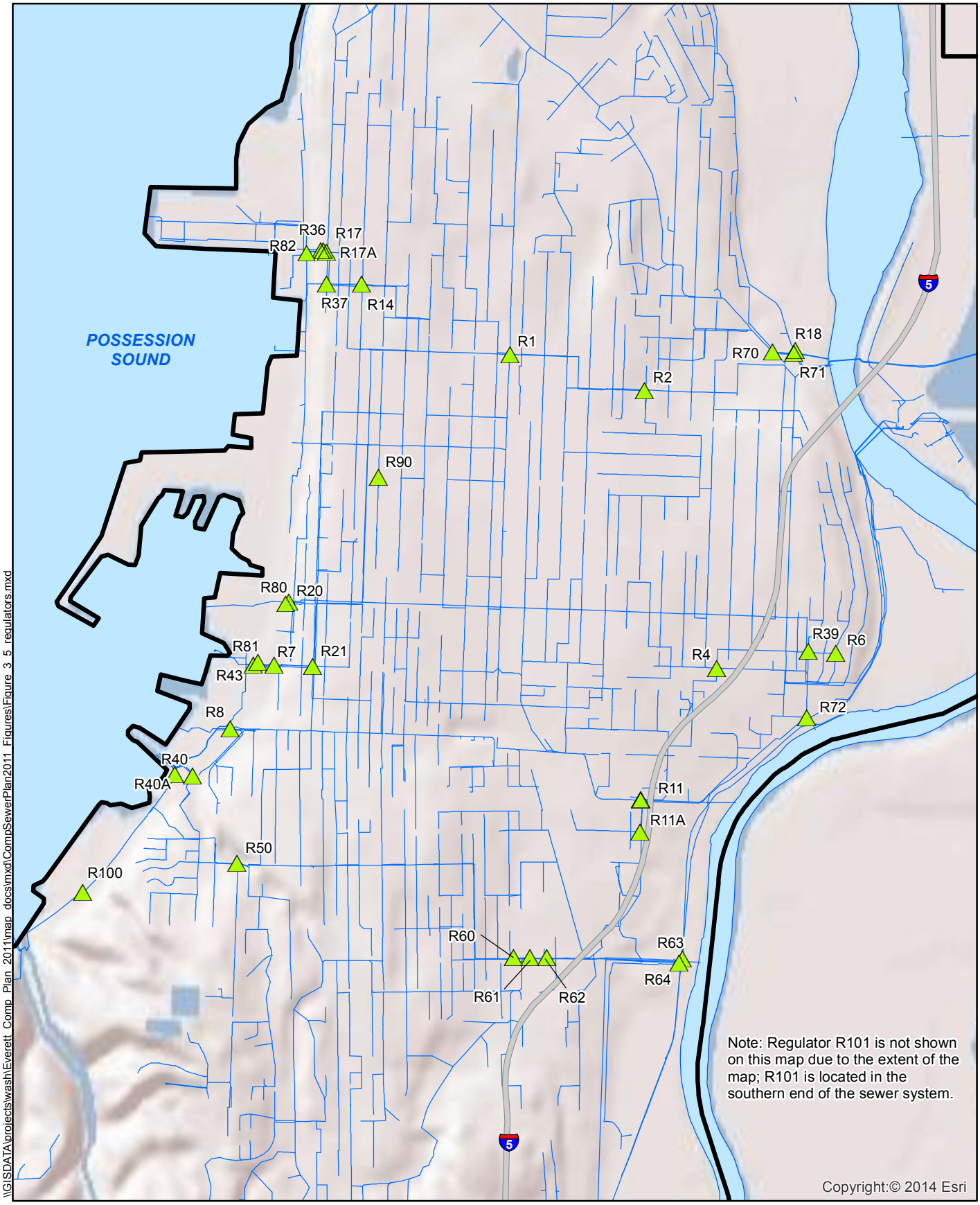
Table 3-5. Regulators

Regulator ID	Manhole ID	Location	Regulator Type	Overflow to CSO (or other)
R1	SMH1795W14	17th Street and Broadway Avenue (Removal recommended by 17th St. Interceptor CIP)	Leaping Weir	No
R2	SMH1795Y05	19th Street between Cedar Avenue and Pine Avenue(Removal recommended by 17th St. Interceptor CIP)	Leaping Weir	No
R4	SMH2095S07	Chestnut Street between 26th Street and Everett Avenue (to be modified following East Grand and Cleveland Ave sewer projects)	Leaping Weir	LS 32 to SRO4
R6	SMH2195V20	26th Street between Cleveland Avenue and East Grand Avenue (removal pending by Cleveland Ave Sewer project, 2016)	Leaping Weir	No
R7	SMH1995T04	Everett Avenue and Nassau Street	Leaping Weir	PSO5
R8	SMH1995X15	Hewitt Avenue and Federal Avenue (relocation of R8 pending by BNSF bridge removal and embankment placement)	Leaping Weir	PSO6
R11	SMH2995B07	Pacific Avenue and Pine Street	Weir	R11A to SRO7
R11A	SMH2995A01	Pacific Avenue and Chestnut Street	Weir	SRO7
R14	SMH1895S01	15th Street between Rucker Avenue and Hoyt Avenue (Sewer M to change function of this regulator to be low flow storm drainage diversion to 17th St. Interceptor)	Leaping Weir	LS8 to, PSO1,2 or 3
R17	SMH1895Q14	14th Street and Grand Avenue, upstream of	Weir	PSO1 & PSO2

Regulator ID	Manhole ID	Location	Regulator Type	Overflow to CSO (or other)
		LS 8 (CSO overflow to PSO1 and PSO2 to be changed by Sewer M project in 2015. New regulator at Grand Ave and 15th St.)		
R17A	SMH1895Q13	14th Street and Grand Avenue, west of Regulator R17 (CSO overflow to PSO1 and PSO2 to be changed by Sewer M project in 2015. New regulator at Grand Ave and 15th St. PSO2 to be abandoned in 2017, overflow to PSO1 to remain as an emergency LS8 overflow)	Weir/Overflow Pipe	PSO1 & PSO2
R18	SMH1695W03	East Grand Avenue and Hayes Street, at LS 9 (to be modified by Hayes St CSO Control project, 2017)	Weir	SRO1
R20	SMH1995Q04	25th Street and Norton Avenue, upstream of LS 5	Weir	PSO4
R21	SMH1995T14	Everett Avenue and Grand Avenue	Weir	R7 to PSO5
R36	SMH1895Q10	WMVD at 14th Street near LS 7	Overflow Pipe	R82 to PSO2
R37	SMH1895T06	15th Street and Grand Avenue (to be removed by Sewer M projects)	Overflow Pipe	PSO3
R39	SMH2195V01	26th Street and Summit Avenue(to be modified following East Grand and Cleveland Ave sewer projects)	Weir	LS32 to SRO4
R40	SMH3095C04	Upstream of LS 2, to northeast	Weir/Overflow Pipe	PSO7
R40A	SMH3095C03	Upstream of LS 2 to southwest	Overflow Pipe	PSO7
R43	SMH1995T03	Upstream of LS 3 on Everett Avenue, east of Federal Avenue	Weir	PSO5
R50	SMH3095G02	33rd Street between Federal Avenue and Nassau Avenue (to be removed by City crews, 2014)	Dam	LS2 to PSO7
R60	SMH2995P30	36th Street between Paine Avenue and Smith Avenue	Slide Gate	No (Maint. Bypass)
R61	SMH2995P34	36th Street between Smith Avenue and I-5	Weir	No (to Summit Int, SRO7, SRO4))
R62	SMH2995P31	36th Street under I-5 SB	Gate	No (Maint. Bypass)
R63	SMH2995Q12	36th Street/Eclipse Mill Rd near LS33	Overflow Pipe	SRO8
R64	SMH2995Q13	36th Street/Eclipse Mill Rd at SRO8 structure	Motor Operated Slide Gate	SRO8
R70	SMH1795S25	Hayes Street at Marine View Drive (to be relocated, 2017)	Weir	SRO2
R71	SMH1695W06	East of Marine View Drive, south of Hayes Street (at Siphon Headworks Structure)	Weir	SRO3
R72	SMH2195W75	Upstream of LS 32, east of Railway Avenue and US-2 (to be reconstructed by East Grand sewer project, 2015)	Weir	SRO4
R80	SMH1995Q04	Upstream of LS 5	Weir	PSO4
R81	SMH1995T37	Upstream of LS 3	Cipolletti Weir	PSO5
R82	SMH1895Q10	WMVD at 14th Street near LS7 (Tide gate welded closed)	Overflow Pipe	PSO2 (not active)

Regulator ID	Manhole ID	Location	Regulator Type	Overflow to CSO (or other)
R90	SMH1995A20	20th Street and Hoyt Avenue	Weir Gate	No (20th St trunk)
R100	NID4626	Upstream of LS 1, on Pigeon Creek Road	Weir	SSO to Bay
R101	SMH1384R29	3rd Avenue SE and 92nd Street	Overflow Pipe	No (diversion)

Sources: City of Everett staff; City of Everett As-Built Drawings; City of Everett GIS Database; CH2M HILL, 1978, NESS Study, Lower Snohomish Basin 201 Facilities Plan.



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2014 Comprehensive Sewer Plan
City of Everett

FIGURE 3-5

Regulators

City of Everett Limits
Waterbody
Highways
Sewer Lines

0 0.225 0.45 0.9
Miles

3.5 CSO Outfalls

During peak wet weather flows, stormwater and wastewater in excess of the capacity of the combined sewers in the north end of Everett can discharge through CSO outfalls. Everett has 13 active permitted CSO outfalls; six of which discharge to the Snohomish River and seven that discharge to Port Gardner Bay in Possession Sound. Two other CSO outfalls that discharged to the Snohomish River (SR 05 and SR 06) and one other CSO outfall that discharged to Port Gardner Bay (PS 08) have been abandoned. Table 3-6 lists the CSO outfalls and their location. Figure 3-6 shows the CSO outfalls.

Table 3-6. CSO Outfalls

Everett CSO ID	Discharge Number	Discharge Name	Receiving Water
PS 01	005	Lift Station #8	Port Gardner Bay
PS 02	013	Lift Station #8	Port Gardner Bay
PS 03	012	15th & Grand Street Outfall	Port Gardner Bay
PS 04	011	Lift Station #5	Port Gardner Bay
PS 05	009	Lift Station #3	Port Gardner Bay
PS 06	008	West Hewitt & Bond Street Outfall	Port Gardner Bay
PS 07	007	Lift Station #2	Port Gardner Bay
SR 01	016	Lift Station #9	Snohomish River
SR 02	017	Hayes Street Outfall	Snohomish River
SR 03	018	Siphon Headworks Outfall	Snohomish River
SR 04	019	Lift Station #32	Snohomish River
SR 07	026	East Pacific Avenue Outfall	Snohomish River
SR 08	028	East 36th Street & Lift Station #33 Outfall	Snohomish River

Source: NPDES permit; Section S11 Combined Sewer Overflows.

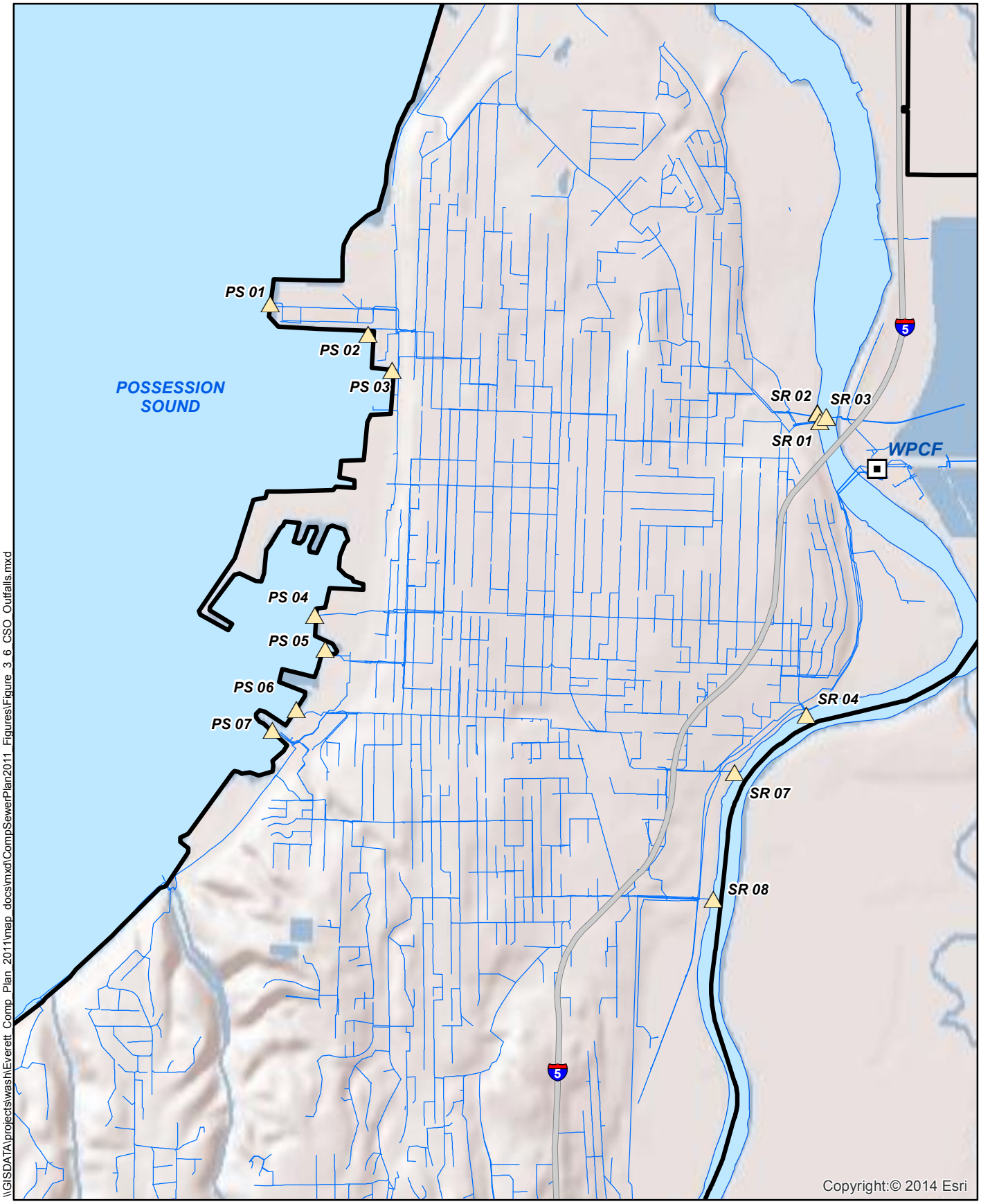
3.6 Water Pollution Control Facility

The WPCF provides wastewater treatment for the following entities: Everett, Mukilteo WWD, Silver Lake WSD, and Alderwood WWD. Septic systems still serve a few hundred residential lots within Everett, as discussed in Section 2.1. The number of septic systems in Everett's treatment service area, but outside of Everett, is unknown.

For a separated system with no I&I, the amount of domestic organic loading on a mass basis would remain approximately the same during large storm events. However, due to the combined sewer system at the north end of Everett, the additional suspended solids from stormwater increase the predominately organic pollutants with a slight increase in inorganic pollutants that the WPCF must treat.

The WPCF is located on a 350-acre land parcel owned by Everett on Smith Island, east of the Snohomish River. The WPCF is bordered by Interstate 5 to the west, Snohomish River to the south, and Union Slough to the east. A dike system protects the plant, located within the Snohomish River flood plain, from flooding.

The existing WPCF has two parallel treatment systems. The Trickling Filter/Solids Contact (TF/SC) system provides secondary treatment along with disinfection for up to 18 million gallons per day (mgd). The aeration/oxidation pond or lagoon system treats the wastewater not treated and discharged by the TF/SC. The WPCF is designed for a maximum month design flow of 36.3 mgd. The existing process flow diagram is provided as Figure 3-7



\\GISDATA\projects\wash\Everett_Comp_Plan_2011\map_docs\mxd\CompSewerPlan2011_Figures\Figure_3_6_CSO_Outfalls.mxd

Outfall
City of Everett WPCF
City of Everett Limits
Highway
Sewer Line
Waterbody

0 0.225 0.45 0.9
Miles

2014 Comprehensive Sewer Plan
City of Everett
FIGURE 3-6
CSO Outfalls

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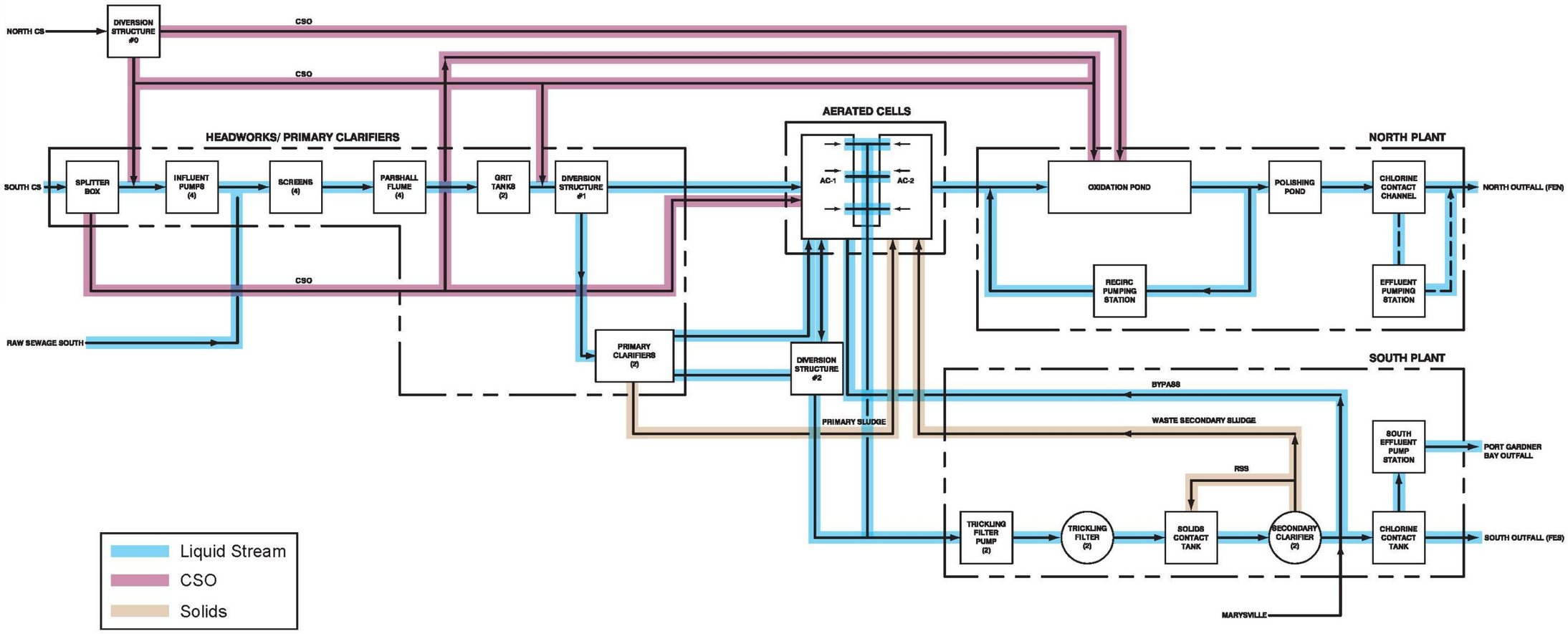

Figure 3-7. Existing WPCF Process Flow Schematic

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3.6.1 WPCF Outfalls

Effluent from the WPCF is discharged via the three outfalls described below. The same NPDES permit covers all three outfalls, although each outfall has different effluent discharge limitations under the permit.

Outfall 015 - Lagoon Outfall
Effluent from the aeration/oxidation pond system (lagoon) enters the Snohomish River about 900 feet west of the polishing pond and about one mile downstream of the TF/SC facility. The river is approximately 350 feet wide at the location of the outfall. The outfall pipe is 48 inches in diameter. The diffuser is located at approximately -8 feet below mean lower low water datum. The diffuser is approximately 36 feet long and has sixteen 10-inch risers spaced 2.5 feet apart. Effluent discharges horizontally through pinch check valves. The outfall has an effluent pump station consisting of three pumps that yield a discharge capacity of approximately 50 mgd and normal operation of the outfall is with pumped flow.

Outfall 025 - Trickling Filter/Solids Contact Snohomish River Outfall
The 48-inch diameter TF/SC outfall is located about one mile upstream of the lagoon outfall. The river at the outfall location is approximately 450 feet wide; the outfall diffuser extends approximately 200 feet into the river at a depth of -16 feet below mean lower low water datum. The diffuser is approximately 35 feet long and has twelve 10-inch risers spaced 2.5 feet apart. Effluent discharges horizontally through pinch check valves. This outfall is used only for periodic flushing and in case of emergency. Flushing is currently permitted once a week for a maximum of 3 hours at a flow of 18 MGD. Periodic flushing keeps the outfall functional in case it is needed in an emergency. A pre-design evaluation completed in December 2011 provides alternatives and cost estimates for modifying and/or moving the outfall.

Outfall 100 - Trickling Filter/Solids Contact Port Gardner Bay Deep Water Marine Outfall
Outfall 100 is a deep-water marine outfall that was constructed in 2004 by Kimberly-Clark Worldwide, Inc. (Kimberly-Clark) with the City of Everett per the Joint Use Agreement (1999). Under agreements with Kimberly-Clark and Everett, Marysville purchased capacity from Everett and Kimberly-Clark to discharge through Outfall 100. The outfall discharges to Port Gardner Bay at a depth of about 350 feet and over 1,300 feet from the nearest shoreline. The outfall pipe is 63-inch diameter HDPE, which is buried in the intertidal and shallow subtidal area and then rests on the seabed with concrete anchors. The diffuser section is 1,556 feet in length and it is laid along a gradual curve that starts at -340 feet and ends at -348 feet below mean lower low water (MLLW). The diffuser has 80 vertical risers with 90° elbows, and these terminate with 5-inch round ports on each diffuser orifice plate. The riser elbows are oriented so that the diffuser port openings alternate along the length of the diffuser.

Outfall 100 is part of a new effluent transfer system constructed in 2004. This system consists of the South Effluent Pump Station (SEPS) constructed on top of the existing Chlorine Contact Channel (CCC) at the WPCF, a cross-town pipeline, and the Deep-Water Marine Outfall (DWO). The City of Marysville conveys its treated effluent (July through October) to the SEPS for discharge to the DWO via two, 26-inch-diameter pipes. The SEPS conveys treated wastewater effluent from the WPCF's CCC, under the Snohomish River, and across downtown Everett on its way to the DWO (Outfall 100) in Port Gardner Bay.

Since the closing of the Kimberly-Clark pulp mill in 2012, Kimberly-Clark no longer discharges effluent out of the DWO. The City and Kimberly-Clark are negotiating the transfer of the joint use facilities (that include the DWO) to the City. The Joint Use Agreement of the DWO between Kimberly-Clark and the City is expected to be amended, resulting in the DWO being a city owned asset.

3.6.2 NPDES Permit

The current NPDES waste discharge permit for Everett (Permit No. WA-002449-0) was issued on September 1, 2009, became effective October 1, 2009, and will expire on October 1, 2014. The NPDES permit is included in Appendix I.

Table 3-7 and Table 3-8 provide a summary of the effluent limitations for the Everett WPCF. In addition, the NPDES permit includes a section on facility loading. Table 3-9 shows the existing design criteria for the WPCF.

The Criteria for Sewage Works Design (Ecology, 2008), commonly known as the Orange Book, states that wastewater utilities should plan for maintaining adequate capacity at their treatment facilities (NPDES Section S.4.B.1). When the actual flow or wasteload reaches 85 percent of any one of the design criteria for three consecutive months, or when projected increases in flow or loading would cause the plant to reach its capacity within five years, Ecology requires the preparation of a plan and schedule for continuing to maintain sufficient capacity at the facility to achieve the effluent limitations and other conditions of the NPDES permit.

The WPCF first exceeded the design criteria, 85% primary influent biochemical oxygen demand (BOD) loading for three consecutive months, in November 2007. Everett notified Ecology of the exceedance of the trigger level. A Wasteload Assessment was submitted to Ecology in 2008. An Engineering Report was submitted to Ecology in 2009, revised in April 2010, and approved in June 2010. The projects in the Engineering Report, which are described in Section 4.6.4 of this sewer plan and included in the CIP in Section 6.2, will rectify this situation.

Table 3-7. NPDES Permit Effluent Limitations – July to October

Lagoon (Snohomish River) Outfall 015 [1]		
Parameter	**Average Monthly**	**Average Weekly**
$CBOD_5$	25 mg/L 65% removal of influent CBOD	40 mg/L
Total Suspended Solids	66 mg/L 8,420 lbs/day	99 mg/L 12,630 lbs/day
Fecal Coliform Bacteria	200/100 mL	400/100 mL
pH	Daily minimum is equal to or greater than 6, and the daily maximum is less than or equal to 9	Daily minimum is equal to or greater than 6, and the daily maximum is less than or equal to 9
Parameter	**Average Monthly**	**Maximum Daily**
Equivalent $CBOD_5$	3,043 lbs/day	5,402 lbs/day
Total Residual Chlorine	0.016 mg/L	0.083 mg/L
TF/SC (Port Gardner) Outfall 100		
Parameter	**Average Monthly**	**Average Weekly**
$CBOD_5$	25 mg/L 4,380 lbs/day 85% removal of influent CBOD	40 mg/L 7,010 lbs/day
Total Suspended Solids	30 mg/L 5,250 lbs/day 85% removal of influent TSS	45 mg/L 7,880 lbs/day
Fecal Coliform Bacteria	200/100 mL	400/100 mL
pH	Daily minimum is equal to or greater than 6, and the daily maximum is less than or equal to 9	Daily minimum is equal to or greater than 6, and the daily maximum is less than or equal to 9
Total Residual Chlorine	0.5 mg/L	0.75 mg/L

$CBOD_5$ = carbonaceous biochemical oxygen demand, 5-day
Source: NPDES permit; Section S1 Discharge Limits.
1. Discharges from Outfall 025 are only allowed when Outfall 015 is not in use. The combined discharges from Outfalls 015 and 025 may not exceed the permit limits for Outfall 015.

Table 3-8. NPDES Permit Effluent Limitations – November to June

Lagoon (Snohomish River) Outfall 015 [1]		
Parameter	**Average Monthly**	**Average Weekly**
$CBOD_5$	25 mg/L 3,190 lbs/day	40 mg/L 5,100 lbs/day
Total Suspended Solids	66 mg/L 8,420 lbs/day	99 mg/L 12,630 lbs/day
Fecal Coliform Bacteria	200/100 mL	400/100 mL
pH	Daily minimum is equal to or greater than 6, and the daily maximum is less than or equal to 9	Daily minimum is equal to or greater than 6, and the daily maximum is less than or equal to 9
Parameter	**Average Monthly**	**Maximum Daily**
Total Residual Chlorine	0.016 mg/L	0.083 mg/L
TF/SC (Port Gardner) Outfall 100		
Parameter	**Average Monthly**	**Average Weekly**
$CBOD_5$	25 mg/L 4,380 lbs/day 85% removal of influent CBOD	40 mg/L 7,010 lbs/day
Total Suspended Solids	30 mg/L 5,250 lbs/day 85% removal of influent TSS	45 mg/L 7,880 lbs/day
Fecal Coliform Bacteria	200/100 mL	400/100 mL
pH	Daily minimum is equal to or greater than 6, and the daily maximum is less than or equal to 9	Daily minimum is equal to or greater than 6, and the daily maximum is less than or equal to 9
Total Residual Chlorine	0.5 mg/L	0.75 mg/L

$CBOD_5$ = carbonaceous biochemical oxygen demand, 5-day
Source: NPDES permit; Section S1 Discharge Limits.
1. Discharges from Outfall 025 are only allowed when Outfall 015 is not in use. The combined discharges from Outfalls 015 and 025 may not exceed the permit limits for Outfall 015.

Table 3-9. NPDES Design Criteria

Design Criteria	Not to Exceed Value
Facility design flow (max month)	36.3 mgd (total) 15.3 mgd (lagoon) 21 mgd (TF/SC)
Influent BOD_5 loading (max month)	48,900 lbs/day
Influent TSS loading (max month)	67,700 lbs/day

BOD_5 = biochemical oxygen demand, 5-day
TSS = total suspended solids
Source: NPDES permit; Section S4 Facility Loading.

3.7 Sewer System Design Criteria

System design criteria and standards have been developed to ensure that a consistent, minimum level of service is maintained throughout the sewer system and to facilitate planning, design, and construction of sewer system projects. Ecology has standards for the design and review of sewer facilities in the Orange Book (see Section 1.2.2.2). Everett sets forth design standards in Design and Construction Standards and Specifications for Development (Everett, 2007, updated March 2012) to ensure that developments are constructed to City standards. A complete list of design requirements is provided in the Ecology and City documents cited above.

In general, Everett's sewer system design standards address the sizing and siting of facilities, and Everett's standards are consistent with those of Ecology. For capital improvements of Everett's utilities, Ecology's standards for the design and review of sewer facilities in the Orange Book are used. In many cases, Everett's standards are more specific than those of Ecology. Everett's standards that are more stringent than Ecology's are noted in Table 3-10. Capital improvement projects developed, as listed in this 2014 Sewer Plan, will conform to the standards of both Everett and Ecology.

Table 3-10. Collection System Design Standards

Parameter	City of Everett Design and Construction Standards	Criteria for Sewage Works Design (Ecology, 2008)
Sewer Pipe Material	**Section 6-7.1.** The following pipe materials are acceptable for collection systems: plain concrete pipe, ductile iron, PVC, polypropylene pipe (PP), and reinforced concrete pipe.	**Section C1-4.8** Acceptable pipe materials for gravity sewer include HDPE, ductile iron, PVC, and concrete. **Section C2-3.6** Acceptable pipe materials for force mains include ductile iron, steel, HDPE, PVC, fiberglass or reinforced plastics, and pre-stressed and reinforced concrete.
Slope/Velocity	**Section 6-7.10** The minimum velocity is 2 feet per second	**Section C1-4.4** During peak flow, the minimum velocity is 2 feet per second in a gravity sewer flowing full. **Section C1-4.7** For velocities greater than 15 feet per second, provisions need to be made for protection against internal erosion and thrust. **Section C2-3.2** The velocity in a force main can range between 2 to 8 feet per second. The optimum velocity is between 3.5 to 5 feet per second.

3.7.1 Sewers

Sections 4 and 6 of Everett's Design and Construction Standards describe sewer pipe construction requirements. In the Orange Book, Chapters C1 and C2 discuss requirements and recommendations for gravity sewers and force mains.

3.7.1.1 Sewer Construction Methods

Open-cut construction is the traditional method for constructing sewers. Depending on required surface restoration, traffic considerations, or environmental concerns, open-cut construction might not be the most appropriate or cost-effective method. Several trenchless technologies—pipe bursting, thermosetting resin inversion pipe (CIPP, or cured in place pipe), and slip-lining—might be appropriate for addressing existing sewer line deficiencies. For special situations, such as installing new sewer pipe across a highway or arterial street, railroad tracks or environmentally sensitive area, trenchless methods of auger bore and jack, pipe ramming, micro tunneling and horizontal directional drilling may be better suited.

3.7.2 Lift Stations

As noted in Section 6.5 of Everett's Design and Construction Standards, lift stations are to be of a wetwell/drywell type and equipped with telemetry. Submersible sewer lift stations are also acceptable, if appropriate for a given site and flow conditions. Everett and Ecology require an auxiliary power source, including an automatic transfer switch. Consideration for including methods for cleaning discharge force mains such as pigging shall be evaluated for inclusion in lift station design. Chapter C2 of the Orange Book provides additional requirements and recommendations for wastewater lift stations. Considerations for equipment types, noise control, and odor control should be made on a case-by-case basis.

3.7.2.1 Equipment Types

Everett has established a standardized list of equipment manufacturers and suppliers to ensure a consistent operations and maintenance program throughout Everett's collection system. Everett's Technical Services Group (TSG) compiles and maintains the standardized information. TSG will provide equipment specifications for any of Everett's lift station modifications.

3.7.2.2 Noise Control

Pumps, motors, and variable-frequency drives (VFDs) produce noise. Emergency generators can also be a source of noise at a lift station. Several methods of sound attenuation are available, such as mufflers, insulation, and baffle walls. Ecology's design standard recommends hospital-grade silencing. Everett's lift stations comply with City and County noise ordinances.

3.7.2.3 Odor Control

In wastewater collection systems, there is a potential for dissolved oxygen (DO) to be depleted, which causes septic wastewater. Under septic or anaerobic conditions, sulfate-reducing bacteria can flourish, resulting in sulfide accumulation in the wastewater. One of the sulfide forms present is hydrogen sulfide. When released during the vapor phase, there is potential for both odor and corrosion. In gravity sewers with open channel flow, odorous air will tend to be conveyed downstream in the air space of the pipe, above the wastewater flow. At a lift station, the odorous air cannot be conveyed downstream, so the air will tend to be released at the lift station or at manholes upstream of the lift station.

Several methods of odor control are available, including chemical addition, carbon scrubbers, and biotechnology. The appropriate technology depends on the odor characteristics of the wastewater, distance to the nearest receptor, available space, and operator preference. The

odor control methods used by Everett include additives (bioxide – calcium nitrate) scrubbers, and exhaust systems.

3.8 Water Reclamation and Reuse

Water reclamation and reuse is a concept gaining considerable recognition in Washington as both a water supply option and a treated sewage (effluent) discharge alternative. Reclaimed water can provide an alternative water resource for non-potable applications that would otherwise be limited by traditional water supplies. Reclaimed water is also a relatively drought-proof water supply because effluent is a relatively consistent source regardless of climatological conditions. In addition, the public might find that water reuse is more economical and environmentally sound than development of traditional water supplies, such as dam or well field construction.

Wastewater effluent reuse can also provide opportunities for an overall decrease in pollution and the ability to meet more stringent water quality requirements when it replaces conventional sewage discharges to sensitive surface waters.

3.8.1 Standards and Regulations

Ecology and the Washington State Department of Health (DOH) issued Water Reclamation and Reuse Standards that were finalized in 1997. The standards are based primarily on a specified level of treatment which, in turn, is based on the end use of the reclaimed water.

The treatment requirements for the use of reclaimed water are divided into four designated classes. The classes range from Class A, the most highly treated and greatest number of allowable uses, to Class D, the most restrictive level of uses. Class A reclaimed water can be used for open access landscape irrigation, nonfood/food crop irrigation, industrial processes, fire fighting and protection, impoundments, and fish hatchery basins, to name a few. The uses of Class B, C, and D reclaimed water are more restrictive. Some uses of Class C reclaimed water include non-exposure industrial cooling/process water, industrial boiler feed, aggregate washing, and concrete production. DOH and Ecology consider the treatment level and application of reclaimed water on a case-by-case basis. Table 3-11 shows the reclaimed water treatment requirements and coliform limits for the different classes. Table 3-12 shows the treatment and quality requirements for different reclaimed water uses.

Table 3-11. Reclaimed Water Definitions by Treatment Requirements and Coliform Limits

Process	Class A	Class B	Class C	Class D
Oxidation	√	√	√	√
Coagulation	√			
Filtration	√			
Disinfection	√	√	√	√
Total Coliform Limits				
7 Day Average	2.2/100 ml	2.2/100 ml	23/100 ml	240/100 ml
Maximum	23/100 ml	23/100 ml	240/100 ml	none

Source: Water Reclamation and Reuse Standards, Washington State Department of Health and Department of Ecology, 1997.

Table 3-12. Treatment and Quality Requirements for Reclaimed Water Use

Use	Class A	Class B	Class C	Class D
Irrigation of Nonfood Crops				
Trees and Fodder, Fiber, and Seed Crops	Yes	Yes	Yes	Yes
Sod, Ornamental Plants for Commercial Use, and Pasture to Which Milking Cows or Goats Have Access	Yes	Yes	Yes	No
Irrigation of Food Crops				
Spray Irrigation	Yes	No	No	No
All Food Crops	Yes	Yes	Yes	Yes
Food Crops Which Undergo Physical or Chemical Processing Sufficient to Destroy All Pathogenic Agents				
Surface Irrigation	Yes	Yes	No	No
Food Crops Where There is No Reclaimed Water Contact With Edible Portion of Crop	Yes	No	No	No
Root Crops	Yes	Yes	Yes	Yes
Orchards and Vineyards	Yes	Yes	Yes	Yes
Food Crops Which Undergo Physical or Chemical Processing Sufficient to Destroy All Pathogenic Agents				
Landscape Irrigation				
Restricted Access Areas (e.g., Cemeteries and Freeway Landscapes)	Yes	Yes	Yes	No
Open Access Areas (e.g., Golf Courses, Parks, Playgrounds, Schoolyards, and Residential Landscapes)	Yes	No	No	No
Impoundments				
Landscape Impoundments	Yes	Yes	Yes	No
Restricted Recreational Impoundments	Yes	Yes	No	No
Non-restricted Recreational Impoundments	Yes	No	No	No
Fish Hatchery Basins	Yes	Yes	No	No
Decorative Fountains	Yes	No	No	No
Flushing of Sanitary Sewers	Yes	Yes	Yes	Yes
Street Cleaning				
Street Sweeping, Brush Dampening	Yes	Yes	Yes	No
Street Washing, Spray	Yes	No	No	No
Washing of Corporation Yards, Lots, and Sidewalks	Yes	Yes	No	No
Dust Control (Dampening Unpaved Roads and Other Surfaces)	Yes	Yes	Yes	No
Dampening of Soil for Compaction (at Construction Sites, Landfills, etc.)	Yes	Yes	Yes	No
Water Jetting for Consolidation of Backfill around Pipelines				

Use	Class A	Class B	Class C	Class D
Pipelines for Reclaimed Water, Sewage, Storm Drainage, and Gas, and Conduits for Electricity	Yes	Yes	Yes	No
Fire Fighting and Protection				
Dumping from Aircraft	Yes	Yes	Yes	No
Hydrants or Sprinkler Systems in Buildings	Yes	No	No	No
Toilet and Urinal Flushing	Yes	No	No	No
Ship Ballast	Yes	Yes	Yes	No
Washing Aggregate and Making Concrete	Yes	Yes	Yes	No
Industrial Boiler Feed	Yes	Yes	Yes	No
Industrial Cooling				
Aerosols or Other Mist not Created	Yes	Yes	Yes	No
Aerosols or Other Mist Created (e.g., Use in Cooling Towers, Forced Air Evaporation, or Spraying)	Yes	No	No	No
Industrial Process				
Without Exposure of Workers	Yes	Yes	Yes	No
With Exposure of Workers	Yes	No	No	No

Source: Water Reclamation and Reuse Standards, Washington State Department of Health and Department of Ecology, 1997.

3.8.2 Applicability for Everett

Everett made available reclaimed water to the Kimberly-Clark mill from November 2005 until the mill's 2012 closure. This use of reclaimed water was governed by Everett's NPDES permit. The water was authorized for use as single-pass, non-contact cooling water at Kimberly-Clark's heat exchanger in their mill bleach plant. Operations and maintenance procedures were jointly approved by Ecology and DOH in an agreement with Everett titled "Operating Guidelines and Procedures for Treated Effluent Reuse as Non-Contact Cooling Water," signed October 2005. Kimberly-Clark took advantage of the available reclaimed water for a very limited time.

Everett has evaluated the feasibility of providing reclaimed water to other customers. Customers with the greatest potential to use reclaimed water include the Everett-owned Legion Golf Course at American Legion Memorial Park, the Everett-owned Walter Hall Golf Course, and the private Everett Golf and Country Club. Of these customers, Legion Golf Course is the best prospect due to its proximity to the proposed Sewer N project that will separate street and alley drainage from the combined sewer collection system and convey it to ponds within the golf course. Also, the cross-town effluent pipe is within one mile. However, additional permitting would be required for this type of application, and treatment to Class A reclaimed water standards would presumably be required.

Everett currently does not have any plans to provide reclaimed water to any customers within the next six years. This decision is driven by the high infrastructure cost to treat and deliver reclaimed water and the fact that there is no demand or need to use reclaimed water since Everett has an adequate supply of water.

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4 Sewer System Evaluation

An evaluation of Everett's sewer system was conducted using Everett's hydraulic model (model). This process included updating the infrastructure in the model, developing sanitary sewer flow projections, developing inflow and infiltration estimates, calibrating the model, running modeling scenarios to determine current levels of service and identify system deficiencies for the preferred level of service, and developing improvements to rectify the system deficiencies.

4.1 Hydraulic Model

4.1.1 Model Background

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 first version of Everett's model was developed using DHI's Modeling Urban Sewers (MOUSE) software in 2001. A portion of the model was transferred into Innovyze's InfoSWMM software and updated for the North Everett Combined Sewer Evaluation (Basin D) prepared by OTAK. For the 2014 Sewer Plan, HDR combined the portion of Everett's model updated by OTAK with the remainder of the existing model to create a complete model of Everett's system in the InfoSWMM software platform. After integrating these components together, the model was divided into a South Model (the separated system) and North Model (the combined system). HDR updated the models with record drawings and data provided by City staff.

4.1.2 Model Network

The model represents a subset of the entire collection system of manholes, pipes, regulators, overflows, and lift stations. Everett maintains an inventory of its system in a geographic information system (GIS) database. While the model was originally developed from GIS, updates are now added directly into the model.

The model is a skeletonized representation of the existing system. It contains a majority of the existing pipes, regulators, and lift stations in the system. A portion of smaller diameter piping, some regulators, and small lift stations are not included in the model because they do not have a significant impact on the function of the system.

The model includes approximately 45 percent of 6-inch pipes and a majority of all pipe sizes 8-inches in diameter and greater. Table 4-1 summarizes the sewer pipes included in the model, compared to the entire system. There are 35 regulators in the system (leaping weir, weirs, and elevated pipes). The model contains 32 of these regulators. The subset of the system modeled also includes 23 of the 31 active lift stations and all 13 combined sewer outfalls.

Table 4-1. Model and System Pipe Length Summary

Pipe Diameter (in)	Length in Model (ft) (1)	Length in System (ft) (2)	Percent Included in Model (%)
6	22,244	50,078	44
8	482,176	949,230	51
10	122,327	133,046	92
12	145,945	153,798	95
14	3,971	4,109	97
15	76,945	76,945 (3)	100
16	4,905	5,821	84
18	58,848	60,559 (4)	97
20	17,599	18,202	97
21	18,202	18,202 (3)	100
24	66,446	66,446 (3)	100
27	2,983	2,986	100
30	68,124	68,562	99
36	54,493	57,077	95
42	10,800	16,588 (5)	65
48	23,011	27,345	84
54	4,204	5,437 (5)	77
60	6,621	6,903	96
72	9,526	10,313	92
Total (ft)	**1,199,370**	**1,731,647**	**69**
Total (miles)	227	328	

1. Data obtained from hydraulic model
2. Data obtained from GIS data
3. In these cases, the "percent included in the model" was originally more than 100% because new pipes had been added to the model, but not yet to the GIS system. To address this situation, the pipe length from the model was used in this column.
4. This includes a section of 22" HDPE pipe that has an ID of approximately 18"
5. 42" and 54" pipe in the cross town effluent pipe and deep water outfall are not included in the model.

4.1.3 Flow Input

Flow inputs consist of a base flow component and a rainfall-derived infiltration/inflow (RDII) component.

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.

The RDII component addresses groundwater and stormwater conveyed by the collection system and treated by the WPCF. Infiltration is groundwater that enters the sewer system through broken pipes, defective pipe joints, or an illegal connection of 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. RDII water can significantly impact capacity of pipelines (particularly in the combined system in the North Model) and the WPCF.

The North Model has two RDII components. The National Resources Conservation Services (NRCS) method generates the rapid inflow component and the RTK method, a linear response method of generating a hydrograph, generates the rainfall lag response component. The South Model utilizes only the RTK method for the wet weather component where there are no combined sewers in the model. Flow monitoring data collected from January 2009 to June 2012 by SFE Global were used as the basis for estimating the base flow and wet weather components within Everett's system.

4.1.4 Rainfall Record

The Everett rainfall record is the rainfall series used for modeling analysis. It was defined from the Silver Lake Rain Gage located to the south of Everett and contains 24 years of data. Everett's system was evaluated by running simulations with this long term rainfall record. The Everett Rainfall Time Series Memorandum documents the selection and development of the rainfall record.

Due to the extensive processing time to simulate the entire 24 year series, reduced time series were developed. The first time series was developed to evaluate level of service (LOS). It is based on the largest five storm events for the 1, 2, 3, 6, 12, and 24 hour duration categories. After removing overlap events, a rainfall series containing the 14 largest storms was developed and named the 14 Storm Series.

The second time series was developed to evaluate CSO compliance. It contained the largest 25 events in the 1, 2, 3, 6, 12, and 24 hour duration categories. After removing overlap events, a rainfall series containing the 69 largest storm events was developed and named the 69 Storm Series.

The rainfall series were adjusted to account for climate change increasing the intensity of storm events. The climate change rainfall record was used to evaluate level of service improvements.

The City's policy for the design of sewer and stormwater conveyance improvements is to use the climate change adjusted rainfall series. The rainfall time series is provided in Appendix Q.

4.2 Sanitary Sewer Flow Projections

The methodology used to develop sanitary sewer flow projections was to develop a water demand forecast for Everett's sewer service area and then estimate the portion of that water demand that goes to the sewer system. The projections were generated at the sewer basin level and for three sectors (single family, multifamily, and non-residential), and the results were aggregated to the entire sewer service area and to total flows, as appropriate. A separate method was used to develop flow projections for several large industrial customers. Additionally, flows from the neighboring systems that convey sewage to Everett's WPCF were included based on quantities stipulated in the sewage disposal agreements. More details on the methodology are provided below and more detailed information is provided in Appendix J.

4.2.1 Demographics

Demographics were developed for Everett's sewer service area based on Puget Sound Regional Council (PSRC) data. The PSRC provides projections for certain milestone years (2010, 2020, 2030, and 2040) and the intervening years were interpolated for this project. The demographic data used in this plan is comprised of four key categories: population, single family households, multifamily households, and employees. Table 4-2 shows the demographics for key milestone years.

The PSRC data is allocated to small geographic areas called Traffic Analysis Zones (TAZs). The TAZ boundaries are independent of Everett's sewer service area. Therefore, GIS analysis was used to determine which TAZs, or portions thereof, are in Everett's sewer service area. The TAZ boundaries were overlaid on Everett's sewer service area and sewer basins. For TAZs fully in Everett's sewer service area, all of the TAZ's demographics were assigned to the appropriate sewer basin. For TAZ's only partially in Everett's 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 is in the sewer basin, then 40 percent of the demographics were assigned to the sewer basin.

Table 4-2. Demographics

Year	Population	Single Family Households	Multifamily Households	Employment
2013 (Plan Yr 1)	109,611	24,590	19,699	94,430
2014 (Plan Yr 2)	110,802	24,875	20,063	95,854
2015 (Plan Yr 3)	111,992	25,161	20,426	97,278
2016 (Plan Yr 4)	113,182	25,446	20,789	98,702
2017 (Plan Yr 5)	114,373	25,731	21,153	100,126
2018 (Plan Yr 6)	115,563	26,016	21,516	101,550
2024 (Plan Yr 12)	121,829	27,565	23,643	109,749
2030 (Plan Yr 18)	127,657	29,032	25,743	117,775
2036 (Plan Yr 24)	135,832	31,174	28,424	126,412

4.2.2 Water Use Factors

Water use factors were determined based on the Everett 2007 Comprehensive Water Plan. The water use factors were taken from Table 3-8 in that plan, with one exception. For the single family sector, the historical water use factor was calculated as 239 gpd. However, the water demand forecast used 209 gpd reflecting that future use would be less once single family customers are fully metered.

The water use factors used for the sanitary sewer flow projections are as follows:

- **Single Family Sector:** 209 gpd per single family household
- **Multifamily Sector:** 167 gpd per multifamily household
- **Non-Residential Sector:** 45 gpd per employee

4.2.3 Water Demand Forecast

A water demand forecast for the Everett sewer service area was generated out to 2040 (the last year of the PSRC demographic projections) by multiplying the demographic projections by the water use factors.

4.2.4 Percent of Water Demand Going to Sewer

The percent of the water demand that reaches the sewer system was estimated.

For the single family and multifamily sectors, this was determined by analyzing water consumption data, calculating an annual base use, estimating the percent of base use and non-base use that goes to the sewer, and calculating the overall percent of water demand going to the sewer. Monthly water consumption data from the 2007 Everett Comprehensive Water Plan was used for this analysis. The annual base use was calculated as a 4-month (Dec-Mar) winter average water use, multiplied by 12 months. It was assumed 100 percent of the base use goes to the sewer system and 0 percent of the non-base use (i.e., irrigation water) goes to the sewer system.

For the non-residential sector, summarized monthly water consumption data from the 2007 Everett Comprehensive Water Plan was not available. Therefore, the average of two similar HDR analyses was used (City of Tukwila 77 percent; City of Pullman 63 percent).

The resulting percent of water demand reaching the sewer system is as follows:

- **Single Family Sector:** 76 percent
- **Multifamily Sector:** 94 percent
- **Non-Residential Sector:** 70 percent

4.2.5 Sanitary Sewer Flow Projections (Everett Sewer Service Area)

Sanitary sewer flow projections were calculated out to 2040 for the Everett sewer service area by multiplying the water demand forecast by the percent of the water demand going to the sewer system. The projections were extended to 2100 by using the annual growth rates between 2030-2040 (1.3 percent for the entire system) as the annual growth rates between 2040 - 2050 and then using a 0.5 percent annual growth rate between 2050-2100, which is similar to the method used in the 2007 Everett Comprehensive Water Plan. The sanitary sewer flow projections are provided in Table 4-3 and Figure 4-1. Note that these do not include the flow from the large industrial customers discussed in the Section 4.2.6.

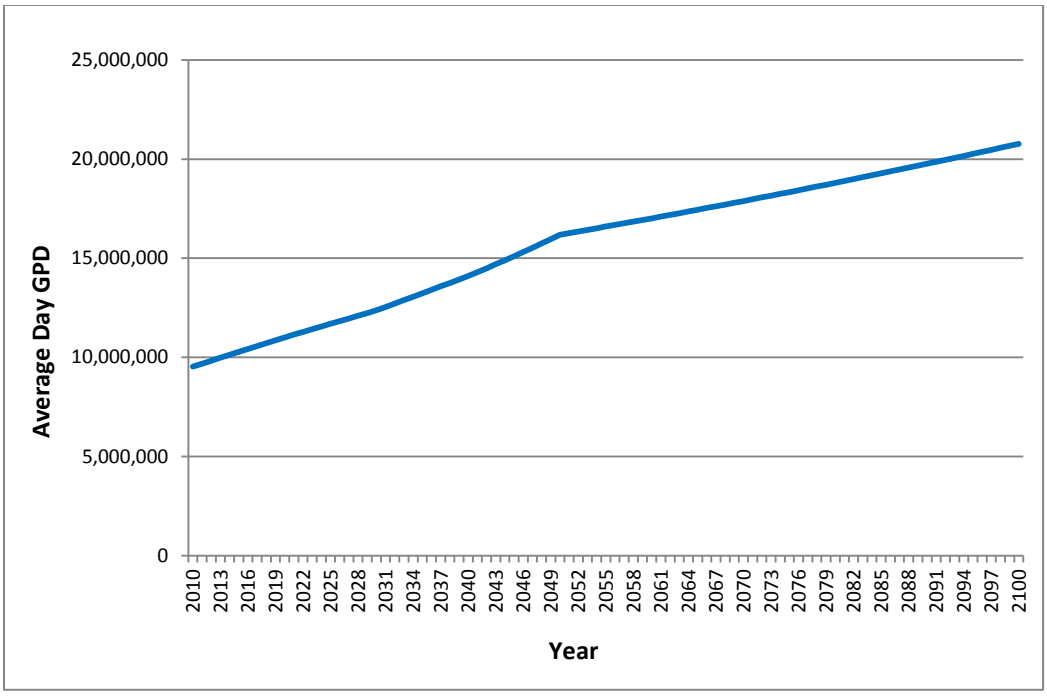

Figure 4-1. Sanitary Sewer Flow Projections – Everett Sewer Service Area

Table 4-3. Sanitary Sewer Flow Projections – Everett Sewer Service Area (GPD)

Plan Year	1	2	3	4	5	6	12	18	24	88
Calendar Year	2013	2014	2015	2016	2017	2018	2024	2030	2036	2100
Basin A	239,221	241,829	244,437	247,045	249,653	252,261	266,275	279,473	297,904	444,028
Basin B	20,536	20,724	20,912	21,100	21,288	21,476	22,546	23,587	25,209	37,811
Basin C	535,770	542,823	549,877	556,931	563,985	571,039	606,941	639,634	679,630	1,005,346
Basin D	353,481	358,116	362,751	367,385	372,020	376,655	400,839	423,210	451,393	673,761
Basin E-M	191,099	193,811	196,522	199,233	201,945	204,656	218,392	230,861	245,583	364,280
Basin G	574,235	583,955	593,675	603,395	613,115	622,835	681,822	741,141	817,429	1,320,813
Basin K	186,872	190,472	194,072	197,671	201,271	204,870	226,774	248,832	276,356	453,967
Basin N	260,395	263,678	266,960	270,243	273,525	276,808	298,439	321,037	351,459	557,951
Basin NC	125,821	127,585	129,348	131,112	132,875	134,639	145,130	155,576	170,300	270,286
Basin ND	377,308	382,546	387,785	393,024	398,263	403,501	434,118	464,326	505,098	789,841
Basin NE	195,601	199,210	202,819	206,429	210,038	213,647	235,305	256,964	284,150	461,970
Basin NG	955,756	967,822	979,888	991,954	1,004,019	1,016,085	1,091,500	1,168,425	1,273,065	1,998,327
Basin P	88,580	90,214	91,847	93,481	95,115	96,749	106,415	116,013	127,426	203,879
Basin T-Q	194,757	198,292	201,826	205,360	208,895	212,429	234,549	257,125	288,945	488,144
Basin SE 7	1,350,723	1,376,418	1,402,112	1,427,807	1,453,502	1,479,197	1,618,334	1,749,955	1,900,571	2,960,749
Basin SE 8	922,109	935,169	948,230	961,290	974,350	987,410	1,064,905	1,141,966	1,240,865	1,935,303
Basin SE 9	678,766	690,141	701,516	712,890	724,265	735,640	795,547	851,283	933,154	1,485,948
Basin SE 10	774,672	789,660	804,648	819,636	834,624	849,611	929,405	1,004,133	1,083,404	1,661,679
Basin SW 1	431,686	436,604	441,522	446,440	451,358	456,276	484,778	512,778	549,520	829,434
Basin SW 3	652,015	658,646	665,276	671,906	678,537	685,167	722,804	759,369	803,359	1,176,291
Basin SW 4	479,279	483,927	488,574	493,222	497,869	502,517	529,481	555,984	589,705	868,693
Basin SW 5	391,838	396,202	400,566	404,930	409,295	413,659	441,506	470,185	511,569	800,324
Total	9,980,523	10,127,844	10,275,164	10,422,485	10,569,806	10,717,127	11,555,804	12,371,857	13,406,093	20,788,825

4.2.6 Large Industrial Water Customers

Separate sanitary sewer flow projections were developed for several large industrial customers, as shown in Table 4-4. This was necessary because the process described above would not provide accurate sanitary sewer flow projections, since the number of employees is not a good surrogate for water use at industrial sites. These customers were identified as those within the industrial pretreatment program that had flow rates of 50,000 gpd or larger.

Table 4-4. Sanitary Sewer Flow Projections – Large Industrial Customers

Customer	Address	Sewer Basin	Sanitary Sewer Flows (gpd)
Boeing	W Casino Road	SE 7 & SE 10	1,620,000
Cintas	6400 Merrill Creek Parkway	SW 1	65,000
Community Transit	7100 Hardeson Road	SW 4	50,000
Everett Landfill	38th Street and Snohomish River	P	160,000
Navy Homeport	2000 W Marine View Drive	E-M	90,000
Overall Laundry	7200 Hardeson Road	SW 4	70,000
Port Chatham Seafood	1930 Merrill Creek Parkway	SW 4	75,000
Stockpot	1200 Merrill Creek Parkway	SW 4	350,000
Total			2,480,000

4.2.7 Neighboring Sewer Systems

Sewer flow projections were developed for the neighboring collection systems that convey sewage to the Everett WPFC. For Silver Lake WSD, Alderwood WWD, and Mukilteo WWD, the projections were based on the capacity required to be provided by Everett, as stipulated in the sewage disposal agreements. The quantities are as follows:

- **Silver Lake WSD:** 11,500 gpm average maximum flow over one-hour period
- **Alderwood WWD:** 2,300 gpm average maximum flow over one-hour period
- **Mukilteo WWD:** 2,500 gpm average maximum flow over one-hour period

4.3 Model Calibration

Model calibration and verification are required to have confidence in the ability of the model to accurately predict flow conditions in the collection system. The InfoSWMM model was calibrated and verified on the basis of selected events between the 2009 to 2012 monitoring period.

Dry weather flow (i.e., base flow of sewage only) was calibrated from five week-long periods when there was no rainfall. Dry weather base flow was assigned from the average flow collected during this period. A diurnal curve was developed from each flow monitoring basin for both weekday and weekend usage patterns.

Wet weather flow was calibrated from 10 storm events that occurred between 2009 and 2012. The NRCS and RTK parameters were adjusted in the North Model to match observed peak flow and volume. The RTK parameters in the South Model were adjusted to correlate to observed I/I flow rates in the separated system.

4.4 Modeling Analysis

4.4.1 Level of Service Methodology

The level of service (LOS) is defined as how frequently the capacity of a sewer pipe is exceeded (Less than 5 years, 5 – 10 years, 10 – 25 years, or greater than 25 years). Everett established a level of service goal that sewer pipes should not exceed their capacity more than once every 25 years.

The modeling analysis was used to determine the current level of service for each pipe in the system and to identify improvements necessary to meet Everett's level of service goal.

To determine the current level of service for Everett's collection system pipes, the model was used to simulate the 14 Storm Series described in Section 4.1.4. The simulated rainfall events determine if a pipe exceeds its capacity. In areas without reported basement backups, surcharging is allowed to five feet below the rim of the manhole. In areas where backups occurred, no surcharging above the crown of the pipe is allowed.

Flow exceeds the pipe capacity when the water level in the pipe rises above either of the two thresholds described above (depending on the area). The LOS recurrence interval for any particular pipe is determined based upon the number of times that flow exceeds the threshold during the 24 year rainfall record.

Table 4-5 shows the recurrence interval defined by an event count down to a one year recurrence interval for the 24 year Everett rainfall data. A pipe color coding similar to that shown in the table is used in the modeling graphics to describe the LOS for each modeled pipe.

Table 4-5. Recurrence Interval for 24 Years of Everett Data

Event Count	Recurrence Interval (T_r) LOS (years)		LOS Category Years
	Gringorten's Equation	Weibull's Equation	
1	43.1	25.0	> 25
2	15.5	12.5	10 to 25
3	9.4	8.3	5 to 10
4	6.8	6.3	
5	5.3	5.0	
6	4.3	4.2	< 5
10	2.5	2.5	
15	1.7	1.7	
20	1.2	1.3	
25	1.0	1.0	

After running the model, a statistical tool is used to determine the number of times that the flow depth in each pipe exceeded a threshold (e.g., crown of pipe, three feet above crown, five feet below rim) with a minimum inter-event period during of 8 hours. An inter-event period is defined as the time between events in which the flow depth exceeds the threshold. A single event would be counted when the flow depth continuously exceeds the threshold for any duration of time, or multiple occurrences of the flow depth exceeding the threshold as long as there are less than eight hours between each occurrence. A new event would not be counted unless a period of eight hours occurs without the flow depth exceeding the threshold.

This period of record and methodology is sufficient to statistically classify the LOS provided by each of the pipes into one of the four LOS categories (greater than 25 years, 10 to 25 years, 5 to 10 years, and less than 5 years). Figure 4-2 depicts Everett's current level of service.

4.4.2 Modeling Scenarios and Alternatives Analysis

The following three base continuous simulation scenarios were analyzed in the model:

1) **Current Level of Service Scenario:** The 14 Storm Series derived from Everett's rainfall record was simulated to document Everett's current level of service. Data generated from this simulation were used to create the level of service mapping and determine existing pipe capacities.

2) **Year 2100 Level of Service Scenario:** Multiple alternatives for conveyance improvements were evaluated in this scenario. The 14 Storm Series adjusted for climate change and the Year 2100 base load projections were simulated in the system to evaluate future improvements. Figures and descriptions are included in the Hydraulic Modeling TM provided in Appendix K.

3) **CSO Compliance Scenario:** The 69 Storm Series was simulated in the model to determine CSO compliance in the existing system, evaluate proposed CSO improvements, and determine the impacts to CSO compliance from proposed level of service improvements.

In addition to the criteria described in Section 4.4.1, areas identified by the model with a current level of service of less than 5 years were evaluated along with the following additional information to determine if an improvement is recommended:

- There is a record of basement backups in the area
- The pipe is aging or in poor condition
- Surcharging is not allowed
- Flow data confirm model results
- Geometry and slope are not influenced by a downstream main surcharging

The alternatives evaluated in the model include conveyance improvements, lift station improvements, removal of leaping weirs and other diversions, green stormwater infrastructure, and CSO storage facilities. A detailed description of the alternatives analysis methodology and results is included in the Hydraulic Modeling Technical Memorandum in Appendix K. Appendix N is a technical memorandum discussing stormwater policies, programs, and green stormwater infrastructure that may help reduce stormwater flows into the combined sewer system and improve the level of service in combined sewer areas.

4.5 Infiltration/Inflow Analysis

An I/I Memorandum was developed as part of the 2014 Sewer Plan and included as Appendix O. The analysis in the memorandum used rainfall data and monitoring data collected by SFE Global to determine the I/I rates for the monitoring basins for storms between 2009 and 2010. I/I rates determined in this study ranged from as low as 440 gpad to 8,680 gpad. The highest I/I rate was not sufficiently high for consideration of I/I reduction projects. No capacity issues were identified in the separated collection system. Based on the analysis, additional I/I reduction measures are not recommended.

An additional I/I report was developed and submitted to Ecology. The report updated infiltration information in the “Infiltration-Inflow Report for the City of Everett Water Pollution Control Facility,” (Carollo Engineers, Dec 2008). An updated analysis was conducted of the inflow at the Everett Water Pollution Control Facility during storm events. The report estimated infiltration in terms of per capita. The estimated wet season dry weather infiltration continues to be less than 120 gpcd. Therefore, based on the 1985 EPA “I/I Analysis and Project Certification” criterion, the Everett sewer collection system is generally not experiencing excessive infiltration with indication that from 2003, the base year, a reduction in per capita infiltration occurred. This report is contained within Appendix O.

There are areas of known high I/I that Everett has identified for further study. In the basins tributary to Lift Station 1 and Lift Station 18, excessive wet weather inflow has been observed and may require improvements to reduce I/I or increased capacity of those two lift stations.

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2014 Comprehensive Sewer Plan
City of Everett
FIGURE 4-2
Current Level of Service

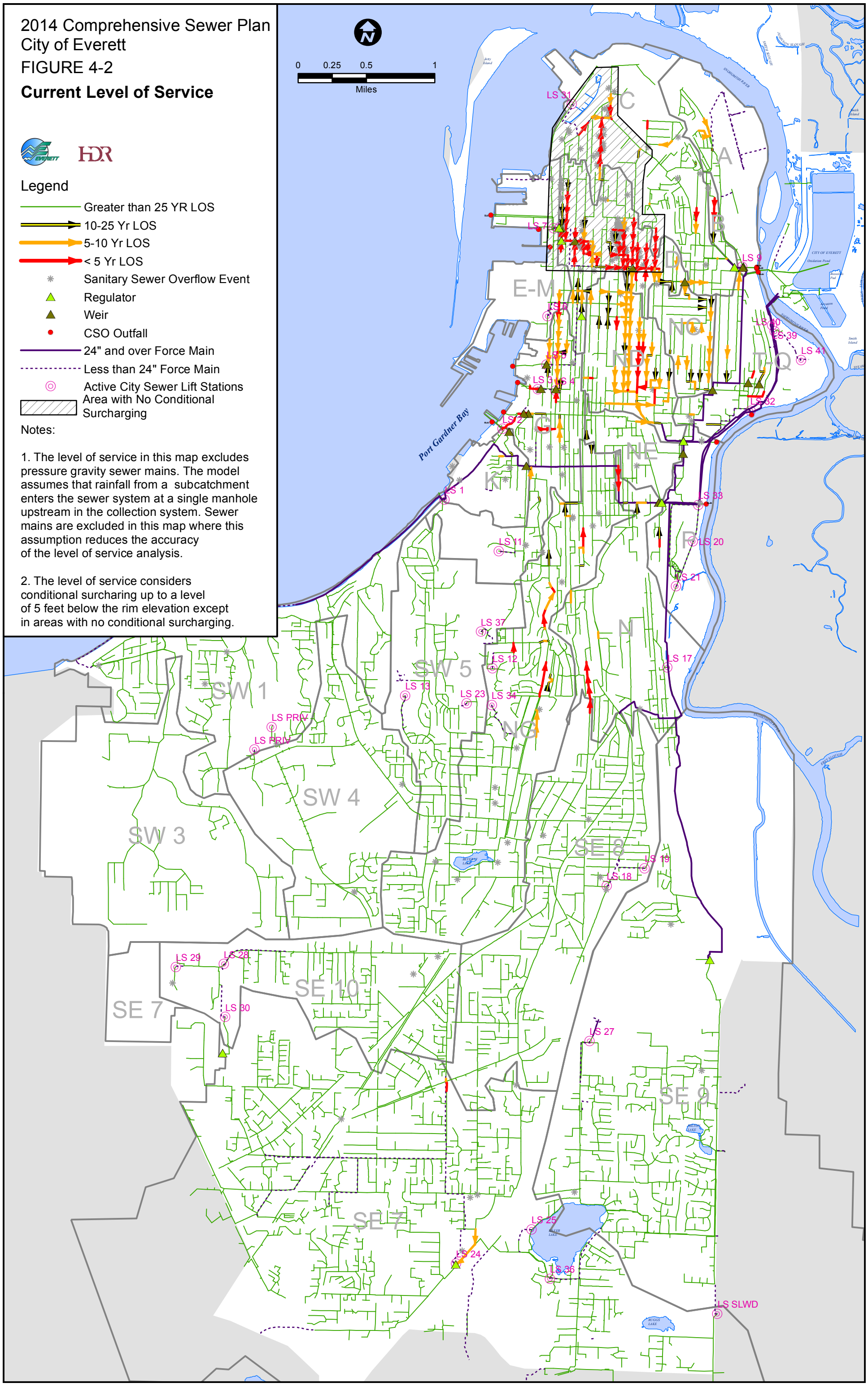
Legend

- Greater than 25 YR LOS
- 10-25 Yr LOS
- 5-10 Yr LOS
- < 5 Yr LOS
- Sanitary Sewer Overflow Event
- Regulator
- Weir
- CSO Outfall
- 24" and over Force Main
- Less than 24" Force Main
- Active City Sewer Lift Stations
- Area with No Conditional Surcharging

Notes:

1. The level of service in this map excludes pressure gravity sewer mains. The model assumes that rainfall from a subcatchment enters the sewer system at a single manhole upstream in the collection system. Sewer mains are excluded in this map where this assumption reduces the accuracy of the level of service analysis.

2. The level of service considers conditional surcharing up to a level of 5 feet below the rim elevation except in areas with no conditional surcharging.



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4.6 Future Improvements to the WPCF

Information in this section is based primarily on data and information provided by others, including Everett's consultant Carollo who prepared the Water Pollution Control Facility Engineering Report (Carollo, 2010).

4.6.1 Projected Flows and Loads

A flow and loading projection was developed by Everett and Carollo in the Water Pollution Control Facility Engineering Report (Carollo 2010). The Engineering Report included an evaluation of historical flows and loads and an estimate of flows and loads for future conditions.

The City has seasonal limitations on the National Pollutant Discharge Elimination System (NPDES) permit. The permit defines a Low River Flow period of July 1 through October 31 and a High River Flow period of November 1 through June 30. These two periods were used in the Engineering Report to develop maximum month flows and loads.

The flow and load projections in the Engineering Report incorporated treating flows from Alderwood WWD, Silver Lake WSD, and MWWD and were based on Everett's contracts with those agencies and information in their comprehensive sewer plans.

Table 4-6 provides a summary of the 20-year flow and load projections from the WPCF Engineering Report.

Table 4-6. Summary of Maximum Month Flows and Loads Projections (from 2010 Engineering Report)

Parameter	Year 2007(1)	Year 2010(2)	Year 2030
High River Flow Season (November through June)			
Max Month Flow	29 mgd	31 mgd	40 mgd(3)
Max Month BOD	57,000 lbs/day	59,000 lbs/day	83,000 lbs/day(4)
Max Month TSS	66,000 lbs/day	66,000 lbs/day	90,000 lbs/day(4)

(1) Historical Information for 2007
(2) Assumes 2% industrial growth
(3) Source: Table 3.13 of the Water Pollution Control Facility Engineering Report (Carollo, 2010).
(4) Source: Table 3.16 of the Water Pollution Control Facility Engineering Report (Carollo, 2010).

4.6.2 Condition Assessment

A condition assessment of the WPCF was performed as part of the Engineering Report to identify improvements to existing facilities that are necessary to assure reliable plant operation. The plant equipment is well maintained and, in most cases, is in good condition. The headworks is over 25 years old and the screw pumps and electrical equipment may be reaching the end of their useful life. This was identified as the item that may require the most rehabilitation.

4.6.3 Capacity Analysis

A review of the plant capacity analysis for both the TF/SC system and the lagoon system was completed as part of the Engineering Report to determine total treatment capacity available. The facility has exceeded its design treatment capacity limit, particularly for AC-1 aeration demands and Trickling Filter BOD loading rates.

Evaluations were conducted for alternatives to increase liquid stream and solids handling capacities in the WPCF Engineering Report. Alternatives were presented to City Staff and recommended improvements were selected and are underway.

4.6.4 Recommended Improvements

The improvements recommended in the Engineering Report as a result of the condition assessment, liquid stream evaluation, and the biosolids evaluation were then scheduled to meet the anticipated flows and loads for the planning period. Those recommended improvements to the liquid stream and biosolids improvements are shown in Figure 4-3.

Since the completion of the Engineering Report, the scheduling of improvements has been revised by WPCF staff. Additional improvements not identified in the Engineering Report have also been added by WPCF staff. Table 4-7shows the total project costs and updated schedules for the improvements to the WPCF.

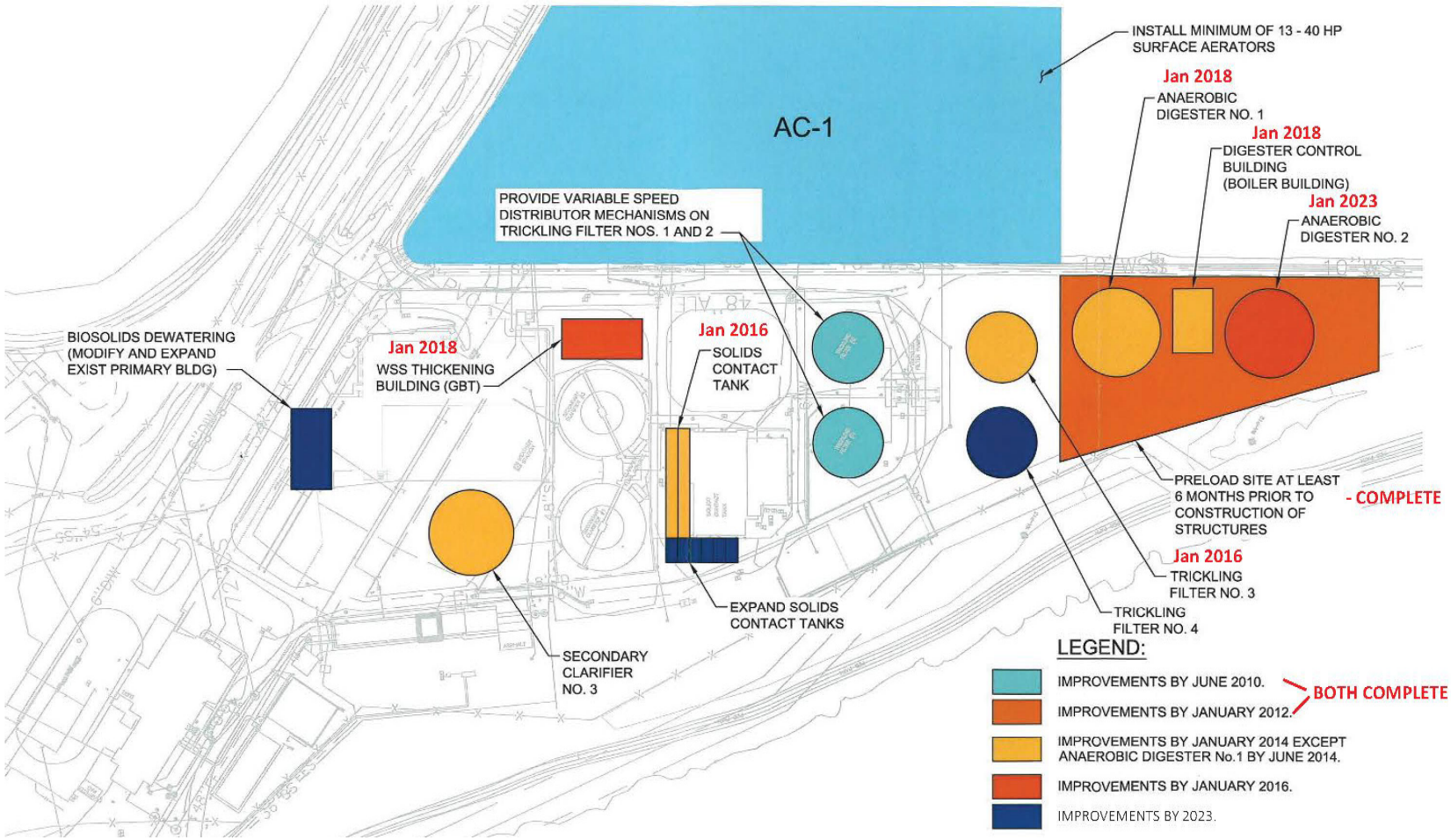

Figure 4-3. Proposed WPCF Plant Improvements (from 2010 Engineering Report)

Table 4-7. WPCF Upgrade Project Phased Construction Schedule

Improvements		Completion Date	Est. Project Cost (Millions)
1	WPCF Replacements (HVAC)	2016	$0.5
2	Outfall 025 Rehab	2018	$1.2
3	Phase C1	2017	$21.5
	One Trickling Filter		
	Expansion of existing Aeration Basin		
	One Secondary Clarifier		
	Additional Pump at South Effluent Pump Station		
	Existing PLC Upgrades		
4	Phase C2	2022	$32.3
	One Anaerobic Digester		
	One Waste Secondary Sludge Thickening Building		
	One Digester Control Building		
5	Phase C3	2028	$22.0
	One Anaerobic Digester		
	One Cogeneration Facility		
6	Diversion Structure No. 0 Modifications	2022	7.8
7	WPCF Lagoon Capacity Expansion	2024	$21.5
8	WPCF FEN Upgrades & N Cl Bldg Expansion	2018	$5.6
9	12th Street NE Dike	2017	$1.7
10	Smith Island Dike Improvements	2020	$2.1
Total Project Cost of EWPCF Upgrade Projects			**$116.2**

* Project scope and schedule is uncertain

4.7 Improvements and Basin Plans

Improvements to the sewer collection system and the WPCF were developed based on the LOS and CSO compliance analyses, condition information provided by the City, or other improvements identified by the City. These improvements are presented in the individual Basin Plans, Volume 3. Each basin plan contains backup documentation and general project descriptions, including a summary of the main characteristics of each basin. The basin plan format is divided into six sections:

1) Basin Description: Descriptive information about the basin, such as location, size, sensitive areas, major arterials, large users, and current level of development.
2) Sewer Flows: Results of the growth projections and future flow estimates.
3) Existing System: Existing facilities of the basin sewer system including type of sewer system (combined or separated), conveyance facilities (pipe length and diameter range), trunk interceptor, pumping stations, flow monitor used for calibration (SFE Global), flow control facilities, and overflows.
4) Improvement Projects: Capital improvement projects recommended for each basin.
5) Comments: Unique conditions that affected the capital improvements.
6) Basin Map: Map detailing the basin boundary, existing pipe network, interceptors and receiving facilities, existing lift stations, existing regulators and overflows, undeveloped areas and unsewered areas, and recommended capital improvements

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5 Operation and Maintenance

This chapter describes operation and maintenance (O&M) activities performed for the sewer collection system and the WPCF, information management and record keeping, identified O&M issues, and recommendations to rectify identified issues.

5.1 Public Works Department Organization

Figure 5-1 shows the organization of Everett's Public Works Department. Everett's Public Works Department is responsible for the operation and maintenance of the sewer collection system and the WPCF, as well as the Water Filtration Plant, water transmission lines, and storm drainage infrastructure. The groups associated with wastewater collection and treatment are described below.

The Technical Services Group (TSG) is responsible for operation and maintenance of the sewer collection system facilities that involve mechanical and electrical systems, including lift stations and CSO monitoring. The TSG is also responsible for the operations of the water distribution facilities.

The sewer/drainage work group is responsible for the maintenance of the remainder of the collection system. This work group has sewer crews for sewer construction, sewer cleaning, and closed circuit television (CCTV) inspections. This work group also maintains the storm drainage facilities and has crews for drainage construction, cleaning, inspections, and detention pond maintenance. The sewer and drainage teams are cross-trained and are assigned to either function based on daily assignments.

The WPCF team is responsible for operations and maintenance of equipment and facilities at the wastewater treatment plant site, including conveyance facilities associated with the plant.

5.2 Operation and Maintenance Activities

Operation and maintenance activities of the collection system fall into four main categories: 1) inspection and condition assessment, 2) preventative maintenance and repair and rehabilitation, 3) the pre-treatment program, and 4) the spill response program. Each of these activities is described below.

5.2.1 Inspection and Condition Assessment

O&M staff are responsible for inspecting the sewer facilities and conducting condition assessments. Condition assessments provide information on the life expectancies of the various sewer system components and serve as a mechanism for Everett to refine their maintenance program to extend the life of their system, thereby decreasing the required investment in repair and replacement of sewer system components. Condition assessments also allow Everett to identify an annual level of funding for repair and replacement of system facilities.

5.2.1.1 Lift Stations

Everett's lift stations are visited multiple times per week by TSG's pump station technicians. The technicians perform routine maintenance, and a visual inspection of the facilities at each visit, including routinely inspecting wetwells for corrosion caused by hydrogen sulfide.

Lift stations are inspected and assessed for conditions and needs twice per year, with semi-annual inspections. These inspections note condition-related issues such as groundwater seepage and corrosion, as well as operational issues such as odor, noise, overflows and status of standby power. Issues and inspection results are noted on the severity of the problem (e.g., minor hindrance versus severely limiting performance) and weighted to reflect their relative importance (e.g., public health issue versus vandalism). Capital improvement program (CIP) or maintenance related projects are developed to address the issues.

Additionally, the lift station conditions are constantly monitored 24/7 by City dispatch. TSG monitors performance of the lift stations remotely via the SCADA system. This SCADA system provides information on pump runs, wet well levels, electricity usage, and other performance and condition indicators.

5.2.1.2 Collection System

CCTV is used to inspect the combined and sanitary sewer lines between 8 inches and 72 inches in diameter in order to assess their condition.

The City conducts strategic CCTV work so crews can work efficiently. The City is divided into several areas and the inspection work is scheduled to take advantage of weather where necessary and to complete a given area by a specific deadline. CCTV inspection of sewers is typically done in advance of annual street pavement overlay projects and any necessary repairs done by City crews.

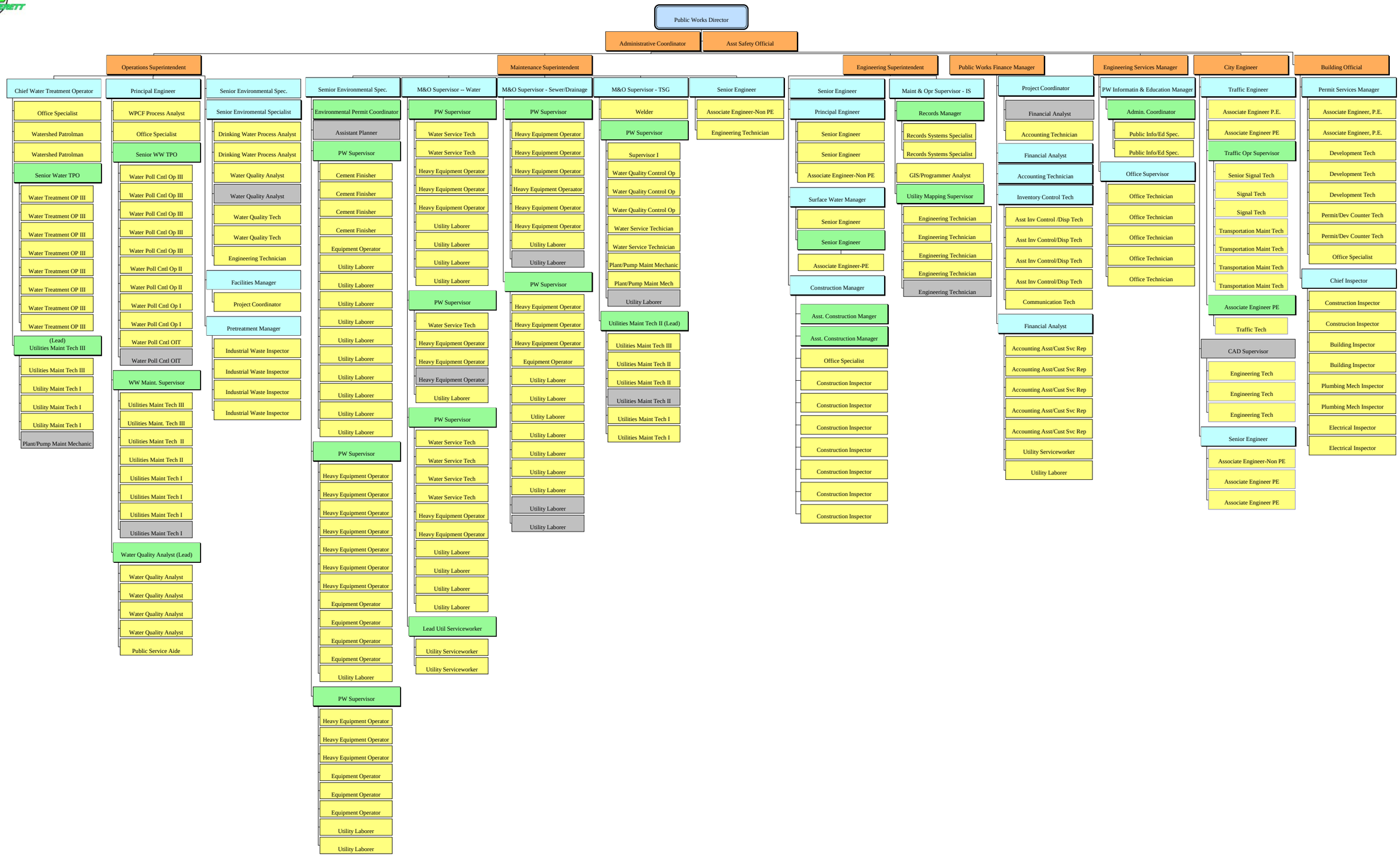
The City purchased new CCTV inspection equipment, software and a field operations truck in approximately 2009. Granite software is used for compiling the inspection videos and condition assessment reports. Additionally, the previous handwritten condition reports are still retained and used regularly. Those reports listed an overall condition rating scale of 1 to 10, with 1 being “like new” and 10 being “near collapse or failure”.

The sewer CCTV videos are rated using the Pipeline Assessment and Certification Program rating system. The CCTV videos and condition assessment reports are uploaded to the Utility Mapping database each week. The videos and the ratings are reviewed by maintenance supervisors to identify spot repair and rehabilitation projects and by engineering staff to assist in the development of CIP projects.

It is customary to conduct a comprehensive CCTV inspection effort for any new CIP project in order to identify any needed condition replacements or pipe repairs. Special CCTV inspection requests can be done by the Sewer & Drainage crews to support any given engineering or design effort.

Additionally, the vactor crews perform inspections on the sewer lines when the lines are cleaned. This inspection information is used to determine future cleaning frequencies needed for each sewer line, as well as some general condition information.

Public Works Department
November 17, 2014



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5.2.2 Preventative Maintenance and Repair/Rehabilitation

5.2.2.1 Lift Stations

Preventive maintenance tasks are performed on a regular basis, typically weekly. The wetwells are vactored out annually, or as needed based on visual inspection. If corrosion in wetwells has progressed enough for rebar to be exposed, the situation is remedied on a case-by-case basis. Emergency engine generators are exercised bimonthly by TSG staff and are serviced on a biannual basis by outsourced contractors. Most small repairs identified during inspections are typically remedied the same day. Larger repairs are scheduled for future work.

5.2.2.2 Collection System

Vactor crews are responsible for cleaning storm drainage catch basins and inlets in addition to sewer lines, some of which have FOG build-up due to relatively flat slopes and grease contributions from customers. The sewer construction crew conducts sewer repairs as needed and performs sewer-related construction projects with a value of less than the State limit for municipal work. The sewer construction crew spends the majority of its time on the repair of side sewers (laterals). The construction crew is also responsible for other collection system repair tasks, such as manhole ring and lid replacement and regulator adjustments.

5.2.2.3 Water Pollution Control Facility

The WPCF maintenance team is responsible for the maintenance of all facilities at the WPCF including equipment such as valves, pumps, pump motors, piping, electrical equipment, sensors, SCADA, and telemetry equipment. A digital operations and maintenance manual, contained in the Division's electronic data management system (referred to as the "On Tap Library"), is in use at the WPCF and at Everett's Water Filtration Plant. This manual is a "living document" that can be easily accessed and updated by Everett staff.

Inspection and maintenance of the outfall pipes and diffuser ports for the WPCF's Snohomish River outfalls are contracted out and performed on a quarterly basis. Preventive maintenance routines include jetting sediment off of the diffusers and verifying that the diffusers are operating correctly.

The WPCF maintenance team is responsible for maintenance of the South Effluent Pump Station. Maintenance of the cross-town effluent transfer pipe is the responsibility of the sewer and drainage team and TSG. Inspection and maintenance of the DWO is contracted out and performed on a 5-year cycle. The most recent inspection was completed in June 2010.

5.2.3 Industrial Pretreatment Program

Everett's industrial pretreatment program regulates the quality of wastewater discharged into Everett's collection system from industrial dischargers through City of Everett Ordinance 2034-95 and EMC Section 14.40 Wastewater Pretreatment Regulations. The program requirements include requiring permits, pretreatment to standards specified by Everett, sampling, reporting, and compliance monitoring. General prohibitions include any pollutant concentration that might cause damage to the facilities or wastewater treatment process. Specific prohibitions include, but are not limited to, pollutants that might cause a fire or explosion hazard, wastewater with a pH less than 5 or greater than 11, and excessive amounts of non-biodegradable cooking oil that might create a grease buildup.

Any industrial wastewater discharged to Everett's sewer system must be in compliance with local limits. Local limits apply at the point where wastewater is discharged to Everett's sewer system. These limits include concentration limits on metals and nonpolar FOG. In addition, mass limitations might be imposed on a user believed to be using dilution in an effort to meet discharge standards. Table 5-1 lists the Permitted Industrial Pretreatment Industries for Everett.

Table 5-1. Permitted Industrial Pretreatment Industries

Industry	Maximum Permitted Flow (GPD) [1]	Process Flow (GPD) [2]	Total Flow [3] (GPD)
Achilles		25,000	
Airport Road Transfer Station (ARTS)		4,000	
Ametech		1,100	
Blue Streak		4,000	
Boeing	1,620,000 Total	45,000 (4)	700,000 (4)
Cathcart	250,000 Total	30,000	
Cintas		65,000	
Community Transit (Kasch Park)	10,000	3,200	
Community Transit (Hardeson Road)	50,000	5,000	
Everett Landfill		160,000	
Fluke (Evergreen)		1,000	
Fluke (Seaway)		2,000	
Navy Homeport	90,000	45,000	
Overall Laundry		70,000	
Port Chatham Seafood		75,000	
Railmakers	100	20	
Shin Nippon Bioengineering Lab		20,000	
StockPot	350,000	275,000	
Tyee Aerospace	0	0	
Duracoatings	0	0	
JAMCO	0	0	
TOTAL		826,320 (4)	

1. Maximum allowable discharge to sewer from pretreatment regulated sources; except Boeing and Cathcart where it is the maximum allowable discharge to sewer from all sources (pretreatment regulated sources plus other sources).
2. Metered average daily discharge to sewer from pretreatment regulated sources.
3. Metered average daily discharge to sewer from all sources (pretreatment regulated sources plus other sources) where Pretreatment has this data.
4. A permit modification is in process to add approximately 250,000 gpd.

5.2.4 Spill Response Plan

Everett's NPDES permit requires that a sewage spill be reported immediately. Everett has a spill response plan for spills (sewage or otherwise) within the collection system, including lift stations. The spill response plan ensures that spills are documented, reported, and cleaned up in a consistent and responsible manner. The plan is continually updated to meet Ecology requirements and is on file with the Department.

5.3 Information Management / Record Keeping

Everett uses a variety of methods for O&M information management and recordkeeping. The primary methods are listed below. Significant changes to the use of software systems have occurred during the past several years. A Computer Maintenance Management System (CMMS) assessment was completed in 2012 to identify opportunities to improve and integrate these various methods, where appropriate.

- **CASS WORKS Software:** This is a CMMS software package designed to help maintenance workers do their jobs more effectively and to help management make informed decisions. It is used for timekeeping, generating service requests and work orders, viewing certain historical service requests and work orders, storing inspection data, tracking sewer pipe cleaning, and generating preventive maintenance task work orders and maintenance history. It has and can be used for generating reports, directly supporting decision making or analysis, and tracking project backlog and forecasting work.
- **GO! Sync Mobile GIS Software:** Used to enter sewer cleaning inspection data by field crews and for some mapping functions.
- **ArcInfo Software:** Used for GIS mapping.
- **Granite XP Software:** Used for capturing and viewing CCTV inspections.
- **Cayenta Software**: Used for financial management.
- **Excel Software:** Used to display inspection results and for various analyses.
- **Hard Copy:** Used for lift station maintenance records (log books at each lift station).

5.4 Performance Indicators

Performance indicators are quantitative measures that help evaluate sewer system infrastructure performance. They can be used for many purposes including tracking O&M progress over time, optimizing collection system maintenance, and prioritizing O&M efforts.

Some performance indicators are recommended industry norms such as the following:

- Pipe failures (e.g., failures per mile per year)
- Lift station failures
- Sanitary sewer spills
- Combined sewer overflows
- Customer complaints on collection system performance
- Ratio of peak hourly flow to average daily flow

- Ratio of peak monthly flow to average daily flows

Other performance indicators are associated with regulatory requirements. Everett's NPDES permit contains the following requirements, which include information that can be used as performance indicators:

- **Discharge Monitoring Report (DMR):** Everett performs regular sampling of various parameters (e.g., BOD, TSS, pH) on the wastewater influent to, and effluent from, the WPCF. Data is reported to Ecology monthly.
- **Industrial Pretreatment Program:** Everett submits an annual pretreatment report to Ecology that summarizes Everett's Industrial Pretreatment program status, results of wastewater sampling at the WPCF, list of industrial discharges, and status of compliance activities.
- **Combined Sewer Overflow Report:** Everett submits a CSO Annual Report to Ecology summarizes Everett's progress in implementation of their CSO Control Plan. The report notes the volume of discharge at each CSO location and compares those volumes and number of events to an average annual baseline. The most recent CSO Annual Report (2012) is included as Appendix L.

Another performance indicator of the collection and conveyance system is the City's sewer flow monitoring program. City staff review data from numerous monitoring sites every month and analyze the flow versus the pipe capacity, as well as compare recent data with prior months and investigate any significant variations.

5.5 Identified Operation and Maintenance Issues

5.5.1 Lift Stations

O&M issues being addressed at lift stations are listed in Table 5-2 and described below. The issues were identified from O&M staff.

- **Lift Station 1:** The two smaller pumps convey most of the wastewater from this lift station. As a result, these pumps experience most of the wear and were replaced in 2014. Inflow needs to be evaluated. The City is working with Snohomish PUD and outside consultants to reassess power reliability for the lift station.
- **Lift Station 2:** This lift station experiences chronic clogging due to excessive rags in the collection system. Cutters on the pump impellers have recently been installed which has reduced clogging.
- **Lift Station 7:** The VFDs did not work properly and were replaced in 2013.
- **Lift Station 9:** This lift station experiences chronic clogging due to excessive rags in the collection system. Cutters on the pump impellers have recently been installed which has reduced clogging.
- **Lift Station 12:** This lift station currently uses a vacuum system to prime the above water level pumps. The PUD power supply causes neighboring houses to flicker when the pumps run. There is no facility for alternate power, however there is storage capacity for several hours prior to needing pump out by a vactor truck during power failures, so that this station does not spill. Plans are in progress for improvements.

- **Lift Station 17:** The surrounding high groundwater table can seep into the lift station. However, the wet well and lift station were recently recoated, which needs to be done more frequently. The Parshall flume needs to be removed. The bearing wall support needs to be reinforced to be able to lift pumps. A larger diameter force main was constructed which has increase the pumping rate considerably.
- **Lift Station 18:** The influent piping configuration is causing erosion problems in the wetwell, and the influent pipe and upstream manhole need to be replaced. Inflow needs to be evaluated. Electric power service will be upgraded from 208V to 480V.
- **Lift Station 28:** The lift station currently has cavitation problems that need to be verified.
- **Lift Station 31:** The lift station needs a roof replacement.
- **Lift Station 36:** The standby diesel generator is undersized and will not hold full power for a long time.
- **Lift Station 37:** The pump impeller and wear rings need to be replaced. This lift station experiences chronic clogging due to excessive rags in the collection system, as well as grease.

Table 5-2. Lift Station Operation and Maintenance Assessment

Lift Station	Current Issues	Other Comments
1	● Have room for an extra pump ● In 2015, plan to install overflow containment, automatic transfer switch, MCC panel, and distribution panel	● In 2012, installed new controls and programmable logic controller ● In 2013, replaced VFD's on pumps 2 & 3 ● In 2014, replaced pumps 1 & 5 ● Extended UPS control circuit backup power
2	● No backup power ● No electrical disconnect ● Original electrical panels need upgrading ● Ragging issues have been reduced approx. 30% ● Drywell plumbing should be updated.	● Station is approximately 45 yrs old ● In 2011, installed new large pump ● In 2013, rebuilt small pumps & installed rag cutting impellers
3	● Access to wetwell insufficient, a larger hatch is desirable	● Station is approximately 45 yrs old ● In 2011, installed 2 new pumps, control panel, disconnect and generator ● There are 3 operating pumps but only 2 operate at one time
4	● Access to wetwell insufficient, a larger hatch is desirable	● Retrofit is approximately 20 yrs old ● New HPDE force main is approximately 10 yrs old ● In 2011, installed new small pump and large VFD ● In 2014, new VFDs, control panel, rebuilt pumps & motors, cleaned and inspected all electrical items that were not replaced.
5	● Overflow piping in MH prior to wetwell needs modification for higher level ● Pumps need overhaul	● Station is approximately 45 yrs old ● Replaced pumps approximately 20 yrs ago ● In 2010, installed new larger force main and pump and piping and removed Parshall flume ● Backup power / generator installed 2013 ● Wetwell overflow raised & modified to be adjustable 2013 ● Parchal flume removed 2014
6		● Station is approximately 45 yrs old ● Pumps replaced approximately 20 yrs ago ● Service disconnect installed approximately 15 yrs ago ● Station is low flow and only serves the closed Kimberly-Clark mill
7	● New forcemain is currently under design and will be constructed in 2016	● Station overhauled in 1998, with complete new force main ● Has new pump motors, controls, VFDs
8	● Review pumping once LS-7 flows have been re-routed	● Station overhauled 1998, with complete new force main
9	● Ragging issues continue, rag cutters installed reduced approx. 30% of issues	● Station overhauled approximately 15 yrs ago (pumps, motors, controls, VFDs diesel generator, force main) ● Recently upgraded pipe into lift station ● Station used to be a hydraulic restriction ● VFDs & rag cutting impellers installed 2012
11		● Station is approximately 15 yrs old
12	● Vacuum prime still has issues. ● Replace station in future	● Station is approximately 35 yrs old ● 2013 vacuum system & controls to include VFDs installed
13		● Station is approximately 15 yrs old

Lift Station	Current Issues	Other Comments
17	● Ground water seepage ● Need to remove parshall flume ● Wet well access for cleaning ● P1 ragging issues	● Station is approximately 45 yrs old ● New pumps, motors, controls, VFDs Service Disconnect, diesel generator, force main installed approximately 15 yrs ago ● In 2009, installed new control panel, electrical panel, ventilation and VFDs
18	● Influent pipe is in need of replacement ● Infiltration in collection system	● In 2008, installed generator and soft starts ● In 2010-2011 installed control panel, disconnect ● In 2013 a larger parallel force main was installed ● In 2014, PUD power changed to 480
19		● In 2003, installed diesel generator and switch gear ● In 2011, installed new control panel and soft starts ● Rain gauge installed 2014
21		● For landfill leachate only; no domestic sewage ● In 2012, station was replaced
23		● Pumps replaced approximately 20 yrs ago ● In 2008, generator installed ● 2008 generator & new controls installed
24		● All new station 2014
25	● Service panel and control panels need updating	● Wetwell #2 provides overflow storage
27	● Service panel and control panels need updating	● In 2007, installed generator
28		● Large pumps fit in station, however any upgrade would require a new structure ● In 2011, installed new controls, motor soft starters, and motors, and rebuilt pumps
29		● Station is outdated and has relatively very low flow ● In 2011, installed telemetry ● Access to station improved safety 2013
30	● Station needs to be re-evaluated in future ● Vacuum prime system still has on going issues ● Look into submersible pumps at this station	● Serves park bathrooms only ● In 2014, rebuilt check valves ● Changed out float switch for vacuum pump
31	● Needs a new roof	● Station is approximately 40 yrs old ● Station runs 6 minutes a day
32	● Station needs to be re-evaluated in future ● Entrance issues safety ● Transfer switch ● Soft start / VFDs ● Control & electrical updates	● Overhauled approximately 20 yrs ago; new pumps, motors, controls, diesel generator, piping, and valves
33		● Station upgraded approximately 15 yrs ago; including new diesel generator, pumps, and motors ● In 2011, installed soft starts (to replace VFDs) and new control panel ● Station replacement 2015/16 for anticipated development
34		● Station is approximately 25 yrs old Control upgrades 2013

Lift Station	Current Issues	Other Comments
36	● Standby diesel generator undersized; will not hold full power for long time ● Change of electrical distribution and control panels safety ● Update to 2 VFDs is needed	● New larger generator and transfer switch installed 2013
37	● Pump impeller and wear rings need to be replaced ● Has chronic ragging and grease problems ● Original pumps installed with no wear rings, need rebuilding in 2015	● Station new in 2005

5.5.2 Collection System

Some sewer pipes were installed with relatively flat grades. These pipes do not produce adequate flushing velocities during low-flow periods and result in slow velocities and accumulation of solids and debris, including FOG buildup. Many of these pipes require cleaning on a semiannual or annual basis. In many cases, the flat grades are unavoidable due to topography and other factors. However, when possible and in conjunction with a CIP project, such sewer segments should be replaced with new pipes designed with steeper grades for better flow velocity.

Some areas of the collection system are subject to unusually high “ragging”, which tends to clog downstream lift station pumps. Measures to deal with this issue include: modifying pumps with cutter-style impellers, contacting the residents or businesses in the area to curtail flushing of specific items, and installing screening equipment at the lift station.

Some areas of the collection system are beginning to show increasing amounts of wet weather I&I. In one case, this increased flow caused SSOs at a lift station. It is anticipated that some sewer condition replacement will need to be done in the separated sewer area in order to eliminate the SSOs and proactively address potential sewer pipe failure situations.

The trunk and interceptor pipe network generally lacks the ability to divert flow in an alternate direction, such as might be necessary to facilitate repair of a pipe break or to perform major maintenance and inspection. In general, when the opportunity exists, special structures should be provided that can be used to divert the base flow to a different conveyance route. This type of operational flexibility is useful for a variety of emergency situations and to increase safety for workers when entering the sewer system.

5.6 Recommended Operation and Maintenance Improvements

Recommendations to address the issues identified in this chapter are presented below. Some of these recommendations, particularly related to lift stations, are included in the CIP.

- **Pipe Condition Assessment:** The recently acquired Granite software has many beneficial uses; however it does not organize the condition report data to prioritize condition status and help define needed CIP projects nor manhole structure condition. It would be helpful to explore adding that capability in some capacity.

- **Collection System SOP Manual**: Continue to update the standard operating procedures (SOP) manual that was produced in 2009. For equipment, the manual should note preventive maintenance routines and frequency of those routines recommended by the manufacturer. Preventive maintenance routines should also be recorded for pipes, manholes, weirs, and other infrastructure in the collection system.
- **Lift Stations:** Projects should be developed to address the lift station issues identified in Section 5.5.1.
- **Ragging:** The pretreatment program should research the source of rag waste and attempt to reduce or eliminate it.
- **Pipe Slope:** Projects should be developed to improve the pipe slope and eliminate maintenance work, when possible.
- **Snohomish River CSO Interceptor:** Continue existing efforts to evaluate the Interceptor for both operations efficiencies and capital improvements to meet the current combined sewer storage demands and further reduce combined sewer overflows. The pipeline was recently inspected and evidence of trapped air was found. The City is evaluating options to rectify the issue.
- **FOG:** The pretreatment program should increase enforcement on grease generators.

5.7 Staffing Needs

Everett's Public Works Department currently includes approximately 40 FTEs to operate and maintain the sewer collection, transmission, and treatment work (see Section 5.1 for staffing organization). Additional staff would be of benefit to facilitate current programs and tasks, such as asset management. Additional staff will also be needed as new facilities at the WPCF come on-line.

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6 Capital Improvement Program

In previous chapters, future sewage flow projections were used to analyze Everett's existing sewer system. The analyses and documentation identified projects that are required to continue to provide quality sewer service to Everett's current and future ratepayers. This chapter presents a summary of the improvements presented in the Basin Plans (Volume 3) and in Chapter 4, along with the estimated costs and a schedule for each project identified.

The CIP was developed to achieve the following main objectives:

- Identify, group, and prioritize various sewer system needs that would receive maximum benefits from each proposed project
- Recommend and schedule improvements to provide an acceptable level of service within the overall financial ability of Everett to fund the improvements and coordinate construction of improvements with anticipated growth within the service area

6.1 Capital Cost Estimate Development

Capital costs for the 10-Year CIP are based on engineering estimates prepared by the City of Everett. Improvements scheduled beyond 10-Year were estimated by using the cost estimating software Tabula version 3.1 or adjusting the 2006 Comprehensive Sewer Plan project cost estimates to 2014 dollars using the Engineering New Record construction cost index for Seattle. Appendix M provides supporting documentation for the improvements.

The costs presented in this 2014 Sewer Plan have been developed as guidance for evaluating the projects. The costs are based on currently available information and are presented in 2014 dollars and adjusted with an annual escalation of 3% for inflation.

The final project costs will depend on actual labor and material costs, actual site conditions, productivity, competitive market conditions, final project scope, final project schedule, and other variable factors. Because of these other factors, final costs will vary from the costs presented in this 2014 Sewer Plan; therefore, funding needs must be carefully reviewed before making specific financial decisions or establishing final budgets.

Project markups include the following:

- Contingency at 50 percent, to be included to account for undefined scope of work
- Sales tax at 9.2 percent
- Allied costs consisting of engineering, legal, administration, and coordination at 35 percent

6.2 Capital Improvement Projects

The City's 10-Year capital improvement projects are shown in Table 6-1. Capital improvement projects scheduled beyond the 10-Year CIP are described in Appendix M and the Basin Plans (Volume 3). Project costs were developed by the City and are presented in 2014 dollars. The City of Everett maintains a list of CIP projects and updates the schedule and estimated costs for these projects every year.

The capital improvement projects are shown graphically in Figure 6-1A through Figure 6-1L. For easier viewing, the Everett sewer system has been divided into a grid, with twelve maps. A map key is shown in the title block and the area covered in the figure is shaded orange. Each of the twelve grids is shown even if projects are not identified within that particular area of the system. Figure 6-1A, B, C, E, G, and I are the only grids with no CIP projects identified.

Project label “CI” for collection and interceptor improvements and “WPCF” for water pollution control facility improvements are used for specific projects listed in Table 6-1. Improvements scheduled beyond the 10-Year CIP are labeled by the basin each project is within.

Table 6-1. Sewer System Recommended CIP (2015 – 2024)

Project ID	Project Name	Type[1]	Funding Method[2]	Schedule and Cost of Improvements (Millions of 2014 Dollars)										10-yr CIP Total
				2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	
Collection and Interceptor Improvements														
CI-1	COMBINED SEWER OUTFALLS (PS06) RELOCATION	R	1	$0.4										$0.4
CI-2	GRAND AVE PARK BRIDGE (70% SEWER PORTION) [3]	R	1	$1.0	$1.0	$5.1								$7.1
CI-3	PORT GARDNER WET WEATHER STORAGE (K/C SITE)	C	1,4		$7.0							$1.0	$1.0	$9.0
CI-4	PSO 4 RELOCATION FOR K/C SITE	R	1			$0.4	$3.6							$4.0
CI-5	RIVERFRONT LS 33 / CENTRAL AREA LS (60% SEWER PORTION) [4]	R	1	$4.9	$1.4									$6.2
CI-6	SEWER PROJECT "N" (33% SEWER PORTION) [3]	R	1,4	$0.1	$0.1	$1.6								$1.8
CI-7	W MARINE VIEW DRIVE CSO CONVEYANCE	C	1						$0.6	$2.1	$2.2			$4.8
CI-8	HAYES ST REGULATOR AND CSO CONTROLS (SRO 1,2,3)	C	1,2	$0.3	$0.2	$2.2								$2.7
CI-9	17th STREET INTERCEPTOR	C	1							$0.3	$0.8	$8.2	$8.2	$17.5
CI-10	SEWER PROJECT "M" (50% SEWER PORTION) [3]	R	1	$3.4	$1.3	$3.2								$7.8
CI-11	REGULATOR 4 & R39 MODIFICATION	R	1	$0.1	$0.2									$0.3
CI-12	LIFT STATION #12	R	1			$0.2	$0.3	$1.4						$2.0
CI-13	BEVERLY LAKE SEWER REPLACEMENT	R	1	$0.1	$0.9									$0.9
CI-14	E GRAND SEWER REPLACEMENT (33% SEWER PORTION) [3]	R	1,2	$1.9	$0.6	$1.0								$3.5
CI-15	SEWER COMPLAN	C	1	$0.2			$0.1	$0.5	$0.4					$1.2
CI-16	FORCE MAIN REDUNDANCY	C	1,4,5			$0.5	$4.7	$2.0	$4.7	$5.0	$6.0	$7.0	$8.0	$37.9
CI-17	SEWER SYSTEM CONDITION REPLACEMENT	R	1			$0.2	$1.2		$1.0	$1.1	$1.1	$1.1	$1.2	$6.9
CI-18	BACKWATER VALVE (BWV) INSTALLATION	C	1	$0.7	$0.7	$0.7								$2.1
CI-19	SEWER SYSTEM (LOS) IMPROVEMENTS	C	1			$0.4	$2.4		$2.1	$2.2	$2.2	$2.3	$2.4	$13.9
CI-20	SEWER SYSTEM CAPACITY IMPROVEMENTS	C	1,2				$0.8	$2.0	$2.1	$2.2	$2.3	$2.4	$2.5	$14.4
CI-21	SEWER SYSTEM MAINTENANCE PROJECTS	R	1,4			$0.4	$0.4	$0.4	$0.4	$0.5	$0.5	$0.5	$0.5	$3.7
CI-22	SERVICE CENTER SEISMIC UPGRADES (30% SEWER PORTION) [5]	R	1,4	$0.2	$0.2	$2.1	$2.4	$1.9	$2.7					$9.5
	Collection and Interceptor Improvements Total			$13.2	$13.4	$18.2	$16.1	$8.3	$14.0	$13.3	$15.1	$22.5	$23.7	$157.7
WPCF Improvements														
WPCF-1	WPCF SOUTH OUTFALL (025) REHAB	R	1,5	$0.1	$0.1	$1.1								$1.3
WPCF-2	WPCF REPLACEMENTS (HVAC)	R	1	$0.5										$0.5
WPCF-3	WPCF CAPACITY EXPANSION - PHASE C	C	1,4,5	$20.5	$1.0	$1.5	$2.0	$14.4	$14.4			$2.0	$20.0	$75.8
WPCF-4	WPCF - DIVERSION STRUCTURE NO. 0 MODIFICATIONS	R	1						$0.8	$7.0				$7.8
WPCF-5	WPCF LAGOON CAPACITY EXPANSION	C	1,4,5			$0.3	$0.3				$5.0	$16.0		$21.5
WPCF-6	WPCF FEN UPGRADES & N CL BLDG REPL	R	1,4	$0.5	$2.0	$3.1								$5.6
WPCF-7	12th STREET NE DIKE	C	1,4,5	$1.4	$0.3									$1.7
WPCF-8	SMITH ISLAND DIKE IMPROVEMENTS	R	1	$0.6	$0.1	$1.0	$0.3	$0.2						$2.1
	WPCF Improvements Total			$23.5	$3.5	$6.9	$2.5	$14.6	$15.2	$7.0	$5.0	$18.0	$20.0	$116.2
	TOTAL			**$36.7**	**$16.9**	**$25.1**	**$18.6**	**$22.9**	**$29.2**	**$20.3**	**$20.1**	**$40.5**	**$43.7**	**$274.0**

1. C = Capacity Expansion, R = Rehab/Replacement
2. FM: Funding Methods, 1 = Rates, 2 = Grants, 3 = Loan (Public Works Trust Fund or State Revolving Fund), 4 = Bonds, 5 = Capital Contributions by Wholesale Customers, 6 = Other Than City Fund
3. Project is partially funded by the Sewer Utility with the remaining funding provided by the Stormwater Utility
4. Project is partially funded by the sewer budget with the remaining funding provided by the Solid Waste Utility.
5. Project funding is shared by the Sewer, Water, and Stormwater Utilities.

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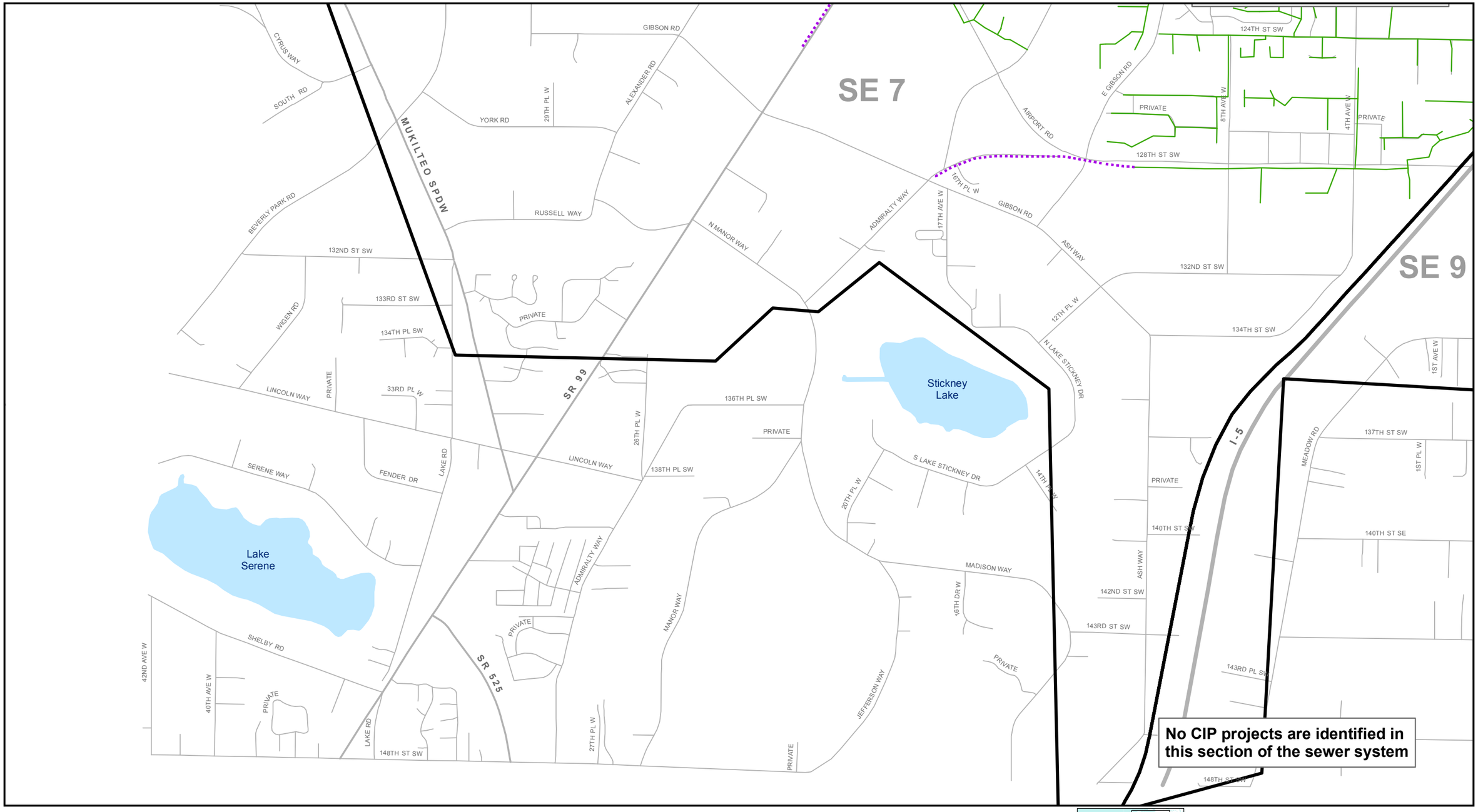


Legend

10-Year CIP
- Facility
- Sewer Main

Unscheduled
- Facility
- Sewer Main

- Lift Station
- CSO Outfall
- Regulator
- Weir
- Sewer Main
- Force Main 24" and Over
- Force Main Less than 24"
- Sewer Basin
- Everett City Boundary
- Highway
- Major Road
- Minor Road
- Water Body

Note: Projects CI-15 through CI-21 are not shown on the map. These are planning or programatic projects without a specific location.

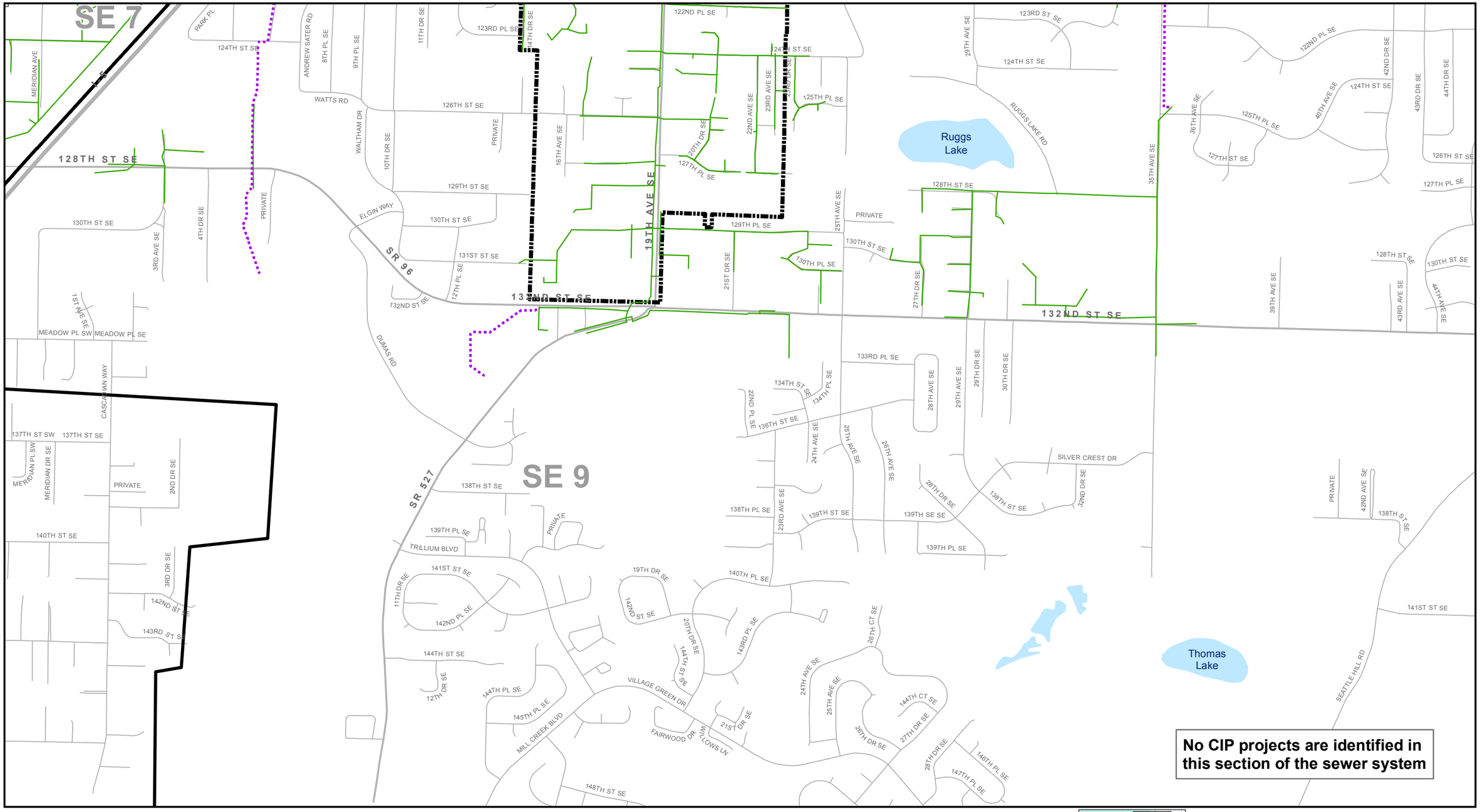
0 500 1,000 2,000 Feet

	6-1L
	6-1K
6-1I	6-1J
6-1G	6-1H
6-1E	6-1F
6-1C	6-1D
6-1A	6-1B

2014 Comprehensive Sewer Plan
City of Everett

FIGURE 6-1A

Capital Improvement Program Map



Legend

10-Year CIP
- Facility
- Sewer Main

Unscheduled
- Facility
- Sewer Main

- Lift Station
- CSO Outfall
- Regulator
- Weir
- Sewer Main
- Force Main 24" and Over
- Force Main Less than 24"

- Sewer Basin
- Everett City Boundary
- Highway
- Major Road
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0 500 1,000 2,000 Feet

	6-1L
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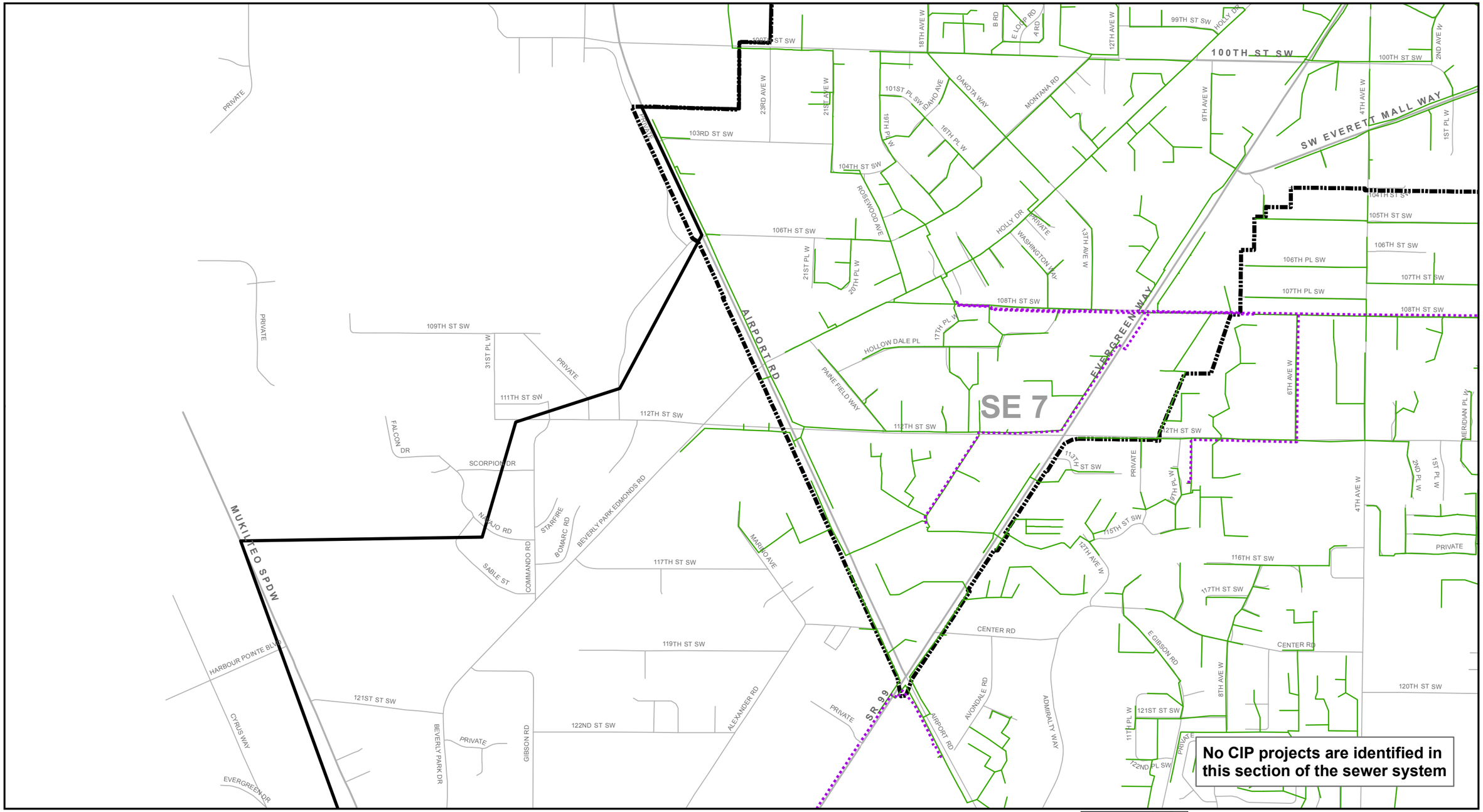
6-1I	6-1J
6-1G	6-1H
6-1E	6-1F
6-1C	6-1D
6-1A	6-1B

2014 Comprehensive Sewer Plan
City of Everett

FIGURE 6-1B

Capital Improvement Program Map



Legend

10-Year CIP
- Facility
- Sewer Main

Unscheduled
- Facility
- Sewer Main

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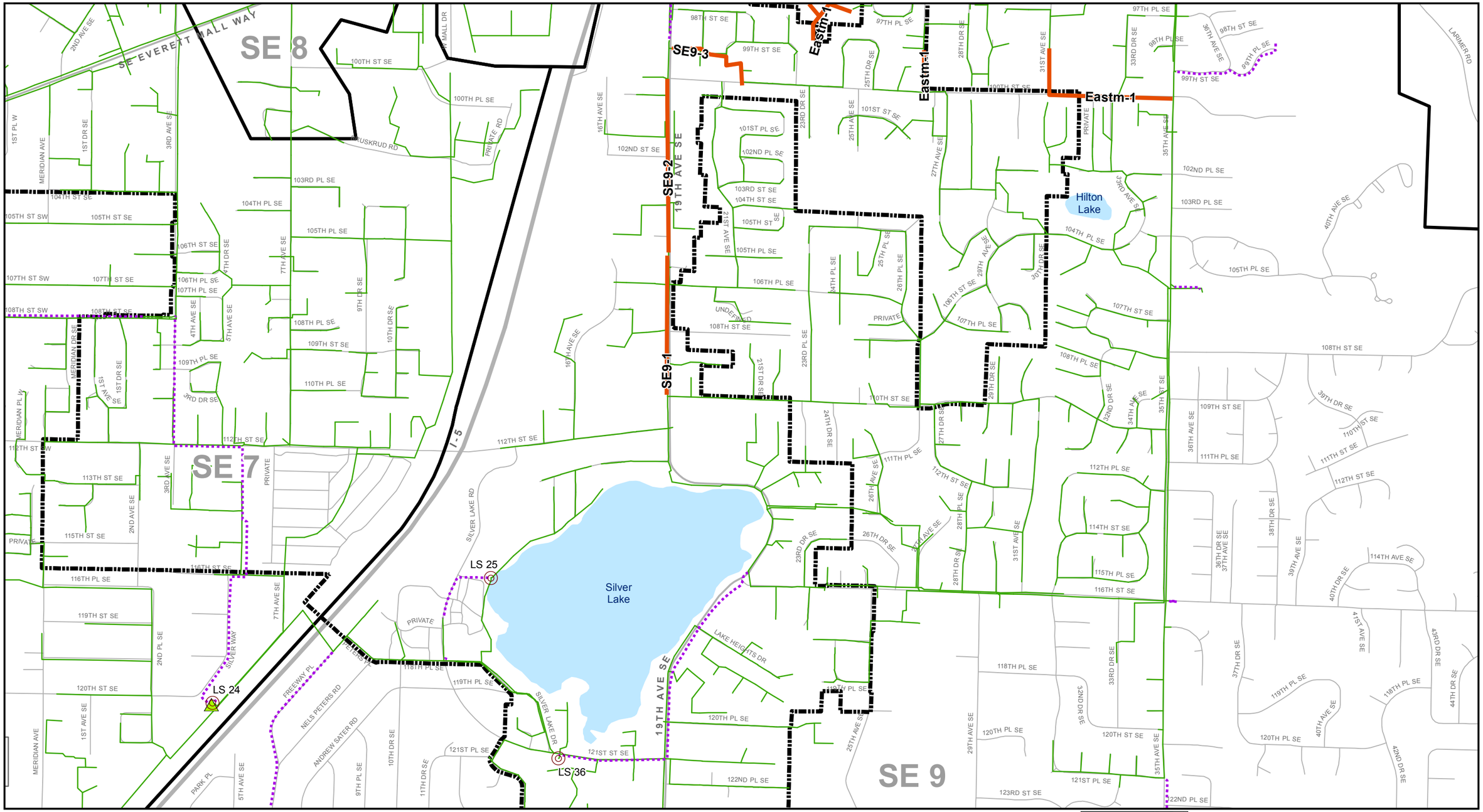
0 500 1,000 2,000 Feet

	6-1L
	6-1K
6-1I	6-1J
6-1G	6-1H
6-1E	6-1F
6-1C	6-1D
6-1A	6-1B

2014 Comprehensive Sewer Plan
City of Everett

FIGURE 6-1C

Capital Improvement Program Map



Legend

10-Year CIP
- Facility
- Sewer Main

Unscheduled
- Facility
- Sewer Main

- Lift Station
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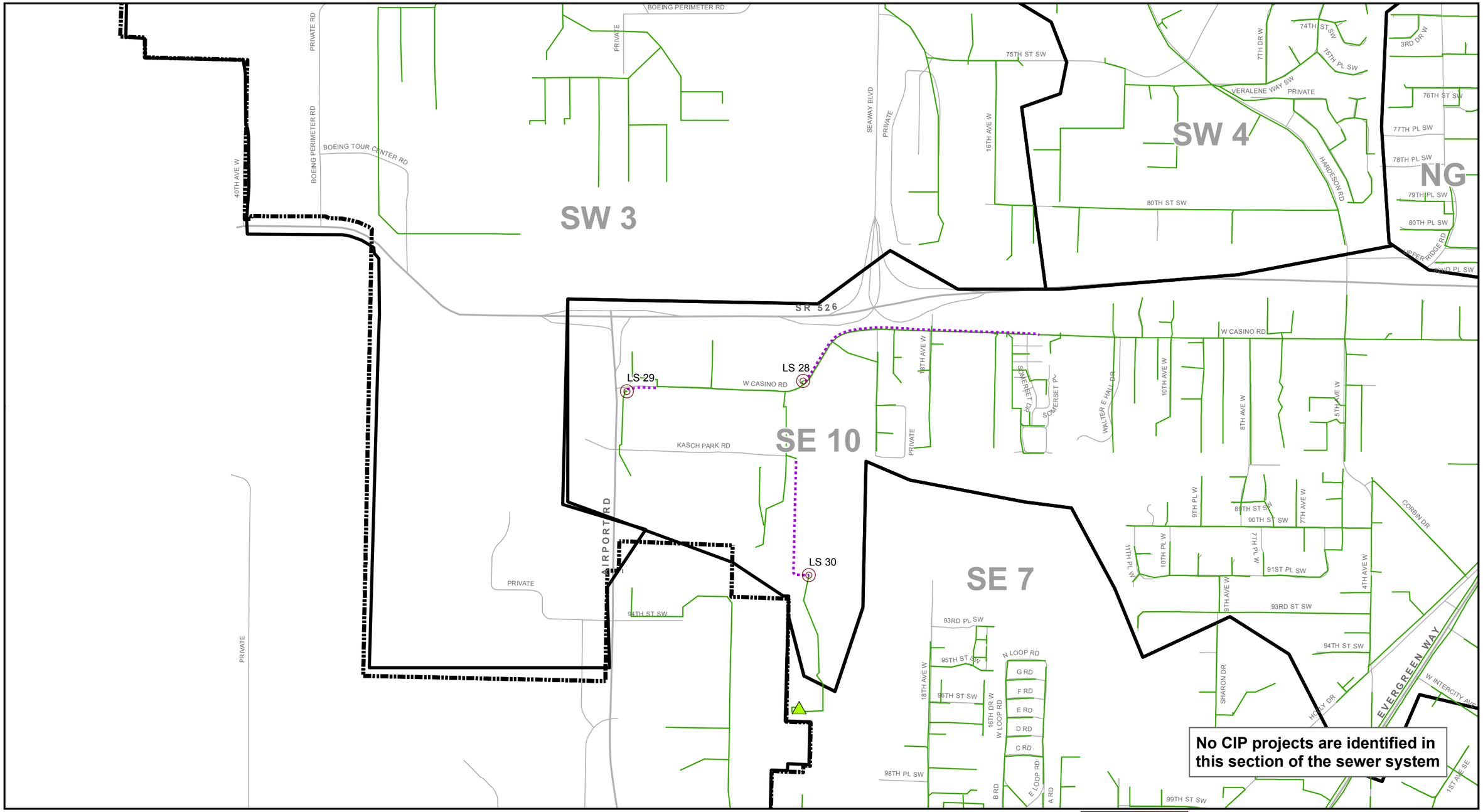
0 500 1,000 2,000 Feet

	6-1L
	6-1K
6-1I	6-1J
6-1G	6-1H
6-1E	6-1F
6-1C	6-1D
6-1A	6-1B

2014 Comprehensive Sewer Plan
City of Everett

FIGURE 6-1D

Capital Improvement Program Map



Legend

10-Year CIP
- Facility
- Sewer Main

Unscheduled
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- Sewer Main

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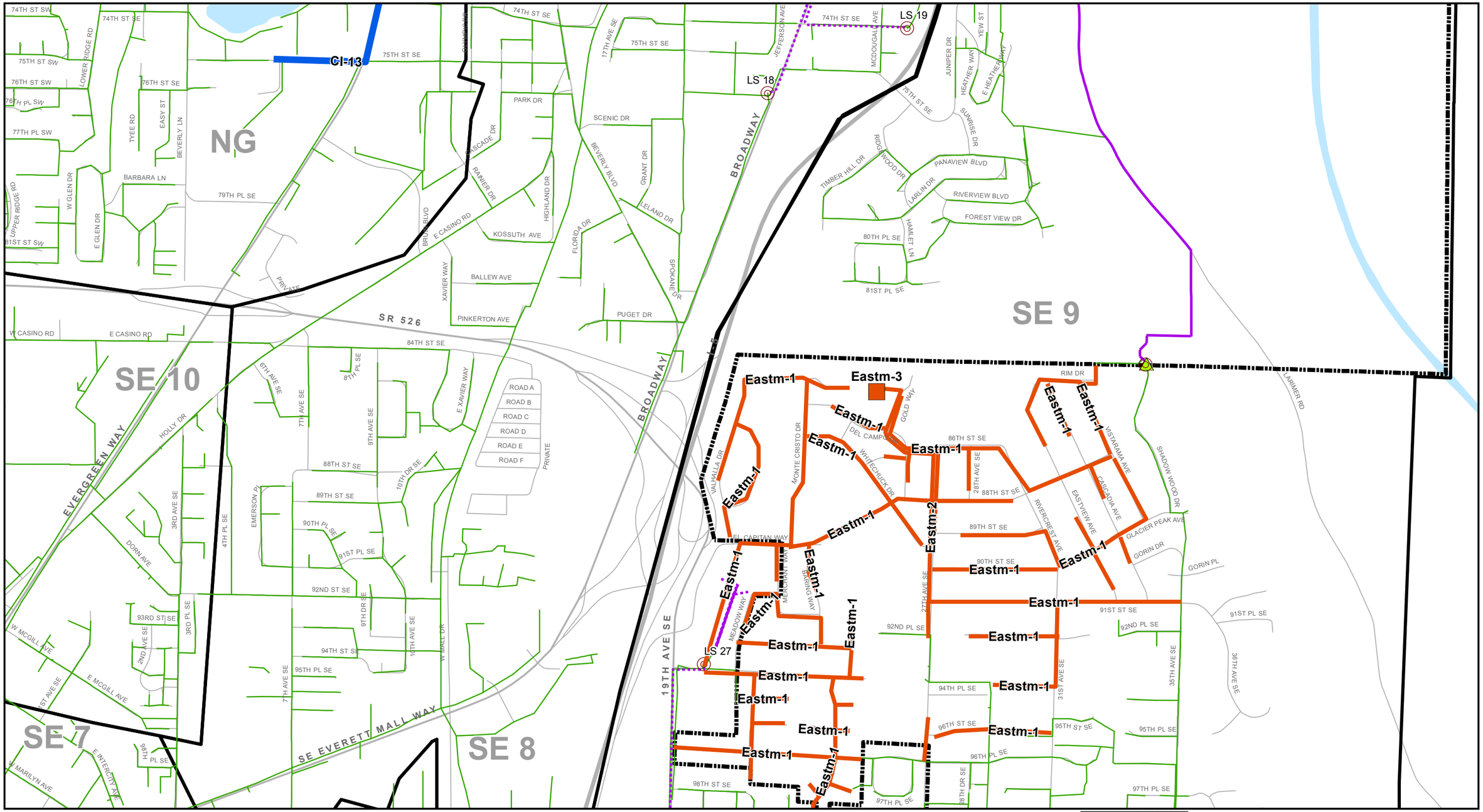
0 500 1,000 2,000 Feet

	6-1L
	6-1K
6-1I	6-1J
6-1G	6-1H
6-1E	6-1F
6-1C	6-1D
6-1A	6-1B

2014 Comprehensive Sewer Plan
City of Everett

FIGURE 6-1E

Capital Improvement Program Map



Legend

10-Year CIP
- Facility
- Sewer Main

Unscheduled
- Facility
- Sewer Main

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- CSO Outfall
- Regulator
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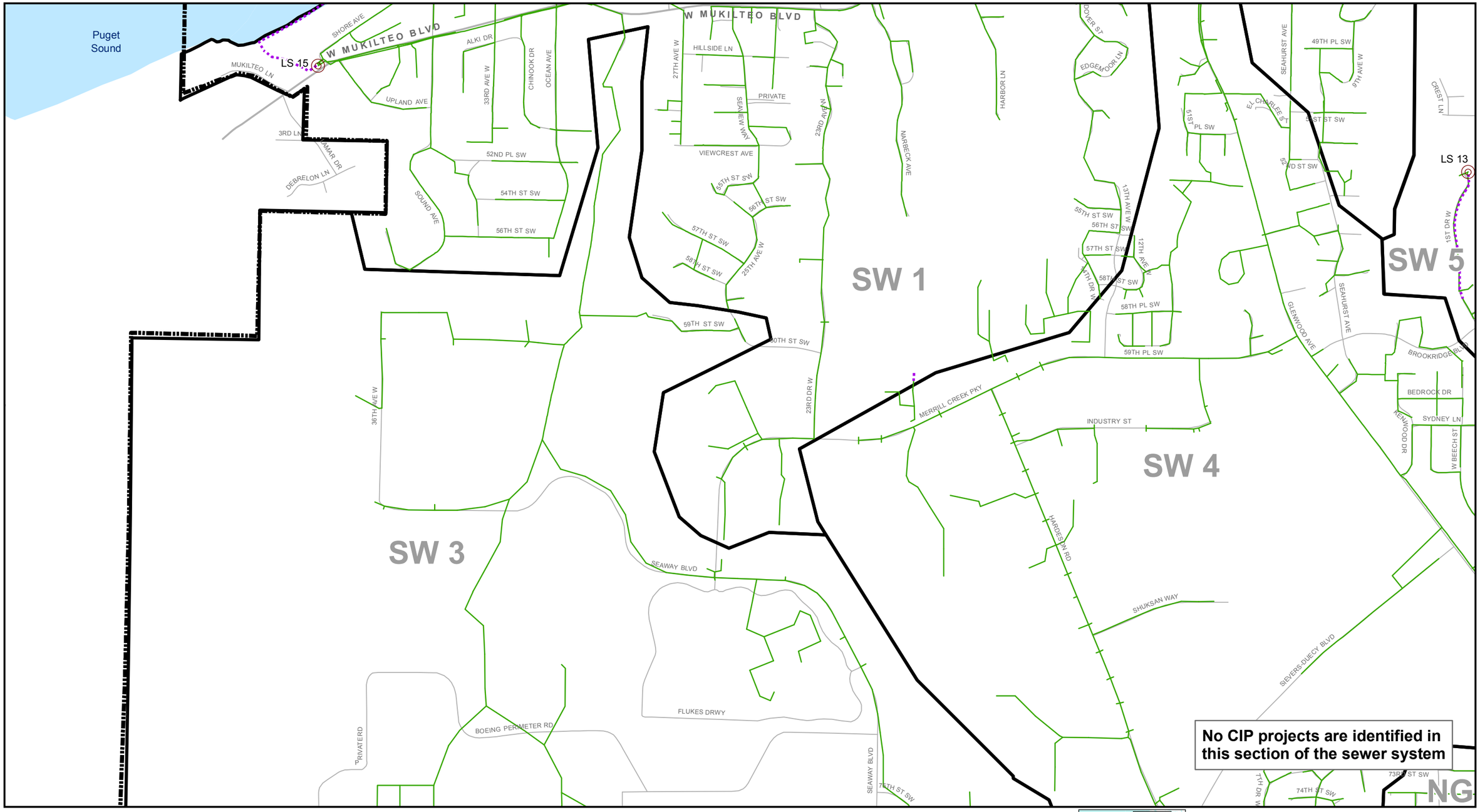
Note: Projects CI-15 through CI-21 are not shown on the map. These are planning or programatic projects without a specific location.

2014 Comprehensive Sewer Plan
City of Everett

FIGURE 6-1F

Capital Improvement Program Map



Legend

10-Year CIP
- Facility
- Sewer Main

Unscheduled
- Facility
- Sewer Main

- Lift Station
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- Minor Road
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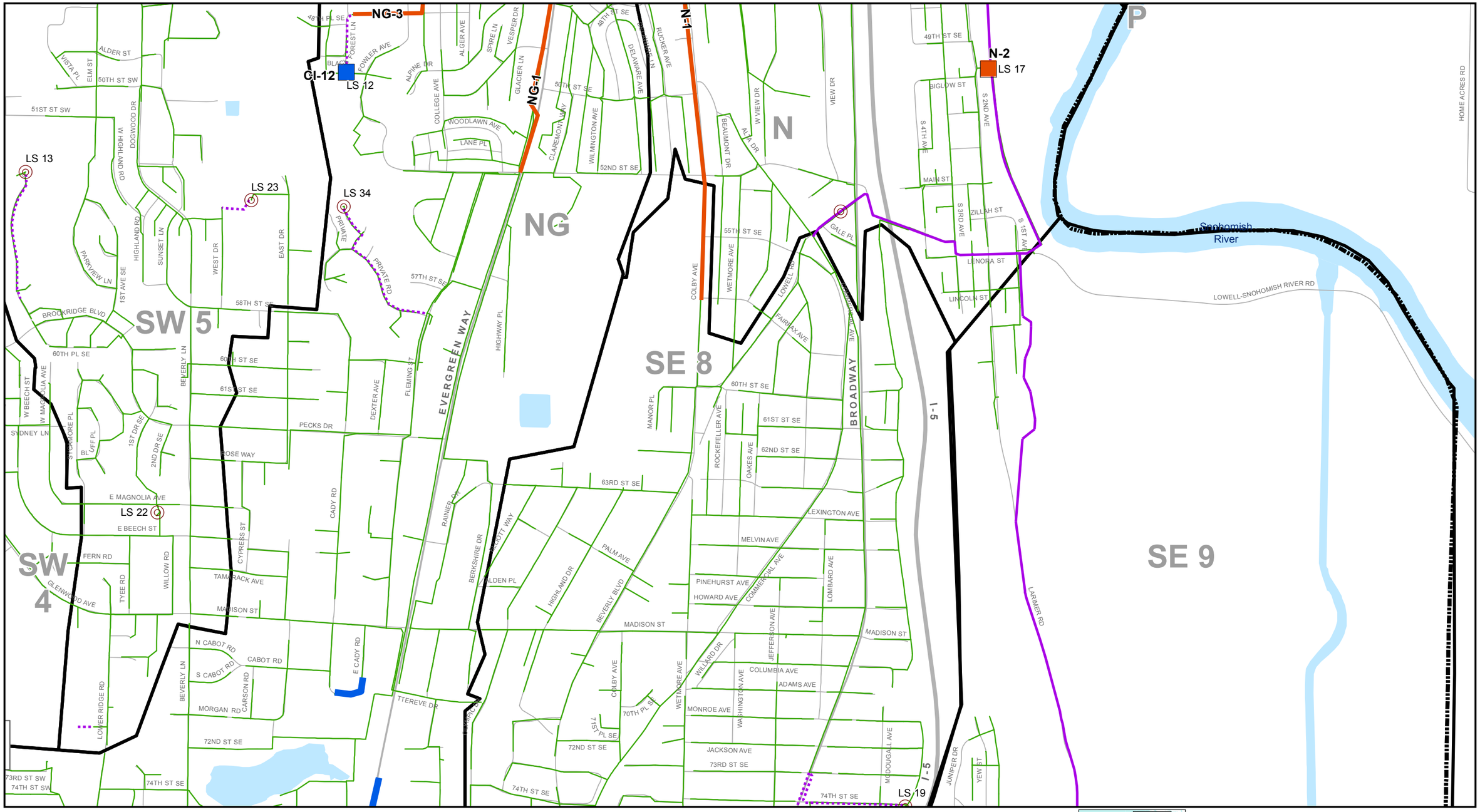
0 500 1,000 2,000 Feet

	6-1L
	6-1K
6-1I	6-1J
6-1G	6-1H
6-1E	6-1F
6-1C	6-1D
6-1A	6-1B

2014 Comprehensive Sewer Plan
City of Everett

FIGURE 6-1G

Capital Improvement Program Map



Legend

10-Year CIP
- Facility
- Sewer Main

Unscheduled
- Facility
- Sewer Main

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- Regulator
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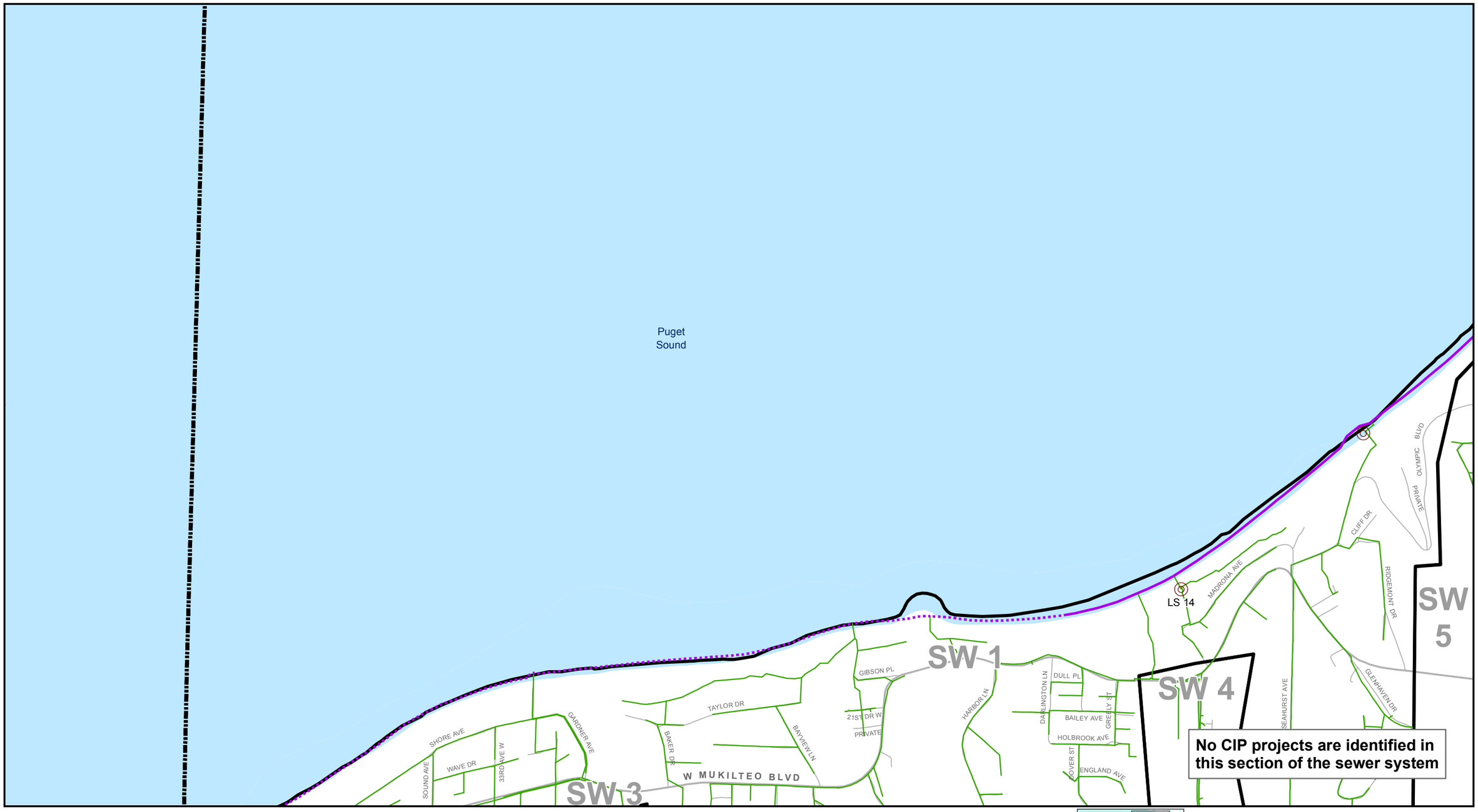
0 500 1,000 2,000 Feet

	6-1L
	6-1K
6-1I	6-1J
6-1G	6-1H
6-1E	6-1F
6-1C	6-1D
6-1A	6-1B

2014 Comprehensive Sewer Plan
City of Everett

FIGURE 6-1H

Capital Improvement Program Map



Legend

10-Year CIP
- Facility
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Unscheduled
- Facility
- Sewer Main

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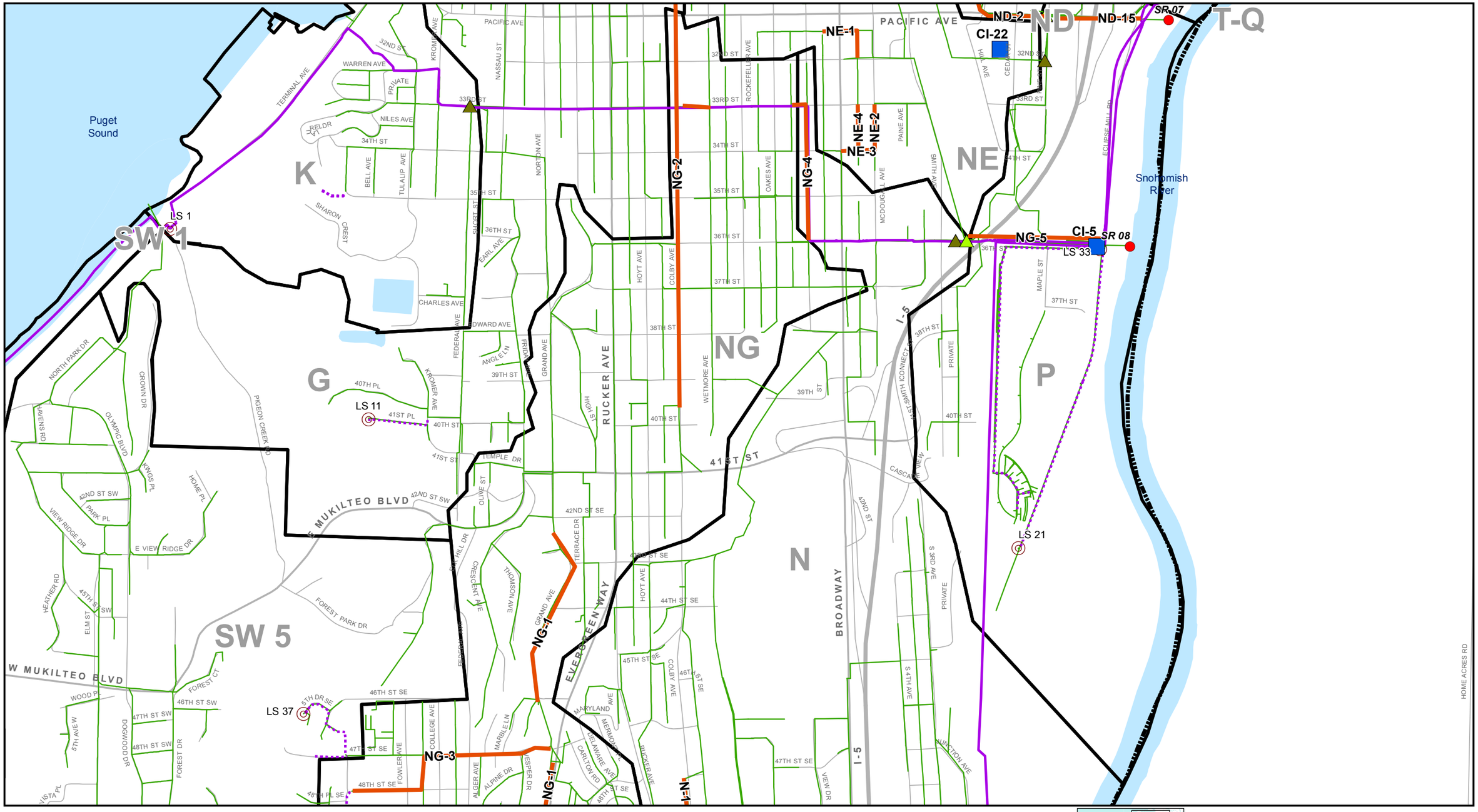
0 500 1,000 2,000 Feet

	6-1L
	6-1K
6-1I	6-1J
6-1G	6-1H
6-1E	6-1F
6-1C	6-1D
6-1A	6-1B

2014 Comprehensive Sewer Plan
City of Everett

FIGURE 6-1I

Capital Improvement Program Map



Legend

10-Year CIP
- Facility
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Unscheduled
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- Sewer Main

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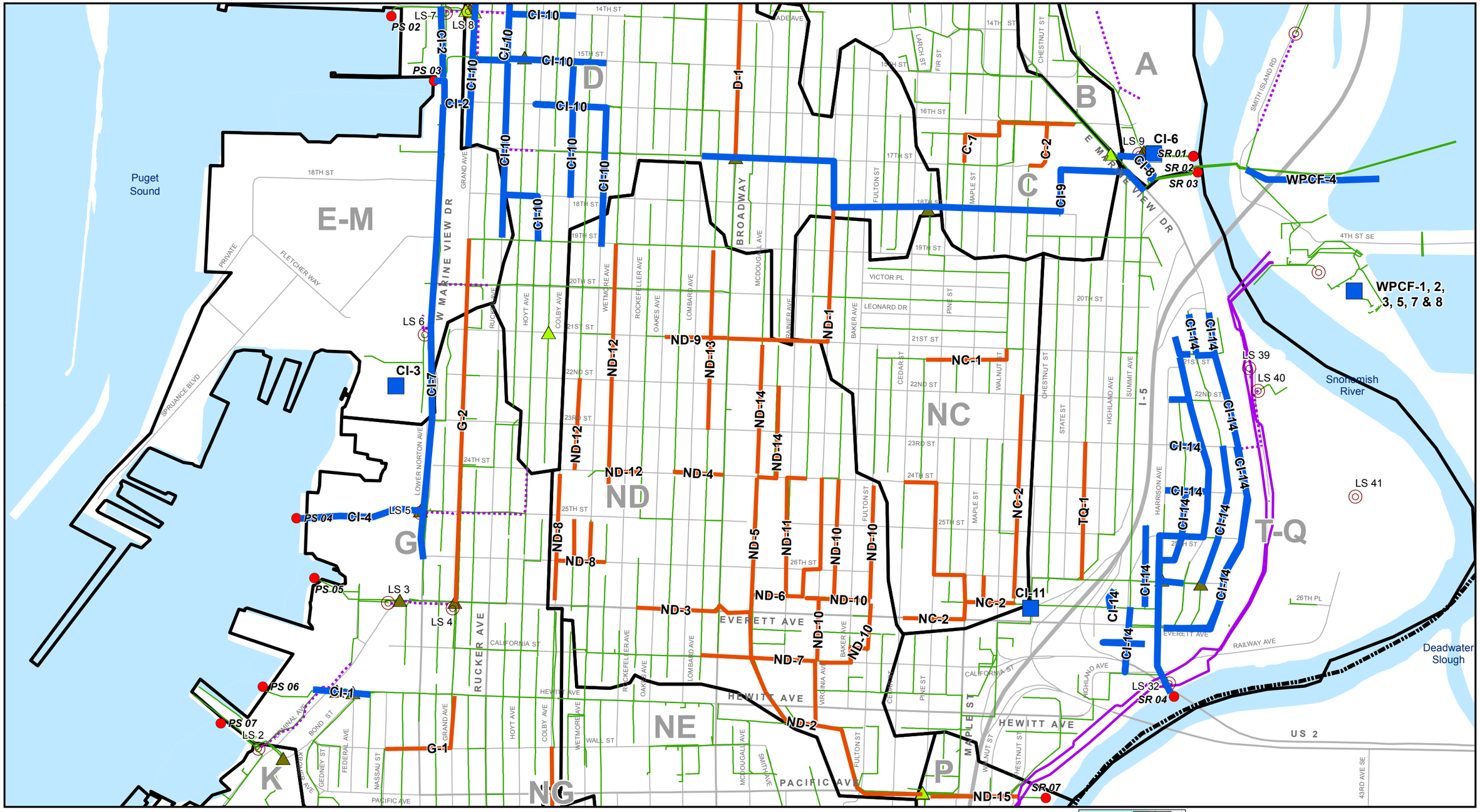
	6-1L
	6-1K
6-1I	6-1J
6-1G	6-1H
6-1E	6-1F
6-1C	6-1D
6-1A	6-1B

2014 Comprehensive Sewer Plan
City of Everett

FIGURE 6-1J

Capital Improvement Program Map



Legend

10-Year CIP
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0 500 1,000 2,000 Feet

	6-1L
	6-1K
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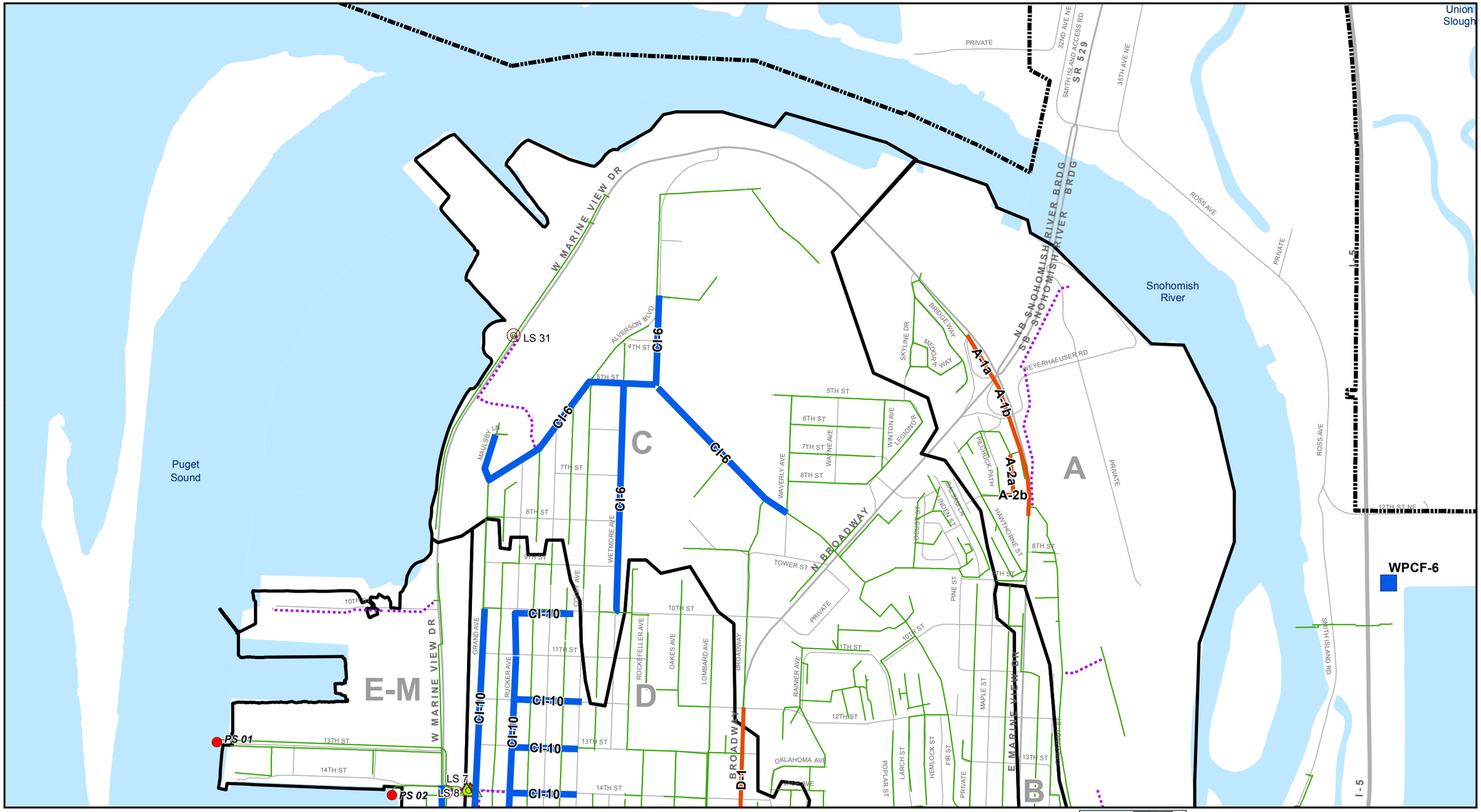
6-1G	6-1H
6-1E	6-1F
6-1C	6-1D
6-1A	6-1B

2014 Comprehensive Sewer Plan
City of Everett

FIGURE 6-1K

Capital Improvement Program Map



Legend

10-Year CIP
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6-1I	6-1J
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6-1A	6-1B

2014 Comprehensive Sewer Plan
City of Everett

FIGURE 6-1L

Capital Improvement Program Map

7 Financial Program

7.1 Introduction

The effective implementation of this Comprehensive Sewer Plan is dependent on developing a plan that can be financially supported by the utility's revenue, will meet State and local regulatory requirements, and provides the flexibility to deal with unforeseen changes.

This chapter presents a financial plan that reviews the revenues and expenses for the City of Everett's (Everett) sewer system. The financial plan includes projected operating and capital costs of the system for the ten-year time horizon of 2015 to 2024. The revenues and expenses used in the financial plan were obtained from Everett's 2012 budget and escalated through 2024.

The capital costs contained within the financial plan are based on the CIP developed in Chapter 6 of this Comprehensive Sewer Plan. The results of the financial plan outline the annual operating and capital needs of the sewer system and determine if the current sewer utility revenues are sufficient to fund operating and capital costs.

7.2 Historical Financial Performance

Financial information for the sewer utility from 2009 through 2011 was evaluated to gain an understanding of the past performance of the utility, and at the same time, gain perspective of the current financial status of the sewer utility. The historical information obtained was in a combined utility basis, including Everett's water and sewer services within the same financial report. Therefore the historical table below is water and sewer combined. All other tables shown are sewer only.

Table 7-1 provides a summary of a three-year financial history (2009 - 2011) for Everett's water and sewer utility, as reported in Everett's annual financial statements for 2009 and 2011.

Table 7-1. Water and Sewer Utility System Financial History ($ Thousands)

	2009	2010	2011
Revenue			
Water	$30,479	$28,674	$29,982
Sewer	28,188	29,076	31,265
Total Revenue	58,667	57,750	61,247
Expenses			
O&M & Taxes	24,198	24,987	25,971
Depreciation	10,504	10,498	11,108
Taxes	1,008	1,102	1,376
Outside/Interfund	7,472	9,485	9,897
Total Expenses	$43,182	$46,072	$48,352
Net Operating Income	$15,485	$11,678	$12,895
Non-Operating Revenues/(Expenses)	(2,020)	(2,155)	(1,035)
Income Before Contributions and Transfers	$13,465	$9,523	$11,860

Historically, Everett has managed its financial resources in a prudent manner in order to meet the operating, capital, and regulatory needs of the water and sewer utility. Balances are available for reserves and capital improvements. Target levels for funding capital improvements for future years are discussed later in this section.

7.3 Sewer Rates

Residential customers pay a flat bi-monthly fee while all other customers pay the flat fee plus a volume charge based on water usage. Everett bills customers on a bi-monthly basis, but sewer rates are presented in Table 7-2 as monthly charges.

Table 7-2. Projected Monthly Sewer/Storm Rates, City of Everett

Customer Class [Inside City]	Jan 1 2014	Jan 1 2015	July 1 2015	Jan 1 2016
Single Family				
Base Rate ($/Month)	$49.50	$51.10	$54.42	$59.87
Multi-Family, Commercial, Governmental, Industrial				
Minimum Charge ($/Month)	$49.50	$51.10	$54.42	$59.87
Per CCF of metered water	$5.50	$5.68	$6.05	$6.65

[1] Rates are calculated from the adopted 2014 rates and the anticipated rate increases of 11% in 2015 & 2016

7.4 Development of Financial Plan

A financial projection was developed to determine Everett's ability to meet its sewer capital improvement and operating needs over the next ten years. Sewer fund balances (or reserve levels) were also analyzed in developing the financial projection. The financial analysis involved reviewing the projected sewer revenues and expenses for 2015 to 2024.

The development of the projection was based on Everett's budget documents, financial data, and staff input. The 2012 sewer utility budget numbers were escalated for 2015 through 2024 by applying factors for inflation and growth, which are described in more detail below.

7.4.1 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

Projections for future year rate revenues were developed by applying a projected growth rate of 1% to the forecasted rate revenue through 2024. This was a conservative approach and is slightly lower than the growth estimates developed in this Plan. Everett has adopted sewer rate adjustments for 2014 has anticipated adjustments for 2015 & 2016 as shown in Table 7-2. These adjustments have been included in the rate revenue forecast for 2014, 2015 and 2016.

For Everett, the sewer rate revenues are projected to be approximately $30.9 million in 2015 and reach $37.5 million in 2024 based on the adopted sewer rates and estimated growth over the 10 year time period prior to any additional rate adjustments. Other revenues projected for 2015 total approximately $0.84 million with a majority of the revenue coming from interfund and miscellaneous revenues. These are projected to increase slightly to reach $0.90 million in 2024.

The total revenue available to offset the operating and capital requirements of the sewer utility totals $31.8 million in 2015 and is projected to increase to $38.4 million in 2024.

Table 7-3 shows the projected revenues for the City of Everett's sewer utility for the years 2015 through 2024. The projected ten year revenues for Everett are based on budgeted estimates, anticipated rate adjustments (2015 & 2016), and new customer growth assumptions.

- Customer growth assumed to be 1.0% annually
- 2015 anticipated rate adjustment – 11%
- 2016 anticipated rate adjustment – 11%

Table 7-3. Projected Ten-year Financial Plan Revenues ($ Millions)

	Projected									
Sources of Revenue	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**
Revenues										
Rate Revenues	$30.92	$34.67	$35.01	$35.36	$35.72	$36.07	$36.43	$36.80	$37.17	$37.54
Other Revenues	0.85	0.86	0.88	0.88	0.91	0.91	0.92	0.92	0.92	0.93
Total Revenue	$31.77	$35.52	$35.89	$36.25	$36.63	$36.99	$37.36	$37.72	$38.09	$38.47

7.4.2 Future Expenses

The second part of the financial analyses is a review of the expenses incurred to provide sewer service. The projection of future operating expenses is based on the 2012 budget and escalated annually through 2024. These expenses are projected for future years by applying escalation factors pertinent to the type of expense being reviewed.

The development of the projection was based on the "cash basis" approach. The cash basis approach is the most commonly used method of accumulating expenses for budgeting and rate setting for municipal utilities. The cash basis includes the following costs:

- Operations and Maintenance (O&M)
- Taxes and Transfers
- Capital Improvements Funded From Rates
- Debt Service
- Working Capital/Contingency Reserves

Operation and Maintenance Expenses

Using the 2015 projected budget (based on the 2012 budget) as a starting point, expenses were escalated by factors representing assumed inflationary rates to obtain projected costs. Escalation factors include labor, benefits, materials and supplies, and miscellaneous. The escalation factors ranged from 2% to 6% annually. Expenses were escalated an average of 3% annually, with medical expenses escalated at 6%.

Sewer operation and maintenance expenses include collection, treatment, biosolids and pretreatment. The total collection, treatment, biosolids and pretreatment expenses for the sewer utility were projected to be $16.5 million in 2015 increasing to $22.3 million in 2024.

Taxes and Transfers

Taxes for the sewer utility include State Excise taxes which Everett separately calculates for collection and treatment expenses. These taxes are based on the amount of infrastructure serving collection purposes versus treatment and the revenue needed to operate and maintain these facilities. Taxes, including intergovernmental transfers, total $5.8 million in 2015, and are estimated to be approximately $7.5 million in 2024. No tax rate increases or decreases are assumed in these projections.

Capital Improvements Funded from Rates

Capital improvements are related to maintaining, improving, and expanding the infrastructure of a utility. The capital improvement plan (CIP) developed contains a number of renewal and replacement, regulatory, and growth-related projects. Renewal and replacements are, as the name suggests, the replacement of existing and worn out (depreciated) facilities. Some of the renewal and replacement projects are also major maintenance projects, such as sewer main replacements. Some projects are also due to regulatory requirements such as combined sewer overflow control projects. Growth-related facilities, on the other hand, are those related to system expansion and new customers. Many times, capital projects have all three elements contained. That is, they address a regulatory issue, they will replace an existing facility, and they will be designed and built to provide service for growth. Funding sources are determined, in part, by what type of improvements the project provides.

Rate funding for renewal and replacement projects is an important part of any capital funding plan. It is prudent utility financial planning to include a minimum of rate funding for renewal projects. By rate funding renewal projects, the utility can achieve a stronger debt service coverage ratio (DSC), which is described below. A higher DSC ratio can provide lower interest rates on future bond financing and help to keep rates lower in the long-term. In this financial plan, the rate funded capital is set at $3.0 million in 2015 and gradually increased to $5.3 million by 2024. The increase in capital funding from rates is implemented gradually to balance the impacts to rates with the goal of funding a minimum of annual depreciation expense which is $5.7 million in 2012. It is recommended that whenever Everett is able to increase this rate funding of capital, it should. This funding source enables Everett to maintain a strong debt service coverage ratio, which is important to maintaining lower interest rates on future revenue bonds.

The capital analysis assumes that any additional funding beyond what is necessary to meet the annual capital requirements will be placed into the capital reserve for future capital needs.

The financial analysis conducted has incorporated the capital projects outlined in this Plan. The final project costs will depend on actual labor and material costs, actual site conditions, productivity, competitive market conditions, final project scope, final project schedule, and other variable factors.

The specific projects identified in this Plan are summarized below by type of project. These projects have been assigned in the year they are expected to be completed along with any known or anticipated funding sources. Capital improvement projects from 2015 to 2024 total approximately $274.0 million over the projected ten-year review period. Table 7-4 presents a summary of the capital improvement projects and funding sources of the utility through 2024.

Table 7-4. Projected Capital Improvements and Funding Sources Summary ($ Millions)

	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	TOTAL
Capital Improvements											
Collection and Interceptor Improvements	$13.15	$13.43	$18.15	$16.05	$8.30	$14.02	$13.30	$15.08	$22.53	$23.72	$157.73
WPCF Improvements	23.50	3.50	6.90	2.51	14.61	15.20	7.00	5.00	18.00	20.00	116.22
Other Improvements	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total Expenses	**$36.65**	**$16.93**	**$25.05**	**$18.56**	**$22.91**	**$29.22**	**$20.30**	**$20.08**	**$40.53**	**$43.72**	**$273.95**
Funding Sources											
Capital Fund Reserves	$0.20	$0.20	$0.20	$0.20	$0.20	$0.20	$0.20	$0.20	$0.20	$0.20	$2.00
Operating Reserves	1.45	1.48	1.35	1.61	1.21	1.27	0.60	0.13	0.33	0.27	9.70
Contributed Capital	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Low Interest Loans	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Revenue Bonds	32.00	12.00	20.00	13.00	17.50	23.50	15.00	15.00	35.00	38.00	221.00
Total Funding	**$33.65**	**$13.68**	**$21.55**	**$14.81**	**$18.91**	**$24.97**	**$15.80**	**$15.33**	**$35.53**	**$38.47**	**$232.70**
CIP from Rates	**$3.00**	**$3.25**	**$3.50**	**$3.75**	**$4.00**	**$4.25**	**$4.50**	**$4.75**	**$5.00**	**$5.25**	**$41.25**

Note: Some columns and rows do not add due to rounding

As a practical matter, and prudent practice, a utility should fund a portion of its capital improvements from rates on an on-going basis. The balancing of funding projects between existing and future customers is prudent as the improvements benefit both. The funding of capital from rates, shown at the bottom of Table 7-4, is targeted toward funding a minimum level of annual depreciation expense. Utility depreciation expense is $5.7 million in 2012. With the addition of new capital projects as outlined in the capital program in Table 7-4 above, depreciation expense will increase significantly. However to minimize rate impacts, the 2012 depreciation expense of $5.7 million is projected to be met in 2024.

Debt Service

The sewer utility has several existing debt issues at this time with a total annual debt service payment of $5.9 million in 2015. It is assumed that the City issued a PWTF loan for Phase C for the WPCF expansion in 2012, which is the most recent large issuance.

Everett is facing a financial challenge of $274.0 million of needed sewer utility capital improvements over the next 10 years. Additional long-term debt issues will be needed to fund these capital projects. A combination of revenue bonds, contributed capital, rates, and reserves are assumed to fully fund the capital plan, with heavy reliance on revenue bonds. Terms assumed for additional revenue bonds are 5.0% interest over 20-years. The approximate debt service for the bond funded portion of the projects (debt financing 80.7% of the total CIP, or $221 million) is estimated to be $15.1 million annually by 2024. Existing and projected new debt total $5.9 million in 2015 and $20.8 million in 2024. The financial model developed for this projection indicates that this could be close to 37.6% of total projected rate revenue in 2024. That represents a large debt burden for the sewer utility. By applying 50% of the connection charge revenue to growth related debt the total debt payment is reduced approximately $50,000 per year based on the assumed growth levels.

In order to repay these bonds, it is necessary to meet debt coverage requirements. Debt service coverage is a financial measurement, or a credit check, required by the bond covenants, of an entity's ability to repay debt. The level of coverage varies with the financial capability of the system (credit worthiness). Meeting DSC requirements is an important financial indicator for well managed utilities. A debt service coverage ratio is a comparison of net income before annual debt service payments compared to the total annual debt service on revenue bonds, or on all outstanding debt service. A debt service coverage ratio of 1.25 or 1.30 is generally considered the legally acceptable minimum for revenue bond depending on the specific bond covenants. A DSC ratio of 1.50 or greater is considered a stronger financial target. Bond rating agencies look at a utility's DSC ratio in determining the utility's rating, which affects interest rates for future bond issues. The higher the DSC ratio, the better the rating and the lower future interest rates, debt payments, and long-term user rates. With no additional rate adjustments, the DSC ratio drops below 1.25 by 2020, and below 1.0 two years later. However, with future sewer rate adjustments, the DSC ratio can be maintained above 1.5 through 2024.

7.4.3 External Sources of Funds for Capital Projects

There are various outside funding sources that can aide in funding capital improvements and maximize funding of capital improvements while minimizing rates to the degree possible. Several outside funding alternatives are described below. The balance of capital projects that cannot be funded by rates or outside funding sources must be debt financed. In this way, customers who connect to the system in the future also pay a share of the cost of the infrastructure needs to serve them. This balancing of funding sources for capital improvements provides intergenerational equity between existing and future customers.

These outside funding sources do not provide full funding of construction projects. If successful in obtaining the outside funding, Everett will need to supplement these funds with other sources of revenue to ensure implementation of the recommended capital improvement projects. Historically, Everett has been successful in using outside funding sources for capital improvements. State budget constraints may have limited availability of these funding sources periodically during the economic downturn. When these sources are available, Everett will likely be successful again in securing some portion of capital funding from these outside sources. Provided below are some common outside funding sources available to Everett to fund the sewer capital improvements.

- Stormwater Financial Assistance Program
- Public Works Trust Fund
- State Revolving Fund
- Centennial Clean Water Fund
- Clean Water Act Section 319 Program
- The Infrastructure Assistance Coordinating Council
- Developer Contributions
- Revenue Bonds

A brief description of these funding sources is provided below, followed by a description of various debt financing mechanisms.

Stormwater Financial Assistance Program. Administered by the Ecology, SFAP is a grant program to fund stormwater projects not explicitly required by NPDES permits. Eligible projects include planning, design, and construction of stromwater infrastructure and implementation of low impact development techniques. SFAP grants are limited to $5 million per recipient and require a 25% match that can be reduced to 15% if hardship criteria are be met. Hardship criteria is defined as less than 25,000 in population and mean household income is less than 80% of the state average mean household income.

Public Works Trust Fund. The Public Works Trust Fund (PWTF) loan program is a loan program set up by the State Legislature to assist cities, towns, counties, and special districts with funding for different types of public works projects. The projects can include streets, roads, drainage systems, water systems, and sewer systems. The emphasis of allocating funds is based on replacement and/or repair of existing systems. Typically, funds are not allocated to install a new system. Rather, funds are granted to rehabilitate or replace existing systems serving existing populations.

The loans are issued at 0.5% up to a 2% interest rate generally for a maximum term of 20 years. A debt service coverage requirement is not imposed on the PWTF loans.

State Revolving Fund (SRF). Administered by the Department of Ecology (Ecology), the SRF is a loan program for which Clean Water Act funding is appropriated to states. SRF loans are available to improve water quality of receiving water bodies. The primary uses for the loans may be used to address water quality violations, health standard violations, replace infrastructure for water quality compliance.

The terms of the loan are generally 1% less than municipal utility revenue bonds, and extend for the life of the facility up to a 20-year maximum. Loans can finance up to 100% of the cost of a project, however ceiling limits in statute do not allow a single applicant to take more than 50% of the funds available in each funding cycle. Loan rates are set in statute at 30% of the average

tax-exempt bond rate for 5-year loans and 60% of the bond rate for 20-year loans. The program also has funding set aside specifically for "Green Projects" and facility design projects. CIP projects that include Green Stormwater Infrastructure elements may receive special funding consideration under the Green Project Reserve funding set-aside. In addition, eligible systems must demonstrate “adequate operational, technical, and financial capability to maintain compliance,” and have an approved System Plan.

Centennial Clean Water Fund (CCWF). Administered by Ecology, the CCWF is primarily available to local governments and tribes facilities and for measures to prevent and control water pollution. Both grants and loans are available on a yearly funding cycle. The CCWF is a grant program primarily aimed at cleaning up polluted water, but it also provides funds for those water systems seeking to prevent pollution of valuable water resources. Due to the limited availability of funds in the CCWF program, access to this program is generally limited to municipalities that can demonstrate financial hardship.

Clean Water Act Section 319 Program. Administered by the EPA, the Section 319 Program offers grant funding for non-point source pollution control projects including the implementation of approved best management practices, public outreach, lake/riparian/wetland restoration, groundwater protection, TMDL support, watershed planning, water quality monitoring, and stormwater planning and outreach. Grants require a 25% matching contribution.

Infrastructure Assistance Coordinating Council. One key resource in identifying other funding programs is the Infrastructure Assistance Coordinating Council (Council). The Council is comprised of state and local agencies whose function is to provide funding for infrastructure repair and development. The purpose of the Council is to assist local governments in coordinating funding efforts for infrastructure improvements.

Developer Extensions/Contributions. When new subdivisions within Everett’s sewer service area require sewer service, the system's extension may be constructed by the developer, according to plans and specifications approved by Everett. The improvements are then deeded to Everett for operation and maintenance. Alternatively, if Everett constructs the infrastructure, funds could paid by developers toward the assets benefitting their development.

Revenue Bonds. Revenue bonds are secured solely by the revenue developed by the sewer system(s). As noted above, the financial plan assumes the use of revenue bond financing for a majority of the capital plan identified above.

While the sources listed above of possible grant, loan and other funding opportunities for Everett is not exhaustive, it does highlight the most probable outside funding sources available to Everett for its sewer capital improvements.

7.4.4 Internal Sources of Funding for Capital Projects

Sewer connection charges. Everett’s sewer utility has a number of connection charges that provide the means of balancing the cost requirements for new utility infrastructure to meet customer growth between existing customers and new customers. These charges are assessed to new customers as they “buy-in” to the system. By implementing fair and equitable connection charges, the burden to existing customers of the cost of infrastructure to serve growth will be mitigated as these fees are used to pay for growth related capital or to offset the debt payments related to the growth related capital.

Due to the level of capital needs presented above, the City should consider updating the sewer utility connection charges to incorporate portions of the projects to be constructed that are

related to growth. This will provide continued equity between the existing and new customers to the system.

Sewer utility reserves. Sewer utility fund balance is a combination of rate and other service fees and charges that exceed expenses in any given year. These funds accumulate and can be applied to capital projects. The sewer utility maintains an O&M reserve to cover expenses during periods of cash flow fluctuations. When reserve balance exceeds minimum levels, if can be applied toward capital projects. In addition, Everett maintains a capital reserve. When this fund has excess revenue above the minimum level funds can be applied toward capital projects. This financial plan projects using approximately $11.7 million of reserves over the 10-year period.

7.4.5 Reserve Levels

Another key indicator of a utility's financial health and viability is its reserve levels. Because a portion of Everett's sewer revenue is based on water consumption, and therefore dependent upon weather conditions and usage patterns, maintaining adequate reserve levels is important for stable fiscal management of the utility.

Industry standards recommend that utilities maintain working capital reserves at a level adequate to handle unexpected occurrences, including unexpected cash flow fluctuations. The City maintains a minimum balance for the O&M reserve, or operating fund, of 90 days of operations expenses. The 90 day fund balance equates to approximately $4.1 million in 2015, increasing to $5.5 million by 2024. Over the duration of the plan, $9.7 million of O&M reserves are used to fund capital projects.

Everett also maintains a balance of $ $8 million in a Capital Fund to assure that debt payments will be met. These reserves can be used to help fund capital whenever the minimum balance of $8 million is exceeded. In this financial plan $2 million of capital reserves is used to fund capital projects.

7.5 Summary of the Financial Projections

A summary of the financial analysis for Everett's sewer system is provided below in Table 7-5 provided the funding assumptions described above.

As shown in Table 7-5, additional rate adjustments are necessary to meet the projected O&M expenses and capital improvement needs. Rate funded capital is necessary to maintain the existing system at current service levels and to provide sufficient debt service coverage in the future with the increased level of debt financing needed for this capital plan. It is important to keep in mind that the financial model developed for this financial plan assumes expenses are completely expended within each year. Typically, during the course of any given year, utilities may receive additional revenue and often actual expenditures do not total 100 percent of budget appropriations. Likewise, unanticipated expenses can arise. Therefore, actual results will vary from this financial plan.

It is also 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. Should these assumptions change (e.g. growth increase, slow down, or not occur) the level of rate adjustment required will be affected. Likewise, if costs escalate faster or slower than indicated in this plan, the projected rate adjustments shown in Table 7-5 would also be affected.

Table 7-5. Projected Ten-year Financial Plan ($ Millions)

	Projected									
	2015	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**
Revenue										
Rate Revenue	$30.92	$34.67	$35.01	$35.36	$35.72	$36.07	$36.43	$36.80	$37.17	$37.54
Miscellaneous Revenue	0.84	0.84	0.85	0.85	0.86	0.86	0.87	0.87	0.88	0.90
Total Revenue	**$31.76**	**$35.50**	**$35.86**	**$36.21**	**$36.58**	**$36.94**	**$37.30**	**$37.67**	**$38.05**	**$38.43**
Expenses										
O&M Expenses	$16.46	$17.02	$17.60	$18.21	$18.83	$19.48	$20.16	$20.86	$21.58	$22.34
Taxes and Transfers	5.77	5.95	6.13	6.31	6.50	6.69	6.89	7.10	7.31	7.53
Net Debt Service (P+I)	5.85	8.83	9.78	11.38	12.41	13.81	15.68	16.78	17.98	20.78
Rate Funded Capital	3.00	3.25	3.50	3.75	4.00	4.25	4.50	4.75	5.00	5.25
To/(From) Reserves	0.67	0.46	0.43	0.01	0.27	0.27	(0.09)	0.46	1.06	0.19
Total Revenue Required	**$31.76**	**$35.50**	**$37.44**	**$39.65**	**$42.01**	**$44.50**	**$47.15**	**$49.95**	**$52.93**	**$56.09**
Balance/(Deficiency)	**$0.00**	**$0.00**	**($1.58)**	**($3.44)**	**($5.43)**	**($7.57)**	**($9.84)**	**($12.28)**	**($14.88)**	**($17.66)**
Rate Adjustment[1]	**0.0%**	**0.0%**	**4.5%**	**5.0%**	**5.0%**	**5.0%**	**5.0%**	**5.0%**	**5.0%**	**5.0%**
Cumulative Rate Adjustment[2]	**0.0%**	**0.0%**	**4.50%**	**9.5%**	**15.0%**	**21.0%**	**27.0%**	**33.5%**	**40.0%**	**47.0%**

[1] Rate adjustments of 11% in 2015 and 2016 are anticipated by City staff and included in the projections of revenues. Additional rate adjustments in 2017 through 2024 are calculated to meet the revenue requirements. The City may choose to implement the CIP in a different timing schedule to be able to mitigate the rate impacts, may defer projects, may leverage rate adjustments, etc. These are not proposed rate adjustments but show the level of commitment to adjusting rates that will be necessary in order to complete the capital needs determined for the utility.
[2] Rate adjustments are cumulative, that is, any rate adjustment made in previous years would reduce the required adjustment in the following years. These rate adjustments are in addition to the rate increases already adopted for 2014-2016.

7.6 Overview of Future Sewer Rates

Based on the assumptions of the analysis, as described above, the results of the financial analysis indicate the need to adjust rates in future years to meet the projected operating and capital needs of the sewer utility. In total, rates need to be adjusted approximately 47.0% over the 10-year projected period, or an average of 5% per year.

There are a number of options available to set rate at the necessary level over the 10 year period. It is recommended that the City phase-in smaller adjustments, as shown in the plan, over a longer period of time and avoid impacts of the larger rate adjustments in the future years. Other options to meet projected needs include reducing operating or capital costs, or deferring or delaying capital projects. It is important to note the financial analysis developed can be considered a worst case scenario, where low-interest loan financing is not readily available and revenue bond debt financing is the primary funding source for the capital projects. Should other outside funding become available, that will also mitigate the rate adjustments indicated in Table 7-5.

Everett conducts annual rate reviews to determine if revenue is adequate to fund the next year's operating and capital projects. Every four years staff brings forward proposed rate adjustments for the next four years. As part of these processes, Everett will develop a more detailed approach to fully funding operating and capital needs of the utility.

7.7 Summary

The financial plan results presented in this section indicate that sewer rates for the 10-year projected time horizon of 2015 to 2024 will require rate adjustments to sufficiently fund the projected O&M, capital, and debt service requirements of the sewer utility. Careful attention to timing and funding of capital projects will be necessary to minimize rate impacts as much as possible. Everett has demonstrated its commitment to responsible management of the sewer utility by past rate adjustments, by conducting comprehensive rate studies, and by funding adequate levels of operating reserves. Continued prudent fiscal management will enable the sewer utility to continue to operate on a financially sound basis.