

CHAPTER 1

Introduction



Lift Station No. 23

SEWER SYSTEM OWNERSHIP AND MANAGEMENT

The City of Bonney Lake (City) is a municipal corporation that owns and operates a public sewer system within its corporate boundaries and some portions of unincorporated Pierce County (County). Sewage collection is provided through a conventional gravity collection and lift station/force main system. Wastewater treatment is provided by the City of Sumner at a wastewater treatment plant jointly owned by the two cities.

OVERVIEW OF THE EXISTING SEWER SYSTEM

Although the City currently only serves portions of its overall sewer service area (SSA), known as the Core Sewer Service Area (CSSA), it also is committed to provide service in the future to areas that are south and north of the City. These areas are known as the South Sewer Service Area (SSSA) and the North Sewer Service Area (NSSA).

At the end of 2015, the City provided service to approximately 6,069 customer connections, or 7,045 residential equivalents (RE), within the City's CSSA, which extends beyond the City limits. The City limits comprise an area of approximately 7.3 square miles, and the CSSA is approximately 8.3 square miles (not including water bodies). It is estimated that at the end of 2015, the City served a population of 17,148 system-wide. A summary of 2015 sewer system data for the City's system is presented in **Table 1-1 – Sewer System Data**.

**Table 1-1
Sewer System Data**

2015 Description	Data
Population Served	17,148
City Limits and Potential Annexation Areas	4,859 acres
Total Sewer Service Area	8,833 acres
<i>Core Sewer Service Area</i>	<i>5,340 acres</i>
<i>South Sewer Service Area</i>	<i>1,827 acres</i>
<i>North Sewer Service Area</i>	<i>1,666 acres</i>
Total Connections	6,069 accounts
Total Customers	7,045 REs
Total Length of Gravity Main	75.5 miles
Total Length of Force Main	13.4 miles
Number of Manholes	1,835
Number of Pump Stations	25
Average Day Flow per RE	180 gpd/RE
Average Design Flow per RE	271 gpd/RE
Average Day Flow	1.18 MGD
Treatment Capacity	3.30 MGD

gpd = gallons per day
 RE = Residential Equivalents
 MGD = million gallons per day

AUTHORIZATION AND PURPOSE

In November 2015, the City authorized RH2 Engineering, Inc., (RH2) to update its General Sewer Plan (Plan) in accordance with Washington Administrative Code (WAC) 173-240-050. The previous Plan was prepared for the City in 2009. The purpose of this updated Plan is as follows:

- To evaluate existing sewer flow data and project future flows.
- To analyze the existing sewer system to determine if it meets minimum requirements mandated by the Washington State Department of Ecology (Ecology), and the City’s policies and design criteria.
- To determine the overall reliability and vulnerability of existing wastewater lift stations.
- To identify sewer system improvements that will resolve existing system deficiencies and accommodate future system needs.
- To prepare a schedule of improvements that meets the goals of the City’s financial program.

SUMMARY OF PLAN CONTENTS

A brief summary of the content of the chapters in this Plan is as follows.

- The **Executive Summary** provides a brief summary of the key elements of the Plan.
- **Chapter 1 – Introduction** introduces the reader to the City’s sewer system, the objectives of the Plan, and Plan’s organization.
- **Chapter 2 – Sewer System Description** presents the sewer service area and describes the existing sewer system.
- **Chapter 3 – Land Use and Population** presents related plans, land use, and population characteristics.
- **Chapter 4 – Projected Growth and Future Service Areas** identifies projected growth and future service areas.
- **Chapter 5 – Policies and Design Criteria** presents the City’s operational policies and design criteria.
- **Chapter 6 – Existing System Evaluation** discusses the sewer system analyses and existing system deficiencies.
- **Chapter 7 – Operations and Maintenance** discusses the City’s operations and maintenance program.
- **Chapter 8 – Sewer System Improvements** presents the proposed sewer system improvements, their estimated costs, and an implementation schedule.
- **Chapter 9 – Financial Analysis** summarizes the financial status of the sewer utility and presents a plan for funding the sewer improvements.
- The **Appendices** contain additional information and plans that supplement the main chapters of the Plan.

The City’s SSA includes all of the City’s corporate limits and its designated Potential Annexation Areas (PAA), as well as several master-planned communities and large areas of unincorporated Pierce County. Both the City and County have adopted comprehensive plans under the Growth Management Act (GMA) that call for and plan for residential and employment growth that is dependent on sanitary sewer service. This Plan was developed using the most current land use plans and GMA forecasts from the Puget Sound Regional Council (PSRC) and the Washington State Office of Financial Management (OFM). The infrastructure improvements programmed in the Capital Improvement Program (CIP) and the studies and reports recommended throughout the plan are consistent with and support the GMA goals and policies of both the City and County.

DEFINITION OF TERMS

The following terms are used throughout this Plan:

Average Annual Flow (AAF). Average daily flow computed from year-long flow records.

Average Design Flow (ADF) (Maximum Month) Average monthly flow of the maximum month, estimated for the design year of the sewage works.

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Average Dry Weather Flow (ADWF). Average daily flow occurring in wet weather seasons.

Biochemical Oxygen Demand (BOD). A measurement of dissolved oxygen used by microorganisms in the biochemical oxidation of organic matter, typically measured over a 5-day period.

Diurnal curve. The curve or graphical representation of the cyclical rise and fall of wastewater flow during a 24-hour period in response to variation in water usage. When used in a general sense, it does not include inflow from storm events.

Diurnal. Occurring during a 24-hour period.

Fecal Coliform. The group of coliform bacteria of fecal origin. *Escherichia coli* is generally used as the measure of fecal contamination.

Firm Capacity. The available capacity when the largest unit is out of service.

Infiltration. Groundwater that enters the sewer system through cracks, service connections, footing drains, and other sources.

Joint Facilities. Shall mean those wastewater facilities designed or constructed to transport, treat, and dispose of sewage from one or more of City, County and South Hill Sewer District.

Maximum Daily Flow. Greatest total flow in a single day.

Minimum Daily Flow. Lowest total flow in a single day.

Most Probable Number (MPN). A measurement of coliform density based on a statistical analysis of the number of positive and negative results obtained when testing multiple portions of equal volume and in portions constituting a geometric series for the presence of coliform bacteria.

Peak Design Flow (PDF)/Peak Wet Weather Flow (PWWF). Largest estimated flow rate sustained over a 60-minute period in the design year of the sewage works.

Peak Dry Water Flow (PDWF). Peak 60-minute flow rate occurring in a dry weather season.

Sewage. The water-carried human wastes from residences, buildings, industrial establishments, or other places together with such industrial wastes or underground, surface, storm, or other water, as may be present. The terms sewage and wastewater are used interchangeably.

Suspended Solids (SS). And approximate measure of the quantity of sludge that will be removed from wastewater by sedimentation (clarification), typically expressed as milligrams per litre (mg/L). Suspended solids include solids that will settle to the bottom of a cone-shaped container in a 60-minute period.

Volatile Suspended Solids. The organic content of suspended solids. Volatile solids are that portion which will oxidize and be driven off as gas at 600 degrees Celsius.

Wastewater. See sewage.

LIST OF ABBREVIATIONS

The abbreviations listed in **Table 1-2 – Abbreviations** are used throughout this Plan.

**Table 1-2
Abbreviations**

Abbreviation	Definition
AAF	Average Annual Flow
ADF	Average Design Flow
ADWF	Average Dry Weather Flow
ASCE	American Society of Civil Engineers
ASR	Aquifer Storage and Recovery
AWWF	Average Wet Weather Flow
BOD	Biochemical Oxygen Demand
cfm	cubic feet per minute
CIP	Capital Improvement Program
CSSA	Core Sewer Service Area
CWA	Cascade Water Alliance
cu ft	cubic feet
DAFT	Dissolved Air Flootation Thickener
d/D	depth/Diameter ratio
deg	degrees Fahrenheit
DO	Dissolved Oxygen
Ecology	Washington Department of Ecology (DOE)
EPA	Environmental Protection Agency
ERP	Emergency Response Plan
ESA	Endangered Species Act
F:M	Food to Microorganism ratio
FAZ	Forecast Analysis Zone
fps	feet per second
ft	feet
gal	gallons
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**Table 1-2
Abbreviations Continued**

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GIS	Geographic Information System
GMA	Growth Management Act
gpcd	gallons per capita per day
gpd	gallons per day
gpm	gallons per minute
hp	horsepower
hr	hour
I&I	Infiltration and Inflow
in	inch
lb	pound
LF	Lineal Feet
MGD	Million Gallons per Day
mg/L	milligrams per liter
min	minute
MLSS	Mixed Liquor Suspended Solids
MLVSS	Mixed Liquor Volatile Suspended Solids
MPN	Most Probable Number
NMFS	National Marine Fisheries Service
NSSA	North Sewer Service Area
NPDES	National Pollution Discharge Elimination System
NPW	Non-potable Water
O&M	Operations and Maintenance
O ₂	Oxygen
OFM	Washington State Office of Financial Management
OSHA	Occupational Safety and Health Administration
PAA	Potential Annexation Area
PCC	Pierce County Code
PDF	Peak Design Flow
PDWF	Peak Dry Weather Flow
PSE	Puget Sound Energy
PSRC	Puget Sound Regional Council
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**Table 1-2
Abbreviations Continued**

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PSRP	Process to Significantly Reduce Pathogens
PUD	Planned Unit Development
PWWF	Peak Wet Weather Flow
RCW	Revised Code of Washington
RE	Residential Equivalent
sec	seconds
SO ₂	Sulfur Dioxide
SORT	Safety Operational Resource Team
sq ft	square feet
SSA	Sewer Service Area
SSSA	South Sewer Service Area
TMDL	Total Maximum Daily Load
TSS	Total Suspended Solids
UGA	Urban Growth Area
ULID	Utility Local Improvement District
USEPA	United States Environmental Protection Agency
WAC	Washington Administrative Code
WAS	Waste Activated Sludge
WDFW	Washington Department of Fish & Wildlife
WDOE	Washington Department of Ecology (see also “Ecology”)
WEF	Water Environment Federation
WFM	Intergovernmental Contract for Wastewater Facilities Management
WISHA	Washington Industrial Safety and Health Act
WWTP	Wastewater Treatment Plant