2019

GENERAL SEWER SYSTEM PLAN UPDATE

Approved by the Council
[date]

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CITY OF SEDRO-WOOLLEY
GENERAL SEWER SYSTEM PLAN
ENGINEER'S CERTIFICATION

The technical material and data contained in this report were prepared by PACE Engineers, Inc. under the supervision of the below-listed individuals. Those responsible staff members who are registered professional engineers are licensed in the State of Washington.

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CITY OF SEDRO-WOOLLEY
GENERAL SEWER SYSTEM PLAN
EXECUTIVE SUMMARY

This Comprehensive Sewer System Plan is the compilation of results and findings of recent planning and engineering analyses completed for the City of Sedro-Woolley. The purpose of the analysis was to assess the ability of the existing sanitary sewer and treatment systems to accommodate the wastewater flows from the existing and projected population of the City. This Plan updates and supersedes the City's previous Comprehensive Sewer System Plan and has been prepared in accordance with all applicable statutes and guidelines. It has been prepared by PACE Engineers, Inc., with the financial aspects of the Plan being completed by Katy Isaksen and Associates.

The City of Sedro-Woolley's sewer service area is approximately 6 square miles and is consistent with the existing Urban Growth Area (UGA) Boundary. The service area extends from just north of the Northern State Multi-Service Center on the north, to the Skagit River to the south, and from just east of Helmick Road on the east to Collins Road on the west. The City currently provides sanitary sewer collection and wastewater treatment services to approximately 3,560 service connections, most of which are within the existing City limits.

The primary purpose of this planning process was to develop a document which establishes a program for future improvements to and expansion of the City of Sedro-Woolley's sanitary sewer system. Insofar as possible, this was achieved using previous plans, studies and other documentation accomplished by the City and other City consultants. The planning process included incorporation of available computerized GIS mapping from Skagit County and the City's GIS mapping database.

Analysis of the collection and treatment systems required development of population projections for the service area and are put forth in Chapter 2 of the Plan. While significant increases are not expected over the ten year life of the Plan, there is significant development potential recognized and proposed within the service area for the twenty year planning horizon. Although there are currently (year 2019) approximately 13,404 residents of the City, sanitary sewer service is provided to an estimated population of 12,327. The number of residents receiving sanitary sewer service is expected to increase to nearly 16,814 residents by build-out (year 2038). This data, which comes from the City's most recent Comprehensive Plan and assumes linear growth, includes unincorporated Urban Growth Area (UGA) as well as expanded basin service areas which extend beyond the UGA to show where sewer service could be reasonably provided in the future. If the City's UGA and expanded basin is excluded, the City's current (2019) population is approximately 11,690 and the projected 2036 population is 17,069.

Determination of the ability of existing facilities to meet the needs of the current and future populations of the City is a primary objective of the planning process and has been accomplished for both the collection and treatment systems. Analysis of the collection system was accomplished using a combination of practical knowledge and engineering, information provided by City staff, and through the use of a computer model constructed as part of this project. The model was constructed using an Excel based software, and includes all of the City's pump stations, trunk lines over 6 inches in diameter and other collection facilities which

were either determined to be critical in the overall system or were suspected of having capacity issues.

The results of the collection system analysis are presented in Chapter 6 of the Plan. Under existing flow conditions, several areas were identified where pipe upgrades are required to correct specific deficiencies such as line sags, flow constrictions, capacity limitations and flow issues associated with pipe grades. Similar analyses were performed for future flow conditions, and as expected, additional areas of potential capacity problems were identified.

Infiltration and inflow was identified as a primary concern in the existing and future operation of the system. Many of the identified capacity issues can be mitigated through reduction of I & I into the system. An aggressive I & I program, which includes flow monitoring, pipeline video inspection and smoke testing, as necessary, is recommended. Initial work in the program should target areas that have historically experienced high flows during wet weather conditions.

Other recommended collection system improvements include routine rehabilitation of pump stations, an annual pipeline renewal and replacement program, a grease program, and telemetry improvements. In addition, this Comprehensive Plan contemplates extension of sewers into currently undeveloped and/or unsewered areas. It is expected, however, that the extension of sewer service will be accomplished as required by development within the service area or as requested by existing properties which are currently served by on-site disposal systems.

The City's Wastewater Treatment Plant is responsible for treating all flows generated by the City's sanitary sewer customers. The treatment plant discharges to the Skagit River via a 24-inch outfall. The treatment plant was originally constructed in 1956 and has undergone upgrades in 1973, 1994 and 1998. The most recent upgrade included improvements to the headworks, added digester capacity, UV disinfection, added sludge dewatering capacity, and added an anoxic tank for secondary treatment. The treatment plant consistently operates within the limits of its existing NPDES permit, which was updated in December of 2018, but is currently operating at capacity limits due to recent increases in max month flows. Upgrades to the Treatment Plant are planned by the City

The Capital Improvements Plan identified in Table 9-9 of Chapter 9 identifies approximately $4,896,648 in collection system improvements and approximately $23,049,781 in treatment plant improvements through the ten year life of this Plan (year 2029). Recommended funding options for the projects include bond financing, Public Works Trust Fund financing, rates, connection charges, developer financing, and existing budgeted funds.

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ACRONYMS AND ABBREVIATIONS

ACRONYM	DEFINITION
AAF	The average day flow for the entire year.
ADWF	Average Dry Weather Flow
AWWF	Average Wet Weather Flow
BOD_5	Five Day Biochemical Oxygen Demand
CBOD	Carbonaceous Biochemical Oxygen Demand
40 CFR	Code of Federal Regulations, Title 40
Ecology	State of Washington Department of Ecology
DOH	State of Washington Department of Health
EPA	The United States Environmental Protection Agency.
ERU	Equivalent Residential Unit. For the purpose of sewer system consists of a projected usage of 220 gallons per day of sewage flow, and 255 gallons per day of projected water usage. Where deemed appropriate, an alternative criteria for determining ERUs may be used and based on the organic loading into the system with consideration of Biological Oxygen Demand (BOD) and/or Suspended Solids (SS).
GMA	State of Washington Growth Management Act.
gpcd	Gallons per capita per day.
gpd	Gallons per day.
gpm	Gallons per minute.
gpd/sf	Gallons per day per square foot.
mgd	Million gallons per day.
mg/l	Milligrams per liter. See also "ppm."
PDF	Peak Day Flow
PHF	Peak Design Flow / Peak Hour Flow
PMF	Peak Month Flow
pH	A measure of the hydrogen-ion concentration in a solution, expressed as the logarithm (base ten) of the reciprocal of the hydrogen-ion concentration in gram moles per liter. On the pH scale (0-14), a value of 7 at 25˚C represents a neutral condition. Decreasing values, below 7, indicate increasing acidity; increasing values, above 7, indicate increasing alkalinity.

ACRONYM	DEFINITION
ppd	Pounds per day.
ppm	Parts per million.
PSRC	Puget Sound Regional Council.
RCW	Revised Code of Washington
SEPA	State Environmental Policy Act.
SS	Suspended Solids
SWPWSD	Sedro-Woolley Public Works Standard Details
TAZ	Transportation Analysis Zone
TSS	Total Suspended Solids
VSS	Volatile Suspended Solids
WAC	Washington Administrative Code
WDOE	State of Washington Department of Ecology.
WDOH	State of Washington Department of Health.

GLOSSARY OF TERMS

TERM	DEFINITION
Activated Sludge Process	A biological wastewater treatment process whereby a mixture of wastewater and activated sludge is agitated and aerated. The activated sludge is subsequently separated from the treated wastewater (mixed liquor) by sedimentation, and wasted or returned to the process as needed.
Aeration	A process that mixes and/or infuses air into a liquid by one or more methods, such as spraying the liquid in the air, forcing air bubbles through the liquid, or agitating the liquid to promote surface absorption of the air.
Anaerobic	An environment devoid of oxygen.
Anoxic	An environment devoid of oxygen where nitrate acts as the electron acceptor.
Aquifer	A porous, water-bearing geologic formation. Generally restricted to materials capable of yielding an appreciable supply of water.
Average Annual Flow	The average day flow for the entire year.
Average Dry Weather Flow	ADWF is the flow for an average day during the dry weather months (generally May through October), and represents the baseline of sewage flow for the service area. The ADWF includes sewage discharges plus the average amount of groundwater infiltration (base GWI) which occurs throughout the dry weather months. In the absence of actual data, 100 gallons per capita per day is often used to predict the ADWF for a new service area. Peaking factors for existing flows are derived on the basis of ADWF.
Average Wet Weather Flow	AWWF is the flow for an average day during the wet weather months of November through April. The AWWF includes sewage discharges, groundwater infiltration and stormwater inflow, which occurs throughout the wet weather months.
Biochemical Oxygen Demand	The quantity of oxygen required to support biological oxidation of the organic matter contained in wastewater. Usually referred to as BOD, this characteristic defines the strength of a wastewater and often determines the type and level of treatment which must be provided to produce a required effluent quality. BOD is commonly expressed as the amount of oxygen utilized in the oxidization of organic matter over a five-day period at 20°C and is typically represented as (BOD_5).

TERM	DEFINITION
Carbonaceous Biochemical Oxygen Demand	Similar to biochemical oxygen demand, except that nitrification is excluded from the oxygen demand calculation. CBOD is measured using nitrification inhibiting agents.
Combined Sewer	A sewer facility that receives both wastewater and storm or surface water through a direct connection (i.e., not incidental inflow).
Commercial Wastewater	Wastewater generated in predominantly business or commercial areas, including both sanitary wastes and wastes from the commercial activities. Typically, commercial wastewater includes, but is not limited to, wastes from restaurants, laundromats, and service stations.
Denitrification	Removal of nitrogen from wastewater by conversion of nitrate into nitrogen gas under anoxic conditions.
Domestic Wastewater	Wastewater principally derived from the sanitary conveniences of residences or produced by normal residential activities.
Dry Weather Flow	Wastewater flow during periods of little or no rainfall; in the Puget Sound area, this typically occurs during the months of May through October. Rates of flow exhibit hourly, daily, and seasonal variations. A certain amount of infiltration may also be present.
Dry Well	The dry compartment in a pump station, near or above the pumping level, where the pumps and/or motors and controls are located.
Forcemain	A sewer pipeline that flows full under pressure, discharging from a pump station (as opposed to an inverted siphon).
Hydrogen Sulfide	A potentially toxic and lethal gas (chemical symbol H_2S) produced in sewers and digesters by anaerobic decomposition. Detectable in low (<0.0001 percent) concentrations by its characteristic "rotten egg" odor, it deadens the sense of smell in higher concentrations or after prolonged exposure.
Industrial Wastewater	Wastewater generated predominately from industrial area, including both sanitary wastes and waste from the industrial activity.
Infiltration	Groundwater that leaks into the wastewater collection system from the surrounding soil. Common points of entry include cracked and/or defective pipes and manholes located below the groundwater table, and percolating rain or irrigation water. Infiltration is divided into two categories: Groundwater-Related Infiltration (GWI) which occurs throughout the year, and Rainfall-Dependent Infiltration (Rain GWI) which occurs during and shortly after storm events.

TERM	DEFINITION
Inflow	Rainwater that enters the collection system through roof drain connections, catch basin connections (in Combined Sewer Overflow systems), and holes in the top of manhole covers. Inflow is generally distinguished from infiltration by the rapidity with which inflow begins and ends after a period of rainfall.
Interceptor	A sewer that receives flow from a number of main or trunk sewers, forcemains, etc.
Inverted Siphon	Inverted Siphon is defined as a sewer that dips below the hydraulic grade line to avoid an obstruction such as a creek, ravine or other utility.
Lateral	A sewer that has no other common sewers discharging into it.
Main	A sewer that receives flow from one or more submains. Also referred to as a "trunk."
Nitrification	The process of converting organic and ammonia-nitrogen into nitrate nitrogen by nitrifying autotrophic bacteria.
Nitrogen	An essential nutrient that is often present in wastewater as ammonia, nitrate, nitrite, and organic nitrogen. The concentrations of each form and the sum, total nitrogen, are expressed as mg/l elemental nitrogen. Also present in some ground water as nitrate and in some polluted ground water in other forms.
Peak Day Flow	The maximum flow received over a calendar day, usually occurring during wet weather months.
Peak Design Flow/ Peak Hour Flow	The largest estimated flow sustained over a 60-minute period in the design year of the wastewater facility.
Peak Month Flow	The largest estimated flow rate sustained over a calendar month.
Phosphorus	An essential chemical element and nutrient for all life forms. Occurs in orthophosphate, pyrophosphate, tripolyphosphate, and organic phosphate forms. Each of these forms is expressed as mg/l elemental phosphorus.
Revised Code of Washington	Compilation of laws passed by the State legislature.
Sewerage	A complete system of piping, pumps, basins, tanks, unit processes, and appurtenances for the collection, transporting, treating, and discharging of wastewater. Term is declining in use, generally being replaced by sewer system or wastewater facilities.
Submain	A sewer that receives flow from one or more lateral sewers.

TERM	DEFINITION
Suspended Solids (SS)	The suspended undiluted material transported in wastewater. The quantity of suspended material removed during treatment varies with the type and degree of treatment and has an important bearing on the size of many mechanical and process units. Also referred to as "Total Suspended Solids (TSS).
Trunk	A sewer that receives flow from one or more sewer mains. See “Main”.
Volatile Suspended Solids	The organic portion of the total suspended solids which will oxidize and be driven off as a gas at 600°C. VSS typically represents 75 to 85 percent of the TSS for digested and undigested sludge.
Washington Administrative Code	Document which consists of regulations adopted by the State to carry out the RCW.
Wastewater	Water-carried wastes from residences, businesses, institutions, and industrial establishments, together with such ground and storm water as may be present.
Wastewater Treatment Plant	A water pollution control facility engineered and constructed to remove pollutants from wastewater. Also referred to as a sewage treatment plant.
Wet Weather Flow	Infiltration and inflow may increase the wet weather flow to a rate many times greater than the dry weather flow, and unless provided for in sewerage design, can produce hydraulic overloads resulting in wastewater overflows to streets or water courses, and/or reduced level of treatment and treatment efficiencies.
Wet Well	The compartment in a pump station where wastewater flow is collected and from which the pump intakes wastewater to be discharged into a forcemain.

CHAPTER 1
INTRODUCTION

1.1 INTRODUCTION

This report compiles and summarizes the results and conclusions of planning and engineering studies undertaken by PACE Engineers, Inc., in developing this General Sewer Plan for the City of Sedro-Woolley. This Plan supersedes and updates the City's 2005 Comprehensive Sewer System Plan and has been prepared in accordance with the requirements of the State Department of Ecology (Ecology) and City requirements. Included herein are identification and description of the characteristics of the City; description of the existing sanitary sewer system; a summary of the minimum design criteria used for development of the Plan; identification of existing and anticipated system deficiencies under various planning horizons; recommendations for system improvements; and a schedule and financing plan for upgrading the sanitary sewer system to accommodate the existing and projected population and land use for the area.

1.2 AUTHORIZATION

Recognizing the need to update the 2005 Comprehensive Sewer System Plan, the City of Sedro-Woolley authorized PACE Engineers, Inc., by contract to prepare this document in accordance with all applicable requirements and regulations.

1.3 PURPOSE

The purpose of this study is to establish a comprehensive sewer system plan which provides for orderly growth of the City's sanitary sewer system facilities within its service area. The Plan is set forth to be in compliance with all applicable requirements of Ecology.

1.4 OBJECTIVES

The objectives of this Plan are as follows:

- Review and analyze existing data and reports concerning the existing sanitary sewer system.
- Make a detailed study of the existing sanitary sewer system facilities and determine the immediate and long-term requirements for improvements to the sanitary sewer system.
- Coordinate the existing sanitary sewer system facilities consistent with land use designations.
- Develop minimum design criteria for present and future needs.

- Review previously completed hydraulic studies of the sewer system and perform additional computerized system modeling as required to verify the system capabilities.
- Develop recommendations for system upgrades based on current projections of future population and anticipated growth patterns.
- Prepare a comprehensive Capital Facilities Plan for the present and future sanitary sewer system improvements.
- Prepare preliminary cost estimates and tentative schedules for needed improvements.
- Develop a financial plan for the implementation of the Capital Facilities Plan.
- Comply with all requirements of the SEPA (State Environmental Policy Act) and other regulations governing sewage collection, treatment and disposal.

1.5 LOCATION

The City of Sedro-Woolley is located in Skagit County, Washington, just east of the City of Burlington and along State Route 20, a major east-west highway that spans the North Cascade Mountains east of Sedro-Woolley, as shown on Figure 1-1. The City is located along the Skagit River and consists of approximately 4.1 square miles of incorporated land.

1.6 AUTHORITY, MANAGEMENT, AND CONDUCT OF BUSINESS

The City of Sedro-Woolley is authorized and granted certain powers by the state of Washington under the Revised Code of Washington (RCW) Title 35 (Cities and Towns). It is under this authority that the City operates its public sanitary sewer system and other governmental services. The City operates under a mayor and a seven-person City Council that are elected by the citizens of the City. The ordinances and policies of the Council establish the policies of the sanitary sewer system and govern connection to, and operation of, the system. Direct responsibility for the sanitary sewer collection system and treatment plant is the responsibility of the City's Public Works Director/City Engineer.

The Wastewater Supervisor has the overall responsibility of day-to-day operation of the treatment plant and collection system. The City employs a sewer system field staff of seven permanent employees, of which two are dedicated to collections, four are dedicated to the plant operations, and one is a supervisor.

Engineering, legal counsel, and financial support are provided by outside consultants selected by the City Council.

Figure 1-1	*Vicinity Map*	18481.00
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1.7 HISTORY OF THE CITY

The City of Sedro-Woolley was incorporated as a City on December 19, 1898. The incorporation was the result of the merger of the towns of Sedro and Woolley.

The original wastewater system in the City was installed in 1911 and consisted of vitrified clay pipe ranging in size from 8 inch to 18 inch. As the collection system grew, two main sewer interceptors were developed; the Third Street and Township Street Interceptors both bring wastewater south through the City to the wastewater treatment plant. Many of the extensions to the main interceptors and trunk lines exceeded 8 inches in diameter, while the side sewer extensions in the residential areas of the City were primarily 8-inch or smaller. Concrete pipe was used exclusively for system extensions until the mid-1970s. Starting in the late 1970s, the use of PVC pipe began and was used at the northern end of the City off of Township Street. The sewer main entering the wastewater treatment plant on Fourth Street south of Sterling is 36 inches in diameter and is the largest main in the system.

The City's wastewater treatment plant is located in the southern part of the City, just north of the Skagit River. The plant provides secondary treatment using conventional activated sludge consisting of an oxidation ditch with secondary clarifiers. Influent grit and screenings removal preceded the secondary treatment process and UV disinfection is provided prior to effluent discharge to the Skagit River via a 24-inch outfall. Byproduct waste generated by the treatment process, such as biosolids, is stored in two digesters before being trucked offsite to be used in environmentally sound ways.

1.8 RULES AND REGULATIONS

The City operates the sanitary sewer collection system and wastewater treatment plant under a variety of rules and regulations, some of which are listed below. More detailed discussions of the specific regulations which affect various facets of the City's operation can be found in the appropriate sections of this Plan.

1.8.1 Federal Requirements

The City of Sedro-Woolley must operate within the regulations and requirements established by the federal government, as applicable, including the Clean Water Act (Federal Water Pollution Control Act); U.S. Army Corps of Engineers Permit requirements; the ESA (Endangered Species Act); and CMOM (Capacity, Management, Operations, and Maintenance Regulations).

1.8.1.1 Clean Water Act

The Clean Water Act puts forth regulations and requirements for restoration and maintenance of the integrity of the nation's waters in terms of physical, chemical, and biological characteristics. The EPA (U.S. Environmental Protection Agency) is the primary administrator of the Clean Water Act, but has delegated many aspects of administration of the Act to Ecology, including the NPDES (National

Pollution Discharge Elimination System) permit program, Biosolids regulations (40 CFR 503), and Pretreatment Regulations (40 CFR 503). Additional discussion of the NPDES permit for the City is presented later in this chapter.

1.8.1.2 U.S. Army Corps of Engineers

The Corps (U.S. Army Corps of Engineers) has jurisdiction over waterways and wetlands of the United States. As such, any modifications to a treatment plant outfall or construction of facilities in the vicinity of wetlands or navigable waters may require a permit from the Corps.

1.8.1.3 Endangered Species Act

Because of the listing of the Puget Sound Chinook Salmon and Bull Trout as a "threatened species," rules and regulations under the authority of the ESA will affect collection sewer system and treatment plant operations. Because the City operates a wastewater treatment plant and is responsible for the disposal of treated effluent and waste, compliance issues relating to treatment and disposal are managed and enforced by the City in accordance with the "4d" rule.

In addition, the "4d" rule may impact operation and maintenance activities. The City is responsible for assessing any and all activities that may affect anadromous fish or reduce their habitat, or affect stream levels and the rate or volume of water discharge into open waters. As part of its ESA compliance program, the City is prepared to retain qualified consultants (on its own or through associations and organizations to which it belongs) to train selected staff as BMP (Best Management Practices) compliance officers who would monitor all projects for ESA compliance.

1.8.1.4 Capacity, Management, Operations, and Maintenance

CMOM Regulations are a part of the Environmental Protection Agency's SSO (Sanitary Sewer Overflow) Rule under the NPDES policy. CMOM will require sanitary sewer collection system owners to develop a program to manage its assets. The CMOM program consists of a set of best management practices that have been developed by the industry and are applied over the entire life cycle of the collection system and treatment plant.

1.8.2 State of Washington Requirements

The City of Sedro-Woolley operates its sewer system under the general rules and regulations put forth in Title 35 (Cities and Towns). Title 35.67 (Sewerage Systems – Refuse Collection and Disposal) establishes a variety of regulations for sewer operation and specifically addresses requirements for detailed comprehensive planning for the system. Additional requirements for various aspects of sewer operation in a means consistent with the protection of the health and safety of the environment and the

general public are found throughout the laws of the state of Washington. A summary of key regulations that apply to the City of Sedro-Woolley is as follows.

1.8.2.1 Department of Ecology Regulations

Approval of this document and operation of the sanitary sewer system is under the jurisdiction of Ecology. This document has, therefore, been prepared, and the City is operated, in accordance with the requirements set forth in Ecology's "Criteria for Sewage Works Design" (August 2008), which incorporates the policies, guidelines, and practices of Ecology and identifies the minimum engineering requirements for design, construction, and operation of a public sanitary sewer system.

Ecology administers a variety of regulatory requirements which have a direct impact on operation of public sanitary sewer collection and treatment facilities including the following:

- Surface water quality regulations as put forth in WAC 173-201A
- National Pollutant Discharge Elimination System permit administration and enforcement as authorized in WAC 173-220 and 221
- Contract document review as authorized by WAC 173-240
- Shoreline management permit administration in accordance with WAC 173-27

1.8.2.2 State Environmental Policy Act

SEPA review is a requirement for many of the City's capital improvement projects in order to ensure that environmental concerns associated with construction are adequately addressed. Initiation of the SEPA process can be at the City's direction or as required for various permits. SEPA requirements and guidelines are presented in WAC 197-11.

1.8.2.3 Growth Management Act

The GMA (Growth Management Act) has a direct impact on utility system planning, as it requires a complete inventory of existing facilities and a comprehensive effort toward the capability of existing systems to accommodate future growth. This Plan has been developed consistent with County-wide and local GMA planning.

1.8.3 City Requirements

This Plan has been developed in accordance with a variety of plans, policies, and regulations put forth by the City of Sedro-Woolley. A summary of the specific policies impacting sanitary sewer service are presented in Section 2 of this plan.

1.9 RELATED PLANNING STUDIES

Recent planning and engineering studies that have been considered in the development of this Plan are listed below. These documents were used to ensure consistency with existing regional and local planning efforts and previous studies performed on the sanitary sewer collection and wastewater treatment plant.

- **City of Sedro-Woolley Comprehensive Plan 2016**. This document puts forth the plans and policies currently guiding City decisions on growth, land use, and public facilities and services.
- **City of Sedro-Woolley Public Works Standards.** These are the City's current standards.
- **City of Sedro-Woolley Comprehensive Sewer System Plan 2005, by PACE Engineers, Inc.** This document puts forth planning and engineering analyses in assessing existing and projected wastewater flows and infrastructure within the City.
- **Sedro-Woolley WWTP Condition Assessment Technical Memorandum, February 2016, by Brown and Caldwell.** This report documents the conditions of the wastewater treatment plant.
- **Sedro-Woolley WWTP Plant Capacity Assessment Report, May 2018, by Brown and Caldwell.** These documents further describe the capacity and latest upgrades to the wastewater treatment plant.

CHAPTER 2
PLANNING DATA

2.1 GENERAL

This chapter of the Plan provides a general description of the City of Sedro-Woolley's existing and potential sanitary sewer service areas and identifies the primary physical characteristics, land use, and demographics within those areas. This information has been developed based on existing and future land use and is used to forecast future population, employment, and flow projections, which will be used in system analyses contained in subsequent chapters of the Plan.

2.2 STUDY AND SERVICE AREA

The study area for this plan includes the existing and projected sewer service area of the City of Sedro-Woolley, which is generally located along States Route 9 and 20, northeast of the cities of Mount Vernon and Burlington, in Skagit County, Washington. The 5.96-square-mile service area shown on Figure 2-1 is consistent with the existing Urban Growth Area (UGA) boundary and reaches from just north of the Sedro-Woolley Innovation for Tomorrow (SWIFT) Center on the north to the Skagit River to the south, and from just east of Helmick Road on the east to Collins Road on the west. The City currently serves an estimated 3,560 connections, most of which are within the existing city limits. The exception to this is a platted area along SR 20 which is within the UGA and served by the City sewer system. There are, as of December 2019, an estimated 129 properties within the City limits that receive garbage collection service, but not sewer service, and are therefore presumed to be served by onsite sewage disposal (septic) systems.

As part of this comprehensive sewer planning process, three development time periods (present, 10-year and 20-year) were considered. The existing development conditions were established from City land use information. A ten-year development scenario was considered and included areas identified by the City as likely to be developed within the next ten years. A twenty-year build-out analysis was considered which assumed full development of the UGA in accordance with City zoning.

Previously there had been discussion of diverting flows from tribal land to the City for treatment; however, the Upper Skagit Indian Tribe built a community septic system and no longer needs the City's plant.

2.3 GOVERNMENT AND SERVICES

As mentioned previously and shown on Figure 2-1, the sewer service area is within the existing City limits and the Urban Growth Area. The City provides both sanitary sewer collection and wastewater treatment and disposal.

Water service in the City and surrounding area is provided by the Skagit County PUD No.1. In addition to sanitary sewer and wastewater treatment and disposal, the City provides other public services, such as police, fire, parks, stormwater collection, and garbage collection. An analysis of the City's policies for these services, current levels of service, and improvements needed to address projected growth is presented in this and subsequent Plan chapters. The results of this analysis are presented in the form of a Capital Improvement Plan for the sanitary sewer system located in Chapter 8 of this Sewer Plan.

2.4 SERVICE AREA POLICIES

The City of Sedro-Woolley currently provides sanitary sewer service within the City boundary, although there are currently some areas within the City limits that are served by septic systems. It is the City's policy to provide service to areas within the City in accordance with the established schedule of fees and charges. Sewer service will only be extended outside the City limits upon annexation of the area into the City or with City Council approval. City policies regarding sewer service are as follows:

- Policy CF3.3 Maintain a safe, efficient, and cost effective sewage collection and treatment system.
- Policy CF3.4: Require all new subdivisions to connect to City sewer.
- Policy CF3.5: Existing septic systems shall be replaced with City sewer when it is available. The City shall seek sources of financial aid to assist low-income residents with this cost.
- Policy CF3.6: Monitor groundwater quality in areas of septic service on a timely basis.
- Policy CF3.7: Update the Sewer Plan every six years on a rotating schedule with other capital facilities plans.
- Policy CF3.8: Eliminate any point or non-point pollution sources associated with sewage transport and disposal.
- Policy CF3.9: Monitor infiltration and inflow through routine television inspection. Conduct improvements to limit and reduce current infiltration and inflow.
- Policy CF3.10: The following level of service guidelines should be used to determine the impacts of new development upon existing public facilities. (See description of level of service in the text. A facility with a rating equal to or worse than those listed is considered deficient and planning for improvements should commence.)

- Pipelines – Condition Level of Service 2, Capacity Level of Service D
- Pump Stations – Condition Level of Service 2, Capacity Level of Service D
- Wastewater Treatment Facility – Condition Level of Service 3, Capacity Level of Service D
- Septic Tanks – Condition Level of Service 3

- Goal CF3: To assure that capital improvements necessary to carry out the comprehensive plan are provided when they are needed.
  - Policy CF3.1: Provide capital improvements to correct existing deficiencies, to replace worn out or obsolete facilities and to accommodate desired future growth, according to the Six-Year Financing Plan contained in this element.
  - Policy CF3.2: Coordinate land use and public works planning activities with an ongoing program of long-range financial planning, to conserve fiscal resources available to implement the capital facilities plan.

Stream crossings shall be minimized, and the area served by a stream crossing shall be maximized.

Septic systems are under the jurisdiction of the Skagit County Health Department.

Service area policies such as developer extension requirements, annexation procedures, fees and charges, design standards, and related issues are governed by the City of Sedro-Woolley Municipal Code and Public Works Developer Standards. Additional discussion of how these policies impact sanitary sewer service is provided in Chapter 6.

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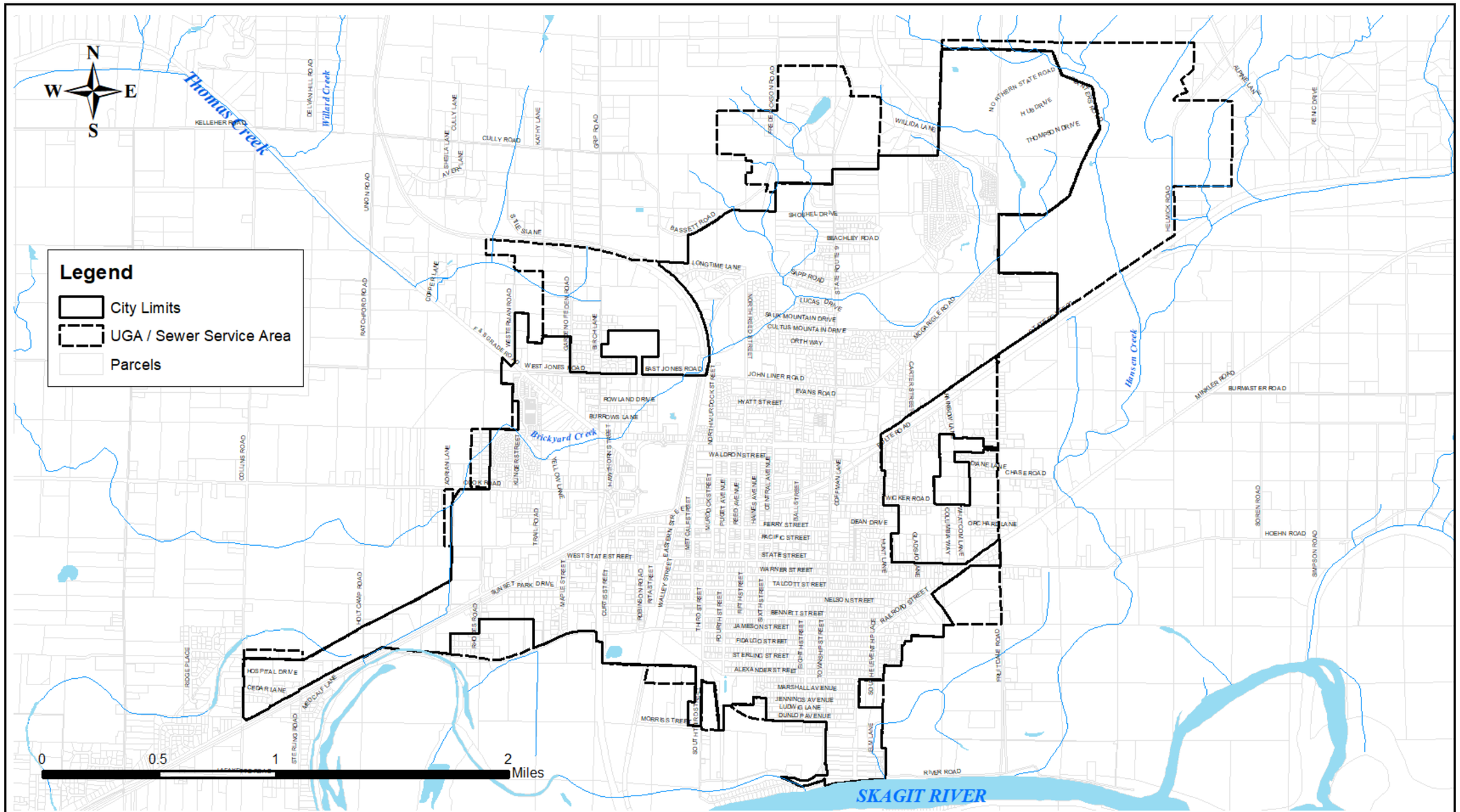

Figure 2-1	Service Area Map	18481.00
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2.5 PHYSICAL CHARACTERISTICS OF THE SERVICE AREA

Physical characteristics of the service area are critical in sanitary sewer system planning in order to maximize gravity service, reduce the need for pump stations, and incorporate protection of the environment into system planning and design. Physical characteristics of the City are summarized below.

2.5.1 Climate

According to data from the Western Regional Climate Center for the City of Sedro-Woolley from 1931 to 2016, the City receives an average of over 46.6 inches of rain annually, with the majority of that falling between the months of October and March. The average temperature is 50°F; average high and low temperatures in the area are 60°F and 42°F respectively.

2.5.2 Topography

Sedro-Woolley is located in west central Skagit County along State Routes 9 and 20. The topography in the service area is generally flat and elevations within the City limits differ only by approximately 20 feet. Elevations in the area range from approximately 40 feet along the banks of the Skagit River at the southern end of the City to over 300 feet in the northeastern portion of the UGA. The northernmost portion of the City, generally north of Sapp Road, has several hills and valleys.

The Skagit River is at the south end of the City and major creeks in the area are Hanson Creek in the eastern portion of the City and Brickyard Creek in the west. These topographic features and other environmentally sensitive areas require special consideration when planning for and providing sanitary sewer service.

2.5.3 Natural Drainage Basins

The natural drainage basins delineated around Sedro-Woolley's existing City and UGA limits, as shown on Figure 2-2, were developed with topological influences in mind. To the south, southwest, and east of the City, the natural drainage basins are approximately the limits of the UGA, due to flat and undulating contours. The topology influences are more apparent to the north and northeast of the City limits, where the natural drainage basins extend far beyond the UGA.

2.5.4 Sanitary Sewer Collection Basins

Topography and drainage characteristics within the District create two primary Sanitary Sewer Collection Basins: the Third-Metcalf Street Basin and the Township Street Basin, as shown on Figure 2-3. These basins were delineated during the sewer system planning process based on topography and existing system characteristics.

The Township Street Basin is in the northeastern portion of the City and extends from the wastewater treatment plant just north of the Skagit River to beyond the northern and

eastern boundary of the City. The western boundary varies from approximately Sapp Road (along the current City limits) in the north to Township Street in the south. All flow from this basin travels to the wastewater treatment plant via the Township Street Interceptor. The potential area that could be served by this basin is approximately 2,600 acres. This basin is divided into eight sub-basins, labeled Sub-Basins “A” through “G” and “NS,” and is discussed in detail in Chapters 4 and 6.

The Third-Metcalf Street Basin is approximately 1,450 acres in size and covers the western portion of the service area, from approximately East Jones Road on the north to the wastewater treatment plant on the south. The City limits define the western basin boundary. Flows from this basin travel to the wastewater treatment plant via the Metcalf Street and Third Street Interceptors. This basin is divided into six sub-basins labeled Sub-Basins “M,” “N,” “P,” “R,” “S,” and “T”. Additional information on these sub-basins is provided in Chapters 4 and 6.

As mentioned earlier, the City’s service area extends to the Urban Growth Area boundary. Some of the basins extend beyond the UGA to include areas that may develop within the next twenty years and could gravity-flow to existing City sewer facilities.

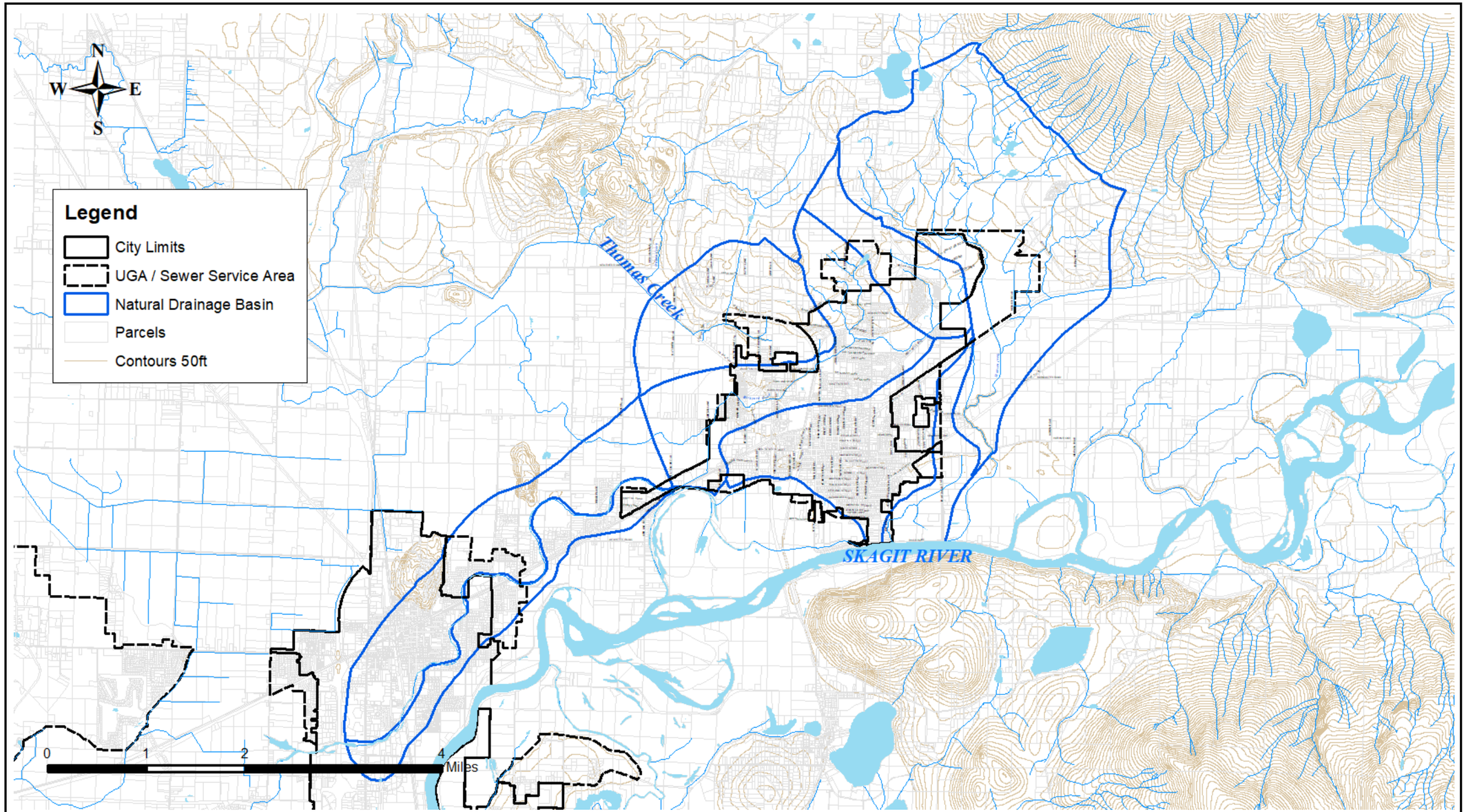

Figure 2-2	*Topography and Natural Drainage Basins*	18481.00
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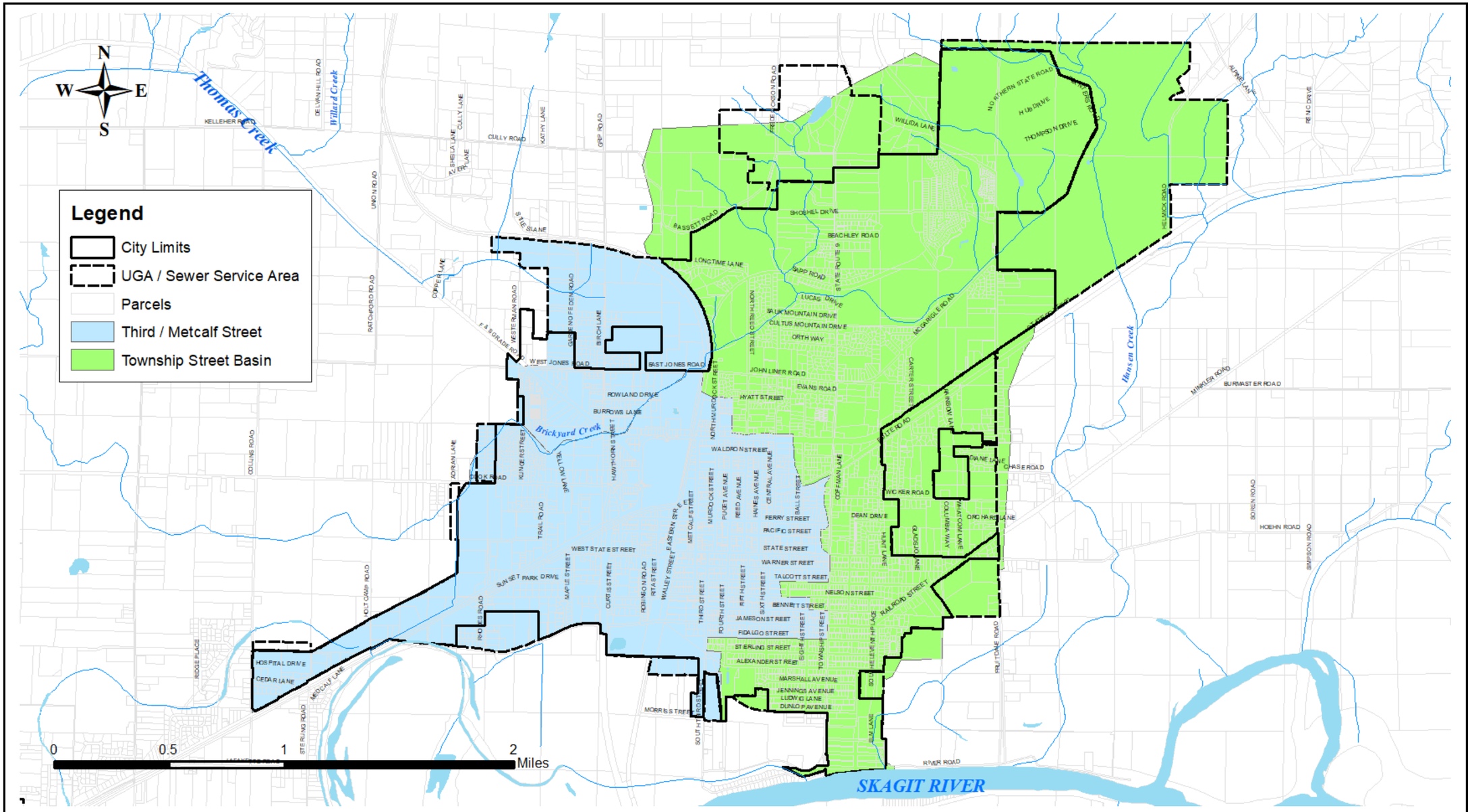

Figure 2-3	Collection System Basins	18481.00
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2.5.5 Soils

According to the City's Comprehensive Plan, some of the soils in the City of Sedro-Woolley and environs are associated with the floodplain of the Skagit River, and consist of very deep, moderately well-drained level soils. North of SR-20, predominant soils are silt loams which form on river terraces or are influenced by glaciation. Limitations for development arising from these soils may consist of potential flooding, perched water table, slow permeability, and seasonal high water table. North of Sapp Road, there are several discontinuous soil units. Some of these will create limitations on development in conjunction with steep slopes.

2.5.6 Sensitive Areas

Wetlands within the City and its UGA are the primary sensitive areas and are presented on Figure 2-4. It should be noted that this information is provided for general planning purposes only; site-specific information can be obtained from the City. According to the City's Comprehensive Plan, wetlands comprise approximately 3.6% of the UGA. Wetlands are protected from development by City ordinance.

The City is located just north of the Skagit River, and there are two creeks within the City that drain into the Skagit River: Brickyard Creek and Hansen Creek. According to the City's Comprehensive Plan, Hansen Creek drains an area that has not experienced much development, and the Creek is valued for its fish and wildlife habitat. Much of the City's new development drains into Brickyard Creek, and its capacity for stormwater conveyance may be reaching its limitations, according to a recent study. In the 1960s Brickyard Creek was altered from its original northwest course, where it used to flow into the Samish River, to its present course south to its confluence with the Skagit River. A third creek, Willard Creek, in the northwest part of the City drains to the Samish River (located north of the City) via Thompson Creek.

2.6 LAND USE AND ZONING

Land use within the City of Sedro-Woolley is varied and includes industrial and commercial uses generally in the west central portion of the City, public use facilities throughout the City, and residential neighborhoods throughout the City. The sewer service area is consistent with the Urban Growth Area (UGA) established by the City and Skagit County in accordance with the Growth Management Act. Some of the basins extend beyond the UGA to include areas that may develop within the next twenty years and could gravity flow to existing City sewer facilities.

Modern and historical transportation corridors in the City of Sedro-Woolley have included railroads, the Skagit River, and State Routes 20 and 9. These have played a major role in shaping the land use characteristics of the area and current commercial and industrial activities are generally located along major transportation routes such as State Routes 20 and 9.

The remainder of the City is best characterized as community/residential. The higher density multi-family land use is also located along the major thoroughfares through the City.

Approximately seventy-two percent of the City is zoned residential (single and multi-family). Approximately twenty-four percent is zoned auto commercial, central business district, public use and industrial. The remaining approximately four percent is categorized as "open space."

Figure 2-5 provides a land use and zoning map of the City based on current information. This information, along with information regarding vacant and re-developable land in the City, was used to identify future land use activities and associated sanitary sewer system requirements.

Table 2-1: Estimated Land Use Acreage

Land Use Classification	Approximate Acres	Percent of Overall District
Single Family Residential (R-1)	43	1.3%
Single Family Residential (R-5)	1,201	36.3%
Single Family Residential (R-7)	565	17.1%
Single Family Residential (R-15)	82	2.5%
Central Business District (CBD)	76	2.3%
Mixed Commercial (MC)	267	8.1%
Industrial (I)	199	6.0%
Public Use (P)	836	25.3%
Open Space (OS)	37	1.1%
Total	**3,306**	**100%**

Note: Based on data provided by the City.

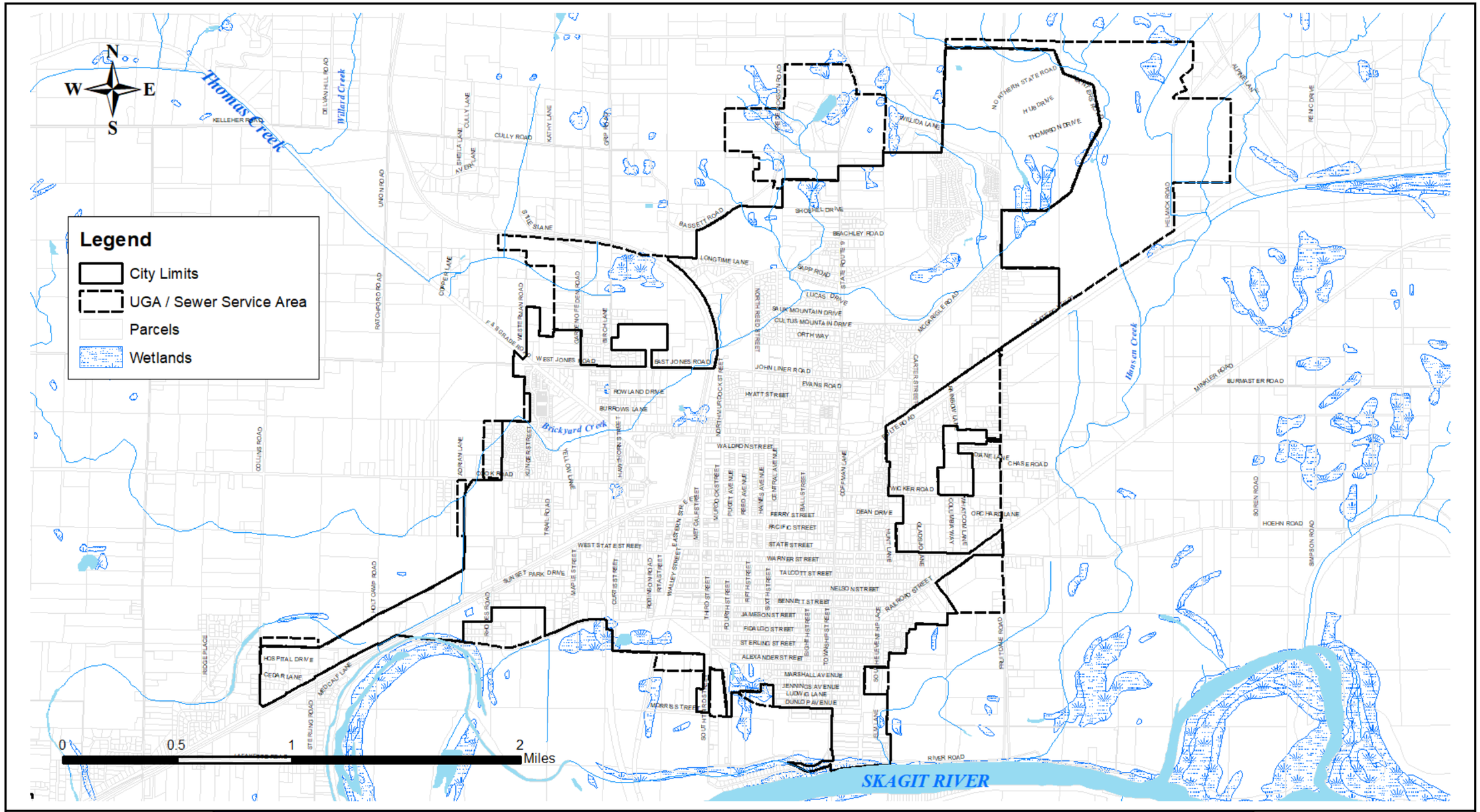

Figure 2-4	Sensitive Areas	18481.00
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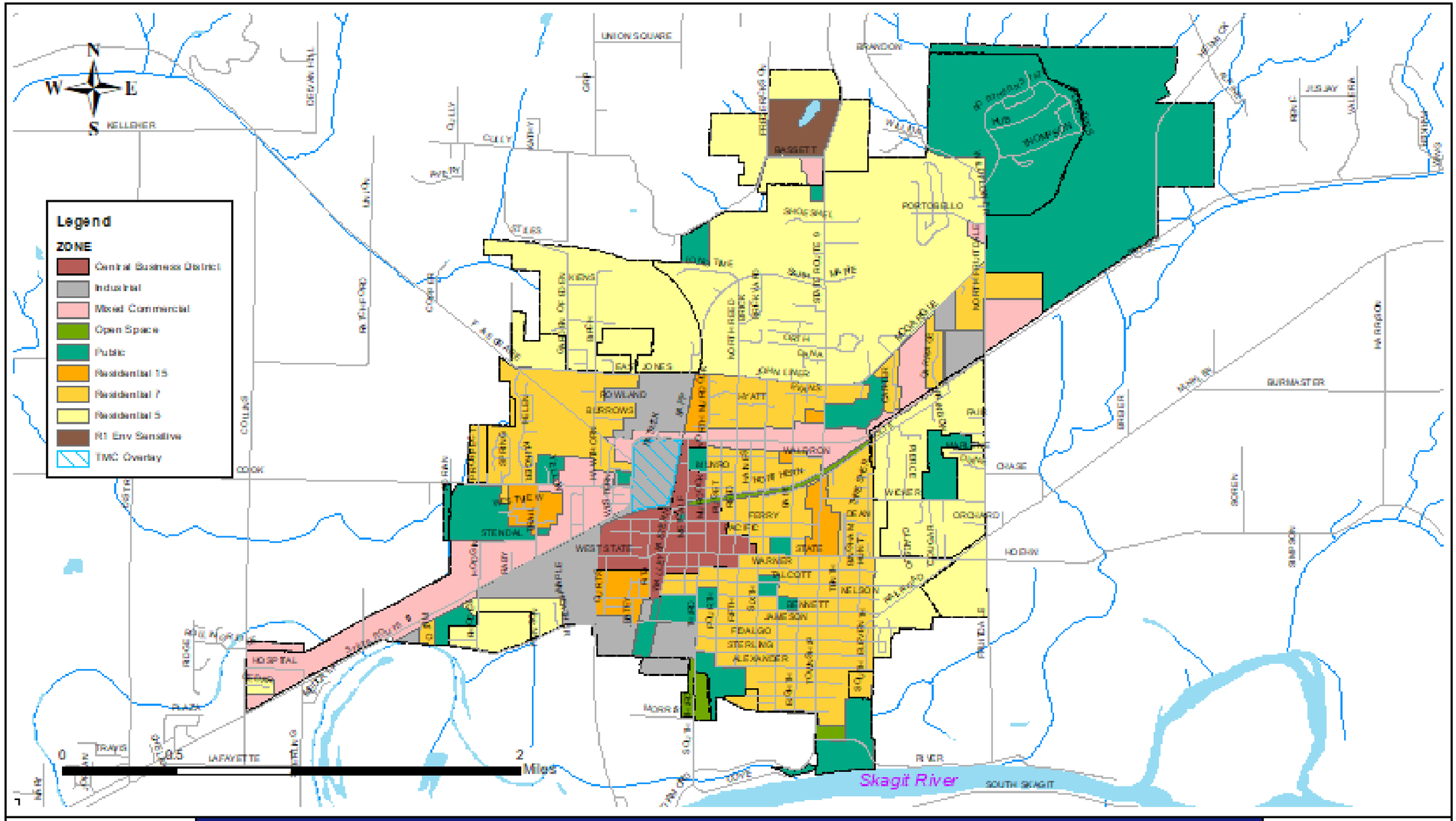

Figure 2-5	Land Use	18481.00
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2.7 POPULATION

Population projections for Sedro-Woolley developed by the City as part of the City's overall comprehensive planning process have been used in this document.

In 2010, the City population was approximately 10,540 (based on U.S. Census Bureau data). The April 1, 2013 Office of Financial Management (OFM) update shows a population increase to 10,610 and the 2019 OFM population estimated 11,690 in the City and UGA. The 2025 population forecast for Sedro-Woolley, including the unincorporated urban growth area, is 15,000. The 2036 population forecast for Sedro-Woolley and its unincorporated UGA is 17,069. Therefore, an increase of 4,555 residents is expected – and must be planned for – in the City and UGA between 2015 and 2036.

The average household size in the City of Sedro-Woolley is 2.59 persons. Based in this average, there are currently an estimated 3,390 households in Sedro-Woolley.

Table 2-2 provides a summary of existing and projected population and households within the study area by drainage sub-basin. It should be noted that the population and households served by the two basins exceeds the City's forecasted growth for the UGA, as the Basins were expanded slightly beyond the UGA to show where sewer service could be reasonably provided. It is also noted that this refers to households that could be served by sewer but may, at present, not be served. According to the City's sewer utility billing, the City served 4,472 units in 2018. This suggests that 376 households do not have hook ups to the sewer and are most likely on septic. The 4,484 value is used for planning purposes and analyzing capacity because these unsewered homes could eventually be hooked up to the City's sewer.

Table 2-2: Population and Households

	2018		2028		Build-out (2038)	
	Population	Households	Population	Households	Population	Households
Third-Metcalf Street Basin	3,945	1,551	4,742	1,831	5,380	2,018
Township Street Basin	8,382	3,297	10,076	3,890	11,433	4,288
Total Served	12,327	4,848	14,818	5,721	16,814	6,306
City Total	**13,165**	**5,083**	**15,564**	**6,009**	**17,661**	**6,819**

Notes: 2015, 2025, and 2036 estimates from City Comprehensive Plan and includes unincorporated Urban Growth Area
Linear growth assumed between 2015 and 2025 and 2036.
Population and household numbers are estimates.
Total served is population receiving sewer service.
Number of households assumes 2.59 people per household.

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CHAPTER 3
FLOW PROJECTIONS

3.1 INTRODUCTION

In order to evaluate the City's existing sewer system and plan for future improvements, it is necessary to estimate the loading, or flows, that the system will be required to carry. Two separate types of flow projections are included in this chapter, sewer collection system flows and treatment plant flows, each of which are discussed further in this chapter. Generally, collection system flows are simple calculations of flows from each of the City's two primary sewer collection basins, based on per capita domestic flows and an assumed infiltration and inflow (I&I) rate. They are presented for the purpose of identifying average and peak flow rates in a basin and provide the basis for preliminary design and local facility sizing. Treatment plant flows are based on diurnal curves throughout the system and are intended to represent the worst-case scenario of flows which may reach the treatment plant at a given point in time. These flows are intended to provide the basis for treatment plant sizing.

All of the flows presented include consideration of both domestic, or base flows, as well as estimated flows resulting from I&I into the system. The flows have been calculated using estimated flow per capita and the projected changes in population and employment outlined in Chapter 2. Per capita flow data was determined using industry standards for various customer classes and land uses and calibrated to actual water use and flows within the City using the City's treatment plant flow records. As discussed later in this chapter, consideration was made for the volume of flow expected from various types of users, and higher per capita discharge rates were assigned to the appropriate system connections. The estimated I&I has been considered separately and estimated in gallons per acre per day. I&I estimates for collection system flows and treatment plant flows have been calculated differently, as discussed later in this chapter. Chapter 6 provides a discussion on how these projections were used in the system modeling and analysis.

3.2 COLLECTION SYSTEM FLOWS

Using the population and employment forecasts presented Chapter 2, flow projections comprised of domestic, commercial, and specific high users were developed. Table 3-1 presents the flows per capita by population type used in the modeling and flow projections for the system. These estimated average flows were derived from a combination of sources, including actual City flow data, historical water use data, Ecology Sewage Design Standards, the Uniform Plumbing Code, and engineering experience.

Table 3-1: Estimated Sewer Base Flows by Population Type

Population Type	Average Daily Flow
Residential	75
Office/Retail	35
Commercial High User	Determined on a per connection basis from water use data

Note: Average flow rates do not include infiltration and inflow.
Source: State Department of Ecology and City Records.

The averages listed in Table 3-1 were confirmed with actual City data. I&I is not included in the average base flow rates shown in Table 3-1 because it can vary significantly throughout a system and, therefore, is addressed as a separate flow component, as discussed later in this chapter. Potential reductions in water use due to conservation efforts have not been included in these sanitary sewer flow estimates, making these estimates conservative in nature.

Table 3-2 presents estimated existing and projected flows for the City's sewer service area by major drainage basin. These estimates are based on projected population and employment figures presented in Chapter 2 and average flow rates identified in Table 3-1

Four separate flow projections are presented in Table 3-1 and are further explained below:

- **Base Flows** are a simple calculation of average flow rates without consideration of infiltration or inflow. Base flows have been determined by applying average flows per capita (as indicated in Table 3-1) to the population and employment data presented in Chapter 2.
- **Peak Flows** are used to estimate domestic flows at peak periods (typically early morning and evenings) and do not take infiltration and inflow into account. A peaking factor of 3.0 has been applied to base flows to estimate the peak flows indicated in Table 3-2 (Base Flow x 3.0 = Peak Base Flow). This peak rate is based upon actual treatment plant flows, past planning, and the Ecology Manual for Sewage Works Design.
- **Infiltration and Inflow** is calculated at a City-wide rate of 1,200 gallons per acre per day (gpad) with consideration of how I&I might be distributed amongst specific problem areas including high groundwater, older systems, or a number of illicit connections. The area used for the I&I calculation for each basin was a 100-foot buffer around each gravity sewer main. It is assumed that I&I can enter the system if within 100 feet of a sewer main. Please note that additional information regarding high I&I areas is provided in Chapter 6. The I&I rate was determined by comparing average historical wet weather and average dry weather flows from the measured Northern State Multi-Service Center area and multiplying by a factor of safety of 2.0 with allowance of open space not contributing to I&I inflow. Additional I&I tests in the urban areas with older

systems will provide better estimates of I&I throughout the city. More detailed I&I information is provided in Chapter 6 Paragraph 6.3 of this plan.

- **Total Flows or peak flows plus Infiltration and Inflow** have been determined by adding the aforementioned I&I rate to the peak base flows. No peaking of I&I has been assumed.

The buildout projections included in Table 3-2 also assume an expansion of the sewer system to include currently unsewered areas within the City limits and UGA.

Table 3-2: Collection System Flows

	Third-Metcalf Street Basin			Township Street Basin			Total		
	2018	2028	2038	2018	2028	2038	2018	2028	2038
Estimated Base Flow (mgd)	0.30	0.37	0.39	0.45	0.60	0.60	0.75	0.97	0.99
Estimated Peak Base Flow (mgd)	0.90	1.11	1.17	1.34	1.68	1.80	2.24	2.79	2.97
Infiltration & Inflow (mgd)	0.56	0.56	0.56	0.81	0.81	0.81	1.37	1.37	1.37
Peak Base Flow Plus I&I (mgd)	1.46	1.66	1.73	2.15	2.49	2.61	3.61	4.16	4.34

Note: Assumes a peaking factor of 3.0 per actual treatment plant historical data.

3.3 TREATMENT PLANT FLOWS

The City monitors flows at the treatment plant and keeps daily records. Detailed information on the treatment plant flows is provided in Chapter 7. The Table 3-3 below summarizes the flows and loading entering the treatment plant from 2013 to 2017.

Table 3-3: Historical Treatment Plant Flows

	2013	2014	2015	2016	2017
Average Dry Weather Flow (Estimated Base Flow) (mgd)	0.74	0.86	0.64	0.66	0.69
Annual Average Flow (mgd)	0.90	1.01	0.87	0.85	0.86
Maximum Month Flow (mgd)	1.26	1.57	1.37	1.32	1.34
Peak Day Flow (mgd)	1.97	2.87	3.35	2.726	1.8

*2013-2015 data is reference in the WWTP Plant Capacity Assessment Report; 2016 -2017 data references the plant monitoring reports.
* Dry weather months are May through September

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CHAPTER 4
EXISTING COLLECTION SYSTEM

4.1 GENERAL

This section provides a general overview of Sedro-Woolley's sanitary sewer collection system including a brief history of system development, a discussion of primary collection system basins and sub-basins and detailed information regarding key system facilities such as pump stations and interceptors. The sewer system is generally shown on Figure 4-1 and the collection system basin boundaries are indicated on Figure 4-2.

Nearly all of the sewage flows created within the existing City sanitary sewer service area are conveyed to and treated by the City's wastewater treatment plant. Areas not served by public sewers within the existing sewer service area are properties served with private septic systems.

4.2 BACKGROUND AND HISTORY

In 1911, the City's wastewater collection system consisted of vitrified clay pipe ranging from 8-inch to 18-inch diameter. Sewer pipe material types and processes improved dramatically from the early 1900s to the mid-1970s, and the City began using reinforced concrete pipe exclusively for system extensions required to serve new growth. Currently, HDPE, PVC, and ductile iron (DI) are approved material types.

As the population within Sedro-Woolley increased, two main trunk interceptors were constructed to carry sewage flow from the two primary collection basins to the City's treatment plant located just north of the Skagit River. The Third-Metcalf Street Interceptor is an 8- to 30-inch pipe that transports flows from SR-20, and the northwest, north, and central areas of Sedro-Woolley's existing sewer service area. The interceptor generally flows south and southeasterly to the treatment plant and is CIPP lined from Sterling street, north to State Street; HDPE from State Street to Northern Street; and PVC north of Northern Street. The Township Street Interceptor has two large mains within the street north of Northern Avenue. South of Northern Avenue, the two sewer mains enter into a 30-inch sewer main and continue on Sterling Street and Fidalgo Street and ultimately to the intersection of Alexander Street and Fourth Street. From this intersection, the flows discharge into the wastewater treatment plant. The Township Street sewer main directs flow from the north, northeast, and east sections of Sedro-Woolley's existing sewer service area. The Third–Metcalf Interceptor has been either replaced or CIPP lined for its entire length. It is CIPP from sterling north to State, HDPE from State to Northern, and PVC north to Northern.

The wastewater treatment plant discharges treated effluent water to the Skagit River via a 24-inch ductile iron pipe outfall. Any byproduct waste generated, like sludge, is stored in two digesters and transported away by trucks to be used in environmentally sound ways. The wastewater treatment facility is explained in greater detail in Chapters 7 and 8 of this Plan.

4.3 SEWER COLLECTION BASINS

The City of Sedro-Woolley's sanitary sewer service area is divided into two primary sewer collection basins, which are referred to as the Third-Metcalf Street and Township Street Basins. For system analysis and reference, the two primary sewer collection basins have been further divided into 14 sub-basins. Sub-basins have been determined based upon ground topography, pump station flow directions, and direction of sewer gravity flow within each area. Primary sewer collection basins and sub-basins are indicated on Figure 4-2 and further described in Table 4-1. Sub-basins A, B, C, D, E, F, G, and NS are within the Township Street Basin and sub-basins M, N, P, R, S, and T are within the Third-Metcalf Street Basin. General basin characteristics are given below with approximate boundary descriptions. Please refer to Chapter 5 for additional detail regarding modeling and analyses of sub-basins.

4.3.1 Township Street Basin

The Township Street basin is the larger basin the City's existing sewer system and is sub-divided into seven sub-basins serving the north, south, northeast, and eastern sections of the City. More detailed information regarding specific sub-basin characteristics in the Township Street Basin is provided in Table 4-1 and the following paragraphs.

4.3.1.1 Sub-basin A

Sub-basin A covers approximately 83 acres of single-family residential, public use, and open space land. The sub-basin is bounded by Fidalgo Street to the north, Third Street to the west, Township Street to the east, and the existing city limits to the south. Both the west and east basins drain into this sub-basin as it is the most down gradient sewer collection sub-basin. Sewer flows from the east basin are directed along Sterling Street via a 30-inch diameter sterling sewer main to the wastewater treatment plant via Fourth Street. The previous 18-inch interceptor located in the alley between Sterling Street and Fidalgo Street is planned to be downsized to an 8-inch line in 2022 as part of the R-1 Capital Improvement Project.

4.3.1.2 Sub-basin B

Sub-basin B covers approximately 212 acres of land and is bounded by the City's existing sewer service area boundary to the east, Township Street to the west, State Street to the north, and the City's sewer service area boundary to the south. Existing land use is comprised primarily of single-family residential development. This sub-basin receives flows from all upstream sub-basins in the Township Basin and directs sewage flow from the north to the south along Township Street via a 30-inch PVC sewer main, then heads westward to Sub-basin A. Manholes connected to the pipes were observed to be in good working condition based upon field observations.

4.3.1.3 Sub-basin C

Sub-basin C covers a 235-acre area as shown on Figure 4-2 is bounded by the City's existing sewer service area boundary to the east, with Township Street to the west, with Polte Road (SR-20) to the north, and with State Street to the south. This sub-basin is directly north of Sub-basin B and southeast of Sub-basin D. The land use in this sub-basin is primarily single-family residences, school, and some open space. This sub-basin directs sewage flow from the north to the south along Township Street via a 30-inch PVC sewer main with manholes connected to the pipes observed to be in good working condition. Flows are directed downstream to the intersection of Township Street and State Street.

4.3.1.4 Sub-basin D

Sub-basin D covers the 209 acres approximately bounded by the City's existing sewer service area boundary to the east, North Ball Street to the west, John Liner Road to the north, and Polte Road (SR-20) to the south. This sub-basin land use is comprised of primarily single-family residences, schools, and open space. This sub-basin accepts flows from Sub-basins E, F, and G, and the dual Township Street Interceptor with a 24-inch PVC sewer main on the west and 15-inch sewer main on the east. This new interceptor along Township Street has been constructed since the last sewer plan and is believed to be in good working condition. Flows are directed downstream to Sub-basin C at the intersection of Township Street and Polte Road.

4.3.1.5 Sub-basin E

Sub-basin E includes approximately 201 acres of land bounded by N. Murdock Street to the west, North Central Avenue and Brickyard Avenue to the east, and the City's northern sewer service area boundary to the north. The majority of the land use in Sub-basin E is single-family residential and open spaces. This sub-basin directs sewage flow from north to south downstream into John Liner Road and eastward into John Liner Pump Station. This pump station is located near the intersection of Central Avenue North and John Liner Road. Sewage flows from this pump station are directed into Sub-basin D and the SR-9 sewer gravity main that flows in a southerly direction toward the treatment plant. The sewer main along John Liner Road is 10-inch diameter PVC in good condition. Sewer mains in Sub-basin E were primarily constructed of PVC pipe in the late 1970s.

4.3.1.6 Sub-basin F

Sub-basin F is estimated at 440 acres and is bounded by the City's existing sewer service area boundary line to the north, with Central Avenue to the west, Fruitdale Road to the east, and John Liner Road to the south. This basin was just recently increased in size with the addition of the UGA expansion area on the north that surrounds Bottomless Lake. The Land use within the sub-basin is

primarily single-family residential. This sub-basin directs sewage flow from north to south downstream along SR-9. The sewer main along SR-9 ranges from a single 8-inch PVC pipe in good working condition to a dual 15-inch PVC and 12-inch PVC sewer main. The Mountain View Estates Pump Station is located near the SR-9 and Cultus Mountain Drive intersection and pumps flow from two small neighborhoods within Sub-basin F to the southern discharge location of the sub-basin.

4.3.1.7 Sub-Basin G

Sub-basin G Currently serves an area approximately 280 acres in size and is bounded by the City's existing sewer service area boundary to the north and east, Fruitdale Road to the west, and McGarigle Road to the south. This sub-basin is directly north of Sub-basin D, east of Sub-basin F, and generally encompasses the northeastern-most portion of the City. Land use area in this area is primarily single-family residential, and undeveloped land Sewage flows from northeast in a southwesterly direction in a 12-inch concrete main along McGarigle Road. The main was lined with CIPP in 2008 and the condition of manholes along this line indicates that the line is in good condition. Flows are directed to the intersection of SR-9 and McGarigle Road, where they flow into Sub-basin D.

4.3.1.8 Sub-Basin NS

The Sub-basin NS serves approximately 227 acres in size and encompasses the most north eastern portion of the sewer service area and is the furthest point in the system. The Sedro-Woolley Innovation for Tomorrow (SWIFT) Center is the largest single contributor of flows into the system.

4.3.2 Third-Metcalf Street Basin

The Third-Metcalf Street Basin includes approximately 1,400 acres of the City's existing sewer service area and generally includes the SR-20 area, the northwest area around the Garden of Eden, the north, and the central areas of the City. Land uses in this portion of the service area are varied and the area is approximately 60 percent developed. Zoning designations and vacant land in the Third–Metcalf Street Basin indicate that considerable development is likely within this basin. Considerable development upstream of Sub-basin P is anticipated in the near future. Descriptions of the sub-basins contributing flow to the Third-Metcalf Street Interceptor serving this portion of the City are provided below and summarized in Table 4-1.

4.3.2.1 Sub-basin M

Sub-basin M is the largest basin within the City's existing western basin. It includes approximately 267 acres of the downtown area and is bounded by Township Street to the east, Walley and Metcalf to the west and Fidalgo Street to the south. Land use in the area is a mixture of commercial, residential and public

facilities. The City's wastewater collector main is located within this basin and is called the Third Street Interceptor. Flows from the entire Third Street Basin are directed to the Third Street Interceptor located within Sub-basin M and flow south directly to the treatment plant. Field observations indicate that manholes in the area are in good working condition.

4.3.2.2 Sub-basin N

Sub-basin N covers the area approximately bounded by SR-20 to the north, Rhodes Road to the west, the Southern service area border to the south, and Walley Street to the east. This sub-basin is directly to the east of Sub-basin T with upstream sewer collection flows coming from Sub-basins T and S. This Sub-basin delivers sewage directly into Sub-basin M trunk lines along SR-20 and West State Street. Sub-basin N is approximately 167 acres. The land uses in this area consist of single-family residential, commercial, and some agricultural uses. The commercial areas are generally located north of Sunset Park Drive and along West State Street. The West State Street Pump Station is located at the intersection of West State Street and Maple Street and pumps flows from Sub-basin N and its contributing upstream sub-basins.

4.3.2.3 Sub-basin P

Sub-basin P covers approximately 283 acres that are bounded by Crossroads Square to the west, John Liner Road and East Jones Street to the north, West State Street and Northern Avenue to the south, and Ball Street to the east. This sub-basin is directly east of Sub-basin S and includes single-family residential, commercial, and some recreational open space land uses. Flows from this sub-basin are directed from north to south from North Murdock Street, then south along Metcalf Street to the intersection of State Street where the basin discharges downstream to Sub-basin M and the Third Street Interceptor. The trunkline in believed to be in good condition.

4.3.2.4 Sub-basin R

Sub-basin R covers approximately 296 acres of mostly flat or slightly undulating slopes. Land use in this area is a mixture of single-family residential, commercial and a significant portion of the sub-basin is unsewered and/or served by private septic tanks. The area north of F&S Grade Road directs their flows to the F&S – Jones Street Pump Station where the flows are directed to sub basin P. The sub-basin R is directly north of sub-basin S and is bounded by F&S Grade Road to the South, the western City Limits/UGA Boundary to the west, and the railroad right-of-way on the east and north.

4.3.2.5 Sub-basin S

Sub-basin S is generally located south of Sub-basin R. Land use in this area is a mixture of single-family residential, commercial and approximately half of the

sub-basin is unsewered and/or served by private septic tanks. The approximate size of the sub-basin is 211 acres. Gravity service is achieved by the Klinger Street Pump Station, located near Thurmond Avenue and Klinger Street and the Cook Road Pump Station, located near the intersection of Cook Road and Prospect Street. The Cook Road Pump Station's force main is an 8-inch PVC line along Cook Road which discharges into a gravity 10-inch diameter PVC sewer main on Trail Road. The sewer flows to the SR-20 sewer trunk which is then flows to the West State Street Pump station where it is directed to Sub-basin M.

4.3.2.6 Sub-basin T

Sub-basin T is generally located at the southwest region of the City's sewer service area. The basin is approximately 142 acres of mostly commercial land in the westernmost part of the City. The sub-basin is along the SR-20 corridor extending from the City limits at Collins Road on the west to Rhodes Road on the east. The majority of the sewer pipes within this sub-basin is PVC pipe. The Hodgins Road Pump Station pumps flows from Sub-basin T to Sub-basin S. Additional detail on the facilities serving this sub-basin including a detailed description of the Hodgins Road Pump Station is provided later in this Chapter. The Holtcamp Station and the Hospital Drive station pump flows up into the Hodgin Pump Station.

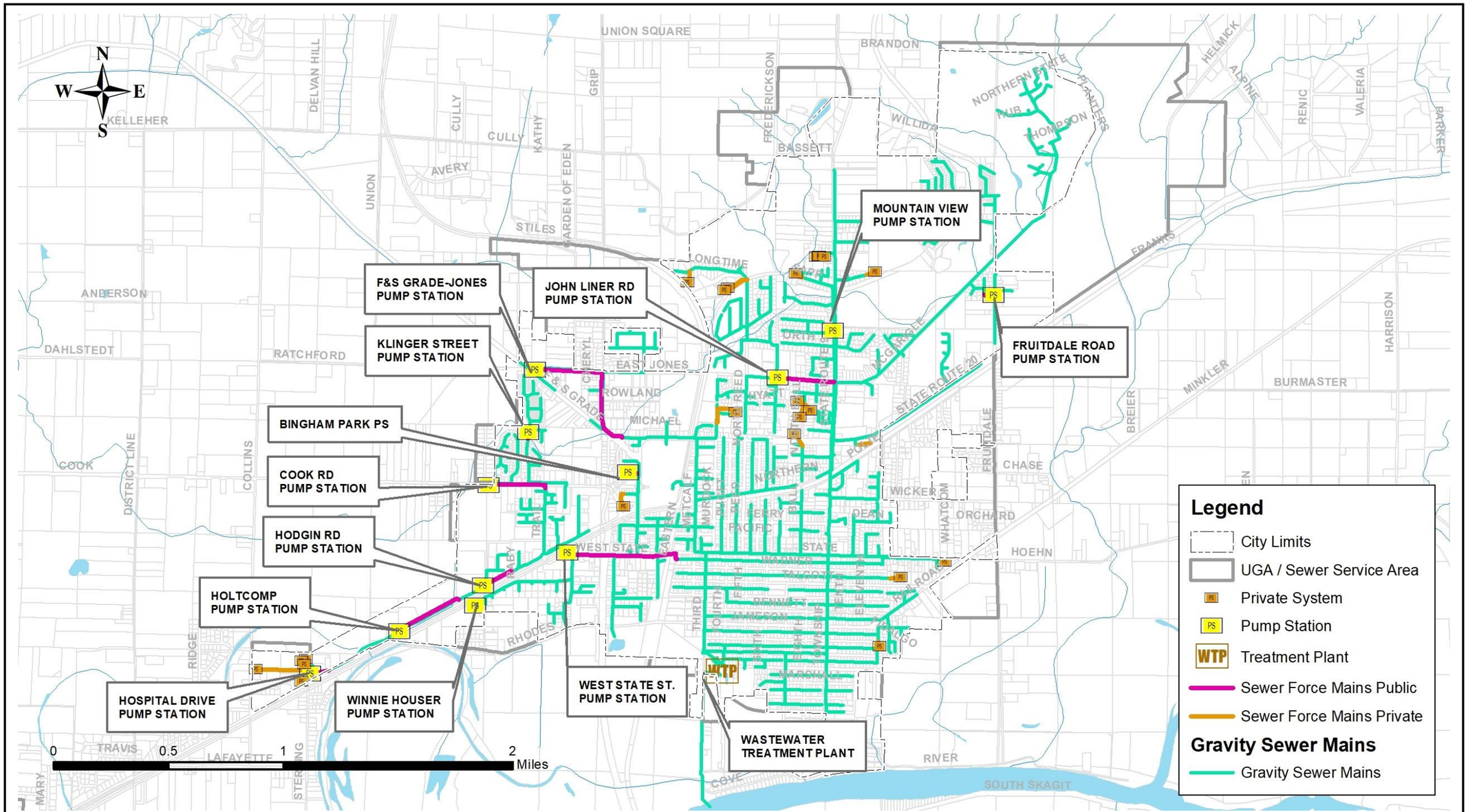

Figure 4-1	Existing Sewer System Map	18481.00
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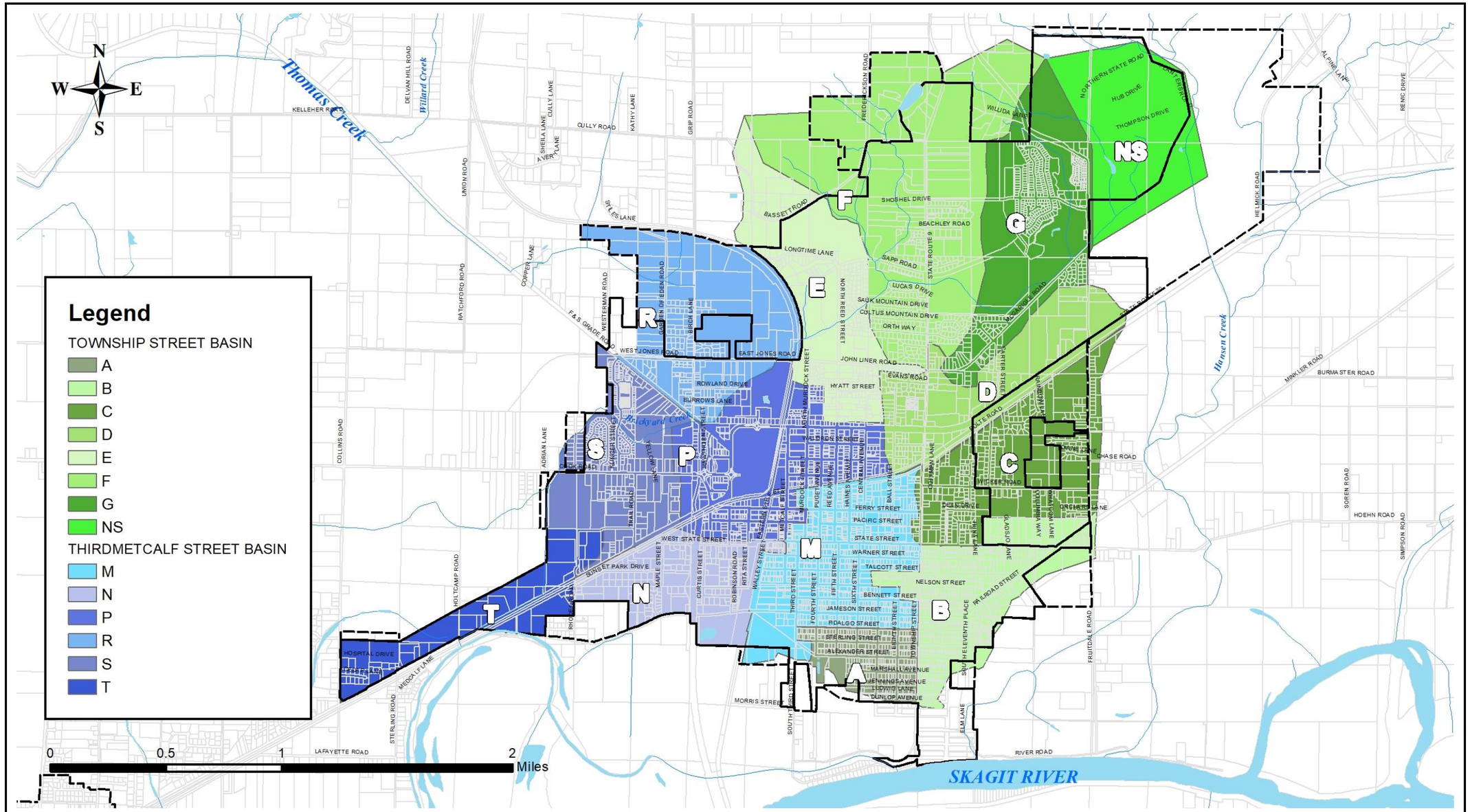

Figure 4-2	Collection System Sub-Basins	18481.00
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Table 4-1: Sanitary Sewer Basin Characteristics

Sub-basin	Size (Acres)	From	Via	To	Comments
THIRD-METCALF STREET BASIN					
M	266	Sub-basins, T, S, R, P, N & M	Third Street Interceptor	Treatment Plant	
N	167	Sub-basins N Only	West State Street Pump Station	Sub-basin M	
P	283	Sub-basin R, and P	Metcalf Street Trunk Line	Sub-basin M	
R	297	Sub-basin R Only	F&S Grade – Jones Road Pump Station and Metcalf Street Trunk Line	Sub-basin S	
S	211	Sub-basins T & S	West State Street Pump Station	Sub-basin M	
T	142	Sub-basin T Only	Hodgins Road Pump Station	Sub-basin S	
TOWNSHIP STREET BASIN					
A	83	Sub-basins A, B, C, D, E, F, G, and NS	Township Street Interceptor and Fidalgo/Sterling Alley Interceptor	Treatment Plant	
B	212	Sub-basins B, C, D, E, F, G, and NS	Township Street Interceptor	Sub-basin A	
C	235	Sub-basins C, D, E, F, G, and NS	Township Street Interceptor	Sub-basin B	
D	209	Sub-basins D, E, F ,G, and NS	Township Street Interceptor	Sub-basin C	
E	201	Sub-basin E Only	John Liner Road Pump Station	Sub-basin D	
F	439	Sub-basin F Only	SR-9 Trunk Line	Sub-basin D	
G	280	Sub-basin NS, and G	SR-9 Trunk Line	Sub-basin D	
NS	227	Sub-basin NS Only	McGarigle Road Line	Sub-basin G	

4.4 COLLECTION SYSTEM FACILITIES

Sedro-Woolley's existing sewer system consists of approximately 46 miles of sewer mains, approximately 0.68 miles of 24-inch outfall, and 12 public pump stations, all of which discharge to the wastewater treatment plant that is described in Chapters 7 and 8 of this Plan. There are currently approximately 3,560 direct service connections on the Sedro-Woolley system

Some of the City's most significant connections in terms of flows to the system include flow from the Sedro-Woolley Innovation for Tomorrow (SWIFT) center, commercial businesses, and schools.

4.4.1 Collection System

The majority of the City's collection system is smooth polyvinyl chloride (PVC) and reinforced concrete pipe (RCP) or asbestos cement (AC). Other pipes throughout the City are comprised of a variety of materials including vitrified clay (CL), ductile iron (DI), and High-Density Polyethylene pipe (HDPE). Vitrified clay is common in the older parts of the City sewer system while the more recently developed areas contain PVC pipes. With the ability to line older pipe, Cured in Place Pipe (CIPP) has been installed throughout the City and represents the third largest in lengths behind PVC and RCP/AC. The collection system includes approximately 2.3 miles of force mains with pump stations in low lying areas. Table 4-2 presents the approximate lengths of different pipe sizes within the system along with the linear feet of the pipe material. There are approximately 993 manholes within the City.

Table 4-2: Existing System Inventory (LF)

Pipe Size[1]	Linear Feet		Pipe Size[1]	Linear Feet		Pipe Material	Linear Feet
4" Gravity	300		21" Gravity	320		PVC	154,310
6" Gravity	8,710		24" Gravity	5,130		RCP/AC	48,210
8" Gravity	176,440		24" Outfall	3,590		CIPP	36,260
10" Gravity	15,150		30" Gravity	7,050		CL	15,950
12" Gravity	16,260		36" Gravity	300		DI	4,080
15" Gravity	10,600		Forcemain	12,200*		HDPE	3,730
18" Gravity	6,490		**TOTAL PIPE**	**262,540**		**Total Pipe**	262,540

Notes:
[1] HDPE outer diameter versus inner diameter is different depending on different SDRs. Sizes are nominal diameters.
* Forcemain length only includes city owned pipe. Forcemain pipe material lengths are included with gravity main

4.4.2 Pump Stations

Sedro-Woolley serves properties with gravity sewers whenever possible. However, since the majority of the central, western, southern, and eastern side of the City changes in elevation by less than 5 feet, some areas of the service area are too low in elevation or too flat to be served by gravity sewers. Sewer pump stations (or lift stations) have been constructed to transport the flows from these areas. The majority of the pump stations are located at the lowest point in the area to be served and pump sewage flows toward the City wastewater treatment plant.

All of the pump stations in the system are submersible stations with the exception of the John Liner and Klinger Pump Stations. In a submersible station, pumps specially designed for submersion in liquid are placed directly in the wet well and the sewage is pumped through a force main to the discharge location. Additionally, all pump stations are equipped with backup generators, with the exceptions of Mountain View, Bingham Park, and Winnie Houser Park Pump Stations.

A brief description of each station in the system is given below and summarized in Table 4-3.

4.4.2.1 State Street Pump Station

The State Street Pump Station is a submersible station located at 600 West State Street near the intersection of SR-20. This pump station was upgraded in 1998 and is scheduled to be upgraded in 2020. It is equipped with two submersible pumps, each rated 700 gpm This pump station serves Sub-basins N, S and T with single-family, agricultural, and commercial land uses. Observing the pump run times year to year, base sewage flows occurring in dry weather periods have increased. Review of wet weather flows indicate a decrease in flows from 2016 to 2017, corresponding to decrease in rainfall during this period. The dry weather flow from 2016 to 2017 decreased. From the collected pump run times for 2000 to 2019, the observed pump flow data increases when rainfall volume is greater and pump flow decreases with less total rainfall totals. Therefore, rainfall has significant influence upstream of this pump station during the wet weather season as observed through the summer pump run times and an increase in the base-flow.

4.4.2.2 John Liner Road Pump Station

The John Liner Road Pump Station is a wet-well mounted station located near the intersection of John Liner Road and Central Avenue North. This pump station was built in 1989 and updated in 2015 with new panels and two new pumps, each optimally rated at 300 gpm. The area upstream of this pump station (Sub-basin E) consists of approximately 198 acres of single-family residential and open space land. From the observed pump run times at the station during the dry weather summer months, the upstream sewage flow has been consistent from year to year with minimal increases in the sewage base-

flow component. However, observations of the wet weather seasonal pump run times indicate that rainfall does have a significant influence upstream of this pump station. Contributing inflow and infiltration accounts for on average 30% increase in pump run times during the wet weather season.

4.4.2.3 Cook Road Pump Station

The Cook Road Pump Station is a submersible station located near the intersection of Prospect Road and Cook Road, east of Janicki Fields on the south side of Cook Road. The station, which services approximately 62.1 acres of Sub-basin S, was constructed in 1998 and is scheduled to be upgraded in 2020. The pump station is equipped with two submersible pumps each capable of delivering an estimated 265 gpm from the existing pumps. From 2015 to 2017, pump run times increased by 14%. From 2000 to 2017 pump run times have increased from 146.6 hours in 2000 to 1456.0 hours in 2017. This is an approximately 900 percent increase in 17 years.

4.4.2.4 Mountain View Estates Pump Station

The Mountain View Estates Pump Station is located near the intersection of SR-9 and Cultus Mountain Drive and services two small neighborhoods within Sub-basin F of approximately 28 acres. This station is equipped with two submersible pumps capable of delivering up to 120 gpm of sewage flow. It was remodeled in 2002 and received a panel upgrade in 2013. This pump station serves primarily residential and undeveloped residential land. The contributing flows have been reviewed are based upon pump run times from 2002 to 2018. Based on 2002 and 2003 data the wet weather component of flow does not contribute significant increases during the winter months according to the pump run time records, however, in other years the wet weather flow is significantly greater than dry weather flows. The pump hours increased from 2012 to 2016 by 19 percent, showing that significant sewer flow growth occurred during this time, however, growth in the area has since been minimal. An investigation of the pump station is currently being conducted by WWTP staff to ensure the proper functioning of the station's check valve.

4.4.2.5 Hodgin Street Pump Station

The Hodgin Street Pump Station is located on Hodgin Street near its intersection with SR-20 and services Sub-basin T. The Hodgin Street Pump Station is equipped with two submersible pumps each capable of delivering 510 gpm of sewage flow. This pump station was constructed in 2003 and services primarily residential and undeveloped residential land upstream of the pump station. The difference between wet and dry seasons have been insignificant. Also, no significant growth has been observed in the pump run times from 2004 to 2017.

4.4.2.6 Holtcamp Pump Station

The Holtcamp Street Pump Station is located on SR-20, 700 feet east of Holtcamp Road and services Sub-basin T. Construction of the Holtcamp Pump Station was completed in 2008. This pump station is equipped with two 400 gpm pumps to service primarily commercial and industrial land upstream of the pump station. This station is designed with a submersible skid mounted station. The difference between the wet and dry weather flow is insignicant. The pump station was put online in 2009 and since then to 2017 the pump run times decreased on average 2% per year.

4.4.2.7 F&S Grade – Jones Pump Station

The F&S Grade – Jones Pump Station is located at the corner of F&S Grade Road and West Jones Road with two submersible pumps and impellers that can initially pump 250 gpm with future upgrade capacity up to 890 gpm. The pump station is located to the southwest of Sub-basin R and services primarily undeveloped residential or near-future residential development. The pump station was constructed in 2005 and the earliest data from this pump station is in December 2005. From 2015 to 2017 the total run time increased from 146.4 hours to 222.5 hours which is a 52% increase.

4.4.2.8 Klinger Street Pump Station

Klinger Road Pump Station is located on Klinger road in Sub-basin R. This pump serves the area on the north side of the S Basin where it pumps the flows across Brickyard Creek and discharges the flows into an 8 inch PVC sewer main in Klinger Street. This pump station was built in 2005 and started receiving flows in October 2005. Significant increase in flows began in 2007 with an 178% increase in pump run times from 2006 to 2007. From 2005 to 2006 the pump run times have increased 26% on average per year, however from 2013 to 2017, the increase has been insignificant. This pump station has 185 gpm capacity. The difference in wet flows and dry flows are insignificant.

4.4.2.9 Fruitdale Pump Station

The Fruitdale Pump Station is located on 920 Fruitdale Road. This pump station is equipped with two 195 gpm pumps and transfers sewer flow from the far east end of Basin D and Basin G back into Basin G. The pump station began receiving sewer flow in 2009 and has averaged a 21% increase in pump run times since then to 2017. Wet weather flows are significantly higher than the dry weather by an average of 87% increase which uses the flows from 2011 to 2017. Although the sewer collection system serving the pump station is recently installed PVC pipe and should not have significant I&I. WWTP staff have observed some illegal discharges into the sewer system during high flow events and are investigating solutions.

4.4.2.10 Hospital Drive Pump Station

The Hospital Drive Pump Station is located on 1970 Hospital Drive. This pump station is equipped with two 306 gpm pumps and transfers sewer flow from Hospital area into Basin T. The pump station began receiving sewer flow in 2008 and has averaged a 2% decrease in pump run times since then to 2017. Wet weather flows are higher than the dry weather by an average of 15% for the flows from 2011 to 2017. WWTP staff believe there are some illegal discharges into the sewer system that could indicate the increase in wet weather flows. These illegal discharges are under investigation.

4.4.2.11 Bingham Park Pump Station

The Bingham Park Pump Station is located on 400 Washington Street and is a small station equipped with one pump able to pump 45 gpm with a 5 feet TDH. The pump station was installed in November 2013.

4.4.2.12 Winnie Houser Park Pump Station

The Winnie Houser Park Pump Station is a small station equipped with one pump able to pump 45 gpm with a 5 feet TDH. As of the writing of this Plan, the force main has been constructed and the pump station is to be installed to be activated in 2020.

4.4.3 Wastewater Treatment Plant

The City of Sedro-Woolley owns and operates the wastewater treatment plant located near the intersection of Alexander and Fourth Street. The wastewater plant was initially constructed in 1956. In 1973, it was upgraded to provide secondary treatment with an oxidation ditch and a secondary clarifier. Modifications were also made to the aerobic digestion process and an outfall was replaced. A second secondary clarifier was added in 1994. Additional upgrades and expansion were implemented in 1998, including new headworks, new anoxic tank, conversion from chlorination to ultraviolet (UV) disinfection, relocation of the gravity belt thickener, and two new aerobic digesters (replacing the old digester).

Raw wastewater enters the plant below ground and is pumped to the headworks. The headworks includes two mechanical screens and one manually cleaned screen for bypass, grit removal equipment, and influent flow measurement. The screened and degritted wastewater is then routed to a diversion box where it can be directed to either the oxidation ditch or the anoxic tank. Anoxic tank effluent is routed to the oxidation ditch. Mixed liquor from the oxidation ditch flows to the secondary clarifiers, where solids are settled out. Secondary effluent is then disinfected with UV light prior to discharge to the outfall into the Skagit River. Return activated sludge (RAS) is routed to the headworks, where it is combined with the degritted influent. Secondary sludge is treated in the aerobic digesters, followed by dewatering in the belt filter press (BFP). The GBT is

used occasionally to thicken solids in the digesters, thus increasing digestion capacity. The dewatered biosolids are transported to eastern Washington for land application.

Table 4-3: Pump Station Characteristics

Pump Station Name	Date Built / Remodeled	Wet Well Size (ft)	Station Type	# of Pumps	Pump Make	Pump Model	Impeller Size	Motor hp	Pump Capacity gpm (each)	Total Capacity gpm
Cook Road	1998	72" Diameter	Submersible	2	ABS	APF1046 M70/4-22.60FM	243mm	3-Phase 9.4 hp	265 @ 58'	265
Fruitdale	2009	96" Diameter	Submersible	2	Hydromatic	S4NX500 JC		5 hp	195 @ 26'	195
West State Street	1998	96" Diameter	Submersible	2	ABS	AFP1044/4-31.60FM	240mm	17.5 hp	700 @ 45'	700
Mountain View	2002	72" Diameter	Submersible	2	ABS	AFP1040-M15/6 (EX)	6.34"	2 hp	120 @ 9'	120
Hodgin Road	2003	96" Diameter	Submersible	2	Meyers	4VCX75M-43	10.3"	7.5 hp	510 @ 36'	510
Holtcamp	2008	96" Diameter	Submersible	2	Hydromatic	S4BX750JB	9.5	5.3	400 @ 33'	400
John Liner	2015	72" Diameter	Above Ground	2	Smith & Loveless	4B2B	8 1/8"-	5 hp	300 @ 23'	300
West Jones	2005	72" Diameter	Submersible	2	Hydromatic	S4BX2500FC	9.875"	14	250 @ 101'	250
Klinger Street	2005	96" Diameter	Above Ground	2	Smith & Loveless	4B2B	7 7/8"	3 Phase 3 hp	185 @23'	185
Hospital Drive	2008	66" Diameter	Submersible	2	Hydromatic	S4MX750FC	7.3125"	5.08	306 @ 38'	306
Bingham Park	2013	24" Diameter	Submersible	1	Zoeller	E840		2	45 @ 5'	45
Winnie Houser Park	2020	24" Diameter	Submersible	1	Zoeller	E840		2	45 @ 5'	45

Note: TBD = To be determined.

CHAPTER 5
COLLECTION SYSTEM MINIMUM DESIGN CRITERIA

5.1 INTRODUCTION

This Section of the Plan identifies minimum collection system design criteria for the purpose of analyzing the existing system and planning future improvements. Minimum design criteria include capacity requirements for various system facilities, I&I rates, and peaking factors to be utilized in design of improved or new facilities. Minimum design criteria and projected flows will be used to evaluate the existing system and project future sewer system requirements for the planning area under anticipated growth scenarios. The minimum design criteria presented herein are intended for analysis of the system and do not in any way supersede other City documents and standards governing location, placement, sizing or construction of sanitary sewer system facilities located within the City of Sedro-Woolley or its sewer service area.

5.2 MINIMUM DESIGN REQUIREMENTS

The "Criteria for Sewage Works Design" (Design Criteria), as published by the State Department of Ecology (Ecology, 2008) in cooperation with the DOH (State Department of Health) and the EPA (U.S. Environmental Protection Agency), sets forth guidelines, standards and minimum requirements for sanitary sewer systems operating within the State of Washington. These guidelines, in conjunction with the City's Public Works Department Standards (updated 2017), establish the design criteria and construction standards to be used for extensions, upgrades and additions to the City of Sedro-Woolley's sanitary sewer system.

5.3 GENERAL DESIGN CRITERIA

All sanitary sewer facilities are to be designed in accordance with good engineering practices to suit the actual conditions at the project location by a professional engineer approved by the City and licensed in the state of Washington. All pipelines are to be designed and constructed in accordance with Ecology's "Criteria for Sewage Works Design", the City's sewer extension policies, and the requirements identified in this General Sewer Plan.

Sewer system facilities must be designed with sufficient capacity to carry peak flows from the tributary area at ultimate development unless the City has established other criteria. Sewer systems shall be designed and constructed to achieve total containment of sanitary wastes and to minimize infiltration and inflow.

5.3.1 Period of Design

In planning sewage facilities, it is necessary to evaluate both present conditions and future service needs, and to design a system capable of meeting variable demands over a given length of time, or period of design. Minimum design periods of 20 years for

mechanical facilities and 50 years for collection facilities are recommended. Ecology design criteria, as put forth in the "Criteria for Sewage Works Design Manual", recommends consideration of the following factors that affect design periods for specific facilities:

- Service laterals and sewer mains should be designed for the ultimate development of the parcel with current zoning or tributary areas to be served.
- The design period for trunk and interceptor sewers should be based on an evaluation of economic, functional, and other considerations, including, but not limited to:
    - Possible solids deposition, odor, and pipe corrosion that might occur at initial flows
    - Population and economic growth projections and the accuracy of the projections
    - Infiltration and Inflow
    - Comparative costs of staggered construction alternatives
    - The effect of sewer sizing on land use and development
- Pump station design should be based on ultimate development under current zoning of the served and potentially served areas.

5.3.2 Planning

Initial system construction and additions should conform to the this plan. The City Planning and Overview Committee shall review all developments against comprehensive plan land use, future growth for the neighboring area, and sewer capital improvement plans to determine if joint ventures can co-exist between the developer and the City. Phased development is permitted where full development will take several years.

5.4 REFERENCE DATUM

Mapping and analyses for this Plan are based on Horizontal Reference Datum NAD 83 and Vertical Reference Datum NAVD88.

5.5 FLOW RATES

Flow in a sanitary sewer system is composed of domestic, commercial and industrial wastes, groundwater infiltration and surface water inflows. All portions of the sewer system must be capable of carrying the peak volumes from these sources. Table 5-1 identifies the estimated quantities of flow associated with various land uses within the City. The flows presented do not include infiltration and inflow. Analysis of flows associated with more specific land uses should be based on actual water consumption data and/or DOH Design Criteria.

Table 5-1: Estimated Base Flow Rates by Land Use	
Land Use	**Average Daily Flow**
Single-Family	100 gallons/capita/day (2.6 persons per unit)
Multi-Family	100 gallons/capita/day (2.2 persons per unit)
Retail/Commercial	35 gallons/employee/day
Industrial	75 gallons/employee/day
Institutional	35 gallons/employee/day
Schools	10-16 gallons/person/day
Notes: Estimated flows do not include Infiltration and Inflow. Estimated flows are based on the Ecology's "Criteria for Sewage Works Design" (December 2008).	

5.5.1 Peaking Factors

Sanitary sewers and associated collection facilities shall be designed to carry at least peak hour flows. Table 5-2 provides a summary of typical peaking factors used in the analysis of sanitary sewer system collection facilities. More specific peaking factors put forth in the Ecology Design Criteria, which are based on ratio of peak hourly flow to design flow according to population, should be utilized in the actual design process of new system facilities.

Table 5-2: Design Peaking Factors		
Type of Facility	**Ecology Standard**	**City Standard**
Lateral and Local Sewers	4	4
Trunks and Interceptors	3	3
Pump Stations	---	2.5
Notes: Peaking Factors indicate the multiplier to be used to determine peak flow. Ecology peaking factors are based on a population of 13,500 for trunks and interceptors. Peaking Factors do not apply to Infiltration and Inflow.		

5.5.2 Infiltration and Inflow

Infiltration is groundwater which enters sewers through pipe joints or porous pipe. Inflow is surface water which enters the sewer through manhole covers or illegal connections such as footing drains, roof drains and area drains.

Infiltration and inflow is expressed in units of gallons per acre per day (gpad). Although new sewers are constructed with materials and methods to eliminate infiltration and inflow, some allowance must be made for the future deterioration of facilities and potential illegal connections. Typical values utilized for infiltration and inflow in evaluation and/or design of sewer systems are 600 gpad for infiltration and 500 gpad for inflow, although these values may vary according to local conditions. For older sewers, values are determined on a case by case basis and verified by pump station and flow monitoring data. Based on historical regional data, average infiltration and inflow rates for the City are approximately 1200 gpad. Future planning should be based on an average I&I rate of 1200 gpad (see section 6.3.2.2. and section 3.3 for more information).

The area used for the I&I calculation for each basin was a 100 foot buffer around each gravity sewer main. It is assumed that I&I can enter the system if within 100 feet of a sewer main.

5.6 COLLECTION FACILITIES

Collection facilities should be designed for the ultimate development of the tributary areas based on the design factors outlined in Tables 5-1 and 5-2 and anticipated infiltration and inflow rates.

5.6.1 Gravity Sewers

Gravity sewers are to be utilized wherever possible. Gravity sewer designs should consider at least the following:

- Peak sewage flows from residential, commercial, and industrial sources
- Infiltration and Inflow
- Topography and depth of excavation
- Treatment plant location
- Soil conditions
- Flow impacts from upstream pump station, if applicable
- Maintenance
- Existing sewers
- Existing and future surface improvements
- Controlling service connection elevations
- Flow from existing combined systems, if applicable

- Potential surcharge from downstream sewers
- Maximum/minimum velocity compliance

Pump stations may be allowed only after a thorough investigation has shown that no other cost-effective alternatives are available. Allowance of pump stations is at the sole discretion of the City.

5.6.2 Trunk and Interceptor Sewers

Trunk and interceptor sewers must be designed with sufficient capacity to carry peak flows from the ultimate development of the tributary area based on criteria established previously in Tables 5-1 and 5-2.

5.6.3 Side Sewers

Side sewers shall be at least 6 inches in the right-of-way and 4 inches in private property and shall be installed at a minimum slope of 2 percent. Side sewers shall be rubber gasketed PVC pipe, colored green, meeting ASTM3034-SDR35 specifications. Glued joints within the right-of-way are not acceptable. Cleanouts shall be located at a maximum spacing of 100 feet and a cleanout shall be provided at the property line and at the foundation. No bend greater than 45% will be permitted without a cleanout. The minimum cover requirement is 18 inches on private property and 30 inches at the property line. Side sewers shall serve only one residence or building.

5.6.4 Alternative Systems

Low-pressure sewers, inverted siphons and other alternative methods of wastewater collections are allowed at the sole discretion of the City and only when no other feasible and cost-effective alternatives exist.

Low-pressure sewers may be used or required in areas where the size of the area to be served is not sufficient to warrant the expense of a pump station. Where physical limitations make it impractical to otherwise serve an area, low pressure or vacuum collection systems may be appropriate. Minimum pipe sizes and system configurations shall be calculated on a case-by-case basis to provide a minimum velocity of 2 feet per second.

Inverted HDPE siphons may be required to accommodate severe grade changes and will only be allowed when no other feasible alternative exists. Minimum pipe size for inverted siphons is 6-inch diameter pipe and a minimum velocity in siphons shall be 3 feet per second. Siphons must be equipped with at least two barrels and provided with air relief valves as well as adequate facilities for cleaning and maintenance of facilities.

5.6.5 Combined Sewers

Combined sanitary and storm sewers are NOT allowed within the City.

5.6.6 Overflows

Overflows or new overflow structures are NOT permitted.

5.7 PIPE SIZING

All gravity collection sewers shall be a minimum of 8-inch diameter unless a specific exception is granted by the City to allow for 6-inch diameter lines. Conditions for consideration of six-inch mains are as follows:

- The probable maximum number served should not exceed four single-family residences or 10 multi-family residences, except as specifically approved by the City.
- The maximum length between access devices shall not exceed 150 feet without City approval.
- A manhole shall be provided where the 6-inch line connects to a larger line and access devices cannot substitute for manholes. An access device or manhole shall be provided at the end of the 6-inch main. If an access device is used, the first manhole shall be placed within 150 feet of the end of the line.
- There shall be no possible extension of a 6-inch main.
- The minimum allowable slope on 6-inch lines shall be 2 feet per 100 feet (2%).
- 6-inch pipes shall be PVC (ASTM D 3034, SDR 35) or ductile iron (ASTM A 21.51). Glued joints are not acceptable.

Pressure sewer, outfall and forcemain pipe sizing shall be as hydraulically justified and approved by the City.

5.7.1 Roughness Coefficient

An “n” value of 0.013 (with 0.8 full flow) shall be used in Manning’s formula for the design of sewer facilities, regardless of type of pipe, except inverted siphons, where an “n” value of up to 0.015 can be used.

5.7.2 Downsizing

Downsizing of sewer lines, or the installation of a smaller diameter line downstream of a larger diameter line, will not be allowed unless otherwise approved by the City. The downstream lines shall be upgraded as necessary.

5.8 PIPE SLOPE

All sewers shall be designed and constructed to give mean velocities of not less than 2.0 feet per second. Table 5-3 shows the minimum allowable slopes for different pipe sizes. Slopes greater than those indicated are desired, particularly under low flow conditions.

In side sewers, flows less than super-critical depth are to be avoided because the associated shallow water depths often leave solids in the pipe. Oversizing sewers with respect to capacity in order to allow the use of flatter slopes shall be avoided as this may create lower operational velocities (2 fps) resulting in high maintenance lines.

Table 5-3: Minimum Slope Requirements (for Pipes Flowing Full)

Sewer Main Size (inches)	Minimum Slope (feet per 100 feet)	Sewer Main Size (inches)	Minimum Slope (feet per 100 feet)
8	0.40	21	0.10
10	0.28	24	0.08
12	0.22	27	0.07
15	0.15	30	0.06
16	0.14	36	0.05
18	0.12		

Note: Minimum requirements from Ecology's "Criteria for Sewage Works Design" (December 1998) apply.

Sanitary sewers are to be laid with uniform slope between manholes. Sewers with slopes greater than 15% are to be anchored securely with concrete anchors or retaining gaskets. Sewers with slopes in excess of 40% or with a velocity greater than 15 fps at any structure shall be equipped with approved energy dissipaters. Anchors shall be required or specified by the City on a case-by-case basis depending on flow rate, velocity, and steep slopes. The maximum azimuth angle for sewer flow shall not be lower than 90 degrees. Any such devices shall be reviewed by the City on a case-by-case basis.

5.9 MATERIALS

Plastic (PVC) pipe may be used for gravity sewer lines where adequate soil foundation conditions permit and for slopes greater than 1% and less than 15% and depths less than 12 feet. Cement-lined ductile iron pipe is required in all other areas and for forcemains. Ductile iron pipe placed in peat soils or potentially corrosive areas shall be polyethylene encased.

All rigid pipes must pass standard crushing, flexural, and fill tests to ensure that the installation will be watertight and able to withstand earth loads after being placed in the trench and during construction.

Sewer pipes shall be connected by flexible rubber-gasket type joints, or other methods specifically approved by the City.

5.10 SEWER LOCATIONS

In general, trunk and interceptor sewers are to be located in existing street rights-of-way or proposed street areas. Certain sewers, however, will have to be located within easements in

order to utilize natural drainage courses and topography. In the event sewer mains must be outside of right-of-way boundaries, then easements shall be provided and be pre-approved by the City.

5.10.1 Depth

Minimum depth of cover for a sewer line in street right-of-way is three feet to the top of pipe. When specifically approved by the City, shallower depths may be used if pipe crush strength analyses are provided; however, in no case shall the depth of cover be less than 36 inches unless Ductile Iron (DI) pipe is used.

5.10.2 Separation

Sanitary sewer, when running parallel to another utility, shall maintain a minimum of 10 feet horizontal separation, center to center, when all pipes are 24-inch inside diameter or less. When pipe is greater than 24-inch inside diameter, a minimum horizontal separation is 10 feet measured from outside of pipe to outside of pipe. Crossings with water mains shall maintain a minimum of 18 inches of vertical separation between sanitary sewers and water pipes with water passing above the sanitary sewer pipe. Sewer joints are required to fall equidistant from any water crossing, and in some cases when separation cannot be maintained, it may be necessary to encase the water and sewer service in pipe approved by the City. No concrete will be allowed unless specifically directed and approved by the City. Where the required separation of water and sewer lines cannot be achieved, sewer lines are to be constructed as specified in Ecology's "Criteria for Sewage Works Design". Cross-connection control shall be done in accordance with State requirements and coordinated with local water service providers.

5.10.3 Alignment

Gravity sewers shall be designed with straight alignment between manholes.

5.10.4 Trench

The trench shall be kept clear of standing water in order to provide a clean, dry, joint seal. Pumping equipment shall be provided in order to keep the trench dry and clear. The trench shall be cut out 6 inches below invert of the pipe and kept clear of roots, boulders, and other obstructions. Compaction is to be provided per the modified proctor test ASTM D1557.

5.10.5 Stream Crossings

Stream crossing shall be minimized for new developments and determined as the only feasible last alternative by the City. Location of the nearest sewers shall be checked with the City prior to presenting stream crossing alternative. The area served by a stream crossing shall be maximized.

5.11 MANHOLES

Manholes are to be installed at the end of each line 8 inches in diameter or greater. Manholes shall also be installed at all changes in grade, size, or alignment, at all intersections and at distances not greater than 350 feet for sewers unless otherwise approved by the City.

The minimum diameter of manholes is 48 inches with channel bottoms conforming to Sedro-Woolley Public Work Standard Details. The minimum clear entrance opening in manholes shall be 24 inches. Larger size manholes may be required to accommodate special requirements.

A drop of up to 24 inches may be allowed if approved by the City and should be accommodated in the manhole channel in order to prevent deposition of solids.

Flow channels in manholes shall be of shape and slope to provide smooth transition between inlet and outlet pipes and to minimize turbulence. The channeling height shall be to the crown of the sewer main. Benches shall be sloped from the manhole walls toward the channel to prevent solid accumulation. All manhole connections shall be made with flexible joints which allow the manhole to settle without destroying the watertight integrity of the connection.

5.12 PUMPING STATIONS

This section covers the design and construction of sewage pump stations and forcemains.

5.12.1 Location and Flood Protection

Sewage pump stations shall be located as far as practical from present or proposed developed residential areas, and an all-weather road shall be provided for access to all pump stations. Noise control, odor control, and station architectural design shall be considered in the locating and design of sewage pump stations. Sites for pump stations shall be of sufficient size to accommodate expansion of facilities to meet projected build-out conditions.

Operational components shall be located at elevations above established 100-year flood/wave action or shall be adequately protected against such action. All pump stations shall be designed to remain fully operational during 100-year flood conditions.

5.12.2 Pumping Rate and Number of Units

At least two pumps shall be provided at each pump station and each shall be capable of handling the anticipated maximum flow, providing a City-approved safety factor. Where three or more pumps are provided, they shall be designed to fit actual flow conditions and shall be of such capacity to handle anticipated maximum flow with the largest pump out of service.

5.12.3 Pump Cycle Ratios

A pump cycle ratio represents the percentage of time during which a pump can be expected to run. Recommended pump replacement sizes are based on cycle ratios of

70% for theoretical peak day flows as generated for the design period conditions. Pump station peaking factors of 3.0 are used to arrive at peak flows from average day figures. Conversely, average day flows represent approximately 33% of peak design flows, so that pumps sized according to recommendations operate approximately 35% of the time. These cycle ratios were selected to provide a margin of safety against pump overheating and subsequent wet well flooding that might occur if mechanical problems were to occur at or near peak flow conditions. In addition, lower cycle ratios imply less running time and, therefore, longer pump life.

5.12.4 Pumps

Pumps shall be capable of passing spheres of at least 3 inches in diameter and run at least once per day. Pump suction and discharge openings shall be at least 4 inches in diameter. Under certain low flow/high head circumstances, grinder pumps, with smaller discharge openings may be approved.

Pumps shall be placed so that they will operate under a net positive suction head under normal operating conditions (unless otherwise approved).

5.12.5 Controls

The method of pump station control shall be submitted to the City for approval at the time of design. Provisions shall be made to automatically alternate pumps in use. Pump stations with motors and/or controls below-grade should be equipped with a secure external disconnect switch. All new pump stations shall be designed with the capability of measuring both pump run times and actual wastewater flow.

5.12.6 Site Water

Water service with a required backflow prevention device is required at each pump station.

5.12.7 Emergency Power

All new pump stations shall be equipped with emergency power generators.

5.12.8 Alarm System

An alarm system to monitor the following is a minimum for all City-owned and operated sewage pump stations: power failure, high wet well, low wet well, and pump failure.

Test circuits should be provided to enable the alarm system to be tested and verified as in good working order.

5.12.9 Wet Wells

Pump station grease maintenance wet pits shall be inspected weekly. A cleaning list shall be created weekly, bi-weekly, or monthly. Documentation of all wet pits shall be

recorded into a logbook. Flotation grease sludge shall be removed from surface sheen to prevent frequent pump failures.

5.12.10 Telemetry

Telemetry is required at all City-owned pump stations. Conduit for fiber optic cable shall be installed to connect the pump station controls to the nearest logical point of connection, such as a telephone pole.

5.13 CROSS-CONNECTION CONTROL

Protection of public water supplies is an important aspect in the design of sewer facilities. There shall be no physical connection between a public or private potable water supply system and a sanitary sewer system, or appurtenance thereto, which would permit the passage of cross-connection with the potable water supply system. Separations should be maintained to the satisfaction of state, county, and city regulations for the crossings. Casings may be required in the event of crossings lower than the minimum distance between separations. Sewer joints should be maximized from the water crossing to further protect in the event of sewer pipe leakages. Smoke and dye testing are to be used on an ongoing basis to assist City maintenance personnel in identifying illegal connections of surface water and sump pump connections. Crews are to continuously monitor the collection system through visual inspections and CCTV equipment. Investigation of excessive flows from direct sources shall be identified and investigated by performing simple dye, sound, or smoke testing. Letters will be written to property owners if they possess cross-connections informing them of corrective measures and solutions.

5.14 LOW PRESSURE SEWER

Low pressure sewers should be inspected with pulled pumps and service as needed. Diagnosis of electrical components with a licensed electrician is recommended on a yearly basis. Open and clean check valve components, paint, and all forcemains associated with low pressure sewers. Pressure cleaning as deemed necessary for any lines needing service. Pump station monthly pump hour log sheets should be reviewed for discrepancies and new monthly work order log sheets should be replaced. On a yearly basis, the pumping capacity should be re-calibrated for the pumps to ensure the maximum efficiency is being reached.

5.15 GREASE TRAPS

Implementation of a grease trap program is advised in areas where grease is a problem downstream within the collection system. Fats, oils, and a grease program including identification, discharge survey, inspection, and installation of grease traps. The grease trap inspection entails keeping date and information updated and complete, keeping 50% of its capacity for grease buildup or have it cleaned to have more than 50% capacity, and opening any traps during less busy business hours. A grease control device called interceptors should be located outside the building with invoices and frequency of cleaning kept on file.

5.16 FORCEMAINS AND LINE CLEANING

The City of Sedro-Woolley is responsible for maintaining all public sewer forcemains associated with its 12 pumping stations. Maintenance of any motorized valves will be performed at a minimum of two times per year to ensure proper operation, with inspection logs and pumping capacities; pigging (pressure cleaning) shall be performed as necessary after inspection of all forcemains.

As an integral part of the City's preventative maintenance program, a high-pressure cleaning of the City's sewer lines as well as the inspection and defect reporting of the manhole conditions which are opened to facility cleaning should be documented. When frequent cleaning is needed, the location is added to the trouble spot documentation report within the Sewer Department. The maintenance crew provides an observation and analysis of the manhole condition. Physical observations of debris in the line are made and, if warranted, a crew will respond with a closed-circuit TV inspection unit to determine line condition. After the complete information has been gathered, line cleaning is then performed to determine if an increase in the preventative maintenance cleaning at that location is needed.

The City maintenance personnel will treat sewer line backups and blockages as a top priority. Every backup will be responded to immediately with a sanitary sewer spill documented on a SSO (Sanitary Sewer Overflow) form. Any sewer spill that reaches a waterway of the County or State is reported to Ecology within 24 hours of its occurrence. Corrective action is taken to ensure there is no recurrence.

CHAPTER 6
COLLECTION SYSTEM ANALYSIS AND RECOMMENDATIONS

6.1 INTRODUCTION

This section of the Plan provides an evaluation of the Sedro-Woolley collection system facilities with regard to current sewage flows and anticipated ultimate flows. This Section also provides recommendations for providing sewer service to currently unsewered areas of the City and an analysis of the impacts of extending sewer service to unsewered areas on the existing downstream sanitary sewer system. A summary of the recommended collection system improvements is provided throughout this Section and a complete Capital Facilities Plan can be found in Section 9 of this document.

The recommendations outlined in this Section are based on general assumptions regarding the timing and location of anticipated development. The land use, population and flow projections dictate improvement recommendations and are based on specific development proposal information provided by the City. In most cases, however, they are based on more general information regarding potential densities allowed by existing zoning designations. The recommendations of this Plan are therefore conceptual, and the precise location, size and configuration of the recommended facilities will be determined by engineering design at the time of development and in accordance with all applicable design criteria, construction standards, and regulatory requirements.

6.2 GOALS AND OBJECTIVES

A variety of goals and objectives were established prior to the development of the recommendations for collection system improvements and are summarized as follows:

- Provide safe, efficient and reliable sanitary sewer service to the entire service area of the City, as identified and discussed in Section 2 of this Plan.
- Evaluate the future needs of the City based on the information provided in the City's comprehensive land use plan and by Skagit County's comprehensive land use plan for areas outside the City's urban growth area, as identified and discussed in Sections 2 and 3.
- Analyze the existing and future system needs using an Excel-based sewer model, in conjunction with City staff knowledge, accepted engineering practices and the minimum design criteria outlined in Section 5.
- Develop practical and cost-effective collection system alternatives and improvement recommendations to provide an efficient and reliable sanitary sewer system operation to serve the existing and future needs of the City's customers.

- Maximize gravity sewer service wherever possible based on the efficiency, cost-effectiveness and feasibility.
- Develop system strategies and improvement recommendations which are consistent with the protection of health, safety, welfare and minimization of impacts to the environment.
- Identify recommended improvements to meet the City's needs at ultimate development and consider project phasing where appropriate.
- Identify "non-project" related recommendations which will improve the overall efficiency of the wastewater collection system.

6.3 COLLECTION SYSTEM MODELING

The analysis of the City's primary system facilities in each of the City's two major drainage basins (Township and Third-Metcalf) was conducted by the model developed in Excel. The Excel model utilizes the pipe attributes such as material, slope, and diameter to calculate the total maximum flow capacity for each pipe modeled in the system. Comparing a maximum capacity for each pipe to the anticipated instantaneous peak flows in the system allows for identification of areas of the system which currently or may in the future experience surcharges. Three scenarios were modeled: existing conditions (based on 2018 flows); a near-term future scenario utilizing 2028 estimated flows; and a long-term scenario using anticipated flows in the year 2038. Population and employment data in the Excel model calculates base flows, peak flows, and infiltration and inflow in gallons/acre/day (gpad) to help assess the capacity of modeled pipes for the three modeling periods.

6.3.1 Data Input

The model is designed to analyze the larger pipelines or trunks for comprehensive planning purposes. For the Sedro-Woolley system, it was determined that major pipelines should be modeled; and one trunk line per basin as sewer branches typically don't have capacity issues. Private side sewers and laterals are not modeled. Specifically, critical gravity pipelines from specific drainage basins, and mains in areas of concern were included in the model.

The information used in this analysis was based upon GIS information provided by the City. The GIS mapping was an important first step in the modeling process along with available records to spot check existing sewer pipes.

The significance of the GIS and Excel based modeling effort is that it allows for a completely integrated mapping and modeling system based on the most current information available. In order to create a correct and calibrated model, the facility location, pipe type, size, age, manhole inverts, ground elevations, etc., were entered into the modeling spreadsheet. The result is a dynamic and up-to-date system model which can be expanded at a later date to include additional detail, facilities or newly

constructed improvements and may be used to evaluate future system expansions or design alternatives.

The final component of the conveyance system layer is the infiltration and inflow rates established for various areas of the City. These rates were estimated and entered into the model as described in Section 6.3.2.2 below.

6.3.2 System Flows

Municipal wastewater consists of basic sanitary flow, groundwater infiltration and surface water inflow, all of which are included in the modeling process. A more detailed discussion of each type of flow and how they enter into the modeling process is presented below.

6.3.2.1 Wastewater Flows

Using population and employment data to develop the amount of wastewater flow through the system, the Excel model calculates the anticipated flows at the Sub-basin level. Household population and employment was estimated at the Sub-basin level and is provided in Section 2.8. After calculating current and anticipated future flows, modeling scenarios were developed for existing conditions (based on 2018 flows) and for the years 2028 and 2038.

Household population and employment data is calculated by Sub-basin, and then allocated to the modeled pipes and trunk lines within each Sub-basin. Per capita flow rates, as presented in Table 3-1, were used for inputting residential and employment flows into the system. For specific facilities, or those which do not exhibit normal flow quantities and/or patterns, specific point flows using specific flow variables were entered into the model. These high-use connections generally include facilities such as the Hospital, Schools, churches and other high commercial users.

The model was generated with existing flows to simulate actual flow from each respective basin subject to customer class information, as explained in further detail in Section 3. The projected flow for the existing scenario was verified with City's data from the Wastewater Treatment Plant. This flow was entered into the model and run for the existing condition scenario.

6.3.2.2 Infiltration and Inflow

Infiltration occurs as a result of groundwater unintentionally entering the wastewater system through joints and cracks in pipes and manholes. The volume of infiltration is mainly influenced by age and condition of the system, antecedent soil conditions and the amount of rainfall. Infiltration is also affected by system proximity to larger bodies of water, side sewer aging and amount of penetrations into the sewer system, high groundwater tables near ground surface elevations, and by tidal influences near low lying shores. Inflow is the water that

unintentionally enters the sanitary system directly. Inflow might occur due to overflowing storm drain systems, cross connections, or result from illegal connections to the sanitary sewer system (typically from area, roof or footing drains).

Infiltration and inflow (I & I) are significant elements of any sanitary sewer system analysis and are particularly critical in wet weather climates, such as the Pacific Northwest, where they can cause overloading, or surcharging of the sanitary sewer system, compromise system capacity, result in unnecessary treatment costs, and, in extreme cases, pose a risk of environmental damage.

Unfortunately, historical I & I data is seldom available and difficult to calibrate without very detailed storm and flow data. Flow data is usually obtained at pump stations to determine if the pump stations are operating at maximum efficiency. The flow data at each pump station, as generated by pump run times, should be verified with a flow meter and compared to its operating flow point. Current flow data at the City's existing pump station is estimated based upon pump run times without having the flow verified through flow tests. For the purposes of this modeling effort, the maximum operating efficiency of each pump station is assumed with one pump operating at any given time only. In addition to the pump station location, flow at the treatment plant is assumed to be the total sewage flow being treated.

As discussed in chapter 3, (I & I) is calculated at a City-wide rate of 1,200 gallons per acre per day (gpad) with consideration of how I & I might be distributed amongst specific problem areas including high groundwater, older systems, or a number of illicit connections. The area used for the I & I calculation for each basin was a 100 foot buffer around each gravity sewer main. It is assumed that I & I can enter the system if within 100 feet of a sewer main.

6.4 COLLECTION SYSTEM ANALYSIS

Analysis of the system was accomplished using the existing system model described above and additional models were constructed for future populations (2028 and build-out (estimated year 2038 conditions).

Each of the models were analyzed with a peaking factor of 3.0 applied to the flow to predict the ability of the wastewater system to accommodate and transport existing and anticipated flows. In addition to the system modeling, the City's sewer service area was generally evaluated to determine the best possible means of serving customers while minimizing operation and maintenance requirements and costs. Modeling and analysis results, along with alternatives and improvement recommendations, are discussed in paragraphs 6.5 and 6.6 of this Section. Due to the significant investment in the upsizing of the sewer trunklines since the last sewer plan from 2005, no substantial capacity issues were discovered through the model analysis. A summary of the results of these analyses is provided below for existing conditions, the 10-year planning horizon, and build-out conditions.

6.4.1 Existing (2018) Conditions

The existing system model was constructed to represent existing conditions within the primary basins and sub-basins of the City. The existing system model, as discussed previously, is based primarily on recently obtained GIS information with additional input from limited system as-built information, historical and current flow data and/or other appropriate City records. Due to the relatively flat topography of Sedro-Woolley, gravity collectors and interceptors in the past have been constructed at smaller slopes to prevent excessive depths of pipe. Therefore, many slopes fall below what is recommended to maintain a cleansing velocity of 2.0 feet per second when flowing full. It is recommended that any new sewer be designed and constructed to meet minimum slope criteria to prevent sediment build-up and blockage, which reduces maintenance costs.

Generally, flows were calculated using the average flow rates established in Section 3. However, specific adjustments were made for known anomalies in the customer base, such as hospitals, schools, and other previously discussed facilities which generate large amounts of flow. An I & I rate of 1,200 gpad was assigned to the area within a 100-foot buffer around each gravity sewer main within each basin. It is assumed that I & I can enter the system if within 100 feet of a sewer main.

From City staff input, the focus for improvement of the system was to identify capacity issues and identify pipes that were needing replacement. Staff indicated that rehabbing or replacing concrete pipe was one of the focuses for this capital improvement plan.

These problem areas represent potential bottlenecks, high grease inflow, and past system back-ups resulting from issues with pipes and/or high flows. Projected new development inflows from upstream of these problem areas will likely cause additional surcharges or backwater conditions in the identified problem areas.

6.4.2 2028 Conditions

The modeling and analysis for the ten-year planning horizon is generally based on the existing system model. Discussing potential projects with City staff, no major improvements (trunk lines, pump stations, etc.) are planned that would have any major effect on the collection system model.

6.4.3 Build-out Conditions

Anticipated maximum build-out conditions were modeled with an average I & I rate of 1200 gpad on a 100-foot buffer around each gravity sewer main and a safety factor of 3.0 applied to the future full build-out scenario based upon UGA and zoning. Any sewer mains exhibiting full pipe flow or manhole surcharging would be targeted as a future capital improvement project.

6.5 ANALYSIS RESULTS AND IMPROVEMENT RECOMMENDATIONS

A summary of known deficiencies or areas of concern is provided below. Some of the identified deficiencies were not discovered through the modeling process and are attributable to sags in sewer lines or other specific deficiencies in pipe segments. This illustrates the importance of combining actual field experience with analytical modeling techniques.

6.5.1 Completed CIP Projects from Previous Plan

The City has been very proactive in maintaining an efficient and reliable sewer system. The City implemented rather extensive amounts of projects from their previous CIP from their 2005 Sewer System Plan. A table below shows the projects that were completed from the previous plan.

The City made an extensive effort and investment in upgrading their trunk lines and these projects were able to be completed. This was one major reason the sewer model showed minimal capacity issues.

Table 6-1: Completed CIP Projects

CIP #	CIP Title	Project Description	Year
1	Phase 1 – Metcalf Street Sewer Replacement	Replaced 8" Sanitary Sewer with approximately 1600 LF of 18" diameter sewer main.	2004
2	Phase 2 – Metcalf Street Sewer Replacement	Phase 2 of the Metcalf Street project replaced 8-, 10- and 12-inch pipe along Metcalf Street from Northern to State with 2,800 LF of 18-inch and 24-inch diameter pipe.	2005
3	West Jones Pump Station	The West Jones Pump Station, constructed at the F&S Grade Road and West Jones Road.	2005
4	Garden of Eden Gravity Sewer and Forcemain	Installed 12-inch sewer gravity line for 1680 LF and 8-inch gravity line for 1600 LF. Installed 3440 LF of forcemain to the intersection of F&S Grade Road.	2005
5	State Route 20 – Phase 1	Installed 1000LF of new 6-inch forcemain from the Hodgin Pump Station and installed 1400 LF of 12-inch gravity line.	2004
6	State Route 20 – Phase 2A & 2B	Installed sewer main that starts at Hodgin Pump Station and terminates at the start of Holtcamp Pump Station with 1750 LF of 8-inch, 1100 LF of 10-inch, and 1900 LF of 6-inch forcemain.	2006
8	West Nelson Street Sewer Extension	Installed 3020 LF of 8" main along West Nelson Road from Curtis Street eastward to Rita Street and north along Rita Street.	2018

CIP #	CIP Title	Project Description	Year
9	Northern State Multi-Service Center I & I Study	An infiltration and inflow study of the private sewer system at the state-owned Multi-Service Center in the northeastern portion of the UGA.	2005
10	Northern State Multi Service Center I & I Reduction, Replacement, and/or Rehabilitation	Rehabbed 8000 LF of differing diameters (4- to 15-inches) Concrete, PVC, PE, and HDPE pipe.	2008
11	Hospital Pump Station	A pump station near the intersection of Sterling Road and Highway 20 to facilitate 170gpm flows along Highway 20.	2008
12	Holtcamp Road Pump Station and Forcemain	Installed Holtcamp Pump Station with 1900 LF of 6-inch forcemain located east of the intersection with Holtcamp Road along SR-20.	2008
13	Township Street to Treatment Plant Sewer Main Replacement – Parallel to Sterling	Installed 3700 LF of 30-inch and 250 LF of 36-inch sewer main.	2005
14-16	Township Street Sewer Main Replacement – Phases 1, 2, 3	Upsized sewer main from Treatment Plant along Township	2006
18	McGarigle Road Sewer Main Rehabilitation/Replacement	Installed sewer on McGarigle Road from Northern State Property to Township Street.	2008
19	North of Fidalgo Alley Rehabilitation/Replacement	Rehabbed 900 lf of 8” sewer main in parallel alley north of Fidalgo Street.	2010
24	Waldron Street West of Township Rehabilitation/Replacement	Replaced 561 LF of 8-inch sewer main.	2013
CIP projects completed not included in previous Plan			
	Jones Road Sewer Extension	Installed 911 LF of 8” sewer main and manholes, Jones Road from Garden of Eden to Cambridge Street	2017
	Jones Estates Sewer	Installed 3,534 LF of 8” sewer main and manholes Cambridge Street, Cambridge Loop and Wellington Place with stubs north and east for future expansion	2018
	Telemetry Installation for Pump Station Sites	Installed SCADA monitoring via Radio signals telemetry to each pump station to gauge flow, pump run times, and pump “on or off” status for each of the six existing pump stations.	2009

CIP #	CIP Title	Project Description	Year
	Green Street Blvd., Virginia and Dean Drive Sewer Project	Replaced 1,194 LF of existing 8" sewer lines, manholes and services on Green, Virginia and Dean Drives	2015
	Township Sewer Extension	Installed new 8" Sewer in Township from Alderwood to Bassett	2010
	North Fruitdale Sewer	2050 LF 8" Sewer and 195 lf 4" FM and pump station	2010

6.5.2 Proposed CIP Projects from Previous Plan

The projects identified have been classified into three categories, Renewal or Replacement, Infill, or Expansion projects.

Renewal or replacement projects have been identified by the wastewater staff as having some deficiencies that could be deterioration in the pipe, root invasion, etc. The method to repair these deficiencies are either through rehabilitation with cured in place pipe (CIPP) or excavate and replace. These projects are funded through the sewer rates through the annual sewer renewal and replacement program.

Infill sewer projects have been identified by the City sewer projects that serve areas that are not served by sewer but are built out. The funding for these projects is typically through Local Improvement Districts or other City funded methods.

Expansion projects are sewer projects that are developer driven and will be funded by the developer as part of their project.

The projects identified, suggested construction date, and planning level cost estimates have been developed using known information at the time of plan development and prioritized accordingly. However, estimated construction dates may change based on need and timing of other projects.

The City is proceeding with video inspection and testing of specific sanitary sewer lines in the collection system to identify additional system issues, especially related to infiltration and inflow. As more information becomes available, identification of additional projects and reprioritization of projects is likely to occur. It is recommended that the City continue to maintain detailed records of system repairs, back-ups and facility inspections.

This information should be used to prioritize projects during the annual budgeting process. Dedication of field staff time is an important component of the overall I & I reduction and renewal/replacement programs.

The planning level cost estimates included in Table 6-2 were developed with the following assumptions:

- The average pipe depth is 8 feet.
- All pipes to be constructed per City of Sedro-Woolley approved piping material.

- Asphalt overlay to cover only trenched areas with 1:1 side slopes greater than 3½ feet deep.
- 8-inch to 10-inch diameter pipe cost estimated at $250 per linear foot.
- 12-inch to 15-inch diameter pipe cost estimated at $260 per linear foot.
- 18-inch to 30-inch diameter pipe cost estimated at $275 per linear foot.

Table 6-2: Capital Improvement Projects

Project No	Year to complete	Project Name (with City CIP #)	Project Function	Estimated Cost (1)
Rehab/Replacement Projects				
R-1	2020-2021	Alley between Fidalgo St and Sterling Street, west of Township, east of Fourth	Rehabilitation or Replacement of 2300 LF of 18-inch sewer main sewer main in parallel alley south of Fidalgo	$ 610,000
R-2	2022	North of Warner Street and east of Township Street Rehabilitation/Replacement	Replace or rehabilitate sewer main north of Warner in alley and east of Township Street. Approximately 1400 LF of 8-inch diameter sewer mains.	$ 350,000
R-3	2023	North of Railroad Avenue and south of Talcott Avenue	Replace or rehabilitate sewer main north of Railroad Avenue and east of Eleventh Street. Approximately 850 LF of 8-inch diameter sewer mains.	$ 215,000
R-4	2024	South of Ferry and north of Pacific and west of Ball Street	Replace or rehabilitate sewer main west of Ball Street, south of Perry Avenue. Approximately 260 LF of 8-inch diameter sewer mains.	$ 65,000
R-5	2024	North of Ferry and west of Ball Street	Replace or rehabilitate sewer main. Approximately 265 LF of 8-inch diameter sewer mains.	$ 66,000
R-6	2024	Alley between Reed Street and Haines Street	Replace or rehabilitate sewer main. Approximately 400 LF of 8-inch diameter sewer mains in alley between Reed Street and Haines Street, south of Northern Avenue.	$ 100,000
R-7	2025	Alley between Gibson Street and Northern Ave	Replace or rehabilitate sewer main. Approximately 400 LF of 8-inch diameter sewer mains in Alley between Gibson Street and Northern Avenue and east of Metcalf Street and West of Murdock Street.	$ 100,000

Project No	Year to complete	Project Name (with City CIP #)	Project Function	Estimated Cost (1)
R-8	2025-2027	Along east side of Hwy 9 from Alderwood Ln to Sapp Road and along the west side of Hwy 9 from Sapp Road to McGarigle Road	Replace or rehabilitate sewer main. Approximately 3500 LF of 10-inch diameter sewer mains along Hwy 9 from Alderwood Ln to McGarigle Road	$ 919,000
R-9	2022	Along Northern Ave from Metcalf to Murdock/Puget Alley. Along Metcalf from Northern Ave to Alley between Munro and Gibson	Replace or rehabilitate sewer main. Approximately 510 LF of 18-inch along Metcalf, 120 LF of 12-inch and 500 LF of 10-inch along Northern Ave.	$ 281,000
Infill Projects				
I-1	2028	North Ball Street Infill	Install approximately 1500 LF of 8-inch diameter sewer mains on North Ball Street and State Route 20.	$380,000
I-2	2029	Rowland Road Infill	Install approximately 1200 LF of 8-inch diameter sewer main on Rowland Road.	$300,000
I-3	2030	Burrows Lane Infill	Install approximately 650 LF of 8-inch diameter sewer main on Burrows Lane.	$160,000
I-4	2031	F & S Grade Road Infill	Install approximately 1100 LF of 8-inch diameter sewer main on F & S Grade Road.	$270,000
I-5	2032	Carter Street Infill	Install approximately 1634 LF of 8-inch diameter sewer main on Carter Street.	$500,000
Expansion Projects				
E-1	Unknown	Railroad and Minkler Road Sewer Expansion	Install pump station and approximately 1,000 LF of 4 or 6-inch high pressure forcemain at the intersection of Minkler and Fruitdale westward Minkler to Hoehn Road and westward to the existing manhole and 8” gravity sewer mains.	$800,000
E-2	Unknown	State Route 20 Sewer Expansion to Collins Rd	Install approximately 1,700 LF of 8-inch diameter sewer main on State Route 20 from Collins Road to the Hospital Pump Station.	$420,000

Project No	Year to complete	Project Name (with City CIP #)	Project Function	Estimated Cost (1)
E-3	Unknown	Bottomless Lake Sewer Expansion	Developers have expressed interest in developing in this recently annexed area of the city. It is unknown currently the phasing of the developments and all designs are very conceptual at this time.	Unknown
E-4	Unknown	Portobello Sewer Expansion	Property owners wishing to develop on the east side of the recently annexed area of the City can be served by gravity connecting to a sewer stub in Portobello Road. Designs are conceptual at this time.	Unknown
E-5	Unknown	East Jones Road Sewer Expansion	Install approximately 1,350 LF of 8-inch diameter sewer main on Jones Road from manhole R44 to Sapp Road	$340,000
E-6	Unknown	Patrick Road Sewer Extension	Install approximately 1,100 LF of sewer as part of the of the Patrick Road Extension Project	$260,000
E-7	Unknown	Garden of Eden Road Sewer Expansion	Install approximately 900 LF of sewer as part of the Trail Road extension connecting West Jones Road to Cook Road. This segment is from West Jones Road to F & S Road	$225,000
E-8	Unknown	Trail Road Sewer Expansion	Install approximately 2,030 LF of sewer as part of the Trail Road extension. This segment is from the F & S Road to Cook Road	$510,000
E-9	2022	Olmsted Park Sewer Expansion	Install approximately 750 LF of 6" and 8" sewer as part of the Olmstead Park Development.	$100,000

Table 6-3: Annual O&M Program

Project No.	Program Name	Project Function	Estimated Cost (1)
A	Annual Pump Station Rehabilitation	Yearly sewage pump station rehabilitations and maintenance tasks.	$ 70,000/yr
B	Annual Renewal and Replacement	Yearly sewer main replacement for deteriorating concrete pipe, undersized and flat sewer mains throughout the City. Approximately 10,000 LF of 8-inch sewer mains is estimated.	$ 350,000/yr

C	Repair Existing Sewer System	Provide emergency repair services for old mains and problem connections.	$ 35,000/yr
D	Annual I & I Reduction Program (Video Inspection, Smoke Testing, Ongoing Inspections etc.) (M1)	Study and provide basin consolidation report to test for I & I in each sub-basin with problem sub-basins as priority. Conduct TV inspection and smoke testing as needed to determine cause of leakage within problem sub-basins.	$ 20,000/yr
E	Wastewater Pretreatment Program	Annual fats, oils, and grease (FOG) inspection and public education program per SWMC Chapter 13.24	$ 15,000

Descriptions of existing conditions and required improvements summarized in Table 6-3 are provided below. Please refer to Section 9 for additional information regarding financing alternatives for each project

Project A – Annual Pump Station Rehabilitation

Annual pump station rehabilitation program includes daily checking of flow readouts and inspection of wet wells to ensure each pump station is performing to its maximum capability, and repair or replacement of mechanical equipment, backup generators and control systems according to the CIP

Project B – Annual Renewal and Replacement

It is recommended that the City continue to budget approximately $350,000 annually for pipeline emergency repairs, rehabilitation and/or replacement projects. These projects are generally described as those required to solve immediate issues in the collection system, extend the useful life of the system, and address known deficiencies before they become costly problems associated with system back-ups or pipeline failures. Regular renewal and replacement of sewer system protects the investment in existing facilities and helps utilities maintain stabilized rates. Although specific recommendations for pipeline replacement and rehabilitation projects have been identified for the six-year planning period, implementation of the I & I Reduction program described below in Project D, may result in identification of problem areas that require more immediate attention and create the need to reprioritize emergency repair, replacement and rehabilitation projects. It is recommended that the results of Project D, field staff records of specific system issues and the pipeline prioritization matrix included in Appendix B be used for annual (or more frequent) consideration of replacement and repair projects on specific pipelines.

Project C – Repair Existing Sewer System

Annual repair and replacement of collection system failures by staff or on-call.

Project D – I & I Reduction Program

As noted throughout Section 6, reduction of I & I is a primary goal of the City of Sedro-Woolley for a variety of reasons. The program should include initial flow monitoring, pipeline video inspection, and smoke testing as necessary, targeting areas of historically high inflows when wet weather is present. The first element of the program should be collecting flow test data at the downstream points of each sub-basin (or smaller area as appropriate) during wet and dry weather periods. A minimum of 6-8 weeks of data is preferable for each monitoring point. With the flow data, an evaluation of pipe lengths by sub-basin flow should be accomplished. After the highest flow per lineal footage of pipe for each sub-basin has been determined and correlated with usage and residential population, those sub-basins exhibiting the highest levels of I & I should be furthered studied with video inspection and smoke testing. After inspection of potential sewer

problems, rehabilitation and re-construction options as well as education and fixing private lateral illegal connections can be considered and scheduled. Specific consideration of side sewer contributions to the overall I & I issues should be an important element of the program. This task will reduce overall inflows into the treatment plant and effectively delay any necessary treatment plant upgrades as well as reducing cycling time of pump stations downstream of I & I problem areas.

Project E – Wastewater Pretreatment Program

Wastewater Pretreatment program per Chapter 13.24 of the Municipal Code. Annual inspection of public and private grease traps, along with public education associated with site visits to ensure continued compliance with city code.

CHAPTER 7
EXISTING TREATMENT FACILITY

7.1 INTRODUCTION

The purpose of this Section is to describe the City of Sedro-Woolley's existing wastewater treatment facility. All flows are treated at the City of Sedro-Woolley Treatment plant, located at 401 Alexander in the southern portion of the city.

The present system consists of headworks, oxidation ditch, secondary clarifiers, UV disinfection, and solids treatment and dewatering. The plant discharges to the Skagit River. Solids are treated, dewatered and hauled offsite for land disposal. Details of each unit process are included in Table 7-2 along with the design criteria from Ecology and the capacity of the process based on those criteria.

The original treatment plant was a primary plant constructed in 1956. In 1973, the facility was upgraded to accomplish secondary treatment and modifications were made to the sludge digester. In 1994, an additional secondary clarifier was built and put into operation, and a new belt filter press for sludge dewatering was added. In 1999, another plant upgrade improved the headworks, added digester capacity, UV disinfection and new sludge dewatering capacity as well as upgraded plant systems and added an anoxic tank for secondary treatment.

7.1.1 Unit Process

The plant provides secondary treatment using conventional activated sludge consisting of an oxidation ditch with secondary clarifiers. Influent grit and screenings removal precedes the secondary process. The UV disinfection system was completed in 1999. Two digesters allow aerated digestion prior to dewatering of the waste sludge. An effluent pump station is used when the river level does not allow gravity discharge. The treatment plant discharges into the lower Skagit River via a 3,576-foot, 24-inch diameter outfall immediately south of the treatment plant. The outfall pipe extends about 100 feet from the riverbank into 3- to 9-feet of water depth (mean lower and mean higher water levels, respectively).

7.2 DISCHARGE PERMIT

The City has a current NPDES Permit, Number WA-002375-2, that expires December 31, 2023. The NPDES Permit limitations are shown in Table 7-1 below. The plant limits in hydraulic, BOD, and solids loading were changed following the plant upgrade performed in 1999. The plant has consistently operated within its permit limits, as described in Section 7.3. The flow limitations for the plant in the permit are 2.07 mgd (million gallons per day) monthly average flow (for the

maximum month) and 7.18 mgd peak instantaneous flow. The influent loading limits are 4,160 lb/day BOD and 4,750 lb/day TSS (for the maximum month).

Table 7-1: NPDES Permit Effluent Limitations

Parameter	Average Monthly *	Average Weekly
BOD	30 mg/l, 518 lbs/day	45 mg/l, 777 lbs/day
TSS	30 mg/l, 518 lbs/day	45 mg/l, 777 lbs/day
Fecal Coliform	200/100 mL	400/100 mL
PH	>6 and <9	
Note: *Removal of 85% minimum is also required.		

The permit describes the maximum boundaries of the mixing zones as 309 feet downstream of the outfall discharge and 100 feet upstream. The associated dilution factor at the edge of the mixing zone is estimated to be 260 to 1. The zone of acute criteria exceedance is limited to 31 feet downstream of the outfall discharge and 10 feet upstream. The associated dilution factor at the edge of the acute zone is estimated to be 30 to 1.

7.3 TREATMENT PLANT COMPONENTS

This section of the report describes the size and loading of the existing treatment plant. Table 7-2 is a summary table showing both the sizing and loading of each unit process. A discussion of each process is also included. Figure 7-2 shows the treatment plant layout and Figure 7-3 is a schematic of the treatment process.

7.3.1 Entrance Structure

The sewage flows reach the plant via the Township Street and Third Street interceptor lines described in detail in Section 4.

The influent pump station is below grade immediately to the east of the headworks. The influent pump station consists of three screw centrifugal pumps by Wemco. Each pump has a rated capacity of 2,800 gpm. With one pump out of service, the total firm capacity is thus 5,600 gpm or 8.1 mgd. Using the peaking factor of 3.47, the equivalent MMF capacity is 2.3 mgd.

7.3.2 Screenings Removal Facilities

Influent screening includes two in-channel fine screens by Hycor and a manual screen for bypass. The influent pumps lift the influent flow to the influent channel. The screenings are washed, and waste is conveyed to the screenings collection system located at grade level in the Headworks building.

7.3.3 Grit Removal Facilities

Following the screenings facilities, the flow drops to the grit separation facilities. The grit tank separators are a TeaCup grit system by Eutek that use centrifugal force to separate

the heavier particles from the sewage flow. The system consists of two grit separating tanks and two grit decanters. The system is designed for a total PHF of 7.2 mgd. Using the peaking factor of 3.47, the equivalent MMF capacity is 2.1 mgd, the same as the current plant design MMF.

The grit stream is sent to the ground level grit decanters for dewatering. Both grit and screenings are hauled to waste by the City. The influent flow is discharged to the flow diversion box, just upstream of the oxidation ditch.

7.3.4 Oxidation Ditch Aerators

Four brush aerators are installed in the oxidation ditch. They are Mammoth Rotor aerators originally supplied by US Filter/Zimpro.

The aerator capacity limit is reached when the peak hour dissolved oxygen concentration drops below 1 mg/L on the day of maximum day load during the simulation. This limit applies to the portions of the ditch where aerators are installed.

The oxidation ditch has a volume of 197,500 cubic feet or 1,477,300 gallons. The side water depth is 11.5 feet. In the 1999 treatment plant upgrade, four new rotors were installed. These rotors were replaced in 2016 and 2017. Two are 22.17 feet long and 20-38.8 HP and two are 26.75 feet long and 25.1-46.8 HP. The rotors are operated independently and on timers. Replacement of motors with the addition of variable frequency drivers is also planned for 2019 and 2020. The oxidation ditch was designed for a 17-hour hydraulic retention rate at the maximum month flow rate of 2.07 mgd.

7.3.5 Secondary Clarifiers

Flow from the oxidation ditch enters the discharge structure at the north end of the oxidation ditch. From this discharge structure, flow can be directed to either or both secondary clarifiers. The clarifiers are 65 feet in diameter with a 12-foot side water depth. They were built at different times, and according to the Sedro-Woolley WWTP Condition Assessment Technical Memorandum (Brown & Caldwell, February 2016), the clarifiers had unbalanced inlet hydraulics. The imbalance was corrected in 2019. In addition, as stated in the Sedro-Woolley Clarifier No. 1 Concrete Condition Survey (WJE, October 20, 2016), Clarifier Number 1 was damaged in the floods of 1990. The center well foundation failed, causing settlement of as much as 1½ inches. As a result of this movement, the clarifier mechanism was inoperable because the sweeper arms were in contact with the clarifier floor. The City drained the clarifier and injected grout beneath the clarifier slab adjacent to the central post. The sweeper arms were also repositioned to alleviate the problem. The 1996 Engineering report documented these problems and discussed possible additional solutions to further stabilize Clarifier Number 1.

The second clarifier was added in 1994. The operations staff reports significant hydraulic imbalance between the clarifiers, as previously mentioned. As a result of a 2017 survey performed in preparation for the Brown and Caldwell Capacity Assessment,

dated May 3, 2018, the City noted that the elevation of the second clarifier did not match the as-built elevation of Clarifier Number 1. Field measurements indicate that Clarifier Number 1's effluent weir is approximately three tenths of a foot lower than Clarifier Number 2's effluent weir.

Secondary clarifier capacity is traditionally derived based on SOR (surface overflow rate) and SLR (solids loading rate) limits. At Sedro-Woolley WWTP, the design PHF of 7.18 mgd translates to a corresponding SOR of 1,087 gallons per day per square foot (gpd/ft2). Based on typical design values given in the Criteria for Sewage Works Design, the peak hour SOR for oxidation ditch process is 700 gpd/ft2. This would translate to a PHF of only 4.6 mgd. Because the secondary clarifiers have processed flows in excess of 4.6 mgd without any negative impact, for the purpose of this analysis, the design peak hour SOR value of 1,087 gpd/ft2 was assumed.

Plant staff addressed concerns for the base slab and mechanism of Secondary Clarifier #1. In the past, there were issues with the slab, center column, and mechanism alignment. Repairs were performed by Lakevue Construction Company in 1991. No records of the extent or methods of repair are available and efforts to contact the company have been unsuccessful.

Clarifier No. 1 was inspected by WJE in October 2016 to determine the current condition of the base slab. The tank was found to be in decent condition given its age. The City elected to not perform the recommended core drilling program and anticipates that a new clarifier will be constructed as part of the next upgrade. Vertical sealant was also recommended for replacement and the City plans on a project to seal the concrete joints and cracks in the next few years.

To address the hydraulic constraints at the flow diversion box and grit tank effluent box, work was completed in early 2019 with the installation of calibrated weir gates, which has resolved the issue.

7.3.6 UV Disinfection

UV disinfection was completed in 1999 to replace chlorination.

The UV disinfection system is a low-pressure UV system including three UV banks installed in an 39-inch wide open channel. The system consists of three sets of UV lamps. A total of 312 lamps are in the three power distribution units. The system uses 65% transmittance lights.

The system was designed to meet the effluent fecal coliform requirements for a PHF of 7.2 mgd and UV transmittance of 65 percent. Using the peaking factor of 3.47, the equivalent MMF capacity is 2.1 mgd, the same as the current plant design MMF.

7.3.7 Anoxic Tank

The anoxic tank was added as part of the 1999 plant upgrade, when the chlorine contact channels below the operations building were converted to an anoxic treatment tank. The anoxic tank can be used to treat a portion of either the mixed liquor from the oxidation

ditch or secondary influent. Aeration blowers for the anoxic tank are located in the Plant Water building. The southerly portion of the anoxic tank is open to the air, and the northerly is underneath the Operations building. The southerly portions of the contact channels were converted to the plant water building and an expanded effluent pump station.

In the design flow scheme, the combined degritted influent and the RAS (returned activated sludge) is routed to the flow diversion box and then to the anoxic tank via a 20-inch-diameter pipe. An IMLR (internal mixed liquor recycle) stream is also pumped to the anoxic tank from the oxidation ditch. Mixed liquor from the anoxic tank flows through a channel into the oxidation ditch. In the current plant operation, the anoxic tank is not used because of the excessive odor generated when it is in service, and the tank is equipped with an aeration system instead of mixers, which would have a negative impact on denitrification.

With the anoxic tank in service, overflow at the grit tank effluent box will occur at a higher flow of 6.25 mgd, which is still less than the design peak hour flow. The hydraulic capacity can be improved if the tank drain pumps are turned off; however, during a prolonged storm event, the tank drain pumps may need to be turned on if the tank drain structure storage capacity is exceeded, thus reducing the plant's hydraulic capacity to process the influent flow.

The addition of bypass piping from the grit tank effluent box to the oxidation ditch and the grit tank effluent box height adjustment, both of which were completed in 2019, have resolved the overflow issue.

7.3.8 Aerobic Digester

The two 35-foot-diameter aerobic digesters which were added in 1999 provide sludge stabilization, generating sludge that is suitable for land application. The digesters are 22 feet deep and each hold 160,000 gallons of sludge. They are lidded with solid roofs and have a fine bubble aeration system. There are three blowers, each capable of 450 scfm. One blower serves as standby.

To meet requirements for Class B biosolids, a minimum SRT (solids retention time) of 40 days at an operating temperature of 20°C or 60 days at 15°C is required. In addition, volatile solids reduction requirements (in either the digesters or bench tests) must be met to provide the needed vector attraction reduction.

7.3.9 Dewatering Equipment

The plant has a gravity belt thickener and belt filter press to dewater the sludge. The gravity belt thickener has a capacity of 200 gpm and 1000 lbs of solids per hour. The belt filter press has a capacity of 60 gpm and 500 lbs of solids per hour. The gravity belt thickener can be used to thicken the sludge either prior to addition to the digesters or in between the digesters. The belt filter press discharges the resulting Class B Biosolids via belt to trucks for haul to disposal. The City of Sedro-Woolley contracts with the

Boulder Park facility in eastern Washington to haul and dispose of the biosolids via land disposal. The City is also exploring alternatives for solids processing that may reduce or eliminate the need for land disposal by the current methods.

Due to limitations with the existing disk style diffusers, the blowers have been operated at low speed only since plant start-up in 1999, producing 270 sdfm. The City plans to upgrade the aeration system in 2020 to remove this bottleneck.

7.3.10 Emergency Generator

The plant has an emergency generator in a separate structure that went online in 1995, prior to the 1999 upgrade. The 400 KW generator runs a little over half of the plant and runs all processes including the WAS pumps, dewatering equipment, and anoxic tank blowers.

7.3.11 Operations Building

The Operations building was remodeled in the 1999 plant upgrade. The old chlorine facility was remodeled into laboratory facilities. The old generator room was converted into storage and a restroom. The Operations building now consists of office, conference and break facilities, restrooms, storage and a laboratory.

7.3.12 Effluent Pumping

Effluent pumping capacity is provided for peak flow and peak river elevation events when gravity flow is not possible. There are two pumps, each capable of 5,000 gpm. The firm capacity of the effluent pumping with one unit at standby is 7.2 mgd.

7.3.13 Electrical and Controls

The plant was upgraded with PLC controls and upgraded electrical systems in 1999.

7.3.14 Support Systems

The plant support systems include the Plant Water building which was constructed in 1999 and is located just south of the Operations building. The plant water system conveys re-use water that is disinfected with a 12.5% sodium hypochlorite solution following UV disinfection. Plant water is used for washdown. The plant support systems also include heat, lifting systems, sump pumps and drains.

7.3.15 Outfall

The Sedro-Woolley wastewater plant discharges through a 24-inch diameter outfall into the lower Skagit River. The outfall pipe totals 3,576 feet, 2,800 of which was installed in 1990. The outfall pipe extends about 100 feet into the riverbank.

7.4 EXISTING TREATMENT PLANT FLOWS

Historical flow data for the plant is included in Figure 7-1 and Table 7-2.

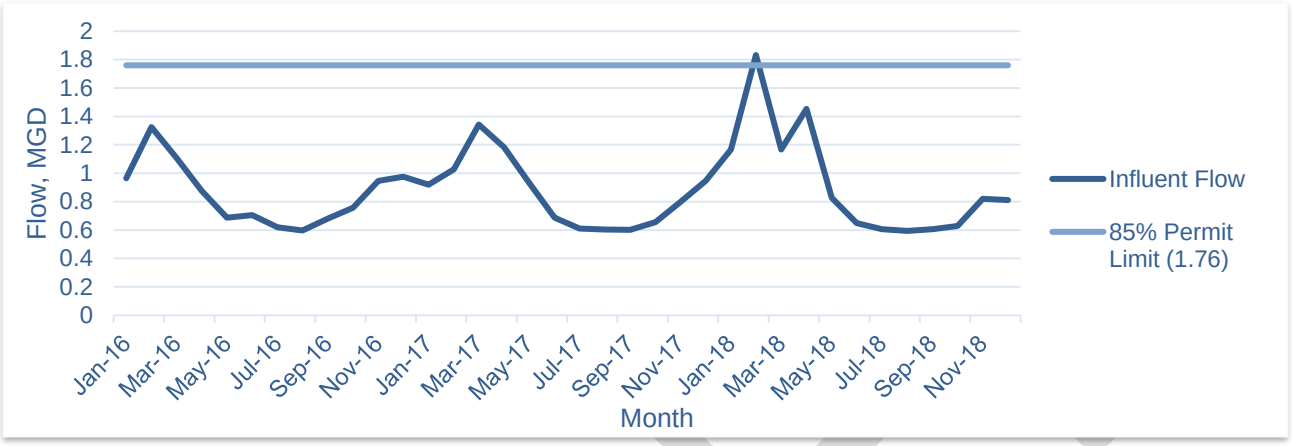

Figure 7-1	***Monthly Average Flow***	18481.00
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Table 7-2: Existing Treatment Plant Flow Data

Year	Month	Flow		Influent BOD		Influent TSS		Effluent BOD		Effluent TSS		Coliform
		Average	Maximum	mg/l	lbs	mg/l	lbs	mg/l	lbs	mg/l	lbs	#/100 ml
Permit Limits			2.07		4160		4750	30	518	30	518	200
2016	January	0.965	1.208	193	1512	179	1421	5.6	43	7.9	63	1
	February	1.324	2.726	155	1535	160	1586	2.1	21	3.0	33	1
	March	1.107	1.273	164	1510	155	1446	3.1	29	4.1	38	1
	April	0.877	1.027	218	1543	200	1475	2.4	17	2.2	16	1
	May	0.688	0.802	284	1624	277	1609	2.9	16	4.1	24	1.4
	June	0.706	0.951	257	1502	266	1565	2.4	14	3.4	21	2.6
	July	0.619	0.676	297	1540	274	1430	2.5	13	3.4	18	2.5
	August	0.596	0.635	307	1531	287	1439	2.9	14	2.1	11	1.5
	September	0.681	1.731	303	1614	263	1507	4.7	25	5.5	37	3.3
	October	0.758	1.078	259	1586	257	1592	5.6	33	8.9	58	3.6
	November	0.947	1.192	209	1649	230	1823	3.4	26	6.7	53	3.4
	December	0.975	1.159	207	1660	164	1345	3.7	30	5.8	48	3.8
	Average	0.854	1.205	238	1567	226	1520	3.4	23	4.8	35	2.2
2017	January	0.919	1.158	205	1611	204	1575	6.2	49	10.8	85	2.9
	February	1.028	1.425	201	1602	166	1396	3.9	31	7.7	66	2.5
	March	1.343	1.8	141	1594	128	1413	3.3	38	4.6	52	1.7
	April	1.182	1.588	166	1610	152	1477	3.1	30	3.7	36	1.3
	May	0.931	1.299	216	1700	203	1599	3.1	24	4.3	34	4.1
	June	0.687	0.782	290	1643	247	1415	3.5	20	5.2	30	7.9
	July	0.610	0.66	327	1658	266	1364	3.4	17	5.7	29	8.0
	August	0.603	0.643	284	1432	229	1169	3.0	15	4.7	24	5.2
	September	0.601	0.671	319	1602	283	1446	4.0	20	7.6	39	3.2
	October	0.655	0.919	282	1519	263	1456	5.6	31	13.0	71	8.3
	November	0.797	1.124	258	1657	214	1434	7.5	47	14.6	97	8.6
	December	0.946	1.49	258	1870	241	1790	7.8	58	17.8	139	3.2
	Average	0.859	1.130	246	1625	216	1461	4.5	32	8.3	59	4.7
2018	January	1.166	1.736	188	1738	172	1596	5.9	54	12.0	122	2.8
	February	1.832	3.445	116	1592	113	1592	4.5	63	8.3	125	2.0
	March	1.167	1.675	174	1722	145	1388	3.8	39	5.3	52	1.4
	April	1.454	3.019	144	1667	142	1692	3.6	44	9.2	121	2.8
	May	0.827	1.129	230	1558	204	1403	3.7	25	5.9	42	1.3
	June	0.650	0.839	306	1633	330	1835	3.1	16	4.6	26	2.4
	July	0.605	0.678	320	1610	325	1669	2.4	12	4.3	22	1.6
	August	0.594	0.659	289	1452	303	1520	3.5	17	6.0	30	2.5
	September	0.606		263	1339	264	1394	5.0	25	5.9	30	1.8
	October	0.628		299	1528	293	1550	3.8	19	6.7	36	5.8
	November	0.819		238	1545	250	1728	4.6	31	11.0	77	9.4
	December	0.811		270	1763	260	1708	4.6	31	5.6	38	2.7
	Average	0.930		236	1596	233	1590	4.0	31	7.1	60	3.0
3-Year Average		0.881	1.287	240	1596	225	1523.5	4.0	28.8	6.7	51.2	3.3
Maximum		1.832	3.445	327	1870	330	1835	7.8	63	17.8	139	9.4
0.85 times permit			1.760		3536		4038	25.5	440.3	25.5	440.3	170.0

The historical flow data shows treatment plant flows are rising and becoming closer to the permitted flow levels. The maximum month data is shown in Table 7-3.

Table 7-3: Maximum Month Flow and Loading Data

Year	Influent Flow mgd	Influent Loading lbs/day BOD	Influent Loading Lbs/day TSS
2016	1.324	1,660	1,823
2017	1.343	1,870	1,790
2018	1.832	1,763	1,835
Three-year average	1.49	1,764	1,816
85% of Permit Limit	1.76	3,536	4,038

Flows and solids loadings have historically been below the limits set by Ecology However, the average monthly flow in the month of February 2018 was 1.832 which is higher than 85% of the permit limit of 2.07. The City must submit a plan and schedule to Ecology for continuing to maintain capacity when the flow load reaches 85 percent of the limit for three consecutive months or when the projected plant flow or loading would reach design capacity within five years. At this time, this criteria isn't met and the City will continue to review flows and capacity limits to ensure the flow is below the permit levels. Table 7-4 shows the capacity limits of each unit process using current Ecology criteria.

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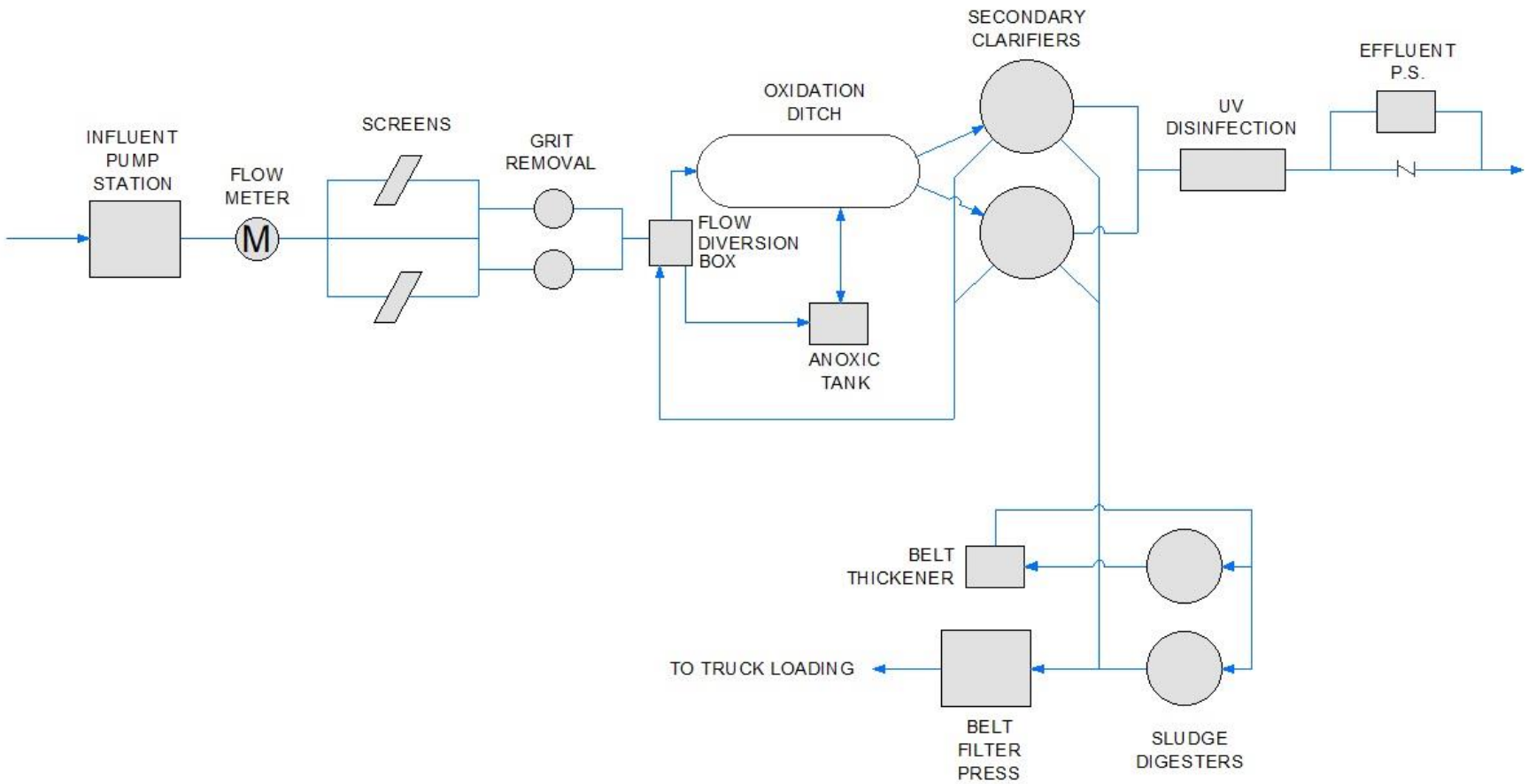

Figure 7-2	***Plant Schematic***	18481.00
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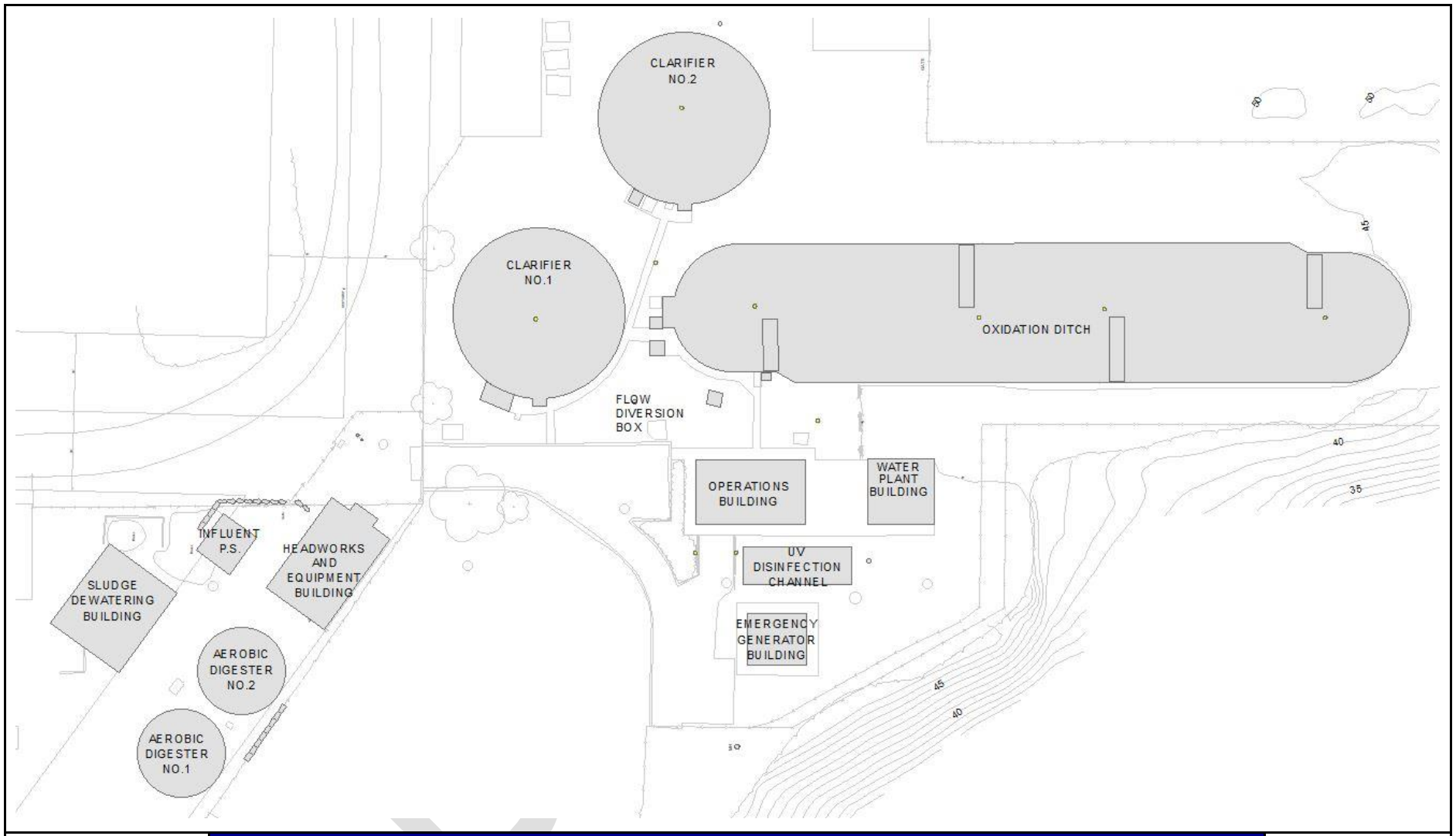

Figure 7-3	*Treatment Plant Layout*	18481.00
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Table 7-4: Plant Operating Limits

Unit Process	Size/Description	Ecology	Firm Capacity
		Criteria	Based on Ecology Criteria
Effluent Quality			BOD: 30 mg/L monthly average, 45 mg/L weekly average TSS: 30 mg/L monthly average, 45 mg/L weekly average
Liquid Stream			
Influent Pumps	3 pumps at 2,800 gpm each, 50 HP	1 unit standby	8.064 mgd
Mechanical Screens	2 units, 6 mgd each		12 mgd (manual screen as standby)
Grit Removal Tanks	2 units, 3.6 mgd each	1 unit standby	7.2 mgd (total peak hour capacity)
Oxidation Ditch Aerators	4 units		Oxygen transfer efficiency = 3.43 lb/hbp-hr
Secondary Clarifiers	2 units, 65-ft diameter	SLR limit evaluated at 85th and 50th percentile from January 2015–June 2016 data	Peak hour SOR limit = 1,087 gpd/ft2 (assumed to correspond to design PHF of 7.18 mgd)
UV Disinfection	3 UV Tanks		7.2 mgd Total PHF capacity
Effluent Pumps	2 units, 5,000 gpm each		7.2 mgd Total peak hour capacity
Hydraulic Limitation			PHF = 4.77 mgd (current flow path with anoxic tank out of service, max flow before overflow at grit tank effluent box) PHF = 6.25 mgd (design flow path with anoxic tank in service, max flow before overflow at grit tank effluent box)
Solids Stream			
Gravity Belt Thickener	1 unit, 200 gpm, 1000 lbs solids per hour		
Aerobic Digesters	2 units operating in series, each 35-ft diameter, 22-ft side water depth	Class B, 60-day SRT at 15°C	
Belt Filter Press	1 unit, 60 gpm, 500 lbs solids per hour		Hydraulic capacity – 60 gpm Solids Loading capacity – 500 lbs/day Operating schedule: 4 day/wk, 7hr/day

7.5 TREATMENT PLANT CONDITION ASSESSMENT

A Condition Assessment Report Technical Memorandum was prepared for the Sedro-Woolley Treatment Plant and delivered in February 2016. The assessment was performed by the Brown and Caldwell staff in December 2015. The condition assessment categorized the recommendations by mechanical, structural, and electrical.

The report indicated that the plant was in good condition and was well-maintained except for a few systems. The recommendations that were developed from that report are summarized below within the respective category.

7.5.1 Mechanical

All process equipment was inspected for noticeable wear or operational issues. These included excess noise, fluid leaks, visible damage, and excess heat. It was observed that the mechanical equipment had been well-maintained, given the age of the facilities. The facilities were clean and displayed very little signs of excessive wear as might be expected in a facility built more than 15 years ago.

Although well-maintained, four mechanical systems were in need of repair and/or replacement; a leaking digester 2 aeration piping, digesters 1 and 2 course-bubble diffuser piping, a leaking sludge pump, and automatic polymer mixing system. They are summarized here.

- The 6” diameter underground aeration piping feeding digester 2 was leaking air. Leaking air increases operating cost due to an increase in air flow required and increased maintenance of equipment. It was recommended that the underground aeration piping be repaired.
- The coarse-bubble diffuser piping in both digester 1 and digester 2 were showing signs of degradation. The plastic piping had become brittle enough to make it susceptible to stresses imposed by the moving fluid in the digester. The diffuser bodies had broken off, requiring extensive repairs. It was recommended that the coarse-bubble diffuser piping and diffusers be replaced.
- Sludge pump P 242 was leaking sludge from the casing. Both sludge pumps in services P 241 and P 242 are the same age and had seen the same amount of service and wear. It was recommended that P 241 and P 242 with rotary lobe pumps be replaced.
- Mixing polymer to feed the gravity belt thickener is a manual, batch process that produces variable results and polymer buildup on all surfaces around the operation. Polymer on the floor can be slippery and cause safety issues. It was recommended that an automatic polymer mixing system that will provide consistent polymer concentrations and reduce spillage in the polymer mixing area be installed.

7.5.2 Structural

Structures were visually inspected to determine the effects of usage and age on structural integrity. All structures appeared to be in reasonably good condition with no significant detrimental impacts caused by age or operation. A few areas that were visible were in need of minor repairs to address specific leaks and expansion joint seal failures. Due to the age of clarifier #1 the structural condition was uncertain and additional inspection was recommended.

7.5.3 Electrical and I&C Systems

It was observed that routine maintenance, including NETA (International Electrical Testing Association) and thermographic testing, had been in place on the electrical distribution and control systems, and had resulted in an overall system that was very well maintained and in very good condition given its age. The system was relatively lightly loaded and can accept a reasonable amount of expansion above current system loading. Overall, the I&C system hardware, PLCs (programmable logic controllers), I/O (input/output) modules, control servers, HMIs (human-machine interfaces), and workstations were all in good working condition. Some of the control equipment had been replaced or upgraded in the previous three years from the report by Brown and Caldwell. Electrical equipment for the most part was protected from the environment and most of the electrical distribution equipment was in its useful service period. Given the condition at the time of inspection and level of maintenance, it was expected that the full 40-year investment would be achieved for all of the equipment observed. While all electrical equipment eventually succumbs to age, it was apparent that the diligent and thorough maintenance that had been applied thus far and had led to a situation where a moderate amount of flexibility exists within the system for desired changes or upgrades. As the plant ages, planned, measured, and prioritized replacements will be possible.

To meet the objectives of the City, the key recommendations/observations are listed below.

- City staff recounted several instances of ATS (automatic transfer switch) 299/699 not working as designed and therefore requiring manual intervention. Because all plant power flows through this piece of equipment, its proper operation, especially when plant staff was not present, is critical. It was recommended that this piece of equipment be replaced with contactor-based technology. Replacement will require additional revisions to the service configuration of the plant.
- NEC (National Electrical Code) and OSHA (Occupational Safety and Health Administration) required arc flash labels were not observed on any electrical equipment throughout the facility. Plant staff, who are not trained electricians, are routinely required to operate electrical equipment. It was recommended that an arc flash study be performed to identify the electrical hazards present at each piece of equipment. Any plant staff required to access or operate electrical

equipment should undergo NFPA (National Fire Protection Association) 70E training.

- There was no low-voltage (<600V) means to safely de-energize and lock out ATS 299/699, MCC (motor control center) 299, and MCC 699. The only means to fully remove voltage from these pieces of equipment was to de-energize the entire plant via the medium-voltage SE (service entrance) switch ahead of the SE transformer. This not only presented a safety hazard, but it also makes plant maintenance unduly cumbersome. It was recommended that the service and ATS distribution be reconfigured to provide a means to de-energize and lock out each of these pieces of equipment at the low-voltage level.
- The City has engaged Brown & Caldwell to design electrical upgrades to resolve the electrical issues as noted above. The construction work is planned for 2020.

7.6 TREATMENT PLANT CAPACITY

The overall plant capacity at the Sedro-Woolley WWTP was assessed in the Brown and Caldwell Capacity Report in 2018. With both clarifiers and all secondary process tankage (including the anoxic tank and oxidation ditch), the current overall plant capacity was determined to remain at the current design value of 2.07 mgd on a maximum month basis as defined in Ecology's Criteria for Sewage Works Design (Ecology 2008). This is based on the peak hour hydraulic capacities of the grit tanks, UV system, and effluent pumps (7.18 mgd as peak hour flow [PHF], assuming the same PHF:MMF ratio). Accounting for the hydraulic bottlenecks at the grit tank effluent box and flow diversion box, however, the plant peak hour flow capacity is limited to values less than the design value.

The maximum month loading capacities are constrained by digester capacity to meet the 40-day SRT requirements for Class B biosolids and secondary clarifier solids loading capacity based on the 90th percentile sludge volume index (SVI). With a limited extent of thickening and an average digested sludge concentration of 1.5 percent solids, the plant capacity is constrained by digester capacity at a maximum month BOD loading of approximately 2,300 pounds per day (lb/d), or 2.17 mgd based on an average BOD concentration of 127 mg/L during the month of maximum month flow. The corresponding TSS loading capacity is 2,010 lb/d. If a higher degree of thickening is provided, increasing the digested sludge concentration to 2.5 percent, the digester capacity is increased and the corresponding influent BOD and TSS loading capacities increase to approximately 3,500 lb/d and 3,080 lb/d, respectively, or 3.3 mgd for the corresponding maximum month flow. The digested sludge concentration is limited to a maximum of 2.5 percent because of oxygen transfer limitations in the digesters. If the digester aeration system is upgraded to allow treatment at higher sludge concentration, the loading capacities will be further increased.

7.6.1 Capacity Recommendations

Based on discussions with the City and its Capacity Assessment of the City's WWTP, Brown and Caldwell developed four alternative courses of recommended plant capacity improvements. The analysis included plant expansion/new industrial flow and load scenarios. Although the installation of an additional aerobic digester was considered, current studies indicate that installing higher capacity blowers and operating the system at TSS 2.5% should resolve existing capacity issues and may allow for growth. The City plans to complete interim upgrades scheduled for 2020 to 2023, as outlined the CIP, in order to restore the plant to its design capacity prior to reassessing aerobic digester options.

7.7 TREATMENT PLANT RECOMMENDATIONS

Table 7-5 compiles the recommendations contained in the Condition Assessment report produced by Brown and Caldwell in February 2016 and the Capacity Report in 2018. The condition assessment recommendations relate either to procedural/documentation changes, further study or investigation, or future consideration or recommendations concerning actions required for equipment replacement or maintenance based on the observed condition. The recommendations, as presented by Brown and Caldwell, may still require further study, alternatives analysis, or predesign to determine the most appropriate method to implement the recommended action and associated cost.

The table also provides a planning-level construction cost, and other than the capacity, related projects are ordered roughly in terms of perceived importance and involve some subjective level of risk identification to determine ordering.

Table 7-5: Treatment Plant Capital Projects and Cost Estimates

Treatment Plant Issue	Estimated Cost
Capacity Upgrades	
Additional digester and new lab	$2,300,000
Facilities Plan	$150,000
Mechanical	
Trench to expose piping and replace the flange gasket, re-torque the flange bolts, and swab the pipe.	$12,000
Replace branch headers with attached branches with individual diffusers to allow for individual replacement of failed diffusers.	$18,800
Replace diaphragm pumps with rotary-lobe pumps.	$30,000
Replace the polymer mixers with an automated polymer mixing system.	$13,000
Structural	
Inject grouting with an epoxy grout into concrete cracks larger than 0.004 inch and finishing to match the adjacent surfaces.	$10,000
Remove existing material, prepare the surfaces, and apply new silicon joint sealant to expansion joints.	$10,000
Fill the base of the walls along the perimeter of the structure with injection grouting.	$20,000
Electrical	
Perform an arc flash study for the plant. Provide proper PPE to plant staff. Train appropriate plant staff per the latest NFPA 70E requirements.	$10,000
Install a means to safely de-energize and lockout ATS 299/699, MCC 299, and MCC 699. Replace ATS 299/699.	$100,000
Install bollards to protect plant service cables adjacent to roadway.	$4,000
Develop a spreadsheet based asset management program and expand asset management equipment and structure fact sheet to include major electrical equipment.	$4,000
Water Reuse Planning	$30,000*

Note: * Construction costs only. Does not reflect total project costs.

7.8 SUMMARY

The existing Sedro-Woolley treatment plant operates under current capacity limits. Upgrades to the treatment plant due to recent increases in max month flows are planned by the City in order to restore the plant to its original capacity. Other maintenance and operations improvements, as outlined in the CIP, were discovered through the condition and assessment report prepared by Brown and Caldwell.

CHAPTER 8
CAPITAL IMPROVEMENT PLAN

8.1 INTRODUCTION

This Section of the Plan provides an overall Capital Improvement Plan (CIP) for the City of Sedro-Woolley's sanitary sewer system, which outlines the recommendations detailed in previous sections of the Plan. The CIP is presented in Table 8-1 and provides a summary of recommended projects, identifies estimated costs of each project, and provides recommended scheduling and financing for each. A summary of the proposed financing is provided in Table 8-2. Detailed information on specific projects was presented in Sections 6 and 7 and additional information on financing options is presented in Section 9.

8.2 PROJECT RECOMMENDATIONS

The projects recommended in Table 8-1 are the result and summary of the analysis and recommendations detailed in Sections 6 (Collection System Analysis and Recommendations) and Section 7 (Existing Treatment Facility). Each project, or project area, is shown on the Sewer System Plan Map provided at the back of this document.

Although the recommended projects are as concise as possible, they are presented at a "planning level" of detail and are in no way meant to replace analysis and engineering required at the time of project implementation. In some cases, the magnitude of projects required cannot be identified without such additional analysis and monitoring. This is especially true in the case of rehabilitation projects, where video inspection of pipelines is required to determine the extent and priority of the projects. In these instances, a worst-case scenario was assumed to provide the City with more conservative budgeting information.

8.3 COST ESTIMATES

Project cost estimates are based on professional engineering opinions. Estimated recommended improvement costs include: construction costs, tax, overhead costs, project design engineering and surveying, legal and administrative services (25%) and a contingency factor (varied between 25% and 40% depending on project size and estimated scope).

The cost estimates outlined herein are based on industry standards, engineering experience and documented costs of similar recent construction work. Other factors affecting cost estimates include the complexity of the project and the known and unknown constraints which may be associated with the construction. The projects outlined have been identified in conceptual terms and it is important to note that further analysis and actual design of the improvements could significantly change the cost of the project from the given estimate. Prior to

the initiation of the projects outlined in the CFP, specific design criteria should be reviewed, and the cost estimates should be updated to reflect current conditions.

8.4 PROJECT SCHEDULING

Recommended project scheduling has been developed for the projects included in the Capital Improvement Plan. The projects have been prioritized according to the needs determined by a combination of engineering analysis performed in this planning process and the City's existing budget and information provided by City staff. Although a detailed 10-year improvement schedule has been developed, scheduled projects identified beyond 2029 are more generally defined.

It is recommended that this CIP be reviewed annually to confirm the actual construction program for the year as well as any transportation improvement projects scheduled by the City or the State Department of Transportation. Project priorities should be modified as required to accommodate more current information, key community issues and available funding. As mentioned previously in this Section, the magnitude of several of the rehabilitation projects identified in the CIP will be determined from additional monitoring and analysis. It is important that the City staff review project priorities as additional studies and analyses are performed and that the CIP is adjusted accordingly.

Table 8-1: Capital Improvement Plan

Project Number	Capital Improvement Program	Cost to City	Escalated Project Costs (4% Annually)										Total	Recommended Funding
		($2019)	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2020-2029	
Rehab/Replacement Projects														
R-1	Alley between Fidalgo St and Sterling Street, west of Township, east of Fourth	$610,000			$100,000	$613,614							$713,614	PWTF/Rates/Reserves/ Connection Charges
R-2	North of Warner Street and east of Township Street Rehabilitation/Replacement	$350,000					$425,829						$425,829	PWTF/Rates/Reserves/ Connection Charges
R-3	North of Railroad Avenue and south of Talcott Avenue	$215,000	$223,600										$223,600	PWTF/Rates/Reserves/ Connection Charges
R-4	South of Ferry and north of Pacific and west of Ball Street	$65,000	$67,600										$67,600	PWTF/Rates/Reserves/ Connection Charges
R-5	North of Ferry and west of Ball Street	$66,000	$68,640										$68,640	PWTF/Rates/Reserves/ Connection Charges
R-6	Alley between Reed Street and Haines Street	$100,000						$126,532					$126,532	PWTF/Rates/Reserves/ Connection Charges
R-7	Alley between Gibson Street and Northern Ave	$100,000							$131,593				$131,593	PWTF/Rates/Reserves/ Connection Charges
R-8	Along east side of Hwy 9 from Alderwood Ln to Sapp Road and along the west side of Hwy 9 from Sapp Road to McGarigle Road	$919,000							$100,000	$350,000	$350,000	$560,344	$1,360,344	PWTF/Rates/Reserves/ Connection Charges
R-9	Along Northern Ave from Metcalf to Murdock/Puget Alley. Along Metcalf from Northern Ave to Alley between Munro and Gibson	$250,000			$281,216								$281,216	PWTF/Rates/Reserves/ Connection Charges
Infill Projects,														
I-1	North Ball Street Infill	$380,000												Rates/ Annual Budget
I-2	Rowland Road Infill	$300,000												Rates/ Annual Budget
I-3	Burrows Lane Infill	$160,000												Rates/ Annual Budget
I-4	F & S Grade Road Infill	$270,000												Rates/ Annual Budget
I-5	Carter Street Infill	$500,000												Rates/ Annual Budget
Expansion Projects														
E-5	East Jones Road Sewer Expansion	$340,000							$447,417				$447,417	Developer/ Corridor Projects Funding
E-6	Patrick Road Sewer Extension	$260,000			$292,465								$292,465	Developer/ Corridor Projects Funding est. $164,000
E-7	Garden of Eden Road Sewer Expansion	$225,000												Developer/ Corridor Projects Funding est. $107,000
E-8	Trail Road Sewer Expansion	$510,000						$645,313					$645,313	Developer/ Corridor Projects Funding est.
E-9	Olmsted Park Sewer Expansion	$100,000			$112,486								$112,486	RCO Grant

Project Number	Capital Improvement Program	Cost to City	Escalated Project Costs (4% Annually)										Total	Recommended Funding
		($2019)	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2020-2029	
Treatment Plant Projects														
Capacity Upgrades														
TP-1	Digester aeration upgrade-diffusers	$25,000	$26,000										$26,000	Rates/Annual Budget, Reserves or New Funding
TP-2	Digester aeration upgrade-blowers	$675,000				$789,655							$789,655	Rates/Annual Budget, Reserves or New Funding
TP-3	Laboratory/Operations Building Replacement	$1,359,000	$150,000	$1,319,894									$1,469,894	Rates/Annual Budget, Reserves or New Funding
TP-4	Replace Street Shop to allow for relocated Lab/Ops Bldg.3	$335,000	$25,000	$362,336									$387,336	Rates/Annual Budget, Reserves or New Funding
TP-5	Anoxic Tank Mixer Upgrade	$207,500			$233,409								$233,409	Rates/Annual Budget, Reserves or New Funding
TP-6	Facilities Plan	$250,000					$50,000	$266,330					$316,330	Rates/Annual Budget, Reserves or New Funding
TP-7	WWTP Upgrade to 10 MGD	$13,375,000							$2,112,071	$16,192,541			$18,304,611	Rates/Annual Budget, Reserves or New Funding
TP-8	WWTP Upgrade - Relocate Displaced Street Shop Bldgs.	$450,000							$71,060	$544,796			$615,856	Rates/Annual Budget, Reserves or New Funding
Mechanical														
TP-9	Replace diaphragm pumps with rotary-lobe pumps.	$30,000	$31,200										$31,200	Rates/Annual Budget
TP-10	Replace the polymer mixers with an automated polymer mixing system.	$13,000			$14,623								$14,623	Rates/Annual Budget
TP-11	Varcor Biosolids Processor	$250,000	$25,000	$245,400									$270,400	Rates/Annual Budget
Structural														
TP-12	Inject grouting into concrete	$10,000	$10,400										$10,400	Rates/Annual Budget
TP-13	Silicone joint sealant to expansion joints	$10,000	$10,400			$11,699							$10,400	Rates/Annual Budget
TP-14	Fill the base of the walls with injection grouting.	$20,000	$20,800										$20,800	Rates/Annual Budget
Electrical														
TP-15	Perform follow-up Arc Flash Study for the plant.	$20,000	$15,000					$25,306					$40,306	Rates/Annual Budget

Project Number	Capital Improvement Program	Cost to City	Escalated Project Costs (4% Annually)										Total	Recommended Funding
		($2019)	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2020-2029	
TP-16	WWTP Electrical System Upgrades	$385,000	$400,400										$400,400	Rates/Annual Budget, Reserves or New Funding
TP-17	Upgrade aerator motors and add variable frequency drives	$100,000	$104,000										$104,000	Rates/Annual Budget
TP-18	Install bollards to protect plant service cables adjacent to roadway.	$4,000	$4,160										$4,160	Rates/Annual Budget

Table 8-2: Capital Facilities Plan Funding Source Summary

Funding Sources for CFP	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	TOTAL
New Loans (Ecology, PWTF)							1,091,565	15,837,336			$16,928,902
Rates/Reserves	$1,182,200	$1,927,630	$1,034,200	$1,403,268	$475,829	$1,063,481	$1,770,575	$1,250,000	$350,000	$560,344	$11,017,527
Total	**$1,182,200**	**$1,927,630**	**$1,034,200**	**$1,403,268**	**$475,829**	**$1,063,481**	**$2,862,141**	**$17,087,336**	**$350,000**	**$560,344**	**$27,946,429**

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CHAPTER 9
FINANCIAL PROGRAM

9.1 INTRODUCTION

This chapter summarizes the City of Sedro-Woolley's sewer utility financial history, identifies funding sources and a plan for funding the recommended capital improvements, and provides a ten-year financial plan with the impact on rates. This chapter was prepared by Katy Isaksen & Associates.

9.2 FINANCIAL HISTORY

The City of Sedro-Woolley owns and operates the sanitary collection system and wastewater treatment facilities within the City. The City accounts for sewer utility financial activity within the Sewer Operating Fund 401 that includes sewer operating and capital expenses, and transfers to/from the sewer reserve to carry out the capital improvement projects. The ending fund balance remains in the fund to provide for future use of the sewer utility and/or system improvements. Table 9-1 provides a three-year financial history of the sewer fund based on the City's financial reports.

Table 9-1: Sewer Financial History

Sewer Operating Fund 401	2016	2017	2018
Sewer Revenue			
Sewer Service Charges	3,260,148	3,320,407	3,527,951
Other Miscellaneous	51,136	50,880	143,177
Transfer from Sewer Reserve Funds	–	–	484,950
Subtotal Revenue	**3,311,284**	**3,371,287**	**4,156,079**
Sewer Expenditures			
Operations, Maintenance & Administration	2,014,403	2,239,575	2,439,302
Existing Debt	689,660	686,710	468,760
Capital Outlay & Improvements	169,659	215,681	1,289,639
Transfer to Sewer Reserves	150,000	–	–
Subtotal Sewer Expenditures	**3,023,721**	**3,141,966**	**4,197,702**
Annual Increase/(Use) of Reserves	**287,563**	**229,321**	**(41,623)**

Table 9-1: Sewer Financial History (cont.)			
Sewer Operating Fund 401	**2016**	**2017**	**2018**
Operating Revenue			
Sewer Service Charges	3,260,148	3,320,407	3,527,951
Fertilizer Sales	958	999	1,227
Misc. (collection recoveries, misc.)	31,483	26,341	97,041
Investment Interest	4,550	11,192	19,350
Late Penalties & Interest	14,145	12,348	25,560
Transfer In from Sewer Reserves 402/407	–	–	484,950
Subtotal Operating Revenue	**3,311,284**	**3,371,287**	**4,156,079**
Operating Expenditures			
Maintenance	183,955	138,022	199,036
Sewer Services	1,053,830	1,115,137	1,225,021
Supplies	107,251	147,913	153,416
Services & Charges	340,019	380,357	696,151
Capital Outlay from Rates			
Engineering Services	65,313	99,213	122,393
Other Improvements	76,633	79,718	988,561
Portable Equipment	6,610	15,118	15,391
Machinery & Equipment	21,103	21,631	163,294
Transfers			
Transfer for Internal Services	329,347	458,147	165,678
Transfer to S Operations Reserve 402	150,000	–	–
Debt Service (supported by rates)			
PWTF payment - Transfer to 410	474,660	471,710	468,760
1998 Revenue Bond - Transfer to 407	215,000	215,000	–
Subtotal Sewer Expenditures	**3,023,721**	**3,141,966**	**4,197,702**
Annual Increase/(Use) of Reserves	**287,563**	**229,321**	**(41,623)**

At the bottom of Table 9-1, the Annual Increase/ (Use) of Reserves line provides a quick view of whether the sewer revenue was sufficient to meet the expenditures in each year. If revenue is greater than expenses, as in 2016 & 2017, the reserve levels are increased. If revenues are less than expenditures, as in 2018, the reserves are used to balance the budget for the year. This may work for several years as long as capital improvement funding is higher, but does not support annual improvements to the system. With the 2018 Annual (Use) of Reserves of ($42,000), the available balance in Sewer Fund 401 has been reduced.

Monthly sewer service charges are the primary source of ongoing revenue for the sewer utility. Other revenue sources include fertilizer sales, late payments & penalties, collection recoveries,

reimbursements, investment interest and other miscellaneous items. Connection charges collected from new connections are deposited directly into the sewer capital reserve fund 410 to be used for debt repayment, system repair/replacement and system improvements. Table 9-2 shows the history of new connections in recent years and includes both capital facilities charges paid by all new connections and additional special connection fees paid by properties in certain areas.

Table 9-2: Sewer Connection Fee History

Sewer Capital Reserve Fund 410	2016	2017	2018
Sewer Connection Fees	304,491	975,728	185,186
Connection Fee per ERU	6,995	6,995	6,995
Estimated New ERUs	44	139	26

The City prepares an annual budget that includes operating, debt and capital expenditures. The annual process involves review of financial projections and adoption of a balanced budget. Every several years, the City completes a rate study to provide updated projections of revenue and expenditures for the next six years.

9.3 SEWER UTILITY FUNDS

The City had five funds related to the sewer utility. As of late 2019, several of the funds have been closed due to retirement of the revenue bonds (407, 411), or consolidated (402 into 410). Two sewer funds are anticipated to remain: 401 sewer operating fund and 410 sewer facilities reserve fund.

- Sewer Fund 401 – This is the operating fund for sewer activity. Sewer service charges are the primary revenue source for this fund. Other sources include late payments, interest, miscellaneous and capital funding such as grants, loan proceeds or transfers from the cumulative reserve/sewer facilities fund. The uses of the fund include maintenance, operations, capital expenditures, and transfers to city funds for administrative/finance support and other internal services, the 1998 revenue bond fund for debt repayment and the equipment replacement fund.
- Sewer Facilities Operations Fund 402 – This fund was set up with annual funding from rates to be used for equipment updates at the treatment plant. The purpose was to be sure that rates were continuing to fund equipment replacement while the expenditures are uneven from year to year. The six-year outlook assumes this fund will be merged into the Sewer Facilities Fund 410.
- Cumulative Reserve/Sewer Facilities Fund 410 – This fund captures the reserves set aside for capital improvements. The main revenue source is connection fees/general facilities charges. Interest is also earned on the fund balance. Typically, expenditures are not made in this fund, rather a transfer is made to sewer fund 401 for capital

improvements underway and to sewer debt fund 407 for revenue bond payments. The exception is that this fund is used is to make PWTF loan repayments.

- 1998 Sewer Revenue Bond Fund 407 – This is a restricted bond fund that was tied to the repayment of the 1998 sewer revenue bonds. The 1998 revenue bonds are supported by assessments, rates and connection charges. The assessments are deposited into this fund and transfers are made from funds 401 and 410 for the remainder of the annual debt service payment. The City split the bond payment 50/50 between rates and connection fees and the final payment was made in 2018.
- Revenue Bond Reserve Fund 411 – This is a restricted bond reserve fund that was required as a covenant of the 1998 sewer revenue bonds. The reserve was held until 2018 with the proceeds transferred to the Revenue Bond Fund 407 for the final payment. This fund is no longer required and has been closed.

9.4 SEWER FUND BALANCES

The beginning 2019 balance for the sewer operating fund was $848,000. With a planned increase in reserves of $19,000, the estimated ending balance for the sewer operating fund is $867,000, as shown in Table 9-3. The target minimum balance of $402,000 includes the cash flow reserve calculated at 8% of the revenue and reserve. This is a similar formula that the City uses for the general fund. After subtracting the cash flow reserve of $402,000, there is $465,000 available for capital improvements.

Table 9-3: Sewer Fund Balance - 401

Sewer Fund 401	Amount	Comments
Beginning Balance 2019	$847,986	
Planned Increase in Reserves	19,166	
Estimated Ending Balance 2019	**$867,152**	
Target Minimum Balance		
Cash Flow Reserve	$401,935	8% x (revenue + reserve)
Meets Target?	*ok*	
Remainder Available	$465,217	for capital improvements

The beginning 2019 balance for the sewer reserve/facilities fund was $2,400,000 as shown in Table 9-4. The target minimum balance is an emergency reserve of $1,000,000 that is set aside for emergencies. After subtracting the $1,000,000, there is $1,400,000 available for capital improvements.

Table 9-4: Sewer Reserves Balance - 410		
Sewer Capital Reserve Fund 410*	**Amount**	**Comments**
Beginning Balance 2019	**$2,400,157**	
Target Minimum Balance		
Emergency Reserve	$1,000,000	set-aside for emergencies
Meets Target?	*ok*	
Remainder Available	$1,400,157	for capital improvements
**Combines Sewer Operations 402 and Sewer Capital Reserves 410.*		

9.5 FUNDING PRIORITIES

Sewer service charges, or monthly rates, are the primary on-going source of revenue for sewer maintenance, operations, administration, capital and debt service. Any surplus is held in the fund balance and available for capital projects.

General facilities charges (shown as connection fees in the budget) are used for capital improvements, either in the way of debt service payments on previous projects, used for current capital projects, or are set aside in reserves for future capital improvements. Connection fees are deposited into the Cumulative Reserve/Sewer Facilities Fund 410 until appropriated for a specific project or debt repayment. Sewer Inspection Fees are deposited in the operating fund.

Up to 2018, the outstanding Sewer Revenue Bond payments were handled in a restricted Fund No. 407. A transfer was made from Sewer Fund 401 each year for the rate portion (approximately $250,000) of the annual payment. Another transfer was made from the Cumulative Reserve/Sewer Facilities Fund 410 each year for the connection fee portion (approximately $250,000) of the debt payment. The 1998 sewer revenue bonds also included funding for the Cook Road ULID. The assessments received were deposited directly into the bond fund for debt payments. Interest earned remained in the fund for future debt payments. Now that the bonds have been paid off, the fund will likely be closed. Assessments may still come in and would be deposited in the Sewer Facilities Fund 410 for future capital improvements and/or making PWTF loan payments.

The City completes an annual budget that balances the revenue and expenditures for the year. This process involves staff, utility/city management and elected officials and is an important exercise in evaluating changing circumstances and the associated impact on the sewer program and ultimately rates.

9.6 OUTSTANDING DEBT

The sewer utility has three outstanding debt issues, all are loans from the Public Works Trust Fund Program (under the Washington State Department of Commerce) with 0.5% interest. These three loans were issued for the critical sewer interceptor project during 2005-2008. The 20-year loans have an outstanding principal balance of $5,089,000 at the end of 2018. The

payments are due in June each year through June, 2028. The PWTF program was designed to provide loans that are subordinate to any outstanding revenue bonds and do not have a coverage requirement.

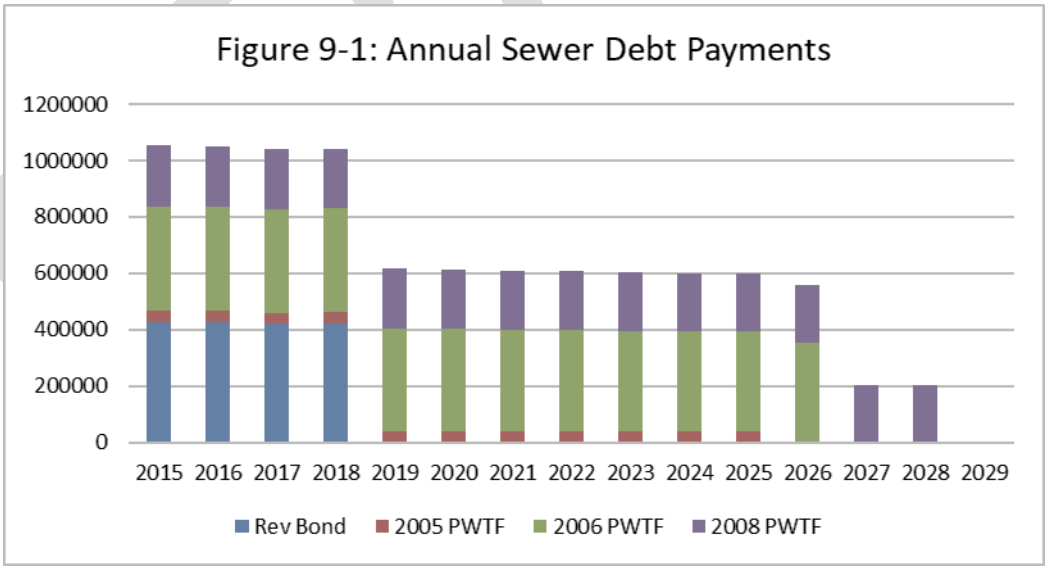
Table 9-5 shows the annual debt service schedule for the outstanding sewer debt.

Table 9-5: Outstanding Sewer Debt Summary

Debt Issue	Principal Balance Dec. 2018	Interest Rate	Year Ends	2019 Principal & Interest	Description
2005 PWTF Precon Loan	$267,945	0.5%	2025	$39,618	All 3 PWTF Loans: Critical Sewer Interceptor Replacement
2006 PWTF Loan #1	$2,800,000	0.5%	2026	$364,000	
2008 PWTF Loan #2	$2,020,819	0.5%	2028	$212,186	
TOTAL	**$5,088,764**			**$615,804**	

Note: PWTF = Public Works Trust Fund loans from Washington State Department of Commerce

Figure 9-1 maps the existing sewer debt payments. This provides a tool for the City to help identify opportunities in the future to increase funding for system replacement and improvement while minimizing the impact on rates. When an existing loan is paid off, the savings can be shifted to pay for increased annual replacement program or plan a large project requiring additional debt to begin payments with the savings. One can see the first opportunity is in 2019 when the revenue bonds were paid off. The next opportunities comes in 2026, 2027, and 2029 when all the existing debt will be paid off.



The total annual debt payments actually decrease a little each year due to the type of amortization schedule for PWTF loans. The annual payments include level principal and interest on the declining balance.

9.7 CURRENT SEWER RATES AND CHARGES

The City Council has authority to set rates and charges for the sewer utility to ensure it remains self-sufficient, meets all covenants on outstanding debt and provides for future system improvement and replacement. The rates and charges are reviewed annually during the budget process. The City Council adopted Ordinance No. 1940-19 in November 2019 to adjust monthly rates and Ordinance No. 1949-19 in December 2019 to adjust general facilities charges effective January 1, 2020.

9.7.1 Monthly Sewer Rates

The City bills customers for monthly sewer service per the rates shown in Table 9-6. The residential customer classes, single family and multiple residential, pay a flat rate per dwelling unit of $63.45 per unit in 2019, and $65.08 in 2020. The low-income class requires an application with qualification and reflects a 35% discount on the residential rate. The nonresidential class, including commercial, schools, and industrial customers, pay a base rate plus a volume rate for discharge in excess of 750 cubic feet per month of metered water usage. The water usage information is provided by the water utility, Skagit PUD #1. Special waste permits and additional charges are required for customers discharging higher than normal waste components.

The City has been adjusting the sewer rates annually to reflect the change in the Consumer Price Index to reflect inflationary pressures on the cost of operating the system and keep up the with the associated impact on the cost of system replacement and improvements. A rate study was completed along with developing the financial plan in this chapter, and was discussed and approved by the City Council. The rate outlook indicated that continuing annual increases for inflation would avoid larger less frequent increases and provide sufficient funding for the utility based on conservative assumptions known at the time.

The rate increase for 2020 includes a surcharge of $0.70 per month for financing the new Public Works facility.

Table 9-6: Current Sewer Rates

Monthly Rate by Customer Class:	Jan. 2019	Jan. 2020	Comments
Single Family	$63.45	$65.08	per dwelling unit
Low-Income Citizen	$41.32	$42.38	must meet qualifications
Accessory Dwelling Unit (> 450 SF)	N/A	N/A	61% of base rate (first reading Feb 2020)
Accessory Dwelling Unit (< 450 SF)	N/A	N/A	30% of base rate (first reading Feb 2020)
Multiple Residential Unit	$63.45	$65.08	per dwelling unit
Nonresidential Base Rate (includes 750 cubic feet per mo.)	$63.45	$65.08	per commercial, industrial unit
Nonresidential Volume Rate (over 750 cubic feet per mo.)	$5.88 per 100 cubic feet	$6.03 per 100 cubic feet	for all discharge > 750 cubic feet per mo.

9.7.2 General Facilities Charge (GFC) – Connection Fee

New connections pay a connection fee in the form of a general facilities charge for the right to connect and make use of the existing sewer system. The general facilities include the treatment facilities and necessary general pump stations and sewer interceptors to move the waste to the treatment facility. The Sewer General Facilities Charge was $6,995 in 2019 per residential unit or residential equivalent unit for non-residential connections. Following the rate study and financial plan developed to fund the necessary improvements, the General Facilities Charge was raised to $8,495 in 2020, and is anticipated to increase annually for inflation to keep up with the cost of recommended improvements in this plan. The City expects to need an expensive upgrade/expansion to the treatment facility in the next 10 years that will require significant borrowing. A facility plan will be required closer to the time and prior to design. Based on the updated cost estimate and timing of the improvements, the financial plan should be updated and general facilities charge recalculated at that time.

Table 9-7: Sewer General Facilities Charge

New Connections	GFC 2019	GFC 2020	Comments
Residential – Single & Multi-family	$6,995	$8,495	per dwelling unit
Accessory Dwelling Unit (> 450 SF)	N/A	$5,181.95	61% of base rate (first reading Feb 2020)
Accessory Dwelling Unit (< 450 SF)	N/A	$2,548.50	30% of base rate (first reading Feb 2020)
Non-Residential			
for plumbing fixtures	$291	$354	per plumbing fixture unit
for other than plumbing fixtures	$291	$354	per 234 gallons per month

The City continues to work towards having sewer service available throughout the City. This has been done with a combination of developer extensions, utility local improvement districts (ULID) or extensions of sewer mains. It is the responsibility of the property owners to pay for their fair share of the cost of the sewer lines that collect sewage from the property. If a property is within a ULID, they will pay an assessment. If the City has extended the sewer main, a special connection charge will be added when connecting to the system. A developer that has extended the sewer main is eligible for a reimbursement or latecomer's agreement if others connect into the main. The City has a program to promote overall water quality within the City by extending local sewer lines when there is capacity in the budget and pockets of interested homeowners. The City provides incentive for existing septic users to convert to the sanitary sewer system when it becomes available through a credit for decommissioning each septic system.

9.8 CAPITAL FUNDING SOURCES

The City has successfully used a variety of capital funding sources for utility improvements in the past. These include Revenue bonds, Public Works Trust Fund (PWTF) loans, Washington

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State Department of Ecology (Ecology) Clean Water State Revolving Fund (CWSRF) loans, Utility Local Improvement District (ULID) assessments, connection fees, special connection fees, developer extensions, monthly rates, and reserves. These are the primary sources of capital funding available for sewer. The following discussion outlines the City's major sewer funding source opportunities.

The City prefers to use pay-as-you-go funding whenever possible to avoid borrowing. And to borrow only when the improvement is long-serving for both existing and future customers.

9.8.1 Grants

Grant funds are a good source of capital funding because the money does not have to be repaid. Unfortunately, grants are not easy to come by. Skagit County has a grant program to participate in infrastructure projects related to economic development. The City continues to be successful in obtaining these grants. The Department of Ecology has limited grant/loan combinations available for water quality improvement projects. Ecology shows the City is currently eligible for up to 50% forgivable principal (grant) for pre-construction activities that would include the development of a facility plan and design of future wastewater treatment upgrades. The Department of Commerce has the Community Economic Revitalization Board (CERB) with limited grants for economic development, and also energy/water conservation projects. The Community Development Block Grant program is available through Commerce, as is a grant program for energy/water efficiency projects. The City should continue to pursue grants when appropriate and available.

9.8.2 Low-Interest Loans

The State of Washington operates several low-interest loan programs for sewer capital projects. The Public Works Trust Fund (website: pwb.wa.gov) has both a Pre-Construction and a Construction program for loans with low interest rates and loan terms up to 20 years. Both programs are open year-round when funds are available. The Department of Ecology operates a Combined Water Quality Funding Program (website: ecology.wa.gov) has Centennial Clean Water Fund and the Clean Water State Revolving Fund for qualified projects with low interest rates over 20 or 30-year terms. The Ecology programs have applications typically due in October with application workshops in the summer months. The trade-off for the low-interest loans is to agree with the program requirements and fit into their funding cycles.

The City also relies on the infrastructure funding program database that is provided by the Infrastructure Assistance Coordinating Council (IACC). The City uses this database to monitor available funding. The database can be accessed on the web directly at www.infrafunding.wa.gov.

9.8.3 Bond Sales

The City has the authority to sell several types of bonds that would be appropriate for capital projects: revenue, general obligation, limited general obligation and local

improvement district bonds. In general, bonds may have more financing costs than grants and low-interest loans from the State, but the City controls the timing. This can be an attractive funding alternative for major capital projects that will provide service over many years, particularly in times of low interest rates.

9.8.4 Contributions, Joint Projects

Pursuing contributions from benefiting parties or joint projects can provide cost savings to the Sewer fund when appropriate for the project. The City is continuing to offer shared assistance for extending the sewer lines.

9.8.5 Local Funding Sources

Monthly sewer rates can provide an on-going level of funds for planned capital repairs, system replacement, and improvements. These funds are appropriate for repair and replacement of the sewer system to serve existing customers. General facilities charges from new connections are available to fund improvements to the sewer system. The sewer utility is able to borrow from the above-mentioned financial assistance programs and any loans will need to be repaid by monthly rates and connection charges. The sewer utility is able to sell revenue bonds and/or general obligation bonds to fund planned system improvements, to be repaid by sewer rates and connection fees. General obligation bonds can be repaid by sewer rates and charges.

The cost of developer-funded projects is not addressed in this financial plan. These identified projects will be completed as necessary by developers in order to connect their property to the system. When developers complete certain projects that are approved by the City, the infrastructure is deeded over to the City. The developer can negotiate a latecomer or recovery agreement with the City to be reimbursed by new development making use of the facilities constructed by the developer for a specified period of time allowed by state law.

The City has the option to complete area-specific projects and be reimbursed as new development occurs through a special connection charge. Finally, the City also has the option to establish a ULID where the properties specially benefiting from an infrastructure investment would pay their share through an assessment.

9.9 AFFORDABILITY

The EPA defines affordable sewer rates as 2.0 percent of median household income (MHI) for a community. This also reflects the test applied by Ecology to determine the level of hardship in a community when applying for grants and loans for water quality improvement projects. The level of hardship can influence the financial assistance offer. If the rates are higher, the community will be considered in hardship and could be eligible for financial assistance in the offer, resulting in grant subsidy, a lower interest rate on a loan, or some combination of the two.

For the City, the current MHI $47,602 (Ecology Funding Guidelines, August 2019, Appendix M). The threshold for construction hardship at 2.0 percent of MHI would be residential sewer rates

of $79.34 per month. A typical residence in Sedro-Woolley pays $65.08 per month in 2020 for sewer service. This level is considered affordable and does not pose a hardship for a construction loan. If we assume that both the sewer rate and MHI raise by the same annual inflation, no change in affordability is anticipated.

However, for pre-construction loans, Ecology pre-determines eligibility with a combination of community size and 80% of the MHI for Washington State. For pre-construction (includes planning, design, environmental and other pre-construction activities) loans, Sedro-Woolley is eligible in 2020 for up to a 50% principal forgiveness. The financial plan assumes this eligibility will continue and will be considered for the facility plan and design phases. It must be emphasized that "up to 50%" does not guarantee any funding subsidy. It will be determined based on the applications in each round and the funds available.

Another measure of affordability is what residents in other local jurisdictions are paying. Table 9-8 compares monthly sewer rates for a single family residence with 800 cubic feet of usage. While some rate structures vary by volume, most common is a flat rate for residential. The flat residential rate works well for communities that do not have a combined water/sewer utility, such as Sedro-Woolley. The sewer general facilities charges (GFC) are also compared for a new residential connection. This is only the GFC and excludes any permit, inspection and other fees necessary to construct a home and connect to the sewer.

Table 9-8: Local Residential Rate Comparison

SINGLE FAMILY per month for 800 cu ft	2019 Monthly Sewer	2019 Sewer GFC
Concrete*	$115.00	$ 3,711
Monroe*	$ 92.15	$ 7,456
Sultan*	$ 80.55	$12,895
Duvall*	$ 75.74	$11,532
Arlington*	$ 70.15	$ 4,840
La Conner	$ 67.10	$ 2,432
Sedro-Woolley 2020*	$ 65.08	$ 8,495
Sedro-Woolley 2019*	$ 63.45	$ 6,999
Anacortes	$ 61.07	$ 9,091
Mt. Vernon*	$ 47.75	$ 7,347
Burlington	$ 45.83	$ 3,130
Marysville*	$ 43.95	$ 4,490

** Flat rate for sewer service (monthly rate)*

While it is interesting to compare what other jurisdictions are charging for sewer service, it is important to understand that each jurisdiction is developing its financial plan to carry out the projects and maintenance level required for its own system.

9.10 SEWER CAPITAL IMPROVEMENTS

Chapter 8 of this GSP identifies in excess of $28 million in recommended capital improvements for the sewer system during the 10-year planning horizon. Approximately $26.4 million have

been identified as City-funded improvements and $1.4 million as developer-funded improvements. This financial chapter addresses only the City-funded projects. The schedule for developer-funded improvements will depend on development activity. These cost estimates are in 2019 dollars.

A category of conveyance projects are for infill, or extending the sewer lines to unsewered areas of the city. A total of $1.6 million in 2019 dollars for 5 projects have been moved beyond the 10-year plan as it is not anticipated that the City can afford expansion until after the WWTP upgrade project with current financial priorities. This may change over the period and the City will be prepared if the circumstances present themselves in a positive manner that can be afforded.

It is reasonable to assume that the costs will be higher in the future when projects are scheduled for completion. The estimated 2019 costs will need to be escalated to make sure the funding is appropriate to match the anticipated cost escalation. This GSP assumes 4.0 per cent per year construction escalation over the 2019 project cost estimates.

9.10.1 Ten-year capital improvements

The recommended ten-year capital improvements total $21.6 million in 2019 dollars, including $4.1 million for the conveyance system and the $17.5 million for the treatment plant facilities. After construction cost escalation to the planned year, the ten-year improvements total $27.9 million, with $4.9 million for the conveyance system and $23 million for the treatment facilities.

The 10-year projects are displayed by year to demonstrate how they can be scheduled over the planning period, as shown in Table 9-9.

9.10.2 Ten-year capital improvement funding

The ten-year capital improvements have been reviewed for potential funding sources, such as pay-as-you-go through rates or borrowing, along with general facilities charges from new connections, grants and use of sewer capital reserves. The City plans to schedule the projects as necessary to be able to pay cash over the 10 years (pay-as-you-go) except for the major treatment plant upgrade in 2026-27 that will require borrowing. Grants will always be reviewed and pursued when appropriate. To be conservative, no grants are included in the financial outlook. The ten-year capital improvement funding sources include $16.9 million in low-interest loans and $11 million in rates and reserves collected from existing customers and new connections. Table 9-10 summarizes the funding sources to support the recommended capital improvements.

For future borrowing, annual debt service payments are estimated to begin the year after the project is scheduled. Table 9-11 estimates the annual payment for a 50% design loan in 2026 and a construction loan in 2027 for the WWTP upgrade project. The estimated new debt payment for CIP is $1,191,000 in 2028 for 20 years.

Table 9-9: Ten-Year Sewer Capital Improvements

		Escalated at 4% per year for Construction Cost escalation										
CIP #	Project	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2020-29
10-YEAR COLLECTION SYSTEM PROJECTS												
Rehab/Replacement												
R-1	Alley btwn Fidalgo St & Sterling St, W of Township, E of Fourth			$100,000	$613,614							
R-2	N or Warner St & E of Township					$425,829						
R-3	N of Railroad Ave & S of Talcott Ave	$223,600										
R-4	S of Ferry & N of Pacific & W of Ball St	$67,600										
R-5	N of Ferry & W of Ball St	$68,640										
R-6	Alley btwn Reed St & Haines St						$126,532					
R-7	Alley btwn Gibson St & Northern Ave							$131,593				
R-8	Along E side of Hwy 9 fr Alderwood Ln to Sapp Rd & W side of Hwy 9 fr Sapp Rd to McGarigle Rd							$100,000	$350,000	$350,000	560,344	
R-9	Along Northern Ave fr Metcalf to Murdock/Puget Alley. Along Metcalf fr Northern Ave to Alley btwn Munro & Gibson			$281,216								
Expansion Projects												
E-5	Jones Road Sewer Expansion - Corridor Project C1A							$447,417				
E-6	Patrick Road Sewer Expansion - Corridor Project C1B			$292,465								
E-8	Trail Road Sewer Exp Cook to F&S - Corridor Project C9A						$645,313					
E-xx	Olmsted Park Sewer			$112,486								
	10-Year Conveyance CIP (escalated)	$359,840	$0	$786,167	$613,614	$425,829	$771,845	$679,010	$350,000	$350,000	$560,344	$4,896,648

10-YEAR TREATMENT PLANT PROJECTS												
Capacity Upgrades												
TP-1	Digester aeration upgrade-diffusers	$26,000										
TP-2	Digester aeration upgrade-blowers				$789,655							
TP-3	Lab/Operations building replacement	$150,000	$1,319,894									
TP-4	Replace Street Shop to allow for relocated Lab/Ops Building	$25,000	$362,336									
TP-5	Anoxic tank mixer upgrade			$233,409								
TP-6	Facilities plan					$50,000	$266,330					
TP-7	WWTP Upgrade to 10 MGD							$2,112,071	16,192,541			
TP-8	WWTP Upgrade - Relocate Displaced Street Shop Buildings							$71,060	544,796			
Mechanical												
TP-9	Replace diaphragm pumps with rotary lobe pumps	$31,200										
TP-10	Replace the polymer mixers with auto polymer mixing system			$14,623								
TP-10	Varcor Biosolids Processor (Total cost $2.5; local cost $250,000)	$25,000	$245,400									
Structural												
TP-8	Inject grouting into concrete	$10,400										
TP-9	Silicone joint sealant to expansion joints	$10,400										
TP-10	Fill the base of the walls with injection grouting	$20,800										
Electrical												
TP-11	Perform an arc flash study for the plant	$15,000					$25,306					
TP-12	WWTP electrical system upgrades	$400,400										
TP-13	Upgrade aerator motors and add variable frequency drives	$104,000										
TP-14	Install bollards to protect plant service cables adjacent to roadways	$4,160										
Total 10-Year Treatment Plant CIP (escalated)		$822,360	$1,927,630	$248,033	$789,655	$50,000	$291,636	$2,183,131	$16,737,336	$0	$0	$23,049,781
Total 10-Year CIP (escalated)		**$1,182,200**	**$1,927,630**	**$1,034,200**	**$1,403,268**	**$475,829**	**$1,063,481**	**$2,862,141**	**$17,087,336**	**$350,000**	**$560,344**	**$27,946,429**

Table 9-10: Ten-Year Sewer Capital Improvement Funding Sources

Funding Source	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
Loans (Ecology, PWTF)							1,091,565	15,837,336		
Rates / New Connection GFC / Reserves	$1,182,200	$1,927,630	$1,034,200	$1,403,268	$475,829	$1,063,481	$1,770,575	$1,250,000	$350,000	$560,344
Total Funding Sources	**$1,182,200**	**$1,927,630**	**$1,034,200**	**$1,403,268**	**$475,829**	**$1,063,481**	**$2,862,141**	**$17,087,336**	**$350,000**	**$560,344**
Notes on amount to be borrowed:						*50% of design*		*$900k from reserves*		

Table 9-11: Estimated Annual Payments on New Debt for CIP

New Debt for CIP – Estimated Payments	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
2026 Ecology, 20 year (3.5% interest)								$77,000	$77,000	$77,000
2027 Ecology, 20 year (3.5% interest)									$1,114,000	$1,114,000
Total New Debt Payments for CIP	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$77,000**	**$1,191,000**	**$1,191,000**

Assumes debt payments begin the year after scheduled construction.

9.11 TEN-YEAR FINANCIAL PLAN

The ten-year financial plan includes projected revenue, expenditures, recommended CIP, necessary borrowing with debt repayment, and projected monthly rates and general facilities charges.

9.11.1 Ten-Year Rate Outlook

Over the ten-year planning period, the monthly sewer rates are expected to increase for inflation in each year. The 2020 rates adopted by the City Council are $65.08 (including $0.70 per month for the new PW Facility) and are anticipated to reach $80.00 by 2029 with an annual change of 2.3%. The GFC for new connections was increased $1,500 in 2020 to $8,495 and is anticipated to increase annually for inflation similar to rates, to reach $10,400 in 2029. The ten-year sewer rate outlook is summarized in Table 9-12.

The financial plan calls for rates, GFC from new connections, and reserves to fund the recommended capital improvements, until the new WWTP upgrade is designed in 2026 and constructed in 2027. The WWTP upgrade will require significant borrowing. The preferred scenario includes borrowing $16+ million in two low-interest loans (3.5%) to be paid off over 20 years. Given the conservative growth assumption of 75 new ERU per year 2020-2023 and 50 ERU per year 2024-2029, with the rates and GFC levels shown, both the Sewer Operating Fund 401 and WW Facilities Reserve Fund 410 would remain in balance and afford the planned program with improvements. If growth is more rapid, it would affect the timing of the WWTP upgrade by moving it forward but there would be additional GFC revenue to assist.

Table 9-12: Summary Ten-Year Financial Plan – Sewer Utility Fund 401

Summary Sewer Outlook – 401	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
New Connections (ERUs)	80	75	75	75	75	50	50	50	50	50	50
Rate-paying ERUs	4,760	4,835	4,910	4,985	5,060	5,110	5,160	5,210	5,260	5,310	5,360
Single Family Monthly Rate	$63.45	$65.08	$66.58	$68.11	$69.68	$71.28	$72.92	$74.60	$76.32	$78.08	$79.88
Residential Connection Fee (GFC)	$6,995	$8,495	$8,690	$8,890	$9,094	$9,303	$9,517	$9,736	$9,960	$10,189	$10,423
Sewer Service Charges	3,640,000	3,745,732	3,855,470	3,968,755	4,086,202	4,196,642	4,310,702	4,428,439	4,549,908	4,675,166	4,804,268
Other Revenue & Charges	91,200	91,200	91,200	91,200	91,200	91,200	91,200	91,200	91,200	91,200	91,200
Transfer from Reserve 410	445,000	606,000	1,298,000	350,000	661,000	–	221,000	836,000	87,000	145,000	246,000
Total Operating Revenue–401	**4,176,200**	**4,442,932**	**5,244,670**	**4,409,955**	**4,838,402**	**4,287,842**	**4,622,902**	**5,355,639**	**4,728,108**	**4,911,366**	**5,141,468**
Operating Expenditures	3,702,509	2,796,964	2,856,931	2,918,278	2,981,036	3,045,238	3,110,916	3,178,104	3,246,838	3,317,153	3,389,085
Existing Debt Service	464,360	462,852	459,900	456,946	453,996	451,045	448,093	406,863	54,103	53,092	–
Sewer Capital Improvements (CIP)											
CIP Funded by Rates	–	1,182,200	1,927,630	1,034,200	1,403,268	475,829	1,063,481	1,770,575	1,250,000	350,000	560,344
New Debt for CIP	–	–	–	–	–	–	–	–	77,000	1,191,000	1,191,000
Total Expenditures – 401	**4,166,869**	**4,442,016**	**5,244,462**	**4,409,424**	**4,838,301**	**3,972,111**	**4,622,489**	**5,355,543**	**4,627,941**	**4,911,245**	**5,140,430**
Annual Surplus (Deficit)	**9,331**	**916**	**208**	**531**	**101**	**315,731**	**413**	**96**	**100,167**	**121**	**1,038**

WW Facilities Reserve Activity

General Facilities Charges from new connections are deposited into the WW Facilities Reserve Fund 410 and will be used as part of the "Transfer from Reserve 410" to fund the CIP and New Debt for CIP. It is anticipated that $900,000 will be available in 2027 to reduce borrowing for the WWTP upgrade and maintain a minimum balance of $1,000,000.

9.11.2 Detailed Ten-Year Financial Plan – Sewer Fund 401

The detailed outlook for the Sewer Operating Fund 401 is shown in Table 9-13. The base year for the revenue and expenditures is the 2019 budget. The model estimates the future revenue and expenditures based on a series of conservative assumptions. In general, this means lower on revenue and higher on expenditures to increase the likelihood that the plan can be met. Actual results will always vary from the model projections and the goal of financial planning is to have achievable results.

A key element of this plan is the funding of the recommended CIP program. The model reflects an annual "Transfer from Sewer Facilities 410" to meet the planned expenditures. The GFCs collected from new connections are deposited into Fund 410 and transferred back to 401 as necessary to carry out the CIP. If growth were to come in slower than shown, there may not be the same funds available and the City should review and revise the financial plan. This would also mean that the upcoming WWTP upgrade would likely be pushed out.

Table 9-13: Ten-Year Outlook – Sewer Utility Fund 401

SEWER FUND 401 OUTLOOK	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	Comments
ASSUMPTIONS:	*2020 rates includes one–time increase of $0.17/mo surcharge for new PW Op Fac, GFC includes $1,500 bump, then by cost escalation.*											
New Connections (ERU's)	80	75	75	75	75	50	50	50	50	50	50	480.
Ratepaying ERU's	4,760	4,835	4,910	4,985	5,060	5,110	5,160	5,210	5,260	5,310	5,360	calc: svcs chg/rate
Monthly Rate Increase – by year		$1.46	$1.50	$1.53	$1.57	$1.60	$1.64	$1.68	$1.72	$1.76	$1.80	At Cost Escal. 2.3%
Growth Percentage	1.7%	1.7%	1.7%	1.7%	1.7%	1.7%	1.7%	1.7%	1.7%	1.7%	1.7%	
Residential Connection Fee (GFC)	$6,995	$8,495	$8,690	$8,890	$9,094	$9,303	$9,517	$9,736	$9,960	$10,189	$10,423	At Cost Escal. 2.3%
Annual Cost Escalation		2.3%	2.3%	2.3%	2.3%	2.3%	2.3%	2.3%	2.3%	2.3%	2.3%	
Investment Interest	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	
Single Family Monthly Rate	$63.45	$65.08	$66.58	$68.11	$69.68	$71.28	$72.92	$74.60	$76.32	$78.08	$79.88	eff. jan 1=11 mos rev
Operating Revenue												
Sewer Service Charges	3,640,000	3,745,732	3,855,470	3,968,755	4,086,202	4,196,642	4,310,702	4,428,439	4,549,908	4,675,166	4,804,268	new cust=6 mos next yr.
Fertilizer Sales	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	flat
Misc. (collection recoveries, misc)	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	flat
Investment Interest	16,000	16,000	16,000	16,000	16,000	16,000	16,000	16,000	16,000	16,000	16,000	flat
Late Penalties & Interest	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	flat
Transfer from Sewer Facilities 410	**445,000**	**606,000**	**1,298,000**	**350,000**	**661,000**		**221,000**	**836,000**	**87,000**	**145,000**	**246,000**	fromCumRes.Fund410
Subtotal Oper. Revenue	**4,176,200**	**4,442,932**	**5,244,670**	**4,409,955**	**4,838,402**	**4,287,842**	**4,622,902**	**5,355,639**	**4,728,108**	**4,911,366**	**5,141,468**	
Operating Expenditures												
Maintenance	205,000	209,715	214,538	219,473	224,521	229,685	234,967	240,372	245,900	251,556	257,342	costescal
General Operation(swr svs, supp, svs & chg)	1,924,785	1,969,055	2,014,343	2,060,673	2,108,069	2,156,554	2,206,155	2,256,897	2,308,805	2,361,908	2,416,232	seedetailatrow169
Capital Outlay from Rates												
Engineering Services	355,000	50,000	50,000	50,000	50,000	50,000	50,000	50,000	50,000	50,000	50,000	allowances
Other Improvements	664,000	part of CIP										
Portable Equipment	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	allowances
Sewer Operations (was xfer to 402)	–	part of CIP										
Machinery & Equipment	105,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	allowances
Transfers												
Parks Fund 101	8,300	8,491	8,686	8,886	9,090	9,299	9,513	9,732	9,956	10,185	10,419	cost escal.
Equip Replacement Fund 501	101,000	103,323	105,699	108,131	110,618	113,162	115,764	118,427	121,151	123,937	126,788	cost escal.
General Fund 001 (Indirect Cost Alloc.)	293,050	299,790	306,685	313,739	320,955	328,337	335,889	343,614	351,517	359,602	367,873	cost escal.
Fleet M&O 501	16,539	16,919	17,309	17,707	18,114	18,531	18,957	19,393	19,839	20,295	20,762	cost escal.
Solid Waste/PW Operations Facility	9,835	19,670	19,670	19,670	19,670	19,670	19,670	19,670	19,670	19,670	19,670	new ops facility, 20–yr
Subtotal Oper. Expen. & Cap. Outlay	3,702,509	2,796,964	2,856,931	2,918,278	2,981,036	3,045,238	3,110,916	3,178,104	3,246,838	3,317,153	3,389,085	
Net Available for Debt & CIP	**473,691**	**1,645,968**	**2,387,739**	**1,491,677**	**1,857,366**	**1,242,604**	**1,511,987**	**2,177,535**	**1,481,270**	**1,594,213**	**1,752,382**	
Existing Debt Service												
PWTF payment – Xfer to Cap Proj 410	464,360	462,852	459,900	456,946	453,996	451,045	448,093	406,863	54,103	53,092	–	payments less 150k fr conn fees
Subtotal Existing Debt Service	464,360	462,852	459,900	456,946	453,996	451,045	448,093	406,863	54,103	53,092	–	
Sewer Capital Improvement Program (CIP)												
CIP Funded by Rates		1,182,200	1,927,630	1,034,200	1,403,268	475,829	1,063,481	1,770,575	1,250,000	350,000	560,344	See CIP for details
New Debt for CIP		–	–	–	–	–	–	–	77,000	1,191,000	1,191,000	See CIP for details
Subtotal Capital Improvements	–	1,182,200	1,927,630	1,034,200	1,403,268	475,829	1,063,481	1,770,575	1,327,000	1,541,000	1,751,344	
Subtotal Oper, Cap Outlay & Debt	4,166,869	4,442,016	5,244,462	4,409,424	4,838,301	3,972,111	4,622,489	5,355,543	4,627,941	4,911,245	5,140,430	
Annual Surplus (Deficit)	**9,331**	**916**	**208**	**531**	**101**	**315,731**	**413**	**96**	**100,167**	**121**	**1,038**	

Table 9-13: Ten-Year Outlook – Sewer Utility Fund 401

SEWER FUND 401 OUTLOOK	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	Comments
Beginning Fund Balance – Fund 401	847,986	857,317	858,233	858,442	858,973	859,074	1,174,805	1,175,217	1,175,314	1,275,481	1,275,601	2019 budget est.
Annual Surplus (Deficit)	9,331	916	208	531	101	315,731	413	96	100,167	121	1,038	
Ending Fund Balance (estimated)	**857,317**	**858,233**	**858,442**	**858,973**	**859,074**	**1,174,805**	**1,175,217**	**1,175,314**	**1,275,481**	**1,275,601**	**1,276,639**	
Target Ending Balance – Fund 401	401,935	424,020	488,232	421,472	455,790	411,753	463,817	522,469	472,274	494,948	513,366	8% x (Beg. Cash Bal + Rev.)
	ok	ok	ok	ok	ok	ok	ok	ok	ok	ok	ok	

Table 9-14:Ten-Year Outlook – Wastewater Reserves Fund 410

WW RESERVES FUND 410	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	Comments
Revenue												
Investment Interest	40,397	25,600	23,500	15,800	17,600	16,500	19,800	21,100	16,300	10,100	12,300	calc on end bal
Sewer Connection Fee (GFC)	559,600	637,125	651,750	666,750	682,050	465,150	475,850	486,800	498,000	509,450	521,150	# ERUs x Conn Fee
Loan Pmt fr Arterial Streets/Streets	500,000											Loan for cash flow
Interfund Loan Repayment	161,161			–	–	–	–	–	–	–	–	River Rd land interfund loan
Xfer fr 401 for PWTF Loan Pmts	464,360	462,852	459,900	456,946	453,996	451,045	448,093	406,863	54,103	53,092	–	fr 401 for pwtf debt
Subtotal Revenue	**1,725,518**	**1,125,577**	**1,135,150**	**1,139,496**	**1,153,646**	**932,695**	**943,743**	**914,763**	**568,403**	**572,642**	**533,450**	
Expenditures												
Loan to Arterial Streets 104	500,000											Loan for cash flow
PWTF Loan Pmts	615,860	612,852	609,990	606,948	603,996	601,045	598,093	556,863	204,103	203,092	–	from debt tab, ends 2028
Xfer to Sewer Fund 401–Capital Proj.	445,000	606,000	1,298,000	350,000	661,000	–	221,000	836,000	87,000	145,000	246,000	read by 401
Subtotal Expenditures	1,560,860	1,218,852	1,907,990	956,948	1,264,996	601,045	819,093	1,392,863	291,103	348,092	246,000	
Annual Surplus (Deficit)	**164,658**	**(93,275)**	**(772,840)**	**182,548**	**(111,350)**	**331,650**	**124,650**	**(478,100)**	**277,300**	**224,550**	**287,450**	
Beginning Fund Balance Fund 410*	***2,400,157***	***2,447,066***	2,353,791	1,580,951	1,763,499	1,652,149	1,983,799	2,108,449	1,630,349	1,007,649	1,232,199	*2019 budget est.*
Annual Surplus (Deficit)	164,658	(93,275)	(772,840)	182,548	(111,350)	331,650	124,650	(478,100)	277,300	224,550	287,450	
Use of Reserves toward WWTP									(900,000)			
Ending Fund Balance (estimated)	**2,564,815**	**2,353,791**	**1,580,951**	**1,763,499**	**1,652,149**	**1,983,799**	**2,108,449**	**1,630,349**	**1,007,649**	**1,232,199**	**1,519,649**	
Target Minimum Fund Balance	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000	minimum of $1,000,000
	ok	ok	ok	ok	ok	ok	ok	ok	ok	ok	ok	

9.11.3 Detailed Ten-Year Financial Plan – WW Facilities Reserve Fund 410

The model assumes that former sewer reserve funds are combined into one renamed fund, Wastewater Facilities Reserve Fund 410. The detailed outlook for the WW Facilities Fund 410 is shown in Table 9-14. This fund collects the GFC contributions from new connections, any special connection fees from certain areas where the City extended a sewer line, interest on the reserves and the rate contribution toward the PWTF loan repayments. The connection fees pay the first $150,000 toward the existing PWTF loans, with the remainder coming from rates toward the critical sewer line replacement program that was funded with the loans.

This financial plan assumes the City will borrow $1.1 million for 50% of design of the WWTP upgrade in 2026 and $15.7 million for construction in 2027 (after $900,000 contribution from reserves). Estimated annual debt repayment is included in Fund 401 projections in Table 9-13.

The estimated beginning and ending 2019 balances were provided by the City. A target minimum balance is set at $1,000,000 for emergencies. The goal is to be able to transfer sufficient funds to 401 each year to meet the CIP program, and meet the target minimum balance. This recommended plan meets both criteria, with significant borrowing for the WWTP upgrade design and construction out in 2026-2027. Continued annual adjustments to both rates and GFCs to reflect inflation are an important element to the success of this plan.

9.12 SUMMARY RECOMMENDATIONS

The City expects to need an expensive upgrade/expansion to the treatment facility in the next 10 years that will require significant borrowing. A facility plan will be required closer to the time and prior to design (2024-25). Based on the updated cost estimate and timing of the improvements in the facility plan, the financial plan should be updated and general facilities charge recalculated at that time.

The City Council has taken action on the recommendations in the financial plan by passing the rate and fee ordinances. A summary of the actions follows:

- Increased the Sewer General Facilities Charge to $8,495 for new connections to the sewer system with the expectation of increasing annually to reflect the change in Consumer Price Index for inflation.
- Continued to increase monthly rates annually to reflect the change in Consumer Price Index for inflation. The residential rate was increased to $65.08 for 2020, from $63.45, including $0.70 for the new PW facility.
- Anticipate significant borrowing for design and construction of the WWTP upgrade project in 2026-2027. Two low-interest loans are included: $1.1 million for 50% of design of the WWTP upgrade in 2026 and $15.7 million for construction in 2027 (after

$900,000 contribution from reserves). The annual debt payment for the two loans is estimated to be $1,191,000 in 2028 for 20 years.

- Consider applying for Ecology preconstruction hardship program for the Facility Plan and WWTP design, if eligible, for up to 50% of the facility plan/design cost. The Ecology program rules and available funding change over time and would need to be reviewed at the time. To be conservative, no grant funding is included in this scenario.
- Monitor the rate outlook – the rate outlook should be reviewed annually with the budget process. A rate study should be completed to update the future projections with the Facility Plan cost estimates and results. The financial plan includes assumptions on the number of new customers paying the connection fee and paying monthly rates. The future rates may be impacted by any one of the assumptions being slowed.

This balanced financial plan has been developed as a guide to show what can be expected for financial performance in the next ten years as the City follows the capital facilities plan and other recommendations of this plan. The City has been planning ahead to attempt to minimize future borrowing except for major system improvements – the WWTP upgrade. Capital financing in terms of borrowing will be required to complete the projects identified. The City also evaluated monthly rates and facilities charges along with this planning effort. It is clear that continued annual adjustment for both monthly rates and GFCs paid by new connections will avoid the need for larger increases given the assumptions known at this time.

City of Sedro-Woolley
2019 Sewer Plan Update
Sedro-Woolley, Washington

Appendix A
Operations Program

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APPENDIX A

OPERATIONS PROGRAM

A.1 GENERAL

This Appendix to the Plan presents an overview of the routine and emergency procedures that the City of Sedro-Woolley employs for the operation and maintenance of its system. Specific recommendations for continued operation of the sewer utility are in accordance with State regulations and City policies.

A.2 SYSTEM RESPONSIBILITY AND AUTHORITY

A prerequisite to the delivery of efficient and reliable service to all customers of the City is a competent staff organized such that the responsibility for day-to-day and emergency operations is clearly defined and executed. The following is a summary of Sedro-Woolley's sewer utility organization.

A.2.1 Mayor and City Council

Overall responsibility for the City's utility operations lies with the elected officials. The City of Sedro-Woolley has a mayor and 7 City Council members who are responsible for operation, management, regulatory compliance and financial aspects of city services.

The City Council holds regular meetings which are open to the public. Meetings are held twice monthly on the second and fourth Wednesdays of the month at the Sedro-Woolley Community Center.

A.2.2 City Public Works Director

The City of Sedro-Woolley also employs a Public Works Director. This person has overall authority of all public works in the City.

A.2.3 Sewer Personnel

The Sewer Treatment Supervisor has the overall responsibility for the management of the sanitary sewer system and wastewater treatment plant. There are currently six employees in the sewer department who share the responsibility to maintaining and operating the system.

A.2.4 Outside Consultants

The City of Sedro-Woolley retains the services of outside consultants for some of its engineering needs for its sewer system, surveying and legal counsel. In accordance with State law, engineering consultants are selected based on statements of qualifications periodically requested from specialists in sanitary sewer system engineering.

A.2.5 Other Assistance

Other assistance is required from time to time for specific City projects, maintenance and construction. The City maintains a roster of qualified contractors for small works projects and contracts with other service providers as required by City needs and in accordance with State law.

A.3 RECORD MAINTENANCE

Operation of a sewer utility requires consideration of long term records management in a format which is useful to the variety of staff members and outside consultants which use them. The City maintains the following records on an ongoing basis:

- Customer Account Information: Detailed records of each sewer account are maintained through the City's computerized billing system.

- Agreements: Copies of the City's agreements with other agencies, as well as monthly reports required for documentation of wastewater treatment and disposal charges are kept on file at the City.

- Comprehensive Plan Map: The Sewer Comprehensive Map and other maps included in this document are maintained in a computerized (AutoCAD and GIS) format. These maps detail the general location of existing and proposed facilities, as well as physical features, land use, and boundary information for the City.

- Maintenance Reports: Detailed records of periodic maintenance schedules and system attributes are kept on file.

- Record drawings, specifications and operation & maintenance manuals for the Wastewater Treatment Facility and Pump Stations.

A.4 PREVENTATIVE MAINTENANCE

Generally, preventive maintenance on the City's sewer system includes the following elements:

- All possible hazards are thoroughly and systematically identified.

- Potential failures are detected while still in their developing stages.

- Maintenance activities are prioritized and scheduled.

- Scheduled maintenance of pump stations are completed annually per Job Cal work orders. The pump station GPM outputs are inspected daily per SCADA and physically once per week. Problems are addressed on an as needed basis. The pump stations with telemetry are inspected weekly while the stations without telemetry are inspected three times a week.

- System cleaning and field and video inspection of the system, including lines and manholes, is scheduled and accomplished.

- City staff attend workshops and seminars in order to learn up-to-date techniques and materials.

The staff records maintenance information manually or with Excel spreadsheets or proprietary software platforms.

A.5 EMERGENCY PROCEDURES

A.5.1 City Personnel

The City's sewer department maintains a sanitary sewer emergency response crew on 24-hour call. The sewer department duty telephone number (360-661-1834) is

monitored 24 hours a day to allow the public to notify emergency crews at any time.

The City's on-call crew is available to answer any emergency that may occur within the system and has immediate response responsibility. This includes but is not limited to power failures, equipment failure at the treatment plant, response to lift station alarms, sewer back-ups and forcemain blockages, minor repair work and emergency response procedures required to sustain service. In the event of a major emergency, on-call staff are responsible for notifying other staff members as appropriate to conditions. Table A-1 outlines emergency contacts. For a detailed outline of the system's emergency procedures see the Wastewater Treatment Plant Emergency Response Plan, Appendix G of the City of Sedro-Woolley's Emergency Operations Plan, included at the end of Appendix A of this Comprehensive Plan.

A.5.2 Communications

The city staff members have assigned phones for communication with the City. The on-call personnel are required to carry their duty phone during assigned shifts.

A.5.3 Supplies and Spare Parts

The City maintains an inventory of spare parts that are required for routine maintenance and/or emergency repairs. A list of suppliers for after hours and emergency repairs is maintained for response to major emergency conditions.

A.5.4 Outside Assistance

Sedro-Woolley maintains relationships with neighboring cities and the County for coordination during emergency events. In addition, the City has contacts at other agencies and jurisdictions which may be instrumental in emergency response. A summary of emergency contacts and agencies which the City may be required to notify is provided in Table A-1.

A.6 SYSTEM VULNERABILITY

The City of Sedro-Woolley's sewer system consists of individual drainage basins which convey wastewater to the City's wastewater treatment plant for treatment and disposal.

The vulnerability of various components of the overall sewer system has been evaluated to identify areas which may be affected in the event of a natural or manmade disaster. System vulnerability includes loss of service, damage to property, and/or health risks which may be associated with failure of the individual components of the sanitary sewer system. A summary of the system vulnerability analysis is presented in the following paragraphs.

A.6.1 Treatment and Disposal

The City operates a wastewater treatment plant for the treatment and disposal of wastewater flows generated within the City. Any interruption in the treatment would likely result in discharge of untreated wastewater to the Skagit River or at the treatment plant site.

A.6.2 Sewer Mains, Trunks and Regional Interceptors

Any pipeline is subject to clogging and, under certain circumstances, can break.

Clogging of sewer lines can create backups in manholes and in severe cases can progress back to customer properties. Pipe breaks due to settlement, deterioration of pipe material, or other causes can pollute the groundwater and result in excessive infiltration and inflow.

A.6.3 Pump Stations

The City operates pump stations to serve low elevations within the system. Failure of a lift station could cause significant backups in the collection systems surrounding the pump stations, public health and safety concerns or environmental issues.

All pump stations with the exception of the Bingham Park and Houser Park stations are equipped with alarm systems that report to the WWTP SCADA system. The SCADA system will call the duty phone when alarms are activated.

A.6.4 Electrical Power

Power to the City of Sedro-Woolley is provided by Puget Sound Energy. Historically, loss of power has not been a significant issue because the City maintains emergency on-site generators at the treatment plant and at all but three pump stations (the Mountain View, Bingham Park and Houser Park Pump Stations). The Mountain View Estate Pump Station has an emergency overflow to the gravity collection system and does not need a generator at this time. If the overflow capacity becomes an issue at this station and if overflows cause customer or environmental issues, the addition of a generator may be required.

A.7 OPERATIONAL RECOMMENDATIONS

The following operational recommendations are made for the City's sewer system.

1. The National Pollutant Discharge Elimination System (NPDES) requires that all sanitary sewer collection owner/operators have a system in place to ensure that Capacity, Management, Operations and Maintenance (CMOM) regulations and standards are met. This system may take the form of an integrated CMOM program, for which the EPA offers a guide and checklist. The CMOM program is not subject to content standardization or regulatory enforcement and, beyond facilitating regulatory compliance, the optional EPA framework is designed to promote a high level of service to customers, optimize resource utilization, improve communication relations with the public and other municipal entities, and shift system maintenance from a reactive to a proactive approach. In CMOM planning, the owner/operator selects performance goal targets and designs activities to meet the goals. The City currently complies with all relevant regulations. It is nonetheless recommended that City staff work towards developing an integrated CMOM program based on EPA program guidelines. The EPA's planning framework covers operation and maintenance (O&M), capacity assessment and assurance, capital improvement, and financial management planning, all of which are already subject to short and long range planning by the City on an individual basis and covered herein. Use of the EPA guide offer's an additional benefit, as it is also intended for use by EPA and state inspectors. If a federal or state reviewer observes a practice that does not comply with a sewerage provider's CMOM program, he or she may make recommendations to ameliorate the discrepancy without imposing legally

binding requirements upon these circumstances, thus promoting the sewerage provider's self-regulatory function. City staff can review current system components in relation to EPA CMOM program guidelines by following the checklist included in Chapter 3 of the "Guide for Evaluating Capacity, Management, Operation, and Maintenance (CMOM) Programs at Sanitary Sewer Collection Systems", available on the EPA website.

Table A-1: Communications Chart

Name	Title	Phone Number	City Cell
WASTERWATER PLANT CONTACTS			
Debbie Allen	Supervisor/Emergency Coordinator	360-770-2518	360-661-6448
Steve Huizinga	Lead Operator	360-424-5954	360-661-6471
Ralph Kennedy	Plant Operator	360-840-3768	360-661-6474
Nathan Walsh	Plant Operator	360-982-6980	360-399-5720
Kevin Wynn	Plant Operator	360-840-4781	360-661-6473
Casey Sousa	Plant Operator	425-870-9109	360-391-7490
After Hours Duty Phone			360-661-1834
CITY OF SEDRO-WOOLLEY ADMINISTRATION CONTACTS			
Mark Freiberger	Public Works Director	360-855-0771	360-661-6445
David Lee	City Engineer/Stormwater Manager	360-855-3219	360-661-6469
Julia Johnson	Mayor	360-855-3160	360-854-8020
Doug Merriman	City Supervisor	360-855-9921	360-503-9252
DISTRIBUTION/COLLECTION			
Tucker Johnson	Collection Operator	360-855-3160	360-661-7265
Carrie Weyand	Collection Operator	360-540-0808	360-630-4353
NOTIFICATION OF CHEMICAL RELEASE/SUSPICIOUS ACTIVITY			
	Police/HazMat Unit	**911**	
	National Response Center	1-800-424-8802	
	WA Emergency Management Division	1-800-258-5990	
	Dept. Ecology NW Region	425-649-7000	

ADDITIONAL CONTACTS			
Britt Phaff	Skagit County Health Department	360-416-1555	

1.0 INTRODUCTION

1.1 PURPOSE AND SCOPE OF EMERGENCY RESPONSE PLAN

This plan covers emergency response activities that may occur at the City of Sedro-Woolley Wastewater Treatment Plant (WWTP) in response to a hazardous material release, fire or medical emergency. The primary goal of this Emergency Response Plan (Plan) is to reduce or eliminate the potential for injury, illness or death occurring as a result of a sudden emergency.

This Plan contains all the elements as outlined in Chapter 296-824, WAC, *Emergency Response to Hazardous Substances Releases Rule*.

This Plan shall be reviewed and updated as necessary to maintain compliance with changing regulations, the introduction of new hazards, or changes in facility personnel or process equipment.

Emergency response* or *responding to emergencies means a response effort by employees to uncontrolled releases, a release where significant safety and health risks could be created.

Releases of hazardous substances that are either incidental or don't create a safety or health hazard (*i.e.*, fire, explosion, or chemical exposure) are not considered to be uncontrolled releases.

1.2 FACILITY IDENTIFICATION, LOCATION, AND SITE PLAN

- **Name:** City of Sedro-Woolley WWTP
- **Location:** 401 Alexander Street
  Sedro-Woolley, WA 98284
- **Contact:** Debbie Allen, Treatment Plant Supervisor

  Treatment Plant Staff: 360-856-1100
  Supervisor Cell Phone: 360-661-6448
- **Vicinity:** Section 5.0:
  Figure 1: The location map of the facility

1.3 FACILITY OVERVIEW

The City of Sedro-Woolley operates an oxidation-ditch secondary wastewater treatment facility, which has a maximum daily treatment capacity of 2.07 MGD (million gallons per day). The facility, which is operated seven days per week, utilizes an ultraviolet (UV) disinfection process before discharging treated effluent directly into the Skagit River.

1.4 POTENTIAL HAZARDS

The following types of emergencies have been identified for the WWTP. Sections to address specific types of emergencies are summarized in the table.

Type Emergency	Sections
Medical Emergency	Checklist ERP-1
Sodium Hypochlorite Spill	Checklist ERP-2
Diesel Fuel Spill	Checklist ERP-3
Fire Emergency	Checklist ERP-4
Post-Emergency Procedures	Section 3.0

Material Safety Data Sheets (MSDS's) with specific health hazard data are available for the chemicals stored on the site that could cause significant environmental consequences if accidentally released.

2.0 FACILITY PERSONNEL ROLES/NOTIFICATION

2.1 INCIDENT/EMERGENCY DISCOVERY

Figure 1 provides an overview of the sequence of actions that are essential during an emergency response.

If an emergency situation arises involving the WWTP, the Supervisor and/or an operator is always on-call that can assess the incident and activate the incident command system (ICS) by notifying the offsite response agencies.

If a situation arises after normal working hours, notification to the WWTP Supervisor and other response personnel should be done using the communications chart provided in Table 1.

2.2 ALARMS

The WWTP operations building and maintenance shop both have intrusion and smoke alarms. When an intrusion alarm activates, Guardian Security will first call the Treatment Plant office. WWTP staff may clear the alarm by responding with a code known only to authorized

personnel. If a wrong code is given, or no contact is made, the security company will dispatch 911. Guardian Security will immediately dispatch 911 for fire alarms.

There are two autodialer systems in place for plant emergencies. The soft autodialer is the primary system; the hard autodialer is a backup system. When critical plant equipment fails, the soft autodialer (SCADA) will send a voice message to the WWTP duty phone. The WWTP Operator on duty will acknowledge the alarm, and report to work. If there is no response from the duty operator, the auto dialer will continue calling from the emergency list until someone acknowledges the alarm. If after 30 minutes, there is still no response, the hard autodialer will begin calling after hours emergency numbers.

2.3 WWTP SUPERVISOR AUTHORITY AND RESPONSIBILITIES

The WWTP Supervisor has been granted the authority necessary to carry out the procedures outlined in this Contingency Plan in the event of an emergency. These responsibilities may include:

- Directing WWTP personnel.
- Contacting regulatory agencies.
- Summoning assistance from emergency medical services.
- Shut-down of operations and evacuation of the facility.
- Summoning assistance from emergency services.

2.4 FIRST RESPONDER DUTIES

The person observing an incident that he/she believes could involve a threat to human health or property will follow the following procedures:

1. **Recognition** of the nature and extent of emergency in order to determine its level.
   (a) Size up the incident and quantify the chemical released, if safely possible.
   (b) Note product spread, wind direction, and surrounding vulnerabilities.
   (c) Determine whether the nearby storm outlet has been or might be impacted.
   (d) Note whether there has been, or there is the possibility of, serious injuries.

2. **Isolation** of the incident from workers and conditions that could lead to fire/explosion.
   (a) Isolate the area from possible exposures by warning others and barricading.
   (b) For flammable/combustibles, extinguish all flames and other sources of ignition in the area.

3. **Protection** from the consequences of the incident using defensive measures.
   (a) Put barriers in the path of spilled liquid to contain it for recovery.
   (b) If trained to do so, use a fire extinguisher to put out an incipient stage fire.

4. **Notification** to WWTP Supervisor of the emergency to activate response actions. The Supervisor acts as the emergency response dispatcher for external assistance. In the case of a medical or a fire emergency, call 911.

Figure 1. Emergency Response Flowchart

Actual or Potential Emergency Conditions Observed Involving:	
• Oil or chemical product spill	• Spill of solid or hazardous wastes
• Employee or Contractor injury	• Fire or explosion

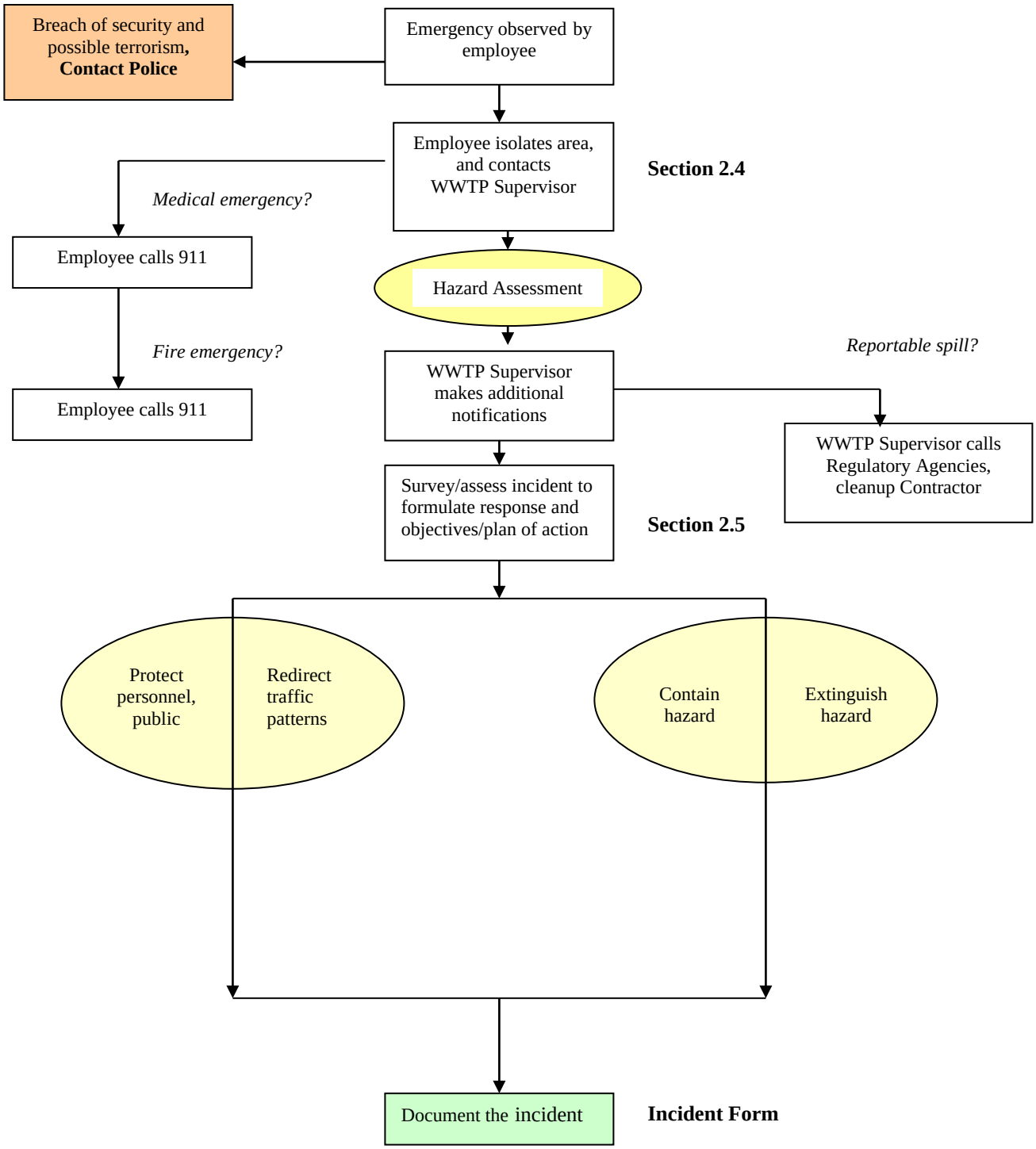


Table 1. Communications Chart

Name	Title	Home Phone	City Cell
WASTEWATER PLANT CONTACTS			
Debbie Allen	Supervisor/Emergency Coordinator	360-770-2518	360-661-6448
Steve Huizinga	Lead Operator	360-424-5954	360-661-6471
Ralph Kennedy	Plant Operator	360-840-3768	360-661-6474
Nathan Walsh	Plant Operator	360-982-6980	360-399-5720
Kevin Wynn	Plant Operator	360-840-4781	360-661-6473
Casey Sousa	Plant Operator	425-870-9109	360-391-7490
After Hours Duty Phone			360-661-1834
CITY OF SEDRO-WOOLLEY ADMINISTRATION CONTACTS			
Mark Freiberger	Public Works Director	360-855-0771	360-661-6445
David Lee	City Engineer/Stormwater Manager	360-855-3219	360-661-6469
Julia Johnson	Mayor	360-855-3160	360-854-8020
Doug Merriman	City Supervisor	360-855-9921	360-503-9252
DISTRIBUTION/COLLECTION			
Tucker Johnson	Collection Operator	360-661-7265	360-661-6489
Carrie Weyand	Collection Operator	360-540-0808	360-630-4353
NOTIFICATION OF CHEMICAL RELEASE/SUSPICIOUS ACTIVITY			
	Police/HazMat Unit	**911**	
	National Response Center	1-800-424-8802	
	WA Emergency Management Division	1-800-258-5990	
	Dept. Ecology NW Region	425-649-7000	
ADDITIONAL CONTACTS			
Britt Phaff	Skagit County Health Department	360-416-1555	

2.5 WWTP SUPERVISOR/EMERGENCY COORDINATOR DUTIES

The WWTP Supervisor will act as the Emergency Coordinator until offsite responders arrive, at which time the Supervisor can transfer the Emergency Coordinator duties to the Incident Commander of the arriving unit(s).

The Emergency Coordinator will take control of the affected area and any resources necessary until the emergency has been eliminated and the necessary cleanup and/or restoration complete. The Emergency Coordinator will direct the following activities during the evaluation process:

1. Where applicable, see that the process and/or operations threatened by the emergency are stopped, and ensure that fires or explosions do not occur or spread.

2. Determine (if possible) the source/cause of the emergency and assess the primary and secondary hazards.

2.5.1 HAZARD ASSESSMENT

The Emergency Coordinator will assess possible hazards, both direct and indirect, to human health and property, and subsequently notify the appropriate site personnel and authorities.

The hazard assessment of the Emergency Coordinator will include information gathered from other site personnel. The Emergency Coordinator will receive verbal reports from responsible individuals as to the condition of all on-site personnel. The Emergency Coordinator will also receive information from other persons concerning the presence and extent of what personal injury or casualty situation exists (*i.e*. hospitals, ambulance, *etc*.).

Based on his/her knowledge of the existing conditions, the Emergency Coordinator will determine the following:

1. Extent of injuries, if any.
2. Possible hazards to human health outside the facility.
3. Whether facility personnel can control the situation. If not, call 911.
4. If evacuation is needed. If so, then activate the evacuation procedures.

2.5.2 SPILL CONTAINMENT AND CONTROL ACTIVITIES

Containment and control activities may be initiated by the Emergency Coordinator who will supervise the incident according to the following procedures:

1. Stop source of flow, if trained to do so and if safely possible.

2. If the spill occurs within secondary containment, ensure that the drain valve is tightly closed to prevent a release.

3. If the spill occurs outside of containment, determine principal flow direction and construct containment barriers at down gradient culverts or inlets. Use any means available to ensure that oil or chemicals to not reach the nearby creek.

4. If the spill potentially exceeds the capacity of onsite recovery, immediately call 911.

2.5.3 EVACUATION

The Emergency Coordinator or the Incident Commander present at the time of the event are the only people authorized to order the evacuation of the facility in response to an emergency which threatens the health and safety of the people at the facility. Evacuation of the facility or nearby neighborhood may be ordered based upon the judgment of the Emergency Coordinator or at the request of local authorities.

The determination that the plant may be safely re-occupied shall be made by the Emergency Coordinator, in consultation with responding emergency service agencies. Facility activities will resume only after the Emergency Coordinator has given approval.

3.0 POST-EMERGENCY PROCEDURES

3.1 SUSTAINED ACTIONS

Sustained actions include ongoing efforts to restore areas affected by the emergency to their normal status. This includes cleanup operations and waste disposal activities.

In the affected area(s) of the facility, confirmatory testing may be required to determine if the area is safe for direct human contact. The secondary containment and emergency equipment must be cleaned or otherwise fit for its intended use before operations are resumed to normal.

3.2 POST-EMERGENCY ACTIONS

The City of Sedro-Woolley will investigate each incident that has resulted in, or could reasonably have resulted in, a major spill or other emergency incident. The investigation will be conducted no later than 48 hours following the incident and will describe:

- Date of the incident.
- Date the inspection began.
- Factors that contributed to the incident.
- Recommendations that resulted from the incident.

The findings of the incident investigation will be used to identify the need for improving emergency preparedness and prevention practices or equipment, and will be discussed with employees.

The WWTP Supervisor will be responsible for keeping the agencies informed of the cleanup progress. This includes submission of any written reports that are required as follow-up to a spill verbally reported to the National Response Center or State Warning Point.

3.3 AMENDMENT TO THE EMERGENCY ACTION PLAN

This ERP is subject to review and amendment under the following circumstance:

1. The ERP fails to meet reasonable expectations under an actual emergency.

2. The facility alters the design and/or operation of the processes that significantly increase the potential for fires, explosions, and/or other emergencies.

3. The regulations applicable to the facility change.

4. Key personnel change (*e.g*. Emergency Coordinator).

SECTION 4.0
EMERGENCY CHECKLISTS

CHECKLIST ERP-1. MEDICAL EMERGENCY

Substance	PPE	Response
OBTAIN SDS FOR ANY CHEMICAL INVOLVED IN MEDICAL EMERGENCY	Fire/Rescue use PPE if rescue is involved	**LIFE-THREATENING** • **Call 911** • Stabilize victim • Administer CPR or first aid if trained to do so. Examples of life-threatening emergencies include unconsciousness, severe arterial bleeding or amputation, broken bones, and heat stroke.
		NON-LIFE THREATENING • Administer first aid if trained to do so • Arrange for transportation based on the seriousness of the emergency. • The WWTP Supervisor will direct the employee to the appropriate medical facility**.** Determine whether the injury is reportable as a lost time injury. Examples of non-life threatening emergencies include foreign particles in the eye, small cuts requiring sutures, sprain, minor burns, heat stress, *etc*. Contact Administration on procedure involving Workman's Compensation and use of approved physicians/clinics.

REGULATORY COMPLIANCE CONSIDERATIONS:

Refer to SDS for information on the product's physical and chemical properties, and for health hazard information. In the case of chemical exposure, the SDS should be copied and provided to the physician.

OSHA requires reporting when there is a fatality or multiple injuries requiring hospitalization. Loss-time injuries must be recorded and posted each February.

Report all injuries to City of Sedro-Woolley Administration for Workman's Compensation purposes.

CHECKLIST ERP-2. SODIUM HYPOCHLORITE SPILL

Substance	PPE	Response
SODIUM HYPOCHLORITE	**Refer to SDS** **SPILL:** Chemical protective clothing. Recommended Materials: Natural rubber + neoprene; polyethylene	Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. **FIRE** **Small Fires:** Dry chemical, CO_2, water spray or regular foam. **Large Fires:** Water spray, fog or regular foam. Move container from fire area if you can do it without risk. Make provisions to contain firewater run-off. It may be contaminated. Apply cooling water to sides of containers that are exposed to flames until well after fire is out. Stay away from ends of tank. **SPILL OR LEAK** Do not touch or walk through spilled material; stop leak if you can do it without risk. **Small Spills (less than 100 gallons):** Take up with absorbent material and place into containers for later disposal. **Large Spills (greater than 100 gallons):** Shut off equipment in the area of the spill. Dike far ahead of liquid spill for later disposal. After all standing liquid has been collected, the entire area should be rinsed with a large amount of water.

CHECKLIST ERP-3. DIESEL FUEL SPILL

Substance	PPE	Response
DIESEL FUEL	**Refer to SDS**	**HEALTH/SAFETY CONCERNS:** Fuel oil is a straw yellow to dark-colored liquid with petroleum odor. It has a flash point of between 100 and 199 degrees F. As a flammable/combustible material it can be ignited by heat, spark, or flames. Vapors are heavier than air and may travel to a source of ignition and flash back. Runoff to sewer may create a fire/explosion hazard. Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. **RESPONSE GUIDANCE:** **SPILL OR LEAK** Shut off ignition sources; no flares, smoking, or flames in hazardous area. Keep material out of water sources and storm water drains. Stop leak if you can do it without risk. Water spray may reduce vapor, but it may not prevent ignition in closed spaces. **Small Spills (less than 5 gallons):** Take up with sand or other noncombustible absorbent material and place into containers for later disposal. Notify Supervisor. **Medium Spills (>5 gallons but <25 gallons): Call HazMat.** Prevent spill from reaching pervious surfaces or drainage areas. Take up spill with noncombustible absorbent material and place into labeled containers for later disposal. **Large Spills (greater than 25 gallons): Call HazMat**. Dike far ahead of liquid spill for later disposal. Use vacuum truck to collect recoverable oil. **REGULATORY REPORTING REQUIREMENTS** Notify City Engineer/Stormwater Manager of any spills that have the potential to enter the Stormwater system under the Illicit Discharge Detection and Elimination Program requirements. A spill onto surface waters in any amount may be a reportable spill under 40 CFR 110.

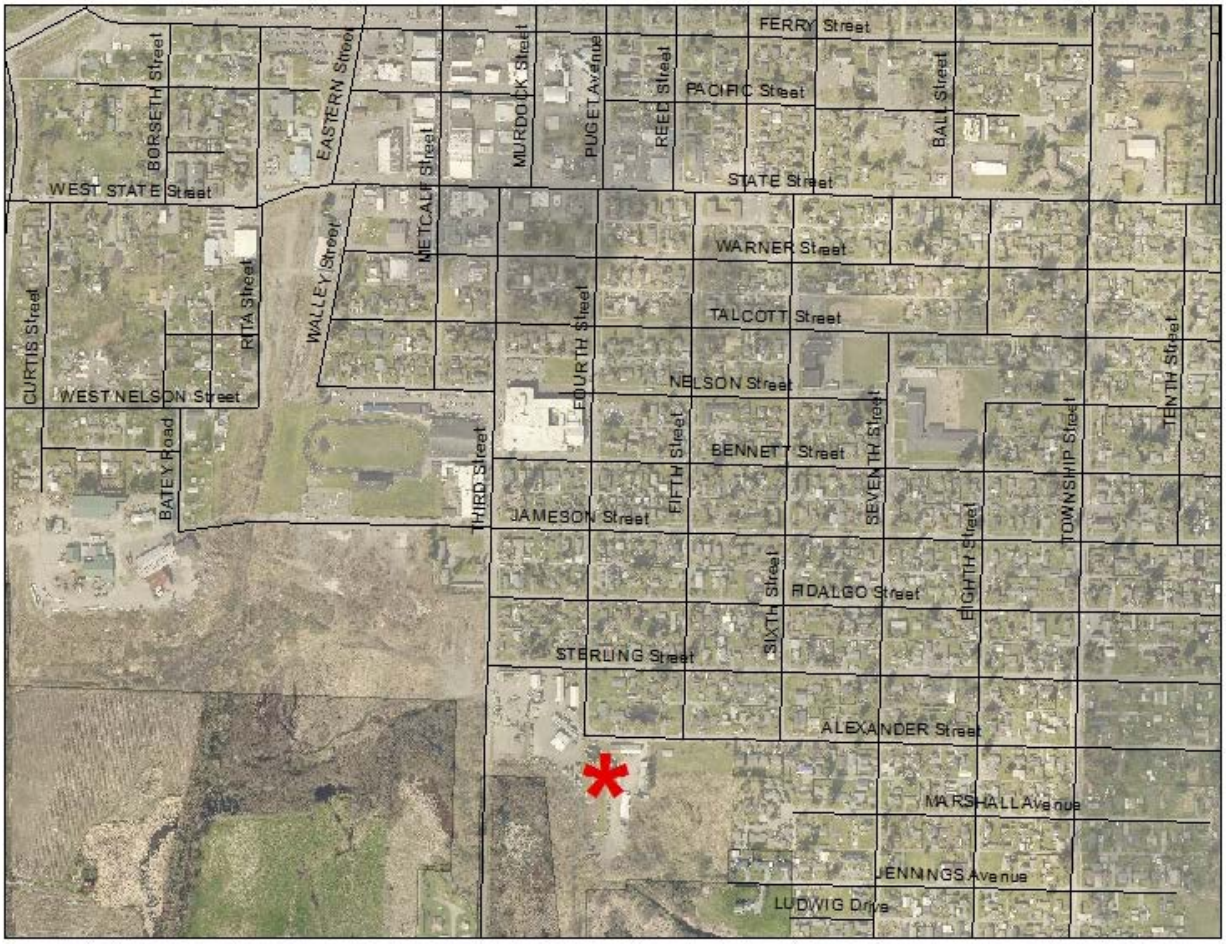
CHECKLIST ERP-4. FIRE OR EXPLOSION RESPONSE

Substance	PPE	Response
NOT APPLICABLE	**Fire-fighting protection, including SCBA**	**Employees are not expected to respond to fires beyond the incipient stage, *i.e.*, fires that have progressed beyond the beginning stage and which cannot be extinguished using a hand-held, portable extinguisher.** **FIRST RESPONSE DUTIES** 1. If a person discovers a fire and feels confident he can extinguish it, he should do so immediately. After the fire is extinguished, the WWTP Supervisor should be notified. 2. When a fire occurs that cannot be readily extinguished, the local Fire Department should be contacted immediately (Call 911). **FIRE FIGHTING PROCEDURES** 1. Rescue operations take precedence over firefighting operations. When handling the emergency incident, remember—no company property is worth a human **life!** 2. WWTP personnel will provide the initial response (first responder only) to the emergency fire situation until professional fire fighting personnel arrive at the site. After the fire department has been called, all personnel must report in person to be accounted for and receive instructions. 3. If the fire threatens any hazardous or flammable containing vessels or lines (*i.e.*, fire near combustible fuel oil tank), shut down the area. 4. After accounting for all personnel, conduct rescue operations as necessary. Do not enter any building or confined space without wearing Self Contained Breathing Apparatus (SCBA) and do not enter without a partner who is similarly equipped. **NOTIFICATION OF LOCAL FIRE DEPARTMENT** If the Fire Department is called, the following actions should be taken by area personnel while awaiting the local fire department: • Make sure the immediate area of the fire is clear of personnel. • Account for all employees working in the area of the fire. • Remove any obstructions (vehicles, material, *etc*.) that might impede response to the scene.

SECTION 5.0 SITE FIGURES

Figure 1. Site Location Map

Figure 2. Aerial Photograph



City of Sedro-Woolley
2018 Sewer Plan Update
Sedro-Woolley, Washington

Appendix B
NPDES Permit

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STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
Northwest Regional Office • 3190 160th Ave SE • Bellevue, WA 98008-5452 • 425-649-7000
711 for Washington Relay Service • Persons with a speech disability can call 877-833-6341

May 15, 2018

Ms. Debbie Allen
Wastewater Treatment Supervisor
City of Sedro-Woolley
325 Metcalf Street
Sedro-Woolley, WA 98284

Re: National Pollutant Discharge Elimination System (NPDES)
Sedro-Woolley Wastewater Treatment Plant; Permit No. WA0023752

Dear Ms. Allen:

The Washington State Department of Ecology (Ecology) acknowledges receiving a NPDES permit renewal application for the Sedro-Woolley Wastewater Treatment Plant on February 22, 2018. The application has been reviewed and accepted as complete on April 30, 2018.

Your current NPDES permit has an expiration date of November 30, 2018. Renewal of your permit is in process; however, the permit may not be issued by the expiration date. If your new permit is not issued and effective by the current permit's expiration date, then the current permit and its terms and conditions are administratively extended and will remain in effect and enforceable until Ecology issues a new permit and it becomes effective for your facility, in accordance with the Washington State Administrative Procedures Act (RCW 34.05.422(3)) and Washington Administrative Code 173-220-180(5).

If you have any questions regarding the development of your renewal permit, please contact Tonya Lane at (425) 649-7050 or Email at tlan461@ecy.wa.gov

Sincerely,

Tricia Miller
Permit Coordinator
Northwest Regional Office

By Certified Mail 9171 9690 0935 0164 4578 60

cc: Tonya Lane, P.E., Facility Manager
Chris Smith, PARIS Coordinator
Central Files: Sedro Woolley WWTP; WA002375-2;WQ 1.1

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Issuance Date: December 21, 2018
Effective Date: January 1, 2019
Expiration Date: December 31, 2023

National Pollutant Discharge Elimination System
Waste Discharge Permit No. WA0023752

State of Washington
DEPARTMENT OF ECOLOGY
Northwest Regional Office
3190 160th Avenue SE
Bellevue, WA 98008-5452

In compliance with the provisions of
The State of Washington Water Pollution Control Law
Chapter 90.48 Revised Code of Washington
and
The Federal Water Pollution Control Act
(The Clean Water Act)
Title 33 United States Code, Section 1342 et seq.

City of Sedro-Woolley
325 Metcalf Street
Sedro-Woolley, WA 98284

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

Plant Location:	Receiving Water:
401 Alexander Street Sedro-Woolley, WA 98284	Skagit River
Treatment Type: Oxidation Ditch with UV Disinfection	

Rachel McCrea

Rachel McCrea
Water Quality Section Manager
Northwest Regional Office
Washington State Department of Ecology

Table of Contents

Summary of Permit Report Submittals

Refer to the Special and General Conditions of this permit for additional submittal requirements.

Permit Section	Submittal	Frequency	First Submittal Date
S3.A	Discharge Monitoring Report (DMR)	Monthly	January 15, 2019
S3.A	Permit Renewal Application Monitoring Data (DMR)	Annual	January 15, 2020
S3.F	Reporting Permit Violations	As necessary	
S4.B	Plans for Maintaining Adequate Capacity	As necessary	
S4.D	Notification of New or Altered Sources	As necessary	
S5.G	Operations and Maintenance Manual Update	As necessary	
S6.B.4	Notify Ecology when Industrial Users violate discharge prohibitions	As necessary	
S6.C.2	Notify Ecology of any proposed discharger which may be a SIU	As necessary	
S6.D	Submit copies of Industrial User notifications letters	As necessary	
S6.E	Industrial User Survey Update	1/permit cycle	May 1, 2023
S8	Outfall Evaluation	1/permit cycle	May 1, 2023
S9	Acute Toxicity Effluent Test Results - Submit with Permit Renewal Application	July 2022 January 2023	September 15, 2022 March 15, 2023
S10	Chronic Toxicity Effluent Test Results – Submit with Permit Renewal Application	April 2022 October 2022	June 15, 2022 December 15, 2022
S11	Application for Permit Renewal	1/permit cycle	May 1, 2023
G1	Notice of Change in Authorization	As necessary	
G4	Reporting Planned Changes	As necessary	
G5	Engineering Report for Construction or Modification Activities	As necessary	
G7	Notice of Permit Transfer	As necessary	
G10	Duty to Provide Information	As necessary	
G20	Compliance Schedules	As necessary	
G21	Contract Submittal	As necessary	

Special Conditions

S1. Discharge limits

S1.A. Effluent limits

All discharges and activities authorized by this permit must comply with the terms and conditions of this permit. The discharge of any of the following pollutants more frequently than, or at a level in excess of, that identified and authorized by this permit violates the terms and conditions of this permit.

Beginning on the effective date of this permit, the Permittee may discharge treated domestic wastewater to the Skagit River at the permitted location subject to compliance with the following limits:

Effluent Limits: Outfall 001 **Latitude: 48.4870958 Longitude: -122.236212**		
Parameter	**Average Monthly [a]**	**Average Weekly [b]**
Biochemical Oxygen Demand (5-day) (BOD_5)	30 milligrams/liter (mg/L) 518 pounds/day (lbs/day) 85% removal of influent BOD_5	45 mg/L 777 lbs/day
Total Suspended Solids (TSS)	30 milligrams/liter (mg/L) 518 pounds/day (lbs/day) 85% removal of influent TSS	45 mg/L 777 lbs/day
Parameter	**Minimum**	**Maximum**
pH	6.0 standard units	9.0 standard units
Parameter	**Monthly Geometric Mean**	**Weekly Geometric Mean**
Fecal Coliform Bacteria [c]	200/100 milliliter (mL)	400/100 mL

a	Average monthly effluent limit means the highest allowable average of daily discharges over a calendar month. To calculate the discharge value to compare to the limit, you add the value of each daily discharge measured during a calendar month and divide this sum by the total number of daily discharges measured. See footnote c for fecal coliform calculations.
b	Average weekly discharge limit means the highest allowable average of daily discharges over a calendar week, calculated as the sum of all daily discharges measured during a calendar week divided by the number of daily discharges measured during that week. See footnote c for fecal coliform calculations.
c	Ecology provides directions to calculate the monthly and the weekly geometric mean in publication No. 04-10-020, Information Manual for Treatment Plant Operators available at: https://fortress.wa.gov/ecy/publications/SummaryPages/0410020.html

S1.B. Mixing zone authorization

Mixing zone for Outfall 001

The paragraphs below defines the maximum boundaries of the mixing zones.

Chronic mixing zone

The length of the chronic mixing zone extends 100 feet upstream and 305 feet downstream of the outfall. The mixing zone extends from the discharge port to the top of the water surface. The concentration of pollutants at the edge of the chronic zone must meet chronic aquatic life criteria and human health criteria.

Acute mixing zone

The length of the acute mixing zone extends 10 feet upstream and 30.5 feet downstream of the outfall. The mixing zone extends from the discharge port to the top of the water surface. The concentration of pollutants at the edge of the acute zone must meet acute aquatic life criteria.

Available Dilution (dilution factor)	
Acute Aquatic Life Criteria	22
Chronic Aquatic Life Criteria	158
Human Health Criteria - Carcinogen	158
Human Health Criteria - Non-carcinogen	158

S2. Monitoring requirements

S2.A. Monitoring schedule

The Permittee must monitor in accordance with the following schedule and the requirements specified in Appendix A.

Parameter	Units & Speciation	Minimum Sampling Frequency	Sample Type
(1) Wastewater influent			
Wastewater Influent means the raw sewage flow from the collection system into the treatment facility. Sample the wastewater entering the headworks of the treatment plant excluding any side-stream returns from inside the plant.			
Flow	MGD	Continuous [a]	Metered/Recorded
Biochemical Oxygen Demand (BOD_5)	mg/L	2/week	24-hour composite [b]
Biochemical Oxygen Demand (BOD_5)	lbs/day	2/week	Calculated [c]
Total Suspended Solids (TSS)	mg/L	2/week	24-hour composite
Total Suspended Solids (TSS)	lbs/day	2/week	Calculated
(2) Final wastewater effluent			
Final Wastewater Effluent means wastewater exiting the last treatment process or operation. Typically, this is after the disinfection process. The Permittee may take effluent samples for the BOD_5 analysis before or after the disinfection process.			
BOD_5	mg/L	2/week	24-hour composite
BOD_5	lbs/day	2/week	Calculated
BOD_5	% removal [d]	1/month	Calculated
TSS	mg/L	2/week	24-hour composite
TSS	lbs/day	2/week	Calculated
TSS	% removal	1/month	Calculated
Fecal Coliform [e]	#cfu/100 ml	2/week	Grab [f]
pH [g]	Standard Units	Daily	Grab
(3) Whole effluent toxicity testing – final wastewater effluent			
Acute Toxicity Testing	See Condition S9	2/permit cycle	24-hour composite
Chronic Toxicity Testing	See Condition S10	2/permit cycle	24-hour composite
(4) Effluent characterization – final wastewater effluent			
Total Phosphorus	mg/L as P	Monthly	24-hour composite
Soluble Reactive Phosphorus	mg/L as P	Monthly	24-hour composite
Total Ammonia	mg/L as N	Monthly	24-hour composite

Parameter	Units & Speciation	Minimum Sampling Frequency	Sample Type
Nitrate plus Nitrite Nitrogen	mg/L as N	Monthly	24-hour composite
Total Kjeldahl Nitrogen (TKN)	mg/L as N	Monthly	24-hour composite
(5) Permit renewal application requirements – final wastewater effluent			
The Permittee must record and report the wastewater treatment plant flow discharged on the day it collects the sample for priority pollutant testing with the discharge monitoring report.			
Temperature [h]	Degrees Celsius	Once per year	Measurement
Total Residual Chlorine	mg/L	Once per year	Grab
Dissolved Oxygen	mg/L	Once per year	Grab
Oil and Grease	mg/L	Once per year	Grab
Total Dissolved Solids	mg/L	Once per year	24-hour composite
Total Hardness	mg/L	Once per year	Grab
Cyanide	micrograms/liter (µg/L)	Once per year	Grab
Total Phenolic Compounds	µg/L	Once per year	Grab
Priority Pollutants (PP) – Total Metals	µg/L; nanograms (ng/L) for mercury	Once per year	24-hour composite Grab for mercury
PP – Volatile Organic Compounds	µg/L	Once per year	Grab
PP – Acid-extractable Compounds	µg/L	Once per year	24-hour composite
PP – Base-neutral Compounds	µg/L	Once per year	24-hour composite
PP – Pesticides/PCBs	ug/L or ng/L	Once per year	24-hour composite

FOOTNOTES:

a	Continuous means uninterrupted except for brief lengths of time for calibration, power failure, or unanticipated equipment repair or maintenance. The time interval for the associated data logger must be no greater than 30 minutes.
b	24-hour composite means a series of individual samples collected over a 24-hour period into a single container, and analyzed as one sample.
c	Calculated means figured concurrently with the respective sample, using the following formula: Concentration (in mg/L) X Flow (in MGD) X Conversion Factor (8.34) = lbs/day
d	% removal = $\frac{\text{Influent concentration (mg/L)} - \text{Effluent concentration (mg/L)}}{\text{Influent concentration (mg/L)}} \times 100$ Calculate the percent (%) removal of BOD_5 and TSS using the above equation.
e	Report a numerical value for fecal coliforms following the procedures in Ecology's *Information Manual for Wastewater Treatment Plant Operators*, Publication Number 04-10-020 available at: https://fortress.wa.gov/ecy/publications/SummaryPages/0410020.html . Do not report a result as too numerous to count (TNTC).
f	Grab means an individual sample collected over a fifteen (15) minute, or less, period.
g	Report the daily pH and the minimum and maximum for the monitoring period.
h	Temperature grab sampling must occur when the effluent is at or near its daily maximum temperature, which usually occurs in the late afternoon.

S2.B. Sampling and analytical procedures

Samples and measurements taken to meet the requirements of this permit must represent the volume and nature of the monitored parameters. The Permittee must conduct representative sampling of any unusual discharge or discharge condition, including bypasses, upsets, and maintenance-related conditions that may affect effluent quality.

Sampling and analytical methods used to meet the monitoring requirements specified in this permit must conform to the latest revision of the *Guidelines Establishing Test Procedures for the Analysis of Pollutants* contained in 40 CFR Part 136 (or as applicable in 40 CFR subchapters N [Parts 400–471] or O [Parts 501-503]) unless otherwise specified in this permit . The Department of Ecology (Ecology) may only specify alternative methods for parameters without permit limits and for those parameters without an EPA approved test method in 40 CFR Part 136.

S2.C. Flow measurement and continuous monitoring devices

The Permittee must:

1. Select and use appropriate flow measurement and continuous monitoring devices and methods consistent with accepted scientific practices.
2. Install, calibrate, and maintain these devices to ensure the accuracy of the measurements is consistent with the accepted industry standard, the manufacturer's recommendation, and approved O&M manual procedures for the device and the wastestream.
3. Calibrate continuous monitoring instruments weekly unless it can demonstrate a longer period is sufficient based on monitoring records. The Permittee:
   a. May calibrate apparatus for continuous monitoring of dissolved oxygen by air calibration.
   b. Must calibrate continuous pH measurement instruments using a grab sample analyzed in the lab with a pH meter calibrated with standard buffers and analyzed within 15 minutes of sampling.
   c. Must calibrate continuous chlorine measurement instruments using a grab sample analyzed in the laboratory within 15 minutes of sampling.
4. Calibrate micro-recording temperature devices, known as thermistors, using protocols from Ecology's Quality Assurance Project Plan Development Tool (*Standard Operating Procedures for Continuous Temperature Monitoring of Fresh Water Rivers and Streams Version 1.0 10/26/2011*). This document is available online at:
   https://fortress.wa.gov/ecy/publications/documents/1803205.pdf
   Calibration as specified in this document is not required if the Permittee uses recording devices certified by the manufacturer.
5. Maintain calibration records for at least three years.

S2.D. Laboratory accreditation

The Permittee must ensure that all monitoring data required by Ecology for permit specified parameters is prepared by a laboratory registered or accredited under the provisions of chapter 173-50 WAC, *Accreditation of Environmental Laboratories*. Flow, temperature, settleable solids, conductivity, pH, and internal process control parameters are exempt from this requirement. The Permittee must obtain accreditation for conductivity and pH if it must receive accreditation or registration for other parameters.

S3. Reporting and recording requirements

The Permittee must monitor and report in accordance with the following conditions. Falsification of information submitted to Ecology is a violation of the terms and conditions of this permit.

S3.A. Discharge monitoring reports

The first monitoring period begins on the effective date of the permit (unless otherwise specified). The Permittee must:

1. Summarize, report, and submit monitoring data obtained during each monitoring period on the electronic discharge monitoring report (DMR) form provided by Ecology within the Water Quality Permitting Portal. Include data for each of the parameters tabulated in Special Condition S2 and as required by the form. Report a value for each day sampling occurred (unless specifically exempted in the permit) and for the summary values (when applicable) included on the electronic form.
2. Ensure that DMRs are electronically submitted no later than the dates specified below, unless otherwise specified in this permit.
3. The Permittee must also submit an electronic copy of the laboratory report as an attachment using WQWebDMR. The contract laboratory reports must also include information on the chain of custody, QA/QC results, and documentation of accreditation for the parameter.
4. Submit DMRs for parameters with the monitoring frequencies specified in S2 (monthly, quarterly, annual, etc.) at the reporting schedule identified below. The Permittee must:
   a. Submit **monthly** DMRs by the 15th day of the following month.
   b. Submit **annual DMRs**, unless otherwise specified in the permit, by January 15 for the previous calendar year. The annual sampling period is the calendar year.
   c. Submit permit renewal application monitoring data on annual DMRs in WQWebDMR as required in Special Condition S2.
5. Enter the “No Discharge” reporting code for an entire DMR, for a specific monitoring point, or for a specific parameter as appropriate, if the Permittee did not discharge wastewater or a specific pollutant during a given monitoring period.
6. Report single analytical values below detection as “less than the detection level (DL)” by entering < followed by the numeric value of the detection level (e.g. < 2.0) on the DMR. If the method used did not meet the minimum DL and quantitation level (QL) identified in the permit, report the actual QL and DL in the comments or in the location provided.
7. Report single analytical values between the detection level (DL) and the quantitation level (QL) by entering the estimated value, the code for estimated value/below quantitation limit (j) and any additional information in the comments. Submit a copy of the laboratory report as an attachment using WQWebDMR.

8. **Not** report zero for bacteria monitoring. Report as required by the laboratory method.
9. Calculate and report an arithmetic average value for each day for bacteria if multiple samples were taken in one day.
10. Calculate the geometric mean values for bacteria using:
    a. The reported numeric value for all bacteria samples measured above the detection value except when multiple samples were taken in one day. If the Permittee takes multiple samples in one day it must use the arithmetic average for the day in the geometric mean calculation.
    b. The detection value for those samples measured below detection.
11. Report the test method used for analysis in the comments if the laboratory used an alternative method not specified in the permit and as allowed in Appendix A.
12. Calculate average values and calculated total values (unless otherwise specified in the permit) using:
    a. The reported numeric value for all parameters measured between the detection value and the quantitation value for the sample analysis.
    b. One-half the detection value (for values reported below detection) if the lab detected the parameter in another sample from the same monitoring point for the reporting period.
    c. Zero (for values reported below detection) if the lab did not detect the parameter in another sample for the reporting period.
13. Report single-sample grouped parameters (for example: priority pollutants, PAHs, pulp and paper chlorophenolics, TTOs) on the WQWebDMR form and include the sample date, concentration detected, detection limit (DL) (as necessary), and laboratory quantitation level (QL) (as necessary).

S3.B. Permit submittals and schedules

The Permittee must use the Water Quality Permitting Portal – Permit Submittals application (unless otherwise specified in the permit) to submit all other written permit-required reports by the date specified in the permit.

When another permit condition requires submittal of a paper (hard-copy) report, the Permittee must ensure that it is postmarked or received by Ecology no later than the dates specified by this permit. Send these paper reports to Ecology at:

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

S3.C. Records retention

The Permittee must retain records of all monitoring information for a minimum of three (3) years. Such information must include all calibration and maintenance records and all original recordings for continuous monitoring instrumentation, copies of all reports required by this permit, and records of all data used to complete the application for this permit. The Permittee must extend this period of retention during the course of any unresolved litigation regarding the discharge of pollutants by the Permittee or when requested by Ecology.

S3.D. Recording of results

For each measurement or sample taken, the Permittee must record the following information:

1. The date, exact place, method, and time of sampling or measurement.
2. The individual who performed the sampling or measurement.
3. The dates the analyses were performed.
4. The individual who performed the analyses.
5. The analytical techniques or methods used.
6. The results of all analyses.

S3.E. Additional monitoring by the Permittee

If the Permittee monitors any pollutant more frequently than required by Special Condition S2 of this permit, then the Permittee must include the results of such monitoring in the calculation and reporting of the data submitted in the Permittee's DMR unless otherwise specified by Special Condition S2.

S3.F. Reporting permit violations

The Permittee must take the following actions when it violates or is unable to comply with any permit condition:

1. Immediately take action to stop, contain, and cleanup unauthorized discharges or otherwise stop the noncompliance and correct the problem.
2. If applicable, immediately repeat sampling and analysis. Submit the results of any repeat sampling to Ecology within thirty (30) days of sampling.

   a. Immediate reporting

   The Permittee must **immediately** report to Ecology, the Department of Health, Drinking Water Program, and the Local Health Jurisdiction (at the numbers listed below), all:

   - Failures of the disinfection system.
   - Collection system overflows discharging to a water body that may be used for drinking water.
   - Plant bypasses discharging to a water body used as a source of drinking water.

- Any other failures of the sewage system (pipe breaks, etc)

Northwest Regional Office	425-649-7000
Department of Health, Drinking Water Program	800-521-0323 (business hours) 877-481-4901 (after business hours)
Skagit County Health Department Anacortes Water Treatment Plant	360-336-9474 (business hours) 360-840-9906 (after business hours) 360-428-1598 (24 hours)

Additionally, for any sanitary sewer overflow (SSO) that discharges to a municipal separate storm sewer system (MS4), the Permittee must notify the appropriate MS4 owner or operator.

b. Bypass reporting – Anacortes Drinking Water Treatment Plant intake

The Permittee shall work cooperatively with the Anacortes Drinking Water Treatment Plant to protect the use of the Skagit River as a source of drinking water. Wastewater treatment plant staff shall notify the Anacortes Drinking Water Treatment Plant of any discharge conditions that may interfere with the treatment process or degrade the quality of drinking water produced at the Anacortes Drinking Water Treatment Plant. Discharges of inadequately disinfected sewage or treatment plant effluent to the Skagit River resulting from collection system overflows, plant bypasses, failure of the disinfection system, or any other unusual occurrences that interfere with the use of the Skagit River as a raw drinking water source shall be reported by phone immediately to the Department of Ecology, the Anacortes Water Treatment Plant, and the Department of Health. Ecology's Northwest Regional Office 24-hour number is 425-649-7000, the Anacortes Water Treatment Plant 24-hour number is 360-428-1598, and the Department of Health Drinking Water Program's after-hours number is 877-481-4901.

c. Twenty-four-hour reporting

The Permittee must report the following occurrences of noncompliance by telephone, to Ecology at the telephone numbers listed above, within 24 hours from the time the Permittee becomes aware of any of the following circumstances:

1. Any noncompliance that may endanger health or the environment, unless previously reported under immediate reporting requirements.
2. Any unanticipated bypass that causes an exceedance of an effluent limit in the permit (See Part S5.F, "Bypass Procedures").
3. Any upset that causes an exceedance of an effluent limit in the permit (See G.15, "Upset").
4. Any violation of a maximum daily or instantaneous maximum discharge limit for any of the pollutants in Section S1.A of this permit.

5. Any overflow prior to the treatment works, whether or not such overflow endangers health or the environment or exceeds any effluent limit in the permit.

d. Report within five days

The Permittee must also submit a written report within five days of the time that the Permittee becomes aware of any reportable event under subparts a or b, above. The report must contain:

1. A description of the noncompliance and its cause.
2. The period of noncompliance, including exact dates and times.
3. The estimated time the Permittee expects the noncompliance to continue if not yet corrected.
4. Steps taken or planned to reduce, eliminate, and prevent recurrence of the noncompliance.
5. If the noncompliance involves an overflow prior to the treatment works, an estimate of the quantity (in gallons) of untreated overflow.

e. Waiver of written reports

Ecology may waive the written report required in subpart c, above, on a case-by-case basis upon request if the Permittee has submitted a timely oral report.

f. All other permit violation reporting

The Permittee must report all permit violations, which do not require immediate or within 24 hours reporting, when it submits monitoring reports for S3.A ("Reporting"). The reports must contain the information listed in subpart c, above. Compliance with these requirements does not relieve the Permittee from responsibility to maintain continuous compliance with the terms and conditions of this permit or the resulting liability for failure to comply.

S3.G. Other reporting

a. Spills of oil or hazardous materials

The Permittee must report a spill of oil or hazardous materials in accordance with the requirements of RCW 90.56.280 and chapter 173-303-145. You can obtain further instructions at the following website: https://ecology.wa.gov/About-us/Get-involved/Report-an-environmental-issue/Report-a-spill .

b. Failure to submit relevant or correct facts

Where the Permittee becomes aware that it failed to submit any relevant facts in a permit application, or submitted incorrect information in a permit application, or in any report to Ecology, it must submit such facts or information promptly.

S3.H. Maintaining a copy of this permit

The Permittee must keep a copy of this permit at the facility and make it available upon request to Ecology inspectors.

S4. Facility loading

S4.A. Design criteria

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

Average Flow for the Maximum Month	2.07 MGD
BOD_5 Influent Loading for Maximum Month	4,160 lb/day
TSS Influent Loading for Maximum Month	4,750 lb/day

S4.B. Plans for maintaining adequate capacity

a. Conditions triggering plan submittal

The Permittee must submit a plan and a schedule for continuing to maintain capacity to Ecology when:

1. The actual flow or waste load reaches 85 percent of any one of the design criteria in S4.A for three consecutive months.
2. The projected plant flow or loading would reach design capacity within five years.

b. Plan and schedule content

The plan and schedule must identify the actions necessary to maintain adequate capacity for the expected population growth and to meet the limits and requirements of the permit. The Permittee must consider the following topics and actions in its plan.

1. Analysis of the present design and proposed process modifications
2. Reduction or elimination of excessive infiltration and inflow of uncontaminated ground and surface water into the sewer system
3. Limits on future sewer extensions or connections or additional waste loads
4. Modification or expansion of facilities
5. Reduction of industrial or commercial flows or waste loads

Engineering documents associated with the plan must meet the requirements of WAC 173-240-060, "Engineering Report," and be approved by Ecology prior to any construction.

S4.C. Duty to mitigate

The Permittee must take all reasonable steps to minimize or prevent any discharge or sludge use or disposal in violation of this permit that has a reasonable likelihood of adversely affecting human health or the environment.

S4.D. Notification of new or altered sources

1. The Permittee must submit written notice to Ecology whenever any new discharge or a substantial change in volume or character of an existing discharge into the wastewater treatment plant is proposed which:
   a. Would interfere with the operation of, or exceed the design capacity of, any portion of the wastewater treatment plant.
   b. Is not part of an approved general sewer plan or approved plans and specifications.
   c. Is subject to pretreatment standards under 40 CFR Part 403 and Section 307(b) of the Clean Water Act.
2. This notice must include an evaluation of the wastewater treatment plant's ability to adequately transport and treat the added flow and/or waste load, the quality and volume of effluent to be discharged to the treatment plant, and the anticipated impact on the Permittee's effluent [40 CFR 122.42(b)].

S5. Operation and maintenance

The Permittee must at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances), which are installed to achieve compliance with the terms and conditions of this permit. Proper operation and maintenance also includes keeping a daily operation logbook (paper or electronic), adequate laboratory controls, and appropriate quality assurance procedures. This provision of the permit requires the Permittee to operate backup or auxiliary facilities or similar systems only when the operation is necessary to achieve compliance with the conditions of this permit.

S5.A. Certified operator

This permitted facility must be operated by an operator certified by the state of Washington for at least a Class II plant. This operator must be in responsible charge of the day-to-day operation of the wastewater treatment plant. An operator certified for at least a Class I plant must be in charge during all regularly scheduled shifts. The Permittee must notify Ecology when the operator in charge at the facility changes. It must provide the new operator's name and certification level and provide the name of the operator leaving the facility.

S5.B. Operation and maintenance program

The Permittee must:

1. Institute an adequate operation and maintenance program for the entire sewage system.
2. Keep maintenance records on all major electrical and mechanical components of the treatment plant, as well as the sewage system and pumping stations. Such records must clearly specify the frequency and type of maintenance recommended by the manufacturer and must show the frequency and type of maintenance performed.
3. Make maintenance records available for inspection at all times.

S5.C. Short-term reduction

The Permittee must schedule any facility maintenance, which might require interruption of wastewater treatment and degrade effluent quality, during non-critical water quality periods and carry this maintenance out according to the approved O&M manual or as otherwise approved by Ecology.

If a Permittee contemplates a reduction in the level of treatment that would cause a violation of permit discharge limits on a short-term basis for any reason, and such reduction cannot be avoided, the Permittee must:

1. Give written notification to Ecology, if possible, thirty (30) days prior to such activities.
2. Detail the reasons for, length of time of, and the potential effects of the reduced level of treatment.

This notification does not relieve the Permittee of its obligations under this permit.

S5.D. Electrical power failure

The Permittee must ensure that adequate safeguards prevent the discharge of untreated wastes or wastes not treated in accordance with the requirements of this permit during electrical power failure at the treatment plant and/or sewage lift stations. Adequate safeguards include, but are not limited to, alternate power sources, standby generator(s), or retention of inadequately treated wastes.

The Permittee must maintain Reliability Class I (EPA 430-99-74-001) at the wastewater treatment plant. Reliability Class I requires a backup power source sufficient to operate all vital components and critical lighting and ventilation during peak wastewater flow conditions.

S5.E. Prevent connection of inflow

The Permittee must strictly enforce its sewer ordinances and not allow the connection of inflow (roof drains, foundation drains, etc.) to the sanitary sewer system.

S5.F. Bypass procedures

A bypass is the intentional diversion of waste streams from any portion of a treatment facility. This permit prohibits all bypasses except when the bypass is for essential maintenance, as authorized in Special Condition S5.F.1, or is approved by Ecology as an anticipated bypass following the procedures in S5.F.2.

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

   This permit allows bypasses for essential maintenance of the treatment system when necessary to ensure efficient operation of the system. The Permittee may bypass the treatment system for essential maintenance only if doing so does not cause violations of effluent limits. The Permittee is not required to notify Ecology when bypassing for essential maintenance. However, the Permittee must comply with the monitoring requirements specified in Special Condition S2.B.

2. Anticipated bypasses for non-essential maintenance

   Ecology may approve an anticipated bypass under the conditions listed below. This permit prohibits any anticipated bypass that is not approved through the following process.

   a. If a bypass is for non-essential maintenance, the Permittee must notify Ecology, if possible, at least ten (10) days before the planned date of bypass. The notice must contain:

      - A description of the bypass and the reason the bypass is necessary.
      - An analysis of all known alternatives which would eliminate, reduce, or mitigate the potential impacts from the proposed bypass.
      - A cost-effectiveness analysis of alternatives.
      - The minimum and maximum duration of bypass under each alternative.
      - A recommendation as to the preferred alternative for conducting the bypass.
      - The projected date of bypass initiation.
      - A statement of compliance with SEPA.
      - A request for modification of water quality standards as provided for in WAC 173-201A-410, if an exceedance of any water quality standard is anticipated.
      - Details of the steps taken or planned to reduce, eliminate, and prevent recurrence of the bypass.

   b. For probable construction bypasses, the Permittee must notify Ecology of the need to bypass as early in the planning process as possible. The Permittee must consider the analysis required above during the project planning and design process. The project-specific engineering report as well as the plans and specifications must include details of probable construction bypasses to the extent practical. In cases where the Permittee determines the probable need to bypass early, the Permittee must continue to analyze conditions up to and including the construction period in an effort to minimize or eliminate the bypass.

   c. Ecology will determine if the Permittee has met the conditions of Special Condition S5.F.2 a and b and consider the following prior to issuing a determination letter, an administrative order, or a permit modification as appropriate for an anticipated bypass:

      - If the Permittee planned and scheduled the bypass to minimize adverse effects on the public and the environment.
      - If the bypass is unavoidable to prevent loss of life, personal injury, or severe property damage. “Severe property damage” means substantial physical damage to property, damage to the treatment facilities which

would cause them to become inoperable, or substantial and permanent loss of natural resources which can reasonably be expected to occur in the absence of a bypass.

- If feasible alternatives to the bypass exist, such as:
  - The use of auxiliary treatment facilities.
  - Retention of untreated wastes.
  - Stopping production.
  - Maintenance during normal periods of equipment downtime, but not if the Permittee should have installed adequate backup equipment in the exercise of reasonable engineering judgment to prevent a bypass which occurred during normal periods of equipment downtime or preventative maintenance.
  - Transport of untreated wastes to another treatment facility.

S5.G. Operations and maintenance (O&M) manual

a. O&M manual submittal and requirements

The Permittee must:

1. Ensure the O & M manual meets the requirements of 173-240-080 WAC.
2. Review the O&M manual at least annually.
3. Submit to Ecology for review and approval substantial changes or updates to the O&M manual whenever it incorporates them into the manual.
4. Keep the approved O&M manual at the permitted facility.
5. Follow the instructions and procedures of this manual.

b. O&M manual components

In addition to the requirements of WAC 173-240-080(1) through (5), the O&M manual must be consistent with the guidance in Table G1-3 in the *Criteria for Sewage Works Design* (Orange Book), 2008. The O&M manual must include:

1. Emergency procedures for cleanup in the event of wastewater system upset or failure.
2. A review of system components which if failed could pollute surface water or could impact human health. Provide a procedure for a routine schedule of checking the function of these components.
3. Wastewater system maintenance procedures that contribute to the generation of process wastewater.
4. Reporting protocols for submitting reports to Ecology to comply with the reporting requirements in the discharge permit.

5. Any directions to maintenance staff when cleaning or maintaining other equipment or performing other tasks which are necessary to protect the operation of the wastewater system (for example, defining maximum allowable discharge rate for draining a tank, blocking all floor drains before beginning the overhaul of a stationary engine).
6. The treatment plant process control monitoring schedule.
7. Minimum staffing adequate to operate and maintain the treatment processes and carry out compliance monitoring required by the permit.

S6. Pretreatment

S6.A. General requirements

The Permittee must work with Ecology to ensure that all commercial and industrial users of the publicly owned treatment works (POTW) comply with the pretreatment regulations in 40 CFR Part 403 and any additional regulations that the Environmental Protection Agency (U.S. EPA) may promulgate under Section 307(b) (pretreatment) and 308 (reporting) of the Federal Clean Water Act.

S6.B. Duty to enforce discharge prohibitions

1. Under federal regulations (40 CFR 403.5(a) and (b)), the Permittee must not authorize or knowingly allow the discharge of any pollutants into its POTW which may be reasonably expected to cause pass through or interference, or which otherwise violate general or specific discharge prohibitions contained in 40 CFR Part 403.5 or WAC 173-216-060.
2. The Permittee must not authorize or knowingly allow the introduction of any of the following into their treatment works:
   a. Pollutants which create a fire or explosion hazard in the POTW (including, but not limited to waste streams with a closed cup flashpoint of less than 140 degrees Fahrenheit or 60 degrees Centigrade using the test methods specified in 40 CFR 261.21).
   b. Pollutants which will cause corrosive structural damage to the POTW, but in no case discharges with pH lower than 5.0, or greater than 11.0 standard units, unless the works are specifically designed to accommodate such discharges.
   c. Solid or viscous pollutants in amounts that could cause obstruction to the flow in sewers or otherwise interfere with the operation of the POTW.
   d. Any pollutant, including oxygen-demanding pollutants, (BOD_5, etc.) released in a discharge at a flow rate and/or pollutant concentration which will cause interference with the POTW.
   e. Petroleum oil, non-biodegradable cutting oil, or products of mineral origin in amounts that will cause interference or pass through.
   f. Pollutants which result in the presence of toxic gases, vapors, or fumes within the POTW in a quantity which may cause acute worker health and safety problems.

g. Heat in amounts that will inhibit biological activity in the POTW resulting in interference but in no case heat in such quantities such that the temperature at the POTW headworks exceeds 40 degrees Centigrade (104 degrees Fahrenheit) unless Ecology, upon request of the Permittee, approves, in writing, alternate temperature limits.

h. Any trucked or hauled pollutants, except at discharge points designated by the Permittee.

i. Wastewaters prohibited to be discharged to the POTW by the Dangerous Waste Regulations (chapter 173-303 WAC), unless authorized under the Domestic Sewage Exclusion (WAC 173-303-071).

3. The Permittee must also not allow the following discharges to the POTW unless approved in writing by Ecology:

   a. Noncontact cooling water in significant volumes.

   b. Stormwater and other direct inflow sources.

   c. Wastewaters significantly affecting system hydraulic loading, which do not require treatment, or would not be afforded a significant degree of treatment by the system.

4. The Permittee must notify Ecology if any industrial user violates the prohibitions listed in this section (S6.B), and initiate enforcement action to promptly curtail any such discharge.

S6.C. Wastewater discharge permit required

The Permittee must:

1. Establish a process for authorizing non-domestic wastewater discharges that ensures all SIUs in all tributary areas meet the applicable state waste discharge permit (SWDP) requirements in accordance with chapter 90.48 RCW and chapter 173-216 WAC.

2. Immediately notify Ecology of any proposed discharge of wastewater from a source, which may be a significant industrial user (SIU) [see fact sheet definitions or refer to 40 CFR 403.3(v)(i)(ii)].

3. Require all SIUs to obtain a SWDP from Ecology prior to accepting their non-domestic wastewater, or require proof that Ecology has determined they do not require a permit.

4. Require the documentation as described in S6.C.3 at the earliest practicable date as a condition of continuing to accept non-domestic wastewater discharges from a previously undiscovered, currently discharging and unpermitted SIU.

5. Require sources of non-domestic wastewater, which do not qualify as SIUs but merit a degree of oversight, to apply for a SWDP and provide it a copy of the application and any Ecology responses.

6. Keep all records documenting that its users have met the requirements of S6.C.

S6.D. Identification and reporting of existing, new, and proposed industrial users

1. The Permittee must take continuous, routine measures to identify all existing, new, and proposed SIUs and potential significant industrial users (PSIUs) discharging or proposing to discharge to the Permittee's sewer system (see **Appendix C** of the fact sheet for definitions).
2. Within 30 days of becoming aware of an unpermitted existing, new, or proposed industrial user who may be a significant industrial user (SIU), the Permittee must notify such user by registered mail that, if classified as an SIU, they must apply to Ecology and obtain a State Waste Discharge Permit. The Permittee must send a copy of this notification letter to Ecology within this same 30-day period.
3. The Permittee must also notify all Potential SIUs (PSIUs), as they are identified, that if their classification should change to an SIU, they must apply to Ecology for a State Waste Discharge Permit within 30 days of such change.

S6.E. Industrial user survey

The Permittee must complete an industrial user survey listing all SIUs and potential significant industrial users (PSIUs) discharging to the POTW. The Permittee must submit the survey to Ecology by May 1, 2023. At a minimum, the Permittee must develop the list of SIUs and PSIUs by means of a telephone book search, a water utility billing records search, and a physical reconnaissance of the service area. Information on PSIUs must include, at a minimum, the business name, telephone number, address, description of the industrial process(s), and the known wastewater volumes and characteristics. If it is confirmed that there are no industrial users discharging to the POTW, this permit condition can be met by indicating the absence of industrial users in Form 2A Section F.

S7. Solid wastes

S7.A. Solid waste handling

The Permittee must handle and dispose of all solid waste material in such a manner as to prevent its entry into state ground or surface water.

S7.B. Leachate

The Permittee must not allow leachate from its solid waste material to enter state waters without providing all known, available, and reasonable methods of treatment, nor allow such leachate to cause violations of the State Surface Water Quality Standards, Chapter 173-201A WAC, or the State Ground Water Quality Standards, Chapter 173-200 WAC. The Permittee must apply for a permit or permit modification as may be required for such discharges to state ground or surface waters.

S8. Outfall evaluation

The Permittee must inspect the submerged portion of the outfall to document its integrity and continued function. If conditions allow for a photographic verification, the Permittee must include such verification in the report. The Permittee must submit the inspection report to Ecology through the Water Quality Permitting Portal – Permit Submittals application. The Permittee must submit hard-copies of any video files to Ecology as required by Permit Condition S3.B. The Portal does not support submittal of video files.

The Permittee must submit the outfall inspection report by May 1, 2023.

The inspector must, at a minimum:

- Assess the physical condition of the outfall pipe, pipe opening or diffuser, and associated couplings.
- Determine the extent of sediment accumulation in the vicinity of the diffuser.
- Ensure diffuser ports are free of obstructions and are allowing uniform flow.
- Confirm physical location (latitude/longitude) and depth (at MLLW) of the diffuser section of the outfall.

S9. Acute toxicity

S9.A. Testing when there is no permit limit for acute toxicity

The Permittee must:

1. Conduct acute toxicity testing on final effluent once in the last summer (July 2022) and once in the last winter (January 2023) prior to submission of the application for permit renewal.
2. Conduct acute toxicity testing on a series of at least five concentrations of effluent, including 100% effluent and a control.
3. Use each of the following species and protocols for each acute toxicity test:

Acute Toxicity Tests	Species	Method
Fathead minnow 96-hour static-renewal test	*Pimephales promelas*	EPA-821-R-02-012
Daphnid 48-hour static test	*Ceriodaphnia dubia, Daphnia pulex,* or *Daphnia magna*	EPA-821-R-02-012

4. Submit the results of the July 2022 test by September 15, 2022, and the results of the January 2023 test by March 15, 2023.

S9.B. Sampling and reporting requirements

1. The Permittee must submit all reports for toxicity testing in accordance with the most recent version of Ecology Publication No. WQ-R-95-80, *Laboratory Guidance and Whole Effluent Toxicity Test Review Criteria*. Reports must contain toxicity data, bench sheets, and reference toxicant results for test methods. In addition, the Permittee must submit toxicity test data in electronic format (CETIS export file preferred) for entry into Ecology's database.

2. The Permittee must collect 24-hour composite effluent samples for toxicity testing. The Permittee must cool the samples to 0 - 6 degrees Celsius during collection and send them to the lab immediately upon completion. The lab must begin the toxicity testing as soon as possible but no later than 36 hours after sampling was completed.
3. The laboratory must conduct water quality measurements on all samples and test solutions for toxicity testing, as specified in the most recent version of Ecology Publication No. WQ-R-95-80, *Laboratory Guidance and Whole Effluent Toxicity Test Review Criteria*.
4. All toxicity tests must meet quality assurance criteria and test conditions specified in the most recent versions of the EPA methods listed in Subsection C and the Ecology Publication No. WQ-R-95-80, *Laboratory Guidance and Whole Effluent Toxicity Test Review Criteria*. If Ecology determines any test results to be invalid or anomalous, the Permittee must repeat the testing with freshly collected effluent.
5. The laboratory must use control water and dilution water meeting the requirements of the EPA methods listed in Section A or pristine natural water of sufficient quality for good control performance.
6. The Permittee must conduct whole effluent toxicity tests on an unmodified sample of final effluent.
7. The Permittee may choose to conduct a full dilution series test during compliance testing in order to determine dose response. In this case, the series must have a minimum of five effluent concentrations and a control. The series of concentrations must include the acute critical effluent concentration (ACEC). The ACEC equals 4.5% effluent.
8. All whole effluent toxicity tests, effluent screening tests, and rapid screening tests that involve hypothesis testing must comply with the acute statistical power standard of 29% as defined in WAC 173-205-020. If the test does not meet the power standard, the Permittee must repeat the test on a fresh sample with an increased number of replicates to increase the power.

S10. Chronic toxicity

S10.A. Testing when there is no permit limit for chronic toxicity

The Permittee must:

1. Conduct chronic toxicity testing on final effluent once in the last spring and once in the last fall prior to submission of the application for permit renewal.
2. Conduct chronic toxicity testing on a series of at least five concentrations of effluent and a control. This series of dilutions must include the acute critical effluent concentration (ACEC). The ACEC equals 4.5% effluent. The series of dilutions should also contain the CCEC of 0.6% effluent.
3. Compare the ACEC to the control using hypothesis testing at the 0.05 level of significance as described in Appendix H, EPA/600/4-89/001.

4. Submit the results of the April 2022 test to Ecology by June 15, 2022, and the results of the October 2022 test by December 15, 2022.
5. Perform chronic toxicity tests with all of the following species and the most recent version of the following protocols:

Freshwater Chronic Test	Species	Method
Fathead minnow survival and growth	*Pimephales promelas*	EPA-821-R-02-013
Water flea survival and reproduction	*Ceriodaphnia dubia*	EPA-821-R-02-013

S10.B. Sampling and reporting requirements

1. The Permittee must submit all reports for toxicity testing in accordance with the most recent version of Ecology Publication No. WQ-R-95-80, *Laboratory Guidance and Whole Effluent Toxicity Test Review Criteria*. Reports must contain toxicity data, bench sheets, and reference toxicant results for test methods. In addition, the Permittee must submit toxicity test data in electronic format (CETIS export file preferred) for entry into Ecology's database.
2. The Permittee must collect 24-hour composite effluent samples for toxicity testing. The Permittee must cool the samples to 0 - 6 degrees Celsius during collection and send them to the lab immediately upon completion. The lab must begin the toxicity testing as soon as possible but no later than 36 hours after sampling was completed.
3. The laboratory must conduct water quality measurements on all samples and test solutions for toxicity testing, as specified in the most recent version of Ecology Publication No. WQ-R-95-80, *Laboratory Guidance and Whole Effluent Toxicity Test Review Criteria*.
4. All toxicity tests must meet quality assurance criteria and test conditions specified in the most recent versions of the EPA methods listed in Section C and the Ecology Publication No. WQ-R-95-80, *Laboratory Guidance and Whole Effluent Toxicity Test Review Criteria*. If Ecology determines any test results to be invalid or anomalous, the Permittee must repeat the testing with freshly collected effluent.
5. The laboratory must use control water and dilution water meeting the requirements of the EPA methods listed in Subsection C or pristine natural water of sufficient quality for good control performance.
6. The Permittee must conduct whole effluent toxicity tests on an unmodified sample of final effluent.
7. The Permittee may choose to conduct a full dilution series test during compliance testing in order to determine dose response. In this case, the series must have a minimum of five effluent concentrations and a control. The series of concentrations must include the CCEC and the ACEC. The CCEC and the ACEC may either substitute for the effluent concentrations that are closest to them in the dilution series or be extra effluent concentrations. The CCEC equals 0.6% effluent. The ACEC equals 4.5% effluent.

8. All whole effluent toxicity tests that involve hypothesis testing must comply with the chronic statistical power standard of 39% as defined in WAC 173-205-020. If the test does not meet the power standard, the Permittee must repeat the test on a fresh sample with an increased number of replicates to increase the power.

S11. Application for permit renewal or modification for facility changes

The Permittee must submit an application for renewal of this permit by May 1, 2023.

The Permittee must also submit a new application or addendum at least one hundred eighty (180) days prior to commencement of discharges, resulting from the activities listed below, which may result in permit violations. These activities include any facility expansions, production increases, or other planned changes, such as process modifications, in the permitted facility.

General Conditions

G1. Signatory requirements

1. All applications submitted to Ecology must be signed and certified.

   a. In the case of corporations, by a responsible corporate officer. For the purpose of this section, a responsible corporate officer means:

      - A president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy- or decision-making functions for the corporation, or
      - The manager of one or more manufacturing, production, or operating facilities, provided, the manager is authorized to make management decisions which govern the operation of the regulated facility including having the explicit or implicit duty of making major capital investment recommendations, and initiating and directing other comprehensive measures to assure long-term environmental compliance with environmental laws and regulations; the manager can ensure that the necessary systems are established or actions taken to gather complete and accurate information for permit application requirements; and where authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures.

   b. In the case of a partnership, by a general partner.

   c. In the case of sole proprietorship, by the proprietor.

   d. In the case of a municipal, state, or other public facility, by either a principal executive officer or ranking elected official.

   Applications for permits for domestic wastewater facilities that are either owned or operated by, or under contract to, a public entity shall be submitted by the public entity.

2. All reports required by this permit and other information requested by Ecology must be signed by a person described above or by a duly authorized representative of that person. A person is a duly authorized representative only if:

   a. The authorization is made in writing by a person described above and submitted to Ecology.

   b. The authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility, such as the position of plant manager, superintendent, position of equivalent responsibility, or an individual or position having overall responsibility for environmental matters. (A duly authorized representative may thus be either a named individual or any individual occupying a named position.)

3. Changes to authorization. If an authorization under paragraph G1.2, above, is no longer accurate because a different individual or position has responsibility for the overall operation of the facility, a new authorization satisfying the requirements of paragraph G1.2, above, must be submitted to Ecology prior to or together with any reports, information, or applications to be signed by an authorized representative.

4. Certification. Any person signing a document under this section must make the following certification:

   "I certify under penalty of law, that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

G2. Right of inspection and entry

The Permittee must allow an authorized representative of Ecology, upon the presentation of credentials and such other documents as may be required by law:

1. To enter upon the premises where a discharge is located or where any records must be kept under the terms and conditions of this permit.
2. To have access to and copy, at reasonable times and at reasonable cost, any records required to be kept under the terms and conditions of this permit.
3. To inspect, at reasonable times, any facilities, equipment (including monitoring and control equipment), practices, methods, or operations regulated or required under this permit.
4. To sample or monitor, at reasonable times, any substances or parameters at any location for purposes of assuring permit compliance or as otherwise authorized by the Clean Water Act.

G3. Permit actions

This permit may be modified, revoked and reissued, or terminated either at the request of any interested person (including the Permittee) or upon Ecology's initiative. However, the permit may only be modified, revoked and reissued, or terminated for the reasons specified in 40 CFR 122.62, 40 CFR 122.64 or WAC 173-220-150 according to the procedures of 40 CFR 124.5.

1. The following are causes for terminating this permit during its term, or for denying a permit renewal application:
   a. Violation of any permit term or condition.
   b. Obtaining a permit by misrepresentation or failure to disclose all relevant facts.
   c. A material change in quantity or type of waste disposal.
   d. A determination that the permitted activity endangers human health or the environment, or contributes to water quality standards violations and can only be regulated to acceptable levels by permit modification or termination.

e. A change in any condition that requires either a temporary or permanent reduction, or elimination of any discharge or sludge use or disposal practice controlled by the permit.

f. Nonpayment of fees assessed pursuant to RCW 90.48.465.

g. Failure or refusal of the Permittee to allow entry as required in RCW 90.48.090.

2. The following are causes for modification but not revocation and reissuance except when the Permittee requests or agrees:

   a. A material change in the condition of the waters of the state.

   b. New information not available at the time of permit issuance that would have justified the application of different permit conditions.

   c. Material and substantial alterations or additions to the permitted facility or activities which occurred after this permit issuance.

   d. Promulgation of new or amended standards or regulations having a direct bearing upon permit conditions, or requiring permit revision.

   e. The Permittee has requested a modification based on other rationale meeting the criteria of 40 CFR Part 122.62.

   f. Ecology has determined that good cause exists for modification of a compliance schedule, and the modification will not violate statutory deadlines.

   g. Incorporation of an approved local pretreatment program into a municipality's permit.

3. The following are causes for modification or alternatively revocation and reissuance:

   a. When cause exists for termination for reasons listed in 1.a through 1.g of this section, and Ecology determines that modification or revocation and reissuance is appropriate.

   b. When Ecology has received notification of a proposed transfer of the permit. A permit may also be modified to reflect a transfer after the effective date of an automatic transfer (General Condition G7) but will not be revoked and reissued after the effective date of the transfer except upon the request of the new Permittee.

G4. Reporting planned changes

The Permittee must, as soon as possible, but no later than one hundred eighty (180) days prior to the proposed changes, give notice to Ecology of planned physical alterations or additions to the permitted facility, production increases, or process modification which will result in:

1. The permitted facility being determined to be a new source pursuant to 40 CFR 122.29(b).

2. A significant change in the nature or an increase in quantity of pollutants discharged.

3. A significant change in the Permittee's sludge use or disposal practices. Following such notice, and the submittal of a new application or supplement to the existing application, along with required engineering plans and reports, this permit may be modified, or revoked and reissued pursuant to 40 CFR 122.62(a) to specify and limit any pollutants not previously limited. Until such modification is effective, any new or increased discharge in excess of permit limits or not specifically authorized by this permit constitutes a violation.

G5. Plan review required

Prior to constructing or modifying any wastewater control facilities, an engineering report and detailed plans and specifications must be submitted to Ecology for approval in accordance with chapter 173-240 WAC. Engineering reports, plans, and specifications must be submitted at least one hundred eighty (180) days prior to the planned start of construction unless a shorter time is approved by Ecology. Facilities must be constructed and operated in accordance with the approved plans.

G6. Compliance with other laws and statutes

Nothing in this permit excuses the Permittee from compliance with any applicable federal, state, or local statutes, ordinances, or regulations.

G7. Transfer of this permit

In the event of any change in control or ownership of facilities from which the authorized discharge emanate, the Permittee must notify the succeeding owner or controller of the existence of this permit by letter, a copy of which must be forwarded to Ecology.

1. Transfers by Modification

   Except as provided in paragraph (2) below, this permit may be transferred by the Permittee to a new owner or operator only if this permit has been modified or revoked and reissued under 40 CFR 122.62(b)(2), or a minor modification made under 40 CFR 122.63(d), to identify the new Permittee and incorporate such other requirements as may be necessary under the Clean Water Act.

2. Automatic Transfers

   This permit may be automatically transferred to a new Permittee if:

   a. The Permittee notifies Ecology at least thirty (30) days in advance of the proposed transfer date.

   b. The notice includes a written agreement between the existing and new Permittees containing a specific date transfer of permit responsibility, coverage, and liability between them.

   c. Ecology does not notify the existing Permittee and the proposed new Permittee of its intent to modify or revoke and reissue this permit. A modification under this subparagraph may also be minor modification under 40 CFR 122.63. If this notice is not received, the transfer is effective on the date specified in the written agreement.

G8. Reduced production for compliance

The Permittee, in order to maintain compliance with its permit, must control production and/or all discharges upon reduction, loss, failure, or bypass of the treatment facility until the facility is restored or an alternative method of treatment is provided. This requirement applies in the situation where, among other things, the primary source of power of the treatment facility is reduced, lost, or fails.

G9. Removed substances

Collected screenings, grit, solids, sludges, filter backwash, or other pollutants removed in the course of treatment or control of wastewaters must not be resuspended or reintroduced to the final effluent stream for discharge to state waters.

G10. Duty to provide information

The Permittee must submit to Ecology, within a reasonable time, all information which Ecology may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit or to determine compliance with this permit. The Permittee must also submit to Ecology upon request, copies of records required to be kept by this permit.

G11. Other requirements of 40 CFR

All other requirements of 40 CFR 122.41 and 122.42 are incorporated in this permit by reference.

G12. Additional monitoring

Ecology may establish specific monitoring requirements in addition to those contained in this permit by administrative order or permit modification.

G13. Payment of fees

The Permittee must submit payment of fees associated with this permit as assessed by Ecology.

G14. Penalties for violating permit conditions

Any person who is found guilty of willfully violating the terms and conditions of this permit is deemed guilty of a crime, and upon conviction thereof shall be punished by a fine of up to ten thousand dollars ($10,000) and costs of prosecution, or by imprisonment in the discretion of the court. Each day upon which a willful violation occurs may be deemed a separate and additional violation.

Any person who violates the terms and conditions of a waste discharge permit may incur, in addition to any other penalty as provided by law, a civil penalty in the amount of up to ten thousand dollars ($10,000) for every such violation. Each and every such violation is a separate and distinct offense, and in case of a continuing violation, every day's continuance is deemed to be a separate and distinct violation.

G15. Upset

Definition – "Upset" means an exceptional incident in which there is unintentional and temporary noncompliance with technology-based permit effluent limits because of factors beyond the reasonable control of the Permittee. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventive maintenance, or careless or improper operation.

An upset constitutes an affirmative defense to an action brought for noncompliance with such technology-based permit effluent limits if the requirements of the following paragraph are met.

A Permittee who wishes to establish the affirmative defense of upset must demonstrate, through properly signed, contemporaneous operating logs, or other relevant evidence that:

1. An upset occurred and that the Permittee can identify the cause(s) of the upset.
2. The permitted facility was being properly operated at the time of the upset.
3. The Permittee submitted notice of the upset as required in Special Condition S3.F.
4. The Permittee complied with any remedial measures required under S3.F of this permit.

In any enforcement action the Permittee seeking to establish the occurrence of an upset has the burden of proof.

G16. Property rights

This permit does not convey any property rights of any sort, or any exclusive privilege.

G17. Duty to comply

The Permittee must comply with all conditions of this permit. Any permit noncompliance constitutes a violation of the Clean Water Act and is grounds for enforcement action; for permit termination, revocation and reissuance, or modification; or denial of a permit renewal application.

G18. Toxic pollutants

The Permittee must comply with effluent standards or prohibitions established under Section 307(a) of the Clean Water Act for toxic pollutants within the time provided in the regulations that establish those standards or prohibitions, even if this permit has not yet been modified to incorporate the requirement.

G19. Penalties for tampering

The Clean Water Act provides that any person who falsifies, tampers with, or knowingly renders inaccurate any monitoring device or method required to be maintained under this permit shall, upon conviction, be punished by a fine of not more than $10,000 per violation, or by imprisonment for not more than two (2) years per violation, or by both.

If a conviction of a person is for a violation committed after a first conviction of such person under this condition, punishment shall be a fine of not more than $20,000 per day of violation, or by imprisonment of not more than four (4) years, or by both.

G20. Compliance schedules

Reports of compliance or noncompliance with, or any progress reports on, interim and final requirements contained in any compliance schedule of this permit must be submitted no later than fourteen (14) days following each schedule date.

G21. Service agreement review

The Permittee must submit to Ecology any proposed service agreements and proposed revisions or updates to existing agreements for the operation of any wastewater treatment facility covered by this permit. The review is to ensure consistency with chapters 90.46 and 90.48 RCW as required by RCW 70.150.040(9). In the event that Ecology does not comment within a thirty-day (30) period, the Permittee may assume consistency and proceed with the service agreement or the revised/updated service agreement.

Appendix A

LIST OF POLLUTANTS WITH ANALYTICAL METHODS, DETECTION LIMITS AND QUANTITATION LEVELS

The Permittee must use the specified analytical methods, detection limits (DLs) and quantitation levels (QLs) in the following table for permit and application required monitoring unless:

- Another permit condition specifies other methods, detection levels, or quantitation levels.
- The method used produces measurable results in the sample and EPA has listed it as an EPA-approved method in 40 CFR Part 136.

If the Permittee uses an alternative method, not specified in the permit and as allowed above, it must report the test method, DL, and QL on the discharge monitoring report or in the required report.

If the Permittee is unable to obtain the required DL and QL in its effluent due to matrix effects, the Permittee must submit a matrix-specific detection limit (MDL) and a quantitation limit (QL) to Ecology with appropriate laboratory documentation.

When the permit requires the Permittee to measure the base neutral compounds in the list of priority pollutants, it must measure all of the base neutral pollutants listed in the table below. The list includes EPA required base neutral priority pollutants and several additional polynuclear aromatic hydrocarbons (PAHs). The Water Quality Program added several PAHs to the list of base neutrals below from Ecology's Persistent Bioaccumulative Toxics (PBT) List. It only added those PBT parameters of interest to Appendix A that did not increase the overall cost of analysis unreasonably.

Ecology added this appendix to the permit in order to reduce the number of analytical "non-detects" in permit-required monitoring and to measure effluent concentrations near or below criteria values where possible at a reasonable cost.

The lists below include conventional pollutants (as defined in CWA section 502(6) and 40 CFR Part 122.), toxic or priority pollutants as defined in CWA section 307(a)(1) and listed in 40 CFR Part 122 Appendix D, 40 CFR Part 401.15 and 40 CFR Part 423 Appendix A), and nonconventionals. 40 CFR Part 122 Appendix D (Table V) also identifies toxic pollutants and hazardous substances which are required to be reported by dischargers if expected to be present. This permit Appendix A list does not include those parameters.

CONVENTIONAL POLLUTANTS

Pollutant	CAS Number (if available)	Recommended Analytical Protocol	Detection (DL)[1] *µg/L unless specified*	Quantitation Level (QL)[2] *µg/L unless specified*
Biochemical Oxygen Demand		SM5210-B		2 mg/L
Biochemical Oxygen Demand, Soluble		SM5210-B [3]		2 mg/L
Fecal Coliform		SM 9221E,9222	N/A	Specified in method - sample aliquot dependent
Oil and Grease (HEM) (Hexane Extractable Material)		1664 A or B	1,400	5,000
pH		SM4500-H^+ B	N/A	N/A
Total Suspended Solids		SM2540-D		5 mg/L

NONCONVENTIONAL POLLUTANTS

Pollutant	CAS Number (if available)	Recommended Analytical Protocol	Detection (DL)[1] µg/L unless specified	Quantitation Level (QL)[2] µg/L unless specified
Alkalinity, Total		SM2320-B		5 mg/L as CaCO3
Aluminum, Total	7429-90-5	200.8	2.0	10
Ammonia, Total (as N)		SM4500-NH3-B and C/D/E/G/H		20
Barium Total	7440-39-3	200.8	0.5	2.0
BTEX (benzene +toluene + ethylbenzene + m,o,p xylenes)		EPA SW 846 8021/8260	1	2
Boron, Total	7440-42-8	200.8	2.0	10.0
Chemical Oxygen Demand		SM5220-D		10 mg/L
Chloride		SM4500-Cl B/C/D/E and SM4110 B		Sample and limit dependent
Chlorine, Total Residual		SM4500 Cl G		50.0
Cobalt, Total	7440-48-4	200.8	0.05	0.25
Color		SM2120 B/C/E		10 color units
Dissolved oxygen		SM4500-OC/OG		0.2 mg/L
Flow		Calibrated device		
Fluoride	16984-48-8	SM4500-F E	25	100
Hardness, Total		SM2340B		200 as CaCO3
Iron, Total	7439-89-6	200.7	12.5	50
Magnesium, Total	7439-95-4	200.7	10	50
Manganese, Total	7439-96-5	200.8	0.1	0.5
Molybdenum, Total	7439-98-7	200.8	0.1	0.5
Nitrate + Nitrite Nitrogen (as N)		SM4500-NO3- E/F/H		100
Nitrogen, Total Kjeldahl (as N)		SM4500-N_{org}B/C and SM4500NH_3-B/C/D/EF/G/H		300

NONCONVENTIONAL POLLUTANTS

Pollutant	CAS Number (if available)	Recommended Analytical Protocol	Detection (DL)[1] µg/L unless specified	Quantitation Level (QL)[2] µg/L unless specified
NWTPH Dx [4]		Ecology NWTPH Dx	250	250
NWTPH Gx [5]		Ecology NWTPH Gx	250	250
Phosphorus, Total (as P)		SM 4500 PB followed by SM4500-PE/PF	3	10
Salinity		SM2520-B		3 practical salinity units or scale (PSU or PSS)
Settleable Solids		SM2540 -F		Sample and limit dependent
Soluble Reactive Phosphorus (as P)		SM4500-P E/F/G	3	10
Sulfate (as mg/L SO_4)		SM4110-B		0.2 mg/L
Sulfide (as mg/L S)		SM4500-S^2F/D/E/G		0.2 mg/L
Sulfite (as mg/L SO_3)		SM4500-SO3B		2 mg/L
Temperature (max. 7-day avg.)		Analog recorder or use micro-recording devices known as thermistors		0.2º C
Tin, Total	7440-31-5	200.8	0.3	1.5
Titanium, Total	7440-32-6	200.8	0.5	2.5
Total Coliform		SM 9221B, 9222B, 9223B	N/A	Specified in method - sample aliquot dependent
Total Organic Carbon		SM5310-B/C/D		1 mg/L
Total dissolved solids		SM2540 C		20 mg/L

PRIORITY POLLUTANTS	**PP #**	**CAS Number (if available)**	**Recommended Analytical Protocol**	**Detection (DL)[1] *µg/L unless specified***	**Quantitation Level (QL)[2] *µg/L unless specified***
METALS, CYANIDE & TOTAL PHENOLS					
Antimony, Total	114	7440-36-0	200.8	0.3	1.0
Arsenic, Total	115	7440-38-2	200.8	0.1	0.5
Beryllium, Total	117	7440-41-7	200.8	0.1	0.5
Cadmium, Total	118	7440-43-9	200.8	0.05	0.25
Chromium (hex) dissolved	119	18540-29-9	SM3500-Cr C	0.3	1.2
Chromium, Total	119	7440-47-3	200.8	0.2	1.0
Copper, Total	120	7440-50-8	200.8	0.4	2.0
Lead, Total	122	7439-92-1	200.8	0.1	0.5
Mercury, Total	123	7439-97-6	1631E	0.0002	0.0005
Nickel, Total	124	7440-02-0	200.8	0.1	0.5
Selenium, Total	125	7782-49-2	200.8	1.0	1.0
Silver, Total	126	7440-22-4	200.8	0.04	0.2
Thallium, Total	127	7440-28-0	200.8	0.09	0.36

PRIORITY POLLUTANTS	**PP #**	**CAS Number (if available)**	**Recommended Analytical Protocol**	**Detection (DL)[1] *µg/L unless specified***	**Quantitation Level (QL)[2] *µg/L unless specified***
METALS, CYANIDE & TOTAL PHENOLS					
Zinc, Total	128	7440-66-6	200.8	0.5	2.5
Cyanide, Total	121	57-12-5	335.4	5	10
Cyanide, Weak Acid Dissociable	121		SM4500-CN I	5	10
Cyanide, Free Amenable to Chlorination (Available Cyanide)	121		SM4500-CN G	5	10
Phenols, Total	65		EPA 420.1		50

PRIORITY POLLUTANTS	**PP #**	**CAS Number (if available)**	**Recommended Analytical Protocol**	**Detection (DL)[1] *µg/L unless specified***	**Quantitation Level (QL)[2] *µg/L unless specified***
ACID COMPOUNDS					
2-Chlorophenol	24	95-57-8	625.1	3.3	9.9
2,4-Dichlorophenol	31	120-83-2	625.1	2.7	8.1
2,4-Dimethylphenol	34	105-67-9	625.1	2.7	8.1
4,6-dinitro-o-cresol (2-methyl-4,6,-dinitrophenol)	60	534-52-1	625.1/1625B	24	72
2,4 dinitrophenol	59	51-28-5	625.1	42	126
2-Nitrophenol	57	88-75-5	625.1	3.6	10.8
4-Nitrophenol	58	100-02-7	625.1	2.4	7.2
Parachlorometa cresol (4-chloro-3-methylphenol)	22	59-50-7	625.1	3.0	9.0
Pentachlorophenol	64	87-86-5	625.1	3.6	10.8
Phenol	65	108-95-2	625.1	1.5	4.5
2,4,6-Trichlorophenol	21	88-06-2	625.1	2.7	8.1

PRIORITY POLLUTANTS	**PP #**	**CAS Number (if available)**	**Recommended Analytical Protocol**	**Detection (DL)[1] *µg/L unless specified***	**Quantitation Level (QL)[2] *µg/L unless specified***
VOLATILE COMPOUNDS					
Acrolein	2	107-02-8	624	5	10
Acrylonitrile	3	107-13-1	624	1.0	2.0
Benzene	4	71-43-2	624.1	4.4	13.2
Bromoform	47	75-25-2	624.1	4.7	14.1
Carbon tetrachloride	6	56-23-5	624.1/601 or SM6230B	2.8	8.4
Chlorobenzene	7	108-90-7	624.1	6.0	18.0
Chloroethane	16	75-00-3	624/601	1.0	2.0
2-Chloroethylvinyl Ether	19	110-75-8	624	1.0	2.0
Chloroform	23	67-66-3	624.1 or SM6210B	1.6	4.8
Dibromochloromethane (chlordibromomethane)	51	124-48-1	624.1	3.1	9.3
1,2-Dichlorobenzene	25	95-50-1	624	1.9	7.6

PRIORITY POLLUTANTS	**PP #**	**CAS Number (if available)**	**Recommended Analytical Protocol**	**Detection (DL)[1] *µg/L unless specified***	**Quantitation Level (QL) [2] *µg/L unless specified***
VOLATILE COMPOUNDS					
1,3-Dichlorobenzene	26	541-73-1	624	1.9	7.6
1,4-Dichlorobenzene	27	106-46-7	624	4.4	17.6
Dichlorobromomethane	48	75-27-4	624.1	2.2	6.6
1,1-Dichloroethane	13	75-34-3	624.1	4.7	14.1
1,2-Dichloroethane	10	107-06-2	624.1	2.8	8.4
1,1-Dichloroethylene	29	75-35-4	624.1	2.8	8.4
1,2-Dichloropropane	32	78-87-5	624.1	6.0	18.0
1,3-dichloropropene (mixed isomers) (1,2-dichloropropylene) [6]	33	542-75-6	624.1	5.0	15.0
Ethylbenzene	38	100-41-4	624.1	7.2	21.6
Methyl bromide (Bromomethane)	46	74-83-9	624/601	5.0	10.0
Methyl chloride (Chloromethane)	45	74-87-3	624	1.0	2.0
Methylene chloride	44	75-09-2	624.1	2.8	8.4
1,1,2,2-Tetrachloroethane	15	79-34-5	624.1	6.9	20.7
Tetrachloroethylene	85	127-18-4	624.1	4.1	12.3
Toluene	86	108-88-3	624.1	6.0	18.0
1,2-Trans-Dichloroethylene (Ethylene dichloride)	30	156-60-5	624.1	1.6	4.8
1,1,1-Trichloroethane	11	71-55-6	624.1	3.8	11.4
1,1,2-Trichloroethane	14	79-00-5	624.1	5.0	15.0
Trichloroethylene	87	79-01-6	624.1	1.9	5.7
Vinyl chloride	88	75-01-4	624/SM6200B	1.0	2.0

PRIORITY POLLUTANTS	**PP #**	**CAS Number (if available)**	**Recommended Analytical Protocol**	**Detection (DL)[1] *µg/L unless specified***	**Quantitation Level (QL) [2] *µg/L unless specified***
BASE/NEUTRAL COMPOUNDS (compounds in bold are Ecology PBTs)					
Acenaphthene	1	83-32-9	625.1	1.9	5.7
Acenaphthylene	77	208-96-8	625.1	3.5	10.5
Anthracene	78	120-12-7	625.1	1.9	5.7
Benzidine	5	92-87-5	625.1	44	132
Benzyl butyl phthalate	67	85-68-7	625.1	2.5	7.5
Benzo(*a*)anthracene	72	56-55-3	625.1	7.8	23.4
Benzo(b)fluoranthene (3,4-benzofluoranthene) [7]	74	205-99-2	610/625.1	4.8	14.4
Benzo(j)fluoranthene [7]		**205-82-3**	625	0.5	1.0
Benzo(k)fluoranthene (11,12-benzofluoranthene) [7]	75	207-08-9	610/625.1	2.5	7.5
Benzo(r,s,t)pentaphene		**189-55-9**	625	1.3	5.0

PRIORITY POLLUTANTS	**PP #**	**CAS Number (if available)**	**Recommended Analytical Protocol**	**Detection (DL)[1] *µg/L unless specified***	**Quantitation Level (QL)[2] *µg/L unless specified***
BASE/NEUTRAL COMPOUNDS (compounds in bold are Ecology PBTs)					
Benzo(*a*)pyrene	73	50-32-8	610/625.1	2.5	7.5
Benzo(*ghi*)Perylene	79	191-24-2	610/625.1	4.1	12.3
Bis(*2-chloroethoxy)*methane	43	111-91-1	625.1	5.3	15.9
Bis(*2-chloroethyl*)ether	18	111-44-4	611/625.1	5.7	17.1
Bis(*2-chloroisopropyl*)ether	42	39638-32-9	625	0.5	1.0
Bis(*2-ethylhexyl*)phthalate	66	117-81-7	625.1	2.5	7.5
4-Bromophenyl phenyl ether	41	101-55-3	625.1	1.9	5.7
2-Chloronaphthalene	20	91-58-7	625.1	1.9	5.7
4-Chlorophenyl phenyl ether	40	7005-72-3	625.1	4.2	12.6
Chrysene	76	218-01-9	610/625.1	2.5	7.5
Dibenzo (a,h)acridine		**226-36-8**	610M/625M	2.5	10.0
Dibenzo (a,j)acridine		**224-42-0**	610M/625M	2.5	10.0
Dibenzo(a-*h*)anthracene (1,2,5,6-dibenzanthracene)	82	53-70-3	625.1	2.5	7.5
Dibenzo(a,e)pyrene		192-65-4	610M/625M	2.5	10.0
Dibenzo(a,h)pyrene		189-64-0	625M	2.5	10.0
3,3-Dichlorobenzidine	28	91-94-1	605/625.1	16.5	49.5
Diethyl phthalate	70	84-66-2	625.1	1.9	5.7
Dimethyl phthalate	71	131-11-3	625.1	1.6	4.8
Di-n-butyl phthalate	68	84-74-2	625.1	2.5	7.5
2,4-dinitrotoluene	35	121-14-2	609/625.1	5.7	17.1
2,6-dinitrotoluene	36	606-20-2	609/625.1	1.9	5.7
Di-n-octyl phthalate	69	117-84-0	625.1	2.5	7.5
1,2-Diphenylhydrazine (*as Azobenzene*)	37	122-66-7	1625B	5.0	20
Fluoranthene	39	206-44-0	625.1	2.2	6.6
Fluorene	80	86-73-7	625.1	1.9	5.7
Hexachlorobenzene	9	118-74-1	612/625.1	1.9	5.7
Hexachlorobutadiene	52	87-68-3	625.1	0.9	2.7
Hexachlorocyclopentadiene	53	77-47-4	1625B/625	2.0	4.0
Hexachloroethane	12	67-72-1	625.1	1.6	4.8
Indeno(*1,2,3-cd*)Pyrene	83	193-39-5	610/625.1	3.7	11.1
Isophorone	54	78-59-1	625.1	2.2	6.6
3-Methyl cholanthrene		**56-49-5**	625	2.0	8.0
Naphthalene	55	91-20-3	625.1	1.6	4.8
Nitrobenzene	56	98-95-3	625.1	1.9	5.7
N-Nitrosodimethylamine	61	62-75-9	607/625	2.0	4.0
N-Nitrosodi-n-propylamine	63	621-64-7	607/625	0.5	1.0
N-Nitrosodiphenylamine	62	86-30-6	625	1.0	2.0
Perylene		**198-55-0**	625	1.9	7.6
Phenanthrene	81	85-01-8	625.1	5.4	16.2
Pyrene	84	129-00-0	625.1	1.9	5.7

PRIORITY POLLUTANTS	**PP #**	**CAS Number (if available)**	**Recommended Analytical Protocol**	**Detection (DL)[1] *µg/L unless specified***	**Quantitation Level (QL) [2] *µg/L unless specified***
BASE/NEUTRAL COMPOUNDS (compounds in bold are Ecology PBTs)					
1,2,4-Trichlorobenzene	8	120-82-1	625.1	1.9	5.7

PRIORITY POLLUTANTS	**PP #**	**CAS Number (if available)**	**Recommended Analytical Protocol**	**Detection (DL)[1] *µg/L unless specified***	**Quantitation Level (QL) [2] *µg/L unless specified***
PESTICIDES/PCBs					
Aldrin	89	309-00-2	608.3	4.0 ng/L	12 ng/L
alpha-BHC	102	319-84-6	608.3	3.0 ng/L	9.0 ng/L
beta-BHC	103	319-85-7	608.3	6.0 ng/L	18 ng/L
gamma-BHC (Lindane)	104	58-89-9	608.3	4.0 ng/L	12 ng/L
delta-BHC	105	319-86-8	608.3	9.0 ng/L	27 ng/L
Chlordane [8]	91	57-74-9	608.3	14 ng/L	42 ng/L
4,4'-DDT	92	50-29-3	608.3	12 ng/L	36 ng/L
4,4'-DDE	93	72-55-9	608.3	4.0 ng/L	12 ng/L
4,4' DDD	94	72-54-8	608.3	11ng/L	33 ng/L
Dieldrin	90	60-57-1	608.3	2.0 ng/L	6.0 ng/L
alpha-Endosulfan	95	959-98-8	608.3	14 ng/L	42 ng/L
beta-Endosulfan	96	33213-65-9	608.3	4.0 ng/L	12 ng/L
Endosulfan Sulfate	97	1031-07-8	608.3	66 ng/L	198 ng/L
Endrin	98	72-20-8	608.3	6.0 ng/L	18 ng/L
Endrin Aldehyde	99	7421-93-4	608.3	23 ng/L	70 ng/L
Heptachlor	100	76-44-8	608.3	3.0 ng/L	9.0 ng/L
Heptachlor Epoxide	101	1024-57-3	608.3	83 ng/L	249 ng/L
PCB-1242 [9]	106	53469-21-9	608.3	0.065	0.195
PCB-1254	107	11097-69-1	608.3	0.065	0.195
PCB-1221	108	11104-28-2	608.3	0.065	0.195
PCB-1232	109	11141-16-5	608.3	0.065	0.195
PCB-1248	110	12672-29-6	608.3	0.065	0.195
PCB-1260	111	11096-82-5	608.3	0.065	0.195
PCB-1016 [9]	112	12674-11-2	608.3	0.065	0.195
Toxaphene	113	8001-35-2	608.3	240 ng/L	720 ng/L

1. Detection level (DL) or detection limit means the minimum concentration of an analyte (substance) that can be measured and reported with a 99% confidence that the analyte concentration is greater than zero as determined by the procedure given in 40 CFR part 136, Appendix B.
2. Quantitation Level (QL) also known as Minimum Level of Quantitation (ML) – The lowest level at which the entire analytical system must give a recognizable signal and acceptable calibration point for the analyte. It is equivalent to the concentration of the lowest calibration standard, assuming that the lab has used all method-specified sample weights, volumes, and cleanup procedures. The QL is calculated by multiplying the MDL by 3.18 and rounding the result to the number nearest to (1, 2, or 5) x 10^n, where n is an integer (64 FR 30417).

ALSO GIVEN AS:
The smallest detectable concentration of analyte greater than the Detection Limit (DL) where the accuracy (precision & bias) achieves the objectives of the intended purpose. (Report of the Federal Advisory Committee on Detection and Quantitation Approaches and Uses in Clean Water Act Programs Submitted to the US Environmental Protection Agency, December 2007).

3. Soluble Biochemical Oxygen Demand method note: First, filter the sample through a Millipore Nylon filter (or equivalent) - pore size of 0.45-0.50 um (prep all filters by filtering 250 ml of laboratory grade deionized water through the filter and discard). Then, analyze sample as per method 5210-B.
4. NWTPH Dx - Northwest Total Petroleum Hydrocarbons Diesel Extended Range – see https://fortress.wa.gov/ecy/publications/documents/97602.pdf
5. NWTPH Gx - Northwest Total Petroleum Hydrocarbons Gasoline Extended Range – see https://fortress.wa.gov/ecy/publications/documents/97602.pdf
6. 1, 3-dichloroproylene (mixed isomers) - You may report this parameter as two separate parameters: cis-1, 3-dichlorpropropene (10061-01-5) and trans-1, 3-dichloropropene (10061-02-6).
7. Total Benzofluoranthenes - Because Benzo(b)fluoranthene, Benzo(j)fluoranthene and Benzo(k)fluoranthene co-elute you may report these three isomers as total benzofluoranthenes.
8. Chlordane - You may report alpha-chlordane (5103-71-9) and gamma-chlordane (5103-74-2) in place of chlordane (57-74-9). If you report alpha and gamma-chlordane, the DL/PQLs that apply are 14/42 ng/L.
9. PCB 1016 & PCB 1242 - You may report these two PCB compounds as one parameter called PCB 1016/1242.

City of Sedro-Woolley
2018 Sewer Plan Update
Sedro-Woolley, Washington

Appendix C
SEPA Documents

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SEPA ENVIRONMENTAL CHECKLIST

Purpose of checklist:

Governmental agencies use this checklist to help determine whether the environmental impacts of your proposal are significant. This information is also helpful to determine if available avoidance, minimization or compensatory mitigation measures will address the probable significant impacts or if an environmental impact statement will be prepared to further analyze the proposal.

Instructions for applicants:

This environmental checklist asks you to describe some basic information about your proposal. Please answer each question accurately and carefully, to the best of your knowledge. You may need to consult with an agency specialist or private consultant for some questions. You may use "not applicable" or "does not apply" only when you can explain why it does not apply and not when the answer is unknown. You may also attach or incorporate by reference additional studies reports. Complete and accurate answers to these questions often avoid delays with the SEPA process as well as later in the decision-making process.

The checklist questions apply to all parts of your proposal, even if you plan to do them over a period of time or on different parcels of land. Attach any additional information that will help describe your proposal or its environmental effects. The agency to which you submit this checklist may ask you to explain your answers or provide additional information reasonably related to determining if there may be significant adverse impact.

Instructions for Lead Agencies:

Please adjust the format of this template as needed. Additional information may be necessary to evaluate the existing environment, all interrelated aspects of the proposal and an analysis of adverse impacts. The checklist is considered the first but not necessarily the only source of information needed to make an adequate threshold determination. Once a threshold determination is made, the lead agency is responsible for the completeness and accuracy of the checklist and other supporting documents.

Use of checklist for nonproject proposals:

For nonproject proposals (such as ordinances, regulations, plans and programs), complete the applicable parts of sections A and B plus the SUPPLEMENTAL SHEET FOR NONPROJECT ACTIONS (part D). Please completely answer all questions that apply and note that the words "project," "applicant," and "property or site" should be read as "proposal," "proponent," and "affected geographic area," respectively. The lead agency may exclude (for non-projects) questions in Part B - Environmental Elements –that do not contribute meaningfully to the analysis of the proposal.

A. Background

1. Name of proposed project, if applicable:

City of Sedro Woolley Comprehensive Sewer Plan Update

2. Name of applicant:

City of Sedro Woolley

3. Address and phone number of applicant and contact person:

Mark Freiberger, Director of Public Works
City of Sedro-Woolley
720 Murdock Street
Sedro Woolley, WA
(360) 855-9933

Paul Weller, Planning Manager
PACE Engineers, Inc.
11255 Kirkland Way, Suite 300
Kirkland, Wa 98033
425-827-2014

4. Date checklist prepared:

January 10, 2020

5. Agency requesting checklist:

City of Sedro Woolley

6. Proposed timing or schedule (including phasing, if applicable):

It is expected that this plan update will be approved and adopted by the City of Sedro Woolley in early 2020.The proposed improvements are scheduled to occur over a 10 year period beginning in 2020.

7. Do you have any plans for future additions, expansion, or further activity related to or connected with this proposal? If yes, explain.

Please refer to Sections 6, 7 and 8 of the updated Plan for detailed information on future improvements considered necessary for the sewer system. The Comprehensive Sewer Plan does not propose any land use expansions or changes, and only considers the sewer system improvements which are required to meet existing and projected system demands within the City's service area.

8. List any environmental information you know about that has been prepared, or will be prepared, directly related to this proposal.

None known

9. Do you know whether applications are pending for governmental approvals of other proposals directly affecting the property covered by your proposal? If yes, explain.

None known

10. List any government approvals or permits that will be needed for your proposal, if known.

The General Sewer Plan Update will require approval from Skagit County and the Washington State Department of Ecology (Ecology). Individual sanitary sewer system improvement projects will require separate review and will be required to obtain the necessary agency permits and approvals.

11. Give brief, complete description of your proposal, including the proposed uses and the size of the project and site. There are several questions later in this checklist that ask you to describe certain aspects of your proposal. You do not need to repeat those answers on this page. (Lead agencies may modify this form to include additional specific information on project description.)

The proposal describes updates to the Sewer Plan for the City of Sedro Woolley to the year 2029. The plan is in conformance with the Rules and Regulations of the Department of Ecology regarding wastewater facilities and WAC 173-240. The Plan addresses future sewer service to all areas of the City's service area as defined in the Plan and illustrated on the Comprehensive Plan maps. The Plan puts forth a capital improvements schedule for system improvements in accordance with sewer system demand projections, hydraulic analyses and design criteria developed as part of the Plan.

12. Location of the proposal. Give sufficient information for a person to understand the precise location of your proposed project, including a street address, if any, and section, township, and range, if known. If a proposal would occur over a range of area, provide the range or boundaries of the site(s). Provide a legal description, site plan, vicinity map, and topographic map, if reasonably available. While you should submit any plans required by the agency, you are not required to duplicate maps or detailed plans submitted with any permit applications related to this checklist.

The study area for this plan includes the existing and projected sewer service area of the City of Sedro-Woolley, which is generally located along State Routes 9 and 20, northeast of the Cities of Mount Vernon and Burlington, in Skagit County, Washington. The 5.96 square mile service area is consistent with the existing Urban Growth Area (UGA) boundary and reaches from just north of the Northern State Multi-Service Center on the north to the Skagit River to the south, and from just east of Helmick Road on the east to Collins Road on the west. The City currently serves an estimated 3,560 connections, most of which are within the existing City limits. Exceptions to this are a platted area along SR-20 and receipt of flows from the private system serving the Northern State Multi-Service Center, both of which are within the UGA and are served by the City sewer system.

B. Environmental Elements

1. *Earth*

a. General description of the site:
(circle one): Flat, rolling, hilly, steep slopes, mountainous, other _____
Topography of the service area rises from approximately 40 feet at the southern boundary of the City to approximately 300 feet at the northeast section of the City. The majority of the City is flat, with topography ranging from 40 to 60 feet.

b. What is the steepest slope on the site (approximate percent slope)?
Slope percentages vary throughout the service area. The steepest slopes are located at the northern edge of the service area.

c. What general types of soils are found on the site (for example, clay, sand, gravel, peat, muck)? If you know the classification of agricultural soils, specify them and note any agricultural land of long-term commercial significance and whether the proposal results in removing any of these soils.
Soil types vary throughout the service area. Soils in the area are generally described as quaternary sediment, which is dominantly glacial drift, and includes some alluvium. The soil in the area is also known to contain organic deposits (peat). There are some areas classified as farmland within the service area. The proposal will have no effect on farmland.

d. Are there surface indications or history of unstable soils in the immediate vicinity? If so, describe.
None known.

e. Describe the purpose, type, total area, and approximate quantities and total affected area of any filling, excavation, and grading proposed. Indicate source of fill.
Does not apply to this proposal. Updates to the sewer system plan will not require grading activities.

f. Could erosion occur as a result of clearing, construction, or use? If so, generally describe.
Not as a result of this plan update.

g. About what percent of the site will be covered with impervious surfaces after project construction (for example, asphalt or buildings)?
Updates to the sewer system plan will not add impervious surfaces to the service area.

h. Proposed measures to reduce or control erosion, or other impacts to the earth, if any:
Updates to the sewer system plan will have no impacts on soils.

2. Air

a. What types of emissions to the air would result from the proposal during construction, operation, and maintenance when the project is completed? If any, generally describe and give approximate quantities if known.
Updates to the sewer system plan will not produce emissions.

b. Are there any off-site sources of emissions or odor that may affect your proposal? If so, generally describe.

No

c. Proposed measures to reduce or control emissions or other impacts to air, if any:
Does not apply. Updates to the sewer plan will have no impact on air quality.

3. Water

a. Surface Water:

1) Is there any surface water body on or in the immediate vicinity of the site (including year-round and seasonal streams, saltwater, lakes, ponds, wetlands)? If yes, describe type and provide names. If appropriate, state what stream or river it flows into.
The City of Sedro-Woolley lies north of the Skagit River. Brickyard Creek runs through the center of the City. Willard Creek drains the northwest portion of the City and Hansen Creek flows into the Skagit River to the east of the City with a small portion of the creek traversing the northeastern portion of the City. The City's 2016 Comprehensive Plan, Land Use Element states that wetlands are located within the northern portion of the City as shown on the National Wetland Inventory Maps.

2) Will the project require any work over, in, or adjacent to (within 200 feet) the described waters? If yes, please describe and attach available plans.
No.

3) Estimate the amount of fill and dredge material that would be placed in or removed from surface water or wetlands and indicate the area of the site that would be affected. Indicate the source of fill material.
No fill or dredge material would be placed or removed from surface waters or wetlands as a result of this plan update.

4) Will the proposal require surface water withdrawals or diversions? Give general description, purpose, and approximate quantities if known.
No.

5) Does the proposal lie within a 100-year floodplain? If so, note location on the site plan.
According to the City's 2016 Comprehensive Plan, Land Use Element, there are areas of the City located along the Skagit River that are located within a FEMA mapped 100-year floodplain.

6) Does the proposal involve any discharges of waste materials to surface waters? If so, describe the type of waste and anticipated volume of discharge.
The Treatment plant outfall is discharged into the Skagit River, in accordance with the City's NPDES permit from Ecology. No change is proposed in this Plan update.

b. Ground Water:

1) Will groundwater be withdrawn from a well for drinking water or other purposes? If so, give a general description of the well, proposed uses and approximate quantities withdrawn from the well. Will water be discharged to groundwater? Give general description, purpose, and approximate quantities if known.
No.
2) Describe waste material that will be discharged into the ground from septic tanks or other sources, if any (for example: Domestic sewage; industrial, containing the

following chemicals. . . ; agricultural; etc.). Describe the general size of the system, the number of such systems, the number of houses to be served (if applicable), or the number of animals or humans the system(s) are expected to serve.
Does not apply to this plan update. The sewer plan supports the City's efforts to provide sewer service to areas currently served by septic systems, thereby reducing waste discharged into the ground.

c. Water runoff (including stormwater):

1) Describe the source of runoff (including storm water) and method of collection and disposal, if any (include quantities, if known). Where will this water flow? Will this water flow into other waters? If so, describe.
Does not apply to this plan update.

2) Could waste materials enter ground or surface waters? If so, generally describe.
Not as a result of this plan update.

3) Does the proposal alter or otherwise affect drainage patterns in the vicinity of the site? If so, describe.
The plan update does not alter or otherwise affect drainage patterns within the City. Impacts to drainage would be reviewed for individual projects.

d. Proposed measures to reduce or control surface, ground, and runoff water, and drainage pattern impacts, if any:
Does not apply; updates to the plan will have no effect on surface, ground or runoff water or drainage patterns.

4. Plants

a. Check the types of vegetation found on the site:

X deciduous tree: alder, maple, aspen, other
X evergreen tree: fir, cedar, pine, other
X shrubs
X grass
X pasture
X crop or grain
___ orchards, vineyards or other permanent crops.
X wet soil plants: cattail, buttercup, bullrush, skunk cabbage, other
X water plants: water lily, eelgrass, milfoil, other
___ other types of vegetation

b. What kind and amount of vegetation will be removed or altered?
None as a result of the plan update

c. List threatened and endangered species known to be on or near the site.
None known.

d. Proposed landscaping, use of native plants, or other measures to preserve or enhance vegetation on the site, if any:

Does not apply to this plan update. Landscaping requirements would be reviewed on a project basis.

e. List all noxious weeds and invasive species known to be on or near the site.
Though none are known to be within the City's sewer service area, Skagit County lists several noxious weeds and invasive plant species throughout the County.

5. Animals

a. List any birds and other animals which have been observed on or near the site or are known to be on or near the site. Examples include:

birds: hawk, heron, eagle, songbirds, other:
mammals: deer, bear, elk, beaver, other:
fish: bass, salmon, trout, herring, shellfish, other _____

b. List any threatened and endangered species known to be on or near the site.
Some species of salmon are listed as threatened and endangered.

c. Is the site part of a migration route? If so, explain.
The Puget Sound area is located within the Pacific Flyway and fish migration waterways corridor.

d. Proposed measures to preserve or enhance wildlife, if any:
Does not apply to plan update; there will be no impacts to wildlife.

e. List any invasive animal species known to be on or near the site.
None known.

6. Energy and Natural Resources

a. What kinds of energy (electric, natural gas, oil, wood stove, solar) will be used to meet the completed project's energy needs? Describe whether it will be used for heating, manufacturing, etc.
Operation of the City's sewer system will require the use of electricity, water and fuel used for collection system and treatment plant operation and maintenance.

b. Would your project affect the potential use of solar energy by adjacent properties? If so, generally describe.
No.

c. What kinds of energy conservation features are included in the plans of this proposal? List other proposed measures to reduce or control energy impacts, if any:
Does not apply to this plan update; energy conservation would be reviewed on a project basis.

7. Environmental Health

a. Are there any environmental health hazards, including exposure to toxic chemicals, risk of fire and explosion, spill, or hazardous waste, that could occur as a result of this

proposal? If so, describe.

Does not apply to this plan update; potential health hazards would be reviewed on a project basis.

1) Describe any known or possible contamination at the site from present or past uses.

Does not apply to this plan update; past or present contamination would be reviewed on a project basis.

2) Describe existing hazardous chemicals/conditions that might affect project development and design. This includes underground hazardous liquid and gas transmission pipelines located within the project area and in the vicinity.

Does not apply to this plan update; hazardous materials would be reviewed on a project basis.

3) Describe any toxic or hazardous chemicals that might be stored, used, or produced during the project's development or construction, or at any time during the operating life of the project.

None as part of this plan update.

4) Describe special emergency services that might be required.

None for this plan update.

5) Proposed measures to reduce or control environmental health hazards, if any:

Does not apply to this plan update; environmental health hazards would be reviewed on a project basis.

b. Noise

1) What types of noise exist in the area which may affect your project (for example: traffic, equipment, operation, other)?

None.

2) What types and levels of noise would be created by or associated with the project on a short-term or a long-term basis (for example: traffic, construction, operation, other)? Indicate what hours noise would come from the site.

None as a part of this plan update; noise levels would be reviewed on a project basis

3) Proposed measures to reduce or control noise impacts, if any:

Does not apply to this plan update; there will be no noise impacts.

8. Land and Shoreline Use

a. What is the current use of the site and adjacent properties? Will the proposal affect current land uses on nearby or adjacent properties? If so, describe.

Land use within the City includes single and multiple family residences, commercial (central business district and auto-oriented), industrial, open space and public use areas.

b. Has the project site been used as working farmlands or working forest lands? If so, describe. How much agricultural or forest land of long-term commercial significance will

be converted to other uses as a result of the proposal, if any? If resource lands have not been designated, how many acres in farmland or forest land tax status will be converted to nonfarm or nonforest use?
Unknown.

1) Will the proposal affect or be affected by surrounding working farm or forest land normal business operations, such as oversize equipment access, the application of pesticides, tilling, and harvesting? If so, how:
No.

c. Describe any structures on the site.
The service area contains residential, commercial and industrial structures.

d. Will any structures be demolished? If so, what?
Not as a result of this plan update. Sewer system facilities are typically constructed within existing road prisms and would not require the demolition of structures.

e. What is the current zoning classification of the site?
Zoning within the City's service area include commercial, business, industrial, residential and open space.

f. What is the current comprehensive plan designation of the site?
Comprehensive plan designations vary throughout the service area.

g. If applicable, what is the current shoreline master program designation of the site?
The Skagit River and Hansen Creek are considered shorelines of the state designated as urban conservancy shorelines with a designation of aquatic environment waterward of the ordinary high water mark of the Skagit River.

h. Has any part of the site been classified as a critical area by the city or county? If so, specify.
The City's critical areas ordinance classifies streams, wetlands, aquifer recharge areas, geologically hazardous areas, fish and wildlife habitat areas and flood hazard areas as critical areas.

i. Approximately how many people would reside or work in the completed project?
Does not apply to this plan update.

j. Approximately how many people would the completed project displace?
Updates to the sewer system plan will not displace people.

k. Proposed measures to avoid or reduce displacement impacts, if any:
Does not apply to this plan update.

L. Proposed measures to ensure the proposal is compatible with existing and projected land uses and plans, if any:

This Comprehensive Sewer System Plan was developed to address the future sewer system needs of the City of Sedro-Woolley based on existing and projected land use patterns and associated sewer demands.

m. Proposed measures to reduce or control impacts to agricultural and forest lands of long-term commercial significance, if any:
Does not apply; updates to the sewer plan will have no impact on agricultural or forest lands.

9. Housing

a. Approximately how many units would be provided, if any? Indicate whether high, middle, or low-income housing.
None as a result of this plan update.

b. Approximately how many units, if any, would be eliminated? Indicate whether high, middle, or low-income housing.
None as a result of this plan update.

c. Proposed measures to reduce or control housing impacts, if any:
Does not apply to this plan update.

10. Aesthetics

a. What is the tallest height of any proposed structure(s), not including antennas; what is the principal exterior building material(s) proposed?
Does not apply; structures are not proposed.

b. What views in the immediate vicinity would be altered or obstructed?
None.

c. Proposed measures to reduce or control aesthetic impacts, if any:
Does not apply; updates to the plan will not impact aesthetics.

11. Light and Glare

a. What type of light or glare will the proposal produce? What time of day would it mainly occur?
None.

b. Could light or glare from the finished project be a safety hazard or interfere with views?
No.

c. What existing off-site sources of light or glare may affect your proposal?
None.

d. Proposed measures to reduce or control light and glare impacts, if any:
Does not apply; updates to the plan will not produce lighting impacts.

12. Recreation

a. What designated and informal recreational opportunities are in the immediate vicinity?
The City of Sedro Woolley 2016 Comprehensive Plan, Parks and Recreation Element lists several parks, trails and open spaces that provide recreational opportunities within the service area.

b. Would the proposed project displace any existing recreational uses? If so, describe.
No.

c. Proposed measures to reduce or control impacts on recreation, including recreation opportunities to be provided by the project or applicant, if any:
Does not apply; updates to the sewer plan will not impact recreational opportunities.

13. Historic and cultural preservation

a. Are there any buildings, structures, or sites, located on or near the site that are over 45 years old listed in or eligible for listing in national, state, or local preservation registers ? If so, specifically describe.
A search of the Washington Information System for Architectural & Archaeological Records Data (WISSARD) indicates the presence of two sites: The Northern State Hospital property located at the northeast portion of the City and the U.S Post Office on Woodworth Street.

b. Are there any landmarks, features, or other evidence of Indian or historic use or occupation? This may include human burials or old cemeteries. Are there any material evidence, artifacts, or areas of cultural importance on or near the site? Please list any professional studies conducted at the site to identify such resources.
A search of the Washington Information System for Architectural & Archaeological Records Data (WISSARD) indicates the presence of possible evidence of Indian or historical use or occupation; the Swinomish Indian Tribe, the Lummi Nation, the Upper Indian Tribe, the Samish Indian Nation.

c. Describe the methods used to assess the potential impacts to cultural and historic resources on or near the project site. Examples include consultation with tribes and the department of archeology and historic preservation, archaeological surveys, historic maps, GIS data, etc.
A desktop search of the WISSARD site was conducted to assess the presence of cultural and historic resources. Updates to the plan would not impact these resources.

d. Proposed measures to avoid, minimize, or compensate for loss, changes to, and disturbance to resources. Please include plans for the above and any permits that may be required.
Does not apply. updates to the sewer plan will have no impact on cultural and historic resources. Potential impacts would be assessed on a project basis.

14. Transportation

a. Identify public streets and highways serving the site or affected geographic area and describe proposed access to the existing street system. Show on site plans, if any.
The City's sewer service area is located along State Routes 9 and 20.

b. Is the site or affected geographic area currently served by public transit? If so, generally describe. If not, what is the approximate distance to the nearest transit stop?
The service area is served by Skagit Transit.

c. How many additional parking spaces would the completed project or non-project proposal have? How many would the project or proposal eliminate?
None.

d. Will the proposal require any new or improvements to existing roads, streets, pedestrian, bicycle or state transportation facilities, not including driveways? If so, generally describe (indicate whether public or private).
No.

e. Will the project or proposal use (or occur in the immediate vicinity of) water, rail, or air transportation? If so, generally describe.
Does not apply to this plan update

f. How many vehicular trips per day would be generated by the completed project or proposal? If known, indicate when peak volumes would occur and what percentage of the volume would be trucks (such as commercial and nonpassenger vehicles). What data or transportation models were used to make these estimates?
None as a result of this plan update.

g. Will the proposal interfere with, affect or be affected by the movement of agricultural and forest products on roads or streets in the area? If so, generally describe.
No.

h. Proposed measures to reduce or control transportation impacts, if any:
Does not apply to this plan update; potential impacts to transportation would be reviewed on a project basis.

15. Public Services

a. Would the project result in an increased need for public services (for example: fire protection, police protection, public transit, health care, schools, other)? If so, generally describe.
Updates to the Sewer System Plan would not require additional public services. However, updates to the City's sewer system could result in increased development within the service area, which may require additional services, and would be addressed on a project basis.

b. Proposed measures to reduce or control direct impacts on public services, if any.
Does not apply to this plan update.

16. Utilities

a. Circle utilities currently available at the site:
electricity, natural gas, water, refuse service, telephone, sanitary sewer, septic system,

other _____

e. Describe the utilities that are proposed for the project, the utility providing the service, and the general construction activities on the site or in the immediate vicinity which might be needed.
The Comprehensive Sewer Plan proses improvements to the sewer system by the City to serve the needs of the City through 2029.

C. Signature

The above answers are true and complete to the best of my knowledge. I understand that the lead agency is relying on them to make its decision.

Signature: _____

Name of signee _____

Position and Agency/Organization _____

Date Submitted: _____

D. Supplemental sheet for nonproject actions

(IT IS NOT NECESSARY to use this sheet for project actions)

Because these questions are very general, it may be helpful to read them in conjunction with the list of the elements of the environment. When answering these questions, be aware of the extent the proposal, or the types of activities likely to result from the proposal, would affect the item at a greater intensity or at a faster rate than if the proposal were not implemented. Respond briefly and in general terms.

1. How would the proposal be likely to increase discharge to water; emissions to air; production, storage, or release of toxic or hazardous substances; or production of noise?
The Plan itself will not result in any of the increases noted above. Individual projects would be evaluated on a case-by-case basis.

Proposed measures to avoid or reduce such increases are:
Does not apply to this Sewer System Plan update

2. How would the proposal be likely to affect plants, animals, fish, or marine life?
Updates to the Sewer System Plan would not affect plants, animals, fish, or marine life.

Proposed measures to protect or conserve plants, animals, fish, or marine life are:
Does not apply to this Sewer System Plan update.

3. How would the proposal be likely to deplete energy or natural resources?
Updates to the Sewer System Plan would not deplete energy or natural resources. Sewer system improvements could require the use of construction materials and could require electricity for operation and would be assessed on a project basis.

Proposed measures to protect or conserve energy and natural resources are:
Efficient planning, design, equipment, and operation of the sewer system would be accomplished in a manner that protects and conserves energy and natural resources.

4. How would the proposal be likely to use or affect environmentally sensitive areas or areas designated (or eligible or under study) for governmental protection; such as parks, wilderness, wild and scenic rivers, threatened or endangered species habitat, historic or cultural sites, wetlands, floodplains, or prime farmlands?
Updates to the Sewer System Plan would not affect environmentally sensitive areas and would provide greater protection of these areas through planning within the City's service area.

Proposed measures to protect such resources or to avoid or reduce impacts are:
Does not apply to this Sewer System Plan update.

5. How would the proposal be likely to affect land and shoreline use, including whether it would allow or encourage land or shoreline uses incompatible with existing plans?
Updates to the Sewer System Plan would not affect, allow, or encourage land and shoreline uses. Future system improvements and expansions will be compatible with the goals and policies of the City's current Comprehensive Plan (2016).

Proposed measures to avoid or reduce shoreline and land use impacts are:

Does not apply to this Sewer System Plan update.

6. How would the proposal be likely to increase demands on transportation or public services and utilities?

The Sewer System Plan itself is not likely to increase demands on transportation or public services and utilities. The Plan addresses future needs for the sewer system as demand grows in the future.

Proposed measures to reduce or respond to such demand(s) are:

Proposed sewer system improvement projects are outlined in Section 9 of the Sewer System Plan update and would be evaluated for effects on a case-by-case basis.

7. Identify, if possible, whether the proposal may conflict with local, state, or federal laws or requirements for the protection of the environment.

Updates to the Sewer System Plan, and this SEPA document, are being prepared to ensure compliance with State Department of Ecology and State Department of Health requirements. Individual projects would be evaluated for effects on the environment and the need for SEPA compliance.

City of Sedro-Woolley
2018 Sewer Plan Update
Sedro-Woolley, Washington

Appendix D

Plan Approval

(to be provided with final submittal)

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City of Sedro-Woolley
2018 Sewer Plan Update
Sedro-Woolley, Washington

Appendix E
Sewer System Plan Map

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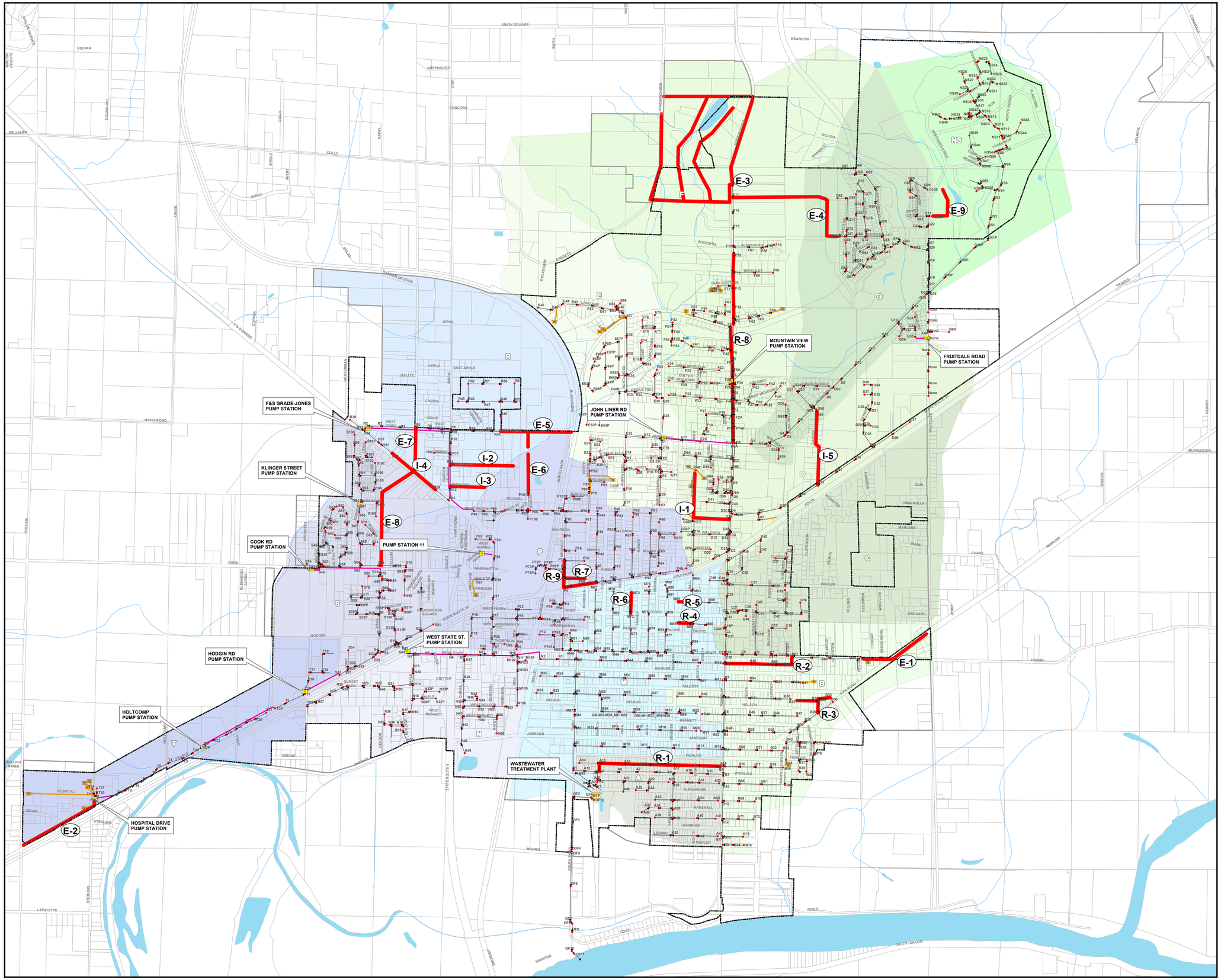
SEDRO-WOOLLEY SEWER SYSTEM

Capital Improvement Program



N
W E
S

0 500 1,000 2,000 Feet

0 0.125 0.25 0.5 Miles

Legend

- City Limits
- UGA / Sewer Service Area
- Private System
- Pump Station
- Treatment Plant
- Manhole

Gravity Sewer Main

- Gravity Sewer Main
- 10-Year CIP List
- Sewer Force Mains Private
- Sewer Force Mains Public

Third Metcalf Street Basin

- M
- N
- P
- R
- S
- T
- U

Township Street Basin

- A
- B
- C
- D
- E
- F
- G
- NS

CITY OF SEDRO-WOOLLEY GATEWAY TO THE NORTH CASCADES

PACE An Engineering Services Company