



DEPARTMENT OF ECOLOGY  
CENTRAL REGIONAL OFFICE

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# CITY OF CLE ELUM GENERAL SEWER PLAN



March 2021

PROJECT NO. 20111E





# CITY OF CLE ELUM

## *GENERAL SEWER PLAN*



Prepared by:



PROJECT NO. 20111E

FEBRUARY 2023 (Amended)





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# **INTRODUCTION AND EXECUTIVE SUMMARY**





### INTRODUCTION AND EXECUTIVE SUMMARY

#### **INTRODUCTION**

The City of Cle Elum located within the western part of Kittitas County as shown in Figure 1-1 Washington State Vicinity Map, owns and operates its own wastewater collection, treatment, and disposal system. The Wastewater Treatment Plant (WWTP) also serves the Town of South Cle Elum, City of Roslyn, unincorporated community of Ronald, and the Suncadia development. Each of these communities are responsible for the operation and maintenance of the collection system within their service area.

This General Sewer Plan (GSP) includes the approximate location and description of existing and future trunk and interceptor sewers, pumping stations, local service areas, and the sewer collection system to serve those areas. The sections of this Plan describe the basis for development of planning areas, growth projections, forecasted municipal wastewater loadings, and design criteria for recommended collection system improvements. Maps showing the existing sewer system are included in the Appendix.

Cle Elum recognizes the need to improve and expand its sewer system to meet the demands of system users and to keep pace with other growth-oriented improvements in this vital area of Kittitas County. HLA Engineering and Land Surveying, Inc., (HLA) was authorized by the City of Cle Elum to prepare this GSP, which represents the culmination of planning and data collection efforts.

#### **REQUIREMENTS**

State regulation 173-240-050 WAC specifies that a GSP include the following information:

- Purpose and need for the proposed Plan.
- A discussion of who will own, operate, and maintain the system.
- The existing and proposed service boundaries.
- Layout map, including existing and proposed sewers, existing and proposed pump stations and force mains, topography and elevations, streams, lakes, and other bodies of water, and location of major water system components.
- Current and future population.
- Existing domestic or industrial wastewater facilities within the vicinity of the general plan area.
- A discussion of any Infiltration and Inflow (I/I) problems.
- A statement regarding provisions for and adequacy of wastewater treatment.
- List of all sources of, and quality and quantity of, industrial wastewater discharged to the system.
- Location of private and public wells or other sources of water supply.
- Alternatives evaluated.
- Financial evaluation, including the cost per service in terms of both debt service and operation and maintenance costs.
- A statement regarding compliance with any adopted water quality management plan under the Federal Water Pollution Control Act as amended.
- A statement regarding compliance with the State Environmental Policy Act (SEPA) and the National Environmental Policy Act (NEPA).





### **PURPOSE AND OBJECTIVE OF PLAN**

This GSP has been developed to serve as a guide for the expansion of the City of Cle Elum's wastewater collection, treatment, and disposal facilities. The following major components are included in this Plan:

- Definition of the planning area, determination of the areas in and around Cle Elum most likely to grow, and the projected population increases.
- Development of estimates for the current quantity of wastewater and projected quantity to be generated within the planning area.
- Evaluation of capacity and condition of the existing sewer system, including lift stations.
- Recommendations for extension of the existing sewer system, including lift stations.
- Development of design standards for extension of sewers.
- Review and evaluation of the existing treatment and disposal facilities.
- Development of policies for the extension of sewer service.

The sections of this Plan describe the basis for development of planning areas, growth projections, forecast wastewater loadings, and design criteria for recommended improvements. By regulation, GSPs are required to contain maps showing sources of drinking water supply, storage, and treatment. Major City of Cle Elum water system components are shown in Figure 3-1 Sewer Collection System Map.

An equally important reason for developing a GSP is to assure orderly growth of the system while maintaining reliable wastewater collection and treatment service. This Plan is intended to guide sewer utility actions in a manner consistent with other activities taking place in the community.

### **SUMMARY OF SYSTEM ANALYSIS**

A hydraulic analysis of the existing Cle Elum collection system was performed to evaluate the capacity of the system and to identify specific hydraulic loading problem areas within the system. The computer-assisted analysis involves using pipe sizes and slopes to develop a model of the main trunk lines of the sewer system. The analysis also examined the capacities of the existing lift stations. The results of the analysis show:

- Existing System: No hydraulic problems were found in the existing system. Collection system pipelines, lift stations, and force mains all have adequate capacity to handle the existing flows and no improvements are needed for capacity reasons. Improvements to the existing system are needed to address high-maintenance areas and I/I which was determined to be excessive per EPA standards.
- Year 2040 System: The 2040 system projections include completion of the 47° North (47N) and City Heights developments and an accelerated growth period for Suncadia. Even with these higher than historical average growth projections, the year 2040 hydraulic analysis did not result in any capacity related limits being reached within the existing collection or treatment system. Therefore, the City's existing collection system does not have any identified deficiencies for the Year 2040 projected peak flows. Treatment capacity of the WWTP for total suspended solids (TSS) may need to be increased prior to 2040 if growth occurs at the rate projected by current ongoing developments.



- **Full Build-Out System:** The hydraulic analysis was completed to examine existing and proposed future sewer network at peak flows generated by the complete development within both the City and Urban Growth Area (UGA). Flows from future collection basins were modeled and routed through the existing collection system to examine system capacity and determine potential problem areas. Based upon projected type and location of future growth, the City's sewer trunk mains conveying sewer to the WWTP were found to have sufficient capacity to handle projected full build-out flows. The capacity rating of the plant to treat for TSS will need to increase to meet the projected full build-out conditions. Decreasing peak flows caused by I/I may be enough to adequately reduce the loading to the WWTP and avoid future improvements.

### **SUMMARY OF RECOMMENDED IMPROVEMENTS**

Improvements to the existing collection and treatment system, and expansion to accommodate future growth with their associated costs are identified within CHAPTER 7 of this Plan. The following is a summary of the recommended improvements (see Figure 7-1):

#### **Maintenance Improvements:**

Ten areas of improvements are proposed to correct areas within the existing collection system that, through routine maintenance, have been identified as needing attention to address potential problems such as inadequate pipe slopes, separated joints, or root/debris intrusions. The City recently embarked on a TV-inspection program of the collection system to identify additional areas in need of repair. These projects are described in more detail in CHAPTER 3.

The City's I/I rates are in the range considered excessive by EPA standards. Most of the City's collection system piping is over 50 years old, and has, or is reaching the end of its service life. Therefore, it is expected that more areas will be identified as needing replacement or repairs as the inspection program continues.

In addition, the WWTP has been in service for 15 years and the equipment is reaching major overhaul or replacement schedule periods. Seventeen items have been identified at the WWTP in CHAPTER 6 to be refurbished or replaced within the next ten years. Like the collection system, the list of needs is likely to grow in the next several years.

### **SCHEDULE OF IMPROVEMENTS AND ESTIMATED COSTS**

It is recommended that Cle Elum proceed with construction of improvements referenced in Table 7-1 of CHAPTER 7, and as shown in Figure 7-1. Estimated costs (in 2020 dollars) for construction of the improvements recommended in the previous section are presented in Table 7-1 of CHAPTER 7.

### **ESTIMATED COSTS AND PROPOSED SEWER SYSTEM FINANCIAL PROGRAM**

Developing a plan for project financing involves examining current system expenditures and revenues, integrating the schedule and costs of the recommended improvements into the City's financial structure, recommending funding sources, and developing a method to pay for the identified improvements. Most of the recommended wastewater collection system improvements are necessary to reduce operation and maintenance costs and improve system performance, rather than increase capacity. A schedule and estimate of costs for recommended improvements are provided in Section 7.3 of this Plan. Timing of the improvements has been developed to allow the City to meet the most pressing needs yet maintain positive fund balances.





## GENERAL SEWER PLAN

Revenue increases are necessary to fund recommended system improvements identified in the GSP. The City is in the process of inspecting the collection system and additional projects will be identified over the next couple of years to reduce I/I and repair damaged sewer lines. To fund these collection systems and WWTP maintenance program projects identified in Table 7-1, it is recommended the City first perform a rate study to adequately increase and equitably establish user rates between its customer classes.

It is recommended the sewer revenue increases a minimum of 50 percent to adequately fund the sewer system needs immediately. Due to unknowns related to operating expenses and growth, the City should also continue to monitor system finances and make necessary annual adjustments in rates to adequately fund expenses. Additionally, future grant/loan funding is expected to be necessary to finance recommended system improvements without negatively affecting existing fund balances.



# **CHAPTER 1 -**

## **BASIC PLANNING INFORMATION**







### CHAPTER 1 – BASIC PLANNING DATA

#### **1.1 BACKGROUND INFORMATION**

##### **1.1.1 Wastewater System Ownership**

The City of Cle Elum, a municipal corporation located within the western part of Kittitas County as shown in Figure 1-1 Washington State Vicinity Map, owns and operates its own wastewater collection, treatment, and disposal system. Decisions regarding daily sewer system operations are made by the Public Works Director and the private WWTP operator, Veolia Water. Financial decisions regarding major system improvements and establishment of sewer rates are made by the Cle Elum City Council.

The WWTP serves the Town of South Cle Elum, City of Roslyn, unincorporated community of Ronald, and the Suncadia development. These entities are responsible for operation and maintenance of the collection system within their service area. The following parties are involved in the operation, maintenance, and planning for the Cle Elum wastewater collection, treatment, and disposal facilities:

##### **WASTEWATER SYSTEM NAME, OWNER, AND OPERATOR:**

Upper Kittitas County Regional Wastewater Treatment Facility  
500 Owens Road  
Cle Elum, WA 98922

Owner: City of Cle Elum  
Mayor: Jay McGowan  
Public Works Director: Mike Engelhart  
Wastewater Treatment Plant Operators: William LaRue (Veolia Water)

##### **WASTEWATER SYSTEM CONSULTING ENGINEER:**

HLA Engineering and Land Surveying, Inc.  
2803 River Road  
Yakima, WA 98902  
Phone: (509) 966-7000  
Project Engineer: Dean P. Smith, PE

##### **1.1.2 Service Area Description**

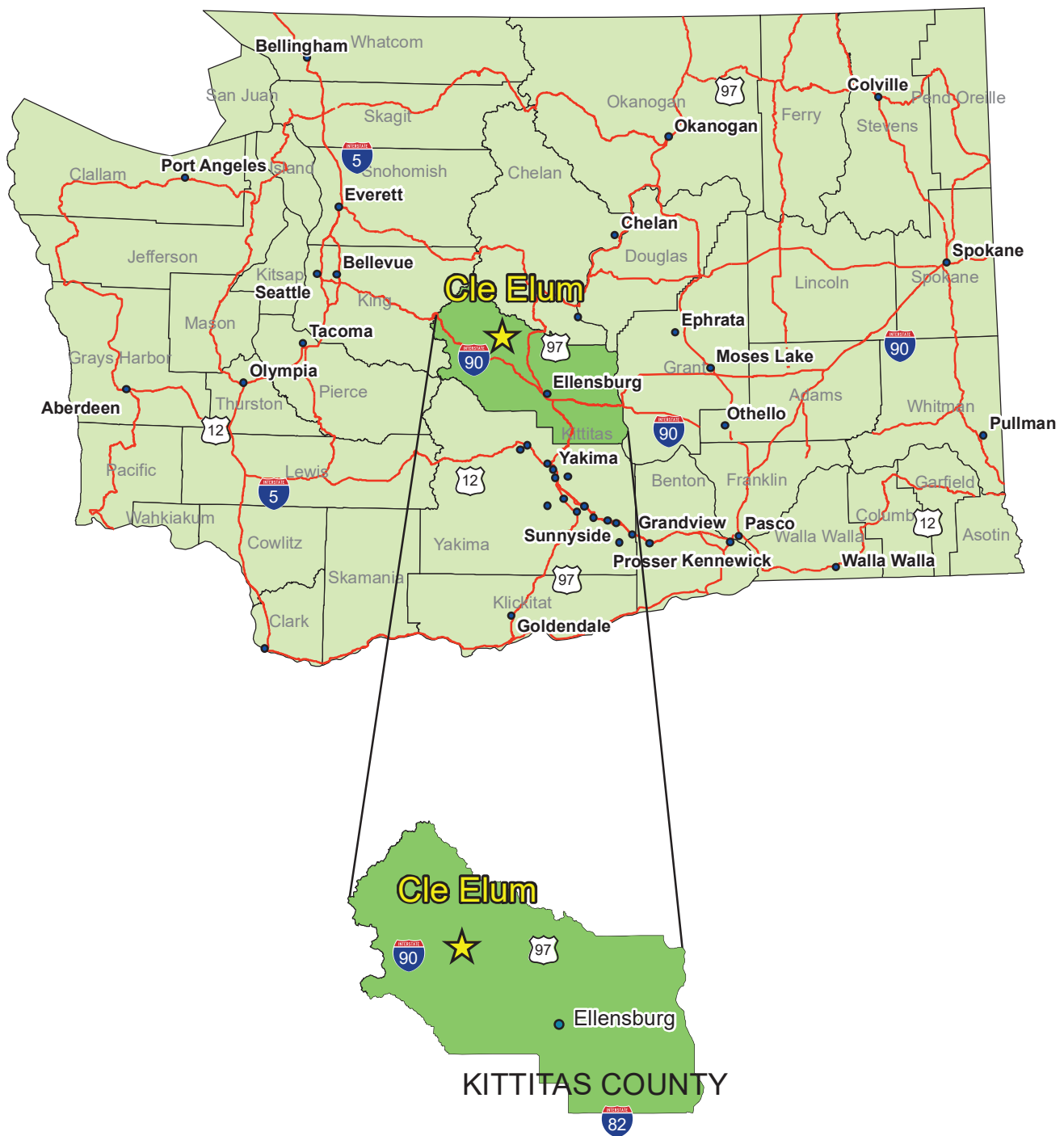
The City of Cle Elum and its UGA is in western Kittitas County, in the central portion of Washington State, as shown in Figure 1-1 Washington State Vicinity Map. The City lies approximately 25 miles northwest of the City of Ellensburg just north of Interstate 90. The City is situated at an elevation of 1,920 to 2,060 feet above mean sea level. The Yakima River lies just south of the City.

Cle Elum and its UGA are on the eastern slopes of the Cascade Mountain Range which acts as a barrier between Kittitas County and the Pacific Ocean, keeping precipitation low. The mean annual temperature range is from a low of 18°F to a high of 83°F. The median temperature is 57°F and mean annual precipitation is 22.1 inches.



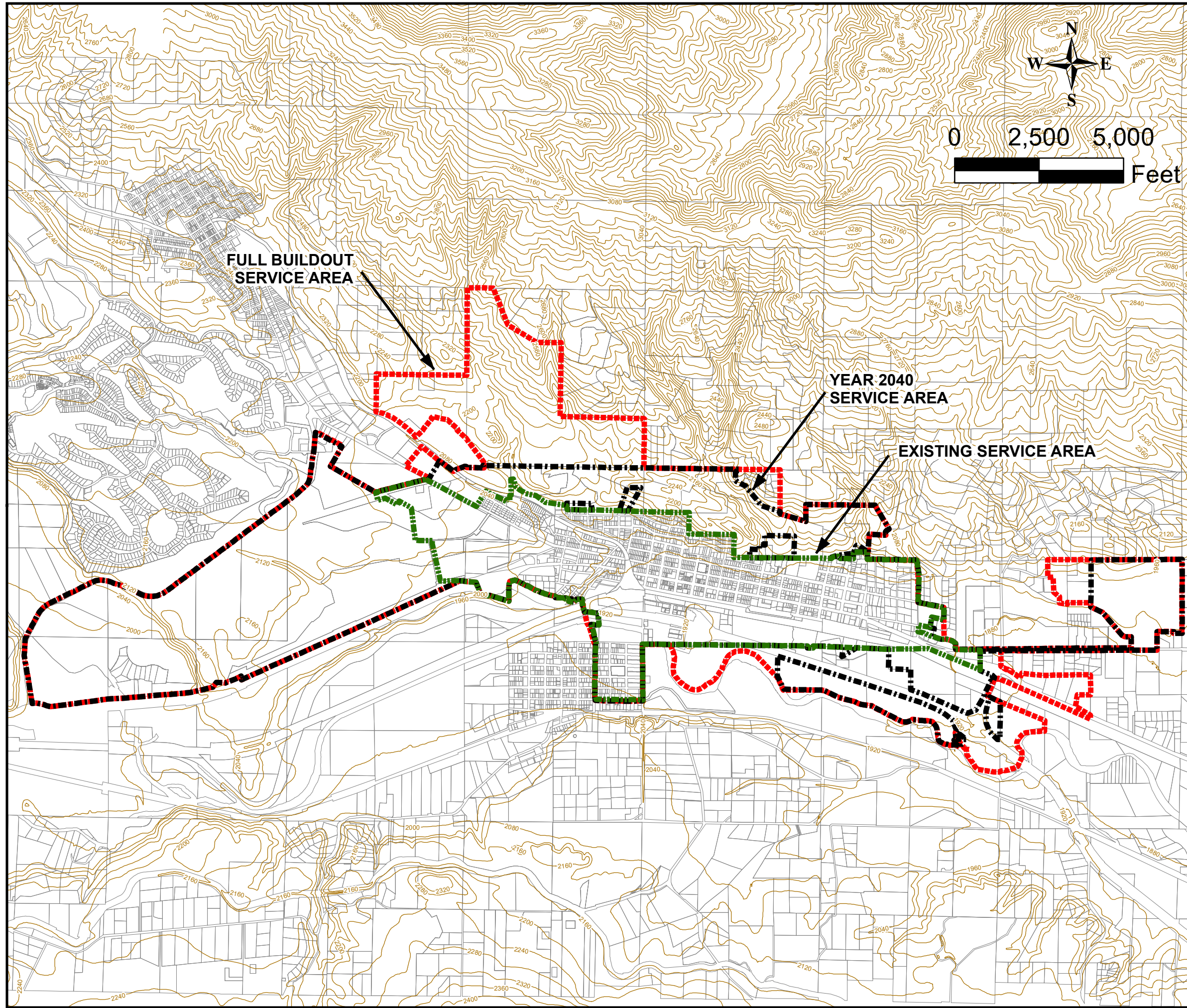
## GENERAL SEWER PLAN

In 2019, Cle Elum completed an update to its Comprehensive Plan as required by the Growth Management Act (GMA). This updated Comprehensive plan was approved and accepted by the planning commission in June 2019. Cle Elum's UGA boundary, existing sewer service area, and future sewer service area boundaries are shown in Figure 1-2 Existing and Future Sewer Service Area Boundaries. Cle Elum's existing sewer service area boundary generally corresponds to the city limits while the future sewer service area boundary generally corresponds to the UGA. The WWTP is a regional facility serving South Cle Elum, Roslyn, Ronald, and the Suncadia development area.



**WASHINGTON STATE  
VICINITY MAP  
FIGURE 1-1**








# CITY OF CLE ELUM

General Sewer Plan

## EXISTING AND FUTURE SEWER SERVICE AREA BOUNDARIES

### LEGEND

-  Existing Service Area
-  City Limits
-  UGA Boundary







### 1.1.3 Wastewater System History

Founded in the 1870s, Cle Elum was incorporated in 1902, and is currently the second largest community in Kittitas County. Population in Cle Elum peaked around 1915 as a center for coal mining, railroad, and logging activities. Today, recreation and tourism are the area's primary industries. The City has become a residential area for commuters working in the greater Seattle area and is central for north Kittitas County's shopping and services.

In 2003, the City of Cle Elum completed a combined GSP and Facility Plan for the City and its UGA. This Plan includes the following:

- Description of existing and future sewer service areas (UGA).
- Description of conditions and location of existing trunk and interceptor sewers, pumping stations, the collection system, current system operation and maintenance, and problem areas.
- Forecast of future wastewater loadings based upon growth projections.
- Recommendation of a wastewater system improvement plan and financial plan; and
- Design standards for recommended wastewater collection system improvements.

The GSP provides Cle Elum with one of their Capital Improvement Plans for various infrastructure systems, predicts future sanitary sewer services within city limits and UGA boundaries, and is the wastewater counterpart to the Water System Plan (WSP).

Table 1-1 provides a summary of the development and some of the major improvements to the City's sewer system starting in 1948.

TABLE 1-1 MAJOR SEWER SYSTEM IMPROVEMENTS	
Year	Improvement Description
1948	Cle Elum single-cell WWTP and collection system were constructed.
1980	Original single-cell lagoon was replaced with three bentonite-lined facultative stabilizations ponds. New outfall to the Yakima River was constructed, and extensive rehabilitation of the collection system was completed.
1995	The Cle Elum WWTP began functioning as a regional system.
2001	Interim lagoon system improvements were completed.
2000	Submitted a Comprehensive Sewer and Wastewater Facility Plan to Ecology.
2002	Submitted a draft Regional Sewerage Facilities Plan.
2003	Addenda to the Facilities Plan was submitted to and approved by Ecology for the new WWTP to service the region, including the Suncadia Resort.
2004	Completed a sewer system I/I removal project replacing sanitary sewers and removing storm drain connection to the sewer collection system.
2005	Completed the new Regional Sequencing Batch Reactor (SBR) WWTP.



### **1.2 RELATED PLANNING DOCUMENTS**

#### **1.2.1 Wastewater Plans**

In 2003, the City of Cle Elum completed a Comprehensive Sewer and Wastewater Facility Plan for the City and its UGA. These documents include:

- Description of the existing city limits, future UGA sewer service area, and Suncadia master planned resort.
- Estimate of future sewer service population based upon the current population.
- Forecast of future wastewater loadings based on sewer service population predictions.
- Description and location of existing sewer system, WWTP, and potable water supply components.
- Design standards for recommended sewer system improvements and a financial plan.

The Plan provided Cle Elum with a component of its Capital Improvement Plan for providing future services within both the City, the master planned resort, and the UGA.

#### **1.2.2 Wastewater Facility Plan**

In 2003, the City of Cle Elum received approval from Ecology of the Facility Plan for the Regional WWTP. This document included:

- Description of existing and future sewer service area, population projections, and regulatory requirements.
- Description of existing wastewater treatment facilities and wastewater flows and loadings.
- Presentation and evaluation of the select Sequencing Batch Reactor (SBR) process to provide biological treatment to accommodate the City's projected 30-year growth and to meet pending regulatory requirements.

#### **1.2.3 Urban Growth Area Comprehensive Plan**

The City of Cle Elum's current GMA Comprehensive Plan was adopted on June 25, 2019, with an updated Land Use Element adopted on December 10, 2019. The next GMA Comprehensive Plan update is scheduled to be completed in 2026. The typical GMA Comprehensive Plan describes current conditions, develops forecasts for a 20-year planning period, evaluates observed or predicted deficiencies, strategizes for addressing current and future challenges, and budgets for necessary improvements.

The Town of South Cle Elum, in cooperation with Kittitas County, completed and adopted the Town's most recent update to their GMA Comprehensive Plan in 2019.

Comprehensive plans identify many of the physical, environmental, and economic elements within the Cle Elum, South Cle Elum, and surrounding area (including the UGA). Each also attempts to forecast anticipated changes within those geographical areas. Understanding and predicting future changes within the City, Town, and their future service areas, provides critical background for forecasting future demands on the joint water system. As a result, the City of Cle Elum Comprehensive Plan and Town of South Cle Elum Comprehensive Plan were important tools in development of this GSP.



### 1.2.4 Water System Plans (WSP)

The City's WSP was most recently updated in 2015 and is currently in the process of being updated which is scheduled for completion in 2021. This document provides Cle Elum an in-depth look at their water system, its deficiencies, potential growth, and requirements to serve their own and the surrounding community's needs. Completion of the City's original Comprehensive Water Plan took place in 1997.

### 1.3 NEIGHBORING/ADJACENT WASTEWATER SYSTEMS

No other municipal wastewater systems exist within Cle Elum's UGA. As described previously, the Upper Kittitas County Wastewater Treatment Facility, owned by the City of Cle Elum, provides treatment for the surrounding communities of South Cle Elum, City of Roslyn, unincorporated area of Ronald, and the Suncadia development. The nearest municipal wastewater treatment and disposal systems include the Snoqualmie Pass Utility District WWTP, located 30 miles to the west and the City of Ellensburg WWTP, located 25 miles southeast of Cle Elum.

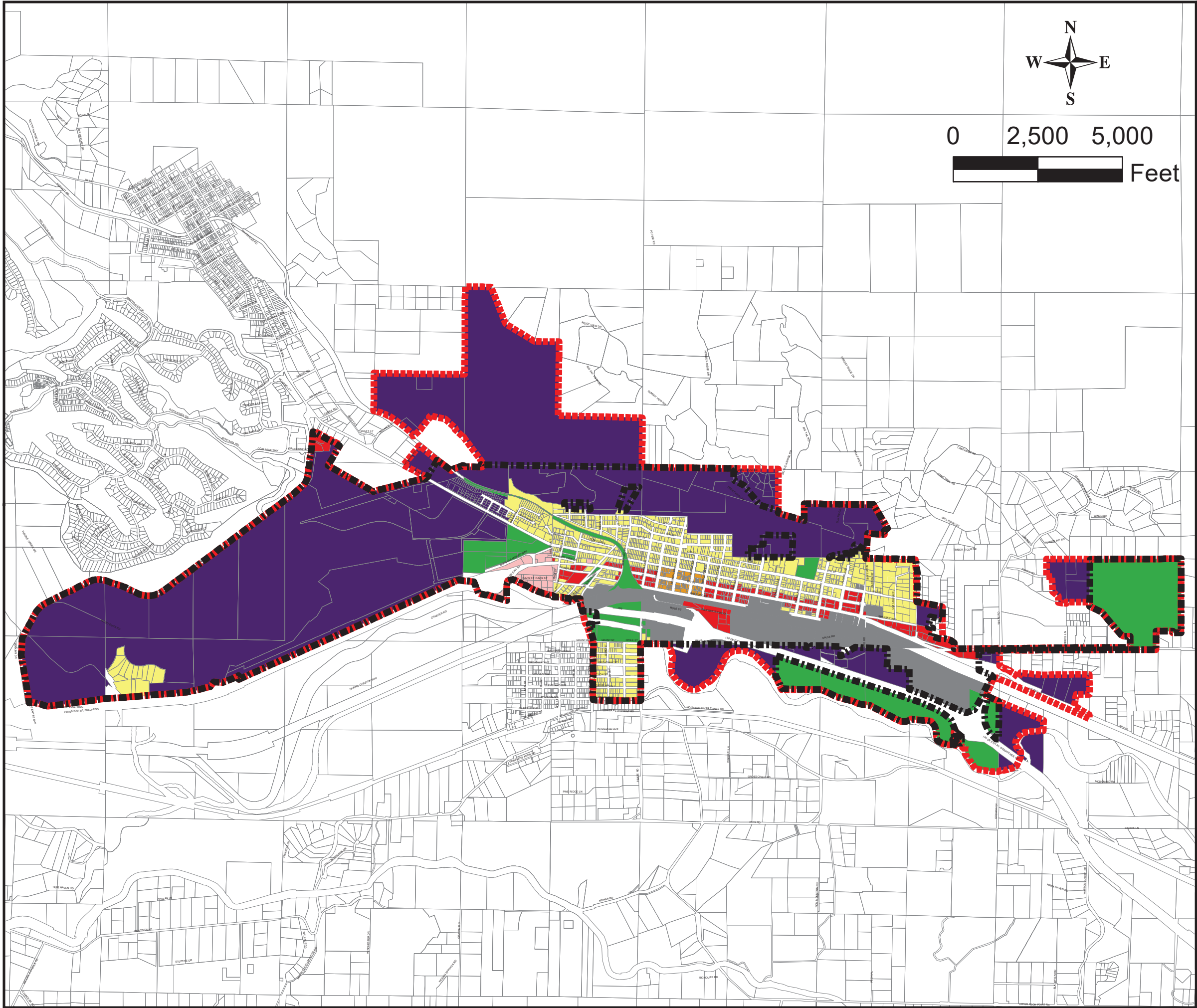
### 1.4 EXISTING SERVICE AREA

The existing wastewater system serves a combination of residential, commercial, industrial, and public users within the city limits. The boundary of the current sewer service area is shown in Figure 1-2. Map A, in the back of this Plan, shows the existing Cle Elum sewer system, including the location of lift stations, manholes, and collection system.

The total area within Cle Elum's city limits is equal to approximately 2,816 acres, but the current area served by the wastewater collection system includes approximately 1,460 acres within the city limits.

Existing zoning within the City of Cle Elum is presented in Table 1-2 and shown in Figure 1-3 Existing Zoning Map.





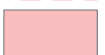
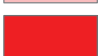







# CITY OF CLE ELUM

General Sewer Plan

## EXISTING ZONING MAP

### LEGEND

-  City Limits
-  UGA Boundary
-  Entry Commercial
-  General Commercial
-  Industrial
-  Old Town Commercial
-  Planned Mixed Use
-  Public Reserve
-  Residential

Note: Based upon Official Zoning Map provided by the City of Cle Elum





**TABLE 1-2 EXISTING ZONING WITHIN CLE ELUM CITY LIMITS**

Grouped Land Use Category	Total Acreage*	Percent of Total
<b>Residential</b>	<b>480.03</b>	<b>17.05%</b>
Single Family Residential (SFR)	477.51	16.96%
Multi-family Residential (MFR)	2.52	0.09%
<b>Commercial (C)</b>	<b>187.45</b>	<b>6.66%</b>
Downtown Commercial	22.05	0.78%
Entry Commercial	51.23	1.82%
General Commercial	114.17	4.05%
<b>Industrial (I)</b>	<b>294.36</b>	<b>10.45%</b>
<b>Planned Mixed Use (PMU)</b>	<b>1,509.04</b>	<b>53.59%</b>
<b>Public Reserve (Parks and Open Space P-O)</b>	<b>344.96</b>	<b>12.25%</b>
<b>TOTAL</b>	<b>2,815.84</b>	<b>100.0%</b>

\* Source: City of Cle Elum 2019 Comprehensive Plan, Land Use Element, Table 1.

As shown in Table 1-3 Planned Mixed Use is the largest land use within the city limits, comprising approximately 1,509 acres or 53.59% of the land. Commercial areas total 187.45 acres (6.66%) of land within the City and Industrial development comprises approximately 294 acres (10.45%) of land within the City. Of the residentially zoned lands, single-family residential makes up the largest area, approximately 477.51 acres (16.96%) of the total area within the City.

## 1.5 FUTURE SERVICE AREA

The City of Cle Elum updated the UGA for Cle Elum in 2017 as part of the GMA planning process. The UGA, which includes an area of 837 acres outside the current city limits, represents the projected future retail service area within which the City may be able to provide and maintain service. Future land use within the UGA is presented in Table 1-3 and is shown in Figure 1-4 Future Land Use Map.

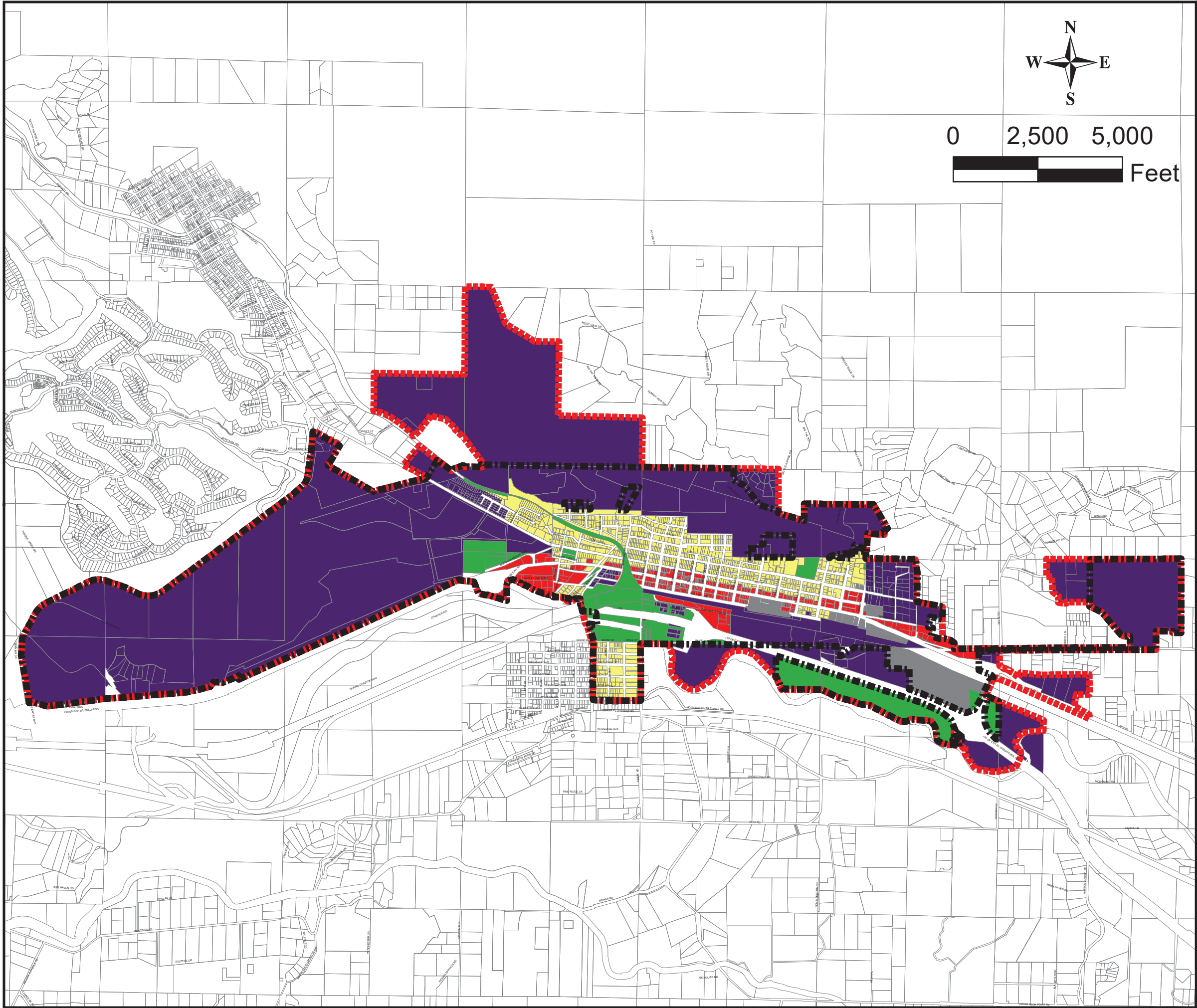
**TABLE 1-3 FUTURE LAND USE WITHIN CLE ELUM'S UGA**

Land Use Category	Total Acreage*	Percent of Total
<b>Residential R-3</b>	<b>402.5</b>	<b>48.1%</b>
<b>Forest and Range</b>	<b>235.7</b>	<b>28.2%</b>
<b>Highway Commercial</b>	<b>33.0</b>	<b>3.9%</b>
<b>Industrial</b>	<b>132.05</b>	<b>15.8%</b>
Light Industrial	18.05	2.2%
General Commercial	114.0	13.6%
<b>Agriculture AG-3</b>	<b>33.6</b>	<b>4.0%</b>
<b>TOTAL</b>	<b>836.85</b>	<b>100.0%</b>

\* Source: City of Cle Elum 2019 Comprehensive Plan, Land Use Element, Table 3.

As shown in Table 1-3, residential areas are the largest land use designation within Cle Elum UGA, comprising approximately 48.1% (402.5 acres) of the total land area within the UGA.












# CITY OF CLE ELUM

General Sewer Plan

## FUTURE LAND USE MAP

### LEGEND

-  City Limits
-  UGA Boundary
-  General Commercial
-  Industrial
-  Planned Mixed Use
-  Public Reserve
-  Residential

Note: Based upon Official Future Land Use Map provided by the City of Cle Elum





## 1.6 POPULATION

### 1.6.1 Current Population

According to the U.S. Census Bureau, the 2010 population of City of Cle Elum was 1,872, an increase of approximately 6.7% (or 117 people) since 2000. Cle Elum's growth rate for the period 2000-2010 was approximately 0.67% per year (6.7% for the ten-year period). Historical growth in Cle Elum has averaged a decrease of 3.53% per year since 1920. Population trends for the City of Cle Elum, Town of South Cle Elum, Kittitas County, and the State of Washington for the period 1910 through 2010 are presented in Table 1-4.

**TABLE 1-4 CENSUS POPULATION TRENDS**

Year	City of Cle Elum		Town of South Cle Elum		City of Roslyn		Kittitas County		State of Washington	
	Population*	Percent Change	Population*	Percent Change	Population*	Percent Change	Population	Percent Change	Population	Percent Change
1910	2,749	-	-	-	3,126	-	18,561	-	1,141,990	-
1920	2,661	-3.2%	587	-	2,673	-14.5%	17,737	-4.4%	1,356,621	18.8%
1930	2,508	-5.7%	338	-42.4%	2,063	-22.8%	18,154	2.4%	1,563,396	15.2%
1940	2,230	-11.7%	340	0.6%	1,743	-15.5%	20,230	11.4%	1,736,191	11.1%
1950	2,206	-1.1%	442	30.0%	1,537	-11.8%	22,235	9.9%	2,378,963	37.0%
1960	1,816	-17.1%	383	-13.3%	1,283	-16.5%	20,467	-8.0%	2,853,214	19.9%
1970	1,725	-5.0%	374	-2.3%	1,031	-19.5%	25,039	22.3%	3,409,169	19.5%
1980	1,773	2.8%	449	20.1%	938	-9.0%	24,877	-0.6%	4,132,156	21.2%
1990	1,778	0.3%	457	1.8%	869	-7.4%	26,725	7.4%	4,866,692	17.8%
2000	1,755	-1.3%	457	0.0%	1,017	17.0%	33,362	24.8%	5,894,121	21.1%
2010	1,872	6.7%	532	16.4%	893	-12.2%	40,915	22.6%	6,724,540	14.1%

Source: U.S. Census Bureau.





## GENERAL SEWER PLAN

The Washington Office of Financial Management (OFM) developed population estimates for the City of Cle Elum and for Kittitas County since the 2000 census and the 2010 census as shown in Table 1-5.

TABLE 1-5 OFM POPULATION ESTIMATES										
Year	City of Cle Elum		Town of South Cle Elum		City of Roslyn		Kittitas County		State of Washington	
	Population*	Percent Change	Population*	Percent Change	Population*	Percent Change	Population	Percent Change	Population	Percent Change
2010	1,872	-	532	-	893	0.22%	40,915	-	6,724,540	-
2011	1,875	0.16%	535	0.56%	895	0%	41,300	0.93%	6,767,900	0.6%
2012	1,865	-0.53%	530	-0.93%	895	0%	41,500	0.48%	6,817,770	1.4%
2013	1,870	0.27%	530	0%	895	0%	41,900	0.95%	6,882,400	0.9%
2014	1,870	0%	530	0%	895	0%	42,100	0.47%	6,968,170	1.2%
2015	1,865	-0.27%	530	0%	890	-0.56%	42,670	1.34%	7,061,410	1.3%
2016	1,870	0.27%	530	0%	890	0%	43,710	2.38%	7,183,700	1.7%
2017	1,875	0.27%	530	0%	890	0%	44,730	2.28%	7,310,300	1.8%
2018	1,875	0%	530	0%	900	1.12%	45,600	1.91%	7,427,570	1.6%
2019	1,915	2.13%	535	0.93%	900	0%	46,570	2.08%	7,546,410	1.6%
2020	1,995	4.18%	535	0%	900	0%	48,140	3.37%	7,656,200	1.5%
Period Average		0.60%		0.05%		0.07%		1.61%		1.26%

\*Source: Washington State Office of Financial Management (OFM)

Cle Elum's population growth has averaged less than 1% per year during the last 10-year period. In 2019 and 2020, development in the area has stimulated growth which has averaged over 3% per year. The other communities in their service area have grown more slowly. The Suncadia development is also expected to grow at a rate similar to Cle Elum.

### 1.6.2 Future Population

The areas served by the WWTP have historically had different growth rates which are reflected in the following tables. Recent development interest within Cle Elum shows a dramatic increase in 2019 and 2020. The average of these two years is consistent with a preliminary report produced by Kittitas County for Cle Elum showing an annual population increase of approximately 3.12%.

47N and City Heights developments are proposed to be constructed over the next 20-year planning period. The proposed developments exceed the projected number of future residential services based on population estimates. As a result, the projected average population increase used in Table 1-6 reflects a buildout schedule assuming 47N development is approximately 66% complete in 2032 and 100% complete in 2042 and City Heights is 50% completed in 2032 and 100% complete in 2042. This results in a population increase of 1,697 residents for the 47N development and 2,364 residents for the City Heights development during the 20-year period.

The buildout rate results in an average population percentage of approximately 5.33% annually over the 20-year period as shown in Table 1-6.



## GENERAL SEWER PLAN

**TABLE 1-6 CITY OF CLE ELUM POPULATION PROJECTIONS**

Year	Future Population	Average Annual Increase, %
2020	1,995 (OFM Est.)	4.18%
2021	2,057	3.12%
2040	5,515	5.33%
2042	6,118	5.33%

Source: Extrapolation of OFM Estimates Using Historical Average of 3.12% per year for 2021. Used Development Agreement Information for Two Major Developments within Cle Elum after 2021.

The Town of South Cle Elum and City of Roslyn have had a much lower growth rates, comparatively, than Cle Elum. The population projections for South Cle Elum and Roslyn/Ronald are shown in Table 1-7 and Table 1-8, respectively.

**TABLE 1-7 TOWN OF SOUTH CLE ELUM POPULATION PROJECTIONS**

Year	Future Population	Average Annual Increase, %
2020	535 (OFM Est.)	0%
2021	538	0.5%
2040	591	0.5%
2042	597	0.5%

Source: Extrapolation of OFM Estimates Using Historical Average of 0.5% per year.

**TABLE 1-8 CITY OF ROSLYN/RONALD POPULATION PROJECTIONS**

Year	Future Population	Average Annual Increase, %
2020	1,292 (OFM Est.)	0%
2021	1,298	0.5%
2040	1,428	0.5%
2042	1,442	0.5%

Source: Extrapolation of OFM Estimates Using Historical Average of 0.5% per year.

The Suncadia area is expected to have a future population increase similar to Cle Elum. Future projection for the Suncadia Area is listed in Table 1-9.

**TABLE 1-9 SUNCADIA POPULATION PROJECTIONS**

Year	Future Population	Average Annual Increase, %
2020	2,174 (Est.)	-
2021	2271	4.45%
2040	5198	4.45%
2042	5671	4.45%

Source: Used Development Agreement Information for Developments within Suncadia.



## GENERAL SEWER PLAN

Table 1-10 is a combination of the areas within the region (Cle Elum, South Cle Elum, Roslyn/Ronald, and Suncadia) served by the WWTP. The total population projection for 2040 is projected to be 12,731 for the region, 5,515 which reside within Cle Elum.

TABLE 1-10 COMBINED CLE ELUM WWTP SERVICE AREA POPULATION PROJECTIONS		
Year	Future Population	Average Annual Increase, %
2020	5,996 (Est.)	-
2021	6,164	2.28%
2040	12,731	3.84%
2042	13,828	3.84%
Source: Extrapolation of Estimates Using Historical Averages for Each Community Shown in Tables Above.		



# **CHAPTER 2 -**

## **PAST AND PROJECTED WASTEWATER LOADINGS**





## CHAPTER 2 – PAST AND PROJECTED WASTEWATER LOADINGS

### 2.1 PREVIOUS INFLUENT WASTEWATER TRENDS

#### 2.1.1 Background

The City of Cle Elum provides wastewater collection, treatment, and disposal services to residences, businesses, public facilities, and industries within the City's existing service area. Municipal sewage, consisting of wastewaters from residential and commercial users, schools, and industrial facilities from within the Cle Elum service area and service areas of South Cle Elum, Roslyn, Ronald, and Suncadia flow by gravity to the main plant for treatment. A detailed description of Cle Elum's wastewater treatment process is in CHAPTER 6 of this Plan. South Cle Elum and Suncadia have lift stations which discharge into the gravity collection system of Cle Elum where the wastewater is conveyed to the WWTP.

The neighboring communities which discharge into the Cle Elum collection system prior to reaching the WWTP have contributed varying level of growth to the City's system. Each of these communities own and operate their own collection system up to a point where it reaches Cle Elum's collection system through which the combined wastewater is conveyed to the WWTP.

#### 2.1.2 System Capacity

Cle Elum's current National Pollutant Discharge Elimination System (NPDES) permit, issued by the Washington Department of Ecology in 2019, specifies the following design criteria for the WWTP. The City of Cle Elum has provided wastewater treatment and disposal services and system capacity is governed by the WWTP design criteria, as given in Table 2-1.

TABLE 2-1 CLE ELUM WASTEWATER TREATMENT PLANT DESIGN CRITERIA	
Parameter	Design Quantity
Maximum Month Design Flow (MMDF)	3.6 MGD
Peak Instantaneous Design Flow (PIDF)	10.5 MGD
BOD <sub>5</sub> Loading for Maximum Month	4,863 lbs/day
TSS Influent Loading for Maximum Month	3,753 lbs/day

#### 2.1.3 Influent Wastewater Flows

Influent wastewater flows to Cle Elum's WWTP for the period 2013 through 2019 are presented in Table 2-2. "Summer flows" represent the average flows for the months of June through August, while "winter flows" represent the average flows for the months of December through February.





**TABLE 2-2 INFLUENT WASTEWATER FLOWS 2013-2019**

(Values are in MGD)

	2013	2014	2015	2016	2017	2018	2019
January	0.591	0.786	1.291	0.947	0.488	1.038	0.935
February	0.825	0.932	0.948	2.001	0.622	1.592	0.734
March	0.889	1.961	0.689	1.556	1.992	1.052	0.975
April	0.850	0.856	0.692	0.847	1.511	1.074	0.976
May	0.792	0.711	0.686	0.953	0.925	1.222	0.849
June	0.710	0.652	0.644	0.803	0.871	0.799	0.899
July	0.794	0.796	0.725	0.911	0.981	0.990	1.096
August	0.786	0.833	0.690	0.837	0.868	0.834	1.018
September	0.519	0.478	0.444	0.494	0.510	0.517	0.627
October	0.428	0.429	0.385	0.477	0.620	0.422	0.539
November	0.521	0.684	0.837	0.498	0.696	0.542	0.494
December	0.809	0.861	1.345	0.511	0.740	0.854	0.584
Average	0.709	0.832	0.781	0.903	0.902	0.911	0.811
Summer	0.763	0.760	0.686	0.850	0.906	0.874	1.005
Winter	0.742	0.860	1.195	1.153	0.617	1.161	0.751
Maximum Month	0.889	1.961	1.345	2.001	1.992	1.592	1.096
Maximum Day	1.961	3.383	4.013	3.770	2.752	2.798	1.642

Average annual influent flows to the WWTP have ranged from a low of 0.709 MGD in 2013 to a high of 0.911 MGD in 2018. Average influent summer flows have ranged from a low of 0.760 MGD in 2014, to a high of 1.005 MGD in 2019. Average influent winter flows have ranged from a low of 0.617 MGD in 2017 to a high of 1.195 MGD in 2015. The greatest maximum monthly flow occurred in 2016 when the WWTP received an average of 2.001 MGD during the month of February. This influent flow represents 55.6% of the design hydraulic capacity (average flow for the maximum month) of the Cle Elum WWTP.

### 2.1.4 Influent Biochemical Oxygen Demand (BOD<sub>5</sub>) Loadings

Influent BOD<sub>5</sub> loadings to Cle Elum's WWTP for the period 2013 through 2019 are presented in Table 2-3. "Summer loadings" represent the average loadings for the months of June through August, while "winter loadings" represent the average loadings for the months of December through February.



**TABLE 2-3 MONTHLY AVERAGE BOD<sub>5</sub> LOADINGS 2013-2019**

(Values are in pounds per day)

	2013	2014	2015	2016	2017	2018	2019
January	884	647	760	882	1,051	781	932
February	775	781	795	1,576	1,478	766	667
March	745	909	693	777	1,025	511	652
April	817	810	880	755	885	741	603
May	953	889	1,023	974	1,267	815	634
June	874	1,103	1,089	1,080	857	920	703
July	954	1,262	1,167	1,344	1,106	1,070	836
August	1,230	1,175	1,165	1,243	1,038	1,045	490
September	882	941	1,169	1,007	867	817	534
October	968	976	1,052	880	788	792	593
November	1,306	887	1,105	807	984	840	557
December	846	888	1,129	1,093	843	1,053	794
Average	936	939	1,002	1,035	1,016	846	666
Summer	1,019	1,180	1,141	1,223	1,000	1,012	676
Winter	835	772	894	1,184	1,124	867	798
Maximum Month	1,306	1,262	1,169	1,576	1,478	1,070	932

Average annual influent BOD<sub>5</sub> loadings to the WWTP have ranged from a low of 666 lbs/day in 2019 to a high of 1,035 lbs/day in 2016. Average influent summer BOD<sub>5</sub> loadings have ranged from a low of 676 lbs/day in 2019, to a high of 1,223 lbs/day in 2016. Average influent winter BOD<sub>5</sub> loadings have ranged from a low of 772 lbs/day in 2014 to a high of 1,184 lbs/day in 2016. The greatest maximum monthly BOD<sub>5</sub> loading occurred in 2016 when the WWTP received an average of 1,576 lbs/day for the month of December. This influent loading represents 32.4% of the BOD<sub>5</sub> design capacity (loading for the maximum month) of the Cle Elum WWTP.

### 2.1.5 Influent Total Suspended Solids (TSS) Loadings

Influent TSS loadings to Cle Elum's WWTP for the period 2013 through 2019 are presented in Table 2-4. "Summer loadings" represent the average loadings for the months of June through August, while "winter loadings" represent the average loadings for the months of December through February.

Average annual influent TSS loadings to the WWTP have ranged from a low of 803 lbs/day in 2019 to a high of 1,840 lbs/day in 2016. Average influent summer TSS loadings have ranged from a low of 956 lbs/day in 2013, to a high of 2,624 lbs/day in 2016. Average influent winter TSS loadings have ranged from a low of 503 lbs/day in 2019 to a high of 3,047 lbs/day in 2017. The greatest maximum monthly TSS loading occurred in 2017 when the WWTP received an average of 6,140 lbs/day for the month of July. This influent loading represents 163.6% of the TSS design capacity (loading for the maximum month) of the Cle Elum WWTP. Although the influent is significantly greater than the design criteria, the effluent TSS for that same month was an average of 37.3 lbs/day. It is suspected that some of the influent samples during February 2017 may not have been representative resulting in the high reported value for the month.



**TABLE 2-4 MONTHLY AVERAGE TSS LOADINGS 2013-2019**

(Values are in pounds per day)

	2013	2014	2015	2016	2017	2018	2019
January	742	521.5	652	1,058	2,176	655	800
February	665	821.4	830	1,038	6,140	773	368
March	643	1,045.1	737	986	1,039	565	572
April	895	832.2	765	1,148	1,204	729	538
May	921	916.9	860	1,447	1,985	870	1,093
June	918	1,039.3	936	2,753	1,458	1,135	1,339
July	915	1,007	989	2,427	1,754	1,252	2,312
August	1,035	1,141.6	1,069	2,691	1,383	1,092	346
September	872	881.5	936	2,328	870	756	641
October	724	865.6	780	1,939	951	622	455
November	1,040	1,026.8	859	1,487	935	818	830
December	744	778.5	1,353	2,784	826	1,295	342
Average	843	906	897	1,840	1,727	880	803
Summer	956	1,063	998	2,624	1,531	1,160	1,332
Winter	717	707	945	1,627	3,047	908	503
Maximum Month	1,040	1,142	1,353	2,784	6,140	1,295	2,312

### 2.1.6 Significant Industrial users (SIU)

The existing industries in the Cle Elum area do not typically have high waste loads or flows; however, a brewery is planning to relocate to the Cle Elum area from Snoqualmie Pass that may have loading high enough to be of concern to the plant operations.

Therefore, it is assumed that the brewery will be a SIU and may need to install some pretreatment process equipment features in the future to minimize potential for a plant upset. The future wastewater loading projections in Chapter 2.2 do not include loadings from this potential future customer as timing of the connection and wastewater characterization is unknown at this point. An analysis of the potential impacts is recommended before allowing such customers to discharge to the system to ensure equitable sewer fees are being assessed, and the potential for a WWTP upset is minimized.

## 2.2 FUTURE WASTEWATER LOADING PROJECTIONS

Forecasts for future wastewater generation in terms of flow, BOD<sub>5</sub>, and TSS from the City of Cle Elum were developed using the following information and assumptions:

- Future sewer service populations are as presented in Table 1-6. These growth projections include expansion and growth of the City of Cle Elum, Roslyn/Ronald, Suncadia, and Town of South Cle Elum populations.
- Cle Elum's future wastewater loadings were assumed to increase at a similar percentage rate as population. Loadings from Roslyn/Ronald, Suncadia, and South Cle Elum are included in the projections.



## GENERAL SEWER PLAN

- Average of the 2018 – 2019 average annual and maximum month loadings for flow, BOD, and TSS presented earlier in this chapter, were used as a baseline from which to project future loadings starting in 2020.

Forecasts for future wastewater generation in terms of flow, BOD<sub>5</sub>, and TSS from the City of Cle Elum for the years 2025, 2030, 2035, and 2040 are presented in Table 2-5.

TABLE 2-5 FUTURE REGIONAL CLE ELUM WASTEWATER LOADING PROJECTIONS					
	Baseline	Year 2025	Year 2030	Year 2035	Year 2040
Service Population	5,750	7,108	8,564	10,403	12,731
Average Annual Flow (MGD)	0.861	1.06	1.28	1.56	1.91
Maximum Monthly Flow (MGD)	1.344	1.66	2.00	2.43	2.98
Annual Average BOD <sub>5</sub> Loading (lbs/day)	756	935	1,126	1,368	1,674
Maximum Month BOD <sub>5</sub> Loading (lbs/day)	1,001	1,193	1,375	1,591	1,849
Annual Average TSS Loading (lbs/day)	842	1,041	1,254	1,523	1,864
Maximum Month TSS Loading (lbs/day)	1,803	2,229	2,685	3,262	3,992

As stated in section 2.1.2, the current design standard for maximum monthly average flow for the City of Cle Elum WWTP is 3.6 MGD. Cle Elum's 2019 maximum month average daily flow was 1.096 MGD, as shown in Table 2-2, leaving an available increase in maximum month average daily flow of 2.504 MGD. The maximum month flow is expected to reach 2.98 MGD by the year 2040, which is 82.8% of the design rated flow capacity for the WWTP.

The NPDES permit requires the City to complete a plan to maintain adequate capacity when a level of 85% of the permitted maximum month design flow is reached for three consecutive months. The maximum month flow average is predicted to reach 85% of the design rating of the facility reached after 2040 which is outside the scope of this Plan.

The current design standard for maximum monthly average BOD<sub>5</sub> for the City of Cle Elum WWTP is 4,863 pounds per day. The maximum monthly average BOD<sub>5</sub> was 1,576 pounds per day (32.4% of design capacity) and occurred in 2016. As shown in Table 2-5, the baseline average is below this average at 1,001 lbs/day (20.6%) which leaves an available increase of 3,862 pounds per day for the maximum month daily average of BOD<sub>5</sub> to increase. The BOD<sub>5</sub> maximum month daily average is projected to reach 1,849 pounds per day (38.2% of design capacity) by the year 2040.

The current design standard for maximum monthly average TSS for the City of Cle Elum WWTP is 3,753 pounds per day. Cle Elum's baseline maximum monthly average TSS was equal to 1,803 pounds per day (48.0% of design capacity), which leaves an available increase in maximum month average daily TSS of 1,950 pounds per day. Maximum month average daily TSS is projected to reach this design limit in 2039. 85% of the design capacity is projected to be reached by the year 2035. Therefore, design to expand the capacity of the WWTP for TSS may need to begin in 2035.

These projections indicate that the projected population increases are not expected to result in a need to expand the WWTP capacity. It should be noted that industries like the proposed brewery can use available capacity quickly, particularly BOD<sub>5</sub>, due to the typical loading from these types of facilities. Careful planning and pretreatment requirements may be necessary to keep the WWTP within their NPDES limits when high BOD<sub>5</sub> discharge industries discharge into the system.



# **CHAPTER 3 - EXISTING COLLECTION SYSTEM**





### CHAPTER 3 – EXISTING COLLECTION SYSTEM

#### 3.1 GENERAL DESCRIPTION

The Cle Elum wastewater collection system, shown in Figure 3-1 Sewer Collection System Map, consists of approximately 103,345 linear feet of pipe, with 98,620 linear feet of gravity sewer pipe and 4,725 linear feet of forcemain pipe. Most of the pipe is 8-inch diameter. The approximate lengths of various pipe sizes are shown in Table 3-1.

TABLE 3-1 CLE ELUM SEWER SYSTEM PIPING	
Pipe Size and Type	Length (Linear Feet)
6-inch Gravity Sewer	6,990
8-inch Gravity Sewer	42,556
10-inch Gravity Sewer	160
12-inch Gravity Sewer	9,590
15-inch Gravity Sewer	7,000
16-inch Gravity Sewer	7,955
18-inch Gravity Sewer	6,700
21-inch Gravity Sewer	4,325
24-inch Gravity Sewer	3,700
27-inch Gravity Sewer	7,910
30-inch Gravity Sewer	1,730
6-inch Forcemain	4,725
TOTAL	103,345

#### 3.2 COLLECTION SYSTEM COMMUNITIES

For purposes of analyzing system performance, the existing collection system has been considered as one basin with three contributing communities discharging into this basin. The existing collection system basin and the three contributing communities are shown in Figure 3-2 Existing Collection Basin Boundaries, and are discussed below.

Cle Elum: The area within Cle Elum basin is zoned residential, commercial, industrial, public, and planned mixed use. Wastewater from the basin flows through a variety of gravity sewer trunk mains, including a 6-inch, 8-inch, 10-inch, 12-inch, 15-inch, 16-inch, 18-inch, 21-inch, 24-inch, 27-inch, and 30-inch gravity sewer trunk mains to the WWTP. The area of the Cle Elum basin is approximately 1,365 acres.

Contributing Communities:

Roslyn: Wastewater from the basin flows through a 12-inch gravity sewer trunk main that follows the Coal Mines Trail from the lagoon/facility to a manhole that connects to the City of Cle Elum. The basin does not show zoned areas, but the average flow was estimated based on metered flow. The current average flow coming from the Roslyn basin is approximately 0.183 MGD based on monthly and annual flow data. The area of the Roslyn basin, including Ronald is approximately 830 acres (712 acres from Roslyn and 119 acres from Ronald).



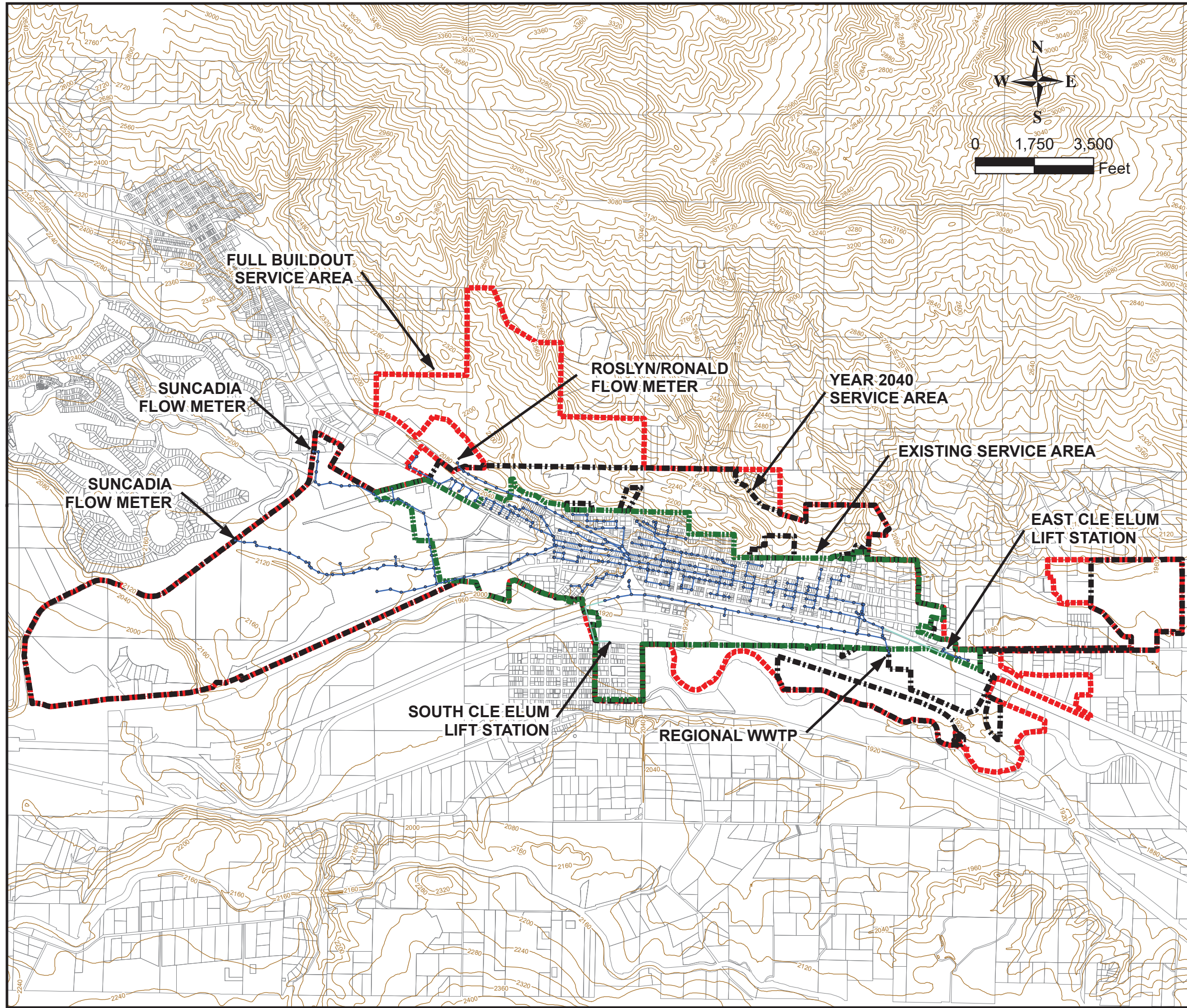
## GENERAL SEWER PLAN

Suncadia: Wastewater from the Suncadia basin flows into two manholes that flow into the Cle Elum basin, which is zoned resort and rural. The average flows were determined based on metered flows from the basin. The average flows entering the Cle Elum basin from the Suncadia basin are approximately 0.102 MGD and 0.051 MGD as shown in Figure 3-2. The area of the Suncadia basin is approximately 7,585 acres.

South Cle Elum: Wastewater from South Cle Elum flows to the South Cle Elum Lift Station and flows through a collection of force mains and gravity sewer trunks. The flow from the lift station is pumped through a 6-inch forcemain to a 16-inch gravity sewer trunk that flows along the train tracks. The wastewater then flows to a 30-inch gravity sewer trunk main before entering the Cle Elum WWTP. Most of the South Cle Elum basin is zoned residential, but wastewater flow from the basin was estimated based on metered data. The average flow coming from the basin and lift station is approximately 0.058 MGD based on monthly and annual flow data. The area of the South Cle Elum basin is approximately 255 acres.

Flows from Roslyn, Suncadia, and South Cle Elum were input at the nearest existing manhole location to evaluate average and peak flows through the existing collection system. These locations are shown in Figure 3-2.











# CITY OF CLE ELUM

General Sewer Plan

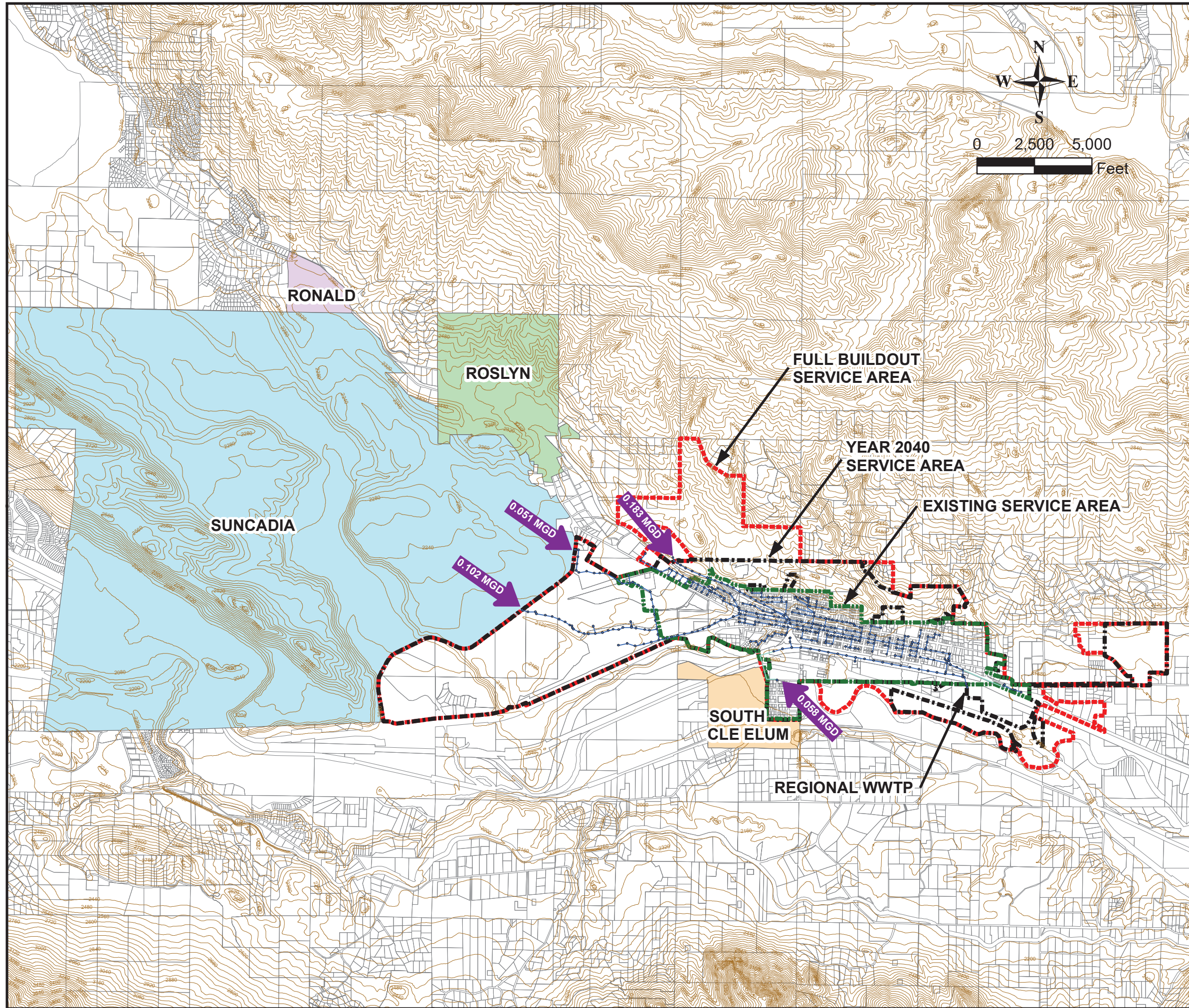
## SEWER COLLECTION MAP

### LEGEND

-  Existing Service Area
-  City Limits
-  UGA Boundary
-  Forcemain
-  Gravity Main
-  Manhole














# CITY OF CLE ELUM

General Sewer Plan

## EXISTING COLLECTION BASIN BOUNDARIES

### LEGEND

-  Existing Service Area
-  City Limits
-  UGA Boundary
-  Forcemain
-  Gravity Main
-  Manhole
-  Average Loading from Contributing Communities







### **3.3 LIFT STATION AND REGIONAL FLOW METERING**

Cle Elum's existing wastewater collection system contains one sewage lift station designed to serve the area north of Third Street, east of N. Floral Avenue, and also south of Third Street, east of N. Short Avenue and north of SR 900 to the UGA boundary. The lift station discharges from the east boundary of Cle Elum. The following are characteristics of the lift station and its location:

#### **East Cle Elum Lift Station**

Location:	State Route 903
Year Constructed:	2005
Number of Pumps:	2
Pump Type:	Submersible Sewage Pump
Wet Well Capacity:	1,200 gallons
Pump No. 1 Flow:	300 gal/min
Pump No. 2 Flow:	300 gal/min
Horsepower:	10 hp

The collection system from South Cle Elum discharges into a lift station with a current capacity of 499 Equivalent Residential Units (ERUs), which pumps the wastewater across the Yakima River and into the Cle Elum collection system to convey wastewater to the WWTP. South Cle Elum's Lift Station includes a mag-meter to measure the total wastewater flow from the Town into the City's collection system. The lift station discharges into the southern portion of the City's collection system. A portion of Cle Elum's service area is on the south side of the Yakima River. This area also discharges into the South Cle Elum lift station prior to entering the City's collection system near Railroad Avenue. The Town of South Cle Elum and City of Cle Elum have maintenance agreements for the homes served on the south side of the Yakima River.

The collection system from Suncadia has a flow meter at each of their two discharge locations into the western portion of Cle Elum's collection system. The total of the meters represents total wastewater generated from the Suncadia master plan development area.

The wastewater from Roslyn, Ronald, and their service areas combines into a lagoon which was part of what used to be Roslyn's facultative WWTP. The lagoon that was retained serves as a retention pond before discharging through a Parshall flume to measure flow discharging into the collection system, in the northwest portion of the City.

### **3.4 EXISTING SEWER SYSTEM HYDRAULIC ANALYSIS**

A hydraulic analysis of the existing City of Cle Elum's collection system was performed to evaluate the capacity of the system and identify specific hydraulic loading problem areas within the system. The computer-assisted analysis involves utilizing information such as pipe sizes and slopes to develop a model of the main trunk lines of the sewer system.

Record drawings and field-verified data were used when possible to determine pipe slopes, but minimum slopes were used where information was not available or where topography did not depict otherwise. Therefore, reasonable sewer depths (approximately 10 feet) were maintained throughout the collection system network, which is consistent with the field-verified depths of manholes at the ends of the collection system.

Wastewater loadings, based on flow rates for different land uses, were then assigned to the model junctions (manholes) as described in the following sections. The following assumptions were made in running the existing system model:





- Pipe slopes (where data was not available, or topography did not depict otherwise) are based upon providing minimum full flow velocities of 2.0 feet per second, as described in the Washington State Department of Ecology, "Criteria for Sewage Works Design."
- A roughness coefficient (Mannings "n") of 0.013 was used for all pipelines in the analysis.
- The following peaking factor equation, suggested by Metcalf & Eddy, was used to analyze the collection system at peak flows.

$$Q_{\text{Peak}} = K (Q_{\text{Average}})^{0.9}$$

Q represents flow in MGD, and K represents the peaking factor.

The peaking factor values for K of 3, 4, 2, and 3 were determined based upon WWTP flow records for Cle Elum, Roslyn, South Cle Elum, and Suncadia, respectively. The peaking factor value for K was determined based upon WWTP flow records.

### 3.4.1 Existing Land Use

As described in CHAPTER 1 of this Plan, most of the land within Cle Elum's city limits is zoned residential. The existing system serves a combination of residential, commercial, industrial, and public users. The boundaries of Existing Service Areas for Cle Elum, South Cle Elum, Roslyn, Ronald, and Suncadia are shown on Figure 3-2 Existing Collection Basin Boundaries.

The Cle Elum city limits include an area of approximately 2,816 acres. Existing zoning within the City is presented in Table 3-2 and is shown in Figure 1-3.

As shown in Table 3-2, Planned Mixed Use is the largest land use within the city limits, comprising approximately 1,509 acres or 53.59% of the land. Most Business uses are along East 2<sup>nd</sup> Street, West 1<sup>st</sup> Street, and East 1<sup>st</sup> Street totaling 187.45 acres (approximately 6.66% of the land within the City). Industrial development within Cle Elum comprises approximately 294 acres (10.45% of the land within the City) and is generally adjacent to Railroad Avenue.

TABLE 3-2 EXISTING ZONING WITHIN CLE ELUM CITY LIMITS		
Grouped Land Use Category	Total Acreage*	Percent of Total
<b>Residential</b>	<b>480.03</b>	<b>17.05%</b>
Single Family Residential (SFR)	477.51	16.96%
Multi-family Residential (MFR)	2.52	0.09%
<b>Commercial (C)</b>	<b>187.45</b>	<b>6.66%</b>
Downtown Commercial	22.05	0.78%
Entry Commercial	51.23	1.82%
General Commercial	114.17	4.05%
<b>Industrial (I)</b>	<b>294.36</b>	<b>10.45%</b>
<b>Planned Mixed Use (PMU)</b>	<b>1,509.04</b>	<b>53.59%</b>
<b>Public Reserve (Parks and Open Space P-O)</b>	<b>344.96</b>	<b>12.25%</b>
TOTAL	2,815.84	100.0%
* Source: City of Cle Elum 2019 Comprehensive Plan, Land Use Element, Table 1.		



### 3.4.2 Unit Flow Rates

The hydraulic analysis is based on unit flow rates from different land uses within the existing collection system basin. The type of activity is taken from existing zoning maps, and flow rates discussed below are assigned based upon that activity. Residential, commercial, light manufacturing, and rural recreation loadings were calculated based upon specified standard loadings or historic water demand data.

**Residential:** Wastewater flow rates from the residential areas are based upon Washington Department of Ecology's "Criteria for Sewage Works Design," which recommends an average unit flow rate of 100 gallons/person/day. Density of development and type of housing (single family, multi-family) in residential areas were calculated assuming 2.7 dwellings per acre. The resulting flow rates (in million gallons per day per acre) used in the hydraulic analysis, assuming an average occupancy of 2.7 persons per dwelling, from the density of residential development is 0.00027 MGD/Acre.

**Commercial:** Wastewater flow rates from the general business areas are based on a unit flow rate of 0.0015 MGD/Acre. For general business wastewater flow rates, Wastewater Engineering: Treatment, Disposal, Reuse (Metcalf & Eddy, Third Edition, 1991) suggests a range from 0.0008 to 0.0015 MGD/Acre. For a conservative analysis, the higher flow rate is used.

**Industrial:** Wastewater flow rates from industrially zoned areas are based on a unit flow rate of 0.003 MGD/Acre. For medium industrial developments, Metcalf & Eddy suggest a range from 0.0015 to 0.0030 MGD/Acre. Again, the higher value was applied to the analysis to remain conservative. It should be noted that individual industries may discharge wastewaters at higher rates, depending on the industrial process. Most of the area zoned industrial in the existing service area is not currently served, therefore, loading rates in the model were altered and allocated to selected manholes.

**Public:** Wastewater flow rates from public zoned areas are based on a unit flow rate of 0.0003 MGD/Acre.

**Planned Mixed Use:** The wastewater flow rates from planned mixed use zoned areas are based on a unit flow rate of 0.00035 MGD/Acre.

A summary of the zoning type basin areas and estimated average flow is presented in Table 3-3.

TABLE 3-3 EXISTING COLLECTION SYSTEM BASIN FLOWS				
Basin No.	Existing Zoning Category	Existing Developed Area (Acres)	Average Flow Based on Unit Flow Rates (MGD)	Total Estimated Average Flow (MGD)
Cle Elum	Residential	248	0.067	0.618
	Commercial	115	0.173	
	Industrial	87	0.261	
	Public Reserve	140	0.042	
	Planned Mixed Use	215	0.075	
Roslyn/ Ronald	-	830	-	0.183
S. Cle Elum	-	255	-	0.058
Suncadia	-	7,585	-	0.153
TOTALS		9,475		1.012



The estimated actual flow for Cle Elum, determined from measured treatment plant flows and subtracting measured flows from adjacent communities, averaged 0.467 MGD, which is 75.6% of textbook average shown in Table 3-3. Therefore, the adjusted unit flow rates used in this plan are:

Residential	205 gpd/acre
Commercial	1,134 gpd/acre
Industrial	2,267 gpd/acre
Public Reserve	227 gpd/acre
Planned Mixed Use	265 gpd/acre

### 3.4.3 Collection System Hydraulic

The existing sewer network hydraulics were modeled under current conditions with a total average day flow of 1.455 MGD and calculated peak hour flow of 2.819 MGD, using the more conservative textbook unit flow rates. Pipe slope, roughness coefficient, and peaking factor values used in the hydraulic model were as described above. Based on the hydraulic analysis of the existing collection system, no pipe capacities are exceeded at current average day or peak hourly flows. Results of the existing hydraulic analysis are provided in the Appendix.

### 3.4.4 Lift Station and Force Main Hydraulic Analysis

Cle Elum's system consists mostly of gravity sewer pipe with one forcemain carrying flow from South Cle Elum. Because the force main carries flow from the South Cle Elum lift station, this lift station was not reviewed in the hydraulic analysis. The East Cle Elum lift station was included in the hydraulic analysis.

A review of the force main and its ability to meet system demands was completed as part of the hydraulic analysis. The force main hydraulic analysis was completed using projected peak flow rates from the model and from actual known pumping rates. The desired velocity within a force main is between 2 and 8 feet per second. Velocities below 2 feet per second tend to lead to deposition of solids in the pipeline, while velocities above 8 feet per second can create excessive pumping costs. The current force main velocity resulted in a value of 3.6 feet per second. This value can be found in the Hydraulic Analysis Results in the Appendix.

## **3.5 COLLECTION SYSTEM MAINTENANCE PROBLEMS**

The City has identified several high-maintenance sections of the existing collection system, where annual cleaning is required to prevent backups, or where the TV/Cleaning inspection program which recently started in 2020 revealed problem areas. These sections of the collection system have been identified for replacement and their location is identified in Figure 3-3.

These areas will be grouped into projects by location and scheduled by priority level as funding is available. CHAPTER 5 reviews projects to address these maintenance issues identified to date. As the City is in process of performing the cleaning and TV inspection of the entire collection system within the City, more needs are anticipated to be identified within the next year.











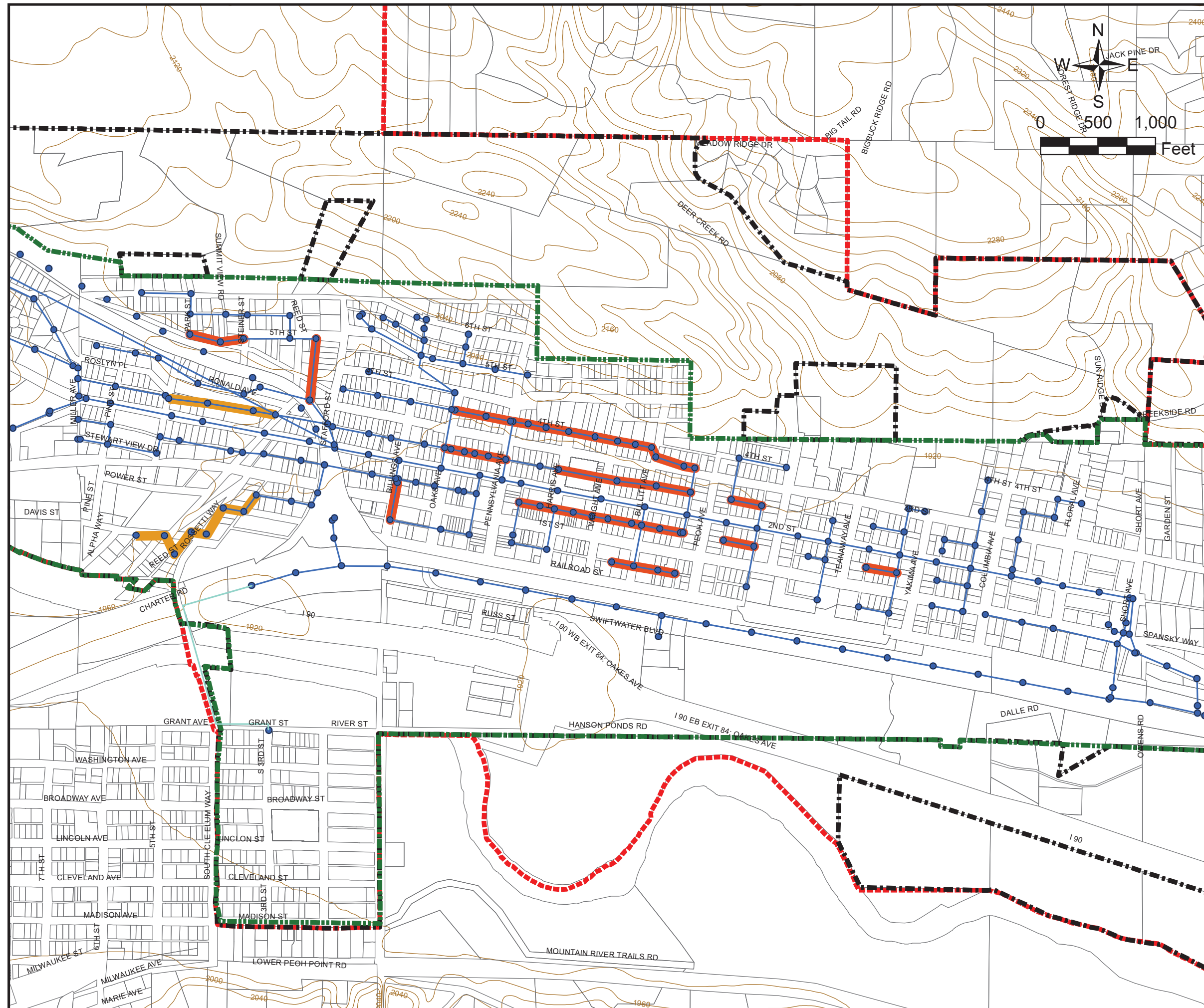
# CITY OF CLE ELUM

General Sewer Plan

## IDENTIFIED MAINTENANCE AREAS

### LEGEND

-  Existing Service Area
-  City Limits
-  UGA Boundary
-  Forcemain
-  Sewer Main
-  High Maintenance Areas
-  Moderate Maintenance Areas
-  Manhole



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Figure 3-3



### **3.6 COLLECTION SYSTEM INFILTRATION / INFLOW (I/I)**

Evaluation of collection system I/I is necessary to determine if there is excessive I/I and to identify system improvements needed to alleviate future I/I problems. Infiltration is defined as groundwater entering a sewer system by means of defective pipes and side sewers, pipe joints, and manhole walls. Inflow is defined as surface water or runoff that enters the collection system through constructed openings such as manhole covers, storm sewer cross-connections, and yard, basement, or roof drains.

Every sewer collection system has some level of I/I. Therefore, limits for non-excessive I/I levels, based upon national statistical data, have been established by the United States Environmental Protection Agency (EPA) in *I/I Analysis and Project Certification* (1985, Ecology Publication No. 97-03). Infiltration is considered by the EPA to be excessive if the average daily per capita dry weather flow (7-14-day average during periods of seasonal high groundwater, excluding major industrial and commercial flow greater than 50,000 gpd each) is more than 120 gallons per capita per day (gpcd). EPA considers inflow to be excessive if the average daily per capita flow during periods of significant rainfall (i.e., during storm events that create surface ponding or runoff) is more than 275 gpcd.

#### **3.6.1 Infiltration and Inflow (I/I)**

Dividing the maximum month influent flow by the minimum month flow during a calendar year is a method commonly used to calculate the I/I rate for a wastewater collection system. The calculated I/I rate gives an indication of the extraneous flow introduced through leaking pipes, manhole joints, basement sumps, and roof drains. I/I calculations were performed for each community and the total combined community flows using the available data since 2010. Cle Elum, nor its contributing communities, have a SIU that discharge more than 50,000 gallons per day, so no adjustments have been made to the total system average monthly flows. The ratio of the high to low month flows for the combined and each contributing community are presented in Table 3-4 for 2012 through 2016.

In summary, Cle Elum and Roslyn had significantly higher rates in 2016 than Suncadia and the Town of South Cle Elum. Unfortunately, complete flow data was only available for all communities from January 2016 through March 2016. Therefore, the maximum month flow which occurred in February 2016 was divided by the minimum month of 2015 (October) to estimate the I/I for each community in 2016. Estimated 2016 I/I value is the only data point available for a comparison of all communities during a given time-period as complete flow data for 2015 was unavailable from January through August. Complete flow data should be tracked each year to evaluate if the I/I for the respective collection systems is increasing, if any system repairs were made, and how effective the repairs were toward reducing I/I.





TABLE 3-4 CALCULATED INFILTRATION AND INFLOW (I/I) FOR EACH COMMUNITY (Ratio of Maximum Month : Minimum Month for a Calendar Year)					
Year	Combined Average	Roslyn/Ronald	Cle Elum	South Cle Elum	Suncadia MPR
2016	5.02	5.33	4.92	1.75	3.74
2015	3.61				
2014	4.57	6.76	3.73	2.34	With CE
2013	1.96	3.38	2.17	1.40	With CE
2012	2.82	5.77	2.47	1.62	With CE
2011	4.16				
2010	1.75	2.67	1.65	1.60	With CE

South Cle Elum has been actively completing pipeline rehabilitation projects to reduce their I/I, evident by the calculated I/I in Table 3-4, showing their ratio to be significantly lower than the combined average each year.

During this period, the per capita flows have averaged over 160-gallons per capita day, exceeding the 120-gallon per capita per day limit that is considered by EPA to be excessive. The City of Cle Elum's collection system is considered to have excessive infiltration.

Collection system inflow was evaluated using the recorded and estimated daily flows during times of significant rainfall events. Again, rainfall is considered by EPA to be significant when ponding or runoff occurs. Given the type of soils in the Cle Elum service area and calculation of a weighted runoff curve number (CN) based upon zoning types within the service area, it was determined that a rainfall event (total daily precipitation) greater than 0.70 inches would be significant. Ten recent significant precipitation events, the associated influent, Yakima River level, and per capita flows on the same day are summarized in Table 3-5.

TABLE 3-5 PER CAPITA FLOW DURING SIGNIFICANT PRECIPITATION EVENTS 2010-2020						
Year	Month	Day	Estimated Cle Elum Precipitation (inches) <sup>1</sup>	Total Influent Flow (MGD) <sup>2</sup>	River Level <sup>4</sup>	Total Per Capita Flow (gal/capita/day) <sup>3</sup>
2020	February	7	1.40	4.787	7.82	1,396
2019	October	21	1.00	0.854	4.15	256
2019	April	8	0.8	1.126	5.86	336
2018	October	8-9	0.41 / 0.45	0.439 / 0.481	4.11 / 4.13	133 / 146
2017	December	29	3.5 (2.52" snow)	0.894	4.3	271
2017	November	20	1.11	1.132	Not Available	344
2017	April	12-13	0.42 / 0.47	1.598 / 1.876	6.09 / 6.15	485 / 569
2015	December	9	1.97	3.659	Not Available	1,114
2015	December	8	1.13	2.238	Not Available	681
2013	May	14	0.90	0.821	Not Available	249

<sup>1</sup> Daily precipitation data is courtesy of the USClimateData.com for Cle Elum.

<sup>2</sup> From daily monitoring report (DMR) influent data.

<sup>3</sup> Based upon OFM population estimates for each year as provided in Table 1-5 of CHAPTER 1.

<sup>4</sup> Based upon data received from WWTP operations staff.



The EPA threshold for excessive I/I of 275 gpcd was exceeded during most of the events listed in Table 3-5 for the period 2013 through 2020, showing the Cle Elum and/or regional partners collection systems discharging to the WWTP are considered as having excessive I/I. There also appears to be a relationship between the river level and influent flows. The assumption is that the river level corresponds with groundwater elevation, and the impact of rain events are more significant when the ground water is higher. Also, the flows are increased during dry periods when the river is high. Immediate increases from rain events are typically an indication of direct connections to the collection system like roof drains and storm sewers (inflow), while more delayed increases, or high flow periods corresponding with high river events are an indication of cracks in manholes and sewer piping infrastructure components (infiltration).

Regardless of the source, the data in Table 3-5 is evidence that the collection system discharging to the WWTP has areas with significant I/I. It is recommended an aggressive I/I program be implemented by the City and their regional partners to reduce the impact to the WWTP.

Max month flows were determined using available data from the WWTP and community flow meters. The max month flow average versus average annual flow ratio for each of the regional partners were:

	<b>Cle Elum</b>	<b>Roslyn/Ronald</b>	<b>South Cle Elum</b>	<b>Suncadia</b>	<b>WWTP</b>
2018	Not Available	1.97	1.52	Not Available	1.65
2019	1.71	2.05	1.18	1.99	1.39
2020	2.29	2.57	1.85	2.78	2.43
Average	2.00	2.20	1.51	2.39	1.82

These values are used to determine estimated max month flows for each community member and the expected corresponding future capacity needs. These ratios are a good indicator of the I/I impact in each community member.

The I/I value for Suncadia is higher than expected for a relatively newly constructed collection system. A video inspection of the mains, smoke testing, and visual of each manhole in the system should reveal if the I/I is from poor construction methods, illicit connections such as roof drains, or opening in pipes installed for future development area yet to be connected. It is expected that there are only a few locations the I/I is being introduced to the system. Therefore, once the correction needs are identified, the associated repairs will result in a significant improvement.



# **CHAPTER 4 - FUTURE COLLECTION SYSTEM**



### CHAPTER 4 – FUTURE COLLECTION SYSTEM

#### **4.1 GENERAL DESCRIPTION**

Forecasting expansion of the future sewer collection system is dependent upon type, nature, and location of future growth within the City of Cle Elum and its UGA. Development of the future collection system is based upon future land uses identified by the City, as shown in Figure 1-4, future sewer system service population, and approved developer agreements for 47N and City Heights within Cle Elum's service area, as provided in CHAPTER 1 and in Section 4.2 of this Plan.

One of the goals of this GSP is to serve as a guide for growth of the City of Cle Elum's wastewater collection system as it expands beyond the current city limits into the UGA. To accomplish this goal, the following tasks are included in this Chapter:

- Develop future collection system drainage basin boundaries to serve unsewered areas outside the existing city limits but within the City's UGA boundary.
- Estimate flows for the future drainage basins using zoning and land use designations and unit flow rates. For the purposes of this Plan, future zoning and land use within the City and UGA is based upon those uses presented in Figure 1-3 and Figure 1-4.
- Model flows from currently unsewered areas in the collection system. Additional flows from the future drainage basins are routed through the existing collection system to examine capacity and determine potential problem areas.
- Identify needed improvements to the existing collection system to accommodate additional flows and analyze alternate routing for future drainage basin flows as necessary.

In CHAPTER 3, the existing collection system was analyzed and modeled under current conditions for normal and peak flows. Estimates of future collection system flows are added to existing system analysis flows to determine the impacts of a full build-out scenario.

#### **4.2 FUTURE COLLECTION SYSTEM BASINS**

The collection system basins identified in CHAPTER 3 were analyzed with respect to future collection system drainage from UGA areas. The boundaries of four of the existing drainage basins were expanded to accommodate additional UGA areas. Again, zoning and land use designations are as shown in Figure 1-3 and Figure 1-4. The future collection system basins are shown in Figure 4-1 Future Collection Basin Boundaries, and discussed below.

Cle Elum: The Cle Elum basin is zoned residential, commercial, industrial, public, and planned mixed use as discussed in CHAPTER 3 of this Plan. The additional area of the future Cle Elum basin is zoned public and planned mixed use. This additional area includes the 985 City Heights homes, and the 47N development which includes 707 residences and 627 RV sites, as proposed by the applicant. The total area of the future Cle Elum basin is approximately 3,615 acres. Wastewater flow from the future Cle Elum basin will be conveyed to the WWTP in the same manner as described in CHAPTER 3.



## GENERAL SEWER PLAN

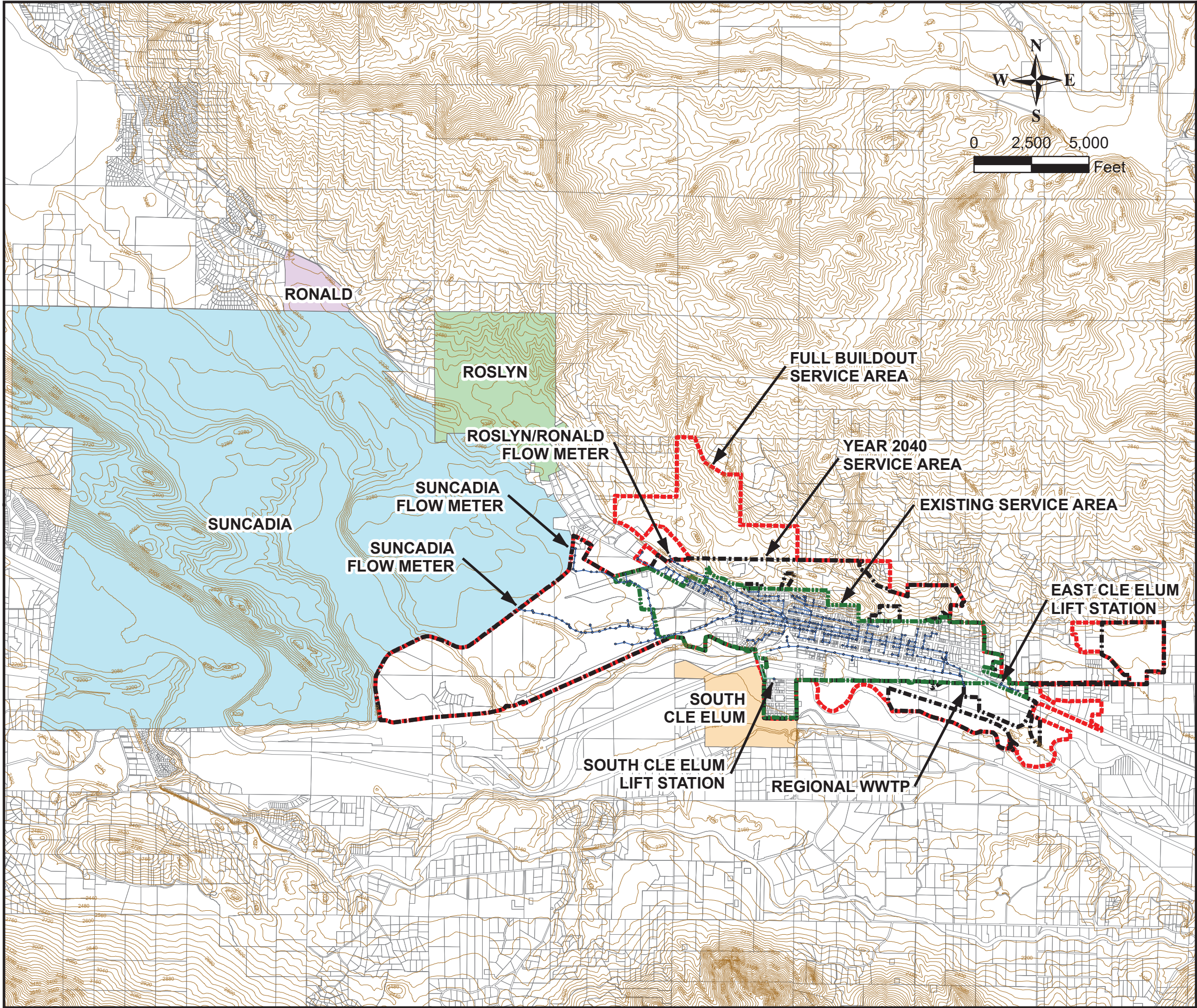
### Contributing communities:

Roslyn: Wastewater flow from the future Roslyn basin will be conveyed to the Cle Elum basin in the same manner as described in CHAPTER 3. The future peak flows were estimated using the peak flows for existing conditions and the equation and K value described in Section 4.3. The total area of the future Roslyn basin is approximately 1,365 acres.

Suncadia: The total area of the future Suncadia basin is approximately 12,475 acres. Wastewater flow from the future Suncadia basin will be conveyed to the Cle Elum basin in the same manner as described in CHAPTER 3.

South Cle Elum: The total area of the future South Cle Elum basin is approximately 420 acres. Wastewater flow from the future South Cle Elum basin will be conveyed to the Cle Elum basin in the same manner as described in CHAPTER 3.










# CITY OF CLE ELUM

General Sewer Plan

## FUTURE COLLECTION BASIN BOUNDARIES

### LEGEND

-  Existing Service Area
-  City Limits
-  UGA Boundary
-  Forcemain
-  Gravity Main
-  Manhole







#### 4.3 FUTURE SEWER SYSTEM HYDRAULIC ANALYSIS

A hydraulic analysis of the existing Cle Elum collection system was performed to find what problems would be created by projected wastewater flows resulting from development of property within the City and the UGA at full build-out. As presented in CHAPTER 3, analysis of the future system involves inputting information regarding pipe slopes, assumptions about pipe friction losses, and assigning wastewater flows to the four future collection system basins. The hydraulic capacity of the existing collection system is based on location where future basin flows will be discharged and the following assumptions:

- Wastewater flows from each basin are based upon the zoning and land use designations described in CHAPTER 2 and the unit flow rates for each as described in Section 4.3.1.
- Pipe slopes (where data was not available) are based upon providing minimum full flow velocities of 2.0 feet per second, as described in the Washington State Department of Ecology, "Criteria for Sewage Works Design."
- A roughness coefficient (Mannings "n") of 0.013 for all pipelines was used in the analysis.
- The following peaking factor equation, suggested by Metcalf & Eddy, was used to analyze the future collection system at peak flows:

$$Q_{\text{Peak}} = K (Q_{\text{Average}})^{0.9}$$

Q represents flow in MGD, and K represent the peaking factor.

The same peaking factor values for K of 3, 4, 2, and 3 for Cle Elum, Roslyn, South Cle Elum, and Suncadia, respectively, were used to analyze the existing collection system peak flows is used to evaluate peak flows in the future.

Proposed future lift stations were not modeled or included in the hydraulic analysis. Future lift stations and associated force mains will be sized as necessary to meet the projected future peak hour demands. Flows from proposed future lift stations were input at the nearest existing manhole location to evaluate average and peak flows through the existing collection system.

##### 4.3.1 Future Unit Flow Rates

The total projected average flow per basin is based on unit flow rates from different zoning designations within the future collection system basins. The unit flow rates for residential, commercial, industrial, public, and planned mixed use zoned areas are identical to the adjusted unit flow rates used for the existing system in CHAPTER 3. Those unit flow rates are:

Residential .....	205 gpd/acre
Commercial .....	1,134 gpd/acre
Industrial .....	2,267 gpd/acre
Public Reserve .....	227 gpd/acre
Planned Mixed Use .....	265 gpd/acre

The industrial unit flow rate for Cle Elum, as discussed in CHAPTER 3, was allocated to selected manholes because most of the area zoned industrial is unserved. For future conditions it was assumed all areas zoned industrial would be served.



### 4.3.2 Full Build-Out Basin Flow Summary

A summary of the projected future basin flows at full build-out, including land use type and acreage, average flow per acre, and total projected flow, is presented in Table 4-1. The land use categories in Table 4-1 have been broken down into known or anticipated zoning categories for the Cle Elum basin to be consistent with unit flow rate categories and correspond with projected future uses. The total acreage of all zoning categories within the Cle Elum basin, as shown in Table 4-1, includes parcel areas and includes right-of-way areas or roads. The projected flows from Table 4-1 were used in the future collection system hydraulic analysis.

TABLE 4-1 FULL BUILD-OUT COLLECTION SYSTEM BASIN FLOWS					
Basin No.	Existing Zoning Category	Total Full Build-Out Area (Acres)	Average Flow per Acre (GPD/Acre)	Projected Average Full Build-Out Flow (MGD)	Projected Max Month Flow (MGD) Max/Ave Month Ratio
Cle Elum	Residential	480	205	1.667	3.334
	Commercial	187	1,134		
	Industrial	294	2,267		
	Public Reserve	345	227		
	Planned Mixed Use	2,309	265		
Roslyn		1,365		0.301	0.662
Suncadia		12,475		0.830	1.984
South Cle Elum		420		0.096	0.145
TOTALS		17,069		2.894	5.267

Figure 4-2 Collection System Loading Map at Full Build-Out, shows the layout of the future collection system within the city limits and UGA. The actual location of the future collection system may change depending on the timing and location of actual development. The projected peak additional full build-out flows to the ends of the existing collection system are also shown in Figure 4-2.

The WWTP is discussed in CHAPTER 6. A report completed in December 2017 reviewed agreements between the regional partners and calculated the allocated capacities of the existing WWTP to be as shown in Table 4-2.



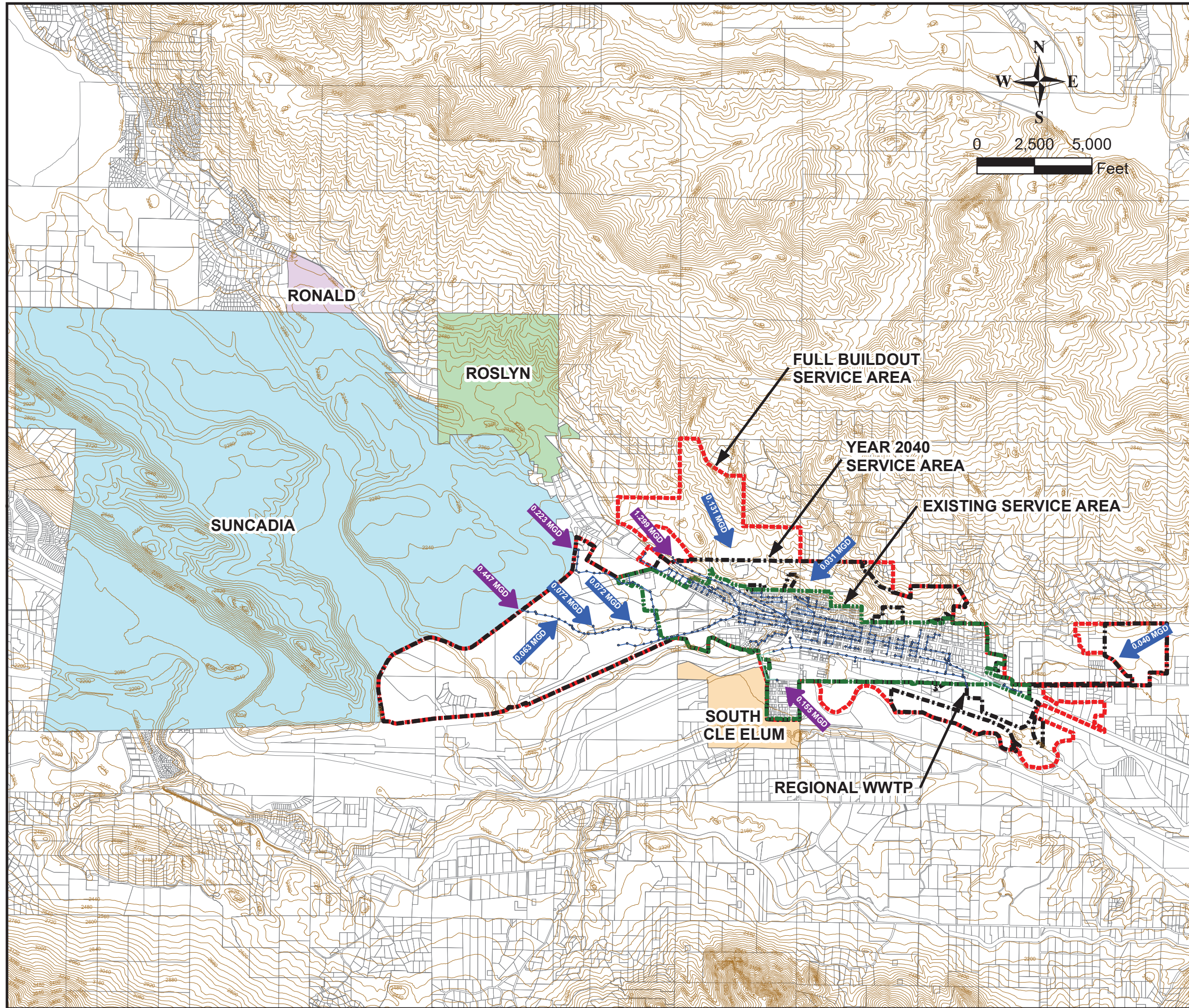
## GENERAL SEWER PLAN

**TABLE 4-2 CURRENT COMMUNITY CAPACITY ALLOCATIONS OF WWTP**

Community	Capacity Allocation (%)	Allocated Maximum Month Flow Equivalent (MGD)	Projected Max Month Full Build-Out Flow (MGD)	Future WWTP Need at Full Build-Out (MGD)
Cle Elum	46.758%	1.683	3.334	1.651
Roslyn/Ronald	21.127%	0.761	0.662	-0.099
Suncadia MPR	22.535%	0.811	1.984	1.173
South Cle Elum	9.579%	0.345	0.145	-0.200
TOTALS	100%	3.600	6.125	-2.525

Table 4-2 indicates the existing capacity of the WWTP will be exceeded by Cle Elum and Suncadia if the max month flow ratios continue as presented in CHAPTER 3. Some of the capacity may be able to be met by purchasing unused capacity from South Cle Elum and Roslyn/Ronald. These future needs may be exaggerated by the I/I flows and as I/I is reduced to levels not determined to be excessive per EPA standards, the actual allocation needs are expected to be reduced and may not require additional treatment capacity to meet projected loadings.













# CITY OF CLE ELUM

General Sewer Plan

## COLLECTION SYSTEM LOADING MAP AT FULL BUILD-OUT

### LEGEND

-  Existing Service Area
-  City Limits
-  UGA Boundary
-  Forcemain
-  Gravity Main
-  Manhole
-  Average Loading from Full Buildout Service Area
-  Average Loading from Contributing Communities







### 4.3.3 Collection System Hydraulic Analysis Results

The existing collection system was analyzed under both projected average day and peak hour flow conditions at full build-out within the City and UGA. Flows from the future collection basin areas were routed through the existing collection system to examine system capacity and determine potential problem areas. Modeled total system average day and peak flows were equal to approximately 3.705 MGD and 7.398 MGD respectively, using the more conservative textbook unit rate values. The textbook values were used as a conservative measure since the City's flow data (lower than textbook) is not a direct measurement, but instead a calculation of regional flows subtracted by flows from each community (Suncadia, South Cle Elum, and Roslyn/Ronald). The historical flow measurements from each community have included uncertainty due to meter inaccuracies and bypass events. Results of the full build-out hydraulic analysis are provided in CHAPTER 8.

The full build-out hydraulic analysis resulted in no capacity related deficiencies under the peak hour flow scenario or the average day flow condition.



# **CHAPTER 5 - YEAR 2040 COLLECTION SYSTEM**





### CHAPTER 5 – YEAR 2040 COLLECTION SYSTEM

#### **5.1 GENERAL DESCRIPTION**

Cle Elum's existing sewer collection system, based upon current wastewater flows, was analyzed, and evaluated in CHAPTER 3 of this Plan. In CHAPTER 4, the existing collection system was analyzed and evaluated based upon the full build-out of land within the city limits and UGA. In this chapter, the existing collection system will be analyzed and evaluated based upon accommodating projected future growth for the next 20 years (through the year 2040). The following approach was used to evaluate sewer system performance related to growth through the year 2039:

- Future collection system drainage basins developed in CHAPTER 4 for unsewered areas outside the existing city limits but within the UGA were used again.
- Future flows were developed based upon future zoning and land use designations and unit flow rates. For the purposes of this Plan, future zoning and land use within the City and UGA is based upon those uses presented in Figure 1-3 and Figure 1-4.
- Rather than assuming complete development within the City and the UGA, year 2040 flows are based upon serving the projected future population of 4,041 as presented in CHAPTER 1 of this Plan. Assumptions are made as to where the future population will be located within the City and the UGA.
- Flows from currently unsewered areas in the collection system were added to the model. Additional flows from the future drainage basins are routed through the existing collection system to examine system capacity and determine potential problem areas.
- Improvements to the existing collection system to accommodate the additional flows were identified.

Like the CHAPTER 4 analysis, estimates of future collection system flows are added to the existing system analysis flows to determine the impacts of year 2040 flows, as compared to the full build-out scenario. Map C in the Appendix shows the layout of the future collection system within the Year 2040 service area. The actual location of the future collection system may change depending on the timing and location of actual development.

#### **5.2 YEAR 2040 COLLECTION SYSTEM BASINS**

The same collection system basins presented in CHAPTER 4 were used to develop the year 2040 sewer service area. The future collection system drainage basins are as shown in Figure 4-1. Cle Elum has a significant amount of land area (1,870 acres) within its city limits that is currently vacant or un-served, including the planned development area. When considering the future land area required to serve a projected future 20-year population, it was assumed that existing vacant or un-served areas would be utilized first before development extends into the UGA areas. Therefore, the city limits area was used to allocate loads in the hydraulic model.



For the purposes of this Plan, existing land uses were projected to increase at the same growth rate as the City population. As described in CHAPTER 1, the 20-year population for Cle Elum and the communities served by the WWTP is based upon an average estimated growth of approximately 3.84% (5.33% within the Cle Elum UGA) per year. Through analysis of the required area to serve projected future uses, it was found that all zoned areas, including residential, commercial, industrial, and public areas within the existing city limits were sufficient to serve the projected 20-year needs. Again, zoning and land use designations are as shown in Figure 1-3 and Figure 1-4.

Cle Elum: The Cle Elum basin is zoned residential, commercial, industrial, public, and planned mixed use as discussed in CHAPTER 3 of this Plan. The additional area of the future Cle Elum basin is zoned public and planned mixed use. This additional area includes the 985 City Heights homes, and the 47N development which includes 707 residences and 627 RV sites as currently proposed by the applicant. The total area of the future Cle Elum basin is approximately 3,615 acres. Wastewater flow from the future Cle Elum basin will be conveyed to the WWTP in the same manner as described in CHAPTER 3.

### Contributing Communities:

Roslyn: Wastewater flow from the future Roslyn communities will be conveyed to the Cle Elum basin in the same manner as described in CHAPTER 3. The future peak flows were estimated using the peak flows for existing conditions and the equation and K value described in Section 4.3. The total area of the future Roslyn basin is approximately 918 acres.

Suncadia: The total area of the future Suncadia community is approximately 9,255 acres. Wastewater flow from the future Suncadia basin will be conveyed to the Cle Elum basin in the same manner as described in CHAPTER 3.

South Cle Elum: The total area of the future South Cle Elum community is approximately 281 acres and will be conveyed to Cle Elum through South Cle Elum's existing pump station with their current services as described in CHAPTER 3.

## 5.3 YEAR 2040 SEWER SYSTEM HYDRAULIC ANALYSIS

A hydraulic analysis of the existing Cle Elum collection system was performed to identify any deficiencies resulting from the year 2040 development of property within the City and UGA. Like the analysis presented in CHAPTER 3, analysis of the future system involves inputting information regarding pipe slopes, making assumptions about pipe friction losses, and assigning wastewater flows, including those from the contributing basins to the Cle Elum collection system basin. The hydraulic capacity of the existing collection system is based on the location where future basin flows are discharged, and the following assumptions:

- Wastewater flows from each basin are based upon the zoning and land use designations described in CHAPTER 2 and the unit flow rates for each as described in Section 5.3.1.
- Pipe slopes (where data was not available) are based upon providing minimum full flow velocity of 2.0 feet per second, as described in the Washington State Department of Ecology, "Criteria for Sewage Works Design."
- A roughness coefficient (Mannings "n") of 0.013 for all pipelines was used in the analysis.



- The following peaking factor equation, suggested by Metcalf & Eddy, was used to analyze the existing collection system at peak flows:

$$Q_{\text{Peak}} = K (Q_{\text{Average}})^{0.9}$$

where Q represents flow in MGD, and K represents the peaking factor.

The same peaking factor values for K of 3, 4, 2, and 3 for Cle Elum, Roslyn, South Cle Elum, and Suncadia, respectively, were used to analyze the existing collection system peak flows is used to evaluate peak flows in the future.

Proposed future lift stations were not modeled or included in the hydraulic analysis. Future lift stations and associated force mains will be sized as necessary to meet the projected future peak hour demands. Flows from proposed future lift stations were input at the nearest existing manhole location to evaluate average and peak flows through the existing collection system.

5.3.1 Unit Flow Rates

The total projected average flow for the Cle Elum basin is based on unit flow rates from different zoning designations within the future collection system basins. The unit flow rates for residential, commercial, public lands/church zone, and planned development zoned areas are identical to the ones used for the existing system in CHAPTER 3. Those unit flow rates are:

Residential .....	205 gpd/acre
Commercial .....	1,134 gpd/acre
Industrial.....	2,267 gpd/acre
Public Reserve .....	227 gpd/acre
Planned Mixed Use .....	265 gpd/acre

The industrial unit flow rate for Cle Elum, as discussed in CHAPTER 3, was allocated to selected manholes because most of the area zoned industrial is unserved. For future conditions it was assumed all areas zoned industrial would be served.

5.3.2 Year 2040 Basin Flow Summary

A summary of the projected future basin flows in the year 2040, including land use type and acreage, average flow per acre, and total projected flow, is presented in Table 5-1. The land use categories in Table 5-1 have been broken down into known or anticipated zoning categories for the Cle Elum basin to be consistent with unit flow rate categories and correspond with projected future uses. Like CHAPTER 3, the land use categories for Roslyn, Suncadia, and South Cle Elum basin are not included, therefore the projected flow rates are estimated based on the metered data. The total acreage of all zoning categories within the Cle Elum basin, as shown in Table 5-1, includes parcel areas and right-of-way areas or roads. The projected flows from Table 5-1 were used in the future collection system hydraulic analysis.



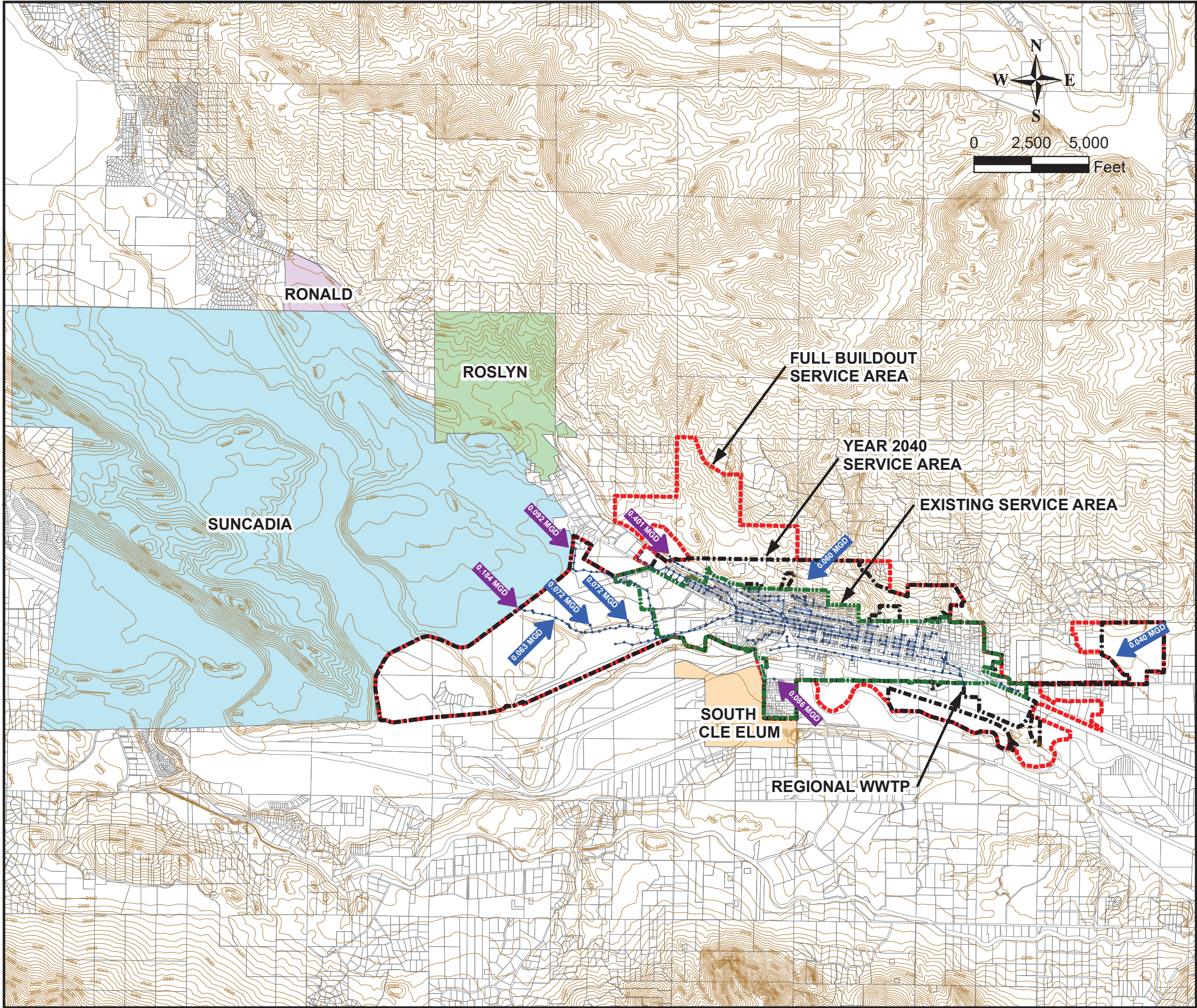


TABLE 5-1 YEAR 2040 COLLECTION SYSTEM BASIN FLOWS					
Basin No.	Existing Zoning Category	Total Year 2040 Area (Acres)	Average Flow per Acre (GPD/Acre)	Projected Average Year 2040 Flow (MGD)	Projected Year 2040 Max Month Flow (MGD)
Cle Elum	Residential	380	205	1.227	2.454
	Commercial	180	1,134		
	Industrial	190	2,267		
	Public Reserve	140	227		
	Planned Mixed Use	1,819	265		
Roslyn		918		0.203	0.447
Suncadia		9,255		0.396	0.946
South Cle Elum		281		0.064	0.097
TOTALS		13,163		1.889	3.438

Table 5-1 shows the total projected average day flow is equal to 1.889 MGD. This value is comparable to the 1.91 MGD flow projection for the year 2040 provided in CHAPTER 2 of the Plan. The WWTP is shown to be within, but approaching, its rated capacity of 3.6 MGD in 2040. Both Cle Elum and Suncadia will need additional allocation to support the projected growth by the year 2040. The most cost-effective method of addressing their need is to reduce I/I to be below the excessive level as defined by EPA as discussed in CHAPTER 3.

Figure 5-1 Year 2040 Collection System Loading Map shows the layout of the future collection system within the city limits and UGA. The actual location of the future collection system may change depending on the timing and location of actual development. The projected average year 2040 flows include additional flows estimated to be added to the collection system that are extended to serve the zoning categories.





# CITY OF CLE ELUM

General Sewer Plan

## YEAR 2040 COLLECTION SYSTEM LOADING MAP

### LEGEND

- Existing Service Area
- City Limits
- UGA Boundary
- Forcemain
- Gravity Main
- Manhole
- Average Loading from Year 2040 Service Area
- Average Loading from Contributing Communities







### 5.3.3 Collection System Hydraulic Analysis Results

The existing collection system was analyzed under both projected average day and peak hour flow conditions for the year 2040 within the City and UGA. Flows from the future collection basin areas were routed through the existing collection system to examine system capacity and determine potential problem areas. Modeled total system average day and peak flows were equal to approximately 2.344 MGD and 7.062 MGD, respectively using the more conservative textbook unit rate values. Results of the year 2040 hydraulic analysis are provided in the Appendix.

The year 2040 hydraulic analysis resulted in no capacity-related deficiencies under the peak hour flow scenario or the average day flow condition.

### 5.4 RECOMMENDED IMPROVEMENTS

As no capacity-related improvements were identified by the hydraulic model, the recommended improvements can be divided into the following categories:

- Maintenance-related and previously identified capacity improvements to the existing collection system.
- Pipeline extension improvements to serve new drainage basins.

#### Maintenance-Related and Identified Capacity Improvements

1. Replacement of 540 LF of 6-inch and 1,115 LF of 8-inch gravity sewer main in alley between 2<sup>nd</sup> and 3<sup>rd</sup> Street from Oakes Avenue to just past Bullitt Street (new sewer lines will all be a minimum size of 8-inch).
2. Replacement of 1,455 LF of 8-inch gravity sewer main in alley between 2<sup>nd</sup> and 1<sup>st</sup> Street from Pennsylvania Avenue to Peoh Avenue.
3. Replacement of 1,669 LF of 6-inch and 511 LF of 8-inch gravity sewer main in 3<sup>rd</sup> Street from Oakes Avenue to just past Bullitt Street (new sewer lines will all be a minimum size of 8-inch).
4. Replacement of 540 LF of 8-inch gravity sewer main in alleys both north and south of 2<sup>nd</sup> Street between Peoh Avenue and Montgomery Avenue.
5. Replacement of 555 LF of 6-inch gravity sewer main north of Railroad Street from Peoh Avenue and Bullitt Avenue (new sewer lines will all be a minimum size of 8-inch).
6. Replacement of 360 LF of 8-inch gravity sewer main in Billings Avenue starting near Railroad Street and heading north.
7. Replacement of 275 LF of 8-inch gravity sewer main in alley south of 2<sup>nd</sup> Street between Teanaway Avenue and Yakima Avenue.
8. Replacement of 1,010 LF of 8-inch gravity sewer west of Stafford Avenue and in Stafford Avenue between Steiner Street and Park Street.



## GENERAL SEWER PLAN

9. Replacement of 940 LF of 12-inch gravity sewer in Ronald Avenue between Alpha Way and Reed Street.
10. Replacement of 1,115 LF of 8-inch gravity sewer in Reed Street starting near railroad tracks and heading north.

### Improvements to Serve New Service Area

The existing collection system will need to be extended to provide service to the developments within the UGA. Proposed sewer extensions to serve the new service areas are presented on Map C in the Appendix. These proposed sewer extensions are intended to provide general guidance for development of the sewer system within the UGA. Actual locations and sizes of sewer extensions will depend on the schedule and location of development.



# **CHAPTER 6 - TREATMENT AND DISPOSAL FACILITIES**







### CHAPTER 6 – TREATMENT AND DISPOSAL FACILITIES

#### **6.1 BACKGROUND AND HISTORY**

The Cle Elum WWTP was constructed in 2005 within part of the existing facultative lagoon. The WWTP is located just north of the Yakima River and Interstate 90. The 2005 facility was constructed as part of the requirements for the Suncadia development and designed as a regional facility to serve the neighboring communities of South Cle Elum, Roslyn, and Ronald, in addition to Cle Elum and the Suncadia Development (Originally Trendwest).

#### **6.2 EXISTING WASTEWATER TREATMENT FACILITIES**

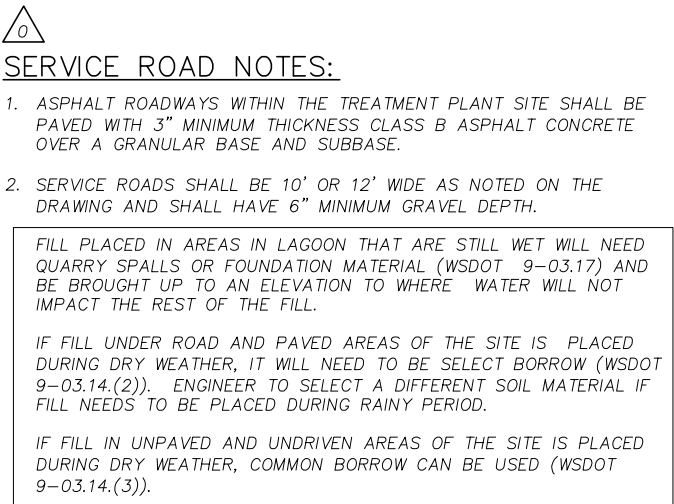
The City of Cle Elum WWTP accomplishes secondary biological treatment of wastewater by means of an activated sludge process, utilizing two SBRs. The existing lagoons retained from the original facility provide equalization and are used for sludge treatment. The location of various components of Cle Elum WWTP is shown in Figure 6-1 WWTP Site Plan – Drainage Plan and Figure 6-2 WWTP Site Plan – Site Grading and Paving Plan. A flow diagram of the current treatment process is shown in Figure 6-3 WWTP Process Flow Diagram.

Wastewater from the City's collection system is conveyed to the WWTP through a 36-inch influent sewer pipe into an influent pump station. The pump station discharges the influent through a headworks consisting of a 0.25-inch bar screen, removing rags, plastics, fibrous material, and other miscellaneous non-degradable solids that could hinder downstream treatment processes. After the screen, the wastewater passes through a circular vortex grit removal system to eliminate inorganics from the process prior to entering the SBR tanks. The SBR is a biological secondary wastewater treatment system in which all the major process steps such as flow equalization, aeration, and clarification occur sequentially within the same tank.

The SBR operates as a batch process, with only one tank receiving water at a time. The process sequence is controlled by a Programmable Logic Controller (PLC) timer repeating the fill-react-settle-decant cycle. This allows both tanks to act as biological reactors and as clarifiers providing full biological treatment in one tank. Blowers located in the SBR Equipment Room next to the SBR tanks provide aeration for the aerobic process. High-flow, low head submersible pumps are located at one end of the tank to provide mixing.

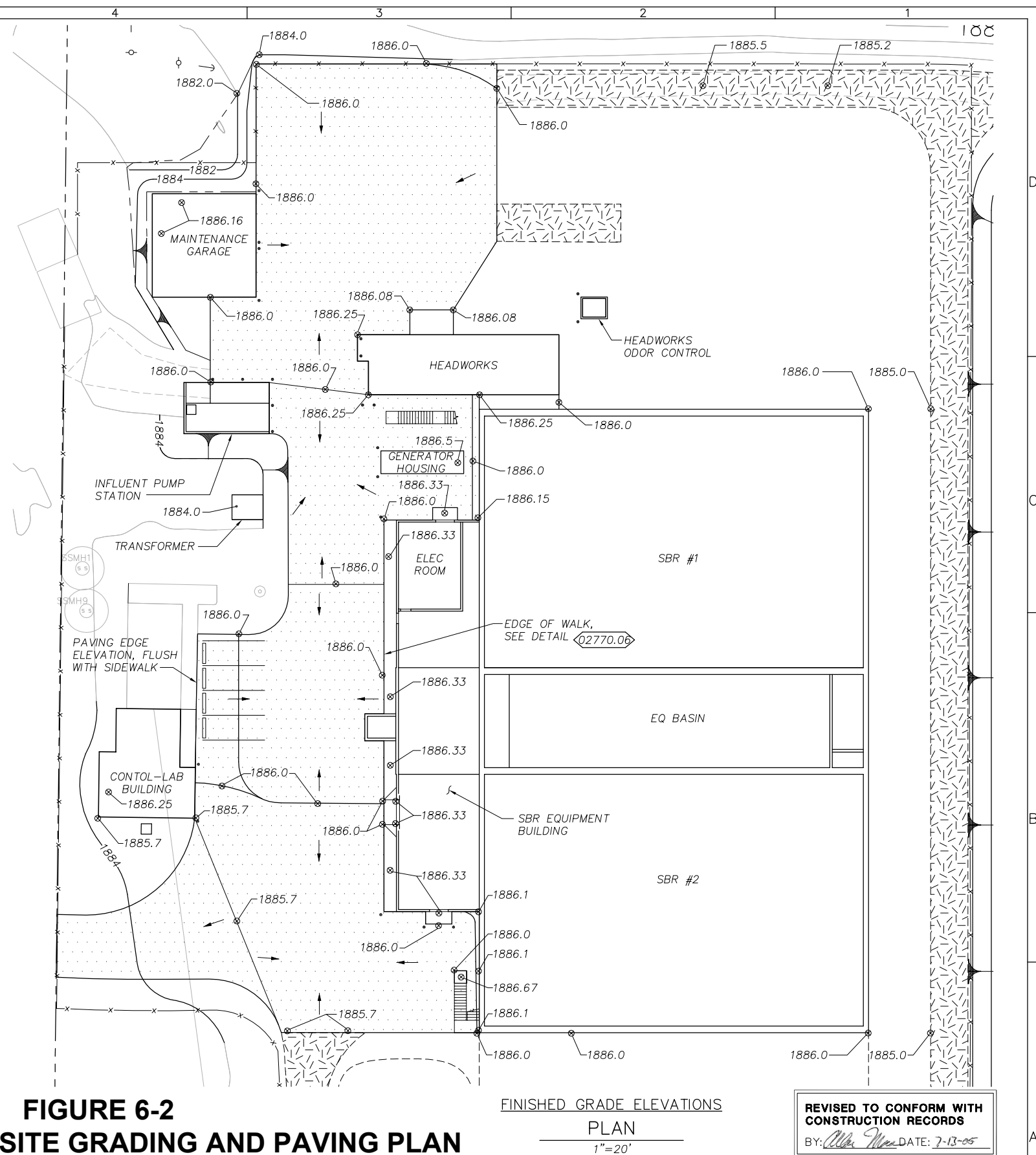
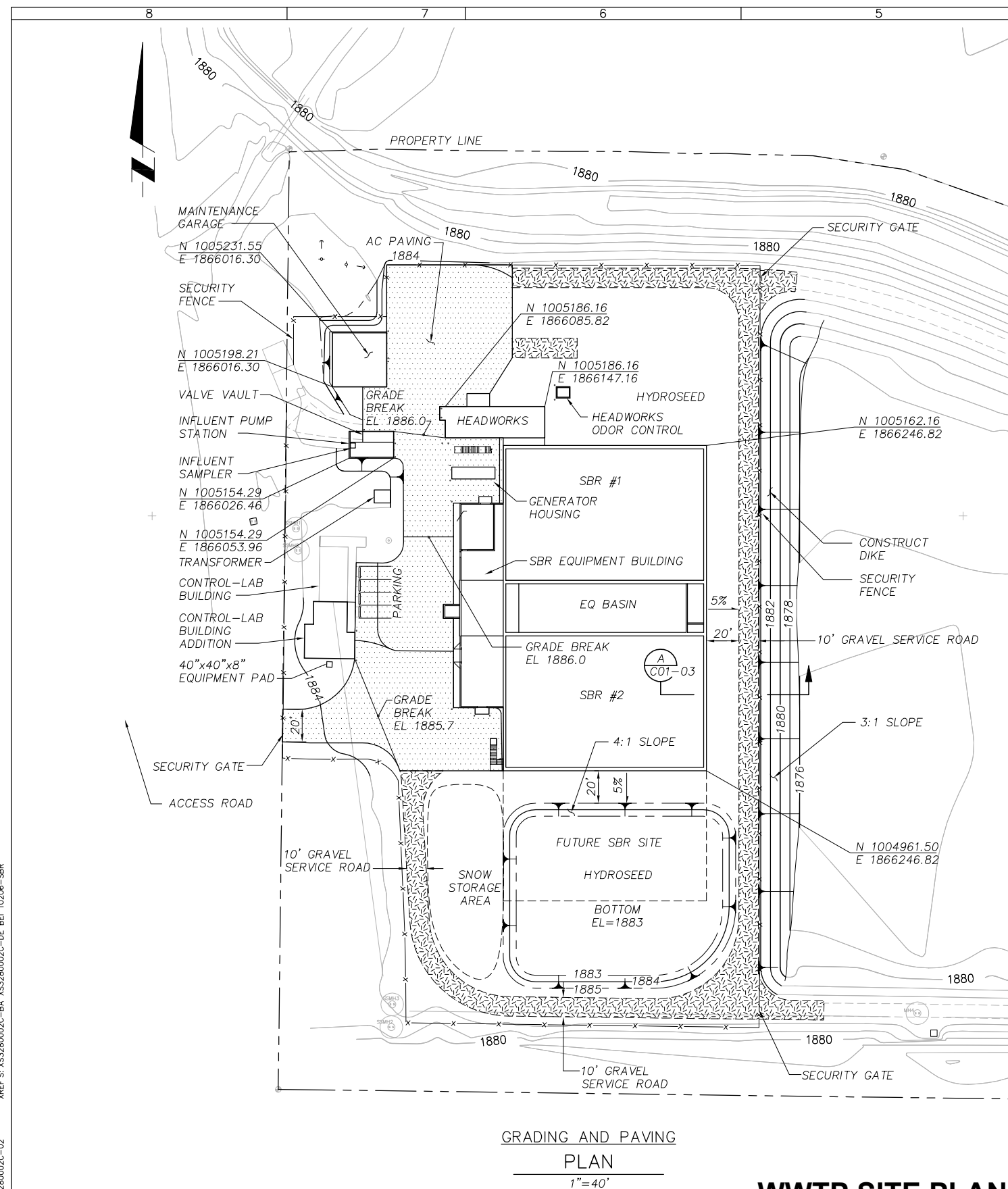
Clarified effluent flows from the SBRs via decanter assemblies into a central equalization tank. The water passes through a reaeration zone to boost the dissolved oxygen (DO) and is directed through an ultra-violet disinfection treatment system prior to leaving the WWTP. The clean effluent is metered and discharged directly into the Yakima River over a constructed rock drop outfall for even further aeration and treatment. Under most conditions effluent leaves the equalization tanks under gravity flow through a 24-inch outlet. When the flows or river level is high, effluent pumps are used to force more flow than gravity alone allows.

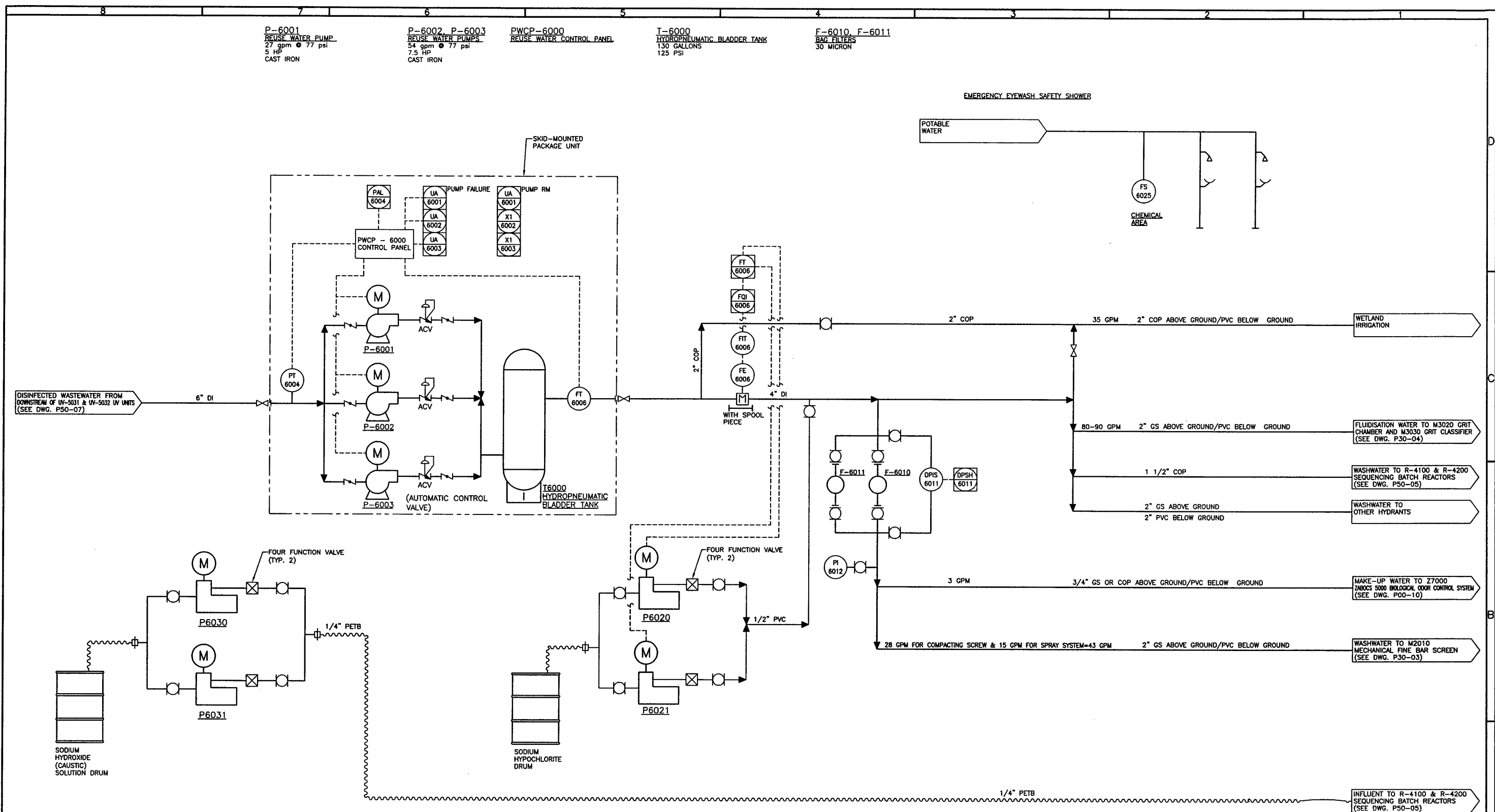
Waste solids, called sludge are separated in the SBRs, and pumped directly to double-lined lagoons for further aeration (and odor control), natural dewatering, and eventual disposal via permitted land application as fertilizer. The resulting treated water called effluent, then flows into the equalization basin where it is combined with the effluent from the SBR decanters.



REVISED TO CONFORM WITH  
CONSTRUCTION RECORDS  
BY: *Allen M...* DATE: 7-13-05

[illegible]

[illegible]



**NOTE 1**

ALL EXPOSED EXTERIOR LIQUID LINES ABOVE GRADE SHALL BE HEAT TRACED AND INSULATED.

**FIGURE 6-3**

**WWTP PROCESS FLOW DIAGRAM**

**RECORD DRAWING**

**Parametrix**

Inspired People  
Inspired Solutions  
Making a difference

**REVISIONS**

REV	DESCRIPTION	DATE	DWN	CHKD	APVD	ECH
0	ISSUED FOR CONSTRUCTION	4/27/04	RW	WRK		
1	RECORD DRAWING	7/08/05	JC	GCG		

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STD: 0302-22X3401

PROJECT: 7050-01  
CODE: P00-09  
DRAWING: 1

VEOLIA WATER NORTH AMERICA OPERATING SERVICES, LLC  
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(412) 809-6000 FAX (412) 809-6075







Table 6-1 provides a summary of design criteria for Cle Elum's WWTP, in accordance with their current NPDES permit, issued by the Washington Department of Ecology in 2019. The design criteria presented in Table 6-1 are based upon the WWTP improvements that were completed in 2005.

TABLE 6-1 CLE ELUM WASTEWATER TREATMENT PLANT DESIGN CRITERIA*	
Parameter	Design Quantity
Average Flow for the Maximum Month	3.6 MGD
Peak Instantaneous Design Flow (PIDF)	10.5 MGD
Maximum Monthly BOD <sub>5</sub> Influent Loading	4,863 lbs/day
Maximum Monthly TSS Influent Loading	3,753 lbs/day
* Source: October 1, 2019, NPDES Permit	

### 6.3 PERMIT EFFLUENT LIMITS AND EFFLUENT QUALITY

Effluent limits specified in a wastewater permit have a direct bearing on the degree of treatment that must be achieved by a WWTP. The City of Cle Elum's current effluent limits are specified in NPDES Waste Discharge Permit No. WA-002193-8, issued with an effective date of October 1, 2019, and an expiration date of September 30, 2024, as presented in Table 6-2.

TABLE 6-2 CITY OF CLE ELUM CURRENT EFFLUENT LIMITS		
Parameter	Average Monthly <sup>1</sup>	Average Weekly <sup>1</sup>
Biochemical Oxygen Demand (5-day)	30 mg/l; 727.5 lbs/day >85% removal of influent BOD	45 mg/l; 1,091.3 lbs/day
Total Suspended Solids	30 mg/l; 562.5 lbs/day >85% removal of influent TSS	45 mg/l; 843.8 lbs/day
Fecal Coliform Bacteria	200 colonies/100 ml	400 colonies/100 ml
pH <sup>2</sup>	Daily minimum ≥ 6 and daily maximum ≤ 9.0	
<sup>1</sup> The average monthly and weekly effluent limitations are based on the arithmetic mean of the samples taken, except for fecal coliform, which is based on the geometric mean.		
<sup>2</sup> Indicates the range of permitted values. The instantaneous maximum and minimum pH shall be reported monthly.		

The City has had no exceedances of their current effluent limits since the effective date of their latest NPDES Permit. Typical WWTP removal of influent BOD<sub>5</sub> and TSS is greater than 90%, above the permitted level of 85%.



### 6.4 FUTURE WASTEWATER LOADING PROJECTIONS

Forecasts for future loadings for flow, BOD, and TSS to the Cle Elum WWTF for the years 2025, 2030, 2035, and 2040 were previously presented in CHAPTER 2 of this Plan and are again presented in Table 6-3.

TABLE 6-3 FUTURE WASTEWATER LOADING PROJECTIONS						
Year	Flow		BOD <sub>5</sub>		TSS	
	Average Monthly Flow (MGD)	Maximum Month Flow (MGD)	Average Monthly BOD <sub>5</sub> (lbs/day)	Maximum Month BOD <sub>5</sub> (lbs/day)	Average Monthly TSS (lbs/day)	Maximum Month TSS (lbs/day)
2025	1.00	1.56	879	1,164	979	2,096
2030	1.12	1.75	982	1,301	1,094	2,343
2035	1.25	1.96	1,101	1,458	1,226	2,626
2040	1.41	2.20	1,237	1,638	1,378	2,951

When compared to the design capacities provided in Table 6-1, the projected future wastewater loadings for the City of Cle Elum will not exceed the current facility capacity within the next 20 years. It should be noted that the maximum month flow, BOD<sub>5</sub> loading, and TSS loading are assumed to increase at a rate like the sewer service population, as discussed in CHAPTER 2. As mentioned in CHAPTER 2, changes to the City's or other regional users SIUs can dramatically change the timing of the WWTP expansion requirements. Further evaluation of projected WWTP loading should be assessed prior to any expansion or improvement to the existing WWTP. Further evaluation of WWTP capacity will also be required if there are any changes to projected future population or future sewer service area uses.

### 6.5 IDENTIFIED CAPITAL IMPROVEMENT PROJECTS

The current WWTP was constructed in 2005. Therefore, the original mechanical equipment has, or will soon be reaching the end of its service life. As a result, the WWTP operations staff have identified the following capital improvement projects at the WWTP. Table 6-4 lists projects, anticipated project need date, and associated cost estimates.

Due to the age of the WWTP, the initiation of a regular repair and replacement program is recommended. The average annual costs of the projects listed in Table 6-4 is estimated to be approximately \$100,000. Therefore, it is recommended the City allocate at least this amount to set aside annually for repair and replacement projects at the WWTP. A condition assessment of the WWTP assets should be performed each year as part of an asset management program to adjust the items and amounts to set aside for these projects to avoid performing the work during an emergency, when costs are typically inflated and difficult to manage. The regional partners are also responsible for participating in the repair and replacement projects at the WWTP. Therefore, the costs of these projects should be included in the regional rates for each partner according to their allotted percentage.



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**TABLE 6-4 WASTEWATER TREATMENT PLANT MAINTENANCE PROJECTS**

Project Scope	Anticipated Need Date	* Estimated Costs (2020 \$)
Rebuild or replace motive pumps.	2021	\$100,000
Rebuild or replace grit pump.	2022	\$20,000
Rebuild or replace headworks screen and compactor.	2022	\$80,000
Update SCADA operations platform, either update to latest platform or replace the platform with AVEVA (formerly known as Wonderware) to provide commonality across the plants.	2023	\$100,000
Replace SCADA field devices (PLC's, currently running SLC500's and 505's, power supplies, etc.) current equipment is obsolete.	2023	\$50,000
Replace Decant flex hoses.	2024	\$10,000
Rebuild or replace influent pumps.	2024	\$20,000
Rebuild or replace effluent pumps.	2024	\$20,000
Replace blower intertie valve.	2024	\$25,000
Re-surface asphalt areas.	2024	\$20,000
Purchase spare MCC breakers.	2025	\$10,000
Surge protection for UV cabinet controllers.	2025	\$30,000
Replace #1 Effluent valve (#5041).	2026	\$30,000
Install electric valve actuators on EQ basin / UV Valves.	2026	\$50,000
Sludge removal / dredging of lagoon.	2027	\$100,000
Replace lagoon aerators with solar powered units.	2028	\$100,000
* All estimates were provided by Veolia Water.		





# **CHAPTER 7 -**

# **CAPITAL IMPROVEMENT**

# **PLAN**





### CHAPTER 7 – CAPITAL IMPROVEMENT PLAN

#### **7.1 GENERAL**

The previous sections of this Plan identified deficiencies in the existing City of Cle Elum wastewater collection system. In CHAPTER 3, maintenance-related improvements were identified. No capacity deficiencies were identified in the existing system under current flow conditions. In CHAPTER 4, the ability of the existing system to handle flows from full build-out of the UGA was examined. Although full build-out projections indicate Cle Elum may need minor additional WWTP capacity, the original allocation includes their existing collection system I/I, which is excessive by EPA standards. By reducing collection system I/I to acceptable levels, the future WWTP capacity needs will be reduced and no capacity deficiencies are identified for the system. This analysis was important to identify long-term piping needs of the system. In CHAPTER 5, the ability of the existing system to meet year 2040 demands was evaluated. No capacity-related deficiencies were again identified for the 20-year system.

Recommended improvements to the system that address both current and future maintenance-related items are summarized in this Chapter, along with estimated costs and a discussion of financing options.

#### **7.2 EXISTING SYSTEM IMPROVEMENTS**

The following Sections list recommended improvements and estimated costs to address maintenance-related, future capacity related, and miscellaneous upgrades to the existing collection system. Full build-out flows were considered in sizing collection system improvements to address the 20-year capacity deficiencies. Again, the 20-year flows are based upon projected population increases and estimated future uses. Completion of these improvements may not be necessary, depending on projected growth and/or future land use changes.

Actual costs of recommended improvements will vary from those costs provided in this Plan, due to changes in the construction industry, the competitive bidding process, the availability of materials and equipment, and the timing of improvements. These preliminary cost estimates are made in 2020 dollars, so inflationary increases should be added for the expected date of construction. No cost estimates have been made for extending service into the UGA or to unserved properties within the city limits. The location of recommended system improvements is shown in Figure 7-1.

##### **7.2.1 Maintenance-Related Improvements**

The City has identified several sections of sewer pipe within their collection system that require additional cleaning and maintenance. The cause of these maintenance issues is not known but could be related to inadequate or transverse pipe slopes, separated joints, or root and/or debris intrusion issues. All identified high-maintenance pipelines should be video inspected and evaluated prior to design and construction to clearly identify the problems and proper repair methods. The estimated costs for these maintenance-related improvements are based upon full replacement of the pipeline section(s). Alternative construction methods such as slip-lining or cured-in-place pipe liners may be possible in some locations to reduce costs.

The identified maintenance projects are shown in Figure 7-1. The projects classified as red require frequent maintenance and are considered the highest priority and should be scheduled first. The improvements are as follows:

1. Replacement of 540 LF of 6-inch and 1,115 LF of 8-inch gravity sewer main in alley between 2<sup>nd</sup> and 3<sup>rd</sup> Street from Oakes Avenue to just past Bullitt Street (new sewer lines will all be a minimum size of 8-inch).



## GENERAL SEWER PLAN

2. Replacement of 1,455 LF of 8-inch gravity sewer main in alley between 2<sup>nd</sup> and 1<sup>st</sup> Street from Pennsylvania Avenue to Peoh Avenue.
3. Replacement of 1,669 LF of 6-inch and 511 LF of 8-inch gravity sewer main in 3<sup>rd</sup> Street from Oakes Avenue to just past Bullitt Street (new sewer lines will all be a minimum size of 8-inch).
4. Replacement of 540 LF of 8-inch gravity sewer main in alleys both north and south of 2<sup>nd</sup> Street between Peoh Avenue and Montgomery Avenue.
5. Replacement of 555 LF of 6-inch gravity sewer main north of Railroad Street from Peoh Avenue and Bullitt Avenue (new sewer lines will all be a minimum size of 8-inch).
6. Replacement of 360 LF of 8-inch gravity sewer main in Billings Avenue starting near Railroad Street and heading north.
7. Replacement of 275 LF of 8-inch gravity sewer main alley south of 2<sup>nd</sup> Street between Teanaway Avenue and Yakima Avenue.
8. Replacement of 1,010 LF of 8-inch gravity sewer west of Stafford Avenue and in Stafford Avenue between Steiner Street and Park Street.
9. Replacement of 940 LF of 12-inch gravity sewer in Ronald Avenue between Alpha Way and Reed Street.
10. Replacement of 1,115 LF of 8-inch gravity sewer in Reed Street starting near railroad tracks and heading north.

The estimated costs for each of these improvements are listed separately in Table 7-1 using 2020 dollars. An annual escalation factor of 3% is included in the financial model based on the year the project is scheduled. Individual cost estimates for each improvement are included in the appendix.

### 7.2.2 Capacity Related Improvements

As described in CHAPTER 3 of this Plan, the hydraulic analysis model of the existing collection system identified no areas where current capacity at existing peak wastewater flows is insufficient.

### 7.2.3 WWTP Related Improvements

The City has identified several maintenance projects needed within the next five to ten years at the WWTP. These include the following:

1. Update SCADA operations platform, either update to latest platform or replace the platform with AVEVA (formerly known as Wonderware) to provide commonality across the plants.
2. Replace SCADA field devices (PLC's, currently running SLC500's and 505's, power supplies, etc.) as current equipment is obsolete.
3. Rebuild or replace motive pumps.
4. Rebuild or replace influent pumps.
5. Rebuild or replace effluent pumps.
6. Rebuild or replace grit pump.
7. Rebuild or replace headworks screen.
8. Rebuild or replace screen compactor.
9. Replace Decant flex hoses.



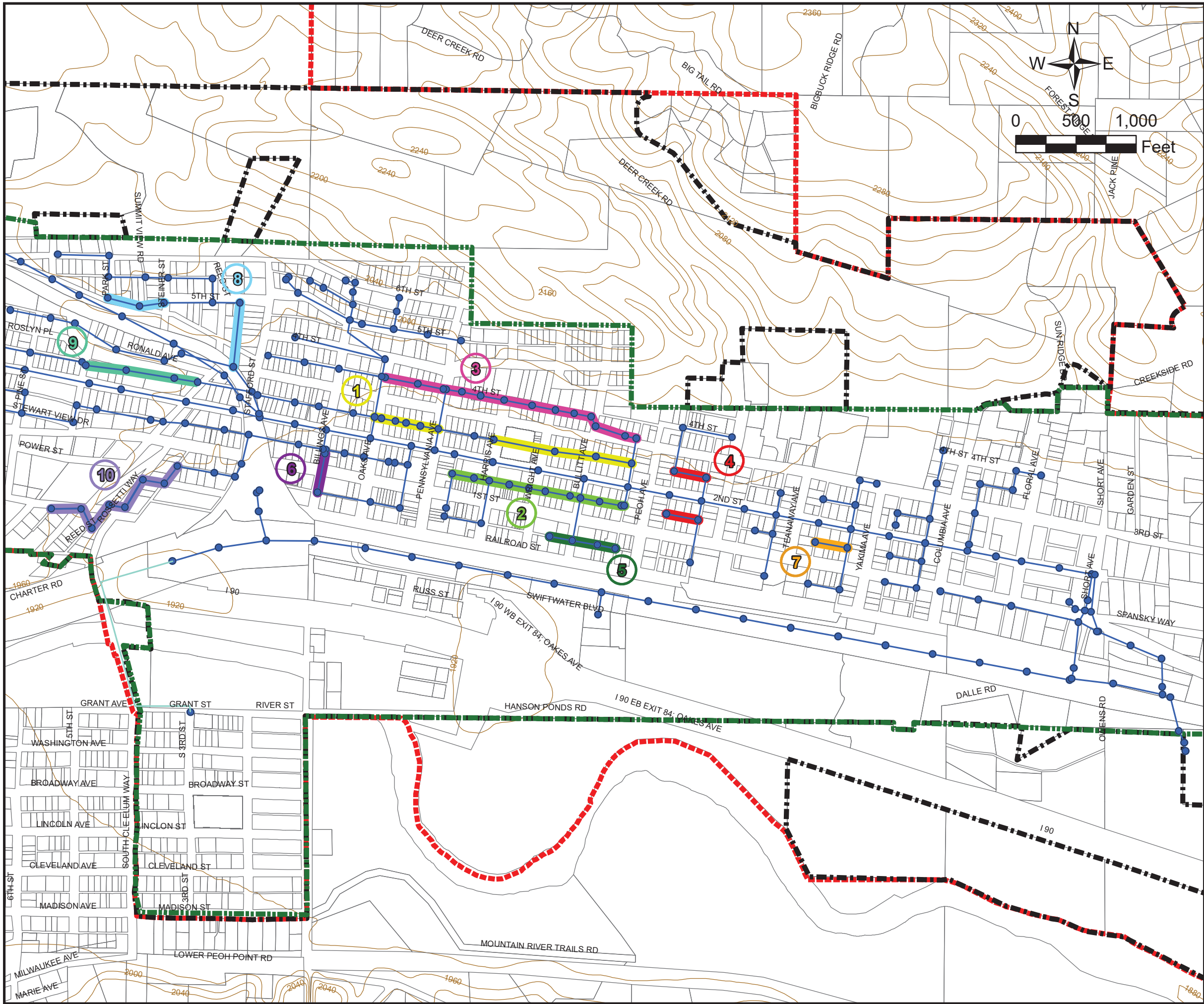


10. Replace #1 Effluent valve (#5041).
11. Replace blower intertie valve.
12. Re-surface asphalt areas.
13. Purchase spare MCC breakers.
14. Surge protection for UV cabinet controllers.
15. Replace lagoon aerators with solar powered units.
16. Sludge removal/dredging of lagoon.
17. Install electric valve actuators on EQ Basin/UV valves.

### **7.3 CAPITAL IMPROVEMENT PLAN**

An estimated schedule for completion of the recommended system improvements, including estimated project costs, year of completion, and source(s) of funding is provided in Table 7-1. The priority of improvements may need to change from that shown in Table 7-1 depending on availability of funds and future capacity and maintenance needs.





# CITY OF CLE ELUM

General Sewer Plan

## RECOMMENDED SYSTEM IMPROVEMENTS

### LEGEND

- Existing Service Area
- City Limits
- UGA Boundary
- Forcemain
- Sewer Main
- 1 Sewer Trunk Main Replacement (Oaks Ave. to just past Bullitt St.)
- 2 Sewer Trunk Main Replacement (Pennsylvania Ave. to Peoh Ave.)
- 3 Sewer Trunk Main Replacement (Oaks Ave. to just past Bullitt St.)
- 4 Sewer Trunk Main Replacement (Peoh Ave. and Montgomery Ave.)
- 5 Sewer Trunk Main Replacement (Peoh Ave. and Bullitt Ave.)
- 6 Sewer Trunk Main Replacement (Billings Avenue)
- 7 Sewer Trunk Main Replacement (Teaway Ave. and Yakima Ave.)
- 8 Sewer Trunk Main Replacement (Steiner St. and Park St.)
- 9 Sewer Trunk Main Replacement (Alpha Way and Reed St.)
- 10 Sewer Trunk Main Replacement (Reed Street)



2-19-21  
P:\arcview\2020\20111\Fig7-1

Figure 7-1



## GENERAL SEWER PLAN

**TABLE 7-1 SCHEDULE OF RECOMMENDED IMPROVEMENTS**

Improvement Description	Estimated Cost in 2020 Dollars	Completion Year	Estimated Cost*	Funding Source
Replacement of 540 LF of 6-inch and 1,115 LF of 8-inch gravity sewer main in alley between 2 <sup>nd</sup> and 3 <sup>rd</sup> Street from Oakes Avenue to just past Bullitt Street (new sewer lines will all be a minimum size of 8-inch).	\$733,000	2022	\$778,000	City
Replacement of 1,455 LF of 8-inch gravity sewer main in alley between 2 <sup>nd</sup> and 1 <sup>st</sup> Street from Pennsylvania Avenue to Peoh Avenue.	\$622,000	2024	\$700,000	City
Replacement of 1,669 LF of 6-inch and 511 LF of 8-inch gravity sewer main in 3 <sup>rd</sup> Street from Oakes Avenue to just past Bullitt Street (new sewer lines will all be a minimum size of 8-inch).	\$777,000	2026	\$928,000	City
Replacement of 540 LF of 8-inch gravity sewer main in alleys both north and south of 2 <sup>nd</sup> Street between Peoh Avenue and Montgomery Avenue.	\$230,000	2028	\$291,000	City
Replacement of 555 LF of 6-inch gravity sewer main north of Railroad Street from Peoh Avenue and Bullitt Avenue (new sewer lines will all be a minimum size of 8-inch).	\$243,000	2028	\$308,000	City
Replacement of 360 LF of 8-inch gravity sewer main in Billings Avenue starting near Railroad Street and heading north.	\$156,000	2028	\$198,000	City
Replacement of 275 LF of 8-inch gravity sewer main alley south of 2 <sup>nd</sup> Street between Teanaway Avenue and Yakima Avenue.	\$115,000	2030	\$155,000	City
Replacement of 1,010 LF of 8-inch gravity sewer west of Stafford Avenue and in Stafford Avenue between Steiner Street and Park Street.	\$362,000	2030	\$486,000	City
Replacement of 940 LF of 12-inch gravity sewer in Ronald Avenue between Alpha Way and Reed Street.	\$301,000	2030	\$405,000	City
Replacement of 1,115 LF of 8-inch gravity sewer in Reed Street starting near railroad tracks and heading north.	\$386,000	2032	\$550,000	City
Combined Total of Collection System Maintenance Projects			\$4,799,000	
Annual Average Cost of Projects over 11-year period			\$436,000/yr	
<b>WWTP projects</b>	<b>\$765,000</b>	<b>2021-2028</b>	<b>\$100,000/yr</b>	<b>City/ Region</b>
<b>TOTAL COSTS</b>	<b>\$4,690,000</b>			

\* Estimated future improvement costs beyond year 2020 include 3% inflation per year.



### **7.4 SEWER RATE ANALYSIS**

The existing rate structure was reviewed as part of this GSP. To finance the projects identified in this GSP, it is recommended the City increase their sewer rates. A survey of surrounding communities and sewer districts was completed revealing Cle Elum's rates are among the lowest in the region. The financial model indicates the current rates will not sustain the necessary improvements and on-going required maintenance. An increase to keep the combined sewer funds from dropping into a deficit is needed.

It is recommended the City conduct a comprehensive rate study to generate necessary revenues, in an equitable manner between the sewer customer classes for a maintenance program for projects identified as part of the collection system inspection program. It is anticipated an immediate rate increase may be necessary to achieve an initial target revenue of 50% above current rates. Short and long-term rate revisions will be necessary to generate revenues to operate and maintain the sewer collection system and WWTP in perpetuity.

The financial model shown in Table 7-2 estimates the needed revenue increase to support the average maintenance project program spending, based on currently identified projects shown in Table 7-1. To prevent the combined sewer fund balance from dropping below zero, a 57% increase from the historical revenue generated through the existing rate structure is needed to adequately maintain the sewer system and implement the recommended capital maintenance program. As additional projects are identified, additional increases or loans will be required to maintain a project spending rate of \$450,000 (2020 dollars), annually. Loans and grants may reduce the estimated rate increase percentage needed. The actual rate adjustment will be determined as the result of the rate study.



TABLE 7-2 SEWER FUNDS FINANCIAL MODEL																						
Year	2020 (Actual)	2021 (Budget)	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	NOTES
Sewer Fund 409																						
BEGINNING FUND BALANCE (308)	260,117.63	348,335.64	348,335.64	632,373	524,196	418,327	315,146	215,059	118,501	25,937	(62,135)	(145,187)	(222,650)	(293,922)	(358,357)	(415,270)	(463,930)	(503,558)	(533,326)	(552,355)	(559,706)	
REVENUES:																						
Charges for Goods and Services (340)	574,057.12	565,000.00	593,250	622,913	654,058	686,761	721,099	757,154	795,012	834,762	876,500	920,325	966,342	1,014,659	1,065,392	1,118,661	1,174,594	1,233,324	1,294,990	1,359,740	1,427,727	A
Rate Increase to Cover Capital Projects		57%	338,153	355,060	372,813	391,454	411,026	431,578	453,157	475,815	499,605	524,586	550,815	578,356	607,273	637,637	669,519	702,995	738,144	775,052	813,804	B
Interest and Other Earnings (360)	248,910.18	52,500.00	52,500	52,500	52,500	52,500	52,500	52,500	52,500	52,500	52,500	52,500	52,500	52,500	52,500	52,500	52,500	52,500	52,500	52,500	52,500	C
Other Financing Sources (390)	0.00	0.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	D
SUBTOTAL – REVENUE	822,967.30	617,500.00	983,903	1,030,473	1,079,371	1,130,715	1,184,626	1,241,232	1,300,668	1,363,077	1,428,606	1,497,411	1,569,657	1,645,514	1,725,165	1,808,798	1,896,613	1,988,819	2,085,635	2,187,292	2,294,031	
TOTAL SEWER FUND	1,083,084.93	965,835.64	1,332,238	1,662,846	1,603,568	1,549,042	1,499,772	1,456,291	1,419,170	1,389,014	1,366,470	1,352,224	1,347,007	1,351,593	1,366,808	1,393,529	1,432,683	1,485,261	1,552,308	1,634,937	1,734,326	
EXPENSES:																						
Salaries and Expenses (535)	626,880.42	425,682.00	446,966	469,314	492,780	517,419	543,290	570,455	598,977	628,926	660,372	693,391	728,061	764,464	802,687	842,821	884,962	929,210	975,671	1,024,454	1,075,677	A
Combined Utilities (538)	68,595.72	85,000.00	89,250	93,713	98,398	103,318	108,484	113,908	119,604	125,584	131,863	138,456	145,379	152,648	160,280	168,294	176,709	185,544	194,822	204,563	214,791	E
Debt Service – Principal Repayment (591)	20,183.58	20,955.00	20,955	20,955	20,955	20,955	20,955	20,955	20,955	20,955	20,955	20,955	20,955	20,955	20,955	20,955	20,955	20,955	20,955	20,955	20,955	C
Debt Service – Interest Costs (592)	11,603.82	10,863.00	10,863	10,863	10,863	10,863	10,863	10,863	10,863	10,863	10,863	10,863	10,863	10,863	10,863	10,863	10,863	10,863	10,863	10,863	10,863	C
Capital Expenditures (594)	7,485.75	75,000.00	77,250	79,568	81,955	84,413	86,946	89,554	92,241	95,008	97,858	100,794	103,818	106,932	110,140	113,444	116,848	120,353	123,964	127,682	131,513	F
Interfund Transfers (597)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
SUBTOTAL - EXPENDITURES	734,749.29	617,500	645,284	674,412	704,951	736,968	770,538	805,735	842,639	881,336	921,911	964,459	1,009,075	1,055,862	1,104,925	1,156,378	1,210,337	1,266,926	1,326,274	1,388,518	1,453,799	
ENDING FUND BALANCE before transfers	348,335.64	348,335.64	686,954	988,433	898,617	812,073	729,234	650,556	576,530	507,679	444,559	387,765	337,931	295,731	261,883	237,151	222,346	218,336	226,034	246,419	280,527	
Interfund Transfer for 409 to 413	0.00	0.00	(54,581)	(464,237)	(480,290)	(496,927)	(514,175)	(532,055)	(550,593)	(569,814)	(589,746)	(610,415)	(631,853)	(654,088)	(677,153)	(701,081)	(725,904)	(751,662)	(778,389)	(806,125)	(834,912)	G
ENDING FUND TRANSFERS	348,335.64	348,335.64	632,373	524,196	418,327	315,146	215,059	118,501	25,937	(62,135)	(145,187)	(222,650)	(293,922)	(358,357)	(415,270)	(463,930)	(503,558)	(533,326)	(552,355)	(559,706)	(554,385)	





TABLE 7-2 SEWER FUNDS FINANCIAL MODEL (CONTINUED)																						
Year	2020 (Actual)	2021 (Budget)	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	NOTES
Sewer Fund 410 – Regional (Pays Veolia / Capital projects at WWTP)																						
BEGINNING FUND BALANCE (308)	163,633.43	227,767.97	227,768	232,606	239,686	249,181	261,271	276,152	294,028	315,116	339,647	367,864	400,025	436,404	477,289	522,988	573,823	630,137	692,291	760,669	835,676	
REVENUES:	Increase Regional Rates to include Planned WWTP Maintenance Project Costs starting in 2022																					
Intergovernmental Revenue (330)	10,215.50	154.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Charges for Goods and Services (340)	680,931.00	623,000.00	759,150	797,108	836,963	878,811	922,752	968,889	1,017,334	1,068,200	1,121,610	1,177,691	1,236,575	1,298,404	1,363,324	1,431,491	1,503,065	1,578,218	1,657,129	1,739,986	1,826,985	H
Interest and Other Earnings (360)	7.48	0.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
SUBTOTAL – REVENUE	691,153.98	623,154.00	759,150	797,108	836,963	878,811	922,752	968,889	1,017,334	1,068,200	1,121,610	1,177,691	1,236,575	1,298,404	1,363,324	1,431,491	1,503,065	1,578,218	1,657,129	1,739,986	1,826,985	
TOTAL FUND BEFORE EXPENSES	854,787.41	850,921.97	986,918	1,029,714	1,076,649	1,127,992	1,184,023	1,245,041	1,311,362	1,383,316	1,461,257	1,545,554	1,636,600	1,734,808	1,840,614	1,954,478	2,076,888	2,208,355	2,349,420	2,500,655	2,662,661	
EXPENSES:																						
Salaries and Expenses (535)	609,155.41	603,000.00	633,150	664,808	698,048	732,950	769,598	808,078	848,482	890,906	935,451	982,223	1,031,335	1,082,901	1,137,046	1,193,899	1,253,594	1,316,273	1,382,087	1,451,191	1,523,751	A
Capital Expenditures (594)	17,864.03	20,154.00	21,162	22,220	23,331	24,497	25,722	27,008	28,359	29,777	31,265	32,829	34,470	36,194	38,003	39,904	41,899	43,994	46,193	48,503	50,928	E
Planned WWTP Maintenance Projects			100,000	103,000	106,090	109,273	112,551	115,927	119,405	122,987	126,677	130,477	134,392	138,423	142,576	146,853	151,259	155,797	160,471	165,285	170,243	I
Interfund Transfers (597)	0.00	0.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	C
SUBTOTAL – EXPENDITURES	627,019.44	623,154.00	754,312	790,027	827,469	866,720	907,871	951,013	996,245	1,043,670	1,093,393	1,145,530	1,200,196	1,257,518	1,317,626	1,380,656	1,446,751	1,516,064	1,588,751	1,664,979	1,744,922	
ENDING FUND BALANCE	227,767.97	227,767.97	232,606	239,686	249,181	261,271	276,152	294,028	315,116	339,647	367,864	400,025	436,404	477,289	522,988	573,823	630,137	692,291	760,669	835,676	917,738	



TABLE 7-2 SEWER FUNDS FINANCIAL MODEL (CONTINUED)																						
Year	2020 (Actual)	2021 (Budget)	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	NOTES
Capital Reserve Account – Capital Expenses (413)																						
BEGINNING FUND BALANCE (308)	212,201.75	373,169.29	394,169	0	(0)	0	(0)	0	0	0	0	0	(0)	(0)	(0)	(0)	0	(0)	0	0	(0)	
REVENUES:																						
Transfer in from 409 for projects:	0.00	0.00	54,581	464,237	480,290	496,927	514,175	532,055	550,593	569,814	589,746	610,415	631,853	654,088	677,153	701,081	725,904	751,662	778,389	806,125	834,912	J
Intergovernmental Revenue (330)	81,560.51	115,000.00																				
Charges for Goods and Services (340)	61,654.60	60,000.00	63,000	66,150	69,458	72,930	76,577	80,406	84,426	88,647	93,080	97,734	102,620	107,751	113,139	118,796	124,736	130,972	137,521	144,397	151,617	A
Interest and Other Earnings (360)	2,809.21	1,000.00	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	C
Other Financing Sources (390)	63,017.74	115,000.00	115,000	115,000	115,000	115,000	115,000	115,000	115,000	115,000	115,000	115,000	115,000	115,000	115,000	115,000	115,000	115,000	115,000	115,000	115,000	C
SUBTOTAL – REVENUE	209,042.06	291,000.00	233,581	646,387	665,748	685,857	706,752	728,461	751,019	774,461	798,826	824,149	850,473	877,839	906,292	935,877	966,640	998,634	1,031,910	1,066,522	1,102,529	
TOTAL SEWER FUND	421,243.81	664,169.29	627,750	646,387	665,747	685,858	706,752	728,461	751,019	774,462	798,826	824,149	850,473	877,839	906,292	935,876	966,640	998,634	1,031,910	1,066,522	1,102,529	
EXPENSES:																						
Expenses (535)	48,074.52	155,000.00	162,750	170,888	179,432	188,403	197,824	207,715	218,101	229,006	240,456	252,479	265,103	278,358	292,276	306,889	322,234	338,346	355,263	373,026	391,677	A
Debt Service – Principal Repayment (591)	0.00	115,000.00	115,000	115,000	115,000	115,000	115,000	115,000	115,000	115,000	115,000	115,000	115,000	115,000	115,000	115,000	115,000	115,000	115,000	115,000	115,000	C
Capital Expenditures (594)	0.00	0.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	C
Planned Collection System Maintenance Projects:			350,000	360,500	371,315	382,454	393,928	405,746	417,918	430,456	443,370	456,671	470,371	484,482	499,016	513,987	529,406	545,289	561,647	578,497	595,852	K
Interfund Transfers (597)	0.00	0.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	C
SUBTOTAL – EXPENDITURES	48,074.52	270,000.00	627,750	646,388	665,747	685,858	706,752	728,461	751,019	774,461	798,825	824,149	850,473	877,840	906,292	935,876	966,640	998,634	1,031,910	1,066,523	1,102,529	
ENDING FUND BALANCE	373,169.29	394,169.29	0	(0)	0	(0)	0	0	0	0	0	(0)	(0)	(0)	(0)	0	(0)	0	0	(0)	(0)	
A. 5% increase after 2021. B. Increase needed for Collection System Capital Projects. C. Same as 2021. D. Same as 2022. E. 5% increase after 2022. F. 3% increase since 2020. G. Transfer money to 413 to cover costs for Collection System Projects. H. Add \$100,000 in 2022 plus 5% increase each year after 2021. I. \$100,000 per escalated at 3% starting in 2021 for WWTP projects. J. Money transferred from 409 to cover collection system projects. K. \$350,000 per escalated at 3% starting in 2021 for WWTP projects.																						



### **7.5 FUNDING SOURCES**

Funds may be available for financing the proposed improvements from several sources. Those considered in this section are listed below:

1. Local Public Enterprise Funds.
2. Use of Local Public Powers.
3. State Assisted or Guaranteed Resources.
4. Federally Assisted or Guaranteed Resources.
5. Private Development.

Available funding is limited in a number of these five sources. Many also restrict the use of funds to certain projects, while other sources limit their participation to a percentage of the total cost. Each of these categories are described briefly below.

#### **7.5.1 Local Public Enterprise Funds**

Reserves in the Enterprise Fund are accumulated from sewer user fee revenues. The amount of reserves will depend on the balance of operation and maintenance costs of the system versus total revenue generated by fees. These reserves may be used to finance any sewer system related project approved by the City Council.

Funds for a future project may be generated by increases in user fees, thus building the reserves in the Enterprise Fund. With this method of financing, often called the "pay-as-you-go" approach, the City is collecting interest on reserves as opposed to paying interest on a loan balance. One method used by some communities to accumulate reserves is through the development of a capital recovery charge system. This approach is like assessing connection fees, except the amount is based on capital costs of constructing collection system trunk lines and treatment facilities, and the collected funds are usually set aside as capital reserves for future projects.

#### **7.5.2 Use of Local Public Powers**

The use of local public powers consists of three primary bonding techniques, including general obligation bonds, special assessment bonds, and revenue bonds. There are advantages and disadvantages to each. The type of bond issued to finance a community improvement depends in part on custom and in part on the circumstances of a particular offering. General information about the three principal types of municipal bonds follows:

1. **GENERAL OBLIGATION BONDS:** General Obligation Bonds pledge unlimited taxing power and full faith and credit of the issuing government to meet required principal and interest payments.
2. **SPECIAL ASSESSMENT BONDS (LID or ULID Bonds):** Special Assessment Bonds are used to finance improvements where the property specially benefitted can be identified. They are frequently used to make capital improvements in a neighborhood. Principal and interest payments are made by the special assessment on the property benefiting from the improvement. Before special assessment bonds are issued, estimated costs are mailed to property owners, and a public hearing is held to allow the affected property owners to say whether they want the improvements. During a subsequent 30-day protest period, property owners may protest the improvements prior to City Council action formally establishing the project. Debt financed by special assessment bonds is not subject to debt limitations. This type of financing is typically not suited to WWTP improvement projects or for construction of trunk sewers within a collection system. It is often used to finance the extension of sewers into a new service area.



3. **REVENUE BONDS:** Revenue Bonds are frequently used to finance City-owned utilities, industrial parks, and other municipal public facilities. The bonds pledge revenue from a revenue source to meet the principal and interest payments. Revenue bonds are appropriate debt instruments when the enterprise fund can be expected to generate sufficient revenue to meet both operating and debt service costs. They generally do not become a general obligation of the government issuing them. Communities may have to pay higher rates of interest than on general obligation bonds, because revenue bonds are considered less secure. Revenue bonds have an important advantage over general obligation bonds as the amount of revenue bonds is not included in the amount of indebtedness subject to state debt limitations. Legal requirements for issuing revenue bonds are more complex than those for issuing general obligation bonds. When revenue bonds are issued, a special authority (Sewer Fund) operates the facility, and a special revenue fund receives and disburses all funds. A trust agreement to provide for the monthly reimbursement of revenues and containing provisions to protect the bond holders must be formulated.

### 7.5.3 State Assisted or Guaranteed Resources

Three types of state administered funding sources are available for domestic wastewater system projects: Centennial Clean Water Fund Program (administered by the Washington Department of Ecology), State Revolving Fund Loan Program (administered by the Washington Department of Ecology), and the Public Works Trust Fund (administered by the Washington State Public Works Board).

1. **CENTENNIAL CLEAN WATER FUND:** Established in 1986, obtaining its money from a tax on tobacco products. Funds from this program are used for grants and loans to local governments for measures to prevent and control water pollution. Up to two-thirds of the funds in this program can be used for activities and facilities related to point source discharges. The Centennial Clean Water Fund provides up to 50% of the total eligible project costs. Applications are accepted once a year. Rules for these funds prohibit their use on projects where state or federal grants were previously awarded, and the same objective achieved.
2. **STATE REVOLVING FUND:** Provides low-interest loans to local governments for projects which improve and protect the state's water quality. Up to 100% of eligible project costs are fundable through this program. Applications are accepted once a year, concurrent with the Centennial Clean Water Fund applications.
3. **PUBLIC WORKS TRUST FUND (PWTF):** Created in 1985 to provide loans for replacement of public works facilities. Applications for construction funds may be submitted once each year, and applications for pre-construction funds (for items such as engineering design, bid document preparation, right-of-way acquisition, environmental studies, and I/I studies) may be submitted any time during the year. Current allocations of funds have been for a wide variety of projects, including domestic wastewater projects. The interest rate on PWTF loans ranges from 0.5% to 2% depending on the amount of matching money provided by the City.

### 7.5.4 Federally Assisted or Guaranteed Resources

Three federally financed funding sources are available for domestic wastewater system construction: the USDA's Rural Development Program, the Economic Development Administration's Public Works Grants and Loans Program, and the Department of Housing and Urban Development's Community Development Block Grants administered by the Washington State Department of Commerce.





1. USDA RURAL DEVELOPMENT PROGRAM: This is one of several programs established by USDA to provide public works assistance to small communities in rural areas. Public entities such as municipalities, counties, special purpose districts or authorities, Indian tribes, and nonprofit corporations or cooperatives are eligible in areas under 10,000 population. Priority will be given to public entities in areas smaller than 5,500 people to improve, enlarge, or modify a wastewater facility. Preference will also be given to requests that involve the merging of small facilities and those serving low-income communities. Loans and grant funds may be used to construct, repair, improve, expand, or otherwise modify rural wastewater collection and treatment systems. Targeted at the neediest communities, grants are designed to keep costs economical. Grants are limited to reducing the facility per user annual costs for debt service to a minimum of 1% of the area's median family income. Loans in the past have also been available at a 5% to 10% interest rate for the useful life of the facility, the statutory limit on the applicant's borrowing authority, or for a maximum of 40 years.
2. PUBLIC WORKS GRANTS AND LOANS PROGRAM: Funded by the Economic Development Administration (EDA) is used to encourage long-range development gains in jurisdictions where economic growth is lagging or where the economic base is shifting. The program provides public works and development facilities needed to attract new industry and provide business expansion. Financial aid may be used to acquire and develop land and improvements for public works and to acquire, construct, rehabilitate, alter, expand, or improve such facilities, including related machinery and equipment. When completed, such projects are expected to bring additional private investment to the area.
3. COMMUNITY DEVELOPMENT BLOCK GRANT PROGRAM (CDBG): Under the U.S. Department of Housing and Urban Development (HUD) and administered by the State Department of Community, Trade, and Economic Development (CTED), communities under 50,000 can apply for grants to undertake activities in providing adequate housing, expanded economic opportunities, and correcting deficiencies in public facilities which affect the public safety and health of area or community residents. The program is designed to aid low- and moderate-income people and is also directed to have maximum impact on stated community problems. Its primary focus is to assist blighted communities, or communities suffering from a community or economic development problem. Sanitary sewer system projects in low-income areas of the City could be eligible for funding under this program.

### 7.5.5 Private Development

Expansion of domestic wastewater facilities to newly developing areas outside the existing service area is a common requirement of private developments. Installation of public utilities within housing subdivisions is normally financed entirely by the developer.

Although funding has been curtailed in several programs within the last few years, some projects statewide are still receiving financing. Competition for available funds has increased significantly. Projects showing the greatest need and that have the largest local funding participation, or benefit to low-income families, are receiving most financing from these programs. Careful planning and packaging of the project is necessary so that through effective dollar use, including local participation, a funding agency may obtain the maximum benefit for the greatest number of people.



Table 7-3 provides a summary of funding sources and projects that are eligible under each program.

TABLE 7-3 FUNDING SOURCE SUMMARY	
Funding Source	Eligible Projects
Sewer Enterprise Fund	All wastewater system projects
General Obligation Bond	All wastewater system projects
Revenue Bond	All wastewater system projects
Special Assessment Bond	Local Improvement District projects
Centennial Clean Water Fund	All wastewater system projects not previously funded with state or federal funds; limited eligibility for growth- and industrial-related projects
State Revolving Fund	All wastewater system projects; limited eligibility for industrial-related projects
Public Works Trust Fund	Replacement of existing wastewater system facilities; service to previously unsewered areas
USDA Rural Development Sewer Grant	All wastewater system projects once maximum level of indebtedness is reached
USDA Rural Development Sewer Loan	All wastewater system projects
EDA Public Works Grant	Water system projects to attract new industries and provide for business expansion
EDA Public Works Loan	Wastewater system projects to attract new industries and provide for business expansion
HUD Community Development Block Grant	Wastewater system projects which directly benefit low- and moderate-income families
Private Development	All wastewater system projects necessary for new housing and/or commercial developments

No future loans or financial assistance is anticipated to be necessary in the next six years, but if funding is required for future improvements to be completed, further investigation of loan/grant program availability, and terms and conditions will be necessary to proceed with the recommended improvements.

### **7.6 RECOMMENDED PROJECT FINANCING**

A review of the City of Cle Elum sewer rate structure indicated an inequity between the different customer classes and a need to increase charges to adequately maintain the sewer collections system. Provided in Table 7-4 are the proposed annual sewer revenues and expenses for Cle Elum's sewer operating and reserve funds, which incorporates charging a portion of the collection system operation and maintenance costs based on the amount of the system used by each of the regional partners. The 2021 values are budgeted amounts adopted by the City in 2020.



## GENERAL SEWER PLAN

The projected future sewer service fees include recommended revenue increases of 50% beginning in 2022 to provide revenue needed for the identified maintenance projects. Revenue increases are a combination of rate increases and sewer service growth. If no growth or reduced growth occurs in any of the proposed financial program years, the program will have to be revised or additional rate increases will need to be implemented to account for the reduced revenue. The model includes inflationary sewer rate increases and the projected growth of each regional partner through 2040.

Future sewer department expenses were estimated based upon an average inflation rate of 5% per year to account for growth and 3% inflation.

The City of Cle Elum will continue annual reviews of the sewer system's financial program during their budget preparation process. The financial program will also be reviewed and revised as needed during the GSP update. This continued review will allow for modifications to the proposed rate and revenue increases, should financial conditions change.



TABLE 7-4 PROPOSED ANNUAL SEWER EXPENSES AND REVENUE FOR REGIONAL PARTNERS																							
Year			2021 (Current)	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	
Annual Fee			\$416,728	\$437,564	\$459,443	\$482,415	\$506,535	\$531,862	\$558,455	\$586,378	\$615,697	\$646,482	\$678,806	\$712,746	\$748,384	\$785,803	\$825,093	\$866,348	\$909,665	\$955,148	\$1,002,906	\$1,053,051	
Utility			\$111,000	\$116,550	\$122,378	\$128,496	\$134,921	\$141,667	\$148,751	\$156,188	\$163,998	\$172,197	\$180,807	\$189,848	\$199,340	\$209,307	\$219,772	\$230,761	\$242,299	\$254,414	\$267,135	\$280,491	
Maintenance			\$85,000	\$89,250	\$93,713	\$98,398	\$103,318	\$108,484	\$113,908	\$119,604	\$125,584	\$131,863	\$138,456	\$145,379	\$152,648	\$160,280	\$168,294	\$176,709	\$185,544	\$194,822	\$204,563	\$214,791	
Legal / Engineer			\$10,000	\$10,500	\$11,025	\$11,576	\$12,155	\$12,763	\$13,401	\$14,071	\$14,775	\$15,513	\$16,289	\$17,103	\$17,959	\$18,856	\$19,799	\$20,789	\$21,829	\$22,920	\$24,066	\$25,270	
Miscellaneous/Capital			\$30,000	\$31,500	\$33,075	\$34,729	\$36,465	\$38,288	\$40,203	\$42,213	\$44,324	\$46,540	\$48,867	\$51,310	\$53,876	\$56,569	\$59,398	\$62,368	\$65,486	\$68,761	\$72,199	\$75,809	
Variable			\$35,000	\$36,750	\$38,588	\$40,517	\$42,543	\$44,670	\$46,903	\$49,249	\$51,711	\$54,296	\$57,011	\$59,862	\$62,855	\$65,998	\$69,298	\$72,762	\$76,401	\$80,221	\$84,232	\$88,443	
Total 2021 Budget			\$687,728	\$722,114	\$758,220	\$796,131	\$835,938	\$877,735	\$921,621	\$967,702	\$1,016,087	\$1,066,892	\$1,120,236	\$1,176,248	\$1,235,061	\$1,296,814	\$1,361,654	\$1,429,737	\$1,501,224	\$1,576,285	\$1,655,099	\$1,737,854	
Regional Reserve Chare (WWTP)			\$100,000	\$103,000	\$106,090	\$109,273	\$112,551	\$115,927	\$119,405	\$122,987	\$126,677	\$130,477	\$134,392	\$138,423	\$142,576	\$146,853	\$151,259	\$155,797	\$160,471	\$165,285	\$170,243	\$175,351	
Cle Elum Collection System			\$0	\$400,000	\$412,000	\$424,360	\$437,091	\$450,204	\$463,710	\$477,621	\$491,950	\$506,708	\$521,909	\$537,567	\$553,694	\$570,304	\$587,413	\$605,036	\$623,187	\$641,883	\$661,139	\$680,973	
			\$787,728	\$1,225,114	\$1,276,310	\$1,329,764	\$1,385,579	\$1,443,865	\$1,504,736	\$1,568,311	\$1,634,714	\$1,704,077	\$1,776,537	\$1,852,238	\$1,931,330	\$2,013,971	\$2,100,327	\$2,190,570	\$2,284,882	\$2,383,453	\$2,486,482	\$2,594,178	
Proposed Regional Rates:			Annual Escalation Rate: 1.03																				
Cle Elum		WWTP	39.501%	\$181,975	\$197,424	\$214,186	\$232,370	\$252,098	\$273,501	\$296,721	\$321,912	\$349,242	\$378,892	\$411,060	\$445,958	\$483,820	\$524,895	\$569,458	\$617,805	\$670,256	\$727,160	\$788,895	\$855,872
Growth Rate	5.33%	Collections	50%	\$0	\$200,000	\$206,000	\$212,180	\$218,545	\$225,102	\$231,855	\$238,810	\$245,975	\$253,354	\$260,955	\$268,783	\$276,847	\$285,152	\$293,707	\$302,518	\$311,593	\$320,941	\$330,570	\$340,487
S. Cle Elum		WWTP	4.137%	\$52,848	\$54,706	\$56,629	\$58,619	\$60,679	\$62,812	\$65,020	\$67,306	\$69,671	\$72,120	\$74,655	\$77,280	\$79,996	\$82,808	\$85,719	\$88,732	\$91,850	\$95,079	\$98,421	\$101,880
Growth Rate	0.50%	Collections	9%	\$0	\$36,000	\$37,080	\$38,192	\$39,338	\$40,518	\$41,734	\$42,986	\$44,275	\$45,604	\$46,972	\$48,381	\$49,832	\$51,327	\$52,867	\$54,453	\$56,087	\$57,769	\$59,503	\$61,288
Roslyn / Ronald		WWTP	12.235%	\$111,890	\$115,823	\$119,894	\$124,108	\$128,471	\$132,987	\$137,661	\$142,500	\$147,509	\$152,694	\$158,061	\$163,617	\$169,368	\$175,321	\$181,484	\$187,863	\$194,466	\$201,302	\$208,377	\$215,702
Growth Rate	0.50%	Collections	15%	\$0	\$60,000	\$61,800	\$63,654	\$65,564	\$67,531	\$69,556	\$71,643	\$73,792	\$76,006	\$78,286	\$80,635	\$83,054	\$85,546	\$88,112	\$90,755	\$93,478	\$96,282	\$99,171	\$102,146
Suncadia MPR		WWTP	44.127%	\$184,707	\$198,714	\$213,784	\$229,996	\$247,438	\$266,202	\$286,390	\$308,108	\$331,473	\$356,611	\$383,654	\$412,749	\$444,049	\$477,724	\$513,952	\$552,928	\$594,859	\$639,970	\$688,502	\$740,715
Growth Rate	4.45%	Collections	26%	\$0	\$104,000	\$107,120	\$110,334	\$113,644	\$117,053	\$120,565	\$124,181	\$127,907	\$131,744	\$135,696	\$139,767	\$143,960	\$148,279	\$152,728	\$157,309	\$162,029	\$166,889	\$171,896	\$177,053
Regional Total for WWTP			\$531,420	\$566,667	\$604,492	\$645,093	\$688,686	\$735,502	\$785,791	\$839,825	\$897,895	\$960,317	\$1,027,430	\$1,099,603	\$1,177,233	\$1,260,748	\$1,350,613	\$1,447,327	\$1,551,431	\$1,663,511	\$1,784,196	\$1,914,169	
Suncadia WWTP Shortfall			\$256,833	\$229,146	\$204,444	\$182,405	\$162,742	\$145,198	\$129,546	\$115,581	\$103,121	\$92,005	\$82,087	\$73,238	\$65,343	\$58,299	\$52,014	\$46,407	\$41,404	\$36,941	\$32,959	\$29,406	
Subtotal			\$788,253	\$795,814	\$808,936	\$827,499	\$851,428	\$880,700	\$915,337	\$955,406	\$1,001,017	\$1,052,322	\$1,109,517	\$1,172,841	\$1,242,576	\$1,319,047	\$1,402,627	\$1,493,734	\$1,592,836	\$1,700,452	\$1,817,155	\$1,943,574	
Collection System Total			\$0	\$400,000	\$412,000	\$424,360	\$437,091	\$450,204	\$463,710	\$477,621	\$491,950	\$506,708	\$521,909	\$537,567	\$553,694	\$570,304	\$587,413	\$605,036	\$623,187	\$641,883	\$661,139	\$680,973	
Total Wastewater Revenue			\$788,253	\$1,195,814	\$1,220,936	\$1,251,859	\$1,288,519	\$1,330,904	\$1,379,047	\$1,433,027	\$1,492,966	\$1,559,030	\$1,631,426	\$1,710,407	\$1,796,269	\$1,889,351	\$1,990,040	\$2,098,770	\$2,216,023	\$2,342,334	\$2,478,294	\$2,624,548	







# **CHAPTER 8 - APPENDIX**





CHAPTER 8 - APPENDIX

**8.1 APPENDIX DOCUMENTS INDEX**

1. Project Cost Estimates
2. SEPA Checklist
3. DNS
4. NPDES Permit No. WA-0021938
5. City of Cle Elum Municipal Sewer Code
6. City of Cle Elum Sewer Construction Standards
7. Hydraulic Analysis Results

Map A - Existing Collection Survey Data

Map B – Collection System Loading and Recommended Improvements at Project Full Buildout

Map C – Collection System at Projected Year 2040

Map D – Hydraulic Analysis Node and Pipe Map



1.

# PROJECT COST ESTIMATES



**CITY OF CLE ELUM**  
**General Sewer Plan Project List**

1/13/2021

HLA Project No. 20111E

**Sewer Main Replacement 1 - Alley between 2nd and 3rd Oakes to past Bullitt**

Item No.	Description	Payment Specification	Unit	Unit Cost	Overall Quantity	Overall Cost
1	Minor Change	1-04.4(1)	FA	\$15,000.00	1	\$15,000.00
2	Mobilization	1-09.7	LS	\$30,000.00	1	\$30,000.00
3	Project Temporary Traffic Control	1-10.5	LS	\$15,000.00	1	\$15,000.00
4	Unclassified Excavation Incl. Haul	2-03.5	CY	\$40.00	25	\$1,000.00
5	Crushed Surfacing Base Course	4-04.5	TON	\$35.00	325	\$11,375.00
6	Crushed Surfacing Top Course	4-04.5	TON	\$35.00	280	\$9,800.00
7	HMA Cl. 1/2-Inch PG 64-28	5-04.5	TON	\$200.00	25	\$5,000.00
8	Manhole 48 In. Diam. Type 1	7-05.5	EA	\$4,000.00	9	\$36,000.00
9	Reconnect to Existing Manhole	7-05.5	EA	\$1,000.00	2	\$2,000.00
10	Shoring or Extra Excavation	7-08.5	LF	\$3.00	1,655	\$4,965.00
11	Select Backfill, as Directed	7-08.5	CY	\$50.00	45	\$2,250.00
12	PVC Sanitary Sewer Pipe 8 In. Diam.	7-17.5	LF	\$70.00	1,655	\$115,850.00
13	Remove Existing Sewer Pipe	7-17.5	LF	\$70.00	1,655	\$115,850.00
14	Reconnect Side Sewer Pipe	7-18.5	EA	\$1,200.00	55	\$66,000.00
15	Landscape Restoration	8-02.5	FA	\$3,000.00	1	\$3,000.00
16	Cement Conc. Sidewalk 6-Inch Thick	8-14.5	SY	\$85.00	20	\$1,700.00

Construction Cost Subtotal \$434,790

Tax (8.0%) \$34,783

Subtotal \$469,573

Contingency (20%) \$93,915

Subtotal \$563,488

Design Engineering (15%) \$84,523

Construction Engineering (15%) \$84,523

**Total Estimated Cost \$733,000**

**Assumptions**

1. HMA thickness is 2"
2. Crushed Surfacing Top Course thickness is 2" under HMA
3. Crushed Surfacing Top Course thickness is 4" along alleyways
4. Crushed Surfacing Base Course thickness is 4"
5. HMA pavement section width for sewer mains is 8'. 4' trench + 4' past trench.
6. All alleyway entrances have driveway approaches
7. All service connections are along alleyway



**CITY OF CLE ELUM****General Sewer Plan Project List**

1/13/2021

HLA Project No. 20111E

**Sewer Main Replacement 2 - Alley between 2nd and 1st (Pennsylvania to past Oakes)**

Item No.	Description	Payment Specification	Unit	Unit Cost	Overall Quantity	Overall Cost
1	Minor Change	1-04.4(1)	FA	\$10,000.00	1	\$10,000.00
2	Mobilization	1-09.7	LS	\$17,000.00	1	\$17,000.00
3	Project Temporary Traffic Control	1-10.5	LS	\$5,000.00	1	\$5,000.00
4	Crushed Surfacing Base Course	4-04.5	TON	\$35.00	395	\$13,825.00
5	Crushed Surfacing Top Course	4-04.5	TON	\$35.00	250	\$8,750.00
6	HMA Cl. 1/2-Inch PG 64-28	5-04.5	TON	\$200.00	30	\$6,000.00
7	Manhole 48 In. Diam. Type 1	7-05.5	EA	\$4,000.00	9	\$36,000.00
8	Reconnect to Existing Manhole	7-05.5	EA	\$1,000.00	2	\$2,000.00
9	Shoring or Extra Excavation	7-08.5	LF	\$3.00	1,455	\$4,365.00
10	Select Backfill, as Directed	7-08.5	CY	\$50.00	35	\$1,750.00
11	PVC Sanitary Sewer Pipe 8 In. Diam.	7-17.5	LF	\$70.00	1,455	\$101,850.00
12	Remove Existing Sewer Pipe	7-17.5	LF	\$70.00	1,455	\$101,850.00
13	Reconnect Side Sewer Pipe	7-18.5	EA	\$800.00	74	\$59,200.00
14	Cement Conc. Sidewalk 6-Inch Thick	8-14.5	SY	\$85.00	20	\$1,700.00

Construction Cost Subtotal \$369,290

Tax (8.0%) \$29,543

Subtotal \$398,833

Contingency (20%) \$79,767

Subtotal \$478,600

Design Engineering (15%) \$71,790

Construction Engineering (15%) \$71,790

**Total Estimated Cost \$622,000****Assumptions**

1. HMA thickness is 2"
2. Crushed Surfacing Top Course thickness is 2" under HMA
3. Crushed Surfacing Top Course thickness is 4" along alleyways
4. Crushed Surfacing Base Course thickness is 4"
5. HMA pavement section width for sewer mains is 8'. 4' trench + 4' past trench.
6. All alleyway entrances have driveway approaches

**CITY OF CLE ELUM**  
**General Sewer Plan Project List**

1/13/2021

HLA Project No. 20111E

**Sewer Main Replacement 3 - 3rd Street (Oakes to past Bullitt)**

Item No.	Description	Payment Specification	Unit	Unit Cost	Overall Quantity	Overall Cost
1	Minor Change	1-04.4(1)	FA	\$10,000.00	1	\$10,000.00
2	Mobilization	1-09.7	LS	\$38,000.00	1	\$38,000.00
3	Project Temporary Traffic Control	1-10.5	LS	\$5,000.00	1	\$5,000.00
4	Unclassified Excavation Incl. Haul	2-03.5	CY	\$40.00	15	\$600.00
5	Crushed Surfacing Base Course	4-04.5	TON	\$35.00	420	\$14,700.00
6	Crushed Surfacing Top Course	4-04.5	TON	\$35.00	295	\$10,325.00
7	HMA Cl. 1/2-Inch PG 64-28	5-04.5	TON	\$200.00	120	\$24,000.00
8	Manhole 48 In. Diam. Type 1	7-05.5	EA	\$3,500.00	13	\$45,500.00
9	Reconnect to Existing Manhole	7-05.5	EA	\$1,000.00	1	\$1,000.00
10	Shoring or Extra Excavation	7-08.5	LF	\$3.00	2,180	\$6,540.00
11	Select Backfill, as Directed	7-08.5	CY	\$50.00	30	\$1,500.00
12	PVC Sanitary Sewer Pipe 8 In. Diam.	7-17.5	LF	\$70.00	2,180	\$152,600.00
13	Remove Existing Sewer Pipe	7-17.5	LF	\$50.00	2,180	\$109,000.00
14	Reconnect Side Sewer Pipe	7-18.5	LF	\$800.00	52	\$41,600.00
15	Landscape Restoration	8-02.5	FA	\$1,000.00	1	\$1,000.00

Construction Cost Subtotal	\$461,365
Tax (8.0%)	\$36,909
Subtotal	\$498,274
Contingency (20%)	\$99,655
Subtotal	\$597,929
Design Engineering (15%)	\$89,689
Construction Engineering (15%)	\$89,689
<b>Total Estimated Cost</b>	<b>\$777,000</b>

**Assumptions**

1. HMA thickness is 2"
2. Crushed Surfacing Top Course thickness is 2" under HMA
3. Crushed Surfacing Top Course thickness is 4" along alleyways
4. Crushed Surfacing Base Course thickness is 4"
5. HMA pavement section width for sewer mains is 4'.

**CITY OF CLE ELUM**  
**General Sewer Plan Project List**

1/13/2021

HLA Project No. 20111E

**Sewer Main Replacement 4 - Both sides of 2nd Street past Peoh**

Item No.	Description	Payment Specification	Unit	Unit Cost	Overall Quantity	Overall Cost
1	Minor Change	1-04.4(1)	FA	\$5,000.00	1	\$5,000.00
2	Mobilization	1-09.7	LS	\$15,000.00	1	\$15,000.00
3	Project Temporary Traffic Control	1-10.5	LS	\$1,000.00	1	\$1,000.00
4	Crushed Surfacing Base Course	4-04.5	TON	\$35.00	135	\$4,725.00
5	Crushed Surfacing Top Course	4-04.5	TON	\$35.00	165	\$5,775.00
6	Manhole 48 In. Diam. Type 1	7-05.5	EA	\$4,000.00	2	\$8,000.00
7	Reconnect to Existing Manhole	7-05.5	EA	\$1,000.00	2	\$2,000.00
8	Shoring or Extra Excavation	7-08.5	LF	\$3.00	900	\$2,700.00
9	PVC Sanitary Sewer Pipe 8 In. Diam.	7-17.5	LF	\$70.00	900	\$63,000.00
10	Remove Existing Sewer Pipe	7-17.5	LF	\$50.00	900	\$45,000.00
11	Reconnect Side Sewer Pipe	7-18.5	EA	\$1,200.00	27	\$32,400.00
Construction Cost Subtotal						\$184,600
Tax (8.0%)						\$14,768
Subtotal						\$199,368
Contingency (20%)						\$39,874
Subtotal						\$239,242
Design Engineering (15%)						\$35,886
Construction Engineering (15%)						\$35,886
<b>Total Estimated Cost</b>						<b>\$311,000</b>

Assumptions

1. Crushed Surfacing Top Course thickness is 4"
2. Crushed Surfacing Base Course thickness is 4"

**CITY OF CLE ELUM**  
**General Sewer Plan Project List**

1/13/2021

HLA Project No. 20111E

**Sewer Main Replacement 5 - North of Railroad between Peoh and Bullitt**

Item No.	Description	Payment Specification	Unit	Unit Cost	Overall Quantity	Overall Cost
1	Minor Change	1-04.4(1)	FA	\$5,000.00	1	\$5,000.00
2	Mobilization	1-09.7	LS	\$12,000.00	1	\$12,000.00
3	Project Temporary Traffic Control	1-10.5	LS	\$1,000.00	1	\$1,000.00
4	Unclassified Excavation Incl. Haul	2-03.5	CY	\$40.00	10	\$400.00
5	Crushed Surfacing Base Course	4-04.5	TON	\$35.00	130	\$4,550.00
6	Crushed Surfacing Top Course	4-04.5	TON	\$35.00	95	\$3,325.00
7	HMA Cl. 1/2-Inch PG 64-28	5-04.5	TON	\$150.00	35	\$5,250.00
8	Manhole 48 In. Diam. Type 1	7-05.5	EA	\$4,000.00	4	\$16,000.00
9	Shoring or Extra Excavation	7-08.5	LF	\$3.00	555	\$1,665.00
10	Select Backfill, as Directed	7-08.5	CY	\$45.00	40	\$1,800.00
11	PVC Sanitary Sewer Pipe 8 In. Diam.	7-17.5	LF	\$70.00	555	\$38,850.00
12	Remove Existing Sewer Pipe	7-17.5	LF	\$50.00	555	\$27,750.00
13	Reconnect Side Sewer Pipe	7-18.5	EA	\$1,200.00	22	\$26,400.00
14	Cement Conc. Sidewalk 6-Inch Thick	8-14.5	SY	\$85.00	5	\$425.00

Construction Cost Subtotal \$144,415

Tax (8.0%) \$11,553

Subtotal \$155,968

Contingency (20%) \$31,194

Subtotal \$187,162

Design Engineering (15%) \$28,074

Construction Engineering (15%) \$28,074

**Total Estimated Cost \$243,000**

Assumptions

1. HMA thickness is 3"
2. Crushed Surfacing Top Course thickness is 3"
3. Crushed Surfacing Base Course thickness is 6"
4. HMA pavement section width for sewer mains is 8'. 4' trench + 4' past trench.



**CITY OF CLE ELUM**  
**General Sewer Plan Project List**

1/13/2021

HLA Project No. 20111E

**Sewer Main Replacement 6 - Along Billings, West of Oakes, North of Railroad**

Item No.	Description	Payment Specification	Unit	Unit Cost	Overall Quantity	Overall Cost
1	Minor Change	1-04.4(1)	FA	\$5,000.00	1	\$5,000.00
2	Mobilization	1-09.7	LS	\$7,000.00	1	\$7,000.00
3	Project Temporary Traffic Control	1-10.5	LS	\$5,000.00	1	\$5,000.00
4	Unclassified Excavation Incl. Haul	2-03.5	CY	\$40.00	55	\$2,200.00
5	Crushed Surfacing Base Course	4-04.5	TON	\$35.00	105	\$3,675.00
6	Crushed Surfacing Top Course	4-04.5	TON	\$35.00	50	\$1,750.00
7	HMA Cl. 1/2-Inch PG 64-28	5-04.5	TON	\$200.00	55	\$11,000.00
8	Manhole 48 In. Diam. Type 1	7-05.5	EA	\$4,000.00	1	\$4,000.00
9	Reconnect to Existing Manhole	7-05.5	EA	\$1,000.00	2	\$2,000.00
10	Shoring or Extra Excavation	7-08.5	LF	\$3.00	360	\$1,080.00
11	Select Backfill, as Directed	7-08.5	CY	\$50.00	65	\$3,250.00
12	PVC Sanitary Sewer Pipe 8 In. Diam.	7-17.5	LF	\$70.00	360	\$25,200.00
13	Remove Existing Sewer Pipe	7-17.5	LF	\$50.00	360	\$18,000.00
14	Reconnect Side Sewer Pipe	7-18.5	EA	\$1,200.00	3	\$3,600.00

Construction Cost Subtotal \$92,755

Tax (8.0%) \$7,420

Subtotal \$100,175

Contingency (20%) \$20,035

Subtotal \$120,210

Design Engineering (15%) \$18,032

Construction Engineering (15%) \$18,032

**Total Estimated Cost \$156,000**

Assumptions

1. HMA thickness is 3"
2. Crushed Surfacing Top Course thickness is 3"
3. Crushed Surfacing Base Course thickness is 6"
4. HMA pavement section width for sewer mains is 8'. 4' trench + 4' past trench.

**CITY OF CLE ELUM****General Sewer Plan Project List**

1/13/2021

HLA Project No. 20111E

**Sewer Main Replacement 7 - South of 2nd , West of Yakima**

Item No.	Description	Payment Specification	Unit	Unit Cost	Overall Quantity	Overall Cost
1	Minor Change	1-04.4(1)	FA	\$5,000.00	1	\$5,000.00
2	Mobilization	1-09.7	LS	\$6,000.00	1	\$6,000.00
3	Project Temporary Traffic Control	1-10.5	LS	\$1,000.00	1	\$1,000.00
4	Crushed Surfacing Base Course	4-04.5	TON	\$35.00	55	\$1,925.00
5	Crushed Surfacing Top Course	4-04.5	TON	\$35.00	40	\$1,400.00
6	Manhole 48 In. Diam. Type 1	7-05.5	EA	\$4,000.00	1	\$4,000.00
7	Reconnect to Existing Manhole	7-05.5	EA	\$1,000.00	1	\$1,000.00
8	Shoring or Extra Excavation	7-08.5	LF	\$3.00	275	\$825.00
9	PVC Sanitary Sewer Pipe 8 In. Diam.	7-17.5	LF	\$70.00	275	\$19,250.00
10	Remove Existing Sewer Pipe	7-17.5	LF	\$50.00	275	\$13,750.00
11	Reconnect Side Sewer Pipe	7-18.5	EA	\$1,200.00	12	\$14,400.00
Construction Cost Subtotal						\$68,550
Tax (8.0%)						\$5,484
Subtotal						\$74,034
Contingency (20%)						\$14,807
Subtotal						\$88,841
Design Engineering (15%)						\$13,326
Construction Engineering (15%)						\$13,326
<b>Total Estimated Cost</b>						<b>\$115,000</b>

Assumptions

1. Crushed Surfacing Top Course thickness is 4"
2. Crushed Surfacing Base Course thickness is 4"

**CITY OF CLE ELUM**  
**General Sewer Plan Project List**

1/13/2021

HLA Project No. 20111E

**Sewer Main Replacement 8 - West of Stafford and West of Steiner**

Item No.	Description	Payment Specification	Unit	Unit Cost	Overall Quantity	Overall Cost
1	Minor Change	1-04.4(1)	FA	\$15,000.00	1	\$15,000.00
2	Mobilization	1-09.7	LS	\$18,000.00	1	\$18,000.00
3	Project Temporary Traffic Control	1-10.5	LS	\$1,000.00	1	\$1,000.00
4	Unclassified Excavation Incl. Haul	2-03.5	CY	\$40.00	50	\$2,000.00
5	Crushed Surfacing Base Course	4-04.5	TON	\$35.00	195	\$6,825.00
6	Crushed Surfacing Top Course	4-04.5	TON	\$35.00	140	\$4,900.00
7	HMA Cl. 1/2-Inch PG 64-28	5-04.5	TON	\$200.00	50	\$10,000.00
8	Manhole 48 In. Diam. Type 1	7-05.5	EA	\$4,000.00	2	\$8,000.00
9	Reconnect to Existing Manhole	7-05.5	EA	\$1,000.00	3	\$3,000.00
10	Shoring or Extra Excavation	7-08.5	LF	\$3.00	1,010	\$3,030.00
11	Select Backfill, as Directed	7-08.5	CY	\$50.00	90	\$4,500.00
12	PVC Sanitary Sewer Pipe 8 In. Diam.	7-17.5	LF	\$70.00	1,010	\$70,700.00
13	Remove Existing Sewer Pipe	7-17.5	LF	\$50.00	1,010	\$50,500.00
14	Reconnect Side Sewer Pipe	7-18.5	EA	\$1,200.00	14	\$16,800.00
15	Landscape Restoration	8-02.5	FA	\$500.00	1	\$500.00

Construction Cost Subtotal	\$214,755
Tax (8.0%)	\$17,180
Subtotal	\$231,935
Contingency (20%)	\$46,387
Subtotal	\$278,322
Design Engineering (15%)	\$41,748
Construction Engineering (15%)	\$41,748
<b>Total Estimated Cost</b>	<b>\$362,000</b>

**Assumptions**

1. HMA thickness is 2"
2. Crushed Surfacing Top Course thickness is 2" under HMA
3. Crushed Surfacing Top Course thickness is 4" along alleyway
4. Crushed Surfacing Base Course thickness is 4"
5. HMA pavement section width for sewer mains is 8'. 4' trench + 4' past trench.

**CITY OF CLE ELUM**  
**General Sewer Plan Project List**

1/13/2021

HLA Project No. 20111E

**Sewer Main Replacement 9 - Between Alpha and Reed St**

Item No.	Description	Payment Specification	Unit	Unit Cost	Overall Quantity	Overall Cost
1	Minor Change	1-04.4(1)	FA	\$5,000.00	1	\$5,000.00
2	Mobilization	1-09.7	LS	\$15,000.00	1	\$15,000.00
3	Project Temporary Traffic Control	1-10.5	LS	\$1,000.00	1	\$1,000.00
4	Crushed Surfacing Base Course	4-04.5	TON	\$35.00	140	\$4,900.00
5	Crushed Surfacing Top Course	4-04.5	TON	\$35.00	130	\$4,550.00
6	Manhole 48 In. Diam. Type 1	7-05.5	EA	\$4,000.00	3	\$12,000.00
7	Reconnect to Existing Manhole	7-05.5	EA	\$1,000.00	1	\$1,000.00
8	Shoring or Extra Excavation	7-08.5	LF	\$3.00	990	\$2,970.00
9	Select Backfill, as Directed	7-08.5	CY	\$50.00	175	\$8,750.00
10	PVC Sanitary Sewer Pipe 8 In. Diam.	7-17.5	LF	\$70.00	940	\$65,800.00
11	Remove Existing Sewer Pipe	7-17.5	LF	\$50.00	940	\$47,000.00
12	Reconnect Side Sewer Pipe	7-18.5	EA	\$1,200.00	7	\$8,400.00
13	Landscape Restoration	8-02.5	FA	\$2,500.00	1	\$2,500.00

Construction Cost Subtotal \$178,870

Tax (8.0%) \$14,310

Subtotal \$193,180

Contingency (20%) \$38,636

Subtotal \$231,816

Design Engineering (15%) \$34,772

Construction Engineering (15%) \$34,772

**Total Estimated Cost \$301,000**

Assumptions

1. HMA thickness is 2"
2. Crushed Surfacing Top Course thickness is 2" under HMA
3. Crushed Surfacing Base Course thickness is 4"
4. HMA pavement section width for sewer mains is 8'. 4' trench + 4' past trench.
5. Backfill sewer with native through vegetated areas



**CITY OF CLE ELUM**  
**General Sewer Plan Project List**

1/13/2021

HLA Project No. 20111E

**Sewer Main Replacement 10 - Along Reed**

Item No.	Description	Payment Specification	Unit	Unit Cost	Overall Quantity	Overall Cost
1	Minor Change	1-04.4(1)	FA	\$5,000.00	1	\$5,000.00
2	Mobilization	1-09.7	LS	\$19,000.00	1	\$19,000.00
3	Project Temporary Traffic Control	1-10.5	LS	\$2,000.00	1	\$2,000.00
4	Unclassified Excavation Incl. Haul	2-03.5	CY	\$40.00	30	\$1,200.00
5	Crushed Surfacing Base Course	4-04.5	TON	\$35.00	215	\$7,525.00
6	Crushed Surfacing Top Course	4-04.5	TON	\$35.00	60	\$2,100.00
7	HMA Cl. 1/2-Inch PG 64-28	5-04.5	TON	\$200.00	30	\$6,000.00
8	Manhole 48 In. Diam. Type 1	7-05.5	EA	\$4,000.00	5	\$20,000.00
9	Reconnect to Existing Manhole	7-05.5	EA	\$1,000.00	2	\$2,000.00
10	Shoring or Extra Excavation	7-08.5	LF	\$3.00	1,115	\$3,345.00
11	Select Backfill, as Directed	7-08.5	CY	\$50.00	135	\$6,750.00
12	PVC Sanitary Sewer Pipe 8 In. Diam.	7-17.5	LF	\$70.00	1,115	\$78,050.00
13	Remove Existing Sewer Pipe	7-17.5	LF	\$50.00	1,115	\$55,750.00
14	Reconnect Side Sewer Pipe	7-18.5	EA	\$1,200.00	15	\$18,000.00
15	Landscape Restoration	8-02.5	FA	\$2,500.00	1	\$2,500.00

Construction Cost Subtotal	\$229,220
Tax (8.0%)	\$18,338
Subtotal	\$247,558
Contingency (20%)	\$49,512
Subtotal	\$297,069
Design Engineering (15%)	\$44,560
Construction Engineering (15%)	\$44,560
<b>Total Estimated Cost</b>	<b>\$386,000</b>

**Assumptions**

- HMA thickness is 2"
- Crushed Surfacing Top Course thickness is 2" under HMA
- Crushed Surfacing Top Course thickness is 4" along gravel roads
- Crushed Surfacing Base Course thickness is 4"
- HMA pavement section width for sewer mains is 8'. 4' trench + 4' past trench.
- Backfill sewer with native through vegetated areas



**2.**

## **SEPA CHECKLIST**

**CITY OF CLE ELUM  
Kittitas County, Washington**

**CITY OF CLE ELUM  
GENERAL SEWER PLAN**

**STATE ENVIRONMENTAL POLICY ACT**

**ENVIRONMENTAL CHECKLIST**

**Prepared by**



**HLA Project No. 20111E  
February 2021**

## **A. Background**

1. Name of proposed project, if applicable: *2021 General Sewer Plan (GSP)*
2. Name of applicant: *City of Cle Elum*
3. Address and phone number of applicant and contact person:  

<i>Robert Omans, City Administrator</i>	<i>Dean P. Smith, PE</i>
<i>City of Cle Elum</i>	<i>HLA Engineering and Land Surveying, Inc.</i>
<i>119 West First Street</i>	<i>2803 River Road</i>
<i>Cle Elum, WA 98922</i>	<i>Yakima, WA 98902</i>
<i>(509) 674-2262</i>	
4. Date checklist prepared: *February 2021*
5. Agency requesting checklist: *City of Cle Elum*
6. Proposed timing or schedule (including phasing, if applicable):  
*GSP adoption planned in May 2022.*
7. Do you have any plans for future additions, expansion, or further activity related to or connected with this proposal? If yes, explain.  
*The GSP identifies on-going maintenance activities and replacement and growth-related improvements for the City's wastewater collection system in the UGA and projects at the regional WWTP.*
8. List any environmental information you know about that has been prepared, or will be prepared, directly related to this proposal.  
*None.*
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 at this time.*
10. List any government approvals or permits that will be needed for your proposal, if known.
  - Cle Elum City Council – Approval and adoption of GSP.
  - Department of Ecology – Approval of GSP and related projects.
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.)  
*Adoption of the GSP for the City of Cle Elum. The plan identifies the following recommended maintenance-related improvements to the Cle Elum wastewater System:*



*Operational and Maintenance (O&M) Improvements:*

1. *Project 1.*
2. *Project 2.*
3. *Project 3.*
4. *Project 4.*
5. *Project 5.*
6. *Project 6.*

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 proposed sanitary sewer system improvements are located throughout the incorporated and unincorporated areas within the City of Cle Elum Urban Growth Area boundary and are shown on Figure 7-1 of the GSP.*

## **B. Environmental Elements**

### **1. Earth**

a. General description of the site:

(circle one): Flat, rolling, hilly, steep slopes, mountainous, other: *Existing development is relatively flat. Newer and future developments may be in hilly and steep slope areas.*

b. What is the steepest slope on the site (approximate percent slope)? *Up to 45%*

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.

*There exists a wide variety of soils within the current Cle Elum and South Cle Elum sanitary sewer service areas, including river cobble, glacial outwash, silty gravel with sand, silty fine sand, sandstone, and loam. None of the soils within the Cle Elum sanitary sewer service areas are believed to be classified as prime farmland.*

d. Are there surface indications or history of unstable soils in the immediate vicinity? If so, describe.

*No.*

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.

*None proposed.*

- f. Could erosion occur as a result of clearing, construction, or use? If so, generally describe.

*No. Project will occur in existing roadways or as part of a development.*

- g. About what percent of the site will be covered with impervious surfaces after project construction (for example, asphalt or buildings)?

*No additional impervious surfaces.*

- h. Proposed measures to reduce or control erosion, or other impacts to the earth, if any:

*None.*

## **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.

*None.*

- 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:

*None.*

## **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 Yakima River, Cle Elum River, and Crystal Creek lie within the current and future water service areas.*

- 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.

*None.*

- 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.

*The City of Cle Elum Urban Growth Area boundary contain lands located within the 100-year floodplain of the Yakima River.*

- 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 City of Cle Elum GSP describes the continuous projected growth related treated wastewater discharges to the Yakima River from the regional WWTP serving Roslyn/Ronald, Suncandia, South Cle Elum, and Cle Elum.*

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.

*None.*

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.

*Not applicable.*

- 2) Could waste materials enter ground or surface waters? If so, generally describe.

*No.*

- 3) Does the proposal alter or otherwise affect drainage patterns in the vicinity of the site? If so, describe.

*No.*

d. Proposed measures to reduce or control surface, ground, and runoff water, and drainage pattern impacts, if any:

*Not applicable.*

#### 4. **Plants** [\[help\]](#)

- a. Check the types of vegetation found on the site:

☒ deciduous tree: alder, maple, aspen, other  
☒ evergreen tree: fir, cedar, pine, other  
☒ shrubs  
☒ grass  
☐ pasture  
☐ crop or grain  
☐ Orchards, vineyards or other permanent crops.  
☒ wet soil plants: cattail, buttercup, bullrush, skunk cabbage, other  
☐ water plants: water lily, eelgrass, milfoil, other  
☐ other types of vegetation

- b. What kind and amount of vegetation will be removed or altered?

*None.*

- c. List threatened and endangered species known to be on or near the site.

*Two threatened or candidate plant species are on the U.S. Department of Fish & Wildlife list for Kittitas County, the Ute ladies'-tresses (*Spiranthes diluvialis*), and the Basalt daisy (*Erigeron basalticus*). Neither of these plants will be effected by completion of the City of Cle Elum GSP.*

- d. Proposed landscaping, use of native plants, or other measures to preserve or enhance vegetation on the site, if any:

*None.*

- e. List all noxious weeds and invasive species known to be on or near the site.

*None. Because the project is in existing developed areas within the City limits.*

#### 5. **Animals** [\[help\]](#)

- 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.

*Thirteen endangered, threatened, designated, or candidate animal species are on the U.S. Department of Fish & Wildlife list or the NOAA Fisheries list for Kittitas County, these being:*

1. Gray wolf (*Canis lupus*); mammal;
2. Canada lynx (*Lynx canadensis*); mammal;
3. Marbled murrelet (*Brachyranphus marmoratus*); bird;
4. Northern spotted owl (*Strix occidentalis caurina*); bird;
5. Yellow-billed cuckoo (*Coccyzus americanus*); bird;
6. Bull Trout (*Salvelinus confluentus*); fish; and
7. Critical habitat for the Columbia River distinct population segment of the bull trout; fish;
8. Bald eagle (*Haliaeetus leucocephalus*); bird;
9. Black Swift (*Cypseloides niger*); bird;
10. Brewer's sparrow (*Spizella breweri*); bird;
11. Golden eagle (*Aquila chrysaetos*); bird;
12. Lewis's Woodpecker (*Melanerpes lewis*)
13. Oliver-sided flycatcher (*Contopus cooperi*); bird;
14. Sage thrasher (*Oreoscoptes montanus*); bird;
15. White headed woodpecker (*Picoides albolarvatus*); bird;
16. Williamson's sapsucker (*Sphyrapicus thyroideus*); bird; and
17. Willow flycatcher (*Empidonax traillii*); bird

*None of these animals will be effected by completion of the joint City of Cle Elum GSP.*

c. Is the site part of a migration route? If so, explain.

*The City of Cle Elum Urban Growth Area boundary may be within migratory routes for some bird and fish species.*

d. Proposed measures to preserve or enhance wildlife, if any:

*None.*

e. List any invasive animal species known to be on or near the site.

*None. Because the project is in existing developed areas within the city limits.*

## **6. Energy and Natural Resources** [\[help\]](#)

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.

*None.*

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:

*None.*

## **7. Environmental Health** [\[help\]](#)



- 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.

*No.*

- 1) Describe any known or possible contamination at the site from present or past uses.

*None.*

- 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.

*None.*

- 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.*

- 4) Describe special emergency services that might be required.

*None.*

- 5) Proposed measures to reduce or control environmental health hazards, if any:

*None.*

**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.*

- 3) Proposed measures to reduce or control noise impacts, if any:

*None.*

**8. Land and Shoreline Use** [\[help\]](#)

- 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.

*The City of Cle Elum Urban Growth Area is a combination of residential, commercial, industrial, agricultural, public, and quasi-public land uses.*

- 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?  
*Not applicable.*
- 1) Will the proposal affect or be affected by surrounding working farm or forest land normal business operations, such as oversize equipment access, the application of pesticides, tilling, and harvesting? If so, how:  
*Not applicable.*
- c. Describe any structures on the site.  
*Not applicable.*
- d. Will any structures be demolished? If so, what?  
*No.*
- e. What is the current zoning classification of the site?  
*Zoning classifications within the City of Cle Elum Urban Growth Area include residential, commercial, agricultural, industrial, rural, and suburban.*
- f. What is the current comprehensive plan designation of the site?  
*Not applicable.*
- g. If applicable, what is the current shoreline master program designation of the site?  
*Not applicable.*
- h. Has any part of the site been classified as a critical area by the city or county? If so, specify.  
*No.*
- i. Approximately how many people would reside or work in the completed project?  
*Not applicable.*
- j. Approximately how many people would the completed project displace?  
*None.*
- k. Proposed measures to avoid or reduce displacement impacts, if any:  
*Not applicable.*
- L. Proposed measures to ensure the proposal is compatible with existing and projected land uses and plans, if any:  
*None.*

- m. Proposed measures to reduce or control impacts to agricultural and forest lands of long-term commercial significance, if any:

*None.*

**9. Housing** [\[help\]](#)

- a. Approximately how many units would be provided, if any? Indicate whether high, middle, or low-income housing.

*None.*

- b. Approximately how many units, if any, would be eliminated? Indicate whether high, middle, or low-income housing.

*None.*

- c. Proposed measures to reduce or control housing impacts, if any:

*None.*

**10. Aesthetics** [\[help\]](#)

- a. What is the tallest height of any proposed structure(s), not including antennas; what is the principal exterior building material(s) proposed?

*Not applicable.*

- b. What views in the immediate vicinity would be altered or obstructed?

*Not applicable.*

- b. Proposed measures to reduce or control aesthetic impacts, if any:

*Not applicable.*

**11. Light and Glare** [\[help\]](#)

- 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:

*None.*

## **12. Recreation** [\[help\]](#)

- a. What designated and informal recreational opportunities are in the immediate vicinity?

*The City of Cle Elum Urban Growth Area contains numerous municipal parks and school playgrounds. Numerous informal recreational opportunities such as fishing, bird watching, walking, jogging, bicycling, etc., exist within the Urban Growth 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:

*None.*

## **13. Historic and cultural preservation** [\[help\]](#)

- 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.

*Not applicable.*

- 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.

*Not applicable.*

- 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.

*None.*

- 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.

*None.*

## **14. Transportation** [\[help\]](#)

- 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 of Cle Elum Urban Growth Area contains numerous City, Town, Kittitas County, and Washington Department of Transportation streets and highways. Public streets are shown on Figure 1-2 of the GSP.*

- 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?

*Regional bus service is provided by Greyhound Bus Lines. Greyhound Bus Lines has a terminal in Ellensburg. Greyhound provides service to Seattle and Spokane via I-90, and service to Yakima via I-82 from Ellensburg. The Central Washington Airporter Shuttle provides an alternative to driving to Seattle with one stop in Cle Elum, one stop in North Bend, and two stops in Seattle. HopeSource and People For People provide additional transportation services. The City of Cle Elum does not operate a local bus service.*

- c. How many additional parking spaces would the completed project or non-project proposal have? How many would the project or proposal eliminate?

*Not applicable.*

- 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.

*The Burlington Northern-Santa Fe Stampede Pass main line traverses the City of Cle Elum Urban Growth Area*

- 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*

- 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:

*None*

## **15. Public Services** [\[help\]](#)

- 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.

*No.*

- b. Proposed measures to reduce or control direct impacts on public services, if any.

*None.*



## 16. Utilities [\[help\]](#)

- a. Circle utilities currently available at the site:

electricity, natural gas, water, refuse service, telephone, sanitary sewer, septic system,

other.

*Available at numerous locations within the City of Cle Elum Urban Growth Area.*

- b. 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.

*None.*

## C. Signature [\[HELP\]](#)

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 [\[HELP\]](#)

(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?

*This General Sewer Plan addresses and identifies improvements to and expansion of the City of Cle Elum sanitary sewer system necessary to accommodate projected growth within the Urban Growth Area of these communities over the next 20-year period. No increases in the discharge of treated wastewater, emissions to air, production, storage, or release of toxic or hazardous substances, or production of noise are likely as a result of this proposal.*

Proposed measures to avoid or reduce such increases are:

*Not applicable.*

2. How would the proposal be likely to affect plants, animals, fish, or marine life?

*No effects are likely as a result of this proposal.*

Proposed measures to protect or conserve plants, animals, fish, or marine life are:

*Not applicable.*

3. How would the proposal be likely to deplete energy or natural resources?

*Because some sanitary sewer system components operate electrically, this proposal may result in a minor increase in energy requirements to operate electrical equipment over current amounts.*

Proposed measures to protect or conserve energy and natural resources are:

*The increase of electrical energy requirements will be reduced to the extent possible through the use of high-efficiency electrical motors and equipment.*

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?

*The proposal is not likely to use or affect environmentally sensitive areas.*

Proposed measures to protect such resources or to avoid or reduce impacts are:

*Environmentally sensitive areas were identified during the development of Cle Elum's Comprehensive Plan. These areas will be avoided when detailed plans are prepared and pipeline alignments selected.*

5. How would the proposal be likely to affect land and shoreline use, including whether it would allow or encourage land or shoreline uses incompatible with existing plans?

*The proposal will not affect land or shoreline use in ways incompatible with existing plans.*

Proposed measures to avoid or reduce shoreline and land use impacts are:

*None*

6. How would the proposal be likely to increase demands on transportation or public services and utilities?

*This proposal identifies the future demand upon the Cle Elum sanitary sewer system, and identifies the measures the City will take to accommodate that future demand.*

Proposed measures to reduce or respond to such demand(s) are:

*Proposed measures include expansion of the sanitary sewer system to serve lands within the Urban Growth Areas of the City.*

7. Identify, if possible, whether the proposal may conflict with local, state, or federal laws or requirements for the protection of the environment.

*This proposal does not conflict with laws or requirements for the protection of the environment. Improvements identified within this proposal will allow the City to comply with public health requirements.*



**3.**

**DNS**

## DETERMINATION OF NONSIGNIFICANCE (DNS)

*Description of Proposal:*

General Sewer Plan.

*Proponents:*

City of Cle Elum

*Location of proposal, including street address, if any:*

City of Cle Elum  
119 West First Street  
Cle Elum, WA 98922

*Lead Agency:*

City of Cle Elum

*The lead agency for this proposal has determined that it does not have a probable significant adverse impact on the environment. An environmental impact statement (EIS) is not required under RCW 43.21C.030(2)(c). This decision was made after review of a completed environmental checklist and other information on file with the lead agency. This information is available to the public on request.*

☐ *There is no comment period for this DNS.*

☒ *This DNS is issued under 197-11-340(2); the lead agency will not act on this proposal for 14 days from the date below. Comments must be submitted by*

\_\_\_\_\_.

City of Cle Elum

*Responsible Official:*

*Position/title:*

*Address:*

Mike Engelhart  
Public Works Director  
119 West First Street  
Cle Elum, WA 98922

*Date:* \_\_\_\_\_

*Signature:* \_\_\_\_\_





4.

# **NPDES PERMIT NO. WA-0021938**

Issuance Date: August 22, 2019  
Effective Date: October 1, 2019  
Expiration Date: September 30, 2024

**National Pollutant Discharge Elimination System  
Waste Discharge Permit No. WA0021938**

State of Washington  
DEPARTMENT OF ECOLOGY  
Central Regional Office  
1250 West Alder Street  
Union Gap, WA 98903

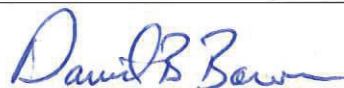
In compliance with the provisions of  
The State of Washington Water Pollution Control Law  
Chapter 90.48 Revised Code of Washington  
and

The Federal Water Pollution Control Act  
(The Clean Water Act)  
Title 33 United States Code, Section 1342 et seq.

**City of Cle Elum  
Upper Kittitas County  
Regional Wastewater Treatment Facility  
119 West First Street  
Cle Elum, WA 98922**

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

Plant Location: 500 Owens Road Cle Elum, Washington 98922	Receiving Water: Yakima River
Treatment Type: Sequential Batch Reactor	Approximate Discharge Location:  Latitude: 47.18521; Longitude: -120.91822



David B. Bowen  
Section Manager  
Water Quality Program  
Central Regional Office  
Washington State Department of Ecology

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## Summary of Permit Report Submittals

Refer to the Special and General Conditions of this permit for additional submittal requirements. The following table is for quick reference only. Enforceable submittal requirements are contained in the permit narrative.

Permit Section	Submittal	Frequency	First Submittal Date
S2.A	EPA Priority Pollutant Data - Single Sample Data	2/permit cycle	<b>October 15, 2021</b> <b>October 15, 2023</b>
S3.A	<b>Monthly</b> Discharge Monitoring Report (DMR)	Monthly	<b>November 15, 2019</b>
S3.A	<b>Quarterly</b> DMR	Quarterly	<b>January 15, 2020</b>
S3.F	Reporting Permit Violations	As necessary	
S4.C	Notification of New or Altered Sources	As necessary	
S4.E	Infiltration and Inflow Evaluation	1/permit cycle	<b>February 15, 2020</b>
S4.F	Wasteload Assessment	1/permit cycle	<b>February 15, 2020</b>
S5.F	Bypass Notification	As necessary	
S5.G.a	Operations and Maintenance Manual Update and/or Review Confirmation Letter	Annually	<b>October 1, 2020</b>
S6.E	List of Industrial Users	Annually	
S8.	Application for Permit Renewal	1/permit cycle	<b>September 30, 2023</b>
S9.	Update Spill Control Plan Submittal	Annually	<b>October 1, 2023</b>
S10.	Outfall Evaluation	1/permit cycle	<b>October 1, 2023</b>
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 **October 1, 2019**, the Permittee may discharge treated domestic wastewater to the Yakima River at the permitted location subject to compliance with the following limits:

Effluent Limits: Outfall 001		
Latitude 47.18567		Longitude -120.91901
Parameter	Average Monthly <sup>a</sup>	Average Weekly <sup>b</sup>
Biochemical Oxygen Demand (5-day) (BOD <sub>5</sub> )	30 milligrams/liter (mg/L) 727.5 pounds/day (lbs/day) >85% removal of influent BOD <sub>5</sub>	45 mg/L 1,091.3 lbs/day
Total Suspended Solids (TSS)	30 mg/L 562.5 lbs/day >85% removal of influent TSS	45 mg/L 843.8 lbs/day
Parameter	Average Monthly	Maximum daily
Residual Chlorine <sup>c</sup>	Not Required	0.5 mg/L
Parameter	Minimum	Maximum
pH	6.0 standard units	9.0 standard units
Parameter	Monthly Geometric Mean	Weekly Geometric Mean
Fecal Coliform Bacteria <sup>d</sup>	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	Chlorine limits apply only during periods when chlorine is used for partial or full disinfection of the effluent. When UV disinfection is the only disinfection method used, chlorine limits do not apply. When not using chlorine for disinfection during the monitoring period, enter qualifier code "M" into the WQWebDMR form.
d	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: <a href="https://fortress.wa.gov/ecy/publications/documents/0410020.pdf">https://fortress.wa.gov/ecy/publications/documents/0410020.pdf</a>

## **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 width of the chronic mixing zone is limited to a distance of 15.2 feet. The length of the chronic mixing zone extends 300 feet downstream of the outfall. The mixing zone extends from the bottom to the top of the water column. The concentration of pollutants at the edge of the chronic zone must meet chronic aquatic life criteria and human health criteria.

#### **Acute mixing zone**

The width of the acute mixing zone is limited to a distance of 5 feet in any horizontal direction from the outfall. The length of the acute mixing zone extends 30 feet downstream of the outfall. The mixing zone extends from the bottom to the top of the water column. The concentration of pollutants at the edge of the acute zone must meet acute aquatic life criteria.

**Table 1 Dilution Factor**

Acute Aquatic Life Criteria	2.8
Chronic Aquatic Life Criteria	38.4

## **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
<b>(1) Wastewater influent</b>			
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.			
Biochemical Oxygen Demand (BOD <sub>5</sub> )	mg/L	1/week	24-hr composite <sup>a</sup>
Biochemical Oxygen Demand (BOD <sub>5</sub> )	lbs/day	1/week	Calculation
Total Suspended Solids (TSS)	mg/L	1/week	24-hr composite <sup>a</sup>
Total Suspended Solids (TSS)	lbs/day	1/week	calculation
<b>(2) Final wastewater effluent</b>			
Final Wastewater Effluent means wastewater exiting the last treatment process or operation. Typically, this is after or at the exit from the chlorine contact chamber or other disinfection process. The Permittee may take effluent samples for the BOD <sub>5</sub> analysis before or after the disinfection process. If taken after, the Permittee must dechlorinate and reseed the sample.			
Flow	mgd	Continuous <sup>b</sup>	Metered/recorded
BOD <sub>5</sub>	mg/L	1/week	24-hr composite
BOD <sub>5</sub> <sup>c</sup>	lbs/day	1/week	calculation
BOD <sub>5</sub>	% removal <sup>d</sup>	Monthly	calculation
TSS	mg/L	1/week	24-hr composite
TSS	lbs/day	1/week	calculation
TSS	% removal	Monthly	calculation
Chlorine (Total Residual) <sup>e</sup>	mg/L	5/week	Grab <sup>f</sup>

Parameter	Units & Speciation	Minimum Sampling Frequency	Sample Type
Chlorine (Total Residual)	lbs/day	5/week	Grab
Fecal Coliform <sup>g</sup>	# /100 ml Membrane filtration SM 9222 D	2/week	Grab
pH	Standard Units	5/week	Grab
Temperature (daily max)	Degrees centigrade (°C)	Continuous <sup>h</sup>	Metered/recorded
Total Ammonia	mg/L	1/week	24-hr composite
Total Ammonia	lbs/day	1/week	calculation
Phosphorus Total	mg/L P	Monthly	Grab
Total Nitrogen	mg/L	Monthly	Grab
Oil & Grease	mg/L	4/year	Grab
Total Hardness	mg/L	4/year	Grab
EPA Priority Pollutants - metals, cyanide, phenols, DDT, Benzo[a]pyrene	Reference Appendix A	2/permit cycle <sup>i</sup>	Reference Appendix A
a	24-hour composite means a series of individual samples collected over a 24-hour period into a single container, and analyzed as one sample.		
b	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.		
c	Take effluent samples for the BOD <sub>5</sub> analysis before or after the disinfection process. If taken after, dechlorinate and reseed the sample.		
d	$\% \text{ removal} = \frac{\text{Influent concentration (mg/L)} - \text{Effluent concentration (mg/L)}}{\text{Influent concentration (mg/L)}} \times 100$ <p>Calculate the percent (%) removal of BOD<sub>5</sub> and TSS using the above equation.</p>		

Parameter	Units & Speciation	Minimum Sampling Frequency	Sample Type
e	The Permittee must monitor total chlorine residual concentrations only when using chlorine for disinfection purposes.		
f	Grab means an individual sample collected over a fifteen (15) minute, or less, period.		
g	Report a numerical value for fecal coliforms following the procedures in Ecology's <i>Information Manual for Wastewater Treatment Plant Operators</i> , Publication Number 04-10-020 available at: <a href="https://fortress.wa.gov/ecy/publications/documents/0410020.pdf">https://fortress.wa.gov/ecy/publications/documents/0410020.pdf</a> . Do not report a result as too numerous to count (TNTC).		
h	Continuous means uninterrupted during effluent discharges 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. The Permittee must sample daily when continuous monitoring is not possible. Continuous monitoring instruments must achieve an accuracy of 0.2 degrees C and the Permittee must verify accuracy annually.		
i	"2/permit cycle" means twice during the 5 year permit cycle. In this case, once the second calendar year and once the fourth calendar year of the permit cycle. One sample shall be submitted to Ecology by <b>October 15, 2021</b> and the second shall be submitted by <b>October 15, 2023</b> .		

## 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 . 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, field measurement, and continuous monitoring devices

The Permittee must:



1. Select and use appropriate flow measurement and field measurement 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/1703201.pdf>

Calibration as specified in this document is not required if the Permittee uses recording devices certified by the manufacturer.
5. Use field measurement devices as directed by the manufacturer and do not use reagents beyond their expiration dates.
6. Establish a calibration frequency for each device or instrument in the O&M manual that conforms to the frequency recommended by the manufacturer.
7. Calibrate flow-monitoring devices at a minimum frequency of at least one calibration per year.
8. 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.

### **S2.E. Request for reduction in monitoring**

The Permittee may request a reduction of the sampling frequency after twelve (12) months of monitoring. Ecology will review each request and at its discretion grant the request when it reissues the permit or by a permit modification.

The Permittee must:

1. Provide a written request.
2. Clearly state the parameters for which it is requesting reduced monitoring.
3. Clearly state the justification for the reduction.

## **S3. Reporting and recording requirements**

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

### **S3.A. Discharge monitoring reports**

The first monitoring period begins on **October 1, 2019** (unless otherwise specified). The Permittee must:

Summarize, report, and submit monitoring data obtained during each monitoring period on the electronic discharge monitoring report (DMR) form provided by Ecology within 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.

To find out more information and to sign up for the Water Quality Permitting Portal go to: <https://ecology.wa.gov/Regulations-Permits/Guidance-technical-assistance/Water-quality-permits-guidance/WQWebPortal-guidance>

The Permittee must:

1. Ensure that DMRs are electronically submitted no later than the dates specified below, unless otherwise specified in this permit.
2. 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.
3. 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 15<sup>th</sup> day of the following month.
  - b. Submit **quarterly DMRs**, unless otherwise specified in the permit, by the 15<sup>th</sup> day of the month following the monitoring period. Quarterly sampling periods are January through March, April through June, July through September, and October through December. The Permittee must submit the first quarterly DMR on **January 15, 2020** for the quarter beginning on **October 1, 2019**.
4. 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.
  5. 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.
  6. 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.
  7. **Not** report zero for bacteria monitoring. Report as required by the laboratory method.

8. Calculate and report an arithmetic average value for each day for bacteria if multiple samples were taken in one day.
9. Calculate the geometric mean values for bacteria (unless otherwise specified in the permit) using:
  - a. The reported numeric value for all bacteria samples measured above the detection value except when it took multiple samples in one day. If the Permittee takes multiple samples in one day it must use the arithmetic average for the day in the geometric mean calculation.
  - b. The detection value for those samples measured below detection.
10. 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.
11. 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.
12. Report single-sample grouped parameters (for example: priority pollutants, PAHs, pulp and paper chlorophenolics, TTOs) on the WQWebDMR form and include: sample date, concentration detected, detection limit (DL) (as necessary), and laboratory quantitation level (QL) (as necessary).

### **S3.B. Permit Submittals and Schedules**

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

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

Water Quality Permit Coordinator  
Department of Ecology  
Central Regional Office  
1250 West Alder Street  
Union Gap, WA 98903

### **S3.C. Records retention**

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

### **S3.D. Recording of results**

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

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

### **S3.E. Additional monitoring by the Permittee**

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



### **S3.F. Reporting permit violations**

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

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

#### **a. Immediate reporting**

The Permittee must immediately report to Ecology and the Local Health Jurisdiction (at the numbers listed below), all:

- Failures of the disinfection system.
- Collection system overflows.
- Plant bypasses resulting in a discharge.
- Any other failures of the sewage system (pipe breaks, etc).

Central Regional Office	509-575-2490
Kittitas County Public Health	509-962-7515

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

#### **b. Twenty-four-hour reporting**

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

1. Any noncompliance that may endanger health or the environment, unless previously reported under immediate reporting requirements.
2. Any unanticipated bypass that causes an exceedance of an effluent limit in the permit (See Part S5.F, "Bypass Procedures").

3. Any upset that causes an exceedance of an effluent limit in the permit (See G.15, "Upset").
4. Any violation of a maximum daily or instantaneous maximum discharge limit for any of the pollutants in Section S1.A of this permit.
5. Any overflow prior to the treatment works, whether or not such overflow endangers health or the environment or exceeds any effluent limit in the permit.

**c. Report within five days**

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

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

**d. Waiver of written reports**

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

**e. All other permit violation reporting**

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

### **S3.G. Other reporting**

#### **a. Spills of Oil or Hazardous Materials**

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

#### **b. Failure to submit relevant or correct facts**

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

### **S3.H. Maintaining a copy of this permit**

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

## **S4. Facility loading**

### **S4.A. Design criteria**

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

Maximum Month Design Flow (MMDF)	3.6 MGD
Peak Instantaneous Design Flow (PIDF)	10.5 MGD
BOD <sub>5</sub> Influent Loading for Maximum Month	4,863 lb/day
TSS Influent Loading for Maximum Month	3,753 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)].

#### **S4.E. Infiltration and inflow evaluation**

1. The Permittee must conduct an infiltration and inflow evaluation. Refer to the U.S. EPA publication, I/I Analysis and Project Certification, available as Publication No. 97-03 at:  
<https://fortress.wa.gov/ecy/publications/SummaryPages/9703.html>
2. The Permittee may use monitoring records to assess measurable infiltration and inflow.
3. The Permittee must prepare a report summarizing any measurable infiltration and inflow. If infiltration and inflow have increased by more than 15 percent from that found in the previous report based on equivalent rainfall, the report must contain a plan and a schedule to locate the sources of infiltration and inflow and to correct the problem.
4. The Permittee must submit a report summarizing the results of the evaluation and any recommendations for corrective actions by **February 15, 2020**.

#### **S4.F. Wasteload assessment**

The Permittee must conduct an assessment of its influent flow and waste load and submit a report to Ecology by **February 15, 2020**, and annually thereafter. The report must contain:

1. A description of compliance or noncompliance with the permit effluent limits.
2. A comparison between the existing and design:
  - a. Monthly average dry weather and wet weather flows.
  - b. Peak flows.
  - c. BOD<sub>5</sub> loading.
  - d. Total suspended solids loadings.



3. The percent change in the above parameters since the previous report (except for the first report).
4. The present and design population or population equivalent.
5. The projected population growth rate.
6. The estimated date upon which the Permittee expects the wastewater treatment plant to reach design capacity, according to the most restrictive of the parameters above.

Ecology may modify the interval for review and reporting if it determines that a different frequency is sufficient.

## **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 III 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 II plant must be in charge during all regularly scheduled shifts.

### **S5.B. Operation and maintenance program**

The Permittee must:

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

3. Make maintenance records available for inspection at all times.

#### **S5.C. Short-term reduction**

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

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

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

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

#### **S5.D. Electrical power failure**

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

The Permittee must maintain Reliability Class II (EPA 430-99-74-001) at the wastewater treatment plant. Reliability Class II requires a backup power source sufficient to operate all vital components and critical lighting and ventilation during peak wastewater flow conditions. Vital components used to support the secondary processes (i.e., mechanical aerators or aeration basin air compressors) need not be operable to full levels of treatment, but must be sufficient to maintain the biota.

#### **S5.E. Prevent connection of inflow**

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

#### **S5.F. Bypass procedures**

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

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

This permit allows bypasses for essential maintenance of the treatment system when necessary to ensure efficient operation of the system. The Permittee may bypass the treatment system for essential maintenance only if doing so does not cause violations of effluent limits. The Permittee is not required to notify Ecology when bypassing for essential maintenance. However the Permittee must comply with the monitoring requirements specified in special condition S2.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. Update the Operations and Maintenance (O&M) Manual that meets the requirements of 173-240-080 WAC and submit it to Ecology for approval by **October 1, 2020**.
2. Review the O&M Manual at least annually and confirm this review by letter to Ecology by January 1 of each year.
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.
8. Specify other items on case-by-case basis such as O&M for collection systems pump stations, lagoon liners, etc.

## **S6. Pretreatment**

### **S6.A. General requirements**

The Permittee must notify 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<sub>5</sub>, 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. Annual submittal of list of industrial users**

The Permittee must annually submit to Ecology a list summarizing all existing and proposed SIUs and PSIUs. The Permittee must submit this list to Ecology by **January 1** of each year of the permit.

**S7. Solid wastes**

**S7.A. Solid waste handling**

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

**S7.B. Leachate**

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

**S8. Application for permit renewal or modification for facility changes**

The Permittee must submit an application for renewal of this permit by **September 30, 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.

**S9. Spill control plan**

**S9.A Spill control plan submittals and requirements**

The Permittee must:

1. Submit to Ecology an update to the existing spill control plan by **October 1, 2023**.
2. Review the plan at least annually and update the spill plan as needed.
3. Send changes to the plan to Ecology.
4. Follow the plan and any supplements throughout the term of the permit.

#### **S9.B. Spill control plan components**

The spill control plan must include the following:

1. A list of all oil and petroleum products and other materials used and/or stored on-site, which when spilled, or otherwise released into the environment, designate as Dangerous Waste (DW) or Extremely Hazardous Waste (EHW) by the procedures set forth in WAC 173-303-070. Include other materials used and/or stored on-site which may become pollutants or cause pollution upon reaching state's waters.
2. A description of preventive measures and facilities (including an overall facility plot showing drainage patterns) which prevent, contain, or treat spills of these materials.
3. A description of the reporting system the Permittee will use to alert responsible managers and legal authorities in the event of a spill.
4. A description of operator training to implement the plan.

The Permittee may submit plans and manuals required by 40 CFR Part 112, contingency plans required by Chapter 173-303 WAC, or other plans required by other agencies, which meet the intent of this section.

#### **S10. Outfall evaluation**

The Permittee must inspect the submerged portion of the outfall pipe and diffuser to document its integrity and continued function. If conditions allow for a photographic verification, the Permittee must include such verification in the report. The Permittee must submit the inspection report to Ecology through the Water Quality Permitting Portal – Permit Submittals application by **October 1, 2023**. The Permittee must submit hard-copies of any video files to Ecology as required by Permit Condition S3.B. The Portal does not support submittal of video files.

The inspector must at minimum:



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

## **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) <sup>1</sup> $\mu\text{g/L}$ unless specified	Quantitation Level (QL) <sup>2</sup> $\mu\text{g/L}$ unless specified
Biochemical Oxygen Demand		SM5210-B		2 mg/L
Biochemical Oxygen Demand, Soluble		SM5210-B <sup>3</sup>		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 <sup>+</sup> B	N/A	N/A
Total Suspended Solids		SM2540-D		5 mg/L

### NONCONVENTIONAL POLLUTANTS

Pollutant & CAS No. (if available)	CAS Number (if available)	Recommended Analytical Protocol	Detection (DL) <sup>1</sup> $\mu\text{g/L}$ unless specified	Quantitation Level (QL) <sup>2</sup> $\mu\text{g/L}$ unless specified
Alkalinity, Total		SM2320-B		5 mg/L as CaCO <sub>3</sub>
Aluminum, Total	7429-90-5	200.8	2.0	10
Ammonia, Total (as N)		SM4500-NH <sub>3</sub> -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

### ***NONCONVENTIONAL POLLUTANTS***

<b>Pollutant &amp; CAS No. (if available)</b>	<b>CAS Number (if available)</b>	<b>Recommended Analytical Protocol</b>	<b>Detection (DL)<sup>1</sup> µg/L unless specified</b>	<b>Quantitation Level (QL)<sup>2</sup> µg/L unless specified</b>
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 CaCO <sub>3</sub>
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-NO <sub>3</sub> - E/F/H		100
Nitrogen, Total Kjeldahl (as N)		SM4500-N <sub>org</sub> B/C and SM4500NH <sub>3</sub> - B/C/D/EF/G/H		300
NWTPH Dx <sup>4</sup>		Ecology NWTPH Dx	250	250
NWTPH Gx <sup>5</sup>		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 <sub>4</sub> )		SM4110-B		0.2 mg/L
Sulfide (as mg/L S)		SM4500-S <sup>2</sup> F/D/E/G		0.2 mg/L
Sulfite (as mg/L SO <sub>3</sub> )		SM4500-SO <sub>3</sub> B		2 mg/L
Temperature (max. 7-day avg.)		Analog recorder or Use micro- recording devices known as thermistors		0.2° C
Tin, Total	7440-31-5	200.8	0.3	1.5
Titanium, Total	7440-32-6	200.8	0.5	2.5

### ***NONCONVENTIONAL POLLUTANTS***

<b>Pollutant &amp; CAS No. (if available)</b>	<b>CAS Number (if available)</b>	<b>Recommended Analytical Protocol</b>	<b>Detection (DL)<sup>1</sup> µg/L unless specified</b>	<b>Quantitation Level (QL)<sup>2</sup> µg/L unless specified</b>
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

<b><i>PRIORITY POLLUTANTS</i></b>	<b>PP #</b>	<b>CAS Number (if available)</b>	<b>Recommended Analytical Protocol</b>	<b>Detection (DL)<sup>1</sup> µg/L unless specified</b>	<b>Quantitation Level (QL)<sup>2</sup> µg/L unless specified</b>
<b>METALS, CYANIDE &amp; TOTAL PHENOLS</b>					
Antimony, Total	114	7440-36-0	200.8	0.3	1.0
Arsenic, Total	115	7440-38-2	200.8	0.1	0.5
Beryllium, Total	117	7440-41-7	200.8	0.1	0.5
Cadmium, Total	118	7440-43-9	200.8	0.05	0.25
Chromium (hex) dissolved	119	18540-29-9	SM3500-Cr C	0.3	1.2
Chromium, Total	119	7440-47-3	200.8	0.2	1.0
Copper, Total	120	7440-50-8	200.8	0.4	2.0
Lead, Total	122	7439-92-1	200.8	0.1	0.5
Mercury, Total	123	7439-97-6	1631E	0.0002	0.0005
Nickel, Total	124	7440-02-0	200.8	0.1	0.5
Selenium, Total	125	7782-49-2	200.8	1.0	1.0
Silver, Total	126	7440-22-4	200.8	0.04	0.2
Thallium, Total	127	7440-28-0	200.8	0.09	0.36
Zinc, Total	128	7440-66-6	200.8	0.5	2.5
Cyanide, Total	121	57-12-5	335.4	5	10
Cyanide, Weak Acid Dissociable	121		SM4500-CN I	5	10
Cyanide, Free Amenable to Chlorination (Available Cyanide)	121		SM4500-CN G	5	10

<b><i>PRIORITY POLLUTANTS</i></b>	<b>PP #</b>	<b>CAS Number (if available)</b>	<b>Recommended Analytical Protocol</b>	<b>Detection (DL)<sup>1</sup> µg/L unless specified</b>	<b>Quantitation Level (QL)<sup>2</sup> µg/L unless specified</b>
<b>METALS, CYANIDE &amp; TOTAL PHENOLS</b>					
Phenols, Total	65		EPA 420.1		50

<b><i>PRIORITY POLLUTANTS</i></b>	<b>PP #</b>	<b>CAS Number (if available)</b>	<b>Recommended Analytical Protocol</b>	<b>Detection (DL)<sup>1</sup> µg/L unless specified</b>	<b>Quantitation Level (QL)<sup>2</sup> µg/L unless specified</b>
<b>ACID COMPOUNDS</b>					
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

<b><i>PRIORITY POLLUTANTS</i></b>	<b>PP #</b>	<b>CAS Number (if available)</b>	<b>Recommended Analytical Protocol</b>	<b>Detection (DL)<sup>1</sup> µg/L unless specified</b>	<b>Quantitation Level (QL)<sup>2</sup> µg/L unless specified</b>
<b>VOLATILE COMPOUNDS</b>					
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

<b>PRIORITY POLLUTANTS</b>	<b>PP #</b>	<b>CAS Number (if available)</b>	<b>Recommended Analytical Protocol</b>	<b>Detection (DL)<sup>1</sup> µg/L unless specified</b>	<b>Quantitation Level (QL)<sup>2</sup> µg/L unless specified</b>
<b>VOLATILE COMPOUNDS</b>					
Carbon tetrachloride	6	56-23-5	624.1/601 or SM6230B	2.8	8.4
Chlorobenzene	7	108-90-7	624.1	6.0	18.0
Chloroethane	16	75-00-3	624/601	1.0	2.0
2-Chloroethylvinyl Ether	19	110-75-8	624	1.0	2.0
Chloroform	23	67-66-3	624.1 or SM6210B	1.6	4.8
Dibromochloromethane (chlordibromomethane)	51	124-48-1	624.1	3.1	9.3
1,2-Dichlorobenzene	25	95-50-1	624	1.9	7.6
1,3-Dichlorobenzene	26	541-73-1	624	1.9	7.6
1,4-Dichlorobenzene	27	106-46-7	624	4.4	17.6
Dichlorobromomethane	48	75-27-4	624.1	2.2	6.6
1,1-Dichloroethane	13	75-34-3	624.1	4.7	14.1
1,2-Dichloroethane	10	107-06-2	624.1	2.8	8.4
1,1-Dichloroethylene	29	75-35-4	624.1	2.8	8.4
1,2-Dichloropropane	32	78-87-5	624.1	6.0	18.0
1,3-dichloropropene (mixed isomers) (1,2-dichloropropylene) <sup>6</sup>	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



<b>PRIORITY POLLUTANTS</b>	<b>PP #</b>	<b>CAS Number (if available)</b>	<b>Recommended Analytical Protocol</b>	<b>Detection (DL)<sup>1</sup> µg/L unless specified</b>	<b>Quantitation Level (QL)<sup>2</sup> µg/L unless specified</b>
<b>VOLATILE COMPOUNDS</b>					
Vinyl chloride	88	75-01-4	624/SM6200B	1.0	2.0

<b>PRIORITY POLLUTANTS</b>	<b>PP #</b>	<b>CAS Number (if available)</b>	<b>Recommended Analytical Protocol</b>	<b>Detection (DL)<sup>1</sup> µg/L unless specified</b>	<b>Quantitation Level (QL)<sup>2</sup> µg/L unless specified</b>
<b>BASE/NEUTRAL COMPOUNDS (compounds in bold are Ecology PBTs)</b>					
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) <sup>7</sup>	74	205-99-2	610/625.1	4.8	14.4
<b>Benzo(j)fluoranthene</b> <sup>7</sup>		<b>205-82-3</b>	625	0.5	1.0
Benzo(k)fluoranthene (11,12-benzofluoranthene) <sup>7</sup>	75	207-08-9	610/625.1	2.5	7.5
<b>Benzo(r,s,t)pentaphene</b>		<b>189-55-9</b>	625	1.3	5.0
Benzo(a)pyrene	73	50-32-8	610/625.1	2.5	7.5
Benzo(ghi)Perylene	79	191-24-2	610/625.1	4.1	12.3
Bis(2-chloroethoxy)methane	43	111-91-1	625.1	5.3	15.9
Bis(2-chloroethyl)ether	18	111-44-4	611/625.1	5.7	17.1
Bis(2-chloroisopropyl)ether	42	39638-32-9	625	0.5	1.0
Bis(2-ethylhexyl)phthalate	66	117-81-7	625.1	2.5	7.5
4-Bromophenyl phenyl ether	41	101-55-3	625.1	1.9	5.7
2-Chloronaphthalene	20	91-58-7	625.1	1.9	5.7
4-Chlorophenyl phenyl ether	40	7005-72-3	625.1	4.2	12.6
Chrysene	76	218-01-9	610/625.1	2.5	7.5

<b>PRIORITY POLLUTANTS</b>	<b>PP #</b>	<b>CAS Number (if available)</b>	<b>Recommended Analytical Protocol</b>	<b>Detection (DL)<sup>1</sup> µg/L unless specified</b>	<b>Quantitation Level (QL)<sup>2</sup> µg/L unless specified</b>
<b>BASE/NEUTRAL COMPOUNDS (compounds in bold are Ecology PBTs)</b>					
<b>Dibenzo (a,h)acridine</b>		<b>226-36-8</b>	610M/625M	2.5	10.0
<b>Dibenzo (a,j)acridine</b>		<b>224-42-0</b>	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
<b>Dibenzo(a,e)pyrene</b>		192-65-4	610M/625M	2.5	10.0
<b>Dibenzo(a,h)pyrene</b>		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 ( <i>as Azobenzene</i> )	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
<b>3-Methyl cholanthrene</b>		<b>56-49-5</b>	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
<b>Perylene</b>		<b>198-55-0</b>	625	1.9	7.6

<b>PRIORITY POLLUTANTS</b>	<b>PP #</b>	<b>CAS Number (if available)</b>	<b>Recommended Analytical Protocol</b>	<b>Detection (DL)<sup>1</sup> µg/L unless specified</b>	<b>Quantitation Level (QL)<sup>2</sup> µg/L unless specified</b>
<b>BASE/NEUTRAL COMPOUNDS (compounds in bold are Ecology PBTs)</b>					
Phenanthrene	81	85-01-8	625.1	5.4	16.2
Pyrene	84	129-00-0	625.1	1.9	5.7
1,2,4-Trichlorobenzene	8	120-82-1	625.1	1.9	5.7

<b>PRIORITY POLLUTANT</b>	<b>PP #</b>	<b>CAS Number (if available)</b>	<b>Recommended Analytical Protocol</b>	<b>Detection (DL)<sup>1</sup> µg/L unless specified</b>	<b>Quantitation Level (QL)<sup>2</sup> µg/L unless specified</b>
<b>DIOXIN</b>					
2,3,7,8-Tetra-Chlorodibenzo-P-Dioxin (2,3,7,8 TCDD)	129	1746-01-6	1613B	1.3 pg/L	5 pg/L

<b>PRIORITY POLLUTANTS</b>	<b>PP #</b>	<b>CAS Number (if available)</b>	<b>Recommended Analytical Protocol</b>	<b>Detection (DL)<sup>1</sup> µg/L unless specified</b>	<b>Quantitation Level (QL)<sup>2</sup> µg/L unless specified</b>
<b>PESTICIDES/PCBs</b>					
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 <sup>8</sup>	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

<b><i>PRIORITY POLLUTANTS</i></b>	<b>PP #</b>	<b>CAS Number (if available)</b>	<b>Recommended Analytical Protocol</b>	<b>Detection (DL)<sup>1</sup> µg/L unless specified</b>	<b>Quantitation Level (QL)<sup>2</sup> µg/L unless specified</b>
<b>PESTICIDES/PCBs</b>					
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 <sup>9</sup>	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 <sup>9</sup>	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<sup>n</sup>, 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-dichloropropylene (mixed isomers) You may report this parameter as two separate parameters: cis-1, 3-dichloropropene (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.



**5.**

# **CITY OF CLE ELUM MUNICIPAL SEWER CODE**





## **Title 13**

### **PUBLIC SERVICES**

#### Chapters:

- 13.04 Combining of Water and Sewer Systems**
- 13.08 Sewer Regulations**
- 13.10 Sewer System Connection Charges**
- 13.12 Water Regulations**
- 13.14 Water Supply System Capital Reimbursement Charge**
- 13.16 Preservation and Protection of Water Supply**
- 13.20 Water Connection and Water Transfer Requirements**
- 13.24 Filling or Obstruction of Surface Drains**
- 13.32 Utility Reimbursement Agreements**
- 13.40 Identity Theft Program**

### **Chapter 13.04**

#### **COMBINING OF WATER AND SEWER SYSTEMS**

#### Sections:

- 13.04.010 Purpose.**
- 13.04.020 Water-sewer fund.**
- 13.04.030 Bond redemption fund.**
- 13.04.040 Charges and payments due under combined systems.**

#### **13.04.010 Purpose.**

Effective January 1, 1952, the sewerage system of the city, with all additions and improvements to the system, is combined with the water system of the city, and on and after that date shall be a part of and belong to the water system. The combining of the systems is believed to be for the best interests of the city by the city council, for the reasons, among others, that it will facilitate sale of bonds for anticipated future improvements and will make more economical and practical the administration of the two systems.

(Ord. 473 § 1, 1951)

### **13.04.020 Water-sewer fund.**

A. Effective January 1, 1991, the funds presently known as the water fund and sewer fund are abolished, and in their place is established a single combined fund to be known as the water-sewer fund into which fund revenues pertaining to the city water system and the city sewer system shall be placed and from which fund expenditures relating to the city water system and city sewer system shall be made.

B. The city clerk and city treasurer are authorized and directed to transfer from the existing water fund and sewer fund into the water-sewer fund any and all remaining funds held in the water fund and the sewer fund.

(Ord. 932 §§ 3, 4, 1991; Ord. 922 §§ 3, 4, 1990; Ord. 473 § 2, 1951)

### **13.04.030 Bond redemption fund.**

The amounts necessary to pay the principal and interest of all outstanding water revenue bonds as the same shall accrue shall be paid from the water and sewer fund into the bond redemption fund.

(Ord. 473 § 3, 1951)

### **13.04.040 Charges and payments due under combined systems.**

All existing ordinances and parts of ordinances related to or pertaining to the water and sewer systems of the city are specifically continued in effect, except such sections or provisions thereof which are directly in conflict with this chapter; it being intended to retain existing rates and regulations. All methods now provided for the collection of either or both water and sewerage charges shall be applicable to collections of all charges and payments due under the combined systems.

(Ord. 473 § 4, 1951)

## **Chapter 13.08 SEWER REGULATIONS**

Sections:

- 13.08.010 Definitions.**
- 13.08.020 Use of public sewers required.**
- 13.08.030 Discharge to natural outlet prohibited.**
- 13.08.040 Private system – Prohibited.**
- 13.08.050 Connection with public system required.**
- 13.08.090 Private system – Regulations.**
- 13.08.100 Private system – Connection to public system required.**

- 13.08.110 Private system – Manner of operation.**
- 13.08.120 Additional requirements.**
- 13.08.130 Building sewer – Permit – Required.**
- 13.08.140 Building sewer – Permit – Classes and application.**
- 13.08.160 Building sewer – Separate connection for each building.**
- 13.08.170 Old connection use.**
- 13.08.180 Building sewer – Inspection.**
- 13.08.190 Building sewer – Compliance required.**
- 13.08.200 Building sewer – Connection supervision.**
- 13.08.210 Building sewer – Excavation protection.**
- 13.08.220 Need for standards.**
- 13.08.230 Materials.**
- 13.08.240 Bedding.**
- 13.08.250 Minimum grade.**
- 13.08.260 Minimum pipe size.**
- 13.08.270 Jointing of pipe.**
- 13.08.280 Backfilling of trench.**
- 13.08.290 Field tests.**
- 13.08.300 Septic tanks discontinuance.**
- 13.08.310 Connection with public sewer.**
- 13.08.320 Discharge of unpolluted water prohibited.**
- 13.08.330 Prohibited discharges designated.**
- 13.08.340 Interceptors required when.**
- 13.08.350 Preliminary treatment facility maintenance.**
- 13.08.360 Inspection permitted.**
- 13.08.370 Rates and charges.**
- 13.08.390 City connection or repair cost collection.**
- 13.08.400 Lien enforcement.**
- 13.08.410 Service of notices.**
- 13.08.420 Penalty for violation.**

## **13.08.010 Definitions.**

- A. “Building sewers” means and includes all sewers running from a sewer lateral or trunk to any building or other source of sewerage, and shall be synonymous with “side sewers.”
- B. “Engineer” means and includes the city engineer or such other official as the city council designates to enforce the provisions of this chapter, such designation to be by resolution.

- C. "Industrial wastes" means and includes the liquid wastes from industrial processes as distinct from sanitary sewage.
- D. "Natural outlet" means and includes any outlet into a watercourse, pond, ditch, lake or other body of surface or ground water.
- E. "Person" means and includes any individual, firm, company, association, society, corporation, or group.
- F. "Properly shredded garbage" means and includes the wastes from the preparation, cooking and dispensing of food that have been shredded to such degree that all particles will be carried freely under the flow conditions normally prevailing in public sewers, with no particle greater than one-half inch in any dimension.
- G. "Sanitary sewer" means and includes a sewer which carries sewage and to which storm, surface and ground waters are not intentionally admitted.
- H. "Sewage" means a combination of the water-carried wastes from residences, business buildings, institutions, and industrial establishments.
- I. "Sewage treatment plant" means and includes any arrangements of devices and structures used for treating sewage.
- J. "Sewage works" means and includes all facilities for collecting, pumping, treating and disposing of sewage.
- K. "Sewer" means and includes a pipe or conduit for carrying sewage.
- L. "Shall" is mandatory; "may" is permissive.
- M. "Storm sewer" or "storm drain" means and includes a sewer which carries storm and surface waters and drainage, but excludes sewage and polluted industrial wastes.
- N. "Watercourse" means and includes a channel in which a flow of water occurs, either continuously or intermittently.

(Ord. 506 § 1, 1954)

### **13.08.020 Use of public sewers required.**

It is unlawful for any person to place, deposit, or permit to be deposited in an unsanitary manner upon public or private property within the city, or in any area under the jurisdiction of the city, any human or animal excrement, garbage, or other filthy, odorous or unsanitary waste.

(Ord. 506 § 2(1), 1954)

**13.08.030 Discharge to natural outlet prohibited.**

It is unlawful to discharge to any natural outlet within the city, or in any area under the jurisdiction of the city, any sanitary sewage, industrial wastes, or other polluted waters, except where suitable treatment has been provided in accordance with subsequent provisions of this chapter.

(Ord. 506 § 2(2), 1954)

**13.08.040 Private system – Prohibited.**

Except as provided in this chapter, it is unlawful to construct or maintain any privy, privy vault, septic tank, cesspool, or other facility intended or used for the disposal of sewage.

(Ord. 506 § 2(3), 1954)

**13.08.050 Connection with public system required.**

All houses, buildings or properties used for human occupancy, employment, recreation, or other public use situated within the city and abutting on any street, alley or right-of-way in which there is now located or may in the future be located a public sanitary sewer of the city, is required at his expense to install suitable toilet and sewage facilities therein, and to connect the facilities directly with the proper public sewer in accordance with the provisions of this chapter, within thirty days after date of official notice to do so; provided, that the public sewer is within two hundred feet of the lot or parcel to be sewered. All new uses shall connect to the public sanitary sewer system unless such use lawfully incorporates no facilities generating sewage.

(Ord. 1155 § 1, 2001; Ord. 506 § 2(4), 1954)

**13.08.090 Private system – Regulations.**

The type, capacities, location and layout of a private sewage disposal system shall comply with all regulations of the Washington State Health Department and the Kittitas County sanitarian. No permit shall be issued for any private sewage disposal system employing subsurface soil absorption facilities where the area of the lot is less than five thousand square feet. No septic tank or cesspool is permitted to discharge to any public sewer or natural outlet.

(Ord. 1155 § 5, 2001; Ord. 506 § 3(4), 1954)

**13.08.100 Private system – Connection to public system required.**

At such time as a public sewer becomes available to a property served by a private sewage disposal system, as provided in this chapter, a direct connection shall be made to the public sewer in compliance with this chapter, and any private septic tanks, cesspools, and similar private sewage disposal facilities shall be properly abandoned and filled with suitable materials. For the purposes of this section, “available” means that a public sewer line is within two hundred feet of the lot or parcel to be served. Should an existing private system fail or be in need of replacement or repair in excess of fifty percent of its value said system shall be properly abandoned and a direct connection shall be made to the public sewer.

(Ord. 1155 § 6, 2001; Ord. 506 § 3(5), 1954)

**13.08.110 Private system – Manner of operation.**

The owner shall operate and maintain the private sewage disposal facilities in a sanitary manner at all times, at no expense to the city.

(Ord. 1155 § 7, 2001; Ord. 506 § 3(6), 1954)

**13.08.120 Additional requirements.**

No statement contained in this chapter shall be construed to interfere with any additional requirements that may be imposed by the city health officer.

(Ord. 506 § 3(7), 1954)

**13.08.130 Building sewer – Permit – Required.**

It is unlawful for any person to uncover, make any connection with or opening into, use, alter, or disturb any public sewer or appurtenance thereof without first obtaining a written permit from the engineer.

(Ord. 506 § 4(1), 1954)

**13.08.140 Building sewer – Permit – Classes and application.**

There shall be two classes of building sewer permits: 1, for residential service; and 2, for commercial service and for service to establishments producing industrial wastes. In either case, the owner or his agent shall make application on a special form furnished by the city. The permit application shall be supplemented by any plans, specifications, or other information considered pertinent in the judgment of the engineer.

(Ord. 506 § 4(3), 1954)



**13.08.160 Building sewer – Separate connection for each building.**

A separate and independent building sewer shall be provided for every building requiring a sewerage connection in accordance with the provisions of this chapter and Chapter [13.10](#) of the Cle Elum Municipal Code.

(Ord. 1124 § 2, 2000; Ord. 506 § 4(4), 1954)

**13.08.170 Old connection use.**

Old building sewers may be used in connection with new buildings only when they are found, on examination and test by the engineer, to meet all requirements of this chapter.

(Ord. 506 § 4(5), 1954)

**13.08.180 Building sewer – Inspection.**

The city engineer shall inspect all building sewers. No backfilling shall be performed until the inspection has been completed. The property owner shall notify the engineer as to the desired time of inspection, and the engineer shall make inspection within forty-eight hours after such notice. The decision of the engineer shall be final regarding the details of construction, regardless of the location of any portion of the building sewer.

(Ord. 506 § 4(6), 1954)

**13.08.190 Building sewer – Compliance required.**

All building sewers constructed in the city must be constructed in compliance with the rules, specifications and standards set out in this chapter.

(Ord. 506 § 4(7), 1954)

**13.08.200 Building sewer – Connection supervision.**

No building sewer shall be connected to a lateral or trunk sewer except under the direct supervision of the engineer.

(Ord. 506 § 4(8), 1954)

### **13.08.210 Building sewer – Excavation protection.**

All excavations for building sewer installation shall be adequately guarded with barricades and lights so as to protect the public from hazard. Streets, sidewalks, parkways and other public property disturbed in the course of the work shall be restored in a manner satisfactory to the city. No excavation shall be left open for a longer time than is necessary to complete the sewer connection.

(Ord. 506 § 4(9), 1954)

### **13.08.220 Need for standards.**

The city council hereby finds that, to provide adequate standards for the protection of health and promotion of the community welfare, it is necessary to adopt the reasonable rules, standards and specifications set forth in this chapter.

(Ord. 506 § 5(1), 1954)

### **13.08.230 Materials.**

All sewer pipe shall be concrete, cast iron, vitrified clay, or other suitable material approved by the engineer. All jointing materials shall be of the bituminous type (asphaltic material with acid-resisting fillers), or lead. Bituminous compounds which are hot poured with a jute or oakum gasket are preferred. The hot poured compound shall be equal to or better than the Atlas mineral product "JC-60." Ready-mixed bituminous compounds that may be packed cold into the joints is the alternate. These compounds shall be equal to or better than the Waterworks Supply Company "Plastiflex." Names and addresses of suppliers will be furnished upon request.

(Ord. 506 § 5(2), 1954)

### **13.08.240 Bedding.**

All excavation near the bottom of the trench shall be accomplished in such way as to insure a uniform bedding for pipe. In general, a groove to fit and receive the pipe shall be formed in the bottom of the trench. In unsuitable or soft material, bedding gravel is required.

(Ord. 506 § 5(3), 1954)

### **13.08.250 Minimum grade.**

The minimum grade on the building sewers shall be one-quarter inch per foot.

(Ord. 506 § 5(4), 1954)

**13.08.260 Minimum pipe size.**

The minimum size of pipe utilized on all newly laid building sewer construction shall be not less than four inches in diameter.

(Ord. 506 § 5(5), 1954)

**13.08.270 Jointing of pipe.**

A gasket of closely twisted hemp or oakum shall be placed around the pipe. The gasket shall be in one piece of suitable size and shall be lapped at the top. The gasket shall be rammed solidly and tightly into the annular space within the socket of the pipe with a suitable caulking tool. A suitable runner shall be placed around the pipe to close the socket opening. The bituminous material or lead shall be heated to approximately three hundred fifty degrees Fahrenheit or until free-flowing and poured so as to completely fill the annular space. Before a joint is made, each collar shall be brushed with a solvent recommended by the manufacturer of the joint material. All bells of bell and spigot type pipe shall be laid at the higher end. All spigots shall be properly centered so as to insure a uniform thickness of the joint. All joints shall be made in a dry trench and shall be made gastight and watertight.

(Ord. 506 § 5(6), 1954)

**13.08.280 Backfilling of trench.**

The material immediately around the pipe shall be carefully compacted to at least six inches above the top of the pipe. In gravel soils, the material above six inches above the pipe may be saturated after seventy-two hours after jointing the pipe so as to decrease the possibility of future settlement.

(Ord. 506 § 5(7), 1954)

**13.08.290 Field tests.**

The city, at the discretion of the engineer, may require pressure tests to determine the adequacy of any building sewer connection.

(Ord. 506 § 5(8), 1954)

**13.08.300 Septic tanks discontinuance.**

All septic tanks shall be bypassed and filled in within thirty days after a new sewer connection has been completed.

(Ord. 506 § 5(9), 1954)

### **13.08.310 Connection with public sewer.**

The connection of the building sewer into the public sewer shall be made at the Y branch, if such branch is available at a suitable location. If the public sewer is twelve inches in diameter or less, and no properly located Y branch is available, the owner shall make connection in the manner specified by the engineer. Where the public sewer is greater than twelve inches in diameter, and no properly located Y branch is available, a neat hole may be cut into the public sewer to receive the building sewer, with entry in the downstream direction at an angle of about forty-five degrees. A forty-five degree ell may be used to make such connection, with the spigot end cut so as not to extend past the inner surface of the public sewer. The invert of the building sewer at the point of connection shall be at the same or at a higher elevation than the invert of the public sewer. A smooth, neat joint shall be made, and the connection made secure and watertight by encasement in concrete. Special fittings may be used for the connection only when approved by the engineer.

(Ord. 506 § 5(10), 1954)

### **13.08.320 Discharge of unpolluted water prohibited.**

No person shall discharge or cause to be discharged any stormwater, surface water, groundwater, roof runoff, subsurface drainage, cooling water or unpolluted industrial process waters to any sanitary sewer.

(Ord. 506 § 6(l), 1954)

### **13.08.330 Prohibited discharges designated.**

Except as provided in this chapter, no person shall discharge or cause to be discharged any of the following described waters, wastes or materials into any public sewer:

- A. Any substance of any type poisonous to man, fish, fowl or another animal; and any waters or wastes containing a toxic or poisonous substance in sufficient quantity to injure or interfere with any sewage treatment process, constitute a hazard to humans or animals, or create any hazard in the receiving waters of the sewage treatment plant;
- B. Any oil, gasoline, cleaning fluid or other oily or volatile substance;
- C. Any inflammable or explosive liquid, solid or gas;
- D. Any garbage that has not been properly shredded;

E. Any ashes, cinders, sand, mud, straw, shavings, metal, glass, rags, feathers, tar, plastics, wood, paunch manure or any other solid or viscous substance capable of causing obstruction to the flow in sewers or other interference with the proper operation of the sewage works.

(Ord. 506 § 6(2), 1954)

### **13.08.340 Interceptors required when.**

Grease, oil and sand interceptors shall be provided when, in the opinion of the engineer or the city council, they are necessary for the proper handling of liquid wastes containing grease in excessive amounts, or any flammable wastes, sand, and other harmful ingredients; except that such interceptors shall not be required for private living quarters or dwelling units. All interceptors shall be of a type and capacity approved by the engineer and shall be located in such manner as to be readily and easily accessible for cleaning and inspection. These interceptors shall be constructed of impervious materials capable of withstanding abrupt and extreme changes in temperature, shall be of substantial construction, watertight, and equipped with easily removable covers which when bolted in place shall be gastight and watertight. All such interceptors shall be maintained by the owner, at his expense, in continuously efficient operation at all times.

(Ord. 506 § 6(3), 1954)

### **13.08.350 Preliminary treatment facility maintenance.**

Where preliminary treatment facilities are provided for any waters or wastes, they shall be maintained continuously in satisfactory and effective operation, by the owner at his expense.

(Ord. 506 § 6(4), 1954)

### **13.08.360 Inspection permitted.**

The engineer and other duly authorized employees of the city bearing proper credentials and identification shall be permitted to enter upon all properties for the purposes of inspection, observation, measurement, sampling, and testing, in accordance with the provisions of this chapter.

(Ord. 506 § 6(5), 1954)

### **13.08.370 Rates and charges.**

A. *Residential Rates.*

1. *Single Family Dwellings.* Single-family dwellings shall be charged a monthly rate as set forth by city council resolution, regardless of occupancy status, provided sewer service is requested and connection has been made.
2. *Multi – Residential Developments.* Multi-residential developments, including manufactured housing parks, trailer parks, and duplexes or triplexes, served collectively or independently, shall be charged a per unit or space monthly rate as set forth by city council resolution, without consideration to occupancy status.
3. *Apartments, Condominium and Townhouse Developments.* Apartments, condominium and townhouse developments with four units or more and residential development complexes (fourplexes or more) served collectively or independently, shall be charged a per unit monthly rate as set forth by city council resolution, without consideration to occupancy status.

B. *Commercial/Business Rates.* Sewer rates for commercial and business users shall be based upon the volume of water delivered including a minimum monthly base charge regardless of the amount of water delivered, plus an additional charge for each cubic foot of water delivered, as follows:

1. *Commercial/Business.* The minimum monthly base charge to a commercial/business account in this category shall be as set forth by city council resolution per establishment, regardless of occupancy status, and regardless of the amount of water delivered. The additional monthly charge based on metered water consumption per cubic foot shall be one dollar and fourteen cents per one hundred cubic feet. The rates specified for this user category shall apply to all users discharging to the City of Cle Elum sewer system who are not specifically listed elsewhere.
2. *Motels.* Motels, or similar establishments such as cabin courts and auto courts, shall be charged at the rates listed above for commercial and business establishments based on metered water consumption per cubic foot. The minimum monthly base charge to a motel shall be as set forth by city council resolution, regardless of occupancy status, and regardless of the amount of water delivered. The additional monthly charge based on metered water consumption per cubic foot shall be one dollar and fourteen cents per one hundred cubic feet.
3. *Car Washes.* The minimum monthly base charge to a car wash, or other commercial/business whose primary wastewater discharge to the city is from car washing operations, shall be per establishment, as set forth by city council resolution, regardless of occupancy status, and regardless of the amount of water delivered. The additional monthly charge based on metered water consumption per cubic foot shall be eighty cents per one hundred cubic feet.
4. *Laundromats/Cleaning Establishments.* The minimum monthly base charge to a Laundromat or cleaning establishment, whose primary function is to provide commercial laundry service, shall be as set forth by city council resolution, per establishment, regardless of occupancy status, and regardless of the amount of water delivered. The additional monthly charge based on metered water consumption per cubic foot shall be eighty cents per one hundred cubic feet.
5. Where multiple commercial and business establishments are tenants in a single building and are served by a common water meter, and have a single account with the city, domestic waste charges shall be based



upon the minimum monthly base charge and the metered water consumption per cubic foot. The minimum monthly charge shall be the total sum of the minimum monthly charges, determined as if each establishment were an individual account. The additional monthly charge based on metered water consumption per cubic foot shall be one dollar and fourteen cents per one hundred cubic feet.

6. Where multiple commercial and business establishments are tenants in a single building and are serviced by separate water meters, then each establishment shall be charged at the minimum monthly base charge as set forth by city council resolution plus an additional monthly charge based on metered water consumption per cubic foot of one dollar and fourteen cents per one hundred cubic feet.

7. Where multiple commercial and business establishments are tenants in a single building and are served by a common water meter, and each establishment has a separate account with the city, domestic waste charges shall be based upon metered water consumption using the commercial and business categories described above. Billing amount for the additional monthly charge based on metered water consumption, at a rate of one dollar and fourteen cents per one hundred cubic feet, shall be distributed equally between the establishments connected to the meter.

8. Commercial/business users who lose water through evaporation, irrigation, or in a product, may request a reduction in their monthly sewer charge only if the difference between water consumed and wastewater discharged to the city is documented through the use of water meters. In such a situation, the monthly sewer charges will be based upon the volume of wastewater discharged to the city at the appropriate rate specified within this section. The commercial/business user shall be responsible for all costs associated with the installation of additional meters needed to verify the volume of wastewater discharged to the city.

C. *School Rates.* Sewer rates for school users shall be based upon the volume of water delivered including a minimum monthly charge regardless of the amount of water delivered, plus an additional charge for each cubic foot of water delivered, as follows:

1. *Schools.* The minimum monthly base charge to a school user in this category shall be as set forth by city council resolution per school, regardless of occupancy status, and regardless of the amount of water delivered. The additional monthly charge based on metered water consumption per cubic foot shall be one dollar and fourteen cents per one hundred cubic feet, per school.

2. *Administration and Ancillary Buildings.* Administration, shop, maintenance, and other ancillary buildings owned or leased by the school, and receiving a sanitary sewer service from the city, shall be charged for service at the rates set forth for commercial/business users.

3. School users who lose water through evaporation, irrigation, or in a product, may request a reduction in their monthly sewer charge only if the difference between water consumed and wastewater discharged to the city is documented through the use of water meters. In such a situation, the monthly sewer charges will be based upon the volume of wastewater discharged to the city at the appropriate rate specified within this section. The school user shall be responsible for all costs associated with installation of additional meters needed to verify the volume of wastewater discharged to the city.

D. *Industrial Rates.* Sewer rates for industrial users shall be based upon the volume of water delivered including a minimum monthly charge regardless of the amount of water delivered, plus an additional charge for each cubic foot of water delivered, as follows:

1. *General Industrial User Conditions.* The following conditions apply to all industrial users discharging to the city wastewater facilities:

- a. There shall be no unmetered sources of water contributing wastewater to the city sewage works without the knowledge and prior written approval of the city.
- b. The city reserves the right to test, monitor, and control any wastewater discharged to any city facility at any time.
- c. Industrial users who lose water through evaporation, irrigation, or in a product, may request a reduction in their monthly sewer charge only if the difference between water consumed and wastewater discharged to city is documented through the use of water meters. In such a situation, the monthly sewer charges will be based upon the volume of wastewater discharged to the city at the appropriate rate specified within this section. The industrial user shall be responsible for all costs associated with installation of additional meters needed to verify the volume of wastewater discharged to the city.
- d. Industrial users of the city wastewater facilities shall be evaluated and determined by the city as to whether monitoring stations on wastewater discharges will be required. If monitoring stations are required by the city, the city shall designate when, where, and how many stations shall be placed. City approved monitoring stations shall be installed and maintained continuously in satisfactory and effective operation by, and at the expense of, the industrial user, at the direction of the city.

2. *Industrial Discharges.* The minimum monthly charge to an industrial user in this category, discharging industrial process wastes, either separate or in combination with domestic sewage, shall be as set forth by city council resolution. The additional monthly charge based on metered water consumption per cubic foot shall be one dollar and fourteen cents per one hundred cubic feet.

E. *Special Sewer Rate Considerations.* When a sewer rate is based on metered water consumption, there may be circumstances when normal procedures for determining monthly sewer rates do not apply. The following considerations shall apply when determining the monthly sewer rate under special circumstances:

1. When a water meter fails or malfunctions and it is not possible to accurately determine the amount of water consumed, the amount to be charged for sewer for any month during which the meter failure or malfunction or leak occurred shall be based on the metered consumption of water for the same period the previous year. In the event there is no record of water consumption for the same period in the prior year, the amount of consumption shall be estimated by the city.
2. In the event of a verified leak, which would result in an unusually large sewer billing due to increased water usage, said sewer charges shall be based upon the metered consumption of water for the same period the previous year. In the event there is no record of water consumption for the same period in the prior year, the amount of consumption shall be estimated by the city.

3. If a sewer service is in a user category whose sewer rates are based on metered water consumption, but that user does not receive water from the city, then the city may require the user to install a meter on the water supply, or the city may determine the monthly sewer rate to be one hundred fifty percent of the minimum monthly charge for sewer service.

4. When a commercial use is combined with a residential use on a single meter, the minimum monthly charge shall be the total sum of the minimum monthly charges, determined as if each establishment were an individual account. A single family dwelling residential use shall be allocated one thousand one hundred twenty-five cubic feet of water per month per dwelling, and an apartment or condominium residential use shall be allocated seven hundred seventy cubic feet of water per month per unit. The additional monthly charge based on metered water consumption per cubic foot shall be one dollar and fourteen cents per one hundred cubic feet, for all water consumed in addition to these allocated monthly minimums for the residential uses.

F. *Sewer Reserve Charges.* Sewer reserve charges shall be collected monthly from all users as described below and placed into the Sewer Reserve Fund.

1. *Single Family Dwellings.* Single-family dwellings shall be charged a monthly sewer reserve charge as set forth by city council resolution, regardless of occupancy status.

2. *Multi – Residential Developments.* Multi-residential developments, including manufactured housing parks, trailer parks, and duplexes or triplexes, served collectively or independently, shall be charged a per unit or space monthly sewer reserve charge as set forth by city council resolution, without consideration to occupancy status.

3. *Apartments, Condominium and Townhouse Developments.* Apartments, condominium and townhouse developments with four units or more, and residential development complexes (fourplexes or more) served collectively or independently, shall be charged a monthly per unit sewer reserve charge as set forth by city council resolution, without consideration to occupancy status.

4. *Commercial/Business.* Sewer reserve charges for commercial/business users shall be based on the number of employees. The minimum monthly sewer reserve charge to a commercial/business account in this category shall be as set forth by city council resolution per establishment, regardless of occupancy status.

5. *Motels.* Motels, or similar establishments such as cabin courts and auto courts, shall be charged a monthly sewer reserve charge as set forth by city council resolution. per every two rooms or units, without consideration to occupancy status.

6. *Car Washes.* A car wash, or other commercial/business whose primary wastewater discharge to the city is from car washing operations, shall be charged a monthly sewer reserve charge as set forth by city council resolution.

7. *Laundromats/Cleaning Establishments.* A Laundromat or cleaning establishment, whose primary function is to provide commercial laundry service, shall be charged a monthly sewer reserve charge as set forth by city council resolution.

8. *Restaurants, Taverns and Drive-ins.* Sewer reserve charges for restaurants, taverns and drive-ins shall be based on the number of seats. The minimum monthly sewer reserve charge to a restaurant, tavern, or drive-in in this category shall be as set forth by city council resolution, per establishment, regardless of occupancy status.

9. *Schools.* Schools shall be charged a monthly sewer reserve charge as set forth by city council resolution, regardless of occupancy status. Administration, shop, maintenance, and other ancillary buildings owned or leased by the school, and receiving sanitary sewer service from the city, shall be charged monthly sewer reserve charges at the rates set forth for commercial/business users.

10. *Industrial Users.* Sewer reserve charges for industrial users shall be based on the number of employees. The minimum monthly sewer reserve charge to an industrial user shall be as set forth by city council resolution, per establishment, regardless of occupancy status.

11. Where multiple uses (e.g., combined commercial and residential uses) are combined into a single account, or where multiple commercial and business establishments are tenants in a single building and are served by a common water meter, the monthly sewer reserve charge shall be the total sum of the sewer reserve charges determined as if each use or establishment were an individual account.

12. Where multiple commercial and business establishments, and/or residential uses, are tenants in a single building and are served by separate water meters, then each establishment shall be charged a sewer reserve charge as if each establishment were an individual account.

G. *Contract-for-Rate Increases.* In addition to the charges set forth by city council resolution, the city may increase charges for sewerage services commencing December 31, 2015, and every year thereafter at a rate of three percent.

(Ord. 1443 § 1, 2015; Ord. 1376 § 1, 2012; Ord. 1308 § 1, 2009; Ord. 1301 § 1, 2008; Ord. 1291 § 2, 2008; Ord. 1261 §§ 1—3, 2006; Ord. 1236 § 1, 2005; Ord. 1189 §§ 1, 2, 2002; Ord. 1124 § 3, 2000; Ord. 910 § 1, 1990; Ord. 845 § 1, 1986; Ord. 816 § 1, 1984; Ord. 754 § 1, 1980; Ord. 714 § 1, 1976; Ord. 506 § 7, 1954)

### **13.08.390 City connection or repair cost collection.**

If any sewer connection, or any repair to an existing sewer, is not made within the time and in the manner in this chapter provided, the engineer is authorized and directed to cause the same to be made and to file a statement of the cost thereof with the city treasurer, and thereupon a warrant shall be issued under the direction of the city council by the city treasurer for the payment of such cost. The amount of the cost, together with a penalty of ten percent of the amount thereof, plus interest at eight percent per year upon the total amount of the cost and penalty shall be assessed against the property upon which the building or structure is situated and shall become a lien thereon as provided in this section.

(Ord. 506 § 9 (part), 1954)

**13.08.400 Lien enforcement.**

All of the service charges, connection charges, assessments and other charges, together with the penalties and interest thereon as provided in this chapter, shall be a lien upon the property serviced, superior to all other liens or encumbrances thereon except those for general taxes and local and special assessments. The lien shall be enforced by the city in the manner provided by law. The city may, as an additional and concurrent method of enforcing such liens, cut off the water service from the premises to which the sewer service has been furnished; provided, this method of enforcement shall not be exercised after two years from the date of the recording of sewerage lien notice, as by law provided, except to enforce payment of six months' charges for which no lien notice is required by law to be recorded.

(Ord. 506 § 9 (part), 1954)

**13.08.410 Service of notices.**

Any person who has the care, custody, control or management of any premises or building or who has control of the renting thereof or the collection of rentals therefrom shall, for purpose of this chapter, be deemed to be the agent of the owner of the premises or building, and the giving of all notices provided for in this chapter to the agent is deemed due notice to the owner. All such notices shall be served personally upon the owner or his agent, or by deposit in the United States mail in a sealed envelope with first class postage prepaid and addressed to the owner or his agent at the address of his last known residence, and such service by mail shall be deemed the equivalent of personal service. Ten days' notice shall be given where notices are required under this chapter, unless a longer notice period is prescribed in this chapter; and the notice period shall commence at the time of personal service or at the time of deposit of the notice in the United States mail.

(Ord. 506 § 10, 1954)

**13.08.420 Penalty for violation.**

Any person who is convicted of violating or failing to comply with any of the provisions of this chapter (except the nonpayment of rates and charges or other moneys due) shall be fined in any sum not to exceed one hundred fifty dollars or imprisoned for a period of not more than thirty days or both fined and imprisoned as provided in this section.

(Ord. 506 § 11, 1954)

## **Chapter 13.10**

### **SEWER SYSTEM CONNECTION CHARGES**

Sections:

- 13.10.010 Purpose and intent.**
- 13.10.020 Sewer connection fees and charges required.**
- 13.10.030 System connection charge.**
- 13.10.040 Capital reimbursement charge.**
- 13.10.050 Schedule of equivalent residential units (ERU's).**
- 13.10.055 Independent ERU calculation.**
- 13.10.060 Responsibility of customer to install.**
- 13.10.070 City inspection and approval of installation – Fee required.**
- 13.10.080 Low income housing facilities schedule of charges.**
- 13.10.090 Collection of charges.**
- 13.10.100 Appeals.**

### **13.10.010 Purpose and intent.**

The system of sewer connection charges and fees established in this section is intended to accomplish the following purposes:

- A. Establish a charge which brings new customers into an equity position with current, long-term customers, regarding the present value of the sewer treatment and interceptor collection system;
- B. Establish a charge which proportionately allocates the cost of new system treatment capacity to those new customers which use that capacity;
- C. Establish a schedule of ERU's which sets the buy-in and new capacity connection charges on the basis of total strength and volume of wastewater generated;
- D. Assign the responsibility for installation of approved new customer hookups to the customer, and provide for city inspection and approval of the work, along with accompanying administrative fee;
- E. Establish modified charges and rates for low income housing facilities;
- F. Establish an appeal procedure, whereby a new customer can request review and appeal of hookup charges calculated on the basis of this section.

(Ord. 1124 § 5 (part), 2000)

### **13.10.020 Sewer connection fees and charges required.**

As provided in this section, all new sewer customers shall be required to pay a connection charge which shall include a system connection charge, a capital reimbursement charge, and an administrative fee.

(Ord. 1124 § 5 (part), 2000)



### **13.10.030 System connection charge.**

The system connection charge, which is based on the current life expectancy value of the existing sewer treatment and interceptor collector system, has been established on the basis of engineering studies, generally accepted professional standards, and analysis of system component costs and values. This connection charge is set at six hundred dollars/ERU.

(Ord. 1124 § 5 (part), 2000)

### **13.10.040 Capital reimbursement charge.**

The capital reimbursement charge is based on the cost of providing new treatment capacity. The capital reimbursement charge is set at three thousand nine hundred thirty-eight dollars/ERU.

(Ord. 1389 § 1, 2013; Ord. 1232 § 1, 2005; Ord. 1151 § 1, 2001; Ord. 1140 § 1, 2001; Ord. 1124 § 5 (part), 2000)

### **13.10.050 Schedule of equivalent residential units (ERU's).**

The following list of ERU values shall serve as the basis for calculating buy-in and new capacity charges. This list is derived from Table G2-1, page G2-6, Criteria for Sewage Works Design, Washington Department of Ecology.

Single-family residence	1.00 ERU
Townhouse	0.85 ERU per unit
Apartment	0.70 ERU per unit
Motels and hotels	0.40 ERU per unit with kitchenette
	0.20 ERU per unit without kitchenette
Restaurants and bars	0.25 ERU per seat
Shopping center	0.60 ERU per 1,000 square feet
Church	0.02 ERU per seat
Country club	0.30 ERU per member
Bowling alley	0.45 ERU per lane

Nursing home	1.15 ERU per bed
Home for aged	0.60 ERU per bed
Theatre (all types)	0.03 ERU per seat
Swimming pool	0.06 ERU per person capacity
Doctor and dentist office	1.40 ERU per chair or examining room
Manufacturing/Industrial – sanitary use only	0.10 ERU per employee
Industrial waste	Independent ERU calculation
Grocery store	0.10 ERU per employee (no sink disposal)
Grocery store	1.30 ERU add on per sink disposal unit
Laundromat	0.90 ERU per machine
Service stations – no service bays	0.10 ERU per pumping station
Service stations – with service bays	0.05 ERU add-on per service bay
Service stations – with wash bays	0.35 ERU add-on per car wash bay
Service stations – with wash bays	0.60 ERU add-on per truck wash bay
By custom facility (not fitting into any above type of facility):	
Washing machine	0.20 ERU per machine (3 or more, use 0.90 ERU)

Dishwasher	0.03 ERU (home style – less than 2 machines)
Bathtub	0.10 ERU per tub
Garbage disposal	1.30 ERU per sink add-on
Shower	0.15 ERU per showerhead
Washbasin	0.05 ERU per sink
Water closet (toilet)	0.30 ERU per toilet

Note: The minimum ERU value, for purposes of determining connection charges and fees, shall be 1 ERU.

(Ord. 1168 § 1, 2002; Ord. 1124 § 5 (part), 2000)

### **13.10.055 Independent ERU calculation.**

Where a specific use is not listed or does not clearly meet the categories provided for in Section [13.08.050](#), an applicant for sewage calculation may submit an independent calculation from which an ERU rate may be calculated. Uses generating industrial waste shall provide an independent calculation. The independent calculation shall be completed by an engineer licensed and registered in the state of Washington with expertise in calculating sewage generation rates and loading. The director of public works shall review the independent calculation and approve the calculation if it is consistent with typical engineering practices.

(Ord. 1168 § 2, 2002)

### **13.10.060 Responsibility of customer to install.**

The customer shall be responsible for installation of the sanitary sewer service line from the property boundary to the city main. This work shall be done by a licensed and bonded contractor, subject to city inspection and acceptance, and shall include installation of the line, street cutting, backfill, compaction, ballast, patching, and traffic control.

(Ord. 1124 § 5 (part), 2000)

**13.10.070 City inspection and approval of installation – Fee required.**

In addition to the connection charge and capital reimbursement charges provided for above, a fee of one hundred dollars shall be assessed for each new hookup, to cover the costs of inspection, approval, and administrative processing.

(Ord. 1124 § 5 (part), 2000)

**13.10.080 Low income housing facilities schedule of charges.**

For development proposals designed to serve low income recipients, with a qualifying income level at or below forty percent of the county median income level, the sewer connection charges for one and two bedroom units shall be as follows:

	<b>Connec- tion</b>	<b>Capital Reimb.</b>	<b>Admin.</b>	<b>Total</b>
1 bed- room	\$510	\$3,348	\$100	\$3,958
2 bed- room	\$540	\$3,545	\$100	\$4,185

(Ord. 1588 § 1, 2020; Ord. 1232 § 2, 2005; Ord. 1151 § 8, 2001; Ord. 1140 § 2, 2001; Ord. 1124 § 5 (part), 2000)

**13.10.090 Collection of charges.**

Charges for sewer connection charges and fees shall be collected at the time of issuance of the building permit.

(Ord. 1124 § 5 (part), 2000)

**13.10.100 Appeals.**

A decision of the director of public works under this chapter may be appealed to the city council as provided for in CEMC Section [17.100.130](#).

(Ord. 1168 § 3, 2002)

## **Chapter 13.12**

### **WATER REGULATIONS**

Sections:

- 13.12.005 Definitions.**
- 13.12.010 Applications.**
- 13.12.015 Service pipes – Arrangement.**
- 13.12.016 Cross-connection prevention.**
- 13.12.020 Service pipes – Placement and size.**
- 13.12.030 Premises to be kept open to inspection.**
- 13.12.035 Defacing service equipment.**
- 13.12.040 Meters property of city.**
- 13.12.050 Repair of service pipes – Owner’s responsibility.**
- 13.12.060 Extension of water mains.**
- 13.12.070 Existing hookups.**
- 13.12.080 Collection of charges.**
- 13.12.090 Auxiliary potable services.**
- 13.12.100 Rates and charges.**
- 13.12.105 Reinstitution charge.**
- 13.12.110 Defective equipment.**
- 13.12.115 Petition for and relief from water bill.**
- 13.12.120 Turning off water and making connections – Written permission required.**
- 13.12.130 Access for purpose of inspection.**
- 13.12.140 Water accounts kept in property owner’s name.**
- 13.12.150 Water shortages – City’s rights in case of.**
- 13.12.160 Water use during fires.**
- 13.12.170 Regulation of water use by meter installation.**
- 13.12.180 Amendment of rules and regulations.**
- 13.12.190 Open hoses and sprinkler head provisions.**
- 13.12.200 Low income senior citizens – Reduced rates.**
- 13.12.210 Violation – Penalty.**

#### **13.12.005 Definitions.**

The following words, as used in this chapter, shall have the following meanings:

- A. “Outside the city limits” means and relates to territories situated beyond the corporate limits of the city of Cle Elum.

B. "Person" means and includes natural persons of either sex, associations, copartnerships and incorporations, whether acting by themselves or by a servant, agent or employee. The single number shall be held to include the plural and the masculine pronoun to include the feminine.

C. "Premises" when used in reference to residence means a single-dwelling unit.

D. "Utility superintendent" means the utility superintendent of the city of Cle Elum.

(Ord. 776 § 1, 1981)

### **13.12.010 Applications.**

A. An application for the use of water must be made on printed forms to be furnished at the office of the city clerk for each water service. The application must state fully all purposes for which city water is to be used and the applicant shall agree to conform to all rules and regulations pertaining to the usage of city water.

B. All new service connections shall be metered. Water shall be furnished at meter rates, which will be no less than the established minimum charge per month. The meters, meter boxes, valves and service line from the main to the meter shall remain the property of the city.

C. No user of water is entitled to use water other than for the purposes stated in the application form.

D. No person will be allowed to make connections with city water mains, or make alterations in any pipe, connect any disconnected pipe or turn connections on or off without permission of the utility superintendent.

(Ord. 776 § 2, 1981)

### **13.12.015 Service pipes – Arrangement.**

A. Service pipes must be so arranged so as a water supply to each separate house or premises may be controlled by a separate stopcock placed within and near the line of the street curb.

B. Where water is now supplied through one service to several houses, families or persons, the city may, at its discretion, either decline to furnish water until separate services are provided, or may continue the supply on the condition that one person shall pay for all in the same service.

(Ord. 776 § 3, 1981)

### **13.12.016 Cross-connection prevention.**

A. The city is required to eliminate or control all cross-connections throughout its service area. Therefore, anyone wanting or using water from the city is required to comply with these regulations. The owner of the property in which a cross-connection occurs is fully responsible for all damages incurred.



B. The city superintendent will enforce the provisions of this section. The city superintendent may delegate responsibilities to a certified cross-connection control specialist/inspector. The provisions of this section may supersede state regulations but in no case shall they be less stringent. All approved standards shall be approved by the city and the city superintendent. All back-flow-prevention assemblies required by this section shall be a model approved by the Kittitas County department of health. Approved backflow prevention assemblies required by this section shall be installed under the direction of the city superintendent and/or under the supervision of the cross-connection specialist/inspector utilizing the city standards.

C. All RPBA's, RPDAs, DCVAs, DCDAs and PVBA's are required to be tested at least annually and all air gaps installed in lieu of an approved backflow prevention assembly shall be inspected at least annually. Completed test reports shall be returned to the city within thirty days after receipt of the yearly test notification. Tests and inspections may be required on a more frequent basis at the discretion of the city superintendent.

D. Authorized employees of the city with proper identification shall have free access at reasonable hours of the day to all parts of a premises or within buildings to which water is supplied. Water service shall be refused or terminated to any premises for failure to allow necessary inspections.

E. Failure of the customer to cooperate in the installation, maintenance, repair, inspection or testing of backflow prevention assemblies required by this section shall be grounds for termination of water services to the premises or the requirement for an air gap separation.

F. As used in this section, the following words shall have the following meanings:

"Air gap (AG)" means the vertical physical separation between the free-flowing discharge end of the potable supply line and the overflow rim of the receiving vessel. This separation must be at least twice the inside diameter of the supply line, but never less than one inch. When located near walls, the air gap separation must be increased.

"Approval/approved" means approved in writing by the Kittitas County health department or other agency having jurisdiction.

"Atmosphere vacuum breaker (AVB)" means a device which contains a float check (poppet), a check seat and air inlet vent. When water pressure is reduced to a gauge pressure of zero or below, air enters the device, preventing backsiphonage. It is designed to protect against backsiphonage only.

"Auxiliary water supply" means any water supply on, or available to, a premises other than the city's approved public potable water supply.

"Auxiliary water supply – approved" means an auxiliary water supply which has been investigated and approved by the Kittitas County health department, meets water quality regulations, and is accepted by the city.

"Auxiliary water supply – unapproved" means an auxiliary water supply which is not approved by the health authority.

"Backflow" means the flow of water or other liquids, gases or solids from any source back into the distribution piping of the public potable supply system.

“Backflow prevention assembly” means an assembly which prevents the backflow of water or other liquids, gases or solids into the city’s potable water supply and appears on the Kittitas County department of health’s “approved” list.

“Backflow prevention device” means a device which prevents the backflow of water or other liquids, gases or solids into the city’s potable water supply and does not appear on the Kittitas County department of health’s “approved” list.

“Backpressure” means water pressure which exceeds the operating pressure of the public potable water supply.

“Backsiphonage” means backflow due to a negative or reduced pressure within the public potable water supply.

“Barometric loop (BL)” means a loop of pipe rising at least thirty-five feet at its uppermost point, above the highest point on the downstream piping.

“Certified backflow assembly tester” means a person who is certified by the Kittitas County department of health to test backflow prevention assemblies.

“Certified cross-connection control specialist/inspector” means person who is certified by the Kittitas County department of health, or other approval agency, to administer a cross-connection control program and to conduct cross-connection surveys.

“Confined space” means any space having a limited means of egress which is subject to the accumulation of toxic or flammable contaminants or any oxygen deficient atmosphere.

“Contamination” means an impairment of the quality of the potable water which creates an actual hazard to the public health through poisoning or through the spread of diseases by sewage, industrial fluids or waste. Also defined as high hazard.

“Critical level” means the point on a vacuum breaker which determines the minimum elevation above the flood level rim of the fixture or receptacle served at which the vacuum breaker may be installed.

“Cross-connection” means a point in the plumbing system where the public potable water supply is connected directly, or has the potential of being connected, to a source of nonpotable substance that is not a part of the public potable water supply.

“Double check detector assembly (DCDA)” means an approved assembly consisting of two approved double check valve assemblies, set in parallel, equipped with a meter on the bypass line to detect small amounts of water leakage or use. This unit must be purchased as a complete assembly. The assembly may be allowed on fire line water services in place of an approved double check valve assembly upon approval by the city superintendent.

“Double check valve assembly (DCVA)” means an approved assembly operating check valves, loaded to the closed position by springs or weights, and installed as a unit with, and between, two resilient seated shutoff valves and having suitable connections for testing.

“Flood level” means the highest level to which water, or other liquid, will rise within a tank or fixture (i.e., the overflow rim of the receiving vessel).

"Health authority" means the Kittitas County department of health or other appropriate state agency having jurisdiction.

"High hazard" means a physical or toxic hazard which could be detrimental to one's health.

"In-plant protection" means the practice of installing backflow prevention assemblies at the point of hazard to protect one or more actual or potential cross-connections within a premises.

"Internally loaded check valve" means a check valve which is internally loaded, either by springs or weights, to the extent it will be drip-tight with a one psi differential in the direction of flow.

"Local enforcement authority" means an authorized agent of the regulatory authority and/or the city of Cle Elum.

"Low hazard" means a hazard which could cause aesthetic problems or have a detrimental effect on the quality of the public potable water supply.

"Nonpotable fluid" means any water, other liquid, gas or other substance which is not safe for human consumption, or is not a part of the public potable water supply as described by the Kittitas County health department.

"Pollution" means an impairment of the quality of the public potable water supply which does not create a hazard to the public health but which does adversely affect the aesthetic qualities of such potable waters for domestic use. Also defined as "low hazard."

"Potable water" means water which is safe for human consumption, free from harmful or objectionable materials, as described by the Kittitas County health department.

"Premises isolation" means the practice of protecting the public potable water supply by installing backflow prevention assemblies at or near the point where water enters the premises. This type of protection does not provide protection to personnel on the premises.

"Pressure vacuum breaker assembly (PVBA)" means an approved assembly consisting of a spring loaded check valve loaded to the closed position, an independently operating air inlet valve loaded to the open position and installed as a unit with and between two resilient seated shutoff valves and with suitable connections for testing. It is designed to protect against backsiphonage only.

"Private hydrant" means any hydrant which is not owned, operated or maintained by the city.

"Process water" means water that is directly connected to, or could come in contact with, an extreme high hazard situation, and must never be consumed by humans.

"Reduced pressure backflow assembly (RPBA)" means an approved assembly consisting of two independently operating check valves, spring loaded to the closed position, separated by a spring loaded differential pressure relief valve loaded to the open position, and installed as a unit with and between two resilient seated shutoff valves and having suitable connections for testing.

“Reduced pressure detector assembly (RPDA)” means an approved assembly consisting of two approved reduced pressure backflow assemblies, set in parallel, equipped with a meter on the bypass line to detect small amounts of water leakage or use. This unit must be purchased as a complete assembly. The assembly may be allowed on fire line water services in place of an approved reduced pressure backflow assembly upon approval by the city.

“Used water” means any potable water which is no longer in the city’s distribution system. In most cases, the potable water has moved past (downstream of) the water meter and/or the property line.

(Ord. 938 § 1, 1991)

### **13.12.020 Service pipes – Placement and size.**

A. When an application for water service is approved, service pipe and connections from the main line to and including the stopcock and meter will be installed and maintained by the city water department, and shall be kept within the exclusive control of the city. The city will lay its connection to the premises upon payment of actual costs of installation plus ten percent.

B. No premises shall be allowed more than one service connection except for fire purposes, industrial or commercial usage, in which case each service shall be metered and paid for separately.

(Ord. 776 § 4, 1981)

### **13.12.030 Premises to be kept open to inspection.**

Agents of the city shall have access at all proper hours of the day for the purpose of inspecting the condition of the pipes and fixtures, the manner of water usage and reading water meter. Water users shall keep their premises adjacent to the water meter free of any material that would prevent meter access. In the event that the water meter is not accessible due to accumulation of debris or other causes, water service may be disconnected and not reconnected until inspection is permitted.

(Ord. 776 § 5, 1981)

### **13.12.035 Defacing service equipment.**

It is unlawful for any person to break, deface or damage any water meters, gate, pipe or water fixture or interfere with proper operation of any portion of the city water system. It is unlawful for any person to disconnect or remove any meter after installation unless the removal or disconnection is approved by the city.

(Ord. 776 § 6, 1981)

**13.12.040 Meters property of city.**

All water meters shall be the property of the city and may be installed or removed only upon direction of the utilities superintendent.

(Ord. 776 § 7, 1981)

**13.12.050 Repair of service pipes – Owner’s responsibility.**

The service pipe past the meter must be kept in repair by the owner, who shall repair any leaks promptly and shall be responsible for damages resulting from leaks or breaks.

(Ord. 776 § 8, 1981)

**13.12.060 Extension of water mains.**

All persons desiring water main extensions maintained by the city shall be charged actual cost of materials, labor, equipment, benefits and overhead costs plus ten percent.

(Ord. 776 § 9, 1981)

**13.12.070 Existing hookups.**

Water users hooked up prior to January 1st shall be allowed to use flat-rate monthly charges in lieu of metering. Upon any disruption or discontinuation of service metering may be required at the discretion of the city prior to reinstituting service. Service lines from property lines to city mains shall be maintained by the city water department who will use all diligence to prevent interruption of water service, but the city shall not be responsible for temporary water interruption due to breakage or freezing.

(Ord. 776 § 10, 1981)

**13.12.080 Collection of charges.**

Water rates will be charged to customers on a monthly basis, and bills shall be payable upon receipt. Charges unpaid after thirty days shall incur interest penalty at the highest rate then permitted by law. The city shall have a lien on delinquent and unpaid charges for water, enforceable as provided by law. Whenever a city water customer is over sixty days delinquent in payment of its water bill, then the city shall undertake all acts necessary to disconnect service to that customer. The sixty days provided for in this section shall be calculated from the date that the bill is due, provided, however, that at least ten calendar days prior to the date on which the city intends to disconnect service, the city shall forward to the customer a notice advising of the city's intent to disconnect service

for nonpayment. Any notice sent to a customer advising of the intent to disconnect service shall inform the customer that in addition to the outstanding bill that would have to be paid in order to restore water service following disconnection, the customer will be charged a one hundred dollar connection fee in order to reconnect service. The cost of sending said notice shall be \$10.00 plus the cost of sending a United States Postal Service Certified Letter. The same notice shall also advise the customer of the right to contest the validity of the bill, as well as the date on which payment must be made in order to avoid disconnection of service. Any writing which is forwarded to the customer shall contain a copy of the delinquent bill.

(Ord. 1422 § 1, 2014; Ord. 1312 § 1, 2009; Ord. 1122 § 1, 2000; Ord. 776 § 11, 1981)

### **13.12.090 Auxiliary potable services.**

Auxiliary potable services is the consumption of water that does not impact the sewer system in any manner. This includes, but is not limited to, irrigating and ice manufacturing. Any city water customer may elect to install a separate meter for an auxiliary potable service. The size of the meter will be at the user's discretion. The expense of the installation, meter and meter box will be the sole responsibility of the customer and work must be performed by a city approved licensed and bonded contractor. If an existing system currently does not have a double check valve, one will be required.

The customer will receive a separate billing statement for the auxiliary meter. Auxiliary meters will be billed at a base rate of ten dollars per month, which includes the first one thousand two hundred cubic feet of water. Additional water usage will be billed at the existing incremental rates as described in Chapter 13.12.100, Section C of the Cle Elum Municipal Code.

Meters used for irrigation only will have a customer installed shut-off valve at the meter to be turned off during the winter months and shall not be billed the standby rate during the months of November 1st through April 30th, unless the customer turns on and uses the meters at any time during those months. Irrigation season is designated as May 1st through October 31st. There will be no administrative fee to turn the meter on in the spring and off in the fall if the customer chooses, but the city will not be responsible for system damage due to freezing. However, the meter will remain turned on during irrigation season and the base rate billed, regardless of use.

(Ord. 1312 § 2, 2009; Ord. 776 § 12, 1981)

### **13.12.100 Rates and charges.**

- A. The city council may alter water rates and charges as set forth herein in the manner provided by law. Monthly rates and charges shall be as set forth by city council resolution.
- B. All water rates and charges shall increase by three percent on December 31, 2015, and every December 31st thereafter as set forth by city council resolution. Refer to the fee schedule for current rates.
- C. *Meter Rates – Within City Limits.* All rates in cubic feet. One cubic foot equals seven and one-half gallons.



<b>Cubic Feet</b>	<b>2017</b>
0 to 1,200	...
1,201 to 2,000	\$0.011
2,001 to 4,000	\$0.013
4,001 and over	\$0.015

D. *Meter Rates – Outside City Limits.* All hook-up must be metered.

<b>Cubic Feet</b>	<b>2017</b>
0 to 1,200	...
1,201 to 2,000	\$0.011
2,001 to 4,000	\$0.013
4,001 and over	\$0.015

E. *Stand-by Rates.* Stand-by rates shall be identical to rates and charges set forth in Paragraphs A, B, C and D above. Base rates are charged regardless of water usage or occupancy.

F. *Water Connection Charges.*

Hook-up	¾" Line	\$2,000.00
Hook-up	1" Line	\$2,500.00
Hook-up	1 ½" Line	\$3,000.00
Hook-up	2" Line	\$3,500.00
Hook-up	3" Line	\$3,500.00

G. All rates enumerated in Sections B, C and D shall increase by three percent on December 31, 2015 and every December 31 thereafter.

H. The city shall charge a fee for water filling station services as set forth by resolution of the city council.

(Ord. 1524 § 1, 2019; Ord. 1442 § 1, 2015; Ord. 1433 § 1, 2015; Ord. 1427 § 1, 2015; Ord. 1397 § 1, 2013; Ord. 1377 § 1, 2012; Ord. 1312 § 3, 2009; Ord. 1300 § 1, 2008; Ord. 1260 §§ 1, 2, 2006; Ord. 1202 § 1, 2003; Ord. 1188)

### **13.12.105 Reinstitution charge.**

A. As used in this section, “existing water connection” means any premises having a connection to the city water system, whether or not water is currently being furnished to such premises.

B. The city council has determined that there may be existing water connections for which the owner or a predecessor in interest to the owner has paid a connection charge for which premises no service charges have been paid as a result of the premises having voluntarily not utilized city water service. City water service will be reinstituted to the premises upon payment of the following amounts:

1. Monthly city water service charges from the date of interruption of water service or from October 1, 1992, whichever amount shall be lesser, together with a late fee of fifteen percent of the amount;
2. Actual costs incurred in reestablishing service, i.e., city crew, backhoe, and other actual expenses incurred in reestablishing service, together with fifteen percent of the amount representing city overhead;
3. Charges for acquisition and installation of a water meter to the premises, if the premises does not already have a water meter, together with fifteen percent representing city overhead.

C. The applicant must pay to the city at the time of application for renewed service an estimate of the amounts set forth above, which estimate shall be determined by the city clerk. Any amounts deposited in excess of actual costs of installation and reconnection together with city overhead shall be refunded to the applicant. In the event that actual cost of reconnection exceeds estimate, the applicant will be required to pay the difference prior to initiation of water service.

(Ord. 975 §§ 1, 2, 1992)

### **13.12.110 Defective equipment.**

A. Water will not be furnished where there are defective or leaking faucets or other water fixtures, and when such may be discovered, the supply will be withdrawn until proper repairs are made at property owner's sole expense.

B. If any person allows any faucet or pipe to run open, not irrigating or sprinkling, he shall be in violation of this chapter. In addition to other penalties prescribed by this chapter, water shall be immediately turned off from the premises and will not be again restored until the penalties are paid.

(Ord. 776 § 14, 1981)

### **13.12.115 Petition for and relief from water bill.**

In the event any person is aggrieved by the amount of one hundred dollars or more in excess of the amount billed for monthly water service, he or she may, within fifteen days of the postmark on said bill, petition the city council in writing to the utilities clerk for a downward adjustment to his or her bill. Upon receipt of such petition, the utilities clerk shall notify the public works director and the utilities committee and schedule a meeting to consider the petition for downward adjustment. The utilities committee may consult with the city public works director or his designee regarding the matter and shall, upon deliberation and oral findings following the meeting, make a recommendation to the entire city council to grant a downward adjustment only upon good cause shown. No

downward adjustment will be considered for leaks within the primary residential or commercial building; however, adjustment for leaks within crawl spaces may be considered on a case-by-case basis. Any bill granted a downward adjustment by the city council shall not exceed five hundred dollars in relief and shall be presented to the mayor for his signature on the face thereof. Notice of the reduction shall be provided in writing by the city to the customer. No ratepayer may petition the city council more than one time per twelve-month period for such a downward adjustment.

In the event that city-maintained water pipes prevent water service to a customer's water meter due to cold or frozen weather for more than two days (forty-eight hours), the city council may, upon the recommendation of the city public works director and the utilities committee, provide equitable relief to the customer by crediting up to one month's water fees which include water base rate fee, water reserve fee, and applicable water taxes for every two to thirty days of interrupted service, or multiples thereof. In the event any neighbor assists a customer with frozen, city-maintained water service by providing water through that neighbor's meter (i.e., through the use of a hose or similar apparatus), that neighbor will be allocated double the volume of water in the base rate for the same period of interrupted service.

(Ord. 1464 § 1, 2017; Ord. 1312 § 4, 2009; Ord. 1158 § 1, 2001; Ord. 1122 § 2, 2000)

### **13.12.120 Turning off water and making connections – Written permission required.**

No person will be allowed to make any connection with the city main or to connect pipes when they have been disconnected or to turn off the water on any premises without written permission from the utilities superintendent.

(Ord. 776 § 15, 1981)

### **13.12.130 Access for purpose of inspection.**

Officers and employees of the city water department shall have free access at proper hours of the day to all parts of buildings in which water may be delivered from the city mains, for the purpose of inspecting the condition of pipes and fixtures, and the manner in which the water is used.

(Ord. 776 § 16, 1981)

### **13.12.140 Water accounts kept in property owner's name.**

All accounts for water shall be kept in the name of the owner of the property, not in the name of the tenant, and the owner only, or his legally authorized agent, shall be responsible for water rates.

(Ord. 776 § 17, 1981)

**13.12.150 Water shortages – City’s rights in case of.**

The city reserves the right in case of shortage of water, or for any other cause, to make any order forbidding the use of water for irrigation or sprinkling, and the use thereof in contravention of the order shall be a violation of this chapter.

(Ord. 776 § 18, 1981)

**13.12.160 Water use during fires.**

No person shall use any water for irrigation or sprinkling during the progress of any fire in the city and all irrigation and sprinkling shall be immediately stopped when an alarm of fire is sounded in any part of the city, and shall not begin again until the fire has been extinguished. Use of water in violation of this section is a violation of this chapter.

(Ord. 776 § 19, 1981)

**13.12.170 Regulation of water use by meter installation.**

The city reserves the right to regulate the use of water to any consumer by requiring the installation of a meter.

(Ord. 776 § 21, 1981)

**13.12.180 Amendment of rules and regulations.**

The right is reserved to the city to amend or add to these rules and regulations or to change the water rates as experience may show to be necessary or expedient.

(Ord. 776 § 22, 1981)

**13.12.190 Open hoses and sprinkler head provisions.**

No water user shall permit open hoses to be allowed to run at any time. No sprinkler head shall apply water through an orifice larger than three-eighths inch and no water user shall utilize more than two sprinkler heads at any one time.

(Ord. 776 § 24, 1981)

### **13.12.200 Low income senior citizens – Reduced rates.**

Low income senior citizens (being a person sixty-two years of age or older and whose total income, including that of his or her spouse or cotenant, does not exceed the amount specified in RCW [84.36.381\(5\)\(b\)](#), as now existing or hereafter amended) shall upon application be entitled to one reduced residential water rate which rate shall be seventy-five percent of the rates otherwise set forth in Section [13.12.100](#).

(Ord. 776 § 25, 1981)

### **13.12.210 Violation – Penalty.**

For each and every violation of the rules and regulations established by this chapter, the offending party shall be subject to a fine, not to exceed five hundred dollars. When the offense is one that relates to plumbing, leakage or other illegal use or waste of water, the utilities superintendent may stop the supply of water to the offender. When the water has been turned off for a violation of the rules, the city may withhold water usage until all penalties have been paid.

(Ord. 776 § 20, 1981)

## **Chapter 13.14**

### **WATER SUPPLY SYSTEM CAPITAL REIMBURSEMENT CHARGE**

Sections:

- 13.14.010 Purpose.**
- 13.14.020 Water capital reimbursement fees required.**
- 13.14.030 Capital reimbursement charge.**
- 13.14.040 Schedule of equivalent residential units.**
- 13.14.050 Independent ERU calculation.**
- 13.14.060 Appeals.**

### **13.14.010 Purpose.**

The purpose of this chapter is to establish a charge for new connections to the city water supply system that proportionately allocates the cost of water system improvements to those new customers that use the system.

(Ord. 1181 § 1, 2002)

### **13.14.020 Water capital reimbursement fees required.**

All new or increased connections to the water supply system shall be required to pay the capital reimbursement charge prior to connection to the system in addition to the connection fees established by CEMC [13.12](#) except for a single equivalent residential unit (ERU) connection on existing lots within the city limits which were platted before January 1, 2001. City limits shall be corporate limits of the city as of January 1, 2001. Connections on these lots that are more than one ERU are subject to the charge for all ERUs over the initial ERU.

(Ord. 1181 § 1, 2002)

### **13.14.030 Capital reimbursement charge.**

The capital reimbursement charge is established as one thousand five hundred sixty-five dollars for each equivalent residential unit. The charge shall be payable prior to building permit issuance or if no permit is required, prior to physical connection to the system.

(Ord. 1181 § 1, 2002)

### **13.14.040 Schedule of equivalent residential units.**

The number of ERUs for each connection shall be based on the following table which is based on the average water use in the city of Cle Elum and Table 5-2 of the Water System Design Manual, WA. State Dept. of Health. The minimum ERU value, for purposes of determining charges is one ERU.

<b>Type of Use</b>	<b>ERU</b>
Single-family residence	1
Apartment	.90 per unit
Camp/RV park	.30 per site
Industrial/warehouse- Employee use	.10 per employee per shift
Factory – Process water	To be determined by engineers estimate.
Hotel/motel	.25 per room
Restaurant/drinking places	.08 per seat
Store (less than 10,000 sq. ft.)	1 per toilet room



Type of Use	ERU
Store (greater than 10,000 sq. ft.)	To be determined by engineers estimate
Service Station	
• No service bays	.10 per pumping station
• With service bays	.05 add on per bay
• With wash bays	Additional charge based on engineers estimate
Swimming pool	.04 per pool occupant based on occupancy
Movie theatre	.02 per seat
Office	.06 per person based on building occupancy load.
All other uses	To be determined by engineers estimate

(Ord. 1181 § 1, 2002)

### **13.14.050 Independent ERU calculation.**

Where a specific use is not listed or does not clearly meet the categories provided for in Section [13.14.040](#) an applicant for water connection may submit an independent calculation from which an ERU rate may be calculated. The independent calculation shall be completed by an engineer licensed and registered in the State of Washington with expertise in water use. The director of public works shall review the independent calculation and approve the calculation if it is consistent with accepted engineering practices.

(Ord. 1181 § 1, 2002)

### **13.14.060 Appeals.**

A decision of the director of public works under this ordinance may be appealed to the city council as provided for in CEMC [17.100.130](#).

(Ord. 1181 § 1, 2002)

## **Chapter 13.16**

### **PRESERVATION AND PROTECTION OF WATER SUPPLY**

Sections:

- 13.16.010 Sources of water.**
- 13.16.020 Prohibited acts.**
- 13.16.030 Violation – Designated.**
- 13.16.040 Violation – Arrest powers.**
- 13.16.050 Violation – Penalty.**

#### **13.16.010 Sources of water.**

For the purpose of protecting the water supply furnished to the inhabitants of the city from pollution, and for the preservation and protection of the purity of the water supply, the city assumes jurisdiction over all the property occupied by the works, reservoirs, systems, springs, branches and pipes by means of tributaries constituting the sources of supply from which the city obtains its supply of water, and over all streams, creeks or tributaries constituting such sources of supply, whether the same or any part thereof are within the corporate limits of the city or outside thereof.

(Ord. 237 § 1, 1925)

#### **13.16.020 Prohibited acts.**

The following acts shall constitute offense against the purity of the water supply: swimming, fishing, and boating in Cle Elum Lake; dumping raw sewage into any lake, river, spring, stream, creek or tributary constituting the source of supply of water of the city, or camping on the shores of the streams, lakes, etc. No dwelling shall be constructed or maintained on the watershed, unless the dwelling is provided with a sanitary toilet so designed and so kept that the contents of the toilet cannot drain on the surface of the ground or reach the water through the ground.

(Ord. 237 § 2, 1925)

#### **13.16.030 Violation – Designated.**

Every person who deposits or causes to be deposited in any spring, stream, river or lake constituting the source of supply from which the city obtains its supply of water, any matter or thing whatever, dangerous or deleterious to health, or any matter or thing which may or would pollute the waters of the spring, stream, river, lake or water system, is deemed guilty of violation of this chapter.

(Ord. 237 § 3, 1925)

### **13.16.040 Violation – Arrest powers.**

The mayor of the city is authorized to appoint special policemen with such compensation as the city council may fix, who shall have powers of a constable under the laws of this state, and who may arrest with, or without, warrant, any person committing within the territory provided by this chapter, any offense declared by this chapter to be against the purity of the water supply, or any rule or regulation as provided in this chapter. Such policeman shall be and he is hereby authorized to forthwith take any such person arrested for such violation aforesaid before any court having jurisdiction thereof to be proceeded with according to law.

(Ord. 237 § 4, 1925)

### **13.16.050 Violation – Penalty.**

Any person or persons, firm or corporation violating any of the provisions of this chapter shall, upon conviction, be punished by a fine of not less than twenty-five dollars, nor exceeding three hundred dollars, or by imprisonment for a period not exceeding thirty days, or by both such fine and imprisonment.

(Ord. 237 § 5, 1925)

## **Chapter 13.20**

# **WATER CONNECTION AND WATER TRANSFER REQUIREMENTS<sup>1</sup>**

Sections:

- 13.20.010 Applicability.**
- 13.20.020 Purpose and intent.**
- 13.20.030 Conditions for providing utility service outside the city.**
- 13.20.040 Hookup fees, connection charges and other conditions.**
- 13.20.050 Types of water rights.**
- 13.20.060 Annexations.**
- 13.20.070 Amount of water and payment in lieu.**
- 13.20.080 Payments received by the city.**
- 13.20.090 Form of transfer and conveyance of water right.**
- 13.20.100 Severability.**

**1 Editor's note:** Ord. [1294](#), § 2, adopted Oct. 14, 2008, amended Ch. [13.20](#) in its entirety to read as herein set out. Former Ch. 13.20, §§ 13.20.010 – 13.20.050, pertained to water connection and fire protection charges outside city limits and derived from Ord. [547](#), §§ 1 – 5, 1959.

### **13.20.010 Applicability.**

This chapter applies to all annexations of land (other than for municipal purposes) to the city greater than two acres approved after the adoption of this chapter. This chapter does not apply to annexations or development agreements in place prior to its approval.

(Ord. 1294 § 2, 2008)

### **13.20.020 Purpose and intent.**

The purpose of this chapter is to ensure that, as new connections to the city water system are approved, either through connections to redevelopment or in-fill development within existing city boundaries, or connections to new development on land annexed to the city, there is adequate water to serve the city's water needs including without limitation, service to residential, commercial, industrial and public spaces, while supporting these commitments through policies that conserve water.

The general intent in the application of this chapter will be to permit two options for those that desire water delivery by the city. The options are listed below in order of the city's preference:

1. Transfer to the city a water right in an amount equal to or greater than the amount required to serve the subject property; or
2. Transfer to the city a water right in an amount less than the amount required to serve the subject property and make payment to the city in an amount sufficient to permit it to acquire the amount of water additionally required to assure service to the subject property.

(Ord. 1294 § 2, 2008)

### **13.20.030 Conditions for providing utility service outside the city.**

For purposes of any application for annexation into the city or any application for water or sewer services or other municipal utility service, the city may extend service only upon satisfaction of the city's engineer and city council that the following standards have been met:

- A. No connection shall be made to any applicant qualifying property or improvement, its heirs, successors and assigns, until and unless adequate safeguards have been made and accepted by the city to adequately defend, indemnify and hold the city harmless from and against any liability, appeals, judicial review, complaints, writs of review and other extraordinary or equitable relief, including reimbursement for any costs, fees, expert fees, expenses for any related legal, judicial, agency, administrative or appellate action(s) related to or arising out of such application or attempted transfer of water rights to the city.
- B. Any connection of the city's water or sewer service to property located outside the city's corporate boundaries, and any transfer to the city of such water rights shall be permitted only upon the execution of forms prepared by

the city which include but are not limited to: the execution of a perpetual and appurtenant no-protest annexation agreement, a no-protest local improvement agreement, a no-protest utility local improvement district agreement, and/or developer's extension agreement. The city expressly reserves its right to condition utility service upon the execution of any or all of these agreements upon terms and conditions as are determined to be necessary by the city council and city engineer.

C. Any transfer to the city may be further conditioned under the State Environmental Policy Act ("SEPA"), implementing SEPA regulations, Cle Elum Municipal Code Chapter [15.28](#), as may now exist or which may hereinafter be amended, adopted SEPA policies, developer agreements under RCW [36.70B.170](#), the requirements of interlocal agreements with Kittitas County, special purposes districts, or municipalities, or landowner agreements entered into under RCW Chapters [35.91](#) and [35.92](#).

D. Agreements with landowners and the city for purposes of siting or acquisition of properties for municipal facilities under RCW Chapters [35.91](#) and [35.92](#) may contain different terms and conditions than provided in this chapter.

(Ord. 1294 § 2, 2008)

### **13.20.040 Hookup fees, connection charges and other conditions.**

Connection to properties outside of the city's municipal boundaries is discretionary. No water connection to any lot or parcel containing an improved structure may be made to persons or property outside the city limits or current service boundaries without first having executed either a developers extension agreement, annexation agreement or no-protest annexation agreement as determined by the city council. Fees and charges shall be no less than fees and charges or other conditions for applicable hookup and service within the city as currently exist or as may hereinafter exist in the future. The city may provide for different terms and conditions for the owners of any properties upon which it locates or seeks to locate any municipal utility facilities for purposes of Section [13.20.030](#) and this section for purposes of acceptance of water supplies into the city's supply system through utility/landowner agreements, development agreements, interlocal agreements with Kittitas County and other jurisdictions, no-protest annexation agreements, or developer extension agreements. To the extent permitted by law, the city may impose surcharges and rates different from those charged to classes of customers located within the city's boundaries; provided that, these rates, conditions, and charges are reasonably related to the cost and system impact of extending service requested by the owner of real property or lawful occupant, maintaining system capacity and operational reliability, maintenance, improvements, repairs, storage, pressure zone requirements and fire flow capability, and other factors determined to be reasonable and necessary by the city council. Any customer granted water under these terms and conditions shall also be subject to mandatory city water conservation programs, including but not limited to conservation surcharges, conservation devices and equipment, time of use restrictions, and increased rates for usage above adopted rates by the city.

(Ord. 1294 § 2, 2008)

### **13.20.050 Types of water rights.**

The various types of water rights subject to this chapter include, but are not necessarily limited to, the following: Permits, certificates, and claims issued by or on file with the Washington State Department of Ecology, or any of its predecessors. The city may consider senior seasonal irrigation rights for their adequacy. The adequacy of any proposed water right shall be determined by the mayor based on written analysis by the city engineer and the city's legal counsel. The mayor's decision shall be final, and shall be based on factors including but not limited to the following:

1. Annual volume of water rights equal to or exceeding the maximum annual water demand volume of the proposed annexation;
2. Instantaneous rate of water right equals or exceeds one hundred twenty-five percent of the maximum daily water demand volume of proposed annexation divided by one thousand four hundred forty minutes per day;
3. Seniority of water right relative to US Water rights for the Yakima Project (1905);
4. Legal status of the water right, e.g., status in DOE v. James J. Acquavella, Yakima County Cause No. 77-2-01484-5;
5. Consideration of any condition or limitations of use applicable to the water right, e.g., interruption or curtailment of use due to stream flow conditions;
6. Physical availability of water at water right's original or previous point of diversion;
7. Seasonal limitations on water right relative to the seasonal water demand of the proposed annexation;
8. Ability to change water right to city's existing point(s) of diversion, for use in the city's water service area, and to municipal water supply purposes with governmental approval on satisfactory terms and conditions (water right "transfer");
9. Comments of Department of Ecology, Bureau of Reclamation or other entities about the water right; and
10. Clear ownership of the water right and ability to convey clear title and ownership to the city.

(Ord. 1294 § 2, 2008)

### **13.20.060 Annexations.**

A. *Requirement for Transfer and Conveyance of Water Rights.* Prior to approval of any annexation subject to this chapter, a property owner(s) who has petitioned for annexation shall transfer and convey water rights in the full amount deemed necessary to serve the property proposed for annexation based on the city's equivalent residential unit calculation, as provided in Section [13.20.070\(B\)](#), below.

B. *Annexation/Development Agreement.* As an alternative to the transfer and conveyance of water rights as set forth in Section [13.20.060\(A\)](#) above, and at the election of the city, the property owner(s) and the city may enter



into an annexation/development agreement, in which the city may: waive the requirement for transfer and conveyance of the full amount of water rights necessary to serve the property proposed for annexation where the property owner(s) agrees to make payments pursuant to Section [13.20.070](#) below in lieu of transfer and conveyance of water rights; limit total water usage on the property; implement conservation measures; and/or provide such other consideration to the city as determined by the city council. The city and the property owner(s) may also enter into an agreement, at the election of the city, to delay the transfer and conveyance to the city of the water rights associated with the subject property until such future point in time as the city determines appropriate, for the purpose of accommodating potential delays encountered in the transfer process or to accommodate continued use of water rights associated with uses in existence at the time of annexation and anticipated to continue until further development of the subject property occurs. In determining whether to waive or delay the requirement for transfer and conveyance of the full amount of water needed by the property proposed for annexation, the city shall consider factors including but not limited to the following:

1. The amount of water available within the city's water system for other new development, redevelopment, and/or annexations;
2. Prevailing and projected environmental conditions affecting the amount of the city's water supply, including snowpack, precipitation, drought, temperature, and ocean current patterns (including La Nina or La Nino systems);
3. Prevailing and projected rates of new development and annexation within the city and Kittitas County;
4. The availability of existing water rights for purchase and the legal and environmental potential for new water rights by the city; and
5. Potential tax revenue or other public benefits to be provided by proposed development associated with a proposed annexation.

As part of any such alternative Annexation/Development Agreement, the city may require the property owner(s) to:

1. Acquire adequate water rights and transfer and convey the same to the city;
2. Deposit an amount into the city water fund equal to the payment in lieu of transfer provided in Section [13.20.070](#), which sum is refundable to the extent of the successful transfer of the water rights; and/or
3. Submit and diligently pursue approval of the water right transfer and conveyance at the expense of the property owner(s).

(Ord. 1294 § 2, 2008)

### **13.20.070 Amount of water and payment in lieu.**

A. *Amount of Water Available.* The city shall have discretion to determine the amount of water available in the city water system, and to evaluate and prioritize all applications for municipal water delivery.

B. *Water Use Determination.* The water needed by development associated with property proposed to be developed or redeveloped within the city, or annexed to the city, shall be calculated in equivalent residential units ("ERUs"). The ERU calculation shall be based upon the city's development regulations in effect at the time that an application for development or redevelopment within the city is vested, or the petition for annexation is submitted. The property owner(s) shall submit to the city a proposed ERU calculation based on the proposed development. The city engineer shall review the ERU calculation and make a recommendation to the mayor, who shall issue a water use determination stating the amount of water rights to be transferred to the city as a result of the application for development or redevelopment, or the petition for annexation. The mayor's decision, which shall be final, shall be communicated in writing to the property owner(s) within a reasonable period of time after vesting of the application for development or redevelopment, or the city council's acceptance of the petition for annexation.

In the calculation of the amount of water rights that must be transferred to the city, credit shall be provided for any existing and previously approved connections to the city's municipal water system that are currently in use on the subject property. In addition, if the owners of the property subject to an annexation request have an exempt well or wells and desire to transfer water rights associated with said wells, as currently provided for in RCW [90.44.105](#), then credit shall also be provided for the water use associated with said wells to the extent the water rights association with the wells are transferred to the city.

C. *Excess Water Rights.* To the extent the water rights or previously approved water connections associated with the subject property exceed the anticipated water usage for the subject property as determined pursuant to subsection B above, the city in its sole discretion may negotiate an agreement with the property owner(s) to:

1. *Transfer Water Rights to the City.*

- a. *Payment.* Provide for the owner(s) of the subject property to transfer and convey any amount of excess water rights to the city, in which event the city and property owner(s) shall negotiate to pay the property owner(s) an amount representing the then current market value of the excess rights; or
- b. *Credit.* Allow said owner(s) to transfer and convey the excess water rights to the city in exchange for credits to be applied to other property owned by said owner(s) within the city's Urban Growth Area.
- c. *Process.* In the event the city acquires the excess water rights pursuant to this subsection (C)1, the transfer of excess water rights will be processed simultaneously with and as part of the transfer process outlined in Section [13.20.090](#).

2. *Transfer Property to City.* For property that has previously approved connections to the city's municipal water system in excess of those that will be used for the property's development ("excess connections"), the owner(s) may sell the excess connections to the city or to third parties, provided the following requirements are satisfied:

- a. The city shall calculate in its sole reasonable discretion the number of excess connections and the number of connections needed to serve the subject property;
- b. The owner(s) of the subject property convey ownership of the subject property to the city by Statutory Warranty Deed in consideration of owner(s)' ability to sell the excess connections;

- c. A covenant in a form acceptable to the city attorney is recorded against the subject property restricting the property's future water connections to a number consistent with the excess connections calculation described in subsection (a) above;
- d. Third-party buyers of the excess connections shall use the excess connections for development, redevelopment or annexation only within the city or within the city's Urban Growth Area; and
- e. Proof of any sale of excess connections to a third-party, in a form reasonably satisfactory to the city, is provided to the city within fourteen days of the sale by owner.

D. *Payment in Lieu.* In the event that the city determines through an annexation or development agreement pursuant to Section [13.20.060](#) above that the owners of property being annexed to the city may transfer and convey less than one hundred percent of the water required to serve the property proposed to be annexed, or in the event that the amount of water rights associated with property proposed to be annexed and successfully transferred to the city is less than the city engineer determines to be sufficient to serve the estimated ERUs of anticipated water usage for the subject property, the owner(s) of the subject property shall pay to the city three thousand five hundred dollars per ERU of anticipated water usage of the subject property, less a credit for the number of ERUs of water rights successfully transferred and conveyed to the city. The city shall evaluate the cost per ERU every two years from the date of adoption of this ordinance and adjust the amount accordingly. Payment shall be made prior to the city's adoption of an ordinance annexing the subject property, at the rate per ERU in effect at the time of the annexation.

E. *Payment of Costs.* The owner(s) of property subject to the application of the provisions of this chapter shall pay the city for all costs associated with the city's determination of the anticipated water usage for the subject property, determination of the adequacy of any proposed water right, and support or participation in a proceeding regarding a property owner's water transfer application. The term "costs" as used in this subsection shall include, but are not limited to, city staff time, engineering fees, attorneys fees, application fees, Kittitas County Water Conservancy Board Fees, publication fees, and any other fees or charges associated with processing and recording the transfer and acquisition of water rights.

F. *Commitment by City.* Nothing herein precludes the city from making commitments to provide municipal water service as part of an annexation or development agreement in which the owner of property subject to the annexation makes payment to the city as required in subsection d above.

G. *Remedies.* In the event a certificate of water availability or building permit is denied solely because of water unavailability and the property for which said certificate or building permit is sought was previously subject to the provisions of this chapter resulting in the transfer and conveyance of water rights and/or payment in lieu thereof to the city, then the property owner(s), as the sole and exclusive remedy, shall receive a payment equal to the amount paid to the city for the remaining anticipated water usage of the subject property pursuant to subsections B and D above, minus a ten percent administrative fee and without interest from the date of the original application unless otherwise required by then-applicable law. The property owner(s) shall repay this payment to the city as a condition of subsequent issuance of a certificate of water availability and/or building permit.

H. *Appeal.* Any determination by the mayor pursuant to this chapter may be appealed by filing an appeal in the Kittitas County Superior Court within twenty-one calendar days of the date of the final decision.

(Ord. 1431 § 1, 2015; Ord. 1426 § 1, 2015; Ord. 1294 § 2, 2008)

### **13.20.080 Payments received by the city.**

All money paid to the city pursuant to this chapter shall be paid to the city water fund. All money paid to the city pursuant to this chapter shall be used by the city water utility for any or all purposes permitted by the laws of the State of Washington, including but not limited to purchase of available water rights, processing of applications for new water rights to be added to the city domestic water utility system, the financing of water conservation, and the maintenance and replacement of equipment and existing system components that have the effect of increasing the city's available water supply.

(Ord. 1294 § 2, 2008)

### **13.20.090 Form of transfer and conveyance of water right.**

The transfer of water rights pursuant to this chapter shall be in such forms as may be approved by the city. Owners of property transferring water rights pursuant to this chapter shall execute all documents required by the city and/or any other governmental entity that may be necessary to achieve the purposes of this chapter. Those documents may include, but are not limited to, application(s) to change in point of diversion, change in place of use, change in purpose of use, and any other documents or forms.

For a water right transfer to be completed, the water right transfer (as defined in Section [13.20.050\(8\)](#)) must ultimately be approved by the Department of Ecology and all appeal periods must have expired without challenge (or any appeals must successfully be resolved). In the event of an appeal or an adverse decision, the city may elect but is not required to litigate the appeal, challenge the adverse decision, or abandon the proposed water right transfer. Any development, annexation or other agreement that provides for a water right transfer to the city shall also provide for the possible appeal of a transfer decision and for the payment of costs of appeal.

Upon completion of the water right transfer, the property owner(s) shall convey the water right to the city by Statutory Warranty Deed or other appropriate conveyance instrument, as determined by the city; provided, however, that the actual conveyance may be delayed, at the city's election, to coincide with the city's approval of the petition for annexation described in this chapter, or as otherwise set forth in an agreement between the property owner(s) and the city.

(Ord. 1294 § 2, 2008)

### **13.20.100 Severability.**

If any section, subsection, paragraph, sentence, clause or phrase of this chapter or its application to any person or situation should be held to be invalid or unconstitutional for any reason by a court of competent jurisdiction, such

invalidity or unconstitutionality shall not affect the validity or constitutionality of the remaining portions of this chapter or its application to any other person or situation.

(Ord. 1294 § 2, 2008)

## **Chapter 13.24**

### **FILLING OR OBSTRUCTION OF SURFACE DRAINS**

Sections:

- 13.24.010 Nuisance.**
- 13.24.020 Permit required.**
- 13.24.030 Culvert installation or obstruction removal.**
- 13.24.040 City reopening.**
- 13.24.050 Violation – Penalty.**

#### **13.24.010 Nuisance.**

The city drainage system consists of underground drains, commonly called storm sewers, and surface drains which are commonly called open ditch drains. These are essential for the preservation of life, health and property. The filling in or obstruction of surface drains by any person, and the continuance of such fill or obstruction, without first obtaining a permit from the city is declared to be a nuisance.

(Ord. 556 § 1, 1960)

#### **13.24.020 Permit required.**

No surface drain shall be filled in by any person, either in whole or in part, unless such person first obtains a permit therefor, and unless there is installed in the fill or obstruction a culvert pipe, the size, strength, construction and grade of which must be adequate to carry the flow of surface waters in the drain and protect the public against cave-in, collapse and rapid deterioration. Upon the making of application to the city clerk for a permit, these factors must first be investigated by the city engineer, or street and water superintendent, or such other qualified person as the city council designates. The investigator shall report his findings to the council, which shall consider them in determining whether or not a permit shall issue. If a permit is issued, the culvert specifications shall be set out therein.

(Ord. 556 § 2, 1960)

### **13.24.030 Culvert installation or obstruction removal.**

If any surface drain in the city has already been obstructed or filled in, either in whole or in part, by any person, whether the fill is made for driveway, sidewalk, entrance, or otherwise, the abutting property owner shall forthwith apply to the city clerk for a permit to install a culvert pipe therein, and shall install therein a culvert pipe meeting such reasonable specifications as the council shall require in the permit, or in lieu thereof shall reopen the drain and remove the fill or obstruction. The application shall be investigated and a report of findings made, as set out in Section [13.24.020](#). The installation of the culvert pipe, if a permit issues, or the removal of the fill or obstruction in lieu thereof if the permit either issues or is denied, shall be done in not less than ten nor more than thirty days after issuance or denial of the permit, as the case may be.

(Ord. 556 § 3, 1960)

### **13.24.040 City reopening.**

If the abutting property owner fails to make such application or in lieu thereof to reopen the drain and remove the fill or obstruction as provided in Section [13.24.030](#) within thirty days after passage of the ordinance codified in this chapter, the city shall reopen the drain and remove the fill and the abutting property owner shall be required to reimburse the city for the expense incurred.

(Ord. 556 § 4, 1960)

### **13.24.050 Violation – Penalty.**

Any person violating any of the provisions of this chapter may, upon conviction thereof, be fined not to exceed two hundred and fifty dollars or imprisoned in the city jail not to exceed thirty days, or both.

(Ord. 556 § 5, 1960)

## **Chapter 13.32 UTILITY REIMBURSEMENT AGREEMENTS**

Sections:

- 13.32.010 Purpose.**
- 13.32.020 Definitions.**
- 13.32.030 Minimum project size.**
- 13.32.040 Application.**
- 13.32.050 Length of reimbursement provision.**
- 13.32.060 Public works director's determination – Review by city council.**



- 13.32.070 Determination of reimbursement area boundary and reimbursement fee.**
- 13.32.090 Reimbursement agreement must be recorded.**
- 13.32.100 Written agreement – Payment of city costs in excess of application fee.**
- 13.32.110 Construction and acceptance of improvements – Recording of final fees.**
- 13.32.120 Collection of reimbursement fees – No liability for failure to collect.**
- 13.32.130 Disposition of undeliverable reimbursement fees.**

### **13.32.010 Purpose.**

The purpose of this chapter is to prescribe rules and regulations for exercise of the authority to enter into a utility reimbursement agreement granted to the city by RCW Chapter [35.91](#).

(Ord. 1177 § 1, 2002)

### **13.32.020 Definitions.**

As used in this chapter, the terms listed below shall be defined as follows:

“Cost of construction” means those costs (excluding interest charges or other financing costs) incurred for design, acquisition for right-of-way and or easements, construction, materials and installation required in order to create an improvement which complies with city standards.

“Director” means the public works director or his/her designated representative.

“Reimbursement agreement” means a written contract between the city and one or more parties providing both for construction of sewer facilities and for reimbursement to the party or parties constructing the facilities for part of the costs of the facilities by owners of property benefited by the improvements.

“Water or sewer facilities” shall have the meaning specified in RCW [35.91.020](#) as it now reads, or as hereafter amended.

(Ord. 1177 § 1, 2002)

### **13.32.030 Minimum project size.**

To be eligible for a reimbursement agreement, the estimated cost of the proposed improvement must be not less than five thousand dollars. The estimated costs of the improvement shall be determined by the public works director, based upon a construction contract for the project, bids, engineering or architectural estimates or other information deemed by the public works director to be a reliable basis for estimating costs. The determination of the public works director shall be final.

(Ord. 1177 § 1, 2002)

### **13.32.040 Application.**

An application for reimbursement agreement shall be made on a form provided by the city. The application fee shall be set by council resolution and shall be submitted to the city with the written application and shall be accompanied by:

- A. Preliminary utility design drawings;
- B. Itemized estimate of construction costs prepared and signed by a licensed civil engineer or in the form of a bid submitted by a qualified contractor (if more than one bid has been obtained, all bids must be submitted to the city);
- C. A scaled vicinity drawing, stamped by a licensed civil engineer or licensed land surveyor depicting the proposed improvements, the location, the proposed benefited area, dimensions and county assessor's numbers for each tax parcel, size of parcels, and evaluations where necessary for determining benefits;
- D. A separate legal description for each tax parcel within the benefited area; and
- E. Such other information as the public works director determines is necessary to properly review the application.

(Ord. 1177 § 1, 2002)

### **13.32.050 Length of reimbursement provision.**

No reimbursement agreement shall provide for reimbursement for a period of not longer than fifteen years from the date of final acceptance of the improvements by the city.

(Ord. 1177 § 1, 2002)

### **13.32.060 Public works director's determination – Review by city council.**

A. The public works director shall review all applications and shall approve the application only if the following requirements are met:

- 1. The project satisfies the minimum size requirement and complies with city standards; and
- 2. The proposed improvements fall within the description of sewer or water facilities as those terms are described in RCW Chapter [35.91](#); and

B. In the event all of the above criteria are not satisfied, the public works director may condition approval as necessary in order for the application to conform to such criteria, or shall deny the application. The final determination of the public works directors shall be in writing. The applicant may obtain a review of the final

determination by filing a request therefore with the city clerk no later than ten days after a copy of the final determination is mailed to the applicant at the address listed on the application.

C. In reviewing a final determination, the city council shall apply the criteria set in this section, and shall uphold the decision of the public works director unless evidence clearly demonstrates that the criteria have been satisfied.

(Ord. 1177 § 1, 2002)

### **13.32.070 Determination of reimbursement area boundary and reimbursement fee.**

The public works director shall define the reimbursement area for all approved applications based upon a determination of which parcels did not contribute to the original cost of the sewer or water facility for which the reimbursement agreement applies and which may subsequently tap in to or use the same, including not only those which may connect directly thereto, but also those who may connect to laterals or branches connecting thereto. An estimated amount of the reimbursement fee shall be established so that each property will pay a share of the costs of the improvements, which is proportional to the benefits which accrue to the property.

(Ord. 1177 § 1, 2002)

### **13.32.090 Reimbursement agreement must be recorded.**

A. In order to become effective, a reimbursement agreement must be recorded with the Kittitas County auditor within thirty days of approval by the city. It shall be the sole responsibility of the applicant to record the reimbursement agreement.

B. Within thirty days after receipt of evidence that the reimbursement agreement has been recorded the public works director shall record a notice of additional tax or correction charge with the Kittitas County auditor's office as required by RCW [65.08.170](#).

(Ord. 1177 § 1, 2002)

### **13.32.100 Written agreement – Payment of city costs in excess of application fee.**

Upon approval of the application, determination of the estimated costs of construction, the reimbursement area and estimated fees by the public works director, the applicant shall sign a reimbursement agreement in the form supplied by the city. The signed agreement, the application and supporting documents, together with the public works director's estimate of cost of construction, and determination of reimbursement area and estimated fees

shall be presented to the city council with a request that the city council authorize the mayor to sign the reimbursement agreement on behalf of the city.

In the event costs incurred by the city for engineering or other professional consultant services required in processing the application exceed the amount of the application fee, the public works director shall so advise the city council and council approval shall be conditioned upon receipt of payment by the applicant of an additional amount sufficient to compensate the city for its actual costs in excess of the application fee.

(Ord. 1177 § 1, 2002)

### **13.32.110 Construction and acceptance of improvements – Recording of final fees.**

A. After the reimbursement agreement has been signed by both parties, and all necessary permits and approvals have been obtained, the applicant shall construct the improvements, and upon completion, request final inspection and acceptance of the improvements by the city, subject to any required obligation to repair defects. An appropriate bill of sale, easement and any other document needed to convey the improvements to the city and to insure right-of-access for maintenance and replacement shall be provided, along with documentation of the actual costs of the improvements and a certification by the applicant that all of such costs have been paid.

B. In the event that actual costs are less than the public works director's estimate used in calculating the estimated fees by ten percent or more, the public works director shall recalculate the fees, reducing them accordingly, and shall cause a revised list of fees to be recorded with the county auditor.

(Ord. 1177 § 1, 2002)

### **13.32.120 Collection of reimbursement fees – No liability for failure to collect.**

A. Subsequent to the recording of a reimbursement agreement, the city shall not permit connection of any property within the reimbursement area to any sewer or water facility constructed pursuant to the reimbursement agreement, unless the share of the costs of such facilities required by the recorded agreement is first paid to the city.

B. Upon receipt of any reimbursement fees, the city shall deduct a ten percent administrative fee and remit the balance of the reimbursement fees to the party entitled to the fees pursuant to the agreement. In the event that through error, the city fails to collect a required reimbursement fee prior to approval of connection to a sewer facility, the city shall make diligent efforts to collect such fee, but shall under no circumstances be obligated to make payment to the party entitled to reimbursement, or in any other way be liable to such party, unless such reimbursement fee has actually been paid to the city.

(Ord. 1177 § 1, 2002)

### **13.32.130 Disposition of undeliverable reimbursement fees.**

In the event that, after reasonable effort, the party to which reimbursement fees are to be paid pursuant to a reimbursement agreement cannot be located, and upon the expiration of one hundred eighty days from the date fees were collected by the city, the fees shall become the property for the city and shall be revenue to the city sewer and water utility.

(Ord. 1177 § 1, 2002)

## **Chapter 13.40 IDENTITY THEFT PROGRAM**

Sections:

- 13.40.010 Program adoption.**
- 13.40.020 Program purpose and definitions.**
- 13.40.030 Identification of red flags.**
- 13.40.040 Detecting red flags.**
- 13.40.050 Preventing and mitigating identity theft.**
- 13.40.060 Program administration.**
- 13.40.070 Program updates.**

### **13.40.010 Program adoption.**

The City of Cle Elum developed this Identity Theft Prevention Program (“program”) pursuant to the Federal Trade Commission’s Red Flags Rule (“Rule”), which implements Sections 114 and 315 of the Fair and Accurate Credit Transactions Act of 2003. This program was developed with the oversight and approval of the city’s finance director. After consideration of the size and complexity of the city’s operations and account systems, and the nature and scope of the city’s activities, the city council determined that this program was appropriate for the city, and therefore approved this program by the adoption of Ordinance No. [1313](#) on March 24, 2009.

(Ord. 1313 § 1(Exh. A), 2009)

### **13.40.020 Program purpose and definitions.**

A. *Fulfilling Requirements of the Red Flags Rule.* Under the red flags rule, every financial institution and creditor is required to establish an identity theft prevention program tailored to its size, complexity and the nature of its operation. The program must contain reasonable policies and procedures to:

1. Identify relevant red flags as defined in the rule and this program for new and existing covered accounts, and incorporate those red flags into the program;
2. Detect red flags that have been incorporated into the program;
3. Respond appropriately to any red flags that are detected to prevent and mitigate identity theft; and
4. Update the program periodically to reflect changes in risks to customers or to the safety and soundness of the city from identity theft.

B. *Red Flags Rule Definitions Used in this Program.* For the purposes of this program, the following definitions apply:

Account. "Account" means a continuing relationship established by a person with a creditor to obtain a product or service for personal, family, household or business purposes.

Covered Account. A "covered account" means:

- a. Any account the city offers or maintains primarily for personal, family or household purposes, that involves multiple payments or transactions; and
- b. Any other account the city offers or maintains for which there is a reasonably foreseeable risk to customers or to the safety and soundness of the city from identity theft.

Creditor. "Creditor" has the same meaning as defined in Section 701 of the Equal Credit Opportunity Act, [15 U.S.C. 1691a](#), and includes a person or entity that arranges for the extension, renewal or continuation of credit, including the city.

Customer. A "customer" means a person or business entity that has a covered account with the city.

Financial Institution. "Financial institution" means a state or national bank, a state or federal savings and loan association, a mutual savings bank, a state or federal credit union, or any other entity that holds a "transaction account" belonging to a customer.

Identifying Information. "Identifying information" means any name or number that may be used, alone or in conjunction with any other information, to identify a specific person, including name, address, telephone number, Social Security number, date of birth, government passport number, employer or taxpayer identification number or unique electronic identification number.

Identity Theft. "Identity theft" means fraud committed using the identifying information of another person.

Red Flag. A "red flag" means a pattern, practice, or specific activity that indicates the possible existence of identity theft.

Service Provider. "Service provider" means a person or business entity that provides a service directly to the city relating to or in connection with a covered account.

(Ord. 1313 § 1(Exh. A), 2009)



### **13.40.030 Identification of red flags.**

In order to identify relevant red flags, the city shall review and consider the types of covered accounts that it offers and maintains, the methods it provides to open covered accounts, the methods it provides to access its covered accounts, and its previous experiences with identity theft. The city identifies the following red flags, in each of the listed categories:

**A. *Notification and Warnings from Credit Reporting Agencies – Red Flags.***

1. Report of fraud accompanying a credit report;
2. Notice or report from a credit agency of a credit freeze on a customer or applicant;
3. Notice or report from a credit agency of an active duty alert for an applicant; and
4. Indication from a credit report of activity that is inconsistent with a customer's usual pattern or activity.

**B. *Suspicious Documents – Red Flags.***

1. Identification document or card that appears to be forged, altered or inauthentic;
2. Identification document or card on which a person's photograph or physical description is not consistent with the person presenting the document;
3. Other document with information that is not consistent with existing customer information (such as a person's signature on a check appears forged); and
4. Application for service that appears to have been altered or forged.

**C. *Suspicious Personal Identifying Information – Red Flags.***

1. Identifying information presented that is inconsistent with other information the customer provides (such as inconsistent birth dates);
2. Identifying information presented that is inconsistent with other sources of information (for instance, an address not matching an address on a driver's license);
3. Identifying information presented that is the same as information shown on other applications that were found to be fraudulent;
4. Identifying information presented that is consistent with fraudulent activity (such as an invalid phone number or fictitious billing address);
5. Social Security number presented that is the same as one given by another customer;
6. An address or phone number presented that is the same as that of another person;
7. Failing to provide complete personal identifying information on an application when reminded to do so (however, by law Social Security numbers must not be required); and

8. Identifying information which is not consistent with the information that is on file for the customer.

D. *Suspicious Account Activity or Unusual Use of Account – Red Flags.*

1. Change of address for an account followed by a request to change the account holder's name;
2. Payments stop on an otherwise consistently up-to-date account;
3. Account used in a way that is not consistent with prior use (such as very high activity);
4. Mail sent to the account holder is repeatedly returned as undeliverable;
5. Notice to the city that a customer is not receiving mail sent by the city;
6. Notice to the city that an account has unauthorized activity;
7. Breach in the city's computer system security; and
8. Unauthorized access to or use of customer account information.

E. *Alerts from Others – Red Flag.*

1. Notice to the city from a customer, a victim of identity theft, a law enforcement authority or other person that it has opened or is maintaining a fraudulent account for a person engaged in identity theft.

(Ord. 1313 § 1(Exh. A), 2009)

### **13.40.040 Detecting red flags.**

A. *New Accounts.* In order to detect any of the red flags identified above associated with the opening of a new account, city personnel will take the following steps to obtain and verify the identity of the person opening the account:

1. Require certain identifying information such as name, date of birth, residential or business address, principal place of business for an entity, driver's license or other identification;
2. Verify the customer's identity (for instance, review a driver's license or other identification card);
3. Review documentation showing the existence of a business entity; and
4. Independently contact the customer.

B. *Existing Accounts.* In order to detect any of the red flags identified above for an existing account, city personnel will take the following steps to monitor transactions with an account:

1. Verify the identification of customers if they request information (in person, via telephone, via facsimile, via email);
2. Verify the validity of requests to change billing addresses; and

3. Verify changes in banking information given for billing and payment purposes.

(Ord. 1313 § 1(Exh. A), 2009)

### **13.40.050 Preventing and mitigating identity theft.**

In the event city personnel detect any identified red flags, such personnel shall take one or more of the following steps, depending on the degree of risk posed by the red flag:

*A. Prevent and Mitigate Identity Theft.*

1. Monitor a covered account for evidence of identity theft;
2. Contact the customer with the covered account;
3. Change any passwords or other security codes and devices that permit access to a covered account;
4. Not open a new covered account;
5. Close an existing covered account;
6. Reopen a covered account with a new number;
7. Not attempt to collect payment on a covered account;
8. Notify the finance director for determination of the appropriate step(s) to take;
9. Notify law enforcement; or
10. Determine that no response is warranted under the particular circumstances.

*B. Protect Customer Identifying Information.* In order to further prevent the likelihood of identity theft occurring with respect to city accounts, the city shall take the following steps with respect to its internal operating procedures to protect customer identifying information:

1. Secure the city website but provide clear notice that the website is not secure;
2. Undertake complete and secure destruction of paper documents and computer files containing customer information;
3. Make office computers password protected and provide that computer screens lock after a set period of time;
4. Keep offices clear of papers containing customer identifying information;
5. Request only the last four digits of Social Security numbers (if any);
6. Maintain computer virus protection up to date; and

7. Require and keep only the kinds of customer information that are necessary for city purposes.

(Ord. 1313 § 1(Exh. A), 2009)

### **13.40.060 Program administration.**

A. *Oversight.* The finance director or other designated city employee at the level of senior management shall be responsible for developing, implementing, and updating the program.

The finance director shall also be responsible for the program administration, for appropriate training of city staff on the program, for reviewing the annual staff report required under the program, as well as any other staff reports regarding the detection of red flags and the steps for preventing and mitigating identity theft, determining which steps of prevention and mitigation should be taken in particular circumstances, and considering periodic changes to the program.

B. *Staff Training and Reports.* City staff responsible for implementing the program shall be trained either by or under the direction of the finance director in the detection of red flags, and the responsive steps to be taken when a red flag is detected. Additionally, a compliance report shall be provided annually to the finance director. The annual compliance report shall at a minimum address the following:

1. The effectiveness of the city's policies and procedures in addressing the risk of identity theft in connection with the opening of covered accounts and with respect to existing covered accounts;
2. Service provider arrangements;
3. Significant incidents involving identity theft and the city's response; and
4. Recommendations for material changes to the program.

C. *Service Provider Arrangements.* In the event the city engages a service provider to perform an activity in connection with one or more covered accounts, the city shall take the following steps to require that the service provider performs its activity in accordance with reasonable policies and procedures designed to detect, prevent, and mitigate the risk of identity theft.

1. Require, by contract, that service providers acknowledge receipt and review of the program and agree to perform their activities with respect to city covered accounts in compliance with the terms and conditions of the program and with all instructions and directives issued by the finance director relative to the program; or
2. Require, by contract, that service providers acknowledge receipt and review of the program and agree to perform their activities with respect to city covered accounts in compliance with the terms and conditions of the service provider's identity theft prevention program and will take appropriate action to prevent and mitigate identity theft; and that the service providers agree to report promptly to the city in writing if the service provider in connection with a city covered account detects an incident of actual or attempted identity theft or is unable to resolve one or more red flags that the service provider detects in connection with a covered account.

D. *Customer Identifying Information and Public Disclosure.* The identifying information of city customers with covered accounts shall be kept confidential and shall be exempt from public disclosure to the maximum extent authorized by law, including RCW [42.56.230\(4\)](#). The city council also finds and determines that public disclosure of the city's specific practices to identify, detect, prevent, and mitigate identify theft may compromise the effectiveness of such practices and hereby direct that, under the program, knowledge of such specific practices shall be limited to the finance director and those city employees and service providers who need to be aware of such practices for the purpose of preventing identity theft.

(Ord. 1313 § 1(Exh. A), 2009)

### **13.40.070 Program updates.**

The program will be periodically reviewed and updated to reflect changes in risks to customers and to the safety and soundness of the city from identity theft. The finance director shall at least annually review the annual compliance report and consider the city's experiences with identity theft, changes in identity theft methods, changes in identity theft detection and prevention methods, changes in types of accounts the city maintains and changes in the city's business arrangements with other entities and service providers. After considering these factors, the finance director shall determine whether changes to the program, including the listing of red flags, are warranted. If warranted, the finance director shall present the recommended changes to the city council for review and approval.

(Ord. 1313 § 1(Exh. A), 2009)

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### **The Cle Elum Municipal Code is current through Ordinance 1589, passed July 29, 2020.**

Disclaimer: The city clerk's office has the official version of the Cle Elum Municipal Code. Users should contact the city clerk's office for ordinances passed subsequent to the ordinance cited here.

**Note:** This site does not support Internet Explorer. To view this site, Code Publishing Company recommends using one of the following browsers: Google Chrome, Firefox, or Safari.

[City Website: cityofcleelum.com](http://cityofcleelum.com)

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**6.**

# **CITY OF CLE ELUM SEWER CONSTRUCTION STANDARDS**





## **CHAPTER 6 - SANITARY SEWER SYSTEM IMPROVEMENTS**

### **GENERAL REQUIREMENTS FOR SANITARY SEWER MAINS**

All extensions to the sewer system shall conform to the design standards of the City of Cle Elum and the Washington State Department of Ecology as follows:

All new lots and developments shall be served by a public sanitary sewer line adjacent to the lot or development site.

Sewer lines shall be extended by the Owner or Developer to the point where the adjoining property owner's responsibility for further extension begins. This typically requires an extension across the entire frontage of the property to the property line of the adjoining owner. In some cases, it will require dedication of an easement and a line extension across the property or extension across two or more side of the developing property. Extensions will be consistent with and implement the City's adopted Sewer Comprehensive Plan.

Sewer lines shall be located in streets to serve abutting properties. When necessary, sewer lines may be located within public easements. Lines located in streets will be offset from the street centerline and not located within a vehicle wheel path. Sewer lines located in easements shall generally be located in the center of the easement, but may, with the approval of the Director of Public Works, be offset to accommodate the installation of other utilities or to satisfy special circumstances.

The minimum size for public sewer mains is eight (8) inches in diameter. The developer's sewer system must provide capacity for the proposed development, but must also provide capacity for future extensions.

Sewer lines shall be terminated with a manhole. In special circumstances, a flush-end (clean-out) may be installed on the end of a sewer main extension, provided the end is no further than 150 feet from the last manhole and the sewer main line and grade will permit further extension.

Manholes shall be installed at intervals of no greater than 400 feet and at all vertical and horizontal angle points in the sewer main.

Each building containing sanitary sewer facilities shall be served by a separate private side sewer line. Branched side sewers serving multiple buildings and properties shall not be permitted. Side sewers serving multi-unit buildings are permitted.

Side sewers shall be installed in accordance with the Uniform Plumbing Code (UPC) and subject to review and approval by the City of Cle Elum Building Inspector. Water and sewer lines shall not be laid in the same trench, except as provided in Section 1008 of the UPC and with written approval of the City of Cle Elum Building Inspector.

Sewer lines shall be designed for gravity flow operation. Lift stations and force mains shall be limited to those locations and circumstances where they are consistent with the Comprehensive Sewer Plan and are the only viable solution to serve the proposed

development and other properties in the vicinity. Lift stations and force mains shall be designed by a Professional Engineer licensed in the State of Washington.

The design of sewer mains and appurtenances is subject to review and approval by the City of Cle Elum Director of Public Works. The Director of Public Works may, at his discretion, adjust these Standards as necessary to facilitate installation of sewer lines and appurtenances for the health, safety, and protection of the general public.

### **SPECIAL PROVISIONS FOR SANITARY SEWER MAINS**

The following sections of the Standard Specifications have been amended or supplemented as described below.

#### **7-05 MANHOLES, INLETS, CATCH BASINS, AND DRYWELLS**

##### **7-05.2 Materials**

Add the following:

Manholes shall be gasketed and constructed of minimum 48-inch diameter reinforced precast concrete manholes sections in conformance with the requirements of this Section. The base and first barrel section shall be precast monolithically with preformed channels.

Joints in the manhole sections shall be watertight and shall be a rubber ring compression joint complying with ASTM C443, a flexible, plastic gasket, or approved equal.

Manhole frames and covers shall be cast iron with a combined weight of not less than 400 pounds and have a clear opening of 24 inches. The frames and covers shall be the manufacturer's stock pattern capable of withstanding, with appropriate margin of safety, an H20 loading. Covers shall have a 1-inch hole only, unless otherwise noted, and the top shall be flat with a non-skid pattern. The contact surfaces of the frames and covers shall be machine finished to a common plane or have other adequate provision to prevent rocking.

##### **7-05.3 Construction Requirements**

Add the following

The design and construction of all manholes shall provide for a minimum 0.10 foot vertical drop through the manhole

Manhole coupling adaptors may be precast in the manhole to accept PVC pipe, provided diameters match. No field grouting of pipe into manholes will be allowed. Pipe connections at manholes must be gasketed and must be flexible. "A-Lok" gasket system or approved equal may be used as an alternate to the manhole coupling adapter.



## **7-08 GENERAL PIPE INSTALLATION REQUIREMENTS**

### **7-08.1 General**

Add the following:

All construction work shall be inspected by the City of Cle Elum prior to backfilling. At least 48 hours notice shall be given to the City Public Works Department prior to backfilling.

The Contractor shall notify the Utility Notification Center (One Call Center) at least 48 hours prior to start of excavation so that underground utilities may be marked. Telephone number is 1-800-553-4344.

### **7-08.3(1)C Bedding the Pipe**

Add the following:

The imported pipe bedding to be utilized for the trench backfill shall be crushed gravel, placed and compacted in layers as designated by the Director of Public Works. Crushed gravel shall conform to Section 9-03.9(3) Crushed Surfacing Top Course.

### **7-08.3(2)B Pipe Laying - General**

Add the following:

All sewer pipe shall be provided with 6-inch wide magnetic marking tape as detailed in Standard Detail S-1.

### **7-08.3(3) Backfilling**

Add the following:

Street crossing trenches shall be backfilled for the full depth of the trench with imported crushed gravel select backfill conforming to Section 9-03.9(3) Crushed Surfacing Base Course. The Director of Public Works may require the use of Controlled Density Fill (CDF) for trench backfill in certain circumstances. The requirements for CDF are set forth in Section 8-30 of these Special Provisions.

Water settling and/or mechanical compaction shall be required for all trenches. The density of the compacted materials shall be at least 95% of the maximum density as determined by ASTM D 698 Test (Standard Proctor).

## **7-17 SANITARY SEWERS**

### **7-17.2 Materials**

Sanitary Sewer Pipe approved for the City of Cle Elum shall be:

PVC Sewer Pipe (Gravity): Polyvinyl Chloride Pipe with flexible gasketed joints shall conform with the requirements of Section 9-05.12 of the Standard Specifications (ASTM D3034, SDR 35). Pipe joint type for restrained gasket.

PVC fittings for PVC sewer pipe such as tees, wyes, elbows, plugs, caps, etc, shall be flexible gasket joint fittings acceptable for use and connection to PVC sewer pipe.

## **7-18 SIDE SEWERS**

### **7-18.1 General**

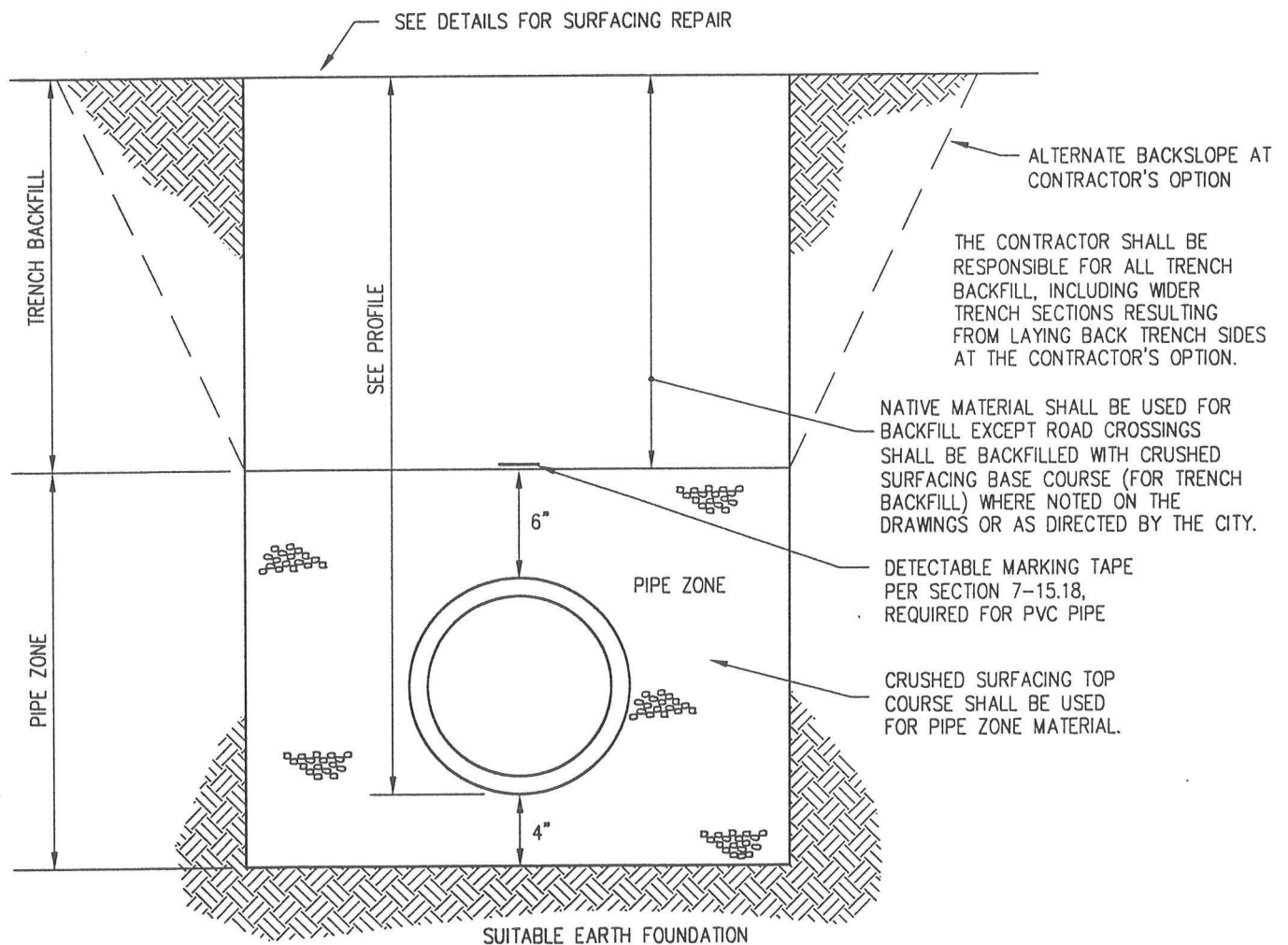
Add the following:

Side sewers shall be constructed with a minimum of 30 inches of cover. This provision may be waived by the Director of Public Works under special circumstances; however, under no circumstances shall the side sewer be laid with less than 18 inches of cover.

### **7-18.2 Materials**

Add the following:

Side sewers shall be a minimum of 4-inches in diameter. Larger sizes, if required, will be approved by the Director of Public Works on a case by case basis.



NOTE:  
ONLY THE LATEST DETAIL, AS APPROVED BY  
THE DIRECTOR OF PUBLIC WORKS, SHALL BE USED.

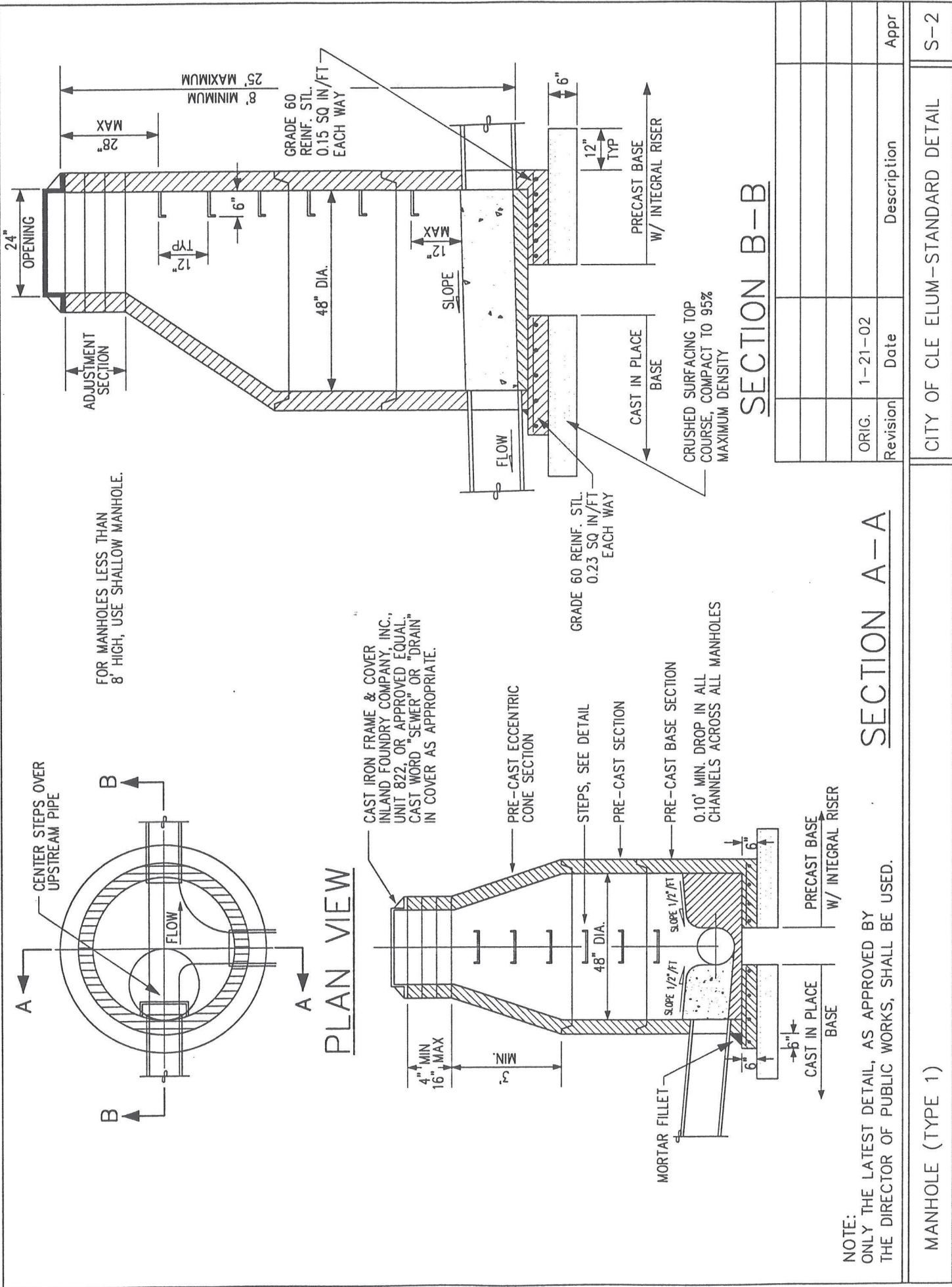
ORIG.	1-21-02		
Revision	Date	Description	Appr

PVC SEWER AND STORM DRAIN  
TRENCH SECTION

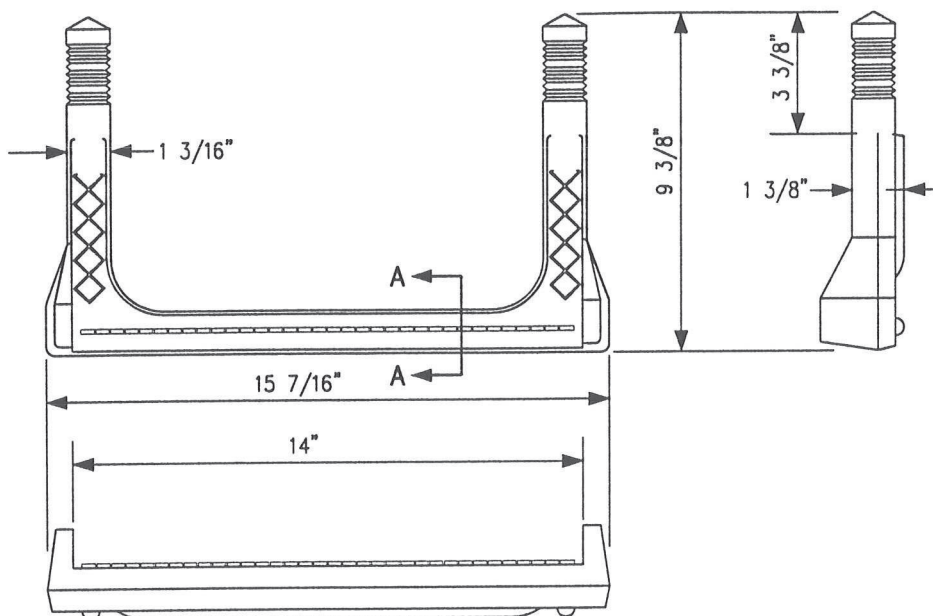
CITY OF CLE ELUM-STANDARD DETAIL

S-1

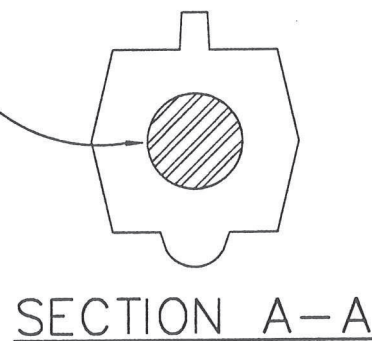
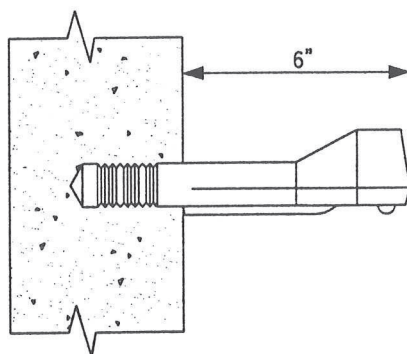








COPOLYMER POLYPROPYLENE  
PLASTIC COATED 1/2" GRADE  
60 STEEL REINFORCEMENT



NOTE:

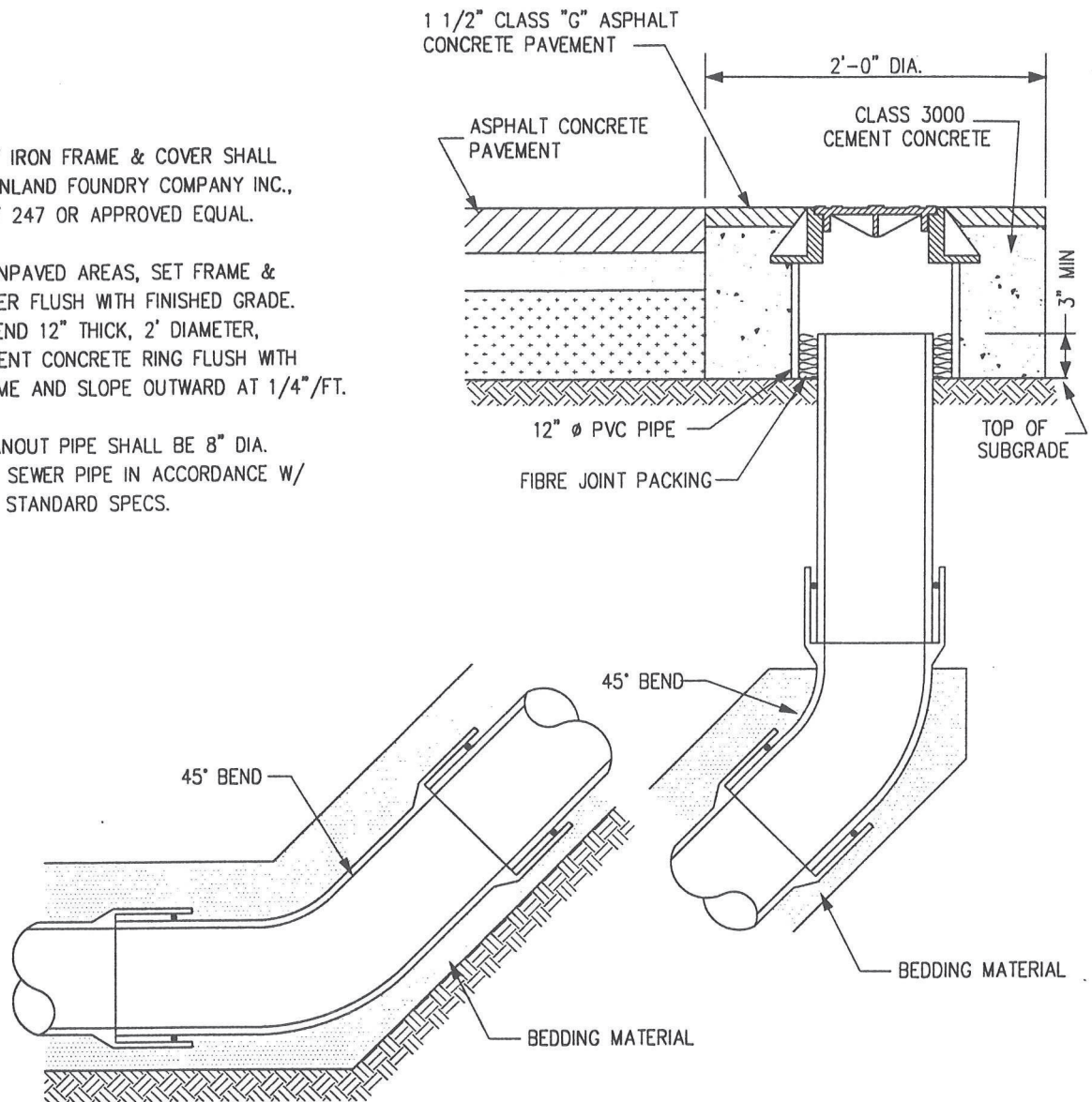
MANHOLE STEPS SHALL BE COPOLYMER  
POLYPROPYLENE PLASTIC COATED 1/2"  
GRADE 60 STEEL REINFORCEMENT, MODEL  
PS2-PF, AS MANUFACTURED BY M.A.  
INDUSTRIES INC., OR APPROVED EQUAL

NOTE:  
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THE DIRECTOR OF PUBLIC WORKS, SHALL BE USED.

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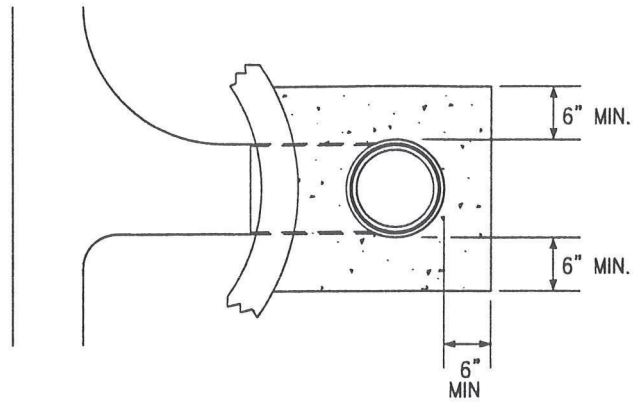
NOTES:

1. CAST IRON FRAME & COVER SHALL BE INLAND FOUNDRY COMPANY INC., UNIT 247 OR APPROVED EQUAL.
2. IN UNPAVED AREAS, SET FRAME & COVER FLUSH WITH FINISHED GRADE. EXTEND 12" THICK, 2' DIAMETER, CEMENT CONCRETE RING FLUSH WITH FRAME AND SLOPE OUTWARD AT 1/4"/FT.
3. CLEANOUT PIPE SHALL BE 8" DIA. PVC SEWER PIPE IN ACCORDANCE W/ THE STANDARD SPECS.

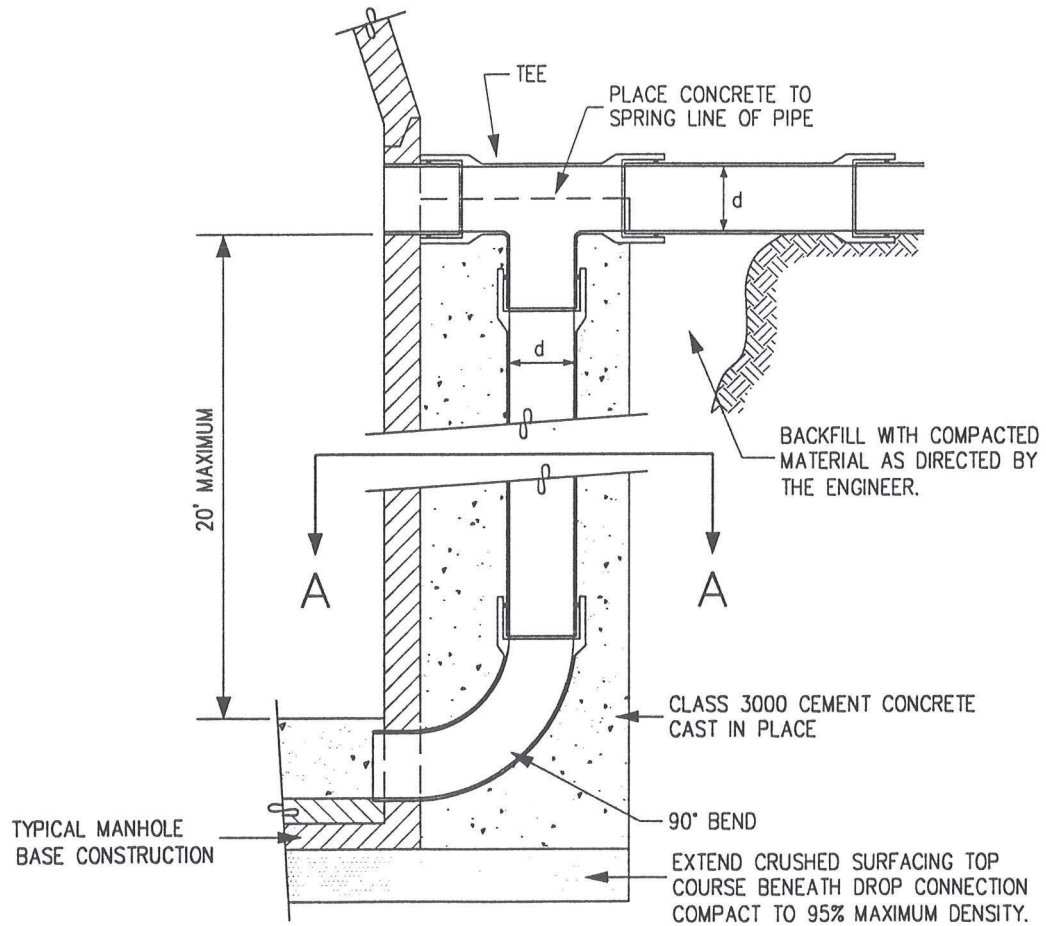


NOTE:  
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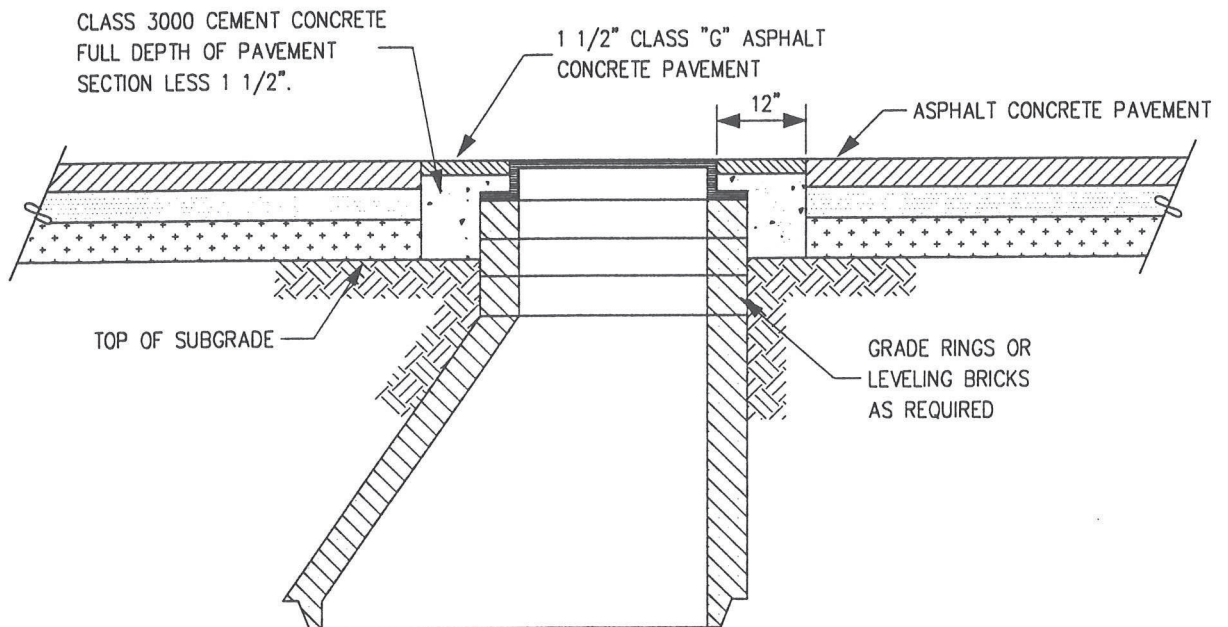
SECTION A-A



PROFILE VIEW

NOTE:  
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THE DIRECTOR OF PUBLIC WORKS, SHALL BE USED.

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NOTES:

1. MANHOLES SHALL BE ADJUSTED TO FINISHED GRADE AFTER PLACEMENT OF ASPHALT CONCRETE PAVEMENT.
2. GRADE RINGS AND/OR LEVELING BRICKS SHALL BE GROUTED IN PLACE AND BE WATER TIGHT.
3. IN UNPAVED AREAS, PROVIDE 12" THICK, 5' DIA. CEMENT CONCRETE RING AROUND TOP OF MANHOLE. SET MANHOLE FRAME FLUSH W/ FINISHED GRADE AND SLOPE CONCRETE OUTWARD AT 1/4"/FT.

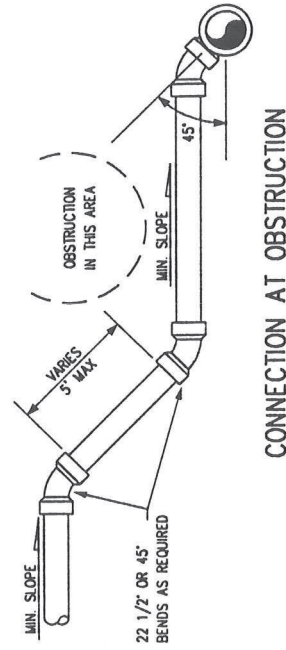
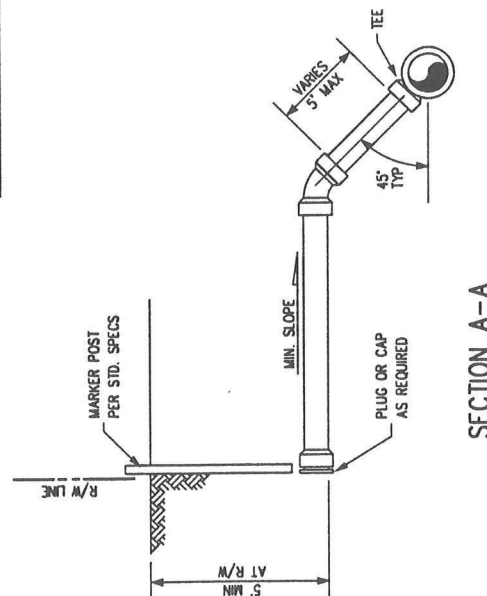
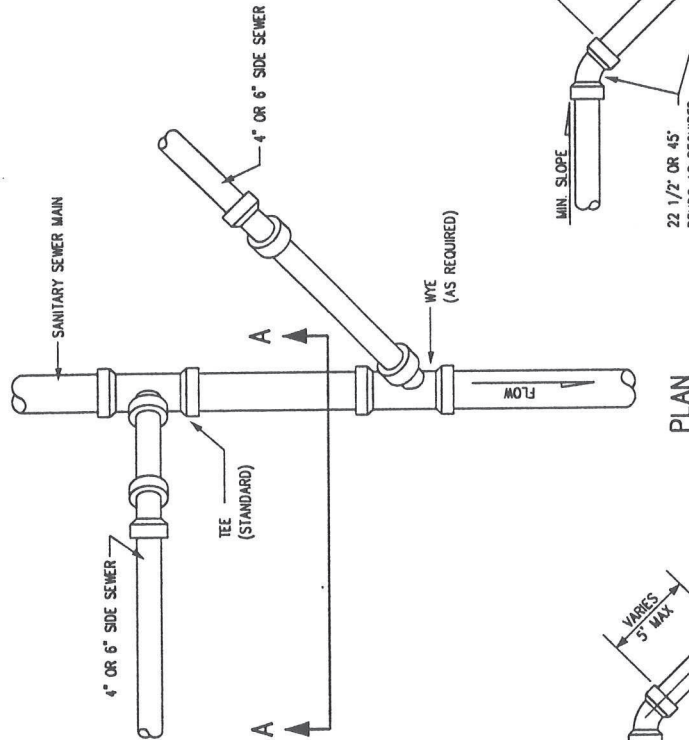
NOTE:  
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NOTES:

1. SERVICE CONNECTIONS 8" OR LARGER MUST BE MADE AT MANHOLE.
2. IF 5' MAXIMUM SLOPED DISTANCE IS INSUFFICIENT FOR SIDE SEWER CONNECTION, INSTALL SIDE SEWER RISER PER DETAIL.
3. ROTATE SANITARY SEWER MAIN TEE OR WYE 45° UPWARD.
4. TEES OR WYES SHALL BE INSTALLED IN NEW SANITARY SEWER MAINS. WHEN INSTALLING SIDE SEWERS IN EXISTING MAINS, CONNECTION SHALL BE MADE BY MACHINE MADE TAP AND APPROVED SADDLE.
5. WHERE DEPTH IS INSUFFICIENT TO ALLOW CONNECTION AS SHOWN, CONNECT SERVICE AS DIRECTED BY ENGINEER.
6. TERMINATE SIDE SEWER AT R/W LINE UNLESS OTHERWISE DIRECTED BY ENGINEER OR SHOWN OTHERWISE ON PLANS.
7. ALL SIDE SEWER MATERIALS SHALL BE PVC SEWER PIPE CONFORMING TO THE REQUIREMENTS OF SECTION 9-05.12 OF THE STD. SPECS.



NOTE:  
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**7.**

# **HYDRAULIC ANALYSIS RESULTS**



## Existing Forcemain

ID	From ID	To ID	Diameter (in)	Length (ft)	Total Flow (mgd)	Unpeakable Flow (mgd)	Peakable Flow (mgd)	Coverage Flow (mgd)	Infiltration Flow (mgd)	Storm Flow (mgd)	Velocity (ft/s)	Headloss (ft)
23	341	190	6	2,195.20	0.058	0.058	0	0	0	0	1.97	4.879

## Existing Gravity Mains

ID	From ID	To ID	Diameter (in)	Length (ft)	Slope	Total Flow (mgd)	Unpeakable Flow (mgd)	Peakable Flow (mgd)	Coverage Flow (mgd)	Infiltration Flow (mgd)	Storm Flow (mgd)	Flow Type	Velocity (ft/s)	d/D	q/Q	Water Depth (ft)	Critical Depth (ft)	Froude Number	Full Flow (mgd)	Coverage Count	Backwater Adjustment	Adjusted Depth (ft)	Adjusted Velocity (ft/s)
102	102	103	8	102.61	0.129	0.001	0.001	0	0	0	0	Free Surface	1.548	0.017	0	0.011	0.02	3.181	2.817	0	No	0.011	1.548
104	205	206	8	104.82	0.005	0.037	0.037	0	0	0	0	Free Surface	1.404	0.173	0.065	0.108	0.875	0.562	0	No	0.115	1.404	
108	149	148	8	108.61	0.005	0.005	0.005	0	0	0	0	Free Surface	0.756	0.066	0.009	0.044	0.039	0.77	0.552	0	No	0.044	0.756
109	52	49	8	158.78	0.005	0.016	0.016	0	0	0	0	Free Surface	1.088	0.118	0.029	0.078	0.071	0.828	0.552	0	No	0.078	1.088
11	328	1	30	64.07	0.001	1.473	1.473	0	0	0	0	Free Surface	2.249	0.26	0.148	0.499	0.483	9.962	9.962	0	No	0.249	2.249
111	50	49	8	185.97	0.005	0.001	0.001	0	0	0	0	Free Surface	0.509	0.036	0.002	0.024	0.02	0.706	0.554	0	No	0.024	0.509
114	98	99	8	114.12	0.11	0.002	0.002	0	0	0	0	Free Surface	1.672	0.021	0.001	0.014	0.024	3.048	2.599	0	No	0.014	1.672
118	192	191	8	118.92	0.005	0.01	0.01	0	0	0	0	Free Surface	0.94	0.092	0.018	0.062	0.055	0.81	0.556	0	No	0.062	0.94
119	61	60	8	270.35	0.005	0.003	0.003	0	0	0	0	Free Surface	0.678	0.056	0.006	0.037	0.032	0.753	0.553	0	No	0.037	0.678
120	118	117	6	120.23	0.008	0.015	0.015	0	0	0	0	Free Surface	1.289	0.15	0.049	0.075	0.075	0.998	0.316	0	No	0.075	1.289
121	60	58	8	199.85	0.005	0.004	0.004	0	0	0	0	Free Surface	0.716	0.061	0.007	0.041	0.035	0.763	0.554	0	No	0.041	0.716
124	106	107	8	124.02	0.008	0	0	0	0	0	0	Free Surface	0.429	0.02	0.001	0.013	0.012	0.808	0.696	0	No	0.013	0.429
125	57	58	8	199.85	0.004	0.016	0.016	0	0	0	0	Free Surface	1.005	0.125	0.033	0.083	0.071	0.743	0.492	0	No	0.083	1.005
127	56	57	8	268.97	0.005	0.003	0.003	0	0	0	0	Free Surface	0.666	0.055	0.006	0.036	0.031	0.749	0.553	0	No	0.036	0.666
128	162	161	8	128.55	0.014	0.004	0.004	0	0	0	0	Free Surface	0.993	0.046	0.004	0.03	0.034	1.224	0.927	0	No	0.03	0.993
131	59	58	27	270.83	0.003	0.744	0.744	0	0	0	0	Free Surface	2.488	0.174	0.066	0.391	0.358	0.842	11.31	0	No	0.391	2.488
132	103	92	8	132.31	0.07	0.002	0.002	0	0	0	0	Free Surface	1.501	0.025	0.001	0.017	0.026	2.498	2.071	0	Yes	0.023	0.943
135	74	63	8	155.38	0.003	0.022	0.022	0	0	0	0	Free Surface	1.001	0.154	0.051	0.102	0.083	0.664	0.431	0	No	0.102	1.001
137	73	74	8	23.82	0.003	0.021	0.021	0	0	0	0	Free Surface	0.975	0.151	0.049	0.101	0.081	0.653	0.425	0	No	0.101	0.975
139	65	63	8	199.93	0.002	0.027	0.027	0	0	0	0	Free Surface	0.96	0.183	0.073	0.122	0.092	0.581	0.372	0	No	0.122	0.96
141	64	65	6	213.98	0.004	0.008	0.008	0	0	0	0	Free Surface	0.881	0.124	0.033	0.062	0.054	0.753	0.244	0	No	0.062	0.881
142	80	79	6	142.12	0.005	0.005	0.005	0	0	0	0	Free Surface	0.776	0.101	0.021	0.05	0.043	0.737	0.244	0	No	0.05	0.776
144	202	203	8	144.51	0.002	0.034	0.034	0	0	0	0	Free Surface	0.958	0.213	0.1	0.142	0.103	0.535	0.338	0	No	0.142	0.958
147	66	65	8	303.17	0.003	0.019	0.019	0	0	0	0	Free Surface	0.917	0.146	0.046	0.097	0.077	0.624	0.407	0	No	0.097	0.917
150	53	52	8	150.81	0.005	0.003	0.003	0	0	0	0	Free Surface	0.656	0.053	0.005	0.035	0.03	0.75	0.556	0	No	0.035	0.656
151	71	69	8	161.14	0.005	0.019	0.019	0	0	0	0	Free Surface	1.15	0.128	0.035	0.085	0.078	0.839	0.555	0	No	0.085	1.15
154	117	116	6	154.18	0.008	0.016	0.016	0	0	0	0	Free Surface	1.307	0.15	0.049	0.075	0.076	1.012	0.321	0	No	0.075	1.307
155	72	73	8	183.6	0.003	0.02	0.02	0	0	0	0	Free Surface	0.971	0.147	0.047	0.098	0.079	0.658	0.429	0	No	0.098	0.971
156	153	152	8	156	0.005	0	0	0	0	0	0	Free Surface	0	0	0	0	0	0	0.554	0	No	0	0
160	148	143	8	160.35	0.005	0.023	0.023	0	0	0	0	Free Surface	1.211	0.139	0.042	0.093	0.085	0.844	0.553	0	No	0.093	1.211
161	78	77	6	151.46	0.005	0.005	0.005	0	0	0	0	Free Surface	0.784	0.094	0.018	0.047	0.041	0.772	0.258	0	No	0.047	0.784
162	71	72	8	162.23	0.003	0.019	0.019	0	0	0	0	Free Surface	0.955	0.143	0.044	0.047	0.095	0.658	0.43	0	No	0.095	0.955
163	76	71	6	359.63	0.005	0.015	0.015	0	0	0	0	Free Surface	1.107	0.165	0.059	0.082	0.074	0.817	0.257	0	No	0.082	1.107
164	152	151	8	164.56	0.005	0.001	0.001	0	0	0	0	Free Surface	0.492	0.034	0.002	0.023	0.019	0.7	0.553	0	No	0.023	0.492
166	160	159	8	166.94	0.005	0.018	0.018	0	0	0	0	Free Surface	1.159	0.121	0.031	0.081	0.075	0.869	0.578	0	No	0.081	1.159
167	158	70	8	208.68	0.006	0.021	0.021	0	0	0	0	Free Surface	1.22	0.13	0.036	0.087	0.081	0.881	0.581	0	No	0.087	1.22
171	159	158	8	141.38	0.006	0.02	0.02	0	0	0	0	Free Surface	1.198	0.126	0.034	0.084	0.079	0.879	0.582	0	No	0.084	1.198
175	161	160	8	167.27	0.006	0.016	0.016	0	0	0	0	Free Surface	1.121	0.114	0.021	0.076	0.071	0.867	0.581	0	No	0.076	1.121
178	195	194	8	178.45	0.005	0.007	0.007	0	0	0	0	Free Surface	0.847	0.079	0.013	0.053	0.047	0.789	0.553	0	Yes	0.053	0.837
180	122	121	8	180.4	0.006	0.002	0.002	0	0	0	0	Free Surface	0.57	0.037	0.002	0.025	0.022	0.782	0.611	0	No	0.025	0.57
187	81	80	6	158.81	0.005	0.004	0.004	0	0	0	0	Free Surface	0.736	0.092	0.018	0.046	0.039	0.732	0.245	0	No	0.046	0.736
189	82	81	6	199.09	0.004	0.003	0.003	0	0	0	0	Free Surface	0.677	0.082	0.014	0.041	0.035	0.715	0.243	0	No	0.041	0.677
190	132	131	8	190.34	0.005	0.003	0.003	0	0	0	0	Free Surface	0.673	0.057	0.006	0.038	0.033	0.742	0.544	0	No	0.038	0.673
1914	248	35	8	203.54	0.005	0.003	0.003	0	0	0	0	Free Surface	0.671	0.055	0.006	0.037	0.032	0.752	0.554	0	No	0.037	0.671
192	75	76	6	192.59	0.005	0.005	0.005	0	0	0	0	Free Surface	0.788	0.095	0.019	0.047	0.042	0.774	0.258	0	No	0.047	0.788
193	84	83	6	199.25	0.005	0.001	0.001	0	0	0	0	Free Surface	0.508	0.052	0.005	0.026	0.021	0.676	0.244	0	No	0.026	0.508
195	85	84	6	158.46	0.004	0.001	0.001	0	0	0	0	Free Surface	0.435	0.041	0.003	0.021	0.017	0.65	0.243	0	No	0.021	0.435
1953	236	147	24	230.5	0.006	0.388	0.388	0	0	0	0	Free Surface	2.599	0.127	0.034	0.253	0.266	1.099	11.344	0	No	0.253	2.599
196	214	215	12	196.69	0.174	0.002	0.002	0	0	0	0	Free Surface	1.845	0.011	0	0.011	0.022	3.719	9.629	0	Yes	0.064	0.143
197	86	85	6	135.25	0.005	0	0	0	0	0	0	Free Surface	0.358	0.031	0.002	0.015	0.012	0.623	0.244	0	No	0.015	0.358
1993	242	138	8	444.1	0.015	0.004	0.004	0	0	0	0	Free Surface	1.072	0.049	0.005	0.033	0.037	1.275	0.955	0	No	0.033	1.072
20	87	86	8	20.37	0.005	0.001	0.001	0	0	0	0	Free Surface	0.474	0.033	0.002	0.022	0.018	0.69	0.549	0	No	0.022	0.474
201	100	102	8	81.74	0.188	0.001	0.001	0	0	0	0	Free Surface	1.695	0.014	0	0.01	0.018	3.742	3.391	0	No	0.01	1.695
202	30	23	8	202.31	0.005	0.004	0.004	0	0	0	0	Free Surface	0.725	0.062	0.008	0.041	0.036	0.764	0.553	0	No	0.041	0.725
2020	1526479	1526515	21	40.76	0.007	0.218	0.218	0	0	0	0	Free Surface	2.337	0.11	0.026	0.193	0.206	1.134	8.511	0	No	0.193	2.337
2021	1526248	1526479	21	251.24	0.002	0.215	0.215	0	0	0	0	Free Surface	1.587	0.142	0.044	0.249	0.204	0.676	4.934	0	No	0.249	1.587
2023	359	210	32	104	0.005	0.135	0.135	0	0	0	0	Free Surface	1.944	0.194	0.083	0.194	0.187	0.931	1.633	0	No	0.194	1.944
2024	267	1527149	8	287.17	0.015	0.003	0.003	0	0	0	0	Free Surface	0.92	0.039	0.003	0.026	0.029	1.22	0.944	0	No	0.026	0.92
203	35	25	8	203.93	0.005	0.004	0.004	0	0	0	0	Free Surface	0.738	0.064	0.008	0.042	0.037	0.768	0.554	0	No	0.042	0.738
2035	1523662	1523987	21	336.04	0.005	0																	

2117	1520554	1520596	18	73.36	0.015	0.102	0.102	0	0	0	Free Surface	2.507	0.077	0.012	0.116	0.146	1.576	8.411	0	No	0.116	2.507
2120	1521493	1521741	15	94	0.038	0.051	0.051	0	0	0	Free Surface	2.852	0.057	0.006	0.071	0.108	2.298	8.112	0	No	0.071	2.852
2121	1520785	1520752	15	304	0.003	0.051	0.051	0	0	0	Free Surface	1.109	0.108	0.024	0.135	0.108	0.645	2.093	0	No	0.135	1.109
2122	1520720	1520835	15	144.77	0.003	0.051	0.051	0	0	0	Free Surface	1.117	0.107	0.024	0.134	0.108	0.652	2.116	0	No	0.134	1.117
2123	1519963	1520233	18	303.55	0.007	0.102	0.102	0	0	0	Free Surface	1.939	0.092	0.018	0.138	0.146	1.116	5.821	0	No	0.138	1.939
2124	1520752	1520720	15	299.55	0.002	0.051	0.051	0	0	0	Free Surface	1.067	0.111	0.026	0.138	0.108	0.612	1.98	0	No	0.138	1.067
2125	1519678	1519963	18	302.11	0.009	0.102	0.102	0	0	0	Free Surface	2.109	0.087	0.016	0.13	0.146	1.249	6.565	0	No	0.13	2.109
2128	1519372	1519678	18	311	0.009	0.102	0.102	0	0	0	Free Surface	2.106	0.087	0.016	0.13	0.146	1.246	6.551	0	No	0.13	2.106
213	77	76	6	213.02	0.005	0.007	0.007	0	0	0	Free Surface	0.898	0.117	0.029	0.058	0.052	0.792	0.258	0	No	0.058	0.898
2132	1518982	1519372	18	395.76	0.01	0.102	0.102	0	0	0	Free Surface	1.177	0.085	0.015	0.128	0.146	1.303	6.869	0	No	0.128	1.177
2134	1518939	1518982	18	104.06	0.009	0.102	0.102	0	0	0	Free Surface	2.048	0.089	0.016	0.133	0.146	1.201	6.295	0	No	0.133	2.048
2136	1518620	1518939	18	318.34	0.002	0.102	0.102	0	0	0	Free Surface	1.228	0.126	0.034	0.188	0.146	0.602	3.028	0	No	0.188	1.228
2138	1518351	1518620	18	275.78	0.007	0.102	0.102	0	0	0	Free Surface	1.927	0.092	0.018	0.139	0.146	1.106	5.768	0	No	0.139	1.927
215	93	92	8	104	0.079	0.006	0.006	0	0	0	Free Surface	2.054	0.037	0.003	0.025	0.041	2.815	2.199	0	Yes	0.027	1.81
217	241	240	24	217.09	0.024	0.386	0.386	0	0	0	Free Surface	4.234	0.09	0.017	0.181	0.265	2.128	22.842	0	Yes	0.19	3.924
218	21	20	27	218.05	0.002	0.832	0.832	0	0	0	Free Surface	1.979	0.22	0.107	0.496	0.379	0.591	7.808	0	No	0.496	1.979
219	243	242	8	155.28	0.022	0.004	0.004	0	0	0	Free Surface	1.158	0.041	0.003	0.027	0.034	1.503	1.155	0	No	0.027	1.158
221	206	207	8	181.83	0.212	0.037	0.037	0	0	0	Free Surface	5.172	0.071	0.01	0.048	0.108	5.079	3.608	0	No	0.048	5.172
224	43	44	6	224.22	0.005	0.004	0.004	0	0	0	Free Surface	0.738	0.086	0.015	0.043	0.037	0.761	0.257	0	No	0.043	0.738
225	91	90	8	149.22	0.059	0.011	0.011	0	0	0	Free Surface	2.289	0.054	0.006	0.036	0.058	2.582	1.906	0	Yes	0.042	1.838
227	129	128	8	227.46	0.015	0.008	0.008	0	0	0	Free Surface	1.287	0.064	0.008	0.042	0.049	1.339	0.966	0	No	0.042	1.287
229	110	90	8	364.7	0.005	0.002	0.002	0	0	0	Free Surface	0.574	0.043	0.004	0.029	0.025	0.725	0.553	0	Yes	0.038	0.377
231	89	88	8	273.33	0.005	0	0	0	0	0	Free Surface	0.293	0.017	0	0.011	0.009	0.599	0.53	0	No	0.011	0.293
233	88	87	8	217.66	0.016	0.001	0.001	0	0	0	Free Surface	0.647	0.022	0.001	0.014	0.016	1.156	0.98	0	No	0.014	0.647
235	83	82	6	235.53	0.005	0.002	0.002	0	0	0	Free Surface	0.592	0.066	0.009	0.033	0.028	0.698	0.244	0	No	0.033	0.592
237	90	121	8	340.05	0.026	0.013	0.013	0	0	0	Free Surface	1.83	0.072	0.01	0.048	0.064	1.794	1.274	0	No	0.048	1.83
239	22	21	27	239.67	0.002	0.83	0.83	0	0	0	Free Surface	1.972	0.221	0.107	0.496	0.379	0.588	7.779	0	No	0.496	1.972
241	121	120	6	57.1	0.008	0.015	0.015	0	0	0	Free Surface	1.323	0.144	0.045	0.072	0.074	1.048	0.333	0	No	0.072	1.323
242	199	201	8	242.84	0.012	0.016	0.016	0	0	0	Free Surface	1.468	0.094	0.018	0.063	0.07	1.251	0.857	0	No	0.063	1.468
243	120	119	6	119.04	0.008	0.015	0.015	0	0	0	Free Surface	1.278	0.148	0.047	0.074	0.074	0.997	0.316	0	No	0.074	1.278
245	124	123	8	199.84	0.012	0.001	0.001	0	0	0	Free Surface	0.56	0.021	0.001	0.014	0.014	1.01	0.858	0	No	0.014	0.56
246	27	28	8	246.57	0.014	0.011	0.011	0	0	0	Free Surface	1.382	0.077	0.012	0.051	0.059	1.307	0.92	0	No	0.051	1.382
247	146	145	27	268.09	0.042	0.592	0.592	0	0	0	Free Surface	5.755	0.084	0.014	0.188	0.319	2.837	41.296	0	No	0.188	5.755
249	168	167	8	208.29	0.005	0.054	0.054	0	0	0	Free Surface	1.559	0.211	0.098	0.141	0.132	0.874	0.553	0	No	0.141	1.559
25	11	10	16	11.42	0	0.018	0.018	0	0	0	Free Surface	0.116	0.229	0.115	0.306	0.063	0.044	0.157	0	No	0.306	0.116
251	156	157	8	251.59	0.003	0.012	0.012	0	0	0	Free Surface	0.829	0.114	0.027	0.076	0.061	0.642	0.43	0	No	0.076	0.829
253	167	145	8	160.44	0.005	0.054	0.054	0	0	0	Free Surface	1.56	0.212	0.098	0.141	0.132	0.873	0.553	0	No	0.141	1.56
255	153	154	8	33.27	0.003	0	0	0	0	0	Free Surface	0	0	0	0	0	0	0.429	0	No	0	0
257	68	67	6	257.7	0.005	0.007	0.007	0	0	0	Free Surface	0.849	0.116	0.029	0.058	0.05	0.75	0.244	0	No	0.058	0.849
259	138	127	8	259.78	0.004	0.014	0.014	0	0	0	Free Surface	0.985	0.113	0.027	0.076	0.066	0.764	0.512	0	No	0.076	0.985
261	121	144	8	180.13	0.011	0	0	0	0	0	Free Surface	0	0	0	0	0	0	0.325	0	No	0	0
263	116	115	8	303.48	0.003	0.017	0.017	0	0	0	Free Surface	0.888	0.139	0.041	0.092	0.073	0.621	0.407	0	No	0.092	0.888
264	28	29	8	264.04	0.006	0.012	0.012	0	0	0	Free Surface	1.067	0.095	0.019	0.063	0.06	0.905	0.619	0	No	0.063	1.067
267	94	93	8	267.67	0.03	0.005	0.005	0	0	0	Free Surface	1.444	0.045	0.004	0.03	0.04	1.797	1.365	0	No	0.03	1.444
268	51	49	27	268.31	0.001	0.765	0.765	0	0	0	Free Surface	1.904	0.214	0.1	0.481	0.363	0.578	7.652	0	No	0.481	1.904
269	45	44	6	269.21	0.005	0.001	0.001	0	0	0	Free Surface	0.514	0.049	0.005	0.025	0.021	0.704	0.257	0	No	0.025	0.514
27	1524166	1525807	8	1,739.88	0.012	0.11	0.11	0	0	0	Free Surface	2.578	0.244	0.131	0.163	0.189	1.338	0.841	0	No	0.163	2.578
270	42	43	6	270.1	0.005	0.002	0.002	0	0	0	Free Surface	0.574	0.058	0.007	0.029	0.025	0.722	0.257	0	No	0.029	0.574
272	261	238	24	272.96	0.04	0.387	0.387	0	0	0	Free Surface	5.051	0.08	0.013	0.161	0.265	2.696	29.39	0	No	0.161	5.051
273	19	18	27	273.14	0.002	0.841	0.841	0	0	0	Free Surface	2.03	0.218	0.104	0.491	0.381	0.609	8.055	0	No	0.491	2.03
275	46	47	8	275.45	0.005	0.006	0.006	0	0	0	Free Surface	0.82	0.075	0.011	0.05	0.044	0.785	0.554	0	No	0.05	0.82
277	115	114	8	164.24	0.003	0.017	0.017	0	0	0	Free Surface	0.892	0.14	0.042	0.094	0.073	0.619	0.405	0	No	0.094	0.892
278	32	31	8	278.14	0.005	0.002	0.002	0	0	0	Free Surface	0.595	0.046	0.004	0.031	0.026	0.732	0.554	0	No	0.031	0.595
279	143	142	27	196.9	0.005	0.671	0.671	0	0	0	Free Surface	2.924	0.145	0.045	0.326	0.34	1.088	14.864	0	Yes	0.345	2.693
28	104	105	8	28.7	0.046	0.001	0.001	0	0	0	Free Surface	0.839	0.014	0	0.009	0.013	1.858	1.686	0	No	0.009	0.839
280	9	8	16	280.8	0.001	0.048	0.048	0	0	0	Free Surface	0.952	0.104	0.023	0.139	0.102	0.544	2.083	0	No	0.139	0.952
281	142	141	27	169.82	0.001	0.672	0.672	0	0	0	Free Surface	1.76	0.206	0.093	0.464	0.34	0.544	7.224	0	No	0.464	1.76
282	107	103	8	282.43	0.033	0.001	0.001	0	0	0	Free Surface	0.841	0.018	0.001	0.012	0.016	1.836	1.425	0	No	0.012	0.841
283	96	95	8	283.16	0.005	0.002	0.002	0	0	0	Free Surface	0.554	0.041	0.003	0.027	0.023	0.719	0.553	0	No	0.027	0.554
285	200	197	8	285.12	0.011	0.001	0.001	0	0	0	Free Surface	0.608	0.026	0.001	0.018	0.018	0.985	0.81	0	No	0.018	0.608
287	208	169	8	205.38	0.005	0.04	0.04	0	0	0	Free Surface	1.43	0.182	0.072	0.121	0.113	0.867	0.555	0	No	0.121	1.43
289	191	169	8	251.03	0.005	0.011	0.011	0	0	0	Free Surface	0.963	0.097	0.02	0.065	0.058	0.809	0.553	0	No		

329	79	68	6	88.13	0.004	0.007	0.007	0	0	0	0	Free Surface	0.832	0.114	0.028	0.057	0.049	0.742	0.242	0	No	0.057	0.832
33	1527159	343	8	101.56	0.018	0.125	0.125	0	0	0	0	Free Surface	3.117	0.234	0.12	0.156	0.202	1.655	1.043	0	No	0.156	3.117
331	163	162	8	183.17	0.014	0.002	0.002	0	0	0	0	Free Surface	0.831	0.035	0.002	0.023	0.025	1.176	0.928	0	No	0.023	0.831
332	207	208	8	332.15	0.005	0.038	0.038	0	0	0	0	Free Surface	1.41	0.179	0.07	0.119	0.111	0.864	0.554	0	No	0.119	1.41
333	210	209	12	333.08	0.022	0	0	0	0	0	0	Free Surface	0	0	0	0	0	0	3.397	0	No	0	0
337	163	164	6	290.83	0.004	0	0	0	0	0	0	Free Surface	0	0	0	0	0	0	0.231	0	No	0	0
339	165	166	6	311.14	0.004	0.005	0.005	0	0	0	0	Free Surface	0.754	0.106	0.024	0.053	0.044	0.698	0.23	0	No	0.053	0.754
340	212	213	12	340.04	0.01	0.001	0.001	0	0	0	0	Free Surface	0.986	0.018	0.001	0.017	0.045	2.278	0.001	0	No	0.017	0.986
341	247	246	8	341.59	0.04	0.001	0.001	0	0	0	0	Free Surface	0.977	0.02	0.001	0.013	0.038	1.825	1.569	0	No	0.013	0.977
342	113	66	8	342.82	0.003	0.018	0.018	0	0	0	0	Free Surface	0.912	0.144	0.045	0.096	0.076	0.625	0.408	0	No	0.096	0.912
344	144	143	27	344.41	0.008	0.647	0.647	0	0	0	0	Free Surface	3.353	0.128	0.035	0.289	0.334	1.327	18.353	0	No	0.289	3.353
345	216	5	16	359.03	0.002	0.508	0.508	0	0	0	0	Free Surface	1.801	0.351	0.264	0.468	0.341	0.542	1.926	0	No	0.468	1.801
347	217	216	16	400.33	0.002	0.489	0.489	0	0	0	0	Free Surface	1.782	0.344	0.254	0.458	0.334	0.542	1.926	0	No	0.458	1.782
349	218	217	16	398.51	0.002	0.468	0.468	0	0	0	0	Free Surface	1.76	0.336	0.243	0.448	0.327	0.543	1.926	0	No	0.448	1.76
35	343	345	8	281.14	0.064	0.127	0.127	0	0	0	0	Free Surface	4.929	0.171	0.064	0.114	0.204	3.085	1.983	0	No	0.114	4.929
351	63	59	27	351.44	0.006	0.744	0.744	0	0	0	0	Free Surface	3.038	0.151	0.049	0.34	0.358	1.105	15.027	0	No	0.34	3.038
353	219	218	16	399.46	0.002	0.445	0.445	0	0	0	0	Free Surface	1.736	0.327	0.231	0.436	0.318	0.543	1.926	0	No	0.436	1.736
355	40	38	6	355.6	0.005	0.012	0.012	0	0	0	0	Free Surface	1.036	0.147	0.047	0.074	0.066	0.81	0.257	0	No	0.074	1.036
357	54	52	8	357.41	0.005	0.011	0.011	0	0	0	0	Free Surface	0.979	0.099	0.02	0.066	0.059	0.814	0.554	0	No	0.066	0.979
358	55	57	8	358.83	0.005	0.01	0.01	0	0	0	0	Free Surface	0.955	0.095	0.019	0.064	0.057	0.809	0.553	0	No	0.064	0.955
359	166	161	6	359.84	0.004	0.011	0.011	0	0	0	0	Free Surface	0.953	0.146	0.046	0.073	0.063	0.749	0.238	0	No	0.073	0.953
360	49	37	27	360.01	0.002	0.783	0.783	0	0	0	0	Free Surface	1.988	0.211	0.097	0.474	0.368	0.608	8.056	0	No	0.474	1.988
361	220	219	16	401.02	0.002	0.42	0.42	0	0	0	0	Free Surface	1.708	0.317	0.218	0.423	0.309	0.543	1.926	0	No	0.423	1.708
363	58	51	27	363.28	0.009	0.765	0.765	0	0	0	0	Free Surface	2.393	0.182	0.072	0.409	0.363	0.79	10.583	0	No	0.409	2.393
364	157	148	8	364.38	0.001	0.016	0.016	0	0	0	0	Free Surface	0.565	0.185	0.075	0.123	0.071	0.34	0.217	0	No	0.123	0.565
365	221	220	16	399.64	0.002	0.395	0.395	0	0	0	0	Free Surface	1.678	0.307	0.205	0.41	0.3	0.544	1.926	0	No	0.41	1.678
367	222	221	16	400.83	0.002	0.368	0.368	0	0	0	0	Free Surface	1.645	0.296	0.191	0.395	0.289	0.544	1.926	0	No	0.395	1.645
368	62	61	6	368.6	0.005	0.003	0.003	0	0	0	0	Free Surface	0.669	0.074	0.011	0.037	0.032	0.746	0.257	0	No	0.037	0.669
369	131	130	8	369.7	0.007	0.004	0.004	0	0	0	0	Free Surface	0.807	0.058	0.006	0.038	0.036	0.883	0.647	0	No	0.038	0.807
37	18	17	27	7.67	0.003	0.844	0.844	0	0	0	0	Free Surface	2.409	0.194	0.082	0.437	0.382	0.769	10.249	0	No	0.437	2.409
371	69	63	27	371.06	0.003	0.694	0.694	0	0	0	0	Free Surface	2.341	0.173	0.065	0.389	0.346	0.794	10.676	0	No	0.389	2.341
373	145	144	27	373.33	0.009	0.647	0.647	0	0	0	0	Free Surface	3.382	0.128	0.035	0.287	0.334	1.343	18.581	0	No	0.287	3.382
375	223	222	16	399.76	0.002	0.339	0.339	0	0	0	0	Free Surface	1.606	0.284	0.176	0.378	0.277	0.544	1.926	0	No	0.378	1.606
377	224	223	16	399.7	0.002	0.307	0.307	0	0	0	0	Free Surface	1.562	0.27	0.159	0.36	0.263	0.543	1.926	0	No	0.36	1.562
379	225	224	16	399.12	0.002	0.287	0.287	0	0	0	0	Free Surface	1.532	0.261	0.149	0.348	0.255	0.543	1.926	0	No	0.348	1.532
383	226	225	16	187.32	0.002	0.047	0.047	0	0	0	0	Free Surface	0.897	0.108	0.024	0.143	0.102	0.505	1.926	0	Yes	0.196	0.57
384	140	139	27	384.02	0.002	0.674	0.674	0	0	0	0	Free Surface	1.977	0.19	0.079	0.428	0.341	0.638	8.507	0	No	0.428	1.977
385	227	225	16	400.25	0.002	0.234	0.234	0	0	0	0	Free Surface	1.445	0.236	0.122	0.314	0.229	0.541	1.926	0	No	0.314	1.445
387	228	227	16	399.7	0.002	0.22	0.22	0	0	0	0	Free Surface	1.419	0.228	0.114	0.304	0.222	0.54	1.926	0	No	0.304	1.419
388	139	69	27	388.99	0.002	0.675	0.675	0	0	0	0	Free Surface	2.055	0.185	0.075	0.417	0.341	0.672	8.987	0	No	0.417	2.055
389	229	228	16	400.58	0.002	0.183	0.183	0	0	0	0	Free Surface	1.345	0.208	0.095	0.278	0.203	0.363	1.926	0	No	0.278	1.345
39	145	257	8	432.29	0.021	0.128	0.128	0	0	0	0	Free Surface	3.327	0.227	0.113	0.151	0.204	1.796	1.133	0	No	0.151	3.327
391	230	229	16	400.11	0.002	0.144	0.144	0	0	0	0	Free Surface	1.253	0.185	0.075	0.247	0.179	0.533	1.926	0	No	0.247	1.253
393	231	230	16	398.53	0.002	0.105	0.105	0	0	0	0	Free Surface	1.142	0.159	0.055	0.212	0.153	0.526	1.926	0	No	0.212	1.142
395	233	231	16	398.53	0.002	0.081	0.081	0	0	0	0	Free Surface	1.083	0.138	0.041	0.184	0.134	0.537	1.992	0	No	0.184	1.083
396	237	236	24	396.4	0.071	0.388	0.388	0	0	0	0	Free Surface	6.148	0.07	0.01	0.141	0.266	3.509	38.928	0	Yes	0.197	3.749
397	234	233	15	401.04	0.002	0.071	0.071	0	0	0	0	Free Surface	1.026	0.143	0.044	0.179	0.128	0.515	1.621	0	No	0.179	1.026
399	189	234	15	399.03	0.002	0.067	0.067	0	0	0	0	Free Surface	1.005	0.138	0.041	0.173	0.124	0.514	1.621	0	No	0.173	1.005
40	211	212	12	40.1	0.009	0.001	0.001	0	0	0	0	Free Surface	0.537	0.017	0	0.017	0.016	0.888	2.157	0	No	0.017	0.537
401	190	189	30	401.7	0.002	0.064	0.064	0	0	0	0	Free Surface	0.901	0.056	0.006	0.141	0.101	0.515	10.295	0	No	0.141	0.901
403	137	129	8	403.07	0.005	0.002	0.002	0	0	0	0	Free Surface	0.555	0.041	0.003	0.027	0.023	0.721	0.554	0	No	0.027	0.555
404	213	214	12	404.44	0.004	0.002	0.002	0	0	0	0	Free Surface	0.473	0.025	0.001	0.025	0.02	0.646	1.479	0	No	0.025	0.473
405	250	26	8	160.9	0.014	0.009	0.009	0	0	0	0	Free Surface	1.31	0.072	0.01	0.048	0.054	1.284	0.911	0	No	0.048	1.31
407	245	244	8	407.94	0.023	0.003	0.003	0	0	0	0	Free Surface	1.053	0.034	0.002	0.023	0.028	1.499	1.184	0	No	0.023	1.053
409	253	46	8	324.26	0.005	0.002	0.002	0	0	0	0	Free Surface	0.555	0.041	0.003	0.027	0.023	0.72	0.553	0	No	0.027	0.555
411	244	243	8	411.44	0.021	0.003	0.003	0	0	0	0	Free Surface	1.089	0.039	0.003	0.026	0.031	1.453	1.126	0	No	0.026	1.089
413	38	25	8	158.88	0.005	0.016	0.016	0	0	0	0	Free Surface	1.093	0.119	0.03	0.079	0.072	0.828	0.552	0	No	0.079	1.093
415	255	241	12	75	0.015	0.135	0.135	0	0	0	0	Free Surface	2.87	0.149	0.048	0.149	0.188	1.58	2.834	0	No	0.149	2.87
417	210	255	12	143	0.01	0.135	0.135	0	0	0	0	Free Surface	2.483	0.164	0.058	0.164	0.187	1.298	2.309	0	No	0.164	2.483
418	337	62	6	418.28	0.005	0.002	0.002	0	0	0	0	Free Surface	0.596	0.062	0.007	0.031	0.026	0.728	0.257	0	No	0.031	0.596
419	265	257	8	356.37	0.005	0.006	0.006																

471	1523098	1523115	8	200.74	0.106	0	0	0	0	0	Free Surface	0	0	0	0	0	0	2.546	0	No	0	0
473	1522749	1523119	18	369.3	0.003	0.102	0.102	0	0	0	Free Surface	1.443	0.112	0.027	0.169	0.146	0.749	3.815	0	No	0.169	1.443
477	1522563	1522749	18	210.86	0.004	0.102	0.102	0	0	0	Free Surface	1.607	0.105	0.023	0.157	0.146	0.866	4.447	0	Yes	0.278	0.7
479	1522331	1522563	18	232.4	0.003	0.102	0.102	0	0	0	Free Surface	1.429	0.113	0.027	0.17	0.146	0.739	3.763	0	No	0.17	1.429
481	1522114	1522331	18	224.81	0.003	0.102	0.102	0	0	0	Free Surface	1.394	0.115	0.028	0.173	0.146	0.715	3.632	0	No	0.173	1.394
483	1521864	1522114	18	262.12	0.003	0.102	0.102	0	0	0	Free Surface	1.416	0.114	0.027	0.171	0.146	0.73	3.713	0	No	0.171	1.416
485	1521558	1521864	18	308.55	0.029	0.102	0.102	0	0	0	Free Surface	3.131	0.066	0.009	0.1	0.146	2.125	11.574	0	No	0.1	3.131
487	108	92	8	487.78	0.02	0.002	0.002	0	0	0	Free Surface	0.863	0.028	0.001	0.019	0.022	1.362	1.111	0	Yes	0.024	0.598
489	1521245	1521558	18	313.48	0.029	0.102	0.102	0	0	0	Free Surface	3.144	0.066	0.009	0.099	0.146	2.137	11.643	0	No	0.099	3.144
491	1521063	1521245	18	181.97	0.176	0.102	0.102	0	0	0	Free Surface	5.87	0.044	0.004	0.065	0.146	4.937	28.573	0	No	0.065	5.87
493	1521458	1521558	8	331.14	0.169	0	0	0	0	0	Free Surface	0	0	0	0	0	0	3.221	0	No	0	0
495	1523943	1524003	15	333.91	0.005	0.063	0.063	0	0	0	Free Surface	1.504	0.101	0.021	0.126	0.12	0.903	2.952	0	No	0.126	1.504
497	1522706	1523047	15	341.43	0.002	0.052	0.052	0	0	0	Free Surface	0.974	0.119	0.03	0.149	0.109	0.538	1.725	0	No	0.149	0.974
499	1522987	1523047	15	357.3	0.001	0.001	0.001	0	0	0	Free Surface	0.422	0.015	0	0.019	0.016	0.558	2.819	0	No	0.019	0.422
501	1523047	1523178	15	136.26	0.016	0.054	0.054	0	0	0	Free Surface	2.152	0.071	0.01	0.089	0.111	1.547	5.295	0	No	0.089	2.152
503	1523178	1523433	15	288.54	0.013	0.054	0.054	0	0	0	Free Surface	1.984	0.076	0.012	0.095	0.111	1.38	4.682	0	No	0.095	1.984
505	1521170	1521493	15	420	0.005	0.051	0.051	0	0	0	Free Surface	1.42	0.091	0.017	0.114	0.108	0.9	2.981	0	No	0.114	1.42
507	1520816	1520785	12	298.95	0.006	0.051	0.051	0	0	0	Free Surface	1.557	0.116	0.028	0.116	0.114	0.975	1.796	0	No	0.116	1.557
509	1520661	1520816	12	154.15	0.033	0.051	0.051	0	0	0	Free Surface	2.817	0.077	0.012	0.077	0.114	2.168	4.2	0	No	0.077	2.817
51	349	12	16	310	0.001	0.013	0.013	0	0	0	Free Surface	0.593	0.06	0.007	0.079	0.053	0.452	1.86	0	Yes	0.091	0.487
511	1523729	1523521	8	334.92	0.016	0.11	0.11	0	0	0	Free Surface	2.895	0.225	0.111	0.15	0.189	1.57	0.991	0	No	0.15	2.895
513	1523521	1523531	8	47.06	0.009	0.11	0.11	0	0	0	Free Surface	2.352	0.261	0.149	0.174	0.189	1.179	0.74	0	No	0.174	2.352
515	1523531	1523828	8	338.18	0.009	0.11	0.11	0	0	0	Free Surface	2.361	0.26	0.148	0.173	0.189	1.185	0.744	0	No	0.173	2.361
517	1523828	1524166	8	383.92	0.009	0.11	0.11	0	0	0	Free Surface	2.361	0.26	0.148	0.173	0.189	1.185	0.743	0	No	0.173	2.361
518	114	113	8	518.22	0.003	0.018	0.018	0	0	0	Free Surface	0.902	0.142	0.043	0.095	0.074	0.622	0.407	0	No	0.095	0.902
52	150	149	8	52.45	0.005	0.004	0.004	0	0	0	Free Surface	0.722	0.06	0.007	0.04	0.035	0.773	0.562	0	No	0.04	0.722
521	1521679	1526286	8	222.96	0.005	0.002	0.002	0	0	0	Free Surface	0.57	0.043	0.003	0.028	0.024	0.726	0.555	0	Yes	0.052	0.231
523	1525926	1526031	8	222.99	0.005	0.002	0.002	0	0	0	Free Surface	0.586	0.045	0.004	0.03	0.025	0.731	0.555	0	Yes	0.04	0.378
525	1526286	1526513	8	256.6	0.01	0.121	0.121	0	0	0	Free Surface	2.531	0.264	0.153	0.176	0.198	1.259	0.79	0	No	0.176	2.531
527	41	40	6	265.81	0.005	0.007	0.007	0	0	0	Free Surface	0.881	0.114	0.027	0.057	0.05	0.788	1.257	0	No	0.057	0.881
529	1	351	30	259	1.489	0.029	1.489	0	0	0	Free Surface	2.526	0.241	0.127	0.603	0.496	11.879	0.603	0	No	0.603	2.526
53	26	27	8	275.24	0.01	0.01	0.01	0	0	0	Free Surface	1.23	0.08	0.013	0.053	0.057	1.142	0.8	0	No	0.053	1.23
531	273	275	30	94	0.001	1.613	1.613	0	0	0	Free Surface	2.296	0.273	0.163	0.683	0.516	0.579	9.885	0	No	0.683	2.296
533	275	339	30	71	0.001	1.888	1.888	0	0	0	Free Surface	2.417	0.295	0.189	0.737	0.559	0.585	9.976	0	No	0.737	2.417
534	128	138	8	534.61	0.116	0.009	0.009	0	0	0	Free Surface	2.702	0.042	0.003	0.028	0.052	3.482	2.67	0	No	0.028	2.702
535	279	235	15	30.89	0.005	0.001	0.001	0	0	0	Free Surface	0.401	0.014	0	0.017	0.014	0.663	2.917	0	No	0.017	0.401
537	235	281	15	150.08	0.005	0.001	0.001	0	0	0	Free Surface	0.434	0.015	0	0.019	0.015	0.683	2.959	0	No	0.019	0.434
539	116	142	8	189	0.008	0	0	0	0	0	Free Surface	0	0	0	0	0	0.698	0	0	No	0	0
541	86	116	8	339	0.015	0.001	0.001	0	0	0	Free Surface	0.644	0.023	0.001	0.015	0.016	1.123	0.944	0	No	0.015	0.644
543	283	147	18	193.56	0.007	0.204	0.204	0	0	0	Free Surface	2.342	0.13	0.036	0.194	0.207	1.13	5.664	0	No	0.194	2.342
547	285	283	12	191	0.038	0.187	0.187	0	0	0	Free Surface	4.386	0.139	0.041	0.139	0.221	2.503	4.523	0	No	0.139	4.386
548	238	237	24	548.21	0.06	0.387	0.387	0	0	0	Free Surface	5.805	0.073	0.011	0.146	0.265	3.25	35.865	0	No	0.146	5.805
549	287	285	12	256	0.019	0.187	0.187	0	0	0	Free Surface	3.425	0.164	0.059	0.164	0.221	1.789	3.181	0	No	0.164	3.425
55	13	48	27	109.78	0.001	0.851	0.851	0	0	0	Free Surface	1.602	0.26	0.148	0.585	0.384	0.438	5.747	0	No	0.585	1.602
551	289	287	12	424	0.019	0.187	0.187	0	0	0	Free Surface	3.426	0.164	0.059	0.164	0.221	1.79	3.183	0	No	0.164	3.426
553	291	289	12	480	0.024	0.186	0.186	0	0	0	Free Surface	3.718	0.155	0.052	0.155	0.222	2.001	3.577	0	No	0.155	3.718
555	293	291	12	300	0.014	0.186	0.186	0	0	0	Free Surface	3.074	0.177	0.068	0.177	0.222	1.732	3.242	0	No	0.177	3.074
557	295	293	12	380	0.021	0.185	0.185	0	0	0	Free Surface	3.541	0.16	0.055	0.16	0.22	1.877	3.346	0	No	0.16	3.541
559	297	295	12	500	0.017	0.184	0.184	0	0	0	Free Surface	3.282	0.168	0.061	0.168	0.22	1.696	3.01	0	No	0.168	3.282
561	299	297	12	109	0.05	0.183	0.183	0	0	0	Free Surface	4.783	0.129	0.035	0.129	0.219	2.836	5.163	0	No	0.129	4.783
563	301	299	12	200	0.01	0.183	0.183	0	0	0	Free Surface	2.717	0.19	0.079	0.19	0.219	1.314	2.309	0	No	0.19	2.717
565	303	301	12	455	0.032	0.183	0.183	0	0	0	Free Surface	4.101	0.143	0.044	0.143	0.219	2.302	4.146	0	Yes	0.167	3.287
567	305	303	12	476	0.023	0.183	0.183	0	0	0	Free Surface	3.642	0.155	0.052	0.155	0.219	1.96	3.502	0	No	0.155	3.642
569	307	305	12	500	0.018	0.183	0.183	0	0	0	Free Surface	3.342	0.165	0.059	0.165	0.219	1.743	3.098	0	No	0.165	3.342
57	351	273	30	73	0.001	1.543	1.543	0	0	0	Free Surface	2.259	0.268	0.157	0.669	0.505	0.576	9.838	0	No	0.669	2.259
571	309	307	12	349	0.016	0.183	0.183	0	0	0	Free Surface	3.205	0.17	0.063	0.17	0.219	1.647	2.919	0	No	0.17	3.205
573	311	309	12	339	0.028	0.183	0.183	0	0	0	Free Surface	3.904	0.148	0.047	0.148	0.219	2.153	3.865	0	No	0.148	3.904
575	47	11	8	748.16	0.005	0.016	0.016	0	0	0	Free Surface	1.151	0.113	0.027	0.075	0.071	0.895	0.6	0	Yes	0.111	0.658
577	313	311	12	500	0.02	0.183	0.183	0	0	0	Free Surface	3.468	0.161	0.056	0.161	0.219	1.833	3.265	0	No	0.161	3.468
579	315	313	12	400	0.014	0.183	0.183	0	0	0	Free Surface	3.059	0.175	0.067	0.175	0.219	1.545	2.732	0	No	0.175	3.059
581	317	315	12	232	0.01	0.183	0.183	0	0	0	Free Surface	2.717	0.19	0.079	0.19	0.219	1.314	2.309	0	No	0.19	2.717
583	319	317	12	116	0.093	0.183	0.183	0	0	0	Free Surface	5.942	0.111	0.026	0.111	0.219	3.802	7.038	0	No	0.111</	

68	164	165	6	68.25	0.004	0.002	0.002	0	0	0	0	Free Surface	0.575	0.07	0.01	0.035	0.028	0.659	0.229	0	No	0.035	0.575
69	34	33	8	101.66	0.005	0	0	0	0	0	0	Free Surface	0.285	0.015	0	0.01	0.008	0.616	0.555	0	No	0.01	0.285
71	355	329	16	116	0.003	0.072	0.072	0	0	0	0	Free Surface	1.318	0.111	0.026	0.147	0.126	0.732	2.785	0	No	0.147	1.318
73	44	23	6	157.44	0.005	0.006	0.006	0	0	0	0	Free Surface	0.854	0.108	0.024	0.054	0.048	0.784	0.258	0	Yes	0.068	0.61
770	109	91	8	770.19	0.017	0.001	0.001	0	0	0	0	Free Surface	0.646	0.02	0.001	0.013	0.015	1.197	1.027	0	No	0.013	0.646
78	15	14	8	78.47	0.005	0.003	0.003	0	0	0	0	Free Surface	0.666	0.055	0.006	0.036	0.032	0.749	0.552	0	No	0.036	0.666
79	257	359	12	30	0.005	0.135	0.135	0	0	0	0	Free Surface	1.943	0.194	0.082	0.194	0.187	0.93	1.633	0	No	0.194	1.943
80	101	100	8	80.58	0.012	0	0	0	0	0	0	Free Surface	0.511	0.018	0.001	0.012	0.012	1	0.872	0	No	0.012	0.511
86	70	71	8	86.31	0.005	0.022	0.022	0	0	0	0	Free Surface	1.232	0.134	0.038	0.089	0.083	0.878	0.578	0	No	0.089	1.232
88	119	118	6	88.5	0.007	0.015	0.015	0	0	0	0	Free Surface	1.264	0.151	0.049	0.075	0.075	0.976	0.309	0	No	0.075	1.264
91	249	248	8	144.48	0.006	0.001	0.001	0	0	0	0	Free Surface	0.544	0.034	0.002	0.022	0.02	0.78	0.618	0	Yes	0.07	0.102
93	36	35	8	269.44	0.005	0.001	0.001	0	0	0	0	Free Surface	0.443	0.029	0.002	0.019	0.016	0.684	0.554	0	No	0.019	0.443
94	67	64	6	94.9	0.005	0.007	0.007	0	0	0	0	Free Surface	0.866	0.12	0.03	0.06	0.052	0.754	0.245	0	No	0.06	0.866
95	37	25	27	271.65	0.001	0.784	0.784	0	0	0	0	Free Surface	1.837	0.223	0.109	0.501	0.368	0.545	7.204	0	No	0.501	1.837
97	39	38	8	270.8	0.005	0.002	0.002	0	0	0	0	Free Surface	0.605	0.047	0.004	0.031	0.027	0.736	0.555	0	No	0.031	0.605



## Existing Manhole

ID	Rim Elevation (ft)	Base Flow (mgd)	Total Flow (mgd)	Storm Flow (mgd)	Grade (ft)	Status	Hydraulic Jump	Surcharge Depth (ft)	Unfilled Depth (ft)
1	1,885.95	0.016	0.016	0	1,881.23	Not Full	No	-1.897	4.717
10	1,891.44	0.003	0.003	0	1,883.60	Not Full	No	-1.211	7.838
100	2,035.87	0.001	0.001	0	2,020.88	Not Full	No	-0.657	14.99
101	2,034.01	0	0	0	2,021.98	Not Full	No	-0.655	12.028
102	2,015.44	0	0	0	2,005.45	Not Full	No	-0.656	9.989
103	2,002.06	0	0	0	1,992.08	Not Full	No	-0.65	9.983
104	2,008.71	0.001	0.001	0	1,998.72	Not Full	No	-0.657	9.991
105	2,007.28	0.001	0.001	0	1,997.30	Not Full	No	-0.652	9.985
106	2,012.59	0	0	0	2,002.60	Not Full	No	-0.654	9.987
107	2,011.51	0	0	0	2,001.52	Not Full	No	-0.654	9.988
108	2,002.63	0	0	0	1,992.65	Not Full	No	-0.648	9.981
109	1,946.68	0.001	0.001	0	1,936.69	Not Full	No	-0.653	9.987
11	1,891.44	0.002	0.002	0	1,884.51	Not Full	No	-1.028	6.934
110	1,933.95	0.001	0.001	0	1,916.35	Not Full	Yes	-0.638	17.601
111	1,939.27	0.001	0.001	0	1,929.29	Not Full	No	-0.649	9.983
112	1,940.92	0.001	0.001	0	1,930.94	Not Full	No	-0.649	9.982
113	1,907.92	0.001	0.001	0	1,897.64	Not Full	No	-0.571	10.284
114	1,909.43	0	0	0	1,899.14	Not Full	No	-0.572	10.295
115	1,909.01	0	0	0	1,899.67	Not Full	No	-0.573	9.336
116	1,909.61	0	0	0	1,900.59	Not Full	Yes	-0.674	9.018
117	1,909.69	0	0	0	1,902.15	Not Full	No	-0.425	7.545
118	1,910.10	0	0	0	1,903.16	Not Full	No	-0.425	6.945
119	1,910.39	0	0	0	1,903.90	Not Full	No	-0.425	6.495
12	1,992.04	0.003	0.003	0	1,883.75	Not Full	No	-1.231	108.288
120	1,911.32	0	0	0	1,904.89	Not Full	Yes	-0.426	6.426
121	1,911.53	0	0	0	1,905.47	Not Full	Yes	-0.695	6.058
122	1,912.64	0	0	0	1,906.63	Not Full	Yes	-0.642	6.015
123	1,926.98	0	0	0	1,919.11	Not Full	No	-0.486	7.866
124	1,928.34	0	0	0	1,921.61	Not Full	No	-0.652	6.726
125	1,934.36	0	0	0	1,927.61	Not Full	No	-0.659	6.752
127	1,935.40	0	0	0	1,925.56	Not Full	No	-0.773	9.84
128	1,999.07	0.001	0.001	0	1,989.00	Not Full	No	-0.639	10.072
129	2,002.63	0.001	0.001	0	1,992.57	Not Full	No	-0.624	10.058
13	1,892.46	0	0	0	1,883.99	Not Full	No	-1.665	8.475
130	2,000.88	0.001	0.001	0	1,994.82	Not Full	No	-0.628	6.061
131	2,005.70	0.001	0.001	0	1,997.44	Not Full	No	-0.628	8.262
132	2,008.52	0.001	0.001	0	1,998.46	Not Full	Yes	-0.629	10.062
133	2,012.24	0	0	0	2,002.17	Not Full	No	-0.639	10.072
134	2,013.25	0.001	0.001	0	2,003.18	Not Full	No	-0.635	10.069
135	2,017.36	0.002	0.002	0	2,007.28	Not Full	No	-0.643	10.077
136	2,004.60	0.001	0.001	0	1,995.79	Not Full	No	-0.644	8.807
137	2,003.56	0.001	0.001	0	1,994.68	Not Full	No	-0.639	8.883
138	1,936.81	0.001	0.001	0	1,926.79	Not Full	Yes	-0.591	10.024
139	1,909.94	0.001	0.001	0	1,896.11	Not Full	No	-1.833	13.833
14	1,892.17	0.001	0.001	0	1,886.19	Not Full	No	-0.628	5.982
140	1,909.86	0.001	0.001	0	1,896.99	Not Full	No	-1.822	12.872
141	1,909.32	0.001	0.001	0	1,897.51	Not Full	No	-1.772	11.812
142	1,909.79	0.001	0.001	0	1,897.81	Not Full	Yes	-1.786	11.976
143	1,910.40	0.001	0.001	0	1,898.86	Not Full	No	-1.924	11.544
144	1,912.27	0.001	0.001	0	1,901.79	Not Full	No	-1.961	10.481
145	1,918.26	0	0	0	1,905.09	Not Full	No	-1.963	13.173
146	1,924.53	0	0	0	1,916.44	Not Full	No	-2.062	8.092
147	1,930.76	0	0	0	1,921.45	Not Full	No	-2.014	9.314
148	1,910.78	0.002	0.002	0	1,900.55	Not Full	No	-0.574	10.227
149	1,911.40	0.001	0.001	0	1,901.14	Not Full	No	-0.622	10.256
15	1,892.04	0.003	0.003	0	1,886.68	Not Full	No	-0.63	5.364
150	1,911.41	0.001	0.001	0	1,901.51	Not Full	No	-0.627	9.9
151	1,911.52	0.001	0.001	0	1,902.65	Not Full	No	-0.634	8.867
1518351	2,141.00	0.102	0.102	0	2,131.20	Not Full	No	-1.361	9.801
1518620	2,138.43	0	0	0	2,129.17	Not Full	Yes	-1.312	9.262
1518939	2,134.95	0	0	0	2,128.38	Not Full	No	-1.367	6.567
1518982	2,134.95	0	0	0	2,127.39	Not Full	No	-1.372	7.562
1519372	2,136.09	0	0	0	2,123.26	Not Full	No	-1.37	12.83
1519678	2,128.34	0	0	0	2,120.28	Not Full	No	-1.37	8.06

1519963	2,127.34	0	0	0	2,117.38	Not Full	No	-1.362	9.962
152	1,913.13	0.001	0.001	0	1,903.56	Not Full	No	-0.644	9.567
1520233	2,123.36	0	0	0	2,115.05	Not Full	No	-1.366	8.306
1520444	2,120.99	0	0	0	2,112.93	Not Full	No	-1.384	8.064
1520544	2,119.73	0	0	0	2,111.26	Not Full	No	-1.36	8.47
1520554	2,119.17	0	0	0	2,110.56	Not Full	No	-1.384	8.614
1520596	2,117.84	0	0	0	2,109.35	Not Full	No	-1.371	8.491
1520661	2,129.30	0.051	0.051	0	2,119.38	Not Full	No	-0.923	9.923
1520720	2,124.56	0	0	0	2,110.46	Not Full	No	-1.116	14.096
1520752	2,121.82	0	0	0	2,111.24	Not Full	No	-1.112	10.582
1520785	2,123.24	0	0	0	2,112.18	Not Full	No	-1.115	11.065
1520816	2,125.41	0	0	0	2,114.22	Not Full	Yes	-0.884	11.194
1520829	2,114.73	0	0	0	2,106.65	Not Full	No	-1.413	8.083
1520835	2,122.93	0	0	0	2,105.95	Not Full	No	-1.174	16.984
1521063	2,104.63	0	0	0	2,094.16	Not Full	No	-1.435	10.475
1521170	2,116.41	0	0	0	2,099.06	Not Full	Yes	-1.136	17.346
1521245	2,072.03	0	0	0	2,062.03	Not Full	No	-1.401	10.001
1521458	2,118.00	0	0	0	2,108.78	Not Full	No	-0.667	9.22
1521493	2,114.45	0	0	0	2,096.79	Not Full	No	-1.179	17.659
1521558	2,053.00	0	0	0	2,052.76	Not Full	No	-1.4	0.24
1521741	2,120.25	0	0	0	2,093.20	Not Full	Yes	-1.136	27.046
1521864	2,053.74	0	0	0	2,043.81	Not Full	Yes	-1.329	9.929
1521987	2,115.04	0	0	0	2,092.49	Not Full	No	-1.136	22.546
1522114	2,050.80	0	0	0	2,042.93	Not Full	No	-1.327	7.867
1522331	2,052.12	0	0	0	2,042.19	Not Full	No	-1.33	9.93
1522447	2,110.35	0	0	0	2,090.15	Not Full	No	-1.133	20.203
1522556	2,047.15	0	0	0	2,029.71	Not Full	No	-1.75	17.44
1522563	2,050.65	0	0	0	2,041.37	Not Full	No	-1.343	9.283
1522706	2,105.36	0.001	0.001	0	2,088.63	Not Full	No	-1.101	16.731
1522749	2,050.64	0	0	0	2,040.71	Not Full	No	-1.331	9.931
1522947	2,046.40	0	0	0	2,027.62	Not Full	No	-1.75	18.78
1522997	2,099.62	0.001	0.001	0	2,089.54	Not Full	No	-1.231	10.081
1523047	2,097.90	0.001	0.001	0	2,087.89	Not Full	No	-1.161	10.011
1523098	2,100.50	0	0	0	2,095.03	Not Full	No	-0.667	5.47
1523115	2,056.83	0	0	0	2,041.31	Not Full	No	-0.667	15.52
1523119	2,046.52	0	0	0	2,039.45	Not Full	No	-1.327	7.067
1523178	2,095.62	0.001	0.001	0	2,085.62	Not Full	No	-1.155	10.005
1523269	2,044.69	0	0	0	2,025.84	Not Full	No	-1.75	18.85
1523316	2,046.34	0	0	0	2,038.80	Not Full	No	-1.317	7.537
1523433	2,091.91	0.003	0.003	0	2,081.95	Not Full	Yes	-1.113	9.963
1523521	2,100.35	0	0	0	2,089.00	Not Full	No	-0.493	11.346
1523531	2,098.00	0	0	0	2,088.48	Not Full	No	-0.493	9.517
1523662	2,037.69	0	0	0	2,023.73	Not Full	No	-1.75	13.96
1523699	2,048.45	0	0	0	2,037.83	Not Full	No	-1.319	10.619
1523729	2,103.13	0.11	0.11	0	2,094.44	Not Full	No	-0.517	8.69
1523828	2,095.00	0	0	0	2,085.33	Not Full	No	-0.493	9.667
1523897	2,044.89	0	0	0	2,037.22	Not Full	No	-1.364	7.674
1523943	2,084.59	0.006	0.006	0	2,080.17	Not Full	No	-1.124	4.424
1523987	2,035.27	0	0	0	2,021.95	Not Full	No	-1.75	13.32
1524003	2,094.40	0.003	0.003	0	2,078.41	Not Full	No	-1.123	15.993
1524062	2,094.67	0.006	0.006	0	2,076.56	Not Full	No	-1.105	18.115
1524123	2,091.86	0	0	0	2,075.08	Not Full	No	-1.189	16.779
1524166	2,091.00	0	0	0	2,081.76	Not Full	No	-0.504	9.237
1524168	2,047.83	0	0	0	2,037.85	Not Full	No	-1.133	9.983
1524235	2,044.89	0	0	0	2,034.46	Not Full	No	-1.373	10.433
1524277	2,035.16	0	0	0	2,027.23	Not Full	No	-1.627	7.927
1524318	2,031.67	0	0	0	2,020.34	Not Full	Yes	-1.536	11.326
1524591	2,028.57	0	0	0	2,019.45	Not Full	No	-1.53	9.12
1524867	2,028.42	0.003	0.003	0	2,018.64	Not Full	No	-1.528	9.778
1525140	2,027.61	0.003	0.003	0	2,017.83	Not Full	No	-1.534	9.784
1525428	2,026.00	0.007	0.007	0	2,016.87	Not Full	No	-1.533	9.133
1525701	2,073.88	0.005	0.005	0	2,062.69	Not Full	No	-0.621	11.194
1525755	2,025.46	0.01	0.01	0	2,016.71	Not Full	No	-1.565	8.755
1525807	2,072.97	0	0	0	2,061.60	Not Full	No	-0.491	11.375
1525926	2,070.64	0.002	0.002	0	2,060.15	Not Full	No	-0.637	10.49
1526016	2,023.55	0.011	0.011	0	2,014.98	Not Full	Yes	-1.499	8.569
1526031	2,070.45	0	0	0	2,059.05	Not Full	No	-0.517	11.4
1526179	2,066.84	0.002	0.002	0	2,054.69	Not Full	No	-0.638	12.152

1526248	2,022.43	0.007	0.007	0	2,014.37	Not Full	No	-1.501	8.061
1526286	2,064.99	0	0	0	2,053.62	Not Full	No	-0.491	11.374
1526407	2,064.80	0.003	0.003	0	2,053.28	Not Full	No	-0.634	11.517
1526478	2,062.72	0.001	0.001	0	2,052.63	Not Full	No	-0.653	10.087
1526479	2,021.14	0.004	0.004	0	2,013.63	Not Full	No	-1.557	7.507
1526513	2,062.28	0	0	0	2,050.87	Not Full	No	-0.523	11.406
1526515	2,020.69	0.005	0.005	0	2,013.31	Not Full	Yes	-1.753	7.383
1526599	2,061.54	0	0	0	2,048.39	Not Full	Yes	-0.446	13.149
1526628	2,058.44	0.001	0.001	0	2,048.36	Not Full	No	-0.652	10.085
1526667	2,055.21	0	0	0	2,045.13	Not Full	No	-0.652	10.085
1526740	2,058.91	0.001	0.001	0	2,047.58	Not Full	No	-0.452	11.335
1526741	2,019.86	0.01	0.01	0	2,012.64	Not Full	No	-1.749	7.219
1526775	2,050.21	0	0	0	2,040.12	Not Full	No	-0.654	10.088
1526992	2,057.47	0.001	0.001	0	2,046.56	Not Full	No	-0.48	10.913
1527015	2,027.68	0.004	0.004	0	2,011.83	Not Full	No	-1.746	15.846
1527149	2,029.40	0.001	0.001	0	2,019.73	Not Full	Yes	-0.627	9.67
1527159	2,053.87	0	0	0	2,043.86	Not Full	No	-0.511	10.014
1527235	2,025.45	0.01	0.01	0	2,011.25	Not Full	No	-1.741	14.201
1527417	2,024.58	0.002	0.002	0	2,018.15	Not Full	No	-0.62	6.433
1527548	2,023.20	0.002	0.002	0	2,010.40	Not Full	No	-1.731	12.801
153	1,914.15	0	0	0	1,904.42	Not Full	No	-0.667	9.73
154	1,913.45	0.001	0.001	0	1,904.25	Not Full	No	-0.64	9.203
155	1,912.16	0.006	0.006	0	1,903.20	Not Full	No	-0.608	8.961
156	1,911.05	0.005	0.005	0	1,901.78	Not Full	No	-0.591	9.274
157	1,910.66	0.005	0.005	0	1,900.96	Not Full	No	-0.543	9.697
158	1,908.49	0.001	0.001	0	1,898.83	Not Full	No	-0.58	9.663
159	1,908.58	0.002	0.002	0	1,899.70	Not Full	No	-0.582	8.876
16	1,892.29	0.002	0.002	0	1,884.14	Not Full	No	-1.758	8.148
160	1,908.32	0.002	0.002	0	1,900.71	Not Full	No	-0.586	7.609
161	1,909.06	0.001	0.001	0	1,901.73	Not Full	Yes	-0.591	7.334
162	1,909.54	0.002	0.002	0	1,903.58	Not Full	No	-0.636	5.96
163	1,909.70	0.002	0.002	0	1,906.24	Not Full	No	-0.644	3.457
164	1,909.05	0.002	0.002	0	1,905.04	Not Full	No	-0.465	4.015
165	1,909.33	0.003	0.003	0	1,904.68	Not Full	No	-0.447	4.647
166	1,908.88	0.006	0.006	0	1,903.36	Not Full	No	-0.427	5.517
167	1,914.21	0	0	0	1,908.64	Not Full	No	-0.525	5.569
168	1,920.99	0.002	0.002	0	1,909.78	Not Full	No	-0.526	11.209
169	1,929.01	0.001	0.001	0	1,912.00	Not Full	No	-0.529	17.012
17	1,892.38	0.001	0.001	0	1,884.58	Not Full	No	-1.757	7.797
18	1,892.44	0.003	0.003	0	1,884.65	Not Full	No	-1.813	7.793
189	1,916.48	0.003	0.003	0	1,896.00	Not Full	No	-1.077	20.483
19	1,892.54	0.006	0.006	0	1,885.24	Not Full	No	-1.759	7.299
190	1,918.81	0.006	0.006	0	1,908.83	Not Full	No	9.807	9.976
191	1,925.21	0.001	0.001	0	1,913.28	Not Full	No	-0.602	11.935
192	1,923.99	0.001	0.001	0	1,913.97	Not Full	No	-0.605	10.018
193	1,925.36	0.001	0.001	0	1,915.05	Not Full	No	-0.61	10.314
194	1,926.57	0.001	0.001	0	1,916.69	Not Full	No	-0.613	9.876
195	1,921.96	0.001	0.001	0	1,917.58	Not Full	No	-0.614	4.377
196	1,927.21	0.006	0.006	0	1,918.60	Not Full	No	-0.617	8.611
197	2,017.92	0.001	0.001	0	2,007.84	Not Full	No	-0.649	10.082
198	2,013.55	0.015	0.015	0	2,003.56	Not Full	No	-0.558	9.991
199	2,013.55	0.001	0.001	0	2,003.39	Not Full	No	-0.604	10.157
20	1,894.37	0.004	0.004	0	1,885.85	Not Full	No	-1.759	8.519
200	2,021.07	0.001	0.001	0	2,010.99	Not Full	No	-0.649	10.082
201	2,010.42	0.008	0.008	0	2,000.42	Not Full	Yes	-0.571	10.005
202	2,007.05	0.009	0.009	0	1,998.09	Not Full	No	-0.525	8.958
203	2,007.68	0	0	0	1,997.67	Not Full	No	-0.574	10.007
204	2,005.71	0.001	0.001	0	1,995.67	Not Full	No	-0.61	10.043
205	1,964.19	0.001	0.001	0	1,954.21	Not Full	Yes	-0.551	9.985
206	1,963.55	0	0	0	1,953.50	Not Full	No	-0.619	10.052
207	1,927.04	0.002	0.002	0	1,914.87	Not Full	Yes	-0.548	12.171
208	1,930.75	0.002	0.002	0	1,913.11	Not Full	No	-0.545	17.639
209	2,011.89	0.001	0.001	0	2,005.90	Not Full	No	-0.988	5.988
21	1,894.91	0.002	0.002	0	1,886.29	Not Full	No	-1.754	8.624
210	2,021.20	0	0	0	2,013.13	Not Full	No	-1.066	8.066
211	2,005.78	0	0	0	2,000.80	Not Full	No	-0.983	4.983
212	2,006.33	0	0	0	2,000.35	Not Full	No	-0.982	5.982
213	2,001.92	0	0	0	1,996.95	Not Full	No	-0.975	4.975

214	2,001.16	0	0	0	1,995.27	Not Full	No	-0.989	5.889
215	1,967.05	0	0	0	1,961.17	Not Full	No	-0.984	5.884
216	1,891.03	0.019	0.019	0	1,884.36	Not Full	No	-0.866	6.674
217	1,892.51	0.021	0.021	0	1,885.05	Not Full	No	-0.875	7.463
218	1,894.39	0.023	0.023	0	1,885.74	Not Full	No	-0.886	8.655
219	1,896.88	0.025	0.025	0	1,886.42	Not Full	No	-0.897	10.458
22	1,895.33	0.002	0.002	0	1,886.75	Not Full	Yes	-1.754	8.584
220	1,897.72	0.025	0.025	0	1,887.11	Not Full	No	-0.91	10.609
221	1,898.40	0.027	0.027	0	1,887.80	Not Full	No	-0.924	10.603
222	1,899.55	0.03	0.03	0	1,888.48	Not Full	No	-0.938	11.067
223	1,901.17	0.031	0.031	0	1,889.17	Not Full	No	-0.955	12.004
224	1,905.70	0.02	0.02	0	1,889.85	Not Full	No	-0.973	15.853
225	1,905.23	0.006	0.006	0	1,890.53	Not Full	No	-0.985	14.696
226	1,907.23	0.047	0.047	0	1,890.71	Not Full	No	-1.19	16.519
227	1,906.23	0.014	0.014	0	1,891.20	Not Full	No	-1.019	15.029
228	1,906.23	0.037	0.037	0	1,891.89	Not Full	No	-1.029	14.34
229	1,907.64	0.039	0.039	0	1,892.57	Not Full	No	-1.055	15.075
23	1,897.42	0	0	0	1,887.38	Not Full	No	-1.758	10.038
230	1,910.25	0.039	0.039	0	1,893.23	Not Full	No	-1.086	17.016
231	1,911.28	0.024	0.024	0	1,893.90	Not Full	No	-1.122	17.383
233	1,912.36	0.01	0.01	0	1,894.61	Not Full	No	-1.149	17.752
234	1,916.07	0.003	0.003	0	1,895.30	Not Full	No	-1.071	20.766
235	1,919.69	0	0	0	1,908.19	Not Full	No	-1.231	11.501
236	1,940.00	0	0	0	1,923.23	Not Full	No	-1.747	16.767
237	1,960.70	0	0	0	1,951.07	Not Full	No	-1.859	9.629
238	1,990.74	0	0	0	1,983.99	Not Full	No	-1.854	6.754
24	1,898.86	0	0	0	1,887.96	Not Full	No	-1.739	10.899
240	2,012.28	0	0	0	2,003.87	Not Full	No	-1.8	8.41
241	2,018.16	0	0	0	2,009.12	Not Full	No	-1.819	9.039
242	1,943.52	0.001	0.001	0	1,933.45	Not Full	No	-0.634	10.067
243	1,947.00	0	0	0	1,936.93	Not Full	No	-0.639	10.073
244	1,955.61	0.001	0.001	0	1,945.54	Not Full	No	-0.641	10.074
245	1,965.04	0.001	0.001	0	1,954.96	Not Full	No	-0.644	10.077
246	1,991.81	0.001	0.001	0	1,981.72	Not Full	No	-0.654	10.087
247	2,005.62	0.001	0.001	0	1,995.53	Not Full	No	-0.653	10.087
248	1,903.32	0.002	0.002	0	1,891.70	Not Full	No	-0.63	11.623
249	1,901.62	0.001	0.001	0	1,892.50	Not Full	No	-0.644	9.118
25	1,899.46	0	0	0	1,888.53	Not Full	No	-1.762	10.932
250	1,905.82	0.001	0.001	0	1,898.15	Not Full	No	-0.619	7.672
251	1,908.96	0.008	0.008	0	1,901.05	Not Full	No	-0.622	7.915
253	1,893.59	0.002	0.002	0	1,891.33	Not Full	No	-0.639	2.263
255	2,020.56	0	0	0	2,011.59	Not Full	No	-0.851	8.971
257	2,020.19	0	0	0	2,014.71	Not Full	Yes	-0.806	5.476
26	1,901.32	0.001	0.001	0	1,895.87	Not Full	No	-0.614	5.447
261	2,002.86	0	0	0	1,995.15	Not Full	No	-1.839	7.709
265	2,019.48	0.001	0.001	0	2,016.45	Not Full	No	-0.616	3.03
267	2,034.06	0.001	0.001	0	2,023.99	Not Full	No	-0.64	10.074
27	1,899.93	0.001	0.001	0	1,892.90	Not Full	No	-0.615	7.029
273	1,885.96	0.071	0.071	0	1,880.51	Not Full	No	-1.817	5.447
275	1,885.70	0.274	0.274	0	1,880.34	Not Full	No	-1.763	5.363
279	1,919.94	0.001	0.001	0	1,908.44	Not Full	No	-1.233	11.503
28	1,896.43	0.001	0.001	0	1,889.41	Not Full	Yes	-0.603	7.017
281	1,918.84	0.001	0.001	0	1,907.34	Not Full	No	-1.226	11.496
283	1,932.60	0	0	0	1,923.49	Not Full	No	-1.306	9.106
285	1,935.50	0	0	0	1,930.90	Not Full	No	-0.861	4.601
287	1,940.50	0	0	0	1,935.88	Not Full	No	-0.836	4.616
289	1,948.50	0	0	0	1,944.04	Not Full	No	-0.836	4.456
29	1,894.68	0	0	0	1,887.65	Not Full	No	-0.614	7.028
291	1,960.00	0	0	0	1,955.66	Not Full	No	-0.845	4.345
293	1,965.00	0.001	0.001	0	1,960.35	Not Full	No	-0.823	4.653
295	1,973.25	0.001	0.001	0	1,968.41	Not Full	No	-0.84	4.84
297	1,981.50	0.001	0.001	0	1,977.02	Not Full	No	-0.832	4.482
299	1,987.00	0	0	0	1,982.53	Not Full	No	-0.871	4.471
30	1,897.05	0	0	0	1,888.54	Not Full	No	-0.625	8.509
301	1,992.00	0	0	0	1,984.69	Not Full	No	-0.81	7.31
303	2,004.00	0	0	0	1,999.31	Not Full	No	-0.857	4.687
305	2,015.25	0	0	0	2,010.38	Not Full	No	-0.845	4.875
307	2,024.00	0	0	0	2,019.49	Not Full	No	-0.835	4.515

309	2,030.50	0	0	0	2,025.17	Not Full	No	-0.83	5.33
31	1,900.38	0.001	0.001	0	1,890.15	Not Full	No	-0.631	10.234
311	2,039.20	0	0	0	2,034.75	Not Full	No	-0.852	4.452
313	2,049.50	0	0	0	2,044.86	Not Full	No	-0.839	4.639
315	2,055.30	0	0	0	2,050.58	Not Full	No	-0.825	4.725
317	2,059.00	0	0	0	2,053.01	Not Full	No	-0.81	5.99
319	2,068.60	0	0	0	2,063.81	Not Full	No	-0.889	4.789
32	1,901.26	0.002	0.002	0	1,891.63	Not Full	No	-0.636	9.629
321	2,073.15	0	0	0	2,067.74	Not Full	No	-0.81	5.41
323	2,076.00	0.183	0.183	0	2,071.16	Not Full	No	-0.862	4.842
329	1,885.93	0.005	0.005	0	1,881.47	Not Full	No	-1.851	4.461
33	1,900.82	0	0	0	1,889.98	Not Full	No	-0.649	10.843
331	1,888.31	0.014	0.014	0	1,882.05	Not Full	No	-1.8	6.26
333	2,005.00	0.001	0.001	0	1,997.25	Not Full	No	-0.65	7.753
337	1,915.00	0.002	0.002	0	1,898.68	Not Full	No	-0.469	16.319
34	1,899.54	0	0	0	1,890.58	Not Full	No	-0.657	8.96
343	2,049.19	0.002	0.002	0	2,041.91	Not Full	No	-0.552	7.276
345	2,030.07	0.001	0.001	0	2,023.82	Not Full	No	-0.515	6.249
347	1,917.31	0.058	0.058	0	1,909.16	Not Full	No	-3.483	8.15
349	1,892.24	0.013	0.013	0	1,884.16	Not Full	No	-1.254	8.077
35	1,903.22	0	0	0	1,890.58	Not Full	No	-0.624	12.638
351	1,884.97	0.054	0.054	0	1,880.70	Not Full	No	-1.831	4.271
353	2,022.60	0.001	0.001	0	2,010.24	Not Full	No	-1.757	12.357
355	1,889.00	0.004	0.004	0	1,882.30	Not Full	No	-1.186	6.703
359	2,021.00	0	0	0	2,014.46	Not Full	No	-0.806	6.536
36	1,903.32	0.001	0.001	0	1,892.01	Not Full	No	-0.647	11.311
37	1,900.08	0	0	0	1,888.95	Not Full	No	-1.749	11.129
38	1,898.16	0.002	0.002	0	1,890.24	Not Full	No	-0.588	7.921
39	1,900.00	0.002	0.002	0	1,891.65	Not Full	No	-0.636	8.349
40	1,897.95	0.005	0.005	0	1,892.11	Not Full	No	-0.426	5.836
41	1,899.80	0.007	0.007	0	1,893.53	Not Full	No	-0.443	6.273
42	1,896.49	0.002	0.002	0	1,890.79	Not Full	No	-0.471	5.701
43	1,895.86	0.002	0.002	0	1,889.35	Not Full	No	-0.457	6.507
44	1,893.36	0.001	0.001	0	1,888.14	Not Full	No	-0.446	5.216
45	1,896.06	0.001	0.001	0	1,889.56	Not Full	No	-0.475	6.505
46	1,893.46	0.005	0.005	0	1,889.63	Not Full	No	-0.617	3.83
47	1,892.15	0.01	0.01	0	1,888.18	Not Full	No	-0.591	3.975
48	1,892.04	0.005	0.005	0	1,883.70	Not Full	No	-1.757	8.337
49	1,901.26	0	0	0	1,889.60	Not Full	No	-1.776	11.656
5	1,892.50	0.011	0.011	0	1,883.76	Not Full	No	-0.925	8.742
50	1,904.70	0.001	0.001	0	1,891.56	Not Full	No	-0.643	13.136
51	1,902.00	0.001	0.001	0	1,890.08	Not Full	No	-1.769	11.919
52	1,901.60	0.002	0.002	0	1,891.83	Not Full	No	-0.588	9.772
53	1,902.23	0.003	0.003	0	1,892.65	Not Full	No	-0.631	9.585
54	1,901.27	0.011	0.011	0	1,893.71	Not Full	No	-0.601	7.564
55	1,903.50	0.01	0.01	0	1,895.13	Not Full	No	-0.603	8.366
56	1,905.22	0.003	0.003	0	1,894.66	Not Full	No	-0.63	10.564
57	1,904.23	0.003	0.003	0	1,893.26	Not Full	No	-0.584	10.967
58	1,903.60	0	0	0	1,891.12	Not Full	No	-1.841	12.481
59	1,904.56	0	0	0	1,892.03	Not Full	Yes	-1.859	12.529
6	1,892.21	0.002	0.002	0	1,882.74	Not Full	No	-1.916	9.466
60	1,903.51	0.001	0.001	0	1,893.11	Not Full	No	-0.626	10.399
61	1,905.99	0.001	0.001	0	1,894.56	Not Full	No	-0.629	11.433
62	1,914.62	0.001	0.001	0	1,896.50	Not Full	No	-0.463	18.123
63	1,907.19	0	0	0	1,894.05	Not Full	No	-1.91	13.14
64	1,907.22	0.001	0.001	0	1,897.18	Not Full	No	-0.438	10.038
65	1,907.94	0	0	0	1,895.71	Not Full	No	-0.545	12.228
66	1,909.08	0	0	0	1,896.61	Not Full	No	-0.569	12.473
67	1,907.85	0	0	0	1,897.71	Not Full	No	-0.44	10.14
68	1,908.00	0	0	0	1,898.97	Not Full	No	-0.442	9.032
69	1,908.37	0	0	0	1,895.25	Not Full	No	-1.861	13.121
7	1,893.67	0.006	0.006	0	1,883.02	Not Full	No	-1.742	10.652
70	1,908.95	0.001	0.001	0	1,897.58	Not Full	No	-0.578	11.371
71	1,909.06	0.001	0.001	0	1,897.01	Not Full	No	-0.582	12.055
72	1,909.81	0.001	0.001	0	1,896.42	Not Full	No	-0.569	13.392
73	1,907.32	0.001	0.001	0	1,895.77	Not Full	No	-0.566	11.549
74	1,906.94	0.001	0.001	0	1,895.60	Not Full	No	-0.564	11.338
75	1,905.39	0.005	0.005	0	1,899.93	Not Full	No	-0.453	5.463

76	1,906.70	0.003	0.003	0	1,898.89	Not Full	No	-0.418	7.808
77	1,908.30	0.003	0.003	0	1,900.04	Not Full	No	-0.442	8.262
78	1,907.93	0.005	0.005	0	1,900.89	Not Full	No	-0.453	7.043
79	1,907.62	0.001	0.001	0	1,899.46	Not Full	No	-0.443	8.163
8	1,889.01	0.02	0.02	0	1,882.69	Not Full	No	-1.169	6.325
80	1,907.90	0.001	0.001	0	1,900.19	Not Full	No	-0.45	7.71
81	1,908.54	0.001	0.001	0	1,901.01	Not Full	No	-0.454	7.534
82	1,909.90	0.001	0.001	0	1,901.99	Not Full	No	-0.459	7.909
83	1,910.84	0.001	0.001	0	1,903.14	Not Full	No	-0.467	7.697
84	1,910.98	0.001	0.001	0	1,904.14	Not Full	No	-0.474	6.844
85	1,911.18	0	0	0	1,904.94	Not Full	No	-0.479	6.239
86	1,911.32	0	0	0	1,905.65	Not Full	No	-0.651	5.675
87	1,911.42	0	0	0	1,905.85	Not Full	Yes	-0.645	5.568
88	1,919.44	0.001	0.001	0	1,909.35	Not Full	No	-0.652	10.086
89	1,920.79	0	0	0	1,910.70	Not Full	No	-0.656	10.089
9	1,891.38	0.011	0.011	0	1,883.13	Not Full	No	-1.194	8.251
90	1,920.81	0	0	0	1,914.55	Not Full	No	-0.619	6.262
91	1,933.95	0	0	0	1,923.38	Not Full	No	-0.63	10.574
92	1,992.71	0	0	0	1,982.84	Not Full	No	-0.638	9.871
93	2,000.91	0	0	0	1,991.04	Not Full	No	-0.642	9.875
94	2,009.14	0	0	0	1,999.17	Not Full	No	-0.637	9.97
95	2,009.59	0.001	0.001	0	2,000.70	Not Full	No	-0.634	8.887
96	2,010.90	0.002	0.002	0	2,002.21	Not Full	No	-0.639	8.693
98	2,033.57	0.002	0.002	0	2,023.58	Not Full	No	-0.653	9.986
99	2,020.90	0	0	0	2,010.92	Not Full	No	-0.651	9.984



Full Build-out Forcemain

ID	From ID	To ID	Diameter (in)	Length (ft)	Total Flow (mgd)	Unpeakable Flow (mgd)	Peakable Flow (mgd)	Coverage Flow (mgd)	Infiltration Flow (mgd)	Storm Flow (mgd)	Velocity (ft/s)	Headloss (ft)
23	341	190	6	2,195.20	0.252	0.252	0	0	0	0	3.625	15.092

## Full Build-out Gravity Main

ID	From ID	To ID	Diameter (in)	Length (ft)	Slope	Total Flow (mgd)	Unpeakable Flow (mgd)	Peakable Flow (mgd)	Coverage Flow (mgd)	Infiltration Flow (mgd)	Storm Flow (mgd)	Flow Type	Velocity (ft/s)	d/D	q/Q	Water Depth (ft)	Critical Depth (ft)	Froude Number	Full Flow (mgd)	Coverage Count	Backwater Adjustment	Adjusted Depth (ft)	Adjusted Velocity (ft/s)
102	102	103	8	102.61	0.129	0.039		0.008	0	0	0	0 Free Surface	4.416	0.082	0.014	0.055	0.111	4.04	2.817	0	No	0.055	4.416
104	205	206	8	104.82	0.005	0.13		0.03	0	0	0	0 Free Surface	2.024	0.327	0.23	0.218	0.206	0.897	0.562	0	No	0.218	4.024
108	149	148	8	108.61	0.005	0.015		0.003	0	0	0	0 Free Surface	1.059	0.113	0.027	0.075	0.068	0.824	0.552	0	No	0.075	1.059
109	52	49	8	158.78	0.005	0.058		0.012	0	0	0	0 Free Surface	1.586	0.218	0.104	0.146	0.136	0.874	0.552	0	No	0.146	1.586
11	329	1	30	64.07	0.001	6.959	3.95	1.003	0	0	0	0 Free Surface	3.396	0.616	0.699	1.539	1.098	0.524	9.962	0	No	1.539	3.396
111	50	49	8	185.97	0.005	0.006		0.001	0	0	0	0 Free Surface	0.799	0.072	0.01	0.048	0.042	0.781	0.554	0	No	0.048	0.799
114	98	99	8	114.12	0.11	0.047		0.01	0	0	0	0 Free Surface	4.43	0.094	0.018	0.062	0.123	3.79	2.599	0	No	0.062	4.43
118	192	191	8	118.92	0.005	0.031		0.006	0	0	0	0 Free Surface	1.332	0.161	0.056	0.108	0.1	0.861	0.556	0	No	0.108	1.332
119	61	60	8	270.35	0.005	0.111		0.019	0	0	0	0 Free Surface	1.917	0.304	0.201	0.203	0.19	0.884	0.553	0	No	0.203	1.917
120	118	117	6	120.23	0.008	0.142		0.034	0	0	0	0 Free Surface	2.426	0.47	0.449	0.235	0.235	1.003	0.316	0	No	0.235	2.426
121	60	58	8	199.85	0.005	0.113		0.026	0	0	0	0 Free Surface	1.926	0.306	0.203	0.204	0.191	0.884	0.554	0	No	0.204	1.926
124	106	107	8	124.02	0.008	0.006		0.001	0	0	0	0 Free Surface	0.943	0.065	0.008	0.044	0.043	0.968	0.696	0	No	0.044	0.943
125	57	58	8	199.85	0.004	0.053		0.011	0	0	0	0 Free Surface	1.424	0.221	0.107	0.147	0.13	0.779	0.492	0	No	0.147	1.424
127	56	57	8	268.97	0.005	0.01		0.002	0	0	0	0 Free Surface	0.929	0.092	0.017	0.061	0.055	0.804	0.553	0	No	0.061	0.929
128	162	161	8	128.55	0.014	0.014		0.003	0	0	0	0 Free Surface	1.494	0.086	0.015	0.057	0.066	1.336	0.927	0	No	0.057	1.494
131	59	58	27	270.83	0.003	5.855	3.692	0.695	0	0	0	0 Free Surface	4.439	0.51	0.518	1.148	1.036	0.821	11.31	0	No	1.148	4.439
132	103	92	8	132.31	0.07	0.045		0.009	0	0	0	0 Free Surface	3.719	0.102	0.022	0.068	0.119	3.05	2.071	0	Yes	0.093	2.354
135	74	63	8	155.38	0.003	0.051		0.011	0	0	0	0 Free Surface	1.285	0.233	0.119	0.156	0.128	0.684	0.431	0	No	0.156	1.285
137	73	74	8	23.82	0.003	0.049		0.01	0	0	0	0 Free Surface	1.254	0.229	0.115	0.153	0.125	0.673	0.425	0	No	0.153	1.254
139	65	63	8	199.93	0.002	0.144		0.034	0	0	0	0 Free Surface	1.543	0.433	0.389	0.288	0.218	0.581	0.372	0	No	0.288	1.543
141	64	65	6	213.98	0.004	0.047		0.01	0	0	0	0 Free Surface	1.487	0.299	0.195	0.15	0.133	0.798	0.244	0	No	0.15	1.487
142	80	79	6	142.12	0.005	0.024		0.005	0	0	0	0 Free Surface	1.22	0.211	0.097	0.105	0.094	0.791	0.244	0	No	0.105	1.22
144	202	203	8	144.51	0.002	0.121		0.028	0	0	0	0 Free Surface	1.377	0.414	0.359	0.276	0.199	0.532	0.338	0	No	0.276	1.377
147	66	65	8	303.17	0.003	0.105		0.024	0	0	0	0 Free Surface	1.512	0.346	0.257	0.231	0.184	0.648	0.407	0	No	0.231	1.512
150	53	52	8	150.81	0.005	0.009		0.001	0	0	0	0 Free Surface	0.902	0.087	0.015	0.058	0.052	0.803	0.556	0	No	0.058	0.902
151	71	69	8	161.14	0.005	0.044		0.01	0	0	0	0 Free Surface	1.474	0.191	0.08	0.128	0.119	0.871	0.555	0	No	0.128	1.474
154	117	116	6	154.18	0.008	0.143		0.034	0	0	0	0 Free Surface	2.454	0.467	0.445	0.234	0.236	1.018	0.321	0	No	0.234	2.454
155	72	73	8	183.6	0.003	0.047		0.01	0	0	0	0 Free Surface	1.247	0.223	0.109	0.149	0.122	0.679	0.429	0	No	0.149	1.247
156	153	152	8	156	0.005	0		0	0	0	0	0 Free Surface	0	0	0	0	0	0	0.554	0	No	0	0
160	148	143	8	160.35	0.005	0.055		0.012	0	0	0	0 Free Surface	1.566	0.213	0.1	0.142	0.133	0.874	0.553	0	No	0.142	1.566
161	78	77	6	151.46	0.005	0.012		0.002	0	0	0	0 Free Surface	1.033	0.146	0.046	0.073	0.066	0.811	0.258	0	No	0.073	1.033
162	71	72	8	162.23	0.003	0.04		0.009	0	0	0	0 Free Surface	1.195	0.206	0.093	0.138	0.113	0.679	0.43	0	No	0.138	1.195
163	76	71	6	359.63	0.005	0.035		0.007	0	0	0	0 Free Surface	1.414	0.249	0.136	0.125	0.114	0.838	0.257	0	No	0.125	1.414
164	152	151	8	164.56	0.005	0.005		0.001	0	0	0	0 Free Surface	0.744	0.065	0.008	0.043	0.038	0.768	0.553	0	No	0.043	0.744
166	160	159	8	166.94	0.005	0.045		0.009	0	0	0	0 Free Surface	1.521	0.188	0.078	0.126	0.119	0.906	0.578	0	No	0.126	1.521
167	158	70	8	208.68	0.006	0.052		0.011	0	0	0	0 Free Surface	1.591	0.201	0.089	0.134	0.128	0.915	0.581	0	No	0.134	1.591
171	159	158	8	141.38	0.006	0.049		0.01	0	0	0	0 Free Surface	1.564	0.195	0.084	0.13	0.124	0.914	0.582	0	No	0.13	1.564
175	161	160	8	167.27	0.006	0.039		0.008	0	0	0	0 Free Surface	1.464	0.175	0.067	0.117	0.111	0.905	0.581	0	No	0.117	1.464
178	195	194	8	178.45	0.005	0.023		0.005	0	0	0	0 Free Surface	1.213	0.14	0.042	0.093	0.086	0.844	0.553	0	Yes	0.094	1.205
180	122	121	8	180.4	0.006	0.007		0.001	0	0	0	0 Free Surface	0.891	0.073	0.011	0.049	0.045	0.864	0.611	0	Yes	0.086	0.391
187	81	80	6	158.81	0.005	0.017		0.003	0	0	0	0 Free Surface	1.107	0.178	0.069	0.089	0.079	0.784	0.245	0	No	0.089	1.107
189	82	81	6	199.09	0.004	0.012		0.002	0	0	0	0 Free Surface	1.005	0.154	0.051	0.077	0.067	0.769	0.243	0	No	0.077	1.005
190	132	131	8	190.34	0.005	0.142		0.034	0	0	0	0 Free Surface	2.028	0.348	0.26	0.232	0.215	0.867	0.544	0	No	0.232	2.028
1914	248	35	8	203.54	0.005	0.022		0.004	0	0	0	0 Free Surface	1.195	0.136	0.04	0.091	0.083	0.844	0.554	0	No	0.091	1.195
192	75	76	6	192.59	0.005	0.013		0.002	0	0	0	0 Free Surface	1.069	0.154	0.051	0.077	0.07	0.816	0.258	0	No	0.077	1.069
193	84	83	6	199.25	0.005	0.005		0.001	0	0	0	0 Free Surface	0.759	0.097	0.02	0.049	0.042	0.735	0.244	0	No	0.049	0.759
195	85	84	6	158.46	0.004	0.003		0	0	0	0	0 Free Surface	0.64	0.075	0.011	0.037	0.031	0.708	0.243	0	No	0.037	0.64
1953	236	147	24	230.5	0.006	3.838	2.267	0.487	0	0	0	0 Free Surface	5.045	0.401	0.338	0.802	0.861	1.148	11.344	0	No	0.802	5.045
196	214	215	12	196.69	0.174	0.076		0.017	0	0	0	0 Free Surface	5.672	0.063	0.008	0.063	0.14	4.838	9.629	0	Yes	0.121	2.176
197	86	85	6	135.25	0.005	0.001		0	0	0	0	0 Free Surface	0.495	0.05	0.005	0.025	0.021	0.671	0.244	0	No	0.025	0.495
1993	242	138	8	444.1	0.015	0.019		0.004	0	0	0	0 Free Surface	1.684	0.099	0.02	0.066	0.078	1.402	0.955	0	Yes	0.127	0.649
20	87	86	8	20.37	0.005	0.004		0.001	0	0	0	0 Free Surface	0.689	0.058	0.007	0.039	0.034	0.751	0.549	0	No	0.039	0.689
201	100	102	8	81.74	0.188	0.038		0.008	0	0	0	0 Free Surface	5.002	0.075	0.011	0.05	0.11	4.803	3.391	0	No	0.05	5.002
202	30	23	8	202.31	0.005	0.077		0.017	0	0	0	0 Free Surface	1.726	0.252	0.139	0.168	0.157	0.881	0.553	0	Yes	0.534	0.398
2020	1526479	1526515	21	40.76	0.007	3.346	2.267	0.321	0	0	0	0 Free Surface	5.146	0.436	0.393	0.762	0.835	1.191	8.511	0	Yes	0.825	4.646
2021	1526248	1526479	21	251.24	0.002	3.341	2.267	0.319	0	0	0	0 Free Surface	3.409	0.603	0.677	1.056	0.835	0.639	4.934	0	No	1.056	3.409
2023	359	210	12	104	0.005	0.565		0.157	0	0	0	0 Free Surface	2.923	0.406	0.346	0.406	0.392	0.933	1.633	0	No	0.406	2.923
2024	267	1527149	8	287.17	0.015	0.131		0.031	0	0	0	0 Free Surface	2.945	0.252	0.139	0.168	0.207	1.503	0.944	0	No	0.168	2.945
203	35	25	8	203.93	0.005	0.026		0.005	0	0	0	0 Free Surface	1.255	0.147	0.047	0.098	0.09	0.85	0.554	0	No	0.098	1.255
2035	1523662	1523987	21	336.04	0.005	0.07																	

2115	1521741	1521987	15	122	0.005	0.398	0.303	0.021	0	0	0	Free Surface	2.601	0.248	0.134	0.31	0.306	0.979	2.96	0	No	0.31	2.601
2116	1520835	1521170	15	249	0.028	0.365	0.303	0.013	0	0	0	Free Surface	4.629	0.156	0.053	0.195	0.293	2.225	6.943	0	Yes	0.212	4.105
2117	1520554	1520596	18	73.36	0.015	1.565	0.943	0.174	0	0	0	Free Surface	5.634	0.292	0.186	0.438	0.589	1.769	8.411	0	No	0.438	5.634
2120	1521493	1521741	15	94	0.038	0.39	0.303	0.019	0	0	0	Free Surface	5.266	0.149	0.048	0.186	0.303	2.589	8.112	0	Yes	0.198	4.826
2121	1520785	1520752	15	304	0.003	0.325	0.303	0.004	0	0	0	Free Surface	1.917	0.266	0.155	0.333	0.276	0.693	2.093	0	No	0.333	1.917
2122	1520720	1520835	15	144.77	0.003	0.34	0.303	0.008	0	0	0	Free Surface	1.958	0.271	0.161	0.339	0.283	0.701	2.116	0	No	0.339	1.958
2123	1519963	1520233	18	303.55	0.007	1.538	0.943	0.166	0	0	0	Free Surface	4.302	0.351	0.264	0.526	0.584	1.22	5.821	0	No	0.526	4.302
2124	1520752	1520720	15	299.55	0.002	0.33	0.303	0.005	0	0	0	Free Surface	1.85	0.276	0.166	0.345	0.278	0.656	1.98	0	No	0.345	1.85
2125	1519678	1519963	18	302.11	0.009	1.202	0.607	0.166	0	0	0	Free Surface	4.378	0.29	0.183	0.435	0.514	1.381	6.565	0	No	0.435	4.378
2128	1519372	1519678	18	311	0.009	1.185	0.607	0.161	0	0	0	Free Surface	4.353	0.288	0.181	0.432	0.51	1.377	6.551	0	No	0.432	4.353
213	77	76	6	213.02	0.005	0.019	0	0.004	0	0	0	Free Surface	1.19	0.185	0.074	0.092	0.084	0.828	0.258	0	No	0.092	1.19
2132	1518982	1519372	18	395.76	0.01	1.159	0.607	0.152	0	0	0	Free Surface	4.474	0.278	0.169	0.417	0.504	1.444	6.869	0	No	0.417	4.474
2134	1518939	1518982	18	104.06	0.009	1.11	0.607	0.137	0	0	0	Free Surface	4.152	0.284	0.176	0.426	0.493	1.323	6.295	0	No	0.426	4.152
2136	1518620	1518939	18	318.34	0.002	1.103	0.607	0.135	0	0	0	Free Surface	2.442	0.417	0.364	0.626	0.491	0.626	3.028	0	No	0.626	2.442
2138	1518351	1518620	18	275.78	0.007	0.607	0.607	0	0	0	0	Free Surface	3.278	0.219	0.105	0.329	0.361	1.202	5.768	0	Yes	0.427	2.263
215	93	92	8	104	0.079	0.105	0	0.024	0	0	0	Free Surface	5.005	0.148	0.048	0.099	0.384	3.377	2.199	0	Yes	0.108	4.938
217	241	240	24	217.09	0.024	3.835	2.267	0.486	0	0	0	Free Surface	8.357	0.277	0.168	0.554	0.861	2.338	22.842	0	Yes	0.586	7.731
218	21	20	27	218.05	0.002	6.161	3.692	0.805	0	0	0	Free Surface	3.367	0.67	0.789	1.507	1.064	0.513	7.808	0	No	1.507	3.367
219	243	242	8	155.28	0.022	0.016	0	0.003	0	0	0	Free Surface	1.821	0.083	0.014	0.055	0.071	1.659	1.155	0	No	0.055	1.821
221	206	207	8	181.83	0.212	0.13	0	0.031	0	0	0	Free Surface	7.559	0.13	0.036	0.087	0.206	5.465	3.608	0	Yes	0.105	5.716
224	43	44	6	224.22	0.005	0.006	0	0.001	0	0	0	Free Surface	0.828	0.103	0.022	0.052	0.045	0.778	0.257	0	Yes	0.127	0.225
225	91	90	8	149.22	0.059	0.188	0	0.046	0	0	0	Free Surface	5.379	0.212	0.099	0.141	0.249	3.011	1.906	0	Yes	0.158	4.581
227	129	128	8	227.46	0.015	0.18	0	0.044	0	0	0	Free Surface	3.276	0.292	0.186	0.195	0.244	1.542	0.966	0	No	0.195	3.276
229	110	90	8	364.7	0.005	0.007	0	0.001	0	0	0	Free Surface	0.829	0.077	0.012	0.051	0.045	0.786	0.553	0	Yes	0.113	0.259
231	89	88	8	273.33	0.005	0.001	0	0	0	0	0	Free Surface	0.434	0.03	0.002	0.02	0.016	0.658	0.53	0	No	0.02	0.434
233	88	87	8	217.66	0.016	0.003	0	0	0	0	0	Free Surface	0.974	0.041	0.003	0.027	0.031	1.273	0.98	0	No	0.027	0.974
235	83	82	6	235.53	0.005	0.007	0	0.001	0	0	0	Free Surface	0.864	0.12	0.031	0.06	0.052	0.752	0.244	0	No	0.06	0.864
237	90	121	8	340.05	0.026	0.192	0	0.047	0	0	0	Free Surface	4.07	0.263	0.151	0.175	0.253	2.031	1.274	0	No	0.175	4.07
239	22	21	27	239.67	0.002	6.158	3.692	0.804	0	0	0	Free Surface	3.357	0.671	0.792	1.511	1.064	0.51	7.779	0	No	1.511	3.357
241	121	120	6	57.1	0.008	0.136	0	0.033	0	0	0	Free Surface	2.493	0.445	0.408	0.222	0.23	1.066	0.333	0	No	0.222	2.493
242	199	201	8	242.84	0.012	0.066	0	0.014	0	0	0	Free Surface	2.253	0.188	0.077	0.125	0.146	1.343	0.857	0	No	0.125	2.253
243	120	119	6	119.04	0.008	0.141	0	0.033	0	0	0	Free Surface	2.42	0.468	0.446	0.234	0.234	1.003	0.316	0	No	0.234	2.42
245	124	123	8	199.84	0.012	0.004	0	0.001	0	0	0	Free Surface	0.931	0.046	0.004	0.031	0.033	1.137	0.858	0	No	0.031	0.931
246	27	28	8	246.57	0.014	0.086	0	0.019	0	0	0	Free Surface	2.557	0.207	0.094	0.138	0.167	1.45	0.92	0	No	0.138	2.557
247	146	145	27	268.09	0.042	5.465	3.692	0.557	0	0	0	Free Surface	11.148	0.246	0.132	0.553	1	3.14	41.296	0	Yes	0.649	8.895
249	168	167	8	208.29	0.005	0.173	0	0.042	0	0	0	Free Surface	2.167	0.384	0.312	0.256	0.239	0.876	0.553	0	No	0.256	2.167
25	11	10	16	11.42	0	0.057	0	0.012	0	0	0	Free Surface	0.161	0.418	0.365	0.557	0.113	0.044	0.137	0	No	0.557	0.161
251	156	157	8	251.59	0.003	0.028	0	0.006	0	0	0	Free Surface	1.076	0.173	0.065	0.115	0.094	0.67	0.43	0	No	0.115	1.076
253	167	145	8	160.44	0.005	0.173	0	0.042	0	0	0	Free Surface	2.168	0.385	0.314	0.256	0.239	0.875	0.553	0	No	0.256	2.168
255	153	154	8	33.27	0.003	0	0	0	0	0	0	Free Surface	0	0	0	0	0	0	0.429	0	No	0	0
257	68	67	6	257.7	0.005	0.043	0	0.009	0	0	0	Free Surface	1.452	0.285	0.178	0.143	0.127	0.8	0.244	0	No	0.143	1.452
259	138	127	8	259.78	0.004	0.198	0	0.049	0	0	0	Free Surface	2.124	0.432	0.387	0.288	0.256	0.801	0.512	0	No	0.288	2.124
261	121	144	8	180.13	0.011	0.061	0	0.015	0	0	0	Free Surface	2.136	0.183	0.073	0.122	0.139	1.291	0.825	0	No	0.122	2.136
263	116	115	8	303.48	0.003	0.096	0	0.023	0	0	0	Free Surface	1.474	0.33	0.235	0.22	0.176	0.649	0.407	0	No	0.22	1.474
264	28	29	8	264.04	0.006	0.087	0	0.02	0	0	0	Free Surface	1.938	0.254	0.141	0.169	0.168	0.986	0.619	0	No	0.169	1.938
267	94	93	8	267.67	0.03	0.104	0	0.024	0	0	0	Free Surface	3.568	0.186	0.076	0.124	0.183	2.137	1.365	0	No	0.124	3.568
268	51	49	27	268.31	0.001	5.961	3.692	0.733	0	0	0	Free Surface	3.292	0.664	0.779	1.493	1.046	0.505	7.652	0	No	1.493	3.292
269	45	44.00	6	269.21	0.005	0.007	0	0.001	0	0	0	Free Surface	0.871	0.112	0.026	0.056	0.05	0.785	0.257	0	Yes	0.129	0.261
27	1524166	1525807	8	1,739.88	0.012	0.28	0	0.072	0	0	0	Free Surface	3.352	0.397	0.333	0.265	0.307	1.328	0.841	0	No	0.265	3.352
270	42	43	6	270.1	0.005	0.003	0	0	0	0	0	Free Surface	0.694	0.078	0.012	0.039	0.034	0.752	0.257	0	No	0.039	0.694
272	261	238	24	272.96	0.04	3.836	2.267	0.487	0	0	0	Free Surface	10.001	0.244	0.131	0.488	0.861	2.999	29.39	0	No	0.488	10.001
273	19	18	27	273.14	0.002	6.176	3.692	0.811	0	0	0	Free Surface	3.455	0.656	0.767	1.477	1.065	0.535	8.055	0	No	1.477	3.455
275	46	47	8	275.45	0.005	0.02	0	0.004	0	0	0	Free Surface	1.165	0.131	0.036	0.087	0.08	0.84	0.554	0	No	0.087	1.165
277	115	114	8	164.24	0.003	0.101	0	0.023	0	0	0	Free Surface	1.491	0.34	0.249	0.227	0.181	0.646	0.405	0	No	0.227	1.491
278	32	31	8	278.14	0.005	0.072	0	0.016	0	0	0	Free Surface	1.693	0.243	0.13	0.162	0.152	0.88	0.554	0	No	0.162	1.693
279	143	142	27	196.9	0.005	5.663	3.692	0.627	0	0	0	Free Surface	5.392	0.428	0.381	0.963	1.018	1.112	14.864	0	Yes	1.185	4.128
28	104	105	8	28.7	0.046	0.053	0	0.011	0	0	0	Free Surface	3.381	0.121	0.031	0.081	0.129	2.535	1.686	0	No	0.081	3.381
280	9	8	16	280.8	0.001	0.144	0	0.034	0	0	0	Free Surface	1.325	0.178	0.069	0.238	0.179	0.575	2.083	0	Yes	0.25	1.229
281	142	141	27	169.82	0.001	5.696	3.692	0.639	0	0	0	Free Surface	3.115	0.67	0.789	1.507	1.021	0.475	7.224	0	No	1.507	3.115
282																							

323	25	24	27	323.55	0.002	6.044	3.692	0.763	0	0	0	Free Surface	3.356	0.661	0.774	1.486	1.054	0.517	7.81	0	Yes	1.49	3.345
325	105	108	8	149.81	0.03	0.054	0	0.011	0	0	0	Free Surface	2.938	0.136	0.039	0.09	0.131	2.077	1.365	0	No	0.09	2.938
327	92	91	8	486.1	0.122	0.185	0	0.045	0	0	0	Free Surface	6.917	0.176	0.068	0.118	0.248	4.267	2.737	0	No	0.118	6.917
328	154	155	8	328.25	0.003	0.002	0	0	0	0	0	Free Surface	0.516	0.055	0.006	0.036	0.028	0.58	0.428	0	No	0.036	0.516
329	79	68	6	88.13	0.004	0.043	0	0.009	0	0	0	Free Surface	1.437	0.285	0.177	0.142	0.126	0.793	0.242	0	No	0.142	1.437
33	1527159	343	8	101.56	0.018	0.433	0	0.116	0	0	0	Free Surface	4.407	0.449	0.415	0.299	0.386	1.622	1.043	0	No	0.299	4.407
331	163	162	8	183.17	0.014	0.008	0	0.001	0	0	0	Free Surface	1.261	0.066	0.009	0.044	0.05	1.291	0.928	0	No	0.044	1.261
332	207	208	8	332.15	0.005	0.134	0	0.032	0	0	0	Free Surface	2.021	0.335	0.242	0.223	0.209	0.882	0.554	0	No	0.223	2.021
333	210	209	12	333.08	0.022	0.056	0	0.015	0	0	0	Free Surface	2.499	0.089	0.016	0.089	0.12	1.787	3.397	0	No	0.089	2.499
337	163	164	6	290.83	0.004	0	0	0	0	0	0	Free Surface	0	0	0	0	0	0	0.231	0	No	0	0
339	165	166	6	311.14	0.004	0.013	0	0.002	0	0	0	Free Surface	0.985	0.163	0.058	0.082	0.07	0.73	0.23	0	No	0.082	0.985
340	212	213	12	340.04	0.01	0.074	0	0.014	0	0	0	Free Surface	2.053	0.123	0.032	0.123	0.138	1.245	2.278	0	No	0.123	2.053
341	247	246	8	341.59	0.04	0.006	0	0.001	0	0	0	Free Surface	1.634	0.043	0.004	0.029	0.041	2.056	1.569	0	No	0.029	1.634
342	113	66	8	342.82	0.003	0.103	0	0.024	0	0	0	Free Surface	1.509	0.343	0.254	0.229	0.183	0.65	0.408	0	No	0.229	1.509
344	144	143	27	344.41	0.008	5.628	3.692	0.615	0	0	0	Free Surface	6.281	0.38	0.307	0.855	1.015	1.389	18.353	0	Yes	0.864	6.193
345	216	5	16	359.03	0.002	0.663	0.252	0.11	0	0	0	Free Surface	1.936	0.405	0.344	0.539	0.391	0.536	1.926	0	No	0.539	1.936
347	217	216	16	400.33	0.002	0.643	0.252	0.104	0	0	0	Free Surface	1.921	0.398	0.334	0.531	0.385	0.537	1.926	0	No	0.531	1.921
349	218	217	16	398.51	0.002	0.626	0.252	0.099	0	0	0	Free Surface	1.906	0.392	0.325	0.523	0.379	0.538	1.926	0	No	0.523	1.906
35	343	345	8	281.14	0.064	0.437	0	0.118	0	0	0	Free Surface	7.054	0.319	0.22	0.213	0.388	3.165	1.983	0	No	0.213	7.054
351	63	59	27	351.44	0.006	5.855	3.692	0.695	0	0	0	Free Surface	5.484	0.433	0.39	0.975	1.036	1.123	15.027	0	Yes	1.012	5.225
353	219	218	16	399.46	0.002	0.608	0.252	0.094	0	0	0	Free Surface	1.891	0.386	0.315	0.515	0.374	0.539	1.926	0	No	0.515	1.891
355	40	38	6	355.6	0.005	0.042	0	0.009	0	0	0	Free Surface	1.489	0.272	0.161	0.136	0.124	0.842	0.257	0	No	0.136	1.489
357	54	52	8	357.41	0.005	0.047	0	0.01	0	0	0	Free Surface	1.501	0.198	0.086	0.132	0.123	0.872	0.554	0	No	0.132	1.501
358	55	57	8	358.83	0.005	0.04	0	0.008	0	0	0	Free Surface	1.425	0.182	0.072	0.121	0.113	0.864	0.553	0	No	0.121	1.425
359	166	161	6	359.84	0.004	0.026	0	0.005	0	0	0	Free Surface	1.232	0.224	0.11	0.112	0.098	0.774	0.238	0	No	0.112	1.232
360	49	37	27	360.01	0.002	5.998	3.692	0.747	0	0	0	Free Surface	3.435	0.643	0.745	1.447	1.049	0.541	8.056	0	Yes	1.458	3.405
361	220	219	16	401.02	0.002	0.589	0.252	0.088	0	0	0	Free Surface	1.875	0.379	0.306	0.506	0.368	0.539	1.926	0	No	0.506	1.875
363	58	51	27	363.28	0.003	5.96	3.692	0.733	0	0	0	Free Surface	4.24	0.537	0.563	1.208	1.046	0.759	10.583	0	Yes	1.301	3.872
364	157	148	8	364.38	0.001	0.038	0	0.008	0	0	0	Free Surface	0.722	0.283	0.174	0.188	0.11	0.347	0.217	0	No	0.188	0.722
365	221	220	16	399.64	0.002	0.568	0.252	0.082	0	0	0	Free Surface	1.857	0.372	0.295	0.496	0.361	0.54	1.926	0	No	0.496	1.857
367	222	221	16	400.83	0.002	0.547	0.252	0.076	0	0	0	Free Surface	1.837	0.365	0.284	0.486	0.354	0.541	1.926	0	No	0.486	1.837
368	62	61	6	368.6	0.005	0.11	0	0.025	0	0	0	Free Surface	1.944	0.456	0.427	0.228	0.206	0.819	0.257	0	No	0.228	1.944
369	131	130	8	369.7	0.007	0.148	0	0.035	0	0	0	Free Surface	2.323	0.325	0.229	0.217	0.22	1.031	0.647	0	No	0.217	2.323
37	18	17	27	7.67	0.003	6.181	3.692	0.813	0	0	0	Free Surface	4.173	0.56	0.603	1.26	1.066	0.726	10.249	0	Yes	1.375	3.756
371	69	63	27	371.06	0.003	5.727	3.692	0.65	0	0	0	Free Surface	4.227	0.521	0.536	1.173	1.024	0.771	10.676	0	No	1.173	4.227
373	145	144	27	373.33	0.009	5.586	3.692	0.6	0	0	0	Free Surface	6.324	0.376	0.301	0.846	1.011	1.408	18.581	0	No	0.846	6.324
375	223	222	16	399.76	0.002	0.526	0.252	0.07	0	0	0	Free Surface	1.818	0.357	0.273	0.476	0.347	0.541	1.926	0	No	0.476	1.818
377	224	223	16	399.7	0.002	0.506	0.252	0.064	0	0	0	Free Surface	1.798	0.35	0.263	0.466	0.34	0.542	1.926	0	No	0.466	1.798
379	225	224	16	399.12	0.002	0.499	0.252	0.062	0	0	0	Free Surface	1.791	0.347	0.259	0.463	0.338	0.542	1.926	0	No	0.463	1.791
383	226	225	16	187.32	0.002	0.091	0	0.021	0	0	0	Free Surface	1.095	0.148	0.047	0.198	0.142	0.523	1.926	0	Yes	0.28	0.662
384	140	139	27	384.02	0.002	5.698	3.692	0.639	0	0	0	Free Surface	3.548	0.599	0.67	1.347	1.022	0.589	8.507	0	No	1.347	3.548
385	227	225	16	400.25	0.002	0.417	0.252	0.04	0	0	0	Free Surface	1.704	0.316	0.217	0.421	0.308	0.543	1.926	0	No	0.421	1.704
387	228	227	16	399.7	0.002	0.397	0.252	0.035	0	0	0	Free Surface	1.68	0.308	0.206	0.411	0.3	0.543	1.926	0	No	0.411	1.68
388	139	69	27	388.99	0.002	5.699	3.692	0.64	0	0	0	Free Surface	3.702	0.578	0.634	1.301	1.022	0.63	8.987	0	No	1.301	3.702
389	229	228	16	400.58	0.002	0.377	0.252	0.029	0	0	0	Free Surface	1.656	0.3	0.196	0.4	0.292	0.544	1.926	0	No	0.4	1.656
39	345	257	8	432.29	0.021	0.44	0	0.118	0	0	0	Free Surface	4.705	0.432	0.388	0.288	0.389	1.772	1.133	0	Yes	0.297	4.523
391	230	229	16	400.1	0.002	0.353	0.252	0.023	0	0	0	Free Surface	1.626	0.29	0.183	0.387	0.283	0.544	1.926	0	No	0.387	1.626
393	231	230	16	398.53	0.002	0.333	0.252	0.018	0	0	0	Free Surface	1.599	0.281	0.173	0.375	0.275	0.543	1.926	0	No	0.375	1.599
395	233	231	16	398.53	0.002	0.316	0.252	0.014	0	0	0	Free Surface	1.613	0.269	0.159	0.359	0.267	0.562	1.992	0	No	0.359	1.613
396	237	236	24	396.4	0.071	3.837	2.267	0.487	0	0	0	Free Surface	12.208	0.212	0.099	0.424	0.861	3.945	38.928	0	Yes	0.613	7.272
397	234	233	15	401.04	0.002	0.305	0.252	0.011	0	0	0	Free Surface	1.568	0.294	0.188	0.367	0.267	0.538	1.621	0	No	0.367	1.568
399	189	234	15	399.03	0.002	0.288	0.252	0.007	0	0	0	Free Surface	1.542	0.285	0.177	0.356	0.259	0.538	1.621	0	No	0.356	1.542
40	211	212	12	40.1	0.009	0.073	0	0.016	0	0	0	Free Surface	1.972	0.126	0.034	0.126	0.137	1.182	2.157	0	No	0.126	1.972
401	190	189	30	401.7	0.002	0.277	0.252	0.005	0	0	0	Free Surface	1.404	0.113	0.027	0.282	0.211	0.564	10.295	0	No	0.282	1.404
403	137	129	8	403.07	0.005	0.007	0	0.001	0	0	0	Free Surface	0.858	0.08	0.013	0.054	0.048	0.793	0.554	0	Yes	0.074	0.532
404	213	214	12	404.44	0.004	0.075	0	0.017	0	0	0	Free Surface	1.525	0.153	0.051	0.153	0.139	0.827	1.479	0	No	0.153	1.525
405	250	26	8	160.9	0.014	0.083	0	0.019	0	0	0	Free Surface	2.515	0.204	0.091	0.136	0.164	1.436	0.911	0	No	0.136	2.515
407	245	244	8	407.94	0.023	0.012	0	0.002	0	0	0	Free Surface	1.682	0.07	0.01	0.047	0.061	1.664	1.184	0	No	0.047	1.682
409	253	46	8	324.26	0.005	0.004	0	0.001	0	0	0	Free Surface	0.714	0.061	0.007	0.04	0.035	0.762	0.553	0	No	0.04	0.714
411	244	243	8	411.44	0.021	0.																	

461	1523897	1524235	18	343.33	0.008	2.503	1.701	0.231	0	0	0	Free Surface	5.004	0.451	0.419	0.677	0.753	1.225	5.98	0	No	0.677	5.004
463	1523699	1523897	18	201.33	0.002	2.501	1.701	0.23	0	0	0	Free Surface	3.169	0.652	0.176	0.979	0.752	0.604	3.289	0	No	0.979	3.169
465	1524168	1524235	15	379.05	0.009	0.781	0.566	0.053	0	0	0	Free Surface	3.882	0.301	0.197	0.376	0.433	1.313	3.959	0	Yes	0.452	3.016
467	1523119	1523316	18	199.06	0.003	2.491	1.701	0.227	0	0	0	Free Surface	3.41	0.611	0.69	0.916	0.751	0.684	3.611	0	No	0.916	3.41
469	1523115	1523119	8	49.78	0.039	0.381	0.379	0	0	0	0	Free Surface	5.662	0.339	0.247	0.226	0.361	2.457	1.542	0	Yes	0.521	2.014
47	29	22	8	55.65	0.015	0.088	0	0.02	0	0	0	Free Surface	2.645	0.205	0.092	0.137	0.429	1.508	0.956	0	Yes	0.579	0.423
471	1523098	1523115	8	200.74	0.106	0.379	0.379	0	0	0	0	Free Surface	8.099	0.261	0.149	0.174	0.36	4.058	2.546	0	No	0.174	8.099
473	1522749	1523119	18	369.3	0.003	2.109	1.322	0.226	0	0	0	Free Surface	3.424	0.531	0.553	0.796	0.688	0.756	3.815	0	Yes	0.806	3.372
477	1522563	1522749	18	210.86	0.004	2.103	1.322	0.224	0	0	0	Free Surface	3.839	0.484	0.473	0.726	0.687	0.9	4.447	0	Yes	0.876	3.036
479	1522331	1522563	18	232.4	0.003	2.1	1.322	0.223	0	0	0	Free Surface	3.384	0.534	0.558	0.801	0.687	0.745	3.763	0	No	0.801	3.384
481	1522114	1522331	18	224.81	0.003	2.091	1.322	0.22	0	0	0	Free Surface	3.292	0.544	0.576	0.816	0.685	0.715	3.632	0	No	0.816	3.292
483	1521864	1522114	18	262.12	0.003	2.085	1.322	0.219	0	0	0	Free Surface	3.345	0.536	0.562	0.804	0.684	0.734	3.713	0	No	0.804	3.345
485	1521558	1521864	18	308.55	0.039	2.079	1.322	0.217	0	0	0	Free Surface	7.674	0.287	0.18	0.43	0.683	2.433	11.574	0	Yes	0.567	5.255
487	108	92	8	487.78	0.02	0.055	0	0.012	0	0	0	Free Surface	2.56	0.151	0.05	0.101	0.133	1.71	1.111	0	Yes	0.109	2.285
489	1521245	1521558	18	313.48	0.029	1.691	0.943	0.214	0	0	0	Free Surface	7.263	0.258	0.145	0.386	0.613	2.443	11.643	0	No	0.386	7.263
491	1521063	1521245	18	181.97	0.176	1.678	0.943	0.21	0	0	0	Free Surface	13.675	0.164	0.059	0.247	0.611	5.833	28.573	0	Yes	0.266	12.233
493	1521458	1521558	8	331.14	0.169	0.379	0.379	0	0	0	0	Free Surface	9.572	0.232	0.118	0.154	0.36	5.111	3.221	0	Yes	0.242	5.112
495	1523943	1524003	15	333.91	0.005	0.733	0.566	0.04	0	0	0	Free Surface	3.087	0.34	0.248	0.424	0.419	0.977	2.952	0	No	0.424	3.087
497	1522706	1523047	15	341.43	0.002	0.434	0.303	0.031	0	0	0	Free Surface	1.811	0.342	0.251	0.427	0.32	0.571	1.725	0	No	0.427	1.811
499	1522997	1523047	15	357.3	0.005	0.005	0	0.001	0	0	0	Free Surface	0.666	0.031	0.002	0.039	0.033	0.73	2.819	0	Yes	0.123	0.12
501	1523047	1523178	15	136.26	0.016	0.7	0.566	0.031	0	0	0	Free Surface	4.629	0.246	0.132	0.307	0.409	1.75	5.295	0	No	0.307	4.629
503	1523178	1523433	15	288.54	0.013	0.703	0.566	0.032	0	0	0	Free Surface	4.247	0.262	0.15	0.327	0.41	1.55	4.682	0	Yes	0.356	3.772
505	1521170	1521493	15	420	0.005	0.373	0.303	0.015	0	0	0	Free Surface	2.565	0.239	0.125	0.298	0.296	0.984	2.981	0	No	0.298	2.565
507	1520816	1520785	12	298.95	0.006	0.319	0.303	0.003	0	0	0	Free Surface	2.672	0.285	0.178	0.285	0.291	1.041	1.796	0	No	0.285	2.672
509	1520661	1520816	12	154.15	0.033	0.303	0.303	0	0	0	0	Free Surface	4.809	0.182	0.072	0.182	0.284	2.382	4.2	0	Yes	0.184	4.746
51	349	12	16	310	0.001	0.051	0	0.011	0	0	0	Free Surface	0.895	0.113	0.027	0.151	0.106	0.491	1.86	0	Yes	0.172	0.741
511	1523729	1523521	8	334.92	0.016	0.248	0	0.063	0	0	0	Free Surface	3.653	0.341	0.251	0.228	0.289	1.578	0.991	0	No	0.228	3.653
513	1523521	1523531	8	47.06	0.009	0.249	0	0.063	0	0	0	Free Surface	2.959	0.4	0.337	0.267	0.289	1.167	0.74	0	No	0.267	2.959
515	1523531	1523828	8	338.18	0.009	0.25	0	0.063	0	0	0	Free Surface	2.972	0.399	0.336	0.266	0.289	1.173	0.744	0	No	0.266	2.972
517	1523828	1524166	8	383.92	0.009	0.255	0	0.065	0	0	0	Free Surface	2.986	0.404	0.343	0.269	0.292	1.172	0.743	0	No	0.269	2.986
518	114	113	8	518.22	0.003	0.102	0	0.023	0	0	0	Free Surface	1.5	0.341	0.25	0.227	0.182	0.648	0.407	0	No	0.227	1.5
52	150	149	8	52.45	0.005	0.012	0	0.002	0	0	0	Free Surface	1.003	0.101	0.021	0.067	0.061	0.827	0.562	0	No	0.067	1.003
521	1526179	1526286	8	222.96	0.005	0.01	0	0.002	0	0	0	Free Surface	0.941	0.093	0.018	0.062	0.056	0.808	0.555	0	Yes	0.154	0.251
523	1525926	1526031	8	222.99	0.005	0.011	0	0.002	0	0	0	Free Surface	0.963	0.096	0.019	0.064	0.058	0.812	0.555	0	Yes	0.126	0.36
525	1526286	1526513	8	256.6	0.01	0.42	0	0.113	0	0	0	Free Surface	3.555	0.519	0.532	0.346	0.38	1.196	0.79	0	No	0.346	3.555
527	41	40	6	265.81	0.005	0.029	0	0.006	0	0	0	Free Surface	1.342	0.227	0.113	0.113	0.104	0.837	0.257	0	No	0.113	1.342
529	1	351	30	259	0.002	6.995	3.95	1.016	0	0	0	Free Surface	3.846	0.558	0.599	1.394	1.101	0.637	11.679	0	Yes	1.426	3.74
53	26	27	8	275.24	0.01	0.085	0	0.019	0	0	0	Free Surface	3.303	0.22	0.106	0.146	0.165	1.266	0.8	0	No	0.146	2.303
531	273	275	30	94	0.001	7.099	3.95	1.055	0	0	0	Free Surface	3.389	0.627	0.718	1.568	1.109	0.516	9.885	0	No	1.568	3.389
533	275	339	30	71	0.001	7.749	3.95	1.3	0	0	0	Free Surface	3.474	0.662	0.777	1.656	1.161	0.507	9.976	0	No	1.656	3.474
534	128	138	8	534.61	0.116	0.182	0	0.045	0	0	0	Free Surface	6.765	0.177	0.068	0.118	0.246	4.165	2.67	0	Yes	0.153	4.668
535	279	235	15	30.89	0.005	0.005	0	0.001	0	0	0	Free Surface	0.683	0.03	0.002	0.038	0.033	0.753	2.917	0	No	0.038	0.683
537	235	281	15	150.08	0.005	0.006	0	0.001	0	0	0	Free Surface	0.737	0.033	0.002	0.042	0.037	0.775	2.959	0	No	0.042	0.737
539	116	142	8	189	0.008	0.049	0	0.012	0	0	0	Free Surface	1.784	0.18	0.07	0.12	0.125	1.089	0.698	0	No	0.12	1.784
541	86	116	8	339	0.015	0.002	0	0	0	0	0	Free Surface	0.892	0.028	0.003	0.025	0.028	1.212	0.944	0	No	0.025	0.892
543	283	147	18	193.56	0.007	1.699	1.425	0.07	0	0	0	Free Surface	4.335	0.376	0.3	0.563	0.615	1.182	5.664	0	No	0.563	4.335
547	285	283	12	191	0.038	1.445	1.425	0.004	0	0	0	Free Surface	7.923	0.389	0.319	0.389	0.639	2.595	4.523	0	Yes	0.411	7.351
548	238	237	24	548.21	0.06	3.837	2.267	0.487	0	0	0	Free Surface	11.519	0.221	0.107	0.442	0.861	3.643	35.865	0	No	0.442	11.519
549	287	285	12	256	0.019	1.444	1.425	0.004	0	0	0	Free Surface	6.116	0.473	0.454	0.473	0.639	1.782	3.181	0	No	0.473	6.116
55	13	48	27	109.78	0.002	6.187	3.695	0.814	0	0	0	Free Surface	3.434	0.661	0.774	1.487	1.066	0.529	7.99	0	No	1.487	3.434
551	289	287	12	424	0.019	1.444	1.425	0.004	0	0	0	Free Surface	6.119	0.472	0.454	0.472	0.639	1.783	3.183	0	No	0.472	6.119
553	291	289	12	480	0.024	1.443	1.425	0.003	0	0	0	Free Surface	6.669	0.442	0.403	0.442	0.639	2.024	3.577	0	No	0.442	6.669
555	293	291	12	200	0.014	1.442	1.425	0.003	0	0	0	Free Surface	5.455	0.516	0.528	0.516	0.639	1.503	2.732	0	No	0.516	5.455
557	295	293	12	380	0.021	1.438	1.425	0.002	0	0	0	Free Surface	6.342	0.458	0.43	0.458	0.638	1.884	3.346	0	No	0.458	6.342
559	297	295	12	500	0.017	1.433	1.425	0.001	0	0	0	Free Surface	5.857	0.486	0.476	0.486	0.637	1.677	3.01	0	No	0.486	5.857
561	299	297	12	109	0.05	1.425	1.425	0	0	0	0	Free Surface	8.689	0.359	0.276	0.359	0.635	2.978	5.163	0	Yes	0.372	8.271
563	301	299	12	200	0.01	1.425	1.425	0	0	0	0	Free Surface	4.785	0.568	0.617	0.568	0.635	1.237	2.309	0	No	0.568	4.785
565	303	301	12	455	0.032	1.425	1.425	0	0	0	0	Free Surface	7.407	0.404	0.344	0.404	0.635	2.37	4.146	0	Yes	0.486	5.817
567	305	303	12	476	0.023	1.425	1.425	0															

649	1524062	1524123	15	353.64	0.004	0.76	0.566	0.048	0	0	0	Free Surface	2.788	0.376	0.301	0.47	0.427	0.832	2.528	0	No	0.47	2.788
65	8	355	16	211	0.002	0.254	0	0.064	0	0	0	Free Surface	1.571	0.235	0.121	0.313	0.239	0.589	2.098	0	No	0.313	1.571
651	1524123	1524168	15	258.15	0.144	0.772	0.566	0.051	0	0	0	Free Surface	10.353	0.15	0.049	0.187	0.431	5.074	15.889	0	Yes	0.232	7.614
657	281	234	15	251.23	0.005	0.01	0	0.002	0	0	0	Free Surface	0.866	0.043	0.003	0.053	0.048	0.806	2.965	0	No	0.053	0.866
661	136	137	8	205.15	0.005	0.006	0	0.001	0	0	0	Free Surface	0.794	0.072	0.01	0.048	0.042	0.778	0.552	0	No	0.048	0.794
665	1527548	353	24	15.63	0.002	3.417	2.267	0.344	0	0	0	Free Surface	3.212	0.519	0.532	1.038	0.811	0.624	6.423	0	No	1.038	3.212
667	353	241	24	335.18	0.003	3.418	2.267	0.345	0	0	0	Free Surface	3.774	0.458	0.429	0.915	0.811	0.793	7.967	0	No	0.915	3.774
67	33	30	8	271.77	0.005	0.003	0	0	0	0	0	Free Surface	0.628	0.05	0.005	0.033	0.028	0.741	0.554	0	Yes	0.051	0.336
68	164	165	6	68.25	0.004	0.006	0	0.001	0	0	0	Free Surface	0.763	0.109	0.025	0.054	0.045	0.697	0.229	0	No	0.054	0.763
69	34	33	8	101.66	0.005	0.001	0	0	0	0	0	Free Surface	0.474	0.032	0.002	0.021	0.018	0.696	0.555	0	No	0.021	0.474
71	355	329	16	116	0.003	0.267	0	0.068	0	0	0	Free Surface	1.948	0.209	0.096	0.279	0.245	0.777	2.785	0	Yes	0.399	1.175
73	44	23	6	157.44	0.005	0.016	0	0.003	0	0	0	Free Surface	1.137	0.171	0.064	0.086	0.077	0.822	0.258	0	Yes	0.5	0.129
770	109	91	8	770.19	0.017	0.003	0	0	0	0	0	Free Surface	0.996	0.039	0.003	0.026	0.03	1.326	1.027	0	Yes	0.034	0.679
78	15	14	8	78.47	0.005	0.002	0.002	0	0	0	0	Free Surface	0.584	0.045	0.004	0.03	0.025	0.727	0.552	0	No	0.03	0.584
79	257	359	12	30	0.005	0.565	0	0.156	0	0	0	Free Surface	2.922	0.406	0.346	0.406	0.392	0.933	1.633	0	No	0.406	2.922
80	101	100	8	80.58	0.012	0.021	0	0.004	0	0	0	Free Surface	1.613	0.106	0.024	0.071	0.081	1.292	0.872	0	No	0.071	1.613
86	70	71	8	86.31	0.005	0.054	0	0.012	0	0	0	Free Surface	1.61	0.207	0.094	0.138	0.132	0.912	0.578	0	No	0.138	1.61
88	119	118	6	88.5	0.007	0.142	0	0.034	0	0	0	Free Surface	2.383	0.475	0.458	0.238	0.235	0.979	0.309	0	No	0.238	2.383
91	249	248	8	144.48	0.006	0.006	0	0.001	0	0	0	Free Surface	0.851	0.067	0.009	0.045	0.041	0.863	0.618	0	Yes	0.108	0.235
93	36	35	8	269.44	0.005	0.004	0	0.001	0	0	0	Free Surface	0.689	0.057	0.006	0.038	0.033	0.757	0.554	0	No	0.038	0.689
94	67	64	6	94.9	0.005	0.045	0	0.009	0	0	0	Free Surface	1.474	0.292	0.185	0.146	0.13	0.802	0.245	0	No	0.146	1.474
95	37	25	27	271.65	0.001	5.999	3.692	0.747	0	0	0	Free Surface	3.136	0.697	0.833	1.569	1.049	0.462	7.204	0	No	1.569	3.136
97	39	38	8	270.8	0.005	0.008	0	0.001	0	0	0	Free Surface	0.866	0.082	0.014	0.054	0.048	0.795	0.555	0	No	0.054	0.866



## Full Build-out Manhole

ID	Rim Elevation (ft)	Base Flow (mgd)	Total Flow (mgd)	Storm Flow (mgd)	Grade (ft)	Status	Hydraulic Jump	Surcharge Depth (ft)	Unfilled Depth (ft)
1	1,887.09	0.013	0.06	0	1,882.02	Not Full	No	-1.106	5.066
10	1,891.44	0.001	0.01	0	1,883.69	Not Full	No	-1.123	7.75
100	2,035.87	0.004	0.02	0	2,020.92	Not Full	No	-0.617	14.95
101	2,034.01	0.004	0.02	0	2,022.04	Not Full	No	-0.596	11.969
102	2,015.44	0	0.00	0	2,005.50	Not Full	No	-0.612	9.945
103	2,002.06	0	0.00	0	1,992.13	Not Full	No	-0.599	9.932
104	2,008.71	0.011	0.05	0	1,998.79	Not Full	No	-0.586	9.919
105	2,007.28	0	0.00	0	1,997.37	Not Full	No	-0.576	9.91
106	2,012.59	0.001	0.01	0	2,002.63	Not Full	No	-0.623	9.956
107	2,011.51	0	0.00	0	2,001.54	Not Full	No	-0.633	9.966
108	2,002.63	0	0.00	0	1,992.73	Not Full	No	-0.566	9.899
109	1,946.68	0	0.00	0	1,936.71	Not Full	No	-0.641	9.974
11	1,891.44	0.002	0.01	0	1,884.76	Not Full	No	-0.776	6.683
110	1,933.95	0	0.00	0	1,916.37	Not Full	Yes	-0.616	17.579
111	1,939.27	0	0.00	0	1,929.30	Not Full	No	-0.635	9.968
112	1,940.92	0	0.00	0	1,930.95	Not Full	No	-0.635	9.968
113	1,907.92	0	0.00	0	1,897.77	Not Full	No	-0.438	10.151
114	1,909.43	0	0.00	0	1,899.27	Not Full	No	-0.439	10.163
115	1,909.01	0	0.00	0	1,899.81	Not Full	No	-0.44	9.203
116	1,909.61	0	0.00	0	1,900.72	Not Full	Yes	-0.547	8.89
117	1,909.69	0	0.00	0	1,902.30	Not Full	No	-0.266	7.386
118	1,910.10	0	0.00	0	1,903.32	Not Full	No	-0.265	6.785
119	1,910.39	0	0.00	0	1,904.06	Not Full	Yes	-0.262	6.332
12	1,892.39	0.002	0.01	0	1,883.84	Not Full	No	-1.14	8.547
120	1,911.32	0	0.00	0	1,905.05	Not Full	No	-0.266	6.266
121	1,911.53	0	0.00	0	1,905.62	Not Full	No	-0.544	5.908
122	1,912.64	0	0.00	0	1,906.65	Not Full	Yes	-0.618	5.991
123	1,926.98	0	0.00	0	1,919.13	Not Full	No	-0.471	7.851
124	1,928.34	0	0.00	0	1,921.63	Not Full	No	-0.636	6.709
125	1,934.36	0	0.00	0	1,927.62	Not Full	No	-0.648	6.741
127	1,935.40	0	0.00	0	1,925.73	Not Full	No	-0.606	9.672
128	1,999.07	0.001	0.00	0	1,989.09	Not Full	No	-0.549	9.982
129	2,002.63	0	0.00	0	1,992.73	Not Full	No	-0.472	9.905
13	1,892.46	0	0.00	0	1,884.89	Not Full	No	-0.763	7.573
130	2,000.88	0.007	0.04	0	1,994.99	Not Full	No	-0.458	5.891
131	2,005.70	0.002	0.01	0	1,997.62	Not Full	No	-0.45	8.083
132	2,008.52	0.001	0.00	0	1,998.65	Not Full	Yes	-0.435	9.868
133	2,012.24	0	0.00	0	2,002.32	Not Full	No	-0.484	9.917
134	2,013.25	0.018	0.08	0	2,003.38	Not Full	Yes	-0.442	9.875
135	2,017.36	0.015	0.07	0	2,007.39	Not Full	No	-0.533	9.966
136	2,004.60	0	0.00	0	1,995.82	Not Full	No	-0.619	8.782
137	2,003.56	0	0.00	0	1,994.70	Not Full	No	-0.613	8.856
138	1,936.81	0.001	0.00	0	1,927.00	Not Full	Yes	-0.379	9.812
139	1,909.94	0	0.00	0	1,896.99	Not Full	No	-0.949	12.949
14	1,892.17	0	0.00	0	1,886.18	Not Full	No	-0.637	5.99
140	1,909.86	0	0.00	0	1,897.91	Not Full	No	-0.903	11.953
141	1,909.32	0	0.00	0	1,898.61	Not Full	No	-0.675	10.715
142	1,909.79	0	0.00	0	1,898.86	Not Full	Yes	-0.744	10.934
143	1,910.40	0	0.00	0	1,899.49	Not Full	No	-1.287	10.907
144	1,912.27	0	0.00	0	1,902.36	Not Full	No	-1.395	9.915
145	1,918.26	0	0.00	0	1,905.65	Not Full	No	-1.404	12.614
146	1,924.53	0	0.00	0	1,916.80	Not Full	No	-1.697	7.727
147	1,930.76	0	0.00	0	1,921.92	Not Full	No	-1.545	8.845
148	1,910.78	0.001	0.01	0	1,900.60	Not Full	No	-0.525	10.178
149	1,911.40	0.001	0.00	0	1,901.18	Not Full	No	-0.591	10.225
15	1,892.04	0.002	0.00	0	1,886.67	Not Full	No	-0.637	5.37
150	1,911.41	0.001	0.01	0	1,901.54	Not Full	No	-0.6	9.873
151	1,911.52	0	0.00	0	1,902.67	Not Full	No	-0.614	8.848
1518351	2,141.00	0.607	0.61	0	2,131.39	Not Full	No	-1.171	9.611
1518620	2,138.43	0.135	0.50	0	2,129.61	Not Full	Yes	-0.874	8.824
1518939	2,134.95	0.002	0.01	0	2,128.68	Not Full	No	-1.074	6.274

1518982	2,134.95	0.015	0.07	0	2,127.68	Not Full	No	-1.083	7.273
1519372	2,136.09	0.008	0.04	0	2,123.56	Not Full	No	-1.068	12.528
1519678	2,128.34	0.005	0.03	0	2,120.59	Not Full	No	-1.065	7.755
1519963	2,127.34	0.336	0.34	0	2,117.77	Not Full	No	-0.974	9.574
152	1,913.13	0.001	0.01	0	1,903.58	Not Full	No	-0.624	9.547
1520233	2,123.36	0.004	0.02	0	2,115.43	Not Full	No	-0.986	7.926
1520444	2,120.99	0.001	0.01	0	2,113.25	Not Full	No	-1.064	7.744
1520544	2,119.73	0.003	0.01	0	2,111.66	Not Full	No	-0.958	8.068
1520554	2,119.17	0	0.00	0	2,110.88	Not Full	No	-1.062	8.292
1520596	2,117.84	0.016	0.07	0	2,109.72	Not Full	No	-0.998	8.118
1520661	2,129.30	0.303	0.30	0	2,119.48	Not Full	No	-0.818	9.818
1520720	2,124.56	0.002	0.01	0	2,110.67	Not Full	No	-0.911	13.891
1520752	2,121.82	0.001	0.01	0	2,111.45	Not Full	No	-0.905	10.375
1520785	2,123.24	0.001	0.01	0	2,112.37	Not Full	Yes	-0.917	10.867
1520816	2,125.41	0.003	0.02	0	2,114.39	Not Full	No	-0.715	11.025
1520829	2,114.73	0.012	0.06	0	2,106.89	Not Full	No	-1.167	7.837
1520835	2,122.93	0.006	0.03	0	2,106.07	Not Full	No	-1.055	16.865
1521063	2,104.63	0.008	0.04	0	2,094.34	Not Full	No	-1.253	10.293
1521170	2,116.41	0.002	0.01	0	2,099.25	Not Full	Yes	-0.952	17.162
1521245	2,072.03	0.004	0.02	0	2,062.32	Not Full	No	-1.114	9.714
1521458	2,118.00	0.379	0.38	0	2,108.93	Not Full	No	-0.512	9.066
1521493	2,114.45	0.004	0.02	0	2,096.91	Not Full	No	-1.064	17.544
1521558	2,057.68	0.003	0.02	0	2,053.09	Not Full	No	-1.07	4.59
1521741	2,120.25	0.002	0.01	0	2,093.40	Not Full	Yes	-0.94	26.85
1521864	2,053.74	0.002	0.01	0	2,044.44	Not Full	Yes	-0.696	9.296
1521987	2,115.04	0.001	0.01	0	2,092.69	Not Full	No	-0.938	22.348
1522114	2,050.80	0.002	0.01	0	2,043.58	Not Full	No	-0.684	7.224
1522331	2,052.12	0.003	0.02	0	2,042.82	Not Full	No	-0.699	9.299
1522447	2,110.35	0.003	0.02	0	2,090.36	Not Full	No	-0.925	19.995
1522556	2,047.15	0.009	0.05	0	2,029.81	Not Full	No	-1.653	17.343
1522563	2,050.65	0.001	0.01	0	2,041.94	Not Full	No	-0.774	8.714
1522706	2,105.36	0.005	0.03	0	2,088.91	Not Full	No	-0.823	16.453
1522749	2,050.64	0.002	0.01	0	2,041.34	Not Full	No	-0.704	9.304
1522947	2,046.40	0.002	0.01	0	2,027.73	Not Full	No	-1.643	18.673
1522997	2,099.62	0.001	0.01	0	2,089.56	Not Full	No	-1.211	10.061
1523047	2,097.90	0.263	0.26	0	2,088.11	Not Full	No	-0.943	9.793
1523098	2,100.50	0.379	0.38	0	2,095.20	Not Full	No	-0.493	5.296
1523115	2,056.83	0	0.00	0	2,041.54	Not Full	No	-0.441	15.294
1523119	2,046.52	0.001	0.00	0	2,040.20	Not Full	Yes	-0.584	6.324
1523178	2,095.62	0.001	0.01	0	2,085.85	Not Full	No	-0.923	9.773
1523269	2,044.69	0.002	0.01	0	2,025.96	Not Full	No	-1.634	18.734
1523316	2,046.34	0.001	0.01	0	2,039.61	Not Full	No	-0.508	6.728
1523433	2,091.91	0.003	0.02	0	2,082.30	Not Full	Yes	-0.765	9.615
1523521	2,100.35	0	0.00	0	2,089.10	Not Full	No	-0.4	11.253
1523531	2,098.00	0	0.00	0	2,088.58	Not Full	No	-0.4	9.424
1523662	2,037.69	0.002	0.01	0	2,023.85	Not Full	No	-1.629	13.839
1523699	2,048.45	0.002	0.01	0	2,038.63	Not Full	No	-0.521	9.821
1523729	2,103.13	0.063	0.25	0	2,094.52	Not Full	No	-0.439	8.612
1523828	2,095.00	0.001	0.01	0	2,085.43	Not Full	No	-0.398	9.571
1523897	2,044.89	0.001	0.01	0	2,037.76	Not Full	No	-0.823	7.133
1523943	2,084.59	0.004	0.02	0	2,080.46	Not Full	No	-0.826	4.126
1523987	2,035.27	0.001	0.01	0	2,022.08	Not Full	No	-1.625	13.195
1524003	2,094.40	0.004	0.02	0	2,078.70	Not Full	No	-0.829	15.699
1524062	2,094.67	0.004	0.02	0	2,076.88	Not Full	Yes	-0.78	17.79
1524123	2,091.86	0.003	0.02	0	2,075.21	Not Full	No	-1.063	16.653
1524166	2,091.00	0.007	0.04	0	2,081.87	Not Full	No	-0.402	9.135
1524168	2,047.83	0.002	0.01	0	2,038.11	Not Full	No	-0.874	9.724
1524235	2,044.89	0.001	0.01	0	2,034.87	Not Full	No	-0.961	10.021
1524277	2,035.16	0.001	0.01	0	2,027.62	Not Full	No	-1.24	7.54
1524318	2,031.67	0.001	0.00	0	2,021.11	Not Full	Yes	-0.773	10.563
1524591	2,028.57	0.001	0.01	0	2,020.25	Not Full	No	-0.731	8.321
1524867	2,028.42	0.001	0.01	0	2,019.44	Not Full	No	-0.733	8.983
1525140	2,027.61	0.002	0.01	0	2,018.58	Not Full	No	-0.776	9.026
1525428	2,026.00	0.003	0.01	0	2,017.61	Not Full	No	-0.79	8.39

1525701	2,073.88	0.006	0.03	0	2,062.74	Not Full	No	-0.563	11.137
1525755	2,025.46	0.003	0.02	0	2,017.29	Not Full	No	-0.982	8.172
1525807	2,072.97	0.03	0.13	0	2,061.76	Not Full	No	-0.323	11.206
1525926	2,070.64	0.002	0.01	0	2,060.18	Not Full	No	-0.603	10.456
1526016	2,023.55	0.004	0.02	0	2,015.82	Not Full	Yes	-0.657	7.727
1526031	2,070.45	0.001	0.01	0	2,059.19	Not Full	No	-0.378	11.262
1526179	2,066.84	0.002	0.01	0	2,054.72	Not Full	No	-0.605	12.118
1526248	2,022.43	0.003	0.02	0	2,015.18	Not Full	No	-0.694	7.254
1526286	2,064.99	0	0.00	0	2,053.79	Not Full	No	-0.321	11.204
1526407	2,064.80	0.002	0.01	0	2,053.32	Not Full	No	-0.598	11.481
1526478	2,062.72	0.008	0.04	0	2,052.70	Not Full	No	-0.586	10.019
1526479	2,021.14	0.002	0.01	0	2,014.20	Not Full	No	-0.988	6.938
1526513	2,062.28	0	0.00	0	2,051.00	Not Full	No	-0.392	11.276
1526515	2,020.69	0.003	0.02	0	2,014.05	Not Full	Yes	-1.013	6.643
1526599	2,061.54	0	0.00	0	2,048.63	Not Full	Yes	-0.207	12.91
1526628	2,058.44	0.001	0.00	0	2,048.41	Not Full	No	-0.594	10.027
1526667	2,055.21	0	0.00	0	2,045.19	Not Full	No	-0.592	10.025
1526740	2,058.91	0	0.00	0	2,047.80	Not Full	No	-0.225	11.108
1526741	2,019.86	0.008	0.04	0	2,013.37	Not Full	No	-1.016	6.486
1526775	2,050.21	0	0.00	0	2,040.17	Not Full	No	-0.609	10.042
1526992	2,057.47	0	0.00	0	2,046.74	Not Full	No	-0.296	10.73
1527015	2,027.68	0.003	0.02	0	2,012.57	Not Full	No	-1.012	15.112
1527149	2,029.40	0.003	0.02	0	2,019.92	Not Full	Yes	-0.435	9.478
1527159	2,053.87	0	0.00	0	2,044.00	Not Full	No	-0.367	9.871
1527235	2,025.45	0.008	0.04	0	2,011.98	Not Full	No	-1.009	13.469
1527417	2,024.58	0.003	0.01	0	2,018.34	Not Full	No	-0.426	6.24
1527548	2,023.20	0.001	0.01	0	2,011.17	Not Full	No	-0.962	12.032
153	1,914.15	0	0.00	0	1,904.42	Not Full	No	-0.667	9.73
154	1,913.45	0	0.00	0	1,904.26	Not Full	No	-0.63	9.194
155	1,912.16	0.003	0.02	0	1,903.23	Not Full	No	-0.573	8.926
156	1,911.05	0.002	0.01	0	1,901.82	Not Full	No	-0.551	9.235
157	1,910.66	0.002	0.01	0	1,901.03	Not Full	No	-0.478	9.632
158	1,908.49	0.001	0.00	0	1,898.87	Not Full	No	-0.533	9.616
159	1,908.58	0.001	0.01	0	1,899.75	Not Full	No	-0.536	8.83
16	1,892.29	0.001	0.01	0	1,885.12	Not Full	No	-0.777	7.167
160	1,908.32	0.001	0.01	0	1,900.76	Not Full	No	-0.541	7.564
161	1,909.06	0	0.00	0	1,901.77	Not Full	Yes	-0.55	7.293
162	1,909.54	0.001	0.01	0	1,903.61	Not Full	No	-0.61	5.933
163	1,909.70	0.001	0.01	0	1,906.26	Not Full	No	-0.623	3.436
164	1,909.05	0.001	0.01	0	1,905.05	Not Full	No	-0.446	3.996
165	1,909.33	0.001	0.01	0	1,904.71	Not Full	No	-0.418	4.618
166	1,908.88	0.003	0.02	0	1,903.40	Not Full	No	-0.388	5.478
167	1,914.21	0	0.00	0	1,908.76	Not Full	No	-0.41	5.454
168	1,920.99	0.002	0.01	0	1,909.90	Not Full	No	-0.411	11.094
169	1,929.01	0.001	0.00	0	1,912.11	Not Full	No	-0.416	16.899
17	1,892.38	0	0.00	0	1,885.57	Not Full	No	-0.768	6.808
18	1,892.44	0.002	0.01	0	1,885.58	Not Full	No	-0.881	6.861
189	1,916.48	0.002	0.01	0	1,896.18	Not Full	No	-0.894	20.299
19	1,892.54	0.003	0.02	0	1,886.23	Not Full	No	-0.773	6.313
190	1,918.81	0.005	0.03	0	1,907.27	Not Full	No	8.244	11.54
191	1,925.21	0.001	0.00	0	1,913.32	Not Full	No	-0.555	11.888
192	1,923.99	0.001	0.00	0	1,914.02	Not Full	No	-0.559	9.972
193	1,925.36	0.001	0.01	0	1,915.09	Not Full	No	-0.569	10.272
194	1,926.57	0	0.00	0	1,916.73	Not Full	No	-0.573	9.836
195	1,921.96	0.001	0.01	0	1,917.62	Not Full	No	-0.573	4.337
196	1,927.21	0.004	0.02	0	1,918.64	Not Full	No	-0.581	8.574
197	2,017.92	0	0.00	0	2,007.85	Not Full	No	-0.638	10.071
198	2,013.55	0.014	0.06	0	2,003.68	Not Full	No	-0.442	9.875
199	2,013.55	0.001	0.01	0	2,003.46	Not Full	No	-0.541	10.095
20	1,894.37	0.002	0.01	0	1,886.84	Not Full	No	-0.77	7.53
200	2,021.07	0	0.00	0	2,011.00	Not Full	No	-0.641	10.074
201	2,010.42	0.006	0.03	0	2,000.50	Not Full	Yes	-0.482	9.916
202	2,007.05	0.007	0.03	0	1,998.23	Not Full	No	-0.391	8.824
203	2,007.68	0	0.00	0	1,997.75	Not Full	No	-0.493	9.926

204	2,005.71	0.001	0.01	0	1,995.72	Not Full	No	-0.562	9.995
205	1,964.19	0.001	0.01	0	1,954.31	Not Full	Yes	-0.449	9.882
206	1,963.55	0	0.00	0	1,953.54	Not Full	No	-0.58	10.013
207	1,927.04	0.001	0.01	0	1,914.97	Not Full	Yes	-0.443	12.067
208	1,930.75	0.001	0.01	0	1,913.22	Not Full	No	-0.439	17.533
209	2,011.89	0	0.00	0	2,006.01	Not Full	No	-0.882	5.882
21	1,894.91	0.001	0.01	0	1,887.30	Not Full	No	-0.743	7.613
210	2,021.20	0	0.00	0	2,013.29	Not Full	No	-0.911	7.911
211	2,005.78	0	0.00	0	2,000.91	Not Full	No	-0.874	4.874
212	2,006.33	0	0.00	0	2,000.45	Not Full	No	-0.877	5.877
213	2,001.92	0	0.00	0	1,997.07	Not Full	Yes	-0.847	4.847
214	2,001.16	0	0.00	0	1,995.32	Not Full	No	-0.937	5.837
215	1,967.05	0	0.00	0	1,961.23	Not Full	No	-0.921	5.821
216	1,891.03	0.006	0.03	0	1,884.43	Not Full	No	-0.794	6.602
217	1,892.51	0.005	0.03	0	1,885.12	Not Full	No	-0.803	7.39
218	1,894.39	0.005	0.03	0	1,885.81	Not Full	No	-0.81	8.58
219	1,896.88	0.006	0.03	0	1,886.50	Not Full	No	-0.819	10.379
22	1,895.33	0.001	0.01	0	1,887.76	Not Full	Yes	-0.739	7.569
220	1,897.72	0.006	0.03	0	1,887.19	Not Full	No	-0.828	10.527
221	1,898.40	0.006	0.03	0	1,887.88	Not Full	No	-0.837	10.517
222	1,899.55	0.006	0.03	0	1,888.57	Not Full	No	-0.847	10.976
223	1,901.17	0.006	0.03	0	1,889.26	Not Full	No	-0.857	11.906
224	1,905.70	0.002	0.01	0	1,889.95	Not Full	No	-0.867	15.746
225	1,905.23	0.002	0.01	0	1,890.65	Not Full	No	-0.87	14.581
226	1,907.23	0.021	0.09	0	1,890.77	Not Full	No	-1.136	16.465
227	1,906.23	0.005	0.03	0	1,891.31	Not Full	No	-0.912	14.922
228	1,906.23	0.005	0.03	0	1,892.00	Not Full	No	-0.923	14.233
229	1,907.64	0.006	0.03	0	1,892.69	Not Full	No	-0.934	14.953
23	1,897.42	0	0.00	0	1,888.39	Not Full	No	-0.751	9.031
230	1,910.25	0.005	0.03	0	1,893.37	Not Full	No	-0.947	16.876
231	1,911.28	0.004	0.02	0	1,894.06	Not Full	No	-0.958	17.22
233	1,912.36	0.003	0.01	0	1,894.78	Not Full	No	-0.974	17.577
234	1,916.07	0.002	0.01	0	1,895.49	Not Full	No	-0.883	20.577
235	1,919.69	0	0.00	0	1,908.21	Not Full	No	-1.208	11.478
236	1,940.00	0	0.00	0	1,923.78	Not Full	No	-1.198	16.218
237	1,960.70	0	0.00	0	1,951.35	Not Full	No	-1.576	9.346
238	1,990.74	0	0.00	0	1,984.28	Not Full	No	-1.558	6.458
24	1,898.86	0	0.00	0	1,889.05	Not Full	No	-0.655	9.815
240	2,012.28	0	0.00	0	2,004.29	Not Full	No	-1.382	7.992
241	2,018.16	0	0.00	0	2,009.49	Not Full	No	-1.446	8.666
242	1,943.52	0.001	0.00	0	1,933.49	Not Full	No	-0.601	10.034
243	1,947.00	0	0.00	0	1,936.96	Not Full	No	-0.611	10.045
244	1,955.61	0.001	0.00	0	1,945.56	Not Full	No	-0.614	10.047
245	1,965.04	0.001	0.00	0	1,954.99	Not Full	No	-0.62	10.053
246	1,991.81	0.001	0.00	0	1,981.74	Not Full	No	-0.639	10.073
247	2,005.62	0.001	0.01	0	1,995.55	Not Full	No	-0.638	10.071
248	1,903.32	0.003	0.02	0	1,891.75	Not Full	No	-0.576	11.569
249	1,901.62	0.001	0.01	0	1,892.53	Not Full	No	-0.622	9.095
25	1,899.46	0	0.00	0	1,889.53	Not Full	No	-0.764	9.934
250	1,905.82	0.004	0.02	0	1,898.24	Not Full	No	-0.531	7.584
251	1,908.96	0.014	0.07	0	1,901.12	Not Full	No	-0.545	7.839
253	1,893.59	0.001	0.00	0	1,891.34	Not Full	No	-0.626	2.25
255	2,020.56	0	0.00	0	2,011.73	Not Full	No	-0.711	8.831
257	2,020.19	0	0.00	0	2,014.93	Not Full	Yes	-0.594	5.264
26	1,901.32	0	0.00	0	1,895.97	Not Full	No	-0.52	5.354
261	2,002.86	0	0.00	0	1,995.48	Not Full	No	-1.512	7.382
265	2,019.48	0.001	0.01	0	2,016.64	Not Full	No	-0.424	2.837
267	2,034.06	0.022	0.10	0	2,024.13	Not Full	No	-0.499	9.932
27	1,899.93	0	0.00	0	1,892.99	Not Full	No	-0.529	6.942
273	1,889.73	0.035	0.15	0	1,881.40	Not Full	No	-0.932	8.332
275	1,889.75	0.245	0.85	0	1,881.26	Not Full	No	-0.844	8.494
279	1,919.94	0.001	0.01	0	1,908.46	Not Full	No	-1.212	11.482
28	1,896.43	0	0.00	0	1,889.52	Not Full	Yes	-0.498	6.911
281	1,918.84	0.001	0.01	0	1,907.37	Not Full	No	-1.197	11.467

283	1,932.60	0	0.00	0	1,923.86	Not Full	No	-0.937	8.737
285	1,935.50	0	0.00	0	1,931.15	Not Full	No	-0.611	4.351
287	1,940.50	0	0.00	0	1,936.19	Not Full	No	-0.527	4.307
289	1,948.50	0	0.00	0	1,944.35	Not Full	No	-0.528	4.148
29	1,894.68	0	0.00	0	1,887.77	Not Full	No	-0.499	6.912
291	1,960.00	0	0.00	0	1,955.94	Not Full	No	-0.558	4.058
293	1,965.00	0.001	0.01	0	1,960.69	Not Full	No	-0.484	4.314
295	1,973.25	0.001	0.01	0	1,968.71	Not Full	No	-0.542	4.542
297	1,981.50	0.001	0.01	0	1,977.34	Not Full	No	-0.514	4.164
299	1,987.00	0	0.00	0	1,982.76	Not Full	No	-0.641	4.241
30	1,897.05	0	0.00	0	1,888.67	Not Full	No	-0.499	8.382
301	1,992.00	0	0.00	0	1,985.07	Not Full	No	-0.432	6.932
303	2,004.00	0	0.00	0	1,999.57	Not Full	No	-0.596	4.426
305	2,015.25	0	0.00	0	2,010.66	Not Full	No	-0.556	4.586
307	2,024.00	0	0.00	0	2,019.80	Not Full	No	-0.524	4.204
309	2,030.50	0	0.00	0	2,025.49	Not Full	No	-0.507	5.007
31	1,900.38	0.001	0.00	0	1,890.28	Not Full	No	-0.502	10.105
311	2,039.20	0	0.00	0	2,035.02	Not Full	No	-0.58	4.18
313	2,049.50	0	0.00	0	2,045.16	Not Full	No	-0.538	4.338
315	2,055.30	0	0.00	0	2,050.91	Not Full	No	-0.487	4.387
317	2,059.00	0	0.00	0	2,053.39	Not Full	No	-0.432	5.612
319	2,068.60	0	0.00	0	2,064.01	Not Full	No	-0.695	4.595
32	1,901.26	0.016	0.07	0	1,891.76	Not Full	No	-0.504	9.498
321	2,073.15	0	0.00	0	2,068.12	Not Full	No	-0.432	5.032
323	2,076.00	1.425	1.43	0	2,071.41	Not Full	No	-0.611	4.591
329	1,885.93	0.001	0.01	0	1,882.36	Not Full	No	-0.961	3.571
33	1,900.82	0	0.00	0	1,889.99	Not Full	No	-0.634	10.827
331	1,888.31	0.005	0.03	0	1,883.09	Not Full	No	-0.761	5.221
333	2,005.00	0	0.00	0	1,997.27	Not Full	No	-0.632	7.735
337	1,915.00	0.012	0.06	0	1,898.81	Not Full	No	-0.341	16.191
34	1,899.54	0	0.00	0	1,890.59	Not Full	No	-0.645	8.949
343	2,049.19	0.001	0.01	0	2,042.01	Not Full	No	-0.454	7.177
345	2,030.07	0.001	0.01	0	2,023.96	Not Full	No	-0.378	6.112
347	1,917.31	0.252	0.25	0	1,909.16	Not Full	No	-3.483	8.15
349	1,892.24	0.011	0.05	0	1,884.24	Not Full	No	-1.182	8.005
35	1,903.22	0	0.00	0	1,890.64	Not Full	No	-0.568	12.582
351	1,884.97	0.004	0.02	0	1,881.59	Not Full	No	-0.941	3.381
353	2,022.60	0	0.00	0	2,010.92	Not Full	No	-1.085	11.685
355	1,889.00	0.004	0.02	0	1,882.43	Not Full	No	-1.055	6.571
359	2,021.00	0	0.00	0	2,014.68	Not Full	No	-0.594	6.324
36	1,903.32	0.001	0.00	0	1,892.03	Not Full	No	-0.629	11.292
37	1,900.08	0	0.00	0	1,890.02	Not Full	No	-0.681	10.061
38	1,898.16	0.001	0.01	0	1,890.30	Not Full	No	-0.529	7.862
39	1,900.00	0.001	0.01	0	1,891.67	Not Full	No	-0.612	8.326
40	1,897.95	0.003	0.02	0	1,892.18	Not Full	No	-0.364	5.774
41	1,899.80	0.006	0.03	0	1,893.58	Not Full	No	-0.387	6.217
42	1,896.49	0	0.00	0	1,890.80	Not Full	No	-0.461	5.691
43	1,895.86	0	0.00	0	1,889.36	Not Full	No	-0.448	6.498
44	1,893.36	0.001	0.01	0	1,888.39	Not Full	No	-0.197	4.967
45	1,896.06	0.001	0.01	0	1,889.59	Not Full	No	-0.444	6.474
46	1,893.46	0.003	0.02	0	1,889.67	Not Full	No	-0.58	3.793
47	1,892.15	0.007	0.03	0	1,888.23	Not Full	No	-0.536	3.919
48	1,892.04	0.004	0.00	0	1,884.42	Not Full	No	-0.956	7.62
49	1,901.26	0	0.00	0	1,890.58	Not Full	No	-0.803	10.683
5	1,892.50	0.004	0.02	0	1,883.82	Not Full	No	-0.865	8.682
50	1,904.70	0.001	0.01	0	1,891.59	Not Full	No	-0.619	13.112
51	1,902.00	0.001	0.00	0	1,891.09	Not Full	No	-0.757	10.907
52	1,901.60	0.001	0.01	0	1,891.90	Not Full	No	-0.521	9.704
53	1,902.23	0.001	0.01	0	1,892.67	Not Full	No	-0.609	9.562
54	1,901.27	0.01	0.05	0	1,893.77	Not Full	No	-0.535	7.498
55	1,903.50	0.008	0.04	0	1,895.19	Not Full	No	-0.545	8.309
56	1,905.22	0.002	0.01	0	1,894.68	Not Full	No	-0.606	10.539
57	1,904.23	0.001	0.01	0	1,893.33	Not Full	No	-0.519	10.903
58	1,903.60	0	0.00	0	1,891.92	Not Full	No	-1.042	11.682

59	1,904.56	0	0.00	0	1,892.79	Not Full	Yes	-1.102	11.772
6	1,892.21	0	0.00	0	1,883.53	Not Full	No	-1.126	8.676
60	1,903.51	0	0.00	0	1,893.27	Not Full	No	-0.463	10.236
61	1,905.99	0	0.00	0	1,894.72	Not Full	No	-0.464	11.267
62	1,914.62	0.013	0.06	0	1,896.69	Not Full	No	-0.272	17.932
63	1,907.19	0	0.00	0	1,894.69	Not Full	No	-1.275	12.505
64	1,907.22	0	0.00	0	1,897.27	Not Full	No	-0.35	9.95
65	1,907.94	0	0.00	0	1,895.88	Not Full	No	-0.378	12.062
66	1,909.08	0	0.00	0	1,896.74	Not Full	No	-0.436	12.339
67	1,907.85	0	0.00	0	1,897.80	Not Full	No	-0.354	10.054
68	1,908.00	0	0.00	0	1,899.05	Not Full	No	-0.357	8.947
69	1,908.37	0	0.00	0	1,896.03	Not Full	No	-1.077	12.337
7	1,893.67	0.002	0.01	0	1,884.04	Not Full	No	-0.722	9.632
70	1,908.95	0.001	0.00	0	1,897.63	Not Full	No	-0.528	11.322
71	1,909.06	0	0.00	0	1,897.05	Not Full	No	-0.539	12.012
72	1,909.81	0.001	0.01	0	1,896.47	Not Full	No	-0.518	13.341
73	1,907.32	0	0.00	0	1,895.82	Not Full	No	-0.514	11.497
74	1,906.94	0.001	0.00	0	1,895.66	Not Full	No	-0.511	11.284
75	1,905.39	0.002	0.01	0	1,899.96	Not Full	No	-0.423	5.433
76	1,906.70	0.001	0.01	0	1,898.94	Not Full	No	-0.375	7.765
77	1,908.30	0.002	0.01	0	1,900.07	Not Full	No	-0.408	8.228
78	1,907.93	0.002	0.01	0	1,900.91	Not Full	No	-0.427	7.017
79	1,907.62	0.004	0.02	0	1,899.54	Not Full	No	-0.358	8.078
8	1,889.01	0.03	0.13	0	1,882.83	Not Full	No	-1.02	6.177
80	1,907.90	0.001	0.01	0	1,900.25	Not Full	No	-0.395	7.655
81	1,908.54	0.001	0.01	0	1,901.05	Not Full	No	-0.411	7.491
82	1,909.90	0.001	0.01	0	1,902.03	Not Full	No	-0.423	7.873
83	1,910.84	0	0.00	0	1,903.17	Not Full	No	-0.44	7.67
84	1,910.98	0	0.00	0	1,904.16	Not Full	No	-0.451	6.821
85	1,911.18	0	0.00	0	1,904.96	Not Full	No	-0.463	6.223
86	1,911.32	0	0.00	0	1,905.66	Not Full	No	-0.642	5.665
87	1,911.42	0	0.00	0	1,905.87	Not Full	Yes	-0.628	5.551
88	1,919.44	0	0.00	0	1,909.37	Not Full	No	-0.64	10.073
89	1,920.79	0	0.00	0	1,910.71	Not Full	No	-0.646	10.08
9	1,891.38	0.008	0.04	0	1,883.23	Not Full	No	-1.096	8.152
90	1,920.81	0	0.00	0	1,914.68	Not Full	No	-0.492	6.135
91	1,933.95	0	0.00	0	1,923.48	Not Full	No	-0.525	10.469
92	1,992.71	0	0.00	0	1,982.93	Not Full	No	-0.549	9.782
93	2,000.91	0	0.00	0	1,991.11	Not Full	No	-0.568	9.801
94	2,009.14	0	0.00	0	1,999.26	Not Full	No	-0.542	9.876
95	2,009.59	0.001	0.00	0	2,000.82	Not Full	No	-0.516	8.769
96	2,010.90	0.013	0.06	0	2,002.33	Not Full	No	-0.519	8.572
98	2,033.57	0.01	0.047	0	2,023.63	Not Full	No	-0.604	9.938
99	2,020.90	0	0.001	0	2,010.97	Not Full	No	-0.599	9.932



Year 2040 Forcemain

ID	From ID	To ID	Diameter (in)	Length (ft)	Total Flow (mgd)	Unpeakable Flow (mgd)	Peakable Flow (mgd)	Coverage Flow (mgd)	Infiltration Flow (mgd)	Storm Flow (mgd)	Velocity (ft/s)	Headloss (ft)
23	341	190	6	2,195.20	0.187	0.187	0	0	0	0	3.625	15.092

Year 2040 Gavity Main

ID	From ID	To ID	Diameter (in)	Length (ft)	Slope	Total Flow (mgd)	Unpeakable Flow (mgd)	Peakable Flow (mgd)	Coverage Flow (mgd)	Infiltration Flow (mgd)	Storm Flow (mgd)	Flow Type	Velocity (ft/s)	d/D	q/Q	Water Depth (ft)	Critical Depth (ft)	Froude Number	Full Flow (mgd)	Coverage Count	Backwater Adjustment	Adjusted Depth (ft)	Adjusted Velocity (ft/s)
102	102	103	8	102.61	0.129	0.039	0	0.008	0	0	0	Free Surface	4.416	0.082	0.014	0.055	0.111	4.04	2.817	0	No	0.055	4.416
104	205	206	8	104.82	0.005	0.13	0	0.03	0	0	0	Free Surface	2.024	0.327	0.23	0.218	0.206	0.897	0.562	0	No	0.218	2.024
108	149	148	8	108.61	0.005	0.015	0	0.003	0	0	0	Free Surface	1.059	0.113	0.027	0.075	0.068	0.824	0.552	0	No	0.075	1.059
109	52	49	8	158.78	0.005	0.058	0	0.012	0	0	0	Free Surface	1.586	0.218	0.104	0.146	0.136	0.874	0.552	0	No	0.146	1.586
11	329	1	30	64.07	0.001	5.604	2.926	0.881	0	0	0	Free Surface	3.232	0.536	0.562	1.341	0.981	0.549	9.962	0	No	1.341	3.232
111	50	49	8	185.97	0.005	0.006	0	0.001	0	0	0	Free Surface	0.799	0.072	0.01	0.048	0.042	0.781	0.554	0	No	0.048	0.799
114	98	99	8	114.12	0.11	0.047	0	0.01	0	0	0	Free Surface	4.43	0.094	0.018	0.062	0.123	3.79	2.599	0	No	0.062	4.43
118	192	191	8	118.92	0.005	0.031	0	0.006	0	0	0	Free Surface	1.332	0.161	0.056	0.108	0.1	0.861	0.556	0	No	0.108	1.332
119	61	60	8	270.35	0.005	0.068	0	0.015	0	0	0	Free Surface	1.662	0.236	0.122	0.157	0.147	0.879	0.553	0	No	0.157	1.662
120	118	117	6	120.23	0.008	0.126	0	0.03	0	0	0	Free Surface	2.354	0.44	0.4	0.22	0.221	1.013	0.316	0	No	0.22	2.354
121	60	58	8	199.85	0.005	0.069	0	0.015	0	0	0	Free Surface	1.675	0.239	0.125	0.159	0.149	0.88	0.554	0	No	0.159	1.675
124	106	107	8	124.02	0.008	0.006	0	0.001	0	0	0	Free Surface	0.943	0.065	0.008	0.044	0.043	0.968	0.696	0	No	0.044	0.943
125	57	58	8	199.85	0.004	0.053	0	0.011	0	0	0	Free Surface	1.424	0.221	0.107	0.147	0.13	0.779	0.492	0	No	0.147	1.424
127	56	57	8	268.97	0.005	0.01	0	0.002	0	0	0	Free Surface	0.929	0.092	0.017	0.061	0.055	0.804	0.553	0	No	0.061	0.929
128	162	161	8	128.55	0.014	0.014	0	0.003	0	0	0	Free Surface	1.494	0.086	0.015	0.057	0.066	1.336	0.927	0	No	0.057	1.494
131	59	58	27	270.83	0.003	4.688	2.739	0.619	0	0	0	Free Surface	4.195	0.449	0.415	1.01	0.923	0.841	11.31	0	No	1.01	4.195
132	103	92	8	132.31	0.07	0.045	0	0.009	0	0	0	Free Surface	3.719	0.102	0.022	0.068	0.119	3.05	2.071	0	Yes	0.088	2.531
135	74	63	8	155.38	0.003	0.051	0	0.011	0	0	0	Free Surface	1.285	0.233	0.119	0.156	0.128	0.684	0.431	0	No	0.156	1.285
137	73	74	8	23.82	0.003	0.049	0	0.01	0	0	0	Free Surface	1.254	0.229	0.115	0.153	0.125	0.673	0.425	0	No	0.153	1.254
139	65	63	8	199.93	0.002	0.136	0	0.032	0	0	0	Free Surface	1.519	0.419	0.366	0.279	0.211	0.583	0.372	0	No	0.279	1.519
141	64	65	6	213.98	0.004	0.047	0	0.01	0	0	0	Free Surface	1.485	0.298	0.194	0.149	0.133	0.798	0.244	0	No	0.149	1.485
142	80	79	6	142.12	0.005	0.024	0	0.005	0	0	0	Free Surface	1.22	0.211	0.097	0.105	0.094	0.791	0.244	0	No	0.105	1.22
144	202	203	8	144.51	0.002	0.121	0	0.028	0	0	0	Free Surface	1.377	0.414	0.359	0.276	0.199	0.532	0.338	0	No	0.276	1.377
147	66	65	8	303.17	0.003	0.096	0	0.022	0	0	0	Free Surface	1.478	0.331	0.237	0.221	0.177	0.649	0.407	0	No	0.221	1.478
150	53	52	8	150.81	0.005	0.009	0	0.001	0	0	0	Free Surface	0.902	0.087	0.015	0.058	0.052	0.803	0.556	0	No	0.058	0.902
151	71	69	8	161.14	0.005	0.044	0	0.01	0	0	0	Free Surface	1.474	0.191	0.08	0.128	0.119	0.871	0.555	0	No	0.128	1.474
154	117	116	6	154.18	0.008	0.127	0	0.03	0	0	0	Free Surface	2.381	0.438	0.396	0.219	0.222	1.028	0.321	0	No	0.219	2.381
155	72	73	8	183.6	0.003	0.047	0	0.01	0	0	0	Free Surface	1.247	0.223	0.109	0.149	0.122	0.679	0.429	0	No	0.149	1.247
156	153	152	8	156	0.005	0	0	0	0	0	0	Free Surface	0	0	0	0	0	0	0.554	0	No	0	0
160	148	143	8	160.35	0.005	0.055	0	0.012	0	0	0	Free Surface	1.566	0.213	0.1	0.142	0.133	0.874	0.553	0	No	0.142	1.566
161	78	77	6	151.46	0.005	0.012	0	0.002	0	0	0	Free Surface	1.033	0.146	0.046	0.073	0.066	0.811	0.258	0	No	0.073	1.033
162	71	72	8	162.23	0.003	0.04	0	0.009	0	0	0	Free Surface	1.195	0.206	0.093	0.138	0.113	0.679	0.43	0	No	0.138	1.195
163	76	71	6	359.63	0.005	0.035	0	0.007	0	0	0	Free Surface	1.414	0.249	0.136	0.125	0.114	0.838	0.257	0	No	0.125	1.414
164	152	151	8	164.56	0.005	0.005	0	0.001	0	0	0	Free Surface	0.744	0.065	0.008	0.043	0.038	0.553	0.553	0	No	0.043	0.744
166	160	159	8	166.94	0.005	0.045	0	0.009	0	0	0	Free Surface	1.521	0.188	0.078	0.126	0.119	0.906	0.578	0	No	0.126	1.521
167	158	70	8	208.68	0.006	0.052	0	0.011	0	0	0	Free Surface	1.591	0.201	0.089	0.134	0.128	0.915	0.581	0	No	0.134	1.591
171	159	158	8	141.38	0.006	0.049	0	0.01	0	0	0	Free Surface	1.564	0.195	0.084	0.13	0.124	0.914	0.582	0	No	0.13	1.564
175	161	160	8	167.27	0.006	0.039	0	0.008	0	0	0	Free Surface	1.464	0.175	0.067	0.117	0.111	0.905	0.581	0	No	0.117	1.464
178	195	194	8	178.45	0.005	0.023	0	0.005	0	0	0	Free Surface	1.213	0.14	0.042	0.093	0.086	0.844	0.553	0	Yes	0.094	1.205
180	122	121	8	180.4	0.006	0.007	0	0.001	0	0	0	Free Surface	0.891	0.073	0.011	0.049	0.045	0.864	0.611	0	Yes	0.079	0.442
187	81	80	6	158.81	0.005	0.017	0	0.003	0	0	0	Free Surface	1.107	0.178	0.069	0.089	0.079	0.784	0.245	0	No	0.089	1.107
189	82	81	6	199.09	0.004	0.012	0	0.002	0	0	0	Free Surface	1.005	0.154	0.051	0.077	0.067	0.769	0.243	0	No	0.077	1.005
190	132	131	8	190.34	0.005	0.066	0	0.014	0	0	0	Free Surface	1.631	0.235	0.121	0.157	0.145	0.865	0.544	0	No	0.157	1.631
1914	248	35	8	203.54	0.005	0.018	0	0.003	0	0	0	Free Surface	1.133	0.125	0.033	0.083	0.076	0.836	0.554	0	No	0.083	1.133
192	75	76	6	192.59	0.005	0.013	0	0.002	0	0	0	Free Surface	1.069	0.154	0.051	0.077	0.07	0.816	0.258	0	No	0.077	1.069
193	84	83	6	199.25	0.005	0.005	0	0.001	0	0	0	Free Surface	0.759	0.097	0.02	0.049	0.042	0.735	0.244	0	No	0.049	0.759
195	85	84	6	158.46	0.004	0.003	0	0	0	0	0	Free Surface	0.64	0.075	0.011	0.037	0.031	0.708	0.243	0	No	0.037	0.64
1953	236	147	24	230.5	0.006	3.148	1.681	0.451	0	0	0	Free Surface	4.78	0.36	0.278	0.72	0.777	1.156	11.344	0	No	0.72	4.78
196	214	215	12	196.69	0.174	0.029	0	0.006	0	0	0	Free Surface	4.217	0.04	0.003	0.04	0.086	4.528	9.629	0	Yes	0.095	1.168
197	86	85	6	135.25	0.005	0.001	0	0	0	0	0	Free Surface	0.495	0.05	0.005	0.025	0.021	0.671	0.244	0	No	0.025	0.495
1993	242	138	8	444.1	0.015	0.019	0	0.004	0	0	0	Free Surface	1.684	0.099	0.02	0.066	0.078	1.402	0.955	0	Yes	0.091	1.05
20	87	86	8	20.37	0.005	0.004	0	0.001	0	0	0	Free Surface	0.689	0.058	0.007	0.039	0.034	0.751	0.549	0	No	0.039	0.689
201	100	102	8	81.74	0.188	0.038	0	0.008	0	0	0	Free Surface	5.002	0.075	0.011	0.05	0.11	4.803	3.391	0	No	0.05	5.002
202	30	23	8	202.31	0.005	0.077	0	0.017	0	0	0	Free Surface	1.726	0.252	0.139	0.168	0.157	0.881	0.553	0	Yes	0.431	0.498
2020	1526479	1526515	21	40.76	0.007	2.76	1.681	0.321	0	0	0	Free Surface	4.888	0.392	0.324	0.686	0.755	1.205	8.511	0	Yes	0.735	4.457
2021	1526248	1526479	21	251.24	0.002	2.756	1.681	0.319	0	0	0	Free Surface	3.261	0.534	0.559	0.935	0.755	0.664	4.934	0	No	0.935	3.261
2023	359	210	12	104	0.005	0.411	0	0.11	0	0	0	Free Surface	2.678	0.342	0.252	0.342	0.332	0.944	1.633	0	No	0.342	2.678
2024	267	1527149	8	287.17	0.015	0.04	0	0.008	0	0	0	Free Surface	2.072	0.14	0.042	0.093	0.112	1.441	0.944	0	No	0.093	2.072
203	35	25	8	203.93	0.005	0.022	0	0.004	0	0	0	Free Surface	1.202	0.137	0.041	0.092	0.084	0.844	0.554	0	No	0.092	1.202
2035	1523662	1523																					

2115	1521741	1521987	15	122	0.005	0.319	0.225	0.021	0	0	0	Free Surface	2.44	0.222	0.108	0.277	0.274	0.974	2.96	0	No	0.277	2.44
2116	1520835	1521170	15	249	0.028	0.286	0.225	0.013	0	0	0	Free Surface	4.307	0.139	0.041	0.173	0.259	2.2	6.943	0	Yes	0.184	3.937
2117	1520554	1520596	18	73.36	0.015	1.322	0.699	0.174	0	0	0	Free Surface	5.367	0.268	0.157	0.402	0.539	1.766	8.411	0	No	0.402	5.367
2120	1521493	1521741	15	94	0.038	0.311	0.225	0.019	0	0	0	Free Surface	4.924	0.134	0.038	0.167	0.27	2.561	8.112	0	Yes	0.172	4.716
2121	1520785	1520752	15	304	0.003	0.247	0.225	0.004	0	0	0	Free Surface	1.77	0.232	0.118	0.29	0.24	0.69	2.093	0	No	0.29	1.77
2122	1520720	1520835	15	144.77	0.003	0.262	0.225	0.007	0	0	0	Free Surface	1.815	0.237	0.124	0.297	0.247	0.698	2.116	0	No	0.297	1.815
2123	1519963	1520233	18	303.55	0.007	1.295	0.699	0.166	0	0	0	Free Surface	4.101	0.32	0.222	0.481	0.534	1.223	5.821	0	No	0.481	4.101
2124	1520752	1520720	15	299.55	0.002	0.251	0.225	0.005	0	0	0	Free Surface	1.71	0.24	0.127	0.301	0.242	0.654	1.98	0	No	0.301	1.71
2125	1519678	1519963	18	302.11	0.009	1.046	0.45	0.166	0	0	0	Free Surface	4.206	0.27	0.159	0.405	0.478	1.379	6.565	0	No	0.405	4.206
2128	1519372	1519678	18	311	0.009	1.029	0.45	0.161	0	0	0	Free Surface	4.18	0.268	0.157	0.402	0.474	1.376	6.551	0	No	0.402	4.18
213	77	76	6	213.02	0.005	0.019	0	0.004	0	0	0	Free Surface	1.19	0.185	0.074	0.092	0.084	0.828	0.258	0	No	0.092	1.19
2132	1518982	1519372	18	395.76	0.01	1.002	0.45	0.152	0	0	0	Free Surface	4.292	0.258	0.146	0.397	0.467	1.442	6.869	0	No	0.397	4.292
2134	1518939	1518982	18	104.06	0.009	0.953	0.45	0.137	0	0	0	Free Surface	3.975	0.263	0.151	0.394	0.455	1.322	6.295	0	No	0.394	3.975
2136	1518620	1518939	18	318.34	0.002	0.946	0.45	0.135	0	0	0	Free Surface	2.343	0.384	0.312	0.576	0.454	0.631	3.028	0	No	0.576	2.343
2138	1518351	1518620	18	275.78	0.007	0.45	0.45	0	0	0	0	Free Surface	3.003	0.189	0.078	0.283	0.31	1.191	5.768	0	Yes	0.38	1.982
215	93	92	8	104	0.079	0.101	0	0.023	0	0	0	Free Surface	4.957	0.146	0.046	0.097	0.181	3.372	2.199	0	Yes	0.103	4.574
217	241	240	24	217.09	0.024	3.146	1.681	0.451	0	0	0	Free Surface	7.895	0.251	0.138	0.501	0.777	2.333	22.842	0	Yes	0.53	7.307
218	21	20	27	218.05	0.002	4.963	2.739	0.717	0	0	0	Free Surface	3.218	0.579	0.636	1.303	0.95	0.547	7.808	0	No	1.303	3.218
219	243	242	8	155.28	0.022	0.016	0	0.003	0	0	0	Free Surface	1.821	0.083	0.014	0.055	0.071	1.659	1.155	0	No	0.055	1.821
221	206	207	8	181.83	0.212	0.13	0	0.031	0	0	0	Free Surface	7.559	0.13	0.036	0.087	0.206	5.465	3.608	0	Yes	0.105	5.716
224	43	44	6	224.22	0.005	0.006	0	0.001	0	0	0	Free Surface	0.828	0.103	0.022	0.052	0.045	0.778	0.257	0	No	0.052	0.828
225	91	90	8	149.22	0.059	0.16	0	0.038	0	0	0	Free Surface	5.131	0.196	0.084	0.131	0.229	2.995	1.906	0	Yes	0.146	4.365
227	129	128	8	227.46	0.015	0.097	0	0.022	0	0	0	Free Surface	2.739	0.214	0.1	0.143	0.177	1.526	0.966	0	No	0.143	2.739
229	110	90	8	364.7	0.005	0.007	0	0.001	0	0	0	Free Surface	0.829	0.077	0.012	0.051	0.045	0.786	0.553	0	Yes	0.106	0.283
231	89	88	8	273.33	0.005	0.001	0	0	0	0	0	Free Surface	0.434	0.03	0.002	0.02	0.016	0.658	0.53	0	No	0.02	0.434
233	88	87	8	217.66	0.016	0.003	0	0.001	0	0	0	Free Surface	0.974	0.041	0.003	0.027	0.031	1.273	0.98	0	No	0.027	0.974
235	83	82	6	235.53	0.005	0.007	0	0.001	0	0	0	Free Surface	0.864	0.12	0.031	0.06	0.052	0.752	0.244	0	No	0.06	0.864
237	90	121	8	340.05	0.026	0.165	0	0.04	0	0	0	Free Surface	3.891	0.243	0.129	0.162	0.233	2.026	1.274	0	No	0.162	3.891
239	22	21	27	239.67	0.002	4.96	2.739	0.716	0	0	0	Free Surface	3.208	0.58	0.638	1.305	0.95	0.545	7.779	0	No	1.305	3.208
241	121	120	6	57.1	0.008	0.121	0	0.029	0	0	0	Free Surface	2.419	0.417	0.364	0.209	0.217	1.075	0.333	0	No	0.209	2.419
242	199	201	8	242.84	0.012	0.066	0	0.014	0	0	0	Free Surface	2.253	0.188	0.077	0.125	0.146	1.343	0.857	0	No	0.125	2.253
243	120	119	6	119.04	0.008	0.125	0	0.029	0	0	0	Free Surface	2.347	0.438	0.397	0.219	0.22	1.013	0.316	0	No	0.219	2.347
245	124	123	8	199.84	0.012	0.004	0	0.001	0	0	0	Free Surface	0.931	0.046	0.004	0.031	0.033	1.137	0.858	0	No	0.031	0.931
246	27	28	8	246.57	0.014	0.083	0	0.019	0	0	0	Free Surface	2.533	0.204	0.091	0.136	0.164	1.449	0.92	0	No	0.136	2.533
247	146	145	27	268.09	0.042	4.315	2.739	0.489	0	0	0	Free Surface	10.408	0.218	0.104	0.491	0.884	3.122	41.296	0	Yes	0.57	8.435
249	168	167	8	208.29	0.005	0.173	0	0.042	0	0	0	Free Surface	2.167	0.384	0.312	0.256	0.239	0.876	0.553	0	No	0.256	2.167
25	11	10	16	11.42	0	0.057	0	0.012	0	0	0	Free Surface	0.161	0.418	0.365	0.557	0.113	0.044	0.157	0	No	0.161	0.161
251	156	157	8	251.59	0.003	0.008	0	0.006	0	0	0	Free Surface	1.076	0.173	0.065	0.115	0.094	0.67	0.43	0	No	0.115	1.076
253	167	145	8	160.44	0.005	0.173	0	0.042	0	0	0	Free Surface	2.168	0.385	0.314	0.256	0.239	0.875	0.553	0	No	0.256	2.168
255	153	154	8	33.27	0.003	0	0	0	0	0	0	Free Surface	0	0	0	0	0	0	0.429	0	No	0	0
257	68	67	6	257.7	0.005	0.043	0	0.009	0	0	0	Free Surface	1.45	0.285	0.177	0.142	0.127	0.8	0.244	0	No	0.142	1.45
259	138	127	8	259.78	0.004	0.116	0	0.027	0	0	0	Free Surface	1.836	0.324	0.227	0.216	0.195	0.817	0.512	0	No	0.216	1.836
261	121	144	8	180.13	0.011	0.048	0	0.012	0	0	0	Free Surface	1.988	0.163	0.058	0.109	0.123	1.278	0.825	0	No	0.109	1.988
263	116	115	8	303.48	0.003	0.088	0	0.021	0	0	0	Free Surface	1.439	0.315	0.216	0.21	0.168	0.65	0.407	0	No	0.21	1.439
264	28	29	8	264.04	0.006	0.084	0	0.019	0	0	0	Free Surface	1.92	0.249	0.136	0.166	0.165	0.985	0.619	0	No	0.166	1.92
267	94	93	8	267.67	0.03	0.1	0	0.023	0	0	0	Free Surface	3.533	0.183	0.073	0.122	0.18	2.135	1.365	0	No	0.122	3.533
268	51	49	27	268.31	0.001	4.764	2.739	0.646	0	0	0	Free Surface	3.139	0.571	0.623	1.286	0.93	0.539	7.652	0	No	1.286	3.139
269	45	44.00	6	269.21	0.005	0.007	0	0.001	0	0	0	Free Surface	0.871	0.112	0.026	0.056	0.05	0.785	0.257	0	No	0.056	0.871
27	1524166	1525807	8	1,739.88	0.012	0.277	0	0.071	0	0	0	Free Surface	3.344	0.395	0.329	0.263	0.305	1.328	0.841	0	No	0.263	3.344
270	42	43	6	270.1	0.005	0.003	0	0	0	0	0	Free Surface	0.694	0.078	0.012	0.039	0.034	0.752	0.257	0	No	0.039	0.694
272	261	238	24	272.96	0.04	3.147	1.681	0.451	0	0	0	Free Surface	9.442	0.221	0.107	0.442	0.777	2.985	29.39	0	No	0.442	9.442
273	19	18	27	273.14	0.002	4.978	2.739	0.722	0	0	0	Free Surface	3.299	0.569	0.618	1.279	0.952	0.568	8.055	0	No	1.279	3.299
275	46	47	8	275.45	0.005	0.02	0	0.004	0	0	0	Free Surface	1.165	0.131	0.036	0.087	0.08	0.84	0.554	0	No	0.087	1.165
277	115	114	8	164.24	0.003	0.092	0	0.021	0	0	0	Free Surface	1.455	0.325	0.228	0.216	0.173	0.647	0.405	0	No	0.216	1.455
278	32	31	8	278.14	0.005	0.072	0	0.016	0	0	0	Free Surface	1.693	0.243	0.13	0.162	0.152	0.88	0.554	0	No	0.162	1.693
279	143	142	27	196.9	0.005	4.505	2.739	0.555	0	0	0	Free Surface	5.07	0.378	0.303	0.85	0.904	1.125	14.864	0	Yes	1.021	3.974
28	104	105	8	28.7	0.046	0.023	0	0.005	0	0	0	Free Surface	2.646	0.082	0.014	0.055	0.086	2.418	1.686	0	No	0.055	2.646
280	9	8	16	280.8	0.001	0.144	0	0.034	0	0	0	Free Surface	1.325	0.178	0.069	0.238	0.179	0.575	2.083	0	Yes	0.242	1.291
281	142	141	27	169.82	0.001	4.533	2.739	0.565	0	0	0	Free Surface	2.969	0.574	0.628	1.292	0.907	0.508	7.224	0	No	1.292	2.969
282	107	103	8	282.43	0.033	0.007	0	0.001	0	0</													

323	25	24	27	323.55	0.002	4.846	2.739	0.675	0	0	0	Free Surface	3.202	0.57	0.62	1.283	0.939	0.55	7.81	0	No	1.283	3.202
325	105	108	8	149.81	0.03	0.025	0	0.005	0	0	0	Free Surface	2.326	0.094	0.018	0.062	0.088	1.99	1.365	0	No	0.062	2.326
327	92	91	8	486.1	0.122	0.157	0	0.038	0	0	0	Free Surface	6.59	0.163	0.058	0.109	0.228	4.238	2.737	0	No	0.109	6.59
328	154	155	8	328.25	0.003	0.002	0	0	0	0	0	Free Surface	0.516	0.055	0.006	0.036	0.028	0.58	0.428	0	No	0.036	0.516
329	79	68	6	88.13	0.004	0.043	0	0.009	0	0	0	Free Surface	1.435	0.284	0.176	0.142	0.126	0.793	0.242	0	No	0.142	1.435
33	1527159	343	8	101.56	0.018	0.353	0	0.093	0	0	0	Free Surface	4.173	0.401	0.338	0.267	0.347	1.644	1.043	0	No	0.267	4.173
331	163	162	8	183.17	0.014	0.008	0	0.001	0	0	0	Free Surface	1.261	0.066	0.009	0.044	0.05	1.291	0.928	0	No	0.044	1.261
332	207	208	8	332.15	0.005	0.134	0	0.032	0	0	0	Free Surface	2.021	0.335	0.242	0.223	0.209	0.882	0.554	0	No	0.223	2.021
333	210	209	12	333.08	0.022	0.016	0	0.004	0	0	0	Free Surface	1.717	0.05	0.005	0.05	0.064	1.65	3.397	0	No	0.05	1.717
337	163	164	6	290.83	0.004	0	0	0	0	0	0	Free Surface	0	0	0	0	0	0	0.231	0	No	0	0
339	165	166	6	311.14	0.004	0.013	0	0.002	0	0	0	Free Surface	0.985	0.163	0.058	0.082	0.07	0.73	0.23	0	No	0.082	0.985
340	212	213	12	340.04	0.01	0.026	0	0.005	0	0	0	Free Surface	1.5	0.075	0.011	0.075	0.081	1.172	2.278	0	No	0.075	1.5
341	247	246	8	341.59	0.04	0.006	0	0.001	0	0	0	Free Surface	1.624	0.043	0.004	0.029	0.041	2.056	1.569	0	No	0.029	1.624
342	113	66	8	342.82	0.003	0.095	0	0.022	0	0	0	Free Surface	1.474	0.328	0.233	0.219	0.175	0.65	0.408	0	No	0.219	1.474
344	144	143	27	344.41	0.008	4.47	2.739	0.543	0	0	0	Free Surface	5.893	0.336	0.244	0.756	0.9	1.398	18.353	0	Yes	0.758	5.875
345	216	5	16	359.03	0.002	0.499	0.187	0.081	0	0	0	Free Surface	1.791	0.347	0.259	0.463	0.338	0.542	1.926	0	No	0.463	1.791
347	217	216	16	400.33	0.002	0.489	0.187	0.078	0	0	0	Free Surface	1.782	0.344	0.254	0.458	0.334	0.542	1.926	0	No	0.458	1.782
349	218	217	16	398.51	0.002	0.482	0.187	0.076	0	0	0	Free Surface	1.774	0.341	0.25	0.454	0.332	0.542	1.926	0	No	0.454	1.774
35	343	345	8	281.14	0.064	0.357	0	0.094	0	0	0	Free Surface	6.661	0.287	0.18	0.192	0.349	3.166	1.983	0	No	0.192	6.661
351	63	59	27	351.44	0.006	4.688	2.739	0.619	0	0	0	Free Surface	5.166	0.384	0.312	0.863	0.923	1.137	15.027	0	Yes	0.886	4.984
353	219	218	16	399.46	0.002	0.474	0.187	0.074	0	0	0	Free Surface	1.766	0.338	0.246	0.451	0.329	0.542	1.926	0	No	0.451	1.766
355	40	38	6	355.6	0.005	0.042	0	0.009	0	0	0	Free Surface	1.489	0.272	0.161	0.136	0.124	0.842	0.257	0	No	0.136	1.489
357	54	52	8	357.41	0.005	0.047	0	0.01	0	0	0	Free Surface	1.501	0.198	0.086	0.132	0.123	0.872	0.554	0	No	0.132	1.501
358	55	57	8	358.83	0.005	0.04	0	0.008	0	0	0	Free Surface	1.425	0.182	0.072	0.121	0.113	0.864	0.553	0	No	0.121	1.425
359	166	161	6	359.84	0.004	0.026	0	0.005	0	0	0	Free Surface	1.232	0.224	0.11	0.112	0.098	0.774	0.238	0	No	0.112	1.232
360	49	37	27	360.01	0.002	4.802	2.739	0.66	0	0	0	Free Surface	3.272	0.556	0.596	1.251	0.934	0.572	8.056	0	No	1.251	3.272
361	220	219	16	401.02	0.002	0.466	0.187	0.071	0	0	0	Free Surface	1.758	0.335	0.242	0.447	0.326	0.543	1.926	0	No	0.447	1.758
363	58	51	27	363.28	0.003	4.763	2.739	0.646	0	0	0	Free Surface	4.01	0.47	0.45	1.058	0.93	0.781	10.583	0	Yes	1.122	3.72
364	157	148	8	364.38	0.001	0.038	0	0.008	0	0	0	Free Surface	0.722	0.283	0.174	0.188	0.11	0.347	0.217	0	No	0.188	0.722
365	221	220	16	399.64	0.002	0.455	0.187	0.068	0	0	0	Free Surface	1.746	0.331	0.236	0.441	0.322	0.543	1.926	0	No	0.441	1.746
367	222	221	16	400.83	0.002	0.437	0.187	0.063	0	0	0	Free Surface	1.727	0.324	0.227	0.432	0.316	0.543	1.926	0	No	0.432	1.727
368	62	61	6	368.6	0.005	0.066	0	0.014	0	0	0	Free Surface	1.696	0.346	0.257	0.173	0.158	0.84	0.257	0	No	0.173	1.696
369	131	130	8	369.7	0.007	0.073	0	0.016	0	0	0	Free Surface	1.895	0.226	0.112	0.151	0.153	1.025	0.647	0	No	0.151	1.895
37	18	17	27	7.67	0.003	4.983	2.739	0.724	0	0	0	Free Surface	3.96	0.492	0.486	1.107	0.952	0.75	10.249	0	Yes	1.176	3.667
371	69	63	27	371.06	0.003	4.565	2.739	0.576	0	0	0	Free Surface	3.992	0.457	0.428	1.028	0.91	0.792	10.676	0	No	1.028	3.992
373	145	144	27	373.33	0.009	4.437	2.739	0.531	0	0	0	Free Surface	5.934	0.333	0.239	0.748	0.897	1.416	18.581	0	No	0.748	5.934
375	223	222	16	399.76	0.002	0.418	0.187	0.058	0	0	0	Free Surface	1.705	0.316	0.217	0.422	0.308	0.543	1.926	0	No	0.422	1.705
377	224	223	16	399.7	0.002	0.399	0.187	0.053	0	0	0	Free Surface	1.682	0.309	0.207	0.412	0.301	0.543	1.926	0	No	0.412	1.682
379	225	224	16	399.12	0.002	0.391	0.187	0.051	0	0	0	Free Surface	1.674	0.306	0.203	0.408	0.298	0.544	1.926	0	No	0.408	1.674
383	226	225	16	187.32	0.002	0.055	0	0.012	0	0	0	Free Surface	0.942	0.116	0.029	0.155	0.11	0.51	1.926	0	Yes	0.231	0.527
384	140	139	27	384.02	0.002	4.525	2.739	0.565	0	0	0	Free Surface	3.263	0.519	0.533	1.169	0.907	0.615	8.507	0	No	1.169	3.263
385	227	225	16	400.25	0.002	0.341	0.187	0.037	0	0	0	Free Surface	1.609	0.285	0.177	0.38	0.278	0.543	1.926	0	No	0.38	1.609
387	228	227	16	399.7	0.002	0.321	0.187	0.032	0	0	0	Free Surface	1.581	0.276	0.167	0.368	0.269	0.543	1.926	0	No	0.368	1.581
388	139	69	27	388.99	0.002	4.536	2.739	0.566	0	0	0	Free Surface	3.506	0.503	0.505	1.131	0.907	0.655	8.987	0	No	1.131	3.506
389	229	228	16	400.58	0.002	0.306	0.187	0.028	0	0	0	Free Surface	1.56	0.269	0.159	0.359	0.263	0.543	1.926	0	No	0.359	1.56
39	345	257	8	432.29	0.021	0.36	0	0.095	0	0	0	Free Surface	4.458	0.387	0.317	0.258	0.35	1.792	1.133	0	No	0.258	4.458
391	230	229	16	400.1	0.002	0.287	0.187	0.023	0	0	0	Free Surface	1.531	0.261	0.149	0.348	0.254	0.543	1.926	0	No	0.348	1.531
393	231	230	16	398.53	0.002	0.266	0.187	0.018	0	0	0	Free Surface	1.5	0.251	0.138	0.335	0.245	0.542	1.926	0	No	0.335	1.5
395	233	231	16	398.53	0.002	0.249	0.187	0.013	0	0	0	Free Surface	1.506	0.239	0.125	0.318	0.237	0.559	1.992	0	No	0.318	1.506
396	237	236	24	396.4	0.071	3.147	1.681	0.451	0	0	0	Free Surface	11.518	0.192	0.081	0.385	0.777	3.92	38.928	0	Yes	0.552	6.892
397	234	233	15	401.04	0.002	0.238	0.187	0.011	0	0	0	Free Surface	1.461	0.259	0.147	0.324	0.235	0.537	1.621	0	No	0.324	1.461
399	189	234	15	399.03	0.002	0.221	0.187	0.007	0	0	0	Free Surface	1.43	0.249	0.136	0.312	0.227	0.536	1.621	0	No	0.312	1.43
40	211	212	12	40.1	0.009	0.025	0	0.005	0	0	0	Free Surface	1.434	0.076	0.012	0.076	0.08	1.112	2.157	0	No	0.076	1.434
401	190	189	30	401.7	0.002	0.21	0.187	0.004	0	0	0	Free Surface	1.292	0.099	0.02	0.247	0.184	0.555	10.295	0	No	0.247	1.292
403	137	129	8	403.07	0.005	0.007	0	0.001	0	0	0	Free Surface	0.858	0.08	0.013	0.054	0.048	0.793	0.554	0	No	0.054	0.858
404	213	214	12	404.44	0.004	0.028	0	0.005	0	0	0	Free Surface	1.129	0.095	0.019	0.095	0.084	0.784	1.479	0	No	0.095	1.129
405	250	26	8	160.9	0.014	0.08	0	0.018	0	0	0	Free Surface	2.489	0.201	0.088	0.134	0.161	1.435	0.911	0	No	0.134	2.489
407	245	244	8	407.94	0.023	0.012	0	0.002	0	0	0	Free Surface	1.682	0.07	0.01	0.047	0.061	1.664	1.184	0	No	0.047	1.682
409	253	46	8	324.26	0.005	0.004	0	0.001	0	0	0	Free Surface	0.714	0.061	0.007	0.04	0.035	0.762	0.553	0	No	0.04	0.714
411	244	243	8	411.44	0.021	0.014	0	0.003	0	0	0	Free Surface	1.725	0.079	0.013</								

461	1523897	1524235	18	343.33	0.008	2.064	1.261	0.231	0	0	0	Free Surface	4.754	0.405	0.345	0.608	0.68	1.241	5.98	0	No	0.608	4.754
463	1523699	1523897	18	201.33	0.002	2.061	1.261	0.23	0	0	0	Free Surface	3.04	0.574	0.627	0.861	0.68	0.637	3.289	0	No	0.861	3.04
465	1524168	1524235	15	379.05	0.009	0.635	0.42	0.053	0	0	0	Free Surface	3.66	0.271	0.16	0.339	0.389	1.312	3.959	0	Yes	0.407	2.837
467	1523119	1523316	18	199.06	0.003	2.052	1.261	0.227	0	0	0	Free Surface	3.262	0.54	0.568	0.81	0.678	0.712	3.611	0	No	0.81	3.262
469	1523115	1523119	8	49.78	0.039	0.283	0.281	0.1	0	0	0	Free Surface	5.207	0.29	0.183	0.193	0.309	2.462	1.542	0	Yes	0.452	1.739
47	29	22	8	55.65	0.015	0.085	0	0.019	0	0	0	Free Surface	2.62	0.202	0.089	0.134	0.166	1.506	0.956	0	Yes	0.46	0.513
471	1523098	1523115	8	200.74	0.106	0.281	0.281	0	0	0	0	Free Surface	7.427	0.224	0.11	0.15	0.308	4.034	2.546	0	No	0.15	7.427
473	1522749	1523119	18	369.3	0.003	1.768	0.98	0.226	0	0	0	Free Surface	3.277	0.478	0.463	0.717	0.628	0.774	3.815	0	No	0.717	3.277
477	1522563	1522749	18	210.86	0.004	1.762	0.98	0.226	0	0	0	Free Surface	3.668	0.437	0.396	0.656	0.626	0.915	4.447	0	Yes	0.802	2.836
479	1522331	1522563	18	232.4	0.003	1.758	0.98	0.223	0	0	0	Free Surface	3.239	0.481	0.467	0.721	0.626	0.762	3.763	0	No	0.721	3.239
481	1522114	1522331	18	224.81	0.003	1.749	0.98	0.22	0	0	0	Free Surface	3.15	0.489	0.482	0.734	0.624	0.733	3.632	0	No	0.734	3.15
483	1521864	1522114	18	262.12	0.003	1.744	0.98	0.219	0	0	0	Free Surface	3.2	0.482	0.47	0.723	0.623	0.752	3.713	0	No	0.723	3.2
485	1521558	1521864	18	308.55	0.029	1.738	0.98	0.217	0	0	0	Free Surface	7.29	0.262	0.15	0.393	0.622	2.43	11.574	0	Yes	0.508	5.103
487	108	92	8	487.78	0.02	0.026	0	0.005	0	0	0	Free Surface	2.046	0.106	0.023	0.07	0.091	1.645	1.111	0	Yes	0.09	1.444
489	1521245	1521558	18	313.48	0.029	1.447	0.699	0.214	0	0	0	Free Surface	6.944	0.238	0.124	0.257	0.565	2.436	11.643	0	No	0.357	6.944
491	1521063	1521245	18	181.97	0.176	1.434	0.699	0.21	0	0	0	Free Surface	13.053	0.152	0.05	0.229	0.563	5.793	28.573	0	Yes	0.243	11.955
493	1521458	1521558	8	331.14	0.169	0.281	0.281	0	0	0	0	Free Surface	8.771	0.2	0.087	0.133	0.308	5.068	3.221	0	Yes	0.213	4.526
495	1523943	1524003	15	333.91	0.005	0.587	0.42	0.04	0	0	0	Free Surface	2.79	0.302	0.199	0.378	0.374	0.979	2.952	0	No	0.378	2.9
497	1522706	1523047	15	341.43	0.002	0.355	0.225	0.031	0	0	0	Free Surface	1.712	0.308	0.206	0.385	0.289	0.572	1.725	0	No	0.385	1.712
499	1522997	1523047	15	357.3	0.005	0.005	0	0.001	0	0	0	Free Surface	0.676	0.032	0.002	0.039	0.034	0.732	2.819	0	Yes	0.106	0.156
501	1523047	1523178	15	136.26	0.016	0.553	0.42	0.031	0	0	0	Free Surface	4.324	0.218	0.104	0.273	0.363	1.74	5.295	0	No	0.273	4.324
503	1523178	1523433	15	288.54	0.013	0.557	0.42	0.032	0	0	0	Free Surface	3.97	0.233	0.119	0.291	0.364	1.544	4.682	0	Yes	0.31	3.627
505	1521170	1521493	15	420	0.005	0.294	0.225	0.015	0	0	0	Free Surface	2.394	0.212	0.099	0.265	0.262	0.978	2.981	0	No	0.265	2.394
507	1520816	1520785	12	298.95	0.006	0.241	0.225	0.003	0	0	0	Free Surface	2.463	0.247	0.134	0.247	0.252	1.037	1.796	0	No	0.247	2.463
509	1520661	1520816	12	154.15	0.033	0.225	0.225	0	0	0	0	Free Surface	4.402	0.157	0.054	0.157	0.243	2.353	4.2	0	No	0.157	4.402
51	349	12	16	310	0.001	0.051	0	0.011	0	0	0	Free Surface	0.895	0.113	0.027	0.151	0.106	0.491	1.86	0	Yes	0.172	0.741
511	1523729	1523521	8	334.92	0.016	0.248	0	0.063	0	0	0	Free Surface	3.653	0.341	0.251	0.228	0.289	1.578	0.991	0	No	0.228	3.653
513	1523521	1523531	8	47.06	0.009	0.249	0	0.063	0	0	0	Free Surface	2.959	0.4	0.337	0.267	0.289	1.167	0.74	0	No	0.267	2.959
515	1523531	1523828	8	338.18	0.009	0.25	0	0.063	0	0	0	Free Surface	2.972	0.399	0.336	0.266	0.289	1.173	0.744	0	No	0.266	2.972
517	1523828	1524166	8	383.92	0.009	0.255	0	0.065	0	0	0	Free Surface	2.986	0.404	0.343	0.269	0.292	1.172	0.743	0	No	0.269	2.986
518	114	113	8	518.22	0.003	0.093	0	0.021	0	0	0	Free Surface	1.465	0.326	0.23	0.217	0.174	0.649	0.407	0	No	0.217	1.465
52	150	149	8	52.45	0.005	0.012	0	0.002	0	0	0	Free Surface	1.003	0.101	0.021	0.067	0.061	0.827	0.562	0	No	0.067	1.003
521	1526179	1526286	8	222.96	0.005	0.01	0	0.002	0	0	0	Free Surface	0.941	0.093	0.018	0.062	0.056	0.808	0.555	0	Yes	0.134	0.307
523	1525926	1526031	8	222.99	0.005	0.011	0	0.002	0	0	0	Free Surface	0.963	0.096	0.019	0.064	0.058	0.812	0.555	0	Yes	0.11	0.439
525	1526286	1526513	8	256.6	0.01	0.34	0	0.089	0	0	0	Free Surface	3.369	0.458	0.43	0.306	0.34	1.225	0.79	0	No	0.306	3.369
527	41	40	6	265.81	0.005	0.029	0	0.006	0	0	0	Free Surface	1.342	0.227	0.113	0.113	0.104	0.837	0.257	0	No	0.113	1.342
529	1	351	30	259	0.002	5.64	2.926	0.894	0	0	0	Free Surface	3.649	0.49	0.483	1.225	0.984	0.658	11.679	0	Yes	3.587	3.649
53	26	27	8	275.24	0.01	0.082	0	0.018	0	0	0	Free Surface	2.281	0.216	0.102	0.144	0.162	1.264	0.8	0	No	0.144	2.281
531	273	275	30	94	0.001	5.736	2.926	0.93	0	0	0	Free Surface	3.231	0.547	0.58	1.367	0.993	0.542	9.885	0	No	1.367	3.231
533	275	339	30	71	0.001	6.267	2.926	1.127	0	0	0	Free Surface	3.322	0.575	0.628	1.437	1.04	0.539	9.976	0	No	1.437	3.322
534	128	138	8	534.61	0.116	0.099	0	0.023	0	0	0	Free Surface	5.647	0.132	0.037	0.088	0.179	4.052	2.67	0	Yes	0.102	4.553
535	279	235	15	30.89	0.005	0.005	0	0.001	0	0	0	Free Surface	0.683	0.03	0.002	0.038	0.033	0.753	2.917	0	No	0.038	0.683
537	235	281	15	150.08	0.005	0.006	0	0.001	0	0	0	Free Surface	0.737	0.033	0.002	0.042	0.037	0.775	2.959	0	No	0.042	0.737
539	116	142	8	189	0.008	0.041	0	0.01	0	0	0	Free Surface	1.696	0.165	0.059	0.11	0.115	1.082	0.698	0	No	0.11	1.696
541	86	116	8	339	0.015	0.002	0	0	0	0	0	Free Surface	0.892	0.038	0.003	0.025	0.028	1.212	0.944	0	No	0.025	0.892
543	283	147	18	193.56	0.007	1.213	1.058	0.037	0	0	0	Free Surface	3.947	0.314	0.214	0.471	0.516	1.191	5.664	0	No	0.471	3.947
547	285	283	12	191	0.038	1.078	1.058	0.004	0	0	0	Free Surface	7.309	0.332	0.238	0.332	0.549	2.617	4.523	0	Yes	0.337	7.175
548	238	237	24	548.21	0.06	3.147	1.681	0.451	0	0	0	Free Surface	10.87	0.2	0.088	0.4	0.777	3.621	35.865	0	No	0.4	10.87
549	287	285	12	256	0.019	1.077	1.058	0.004	0	0	0	Free Surface	5.661	0.401	0.339	0.401	0.549	1.82	3.181	0	No	0.401	5.661
55	13	48	27	109.78	0.001	4.993	2.739	0.728	0	0	0	Free Surface	2.519	0.721	0.869	1.621	0.953	0.36	5.747	0	No	1.621	2.519
551	289	287	12	424	0.019	1.077	1.058	0.004	0	0	0	Free Surface	5.664	0.401	0.338	0.401	0.549	1.822	3.183	0	No	0.401	5.664
553	291	289	12	480	0.024	1.076	1.058	0.003	0	0	0	Free Surface	6.164	0.376	0.301	0.376	0.548	2.057	3.577	0	No	0.376	6.164
555	293	291	12	200	0.014	1.075	1.058	0.003	0	0	0	Free Surface	5.06	0.436	0.394	0.436	0.548	1.549	2.732	0	No	0.436	5.06
557	295	293	12	380	0.021	1.071	1.058	0.002	0	0	0	Free Surface	5.864	0.389	0.32	0.389	0.547	1.919	3.346	0	No	0.389	5.864
559	297	295	12	500	0.017	1.066	1.058	0.001	0	0	0	Free Surface	5.421	0.411	0.354	0.411	0.546	1.718	3.01	0	No	0.411	5.421
561	299	297	12	109	0.05	1.058	1.058	0	0	0	0	Free Surface	7.996	0.307	0.205	0.307	0.543	2.991	5.163	0	Yes	0.309	7.927
563	301	299	12	200	0.01	1.058	1.058	0	0	0	0	Free Surface	4.449	0.475	0.458	0.475	0.543	1.292	2.309	0	No	0.475	4.449
565	303	301	12	455	0.032	1.058	1.058	0	0	0	0	Free Surface	6.828	0.345	0.255	0.345	0.543	2.396	4.146	0	Yes	0.41	5.401
567	305	303	12	476	0.023	1.058	1.058	0	0	0	0	Free Surface											

649	1524062	1524123	15	353.64	0.004	0.614	0.42	0.048	0	0	0	Free Surface	2.629	0.336	0.243	0.42	0.383	0.837	2.528	0	No	0.42	2.629
65	8	355	16	211	0.002	0.227	0	0.057	0	0	0	Free Surface	1.521	0.222	0.108	0.296	0.226	0.587	2.098	0	No	0.296	1.521
651	1524123	1524168	15	258.15	0.144	0.626	0.42	0.051	0	0	0	Free Surface	9.725	0.136	0.039	0.169	0.387	5.023	15.889	0	Yes	0.204	7.431
657	281	234	15	251.23	0.005	0.01	0	0.002	0	0	0	Free Surface	0.866	0.043	0.003	0.053	0.048	0.806	2.965	0	No	0.053	0.866
661	136	137	8	205.15	0.005	0.006	0	0.001	0	0	0	Free Surface	0.794	0.072	0.01	0.048	0.042	0.778	0.552	0	No	0.048	0.794
665	1527548	353	24	15.63	0.002	2.831	1.681	0.345	0	0	0	Free Surface	3.064	0.465	0.441	0.93	0.735	0.638	6.423	0	No	0.93	3.064
667	353	241	24	335.18	0.003	2.833	1.681	0.345	0	0	0	Free Surface	3.591	0.412	0.356	0.824	0.735	0.804	7.967	0	No	0.824	3.591
67	33	30	8	271.77	0.005	0.003	0	0	0	0	0	Free Surface	0.628	0.05	0.005	0.033	0.028	0.741	0.554	0	Yes	0.051	0.336
68	164	165	6	68.25	0.004	0.006	0	0.001	0	0	0	Free Surface	0.763	0.109	0.025	0.054	0.045	0.697	0.229	0	No	0.054	0.763
69	34	33	8	101.66	0.005	0.001	0	0	0	0	0	Free Surface	0.474	0.032	0.002	0.021	0.018	0.696	0.555	0	No	0.021	0.474
71	355	329	16	116	0.003	0.24	0	0.06	0	0	0	Free Surface	1.889	0.198	0.086	0.265	0.232	0.774	2.785	0	Yes	0.293	1.633
73	44	23	6	157.44	0.005	0.016	0	0.003	0	0	0	Free Surface	1.137	0.171	0.064	0.086	0.077	0.822	0.258	0	Yes	0.491	0.13
770	109	91	8	770.19	0.017	0.003	0	0	0	0	0	Free Surface	0.996	0.039	0.003	0.026	0.03	1.326	1.027	0	Yes	0.028	0.88
78	15	14	8	78.47	0.005	0.012	0	0.002	0	0	0	Free Surface	0.984	0.1	0.021	0.067	0.06	0.812	0.552	0	No	0.067	0.984
79	257	359	12	30	0.005	0.41	0	0.11	0	0	0	Free Surface	2.677	0.342	0.251	0.342	0.332	0.944	1.633	0	No	0.342	2.677
80	101	100	8	80.58	0.012	0.021	0	0.004	0	0	0	Free Surface	1.613	0.106	0.024	0.071	0.081	1.292	0.872	0	No	0.071	1.613
86	70	71	8	86.31	0.005	0.054	0	0.012	0	0	0	Free Surface	1.61	0.207	0.094	0.138	0.132	0.912	0.578	0	No	0.138	1.61
88	119	118	6	88.5	0.007	0.126	0	0.03	0	0	0	Free Surface	2.312	0.444	0.407	0.222	0.221	0.989	0.309	0	No	0.222	2.312
91	249	248	8	144.48	0.006	0.006	0	0.001	0	0	0	Free Surface	0.851	0.067	0.009	0.045	0.041	0.863	0.618	0	Yes	0.104	0.247
93	36	35	8	269.44	0.005	0.004	0	0.001	0	0	0	Free Surface	0.689	0.057	0.006	0.038	0.033	0.757	0.554	0	No	0.038	0.689
94	67	64	6	94.9	0.005	0.045	0	0.009	0	0	0	Free Surface	1.472	0.291	0.185	0.146	0.13	0.802	0.245	0	No	0.146	1.472
95	37	25	27	271.65	0.001	4.803	2.739	0.66	0	0	0	Free Surface	3.001	0.597	0.667	1.343	0.934	0.499	7.204	0	No	1.343	3.001
97	39	38	8	270.8	0.005	0.008	0	0.001	0	0	0	Free Surface	0.866	0.082	0.014	0.054	0.048	0.795	0.555	0	No	0.054	0.866



## Year 2040 Manhole

ID	Rim Elevation (ft)	Base Flow (mgd)	Total Flow (mgd)	Storm Flow (mgd)	Grade (ft)	Status	Hydraulic Jump	Surcharge Depth (ft)	Unfilled Depth (ft)
1	1,887.09	0.013	0.06	0	1,881.86	Not Full	No	-1.275	5.235
10	1,891.44	0.001	0.01	0	1,883.69	Not Full	No	-1.123	7.75
100	2,035.87	0.004	0.02	0	2,020.92	Not Full	No	-0.617	14.95
101	2,034.01	0.004	0.02	0	2,022.04	Not Full	No	-0.596	11.969
102	2,015.44	0	0.00	0	2,005.50	Not Full	No	-0.612	9.945
103	2,002.06	0	0.00	0	1,992.13	Not Full	No	-0.599	9.932
104	2,008.71	0.005	0.02	0	1,998.77	Not Full	No	-0.612	9.945
105	2,007.28	0	0.00	0	1,997.34	Not Full	No	-0.604	9.938
106	2,012.59	0.001	0.01	0	2,002.63	Not Full	No	-0.623	9.956
107	2,011.51	0	0.00	0	2,001.54	Not Full	No	-0.633	9.966
108	2,002.63	0	0.00	0	1,992.70	Not Full	No	-0.596	9.93
109	1,946.68	0	0.00	0	1,936.71	Not Full	No	-0.641	9.974
11	1,891.44	0.002	0.01	0	1,884.76	Not Full	No	-0.776	6.683
110	1,933.95	0	0.00	0	1,916.37	Not Full	Yes	-0.616	17.579
111	1,939.27	0	0.00	0	1,929.30	Not Full	No	-0.635	9.968
112	1,940.92	0	0.00	0	1,930.95	Not Full	No	-0.635	9.968
113	1,907.92	0	0.00	0	1,897.76	Not Full	No	-0.448	10.161
114	1,909.43	0	0.00	0	1,899.26	Not Full	No	-0.449	10.173
115	1,909.01	0	0.00	0	1,899.80	Not Full	No	-0.45	9.214
116	1,909.61	0	0.00	0	1,900.71	Not Full	Yes	-0.556	8.9
117	1,909.69	0	0.00	0	1,902.29	Not Full	No	-0.281	7.401
118	1,910.10	0	0.00	0	1,903.30	Not Full	No	-0.28	6.8
119	1,910.39	0	0.00	0	1,904.04	Not Full	Yes	-0.278	6.348
12	1,892.39	0.002	0.01	0	1,883.84	Not Full	No	-1.14	8.547
120	1,911.32	0	0.00	0	1,905.04	Not Full	No	-0.281	6.281
121	1,911.53	0	0.00	0	1,905.61	Not Full	No	-0.558	5.921
122	1,912.64	0	0.00	0	1,906.65	Not Full	Yes	-0.618	5.991
123	1,926.98	0	0.00	0	1,919.13	Not Full	No	-0.471	7.851
124	1,928.34	0	0.00	0	1,921.63	Not Full	No	-0.636	6.709
125	1,934.36	0	0.00	0	1,927.62	Not Full	No	-0.648	6.741
127	1,935.40	0	0.00	0	1,925.67	Not Full	No	-0.667	9.733
128	1,999.07	0.001	0.00	0	1,989.06	Not Full	No	-0.579	10.012
129	2,002.63	0	0.00	0	1,992.67	Not Full	No	-0.524	9.957
13	1,892.46	0	0.00	0	1,885.02	Not Full	No	-0.629	7.439
130	2,000.88	0.004	0.02	0	1,994.93	Not Full	No	-0.517	5.95
131	2,005.70	0.002	0.01	0	1,997.55	Not Full	No	-0.516	8.149
132	2,008.52	0.001	0.00	0	1,998.58	Not Full	Yes	-0.51	9.943
133	2,012.24	0	0.00	0	2,002.26	Not Full	No	-0.543	9.977
134	2,013.25	0.007	0.03	0	2,003.30	Not Full	Yes	-0.517	9.95
135	2,017.36	0.007	0.03	0	2,007.36	Not Full	No	-0.571	10.004
136	2,004.60	0	0.00	0	1,995.82	Not Full	No	-0.619	8.782
137	2,003.56	0	0.00	0	1,994.70	Not Full	No	-0.613	8.856
138	1,936.81	0.001	0.00	0	1,926.93	Not Full	Yes	-0.451	9.884
139	1,909.94	0	0.00	0	1,896.82	Not Full	No	-1.119	13.119
14	1,892.17	0	0.00	0	1,886.22	Not Full	No	-0.599	5.953
140	1,909.86	0	0.00	0	1,897.73	Not Full	No	-1.081	12.131
141	1,909.32	0	0.00	0	1,898.37	Not Full	No	-0.907	10.947
142	1,909.79	0	0.00	0	1,898.64	Not Full	Yes	-0.958	11.148
143	1,910.40	0	0.00	0	1,899.38	Not Full	No	-1.4	11.02
144	1,912.27	0	0.00	0	1,902.26	Not Full	No	-1.494	10.014
145	1,918.26	0	0.00	0	1,905.55	Not Full	No	-1.502	12.712
146	1,924.53	0	0.00	0	1,916.74	Not Full	No	-1.759	7.789
147	1,930.76	0	0.00	0	1,921.83	Not Full	No	-1.626	8.926
148	1,910.78	0.001	0.01	0	1,900.60	Not Full	No	-0.525	10.178
149	1,911.40	0.001	0.00	0	1,901.18	Not Full	No	-0.591	10.225
15	1,892.04	0.002	0.01	0	1,886.71	Not Full	No	-0.6	5.333
150	1,911.41	0.001	0.01	0	1,901.54	Not Full	No	-0.6	9.873

151	1,911.52	0	0.00	0	1,902.67	Not Full	No	-0.614	8.848
1518351	2,141.00	0.45	0.45	0	2,131.34	Not Full	No	-1.217	9.657
1518620	2,138.43	0.135	0.50	0	2,129.56	Not Full	Yes	-0.924	8.874
1518939	2,134.95	0.002	0.01	0	2,128.64	Not Full	No	-1.106	6.306
1518982	2,134.95	0.015	0.07	0	2,127.65	Not Full	No	-1.113	7.303
1519372	2,136.09	0.008	0.04	0	2,123.53	Not Full	No	-1.098	12.558
1519678	2,128.34	0.005	0.03	0	2,120.56	Not Full	No	-1.095	7.785
1519963	2,127.34	0.249	0.25	0	2,117.72	Not Full	No	-1.019	9.619
152	1,913.13	0.001	0.01	0	1,903.58	Not Full	No	-0.624	9.547
1520233	2,123.36	0.004	0.02	0	2,115.39	Not Full	No	-1.03	7.97
1520444	2,120.99	0.001	0.01	0	2,113.21	Not Full	No	-1.1	7.78
1520544	2,119.73	0.003	0.01	0	2,111.62	Not Full	No	-1.005	8.115
1520554	2,119.17	0	0.00	0	2,110.84	Not Full	No	-1.098	8.328
1520596	2,117.84	0.016	0.07	0	2,109.68	Not Full	No	-1.039	8.159
1520661	2,129.30	0.225	0.23	0	2,119.46	Not Full	No	-0.843	9.843
1520720	2,124.56	0.002	0.01	0	2,110.63	Not Full	No	-0.953	13.933
1520752	2,121.82	0.001	0.01	0	2,111.40	Not Full	No	-0.949	10.419
1520785	2,123.24	0.001	0.01	0	2,112.33	Not Full	Yes	-0.96	10.91
1520816	2,125.41	0.003	0.02	0	2,114.35	Not Full	No	-0.753	11.063
1520829	2,114.73	0.012	0.06	0	2,106.87	Not Full	No	-1.193	7.863
1520835	2,122.93	0.006	0.03	0	2,106.04	Not Full	No	-1.077	16.887
1521063	2,104.63	0.008	0.04	0	2,094.32	Not Full	No	-1.271	10.311
1521170	2,116.41	0.002	0.01	0	2,099.22	Not Full	Yes	-0.985	17.195
1521245	2,072.03	0.004	0.02	0	2,062.29	Not Full	No	-1.143	9.743
1521458	2,118.00	0.281	0.28	0	2,108.91	Not Full	No	-0.534	9.087
1521493	2,114.45	0.004	0.02	0	2,096.89	Not Full	No	-1.083	17.563
1521558	2,057.68	0.003	0.02	0	2,053.05	Not Full	No	-1.107	4.627
1521741	2,120.25	0.002	0.01	0	2,093.37	Not Full	Yes	-0.973	26.883
1521864	2,053.74	0.002	0.01	0	2,044.36	Not Full	Yes	-0.777	9.377
1521987	2,115.04	0.001	0.01	0	2,092.66	Not Full	No	-0.97	22.38
1522114	2,050.80	0.002	0.01	0	2,043.49	Not Full	No	-0.766	7.306
1522331	2,052.12	0.003	0.02	0	2,042.74	Not Full	No	-0.779	9.379
1522447	2,110.35	0.003	0.02	0	2,090.32	Not Full	No	-0.958	20.028
1522556	2,047.15	0.009	0.05	0	2,029.81	Not Full	No	-1.653	17.343
1522563	2,050.65	0.001	0.01	0	2,041.87	Not Full	No	-0.844	8.784
1522706	2,105.36	0.005	0.03	0	2,088.87	Not Full	No	-0.865	16.495
1522749	2,050.64	0.002	0.01	0	2,041.26	Not Full	No	-0.783	9.383
1522947	2,046.40	0.002	0.01	0	2,027.73	Not Full	No	-1.643	18.673
1522997	2,099.62	0.001	0.01	0	2,089.56	Not Full	No	-1.211	10.061
1523047	2,097.90	0.195	0.20	0	2,088.07	Not Full	No	-0.977	9.827
1523098	2,100.50	0.281	0.28	0	2,095.18	Not Full	No	-0.517	5.32
1523115	2,056.83	0	0.00	0	2,041.50	Not Full	No	-0.473	15.327
1523119	2,046.52	0.001	0.00	0	2,040.09	Not Full	Yes	-0.69	6.43
1523178	2,095.62	0.001	0.01	0	2,085.81	Not Full	No	-0.959	9.809
1523269	2,044.69	0.002	0.01	0	2,025.96	Not Full	No	-1.634	18.734
1523316	2,046.34	0.001	0.01	0	2,039.49	Not Full	No	-0.629	6.849
1523433	2,091.91	0.004	0.02	0	2,082.24	Not Full	Yes	-0.821	9.671
1523521	2,100.35	0	0.00	0	2,089.10	Not Full	No	-0.4	11.253
1523531	2,098.00	0	0.00	0	2,088.58	Not Full	No	-0.4	9.424
1523662	2,037.69	0.002	0.01	0	2,023.85	Not Full	No	-1.629	13.839
1523699	2,048.45	0.002	0.01	0	2,038.51	Not Full	No	-0.639	9.939
1523729	2,103.13	0.063	0.25	0	2,094.52	Not Full	No	-0.439	8.612
1523828	2,095.00	0.001	0.01	0	2,085.43	Not Full	No	-0.398	9.571
1523897	2,044.89	0.001	0.01	0	2,037.69	Not Full	No	-0.892	7.202
1523943	2,084.59	0.004	0.02	0	2,080.42	Not Full	No	-0.872	4.172
1523987	2,035.27	0.001	0.01	0	2,022.08	Not Full	No	-1.625	13.195
1524003	2,094.40	0.004	0.02	0	2,078.66	Not Full	No	-0.874	15.744
1524062	2,094.67	0.004	0.02	0	2,076.83	Not Full	Yes	-0.83	17.84
1524123	2,091.86	0.003	0.02	0	2,075.19	Not Full	No	-1.081	16.671
1524166	2,091.00	0.006	0.03	0	2,081.86	Not Full	No	-0.403	9.137

1524168	2,047.83	0.002	0.01	0	2,038.07	Not Full	No	-0.911	9.761
1524235	2,044.89	0.001	0.01	0	2,034.82	Not Full	No	-1.015	10.075
1524277	2,035.16	0.001	0.01	0	2,027.57	Not Full	No	-1.29	7.59
1524318	2,031.67	0.001	0.00	0	2,021.00	Not Full	Yes	-0.882	10.672
1524591	2,028.57	0.001	0.01	0	2,020.13	Not Full	No	-0.847	8.437
1524867	2,028.42	0.001	0.01	0	2,019.32	Not Full	No	-0.849	9.099
1525140	2,027.61	0.002	0.01	0	2,018.48	Not Full	No	-0.884	9.134
1525428	2,026.00	0.003	0.01	0	2,017.50	Not Full	No	-0.896	8.496
1525701	2,073.88	0.006	0.03	0	2,062.74	Not Full	No	-0.563	11.137
1525755	2,025.46	0.003	0.02	0	2,017.21	Not Full	No	-1.06	8.25
1525807	2,072.97	0.007	0.03	0	2,061.72	Not Full	No	-0.365	11.248
1525926	2,070.64	0.002	0.01	0	2,060.18	Not Full	No	-0.603	10.456
1526016	2,023.55	0.004	0.02	0	2,015.70	Not Full	Yes	-0.785	7.855
1526031	2,070.45	0.001	0.01	0	2,059.16	Not Full	No	-0.411	11.294
1526179	2,066.84	0.002	0.01	0	2,054.72	Not Full	No	-0.605	12.118
1526248	2,022.43	0.003	0.02	0	2,015.06	Not Full	No	-0.815	7.375
1526286	2,064.99	0	0.00	0	2,053.75	Not Full	No	-0.361	11.244
1526407	2,064.80	0.002	0.01	0	2,053.32	Not Full	No	-0.598	11.481
1526478	2,062.72	0.003	0.02	0	2,052.67	Not Full	No	-0.614	10.048
1526479	2,021.14	0.002	0.01	0	2,014.13	Not Full	No	-1.064	7.014
1526513	2,062.28	0	0.00	0	2,050.98	Not Full	No	-0.422	11.305
1526515	2,020.69	0.003	0.02	0	2,013.94	Not Full	Yes	-1.116	6.746
1526599	2,061.54	0	0.00	0	2,048.57	Not Full	Yes	-0.268	12.972
1526628	2,058.44	0.001	0.00	0	2,048.39	Not Full	No	-0.617	10.05
1526667	2,055.21	0	0.00	0	2,045.16	Not Full	No	-0.616	10.049
1526740	2,058.91	0	0.00	0	2,047.75	Not Full	No	-0.282	11.165
1526741	2,019.86	0.008	0.04	0	2,013.27	Not Full	No	-1.117	6.587
1526775	2,050.21	0	0.00	0	2,040.15	Not Full	No	-0.626	10.06
1526992	2,057.47	0	0.00	0	2,046.70	Not Full	No	-0.339	10.773
1527015	2,027.68	0.003	0.02	0	2,012.47	Not Full	No	-1.114	15.214
1527149	2,029.40	0.003	0.02	0	2,019.83	Not Full	Yes	-0.528	9.571
1527159	2,053.87	0	0.00	0	2,043.97	Not Full	No	-0.399	9.903
1527235	2,025.45	0.008	0.04	0	2,011.88	Not Full	No	-1.11	13.57
1527417	2,024.58	0.003	0.01	0	2,018.25	Not Full	No	-0.514	6.327
1527548	2,023.20	0.001	0.01	0	2,011.06	Not Full	No	-1.07	12.14
153	1,914.15	0	0.00	0	1,904.42	Not Full	No	-0.667	9.73
154	1,913.45	0	0.00	0	1,904.26	Not Full	No	-0.63	9.194
155	1,912.16	0.003	0.02	0	1,903.23	Not Full	No	-0.573	8.926
156	1,911.05	0.002	0.01	0	1,901.82	Not Full	No	-0.551	9.235
157	1,910.66	0.002	0.01	0	1,901.03	Not Full	No	-0.478	9.632
158	1,908.49	0.001	0.00	0	1,898.87	Not Full	No	-0.533	9.616
159	1,908.58	0.001	0.01	0	1,899.75	Not Full	No	-0.536	8.83
16	1,892.29	0.001	0.01	0	1,885.08	Not Full	No	-0.821	7.211
160	1,908.32	0.001	0.01	0	1,900.76	Not Full	No	-0.541	7.564
161	1,909.06	0	0.00	0	1,901.77	Not Full	Yes	-0.55	7.293
162	1,909.54	0.001	0.01	0	1,903.61	Not Full	No	-0.61	5.933
163	1,909.70	0.001	0.01	0	1,906.26	Not Full	No	-0.623	3.436
164	1,909.05	0.001	0.01	0	1,905.05	Not Full	No	-0.446	3.996
165	1,909.33	0.001	0.01	0	1,904.71	Not Full	No	-0.418	4.618
166	1,908.88	0.003	0.02	0	1,903.40	Not Full	No	-0.388	5.478
167	1,914.21	0	0.00	0	1,908.76	Not Full	No	-0.41	5.454
168	1,920.99	0.002	0.01	0	1,909.90	Not Full	No	-0.411	11.094
169	1,929.01	0.001	0.00	0	1,912.11	Not Full	No	-0.416	16.899
17	1,892.38	0	0.00	0	1,885.37	Not Full	No	-0.967	7.007
18	1,892.44	0.002	0.01	0	1,885.38	Not Full	No	-1.082	7.062
189	1,916.48	0.002	0.01	0	1,896.14	Not Full	No	-0.938	20.344
19	1,892.54	0.003	0.02	0	1,886.03	Not Full	No	-0.971	6.511
190	1,918.81	0.004	0.02	0	1,909.37	Not Full	No	10.345	9.438
191	1,925.21	0.001	0.00	0	1,913.32	Not Full	No	-0.555	11.888
192	1,923.99	0.001	0.00	0	1,914.02	Not Full	No	-0.559	9.972

193	1,925.36	0.001	0.01	0	1,915.09	Not Full	No	-0.569	10.272
194	1,926.57	0	0.00	0	1,916.73	Not Full	No	-0.573	9.836
195	1,921.96	0.001	0.01	0	1,917.62	Not Full	No	-0.573	4.337
196	1,927.21	0.004	0.02	0	1,918.64	Not Full	No	-0.581	8.574
197	2,017.92	0	0.00	0	2,007.85	Not Full	No	-0.638	10.071
198	2,013.55	0.014	0.06	0	2,003.68	Not Full	No	-0.442	9.875
199	2,013.55	0.001	0.01	0	2,003.46	Not Full	No	-0.541	10.095
20	1,894.37	0.002	0.01	0	1,886.64	Not Full	No	-0.968	7.728
200	2,021.07	0	0.00	0	2,011.00	Not Full	No	-0.641	10.074
201	2,010.42	0.006	0.03	0	2,000.50	Not Full	Yes	-0.482	9.916
202	2,007.05	0.007	0.03	0	1,998.23	Not Full	No	-0.391	8.824
203	2,007.68	0	0.00	0	1,997.75	Not Full	No	-0.493	9.926
204	2,005.71	0.001	0.01	0	1,995.72	Not Full	No	-0.562	9.995
205	1,964.19	0.001	0.01	0	1,954.31	Not Full	Yes	-0.449	9.882
206	1,963.55	0	0.00	0	1,953.54	Not Full	No	-0.58	10.013
207	1,927.04	0.001	0.01	0	1,914.97	Not Full	Yes	-0.443	12.067
208	1,930.75	0.001	0.01	0	1,913.22	Not Full	No	-0.439	17.533
209	2,011.89	0	0.00	0	2,005.96	Not Full	No	-0.93	5.93
21	1,894.91	0.001	0.01	0	1,887.09	Not Full	No	-0.947	7.817
210	2,021.20	0	0.00	0	2,013.25	Not Full	No	-0.95	7.95
211	2,005.78	0	0.00	0	2,000.86	Not Full	No	-0.924	4.924
212	2,006.33	0	0.00	0	2,000.41	Not Full	No	-0.925	5.925
213	2,001.92	0	0.00	0	1,997.02	Not Full	Yes	-0.905	4.905
214	2,001.16	0	0.00	0	1,995.30	Not Full	No	-0.96	5.86
215	1,967.05	0	0.00	0	1,961.20	Not Full	No	-0.949	5.849
216	1,891.03	0.003	0.02	0	1,884.35	Not Full	No	-0.87	6.679
217	1,892.51	0.002	0.01	0	1,885.05	Not Full	No	-0.875	7.463
218	1,894.39	0.002	0.01	0	1,885.74	Not Full	No	-0.879	8.649
219	1,896.88	0.002	0.01	0	1,886.44	Not Full	No	-0.883	10.443
22	1,895.33	0.001	0.01	0	1,887.56	Not Full	Yes	-0.945	7.775
220	1,897.72	0.003	0.02	0	1,887.13	Not Full	No	-0.887	10.586
221	1,898.40	0.005	0.03	0	1,887.83	Not Full	No	-0.892	10.572
222	1,899.55	0.006	0.03	0	1,888.52	Not Full	No	-0.901	11.03
223	1,901.17	0.005	0.03	0	1,889.21	Not Full	No	-0.912	11.96
224	1,905.70	0.002	0.01	0	1,889.90	Not Full	No	-0.922	15.801
225	1,905.23	0.002	0.01	0	1,890.59	Not Full	No	-0.926	14.636
226	1,907.23	0.012	0.06	0	1,890.72	Not Full	No	-1.178	16.508
227	1,906.23	0.005	0.03	0	1,891.27	Not Full	No	-0.954	14.964
228	1,906.23	0.004	0.02	0	1,891.95	Not Full	No	-0.965	14.276
229	1,907.64	0.005	0.03	0	1,892.65	Not Full	No	-0.974	14.994
23	1,897.42	0	0.00	0	1,888.19	Not Full	No	-0.955	9.235
230	1,910.25	0.005	0.03	0	1,893.34	Not Full	No	-0.986	16.915
231	1,911.28	0.004	0.02	0	1,894.02	Not Full	No	-0.998	17.26
233	1,912.36	0.003	0.01	0	1,894.74	Not Full	No	-1.015	17.617
234	1,916.07	0.002	0.01	0	1,895.45	Not Full	No	-0.926	20.621
235	1,919.69	0	0.00	0	1,908.21	Not Full	No	-1.208	11.478
236	1,940.00	0	0.00	0	1,923.70	Not Full	No	-1.28	16.3
237	1,960.70	0	0.00	0	1,951.32	Not Full	No	-1.615	9.385
238	1,990.74	0	0.00	0	1,984.24	Not Full	No	-1.6	6.5
24	1,898.86	0	0.00	0	1,888.81	Not Full	No	-0.886	10.046
240	2,012.28	0	0.00	0	2,004.23	Not Full	No	-1.442	8.052
241	2,018.16	0	0.00	0	2,009.44	Not Full	No	-1.499	8.719
242	1,943.52	0.001	0.00	0	1,933.49	Not Full	No	-0.601	10.034
243	1,947.00	0	0.00	0	1,936.96	Not Full	No	-0.611	10.045
244	1,955.61	0.001	0.00	0	1,945.56	Not Full	No	-0.614	10.047
245	1,965.04	0.001	0.00	0	1,954.99	Not Full	No	-0.62	10.053
246	1,991.81	0.001	0.00	0	1,981.74	Not Full	No	-0.639	10.073
247	2,005.62	0.001	0.01	0	1,995.55	Not Full	No	-0.638	10.071
248	1,903.32	0.003	0.01	0	1,891.74	Not Full	No	-0.583	11.577
249	1,901.62	0.001	0.01	0	1,892.53	Not Full	No	-0.622	9.095

25	1,899.46	0	0.00	0	1,889.32	Not Full	No	-0.967	10.137
250	1,905.82	0.004	0.02	0	1,898.23	Not Full	No	-0.533	7.586
251	1,908.96	0.014	0.06	0	1,901.12	Not Full	No	-0.547	7.841
253	1,893.59	0.001	0.00	0	1,891.34	Not Full	No	-0.626	2.25
255	2,020.56	0	0.00	0	2,011.69	Not Full	No	-0.747	8.867
257	2,020.19	0	0.00	0	2,014.86	Not Full	Yes	-0.658	5.328
26	1,901.32	0	0.00	0	1,895.96	Not Full	No	-0.523	5.356
261	2,002.86	0	0.00	0	1,995.43	Not Full	No	-1.558	7.428
265	2,019.48	0.001	0.01	0	2,016.56	Not Full	No	-0.51	2.923
267	2,034.06	0.004	0.02	0	2,024.05	Not Full	No	-0.573	10.007
27	1,899.93	0	0.00	0	1,892.99	Not Full	No	-0.531	6.944
273	1,889.73	0.032	0.14	0	1,881.20	Not Full	No	-1.133	8.533
275	1,889.75	0.197	0.70	0	1,881.04	Not Full	No	-1.063	8.713
279	1,919.94	0.001	0.01	0	1,908.46	Not Full	No	-1.212	11.482
28	1,896.43	0	0.00	0	1,889.52	Not Full	Yes	-0.5	6.914
281	1,918.84	0.001	0.01	0	1,907.37	Not Full	No	-1.197	11.467
283	1,932.60	0	0.00	0	1,923.77	Not Full	No	-1.029	8.829
285	1,935.50	0	0.00	0	1,931.09	Not Full	No	-0.668	4.408
287	1,940.50	0	0.00	0	1,936.12	Not Full	No	-0.599	4.379
289	1,948.50	0	0.00	0	1,944.28	Not Full	No	-0.599	4.219
29	1,894.68	0	0.00	0	1,887.73	Not Full	No	-0.532	6.946
291	1,960.00	0	0.00	0	1,955.88	Not Full	No	-0.624	4.124
293	1,965.00	0.001	0.01	0	1,960.61	Not Full	No	-0.564	4.394
295	1,973.25	0.001	0.01	0	1,968.64	Not Full	No	-0.611	4.611
297	1,981.50	0.001	0.01	0	1,977.26	Not Full	No	-0.589	4.239
299	1,987.00	0	0.00	0	1,982.71	Not Full	No	-0.693	4.293
30	1,897.05	0	0.00	0	1,888.67	Not Full	No	-0.499	8.382
301	1,992.00	0	0.00	0	1,984.98	Not Full	No	-0.525	7.025
303	2,004.00	0	0.00	0	1,999.52	Not Full	No	-0.655	4.485
305	2,015.25	0	0.00	0	2,010.60	Not Full	No	-0.623	4.653
307	2,024.00	0	0.00	0	2,019.72	Not Full	No	-0.597	4.277
309	2,030.50	0	0.00	0	2,025.42	Not Full	No	-0.584	5.084
31	1,900.38	0.001	0.00	0	1,890.28	Not Full	No	-0.502	10.105
311	2,039.20	0	0.00	0	2,034.96	Not Full	No	-0.642	4.242
313	2,049.50	0	0.00	0	2,045.09	Not Full	No	-0.608	4.408
315	2,055.30	0	0.00	0	2,050.83	Not Full	No	-0.568	4.468
317	2,059.00	0	0.00	0	2,053.30	Not Full	No	-0.525	5.705
319	2,068.60	0	0.00	0	2,063.96	Not Full	No	-0.738	4.638
32	1,901.26	0.016	0.07	0	1,891.76	Not Full	No	-0.504	9.498
321	2,073.15	0	0.00	0	2,068.03	Not Full	No	-0.525	5.125
323	2,076.00	1.058	1.06	0	2,071.35	Not Full	No	-0.668	4.648
329	1,885.93	0.001	0.01	0	1,882.16	Not Full	No	-1.159	3.769
33	1,900.82	0	0.00	0	1,889.99	Not Full	No	-0.634	10.827
331	1,888.31	0.004	0.02	0	1,882.84	Not Full	No	-1.008	5.468
333	2,005.00	0	0.00	0	1,997.27	Not Full	No	-0.632	7.735
337	1,915.00	0.006	0.03	0	1,898.77	Not Full	No	-0.384	16.234
34	1,899.54	0	0.00	0	1,890.59	Not Full	No	-0.645	8.949
343	2,049.19	0.001	0.01	0	2,041.99	Not Full	No	-0.475	7.198
345	2,030.07	0.001	0.01	0	2,023.93	Not Full	No	-0.409	6.142
347	1,917.31	0.187	0.19	0	1,909.16	Not Full	No	-3.483	8.15
349	1,892.24	0.011	0.05	0	1,884.24	Not Full	No	-1.182	8.005
35	1,903.22	0	0.00	0	1,890.63	Not Full	No	-0.575	12.588
351	1,884.97	0.003	0.02	0	1,881.39	Not Full	No	-1.142	3.582
353	2,022.60	0	0.00	0	2,010.82	Not Full	No	-1.176	11.776
355	1,889.00	0.004	0.02	0	1,882.42	Not Full	No	-1.069	6.585
359	2,021.00	0	0.00	0	2,014.61	Not Full	No	-0.658	6.388
36	1,903.32	0.001	0.00	0	1,892.03	Not Full	No	-0.629	11.292
37	1,900.08	0	0.00	0	1,889.79	Not Full	No	-0.907	10.287
38	1,898.16	0.001	0.01	0	1,890.30	Not Full	No	-0.529	7.862
39	1,900.00	0.001	0.01	0	1,891.67	Not Full	No	-0.612	8.326

40	1,897.95	0.003	0.02	0	1,892.18	Not Full	No	-0.364	5.774
41	1,899.80	0.006	0.03	0	1,893.58	Not Full	No	-0.387	6.217
42	1,896.49	0	0.00	0	1,890.80	Not Full	No	-0.461	5.691
43	1,895.86	0	0.00	0	1,889.36	Not Full	No	-0.448	6.498
44	1,893.36	0.001	0.01	0	1,888.19	Not Full	No	-0.402	5.172
45	1,896.06	0.001	0.01	0	1,889.59	Not Full	No	-0.444	6.474
46	1,893.46	0.003	0.02	0	1,889.67	Not Full	No	-0.58	3.793
47	1,892.15	0.007	0.03	0	1,888.23	Not Full	No	-0.536	3.919
48	1,892.04	0.004	0.02	0	1,884.49	Not Full	No	-0.975	7.555
49	1,901.26	0	0.00	0	1,890.38	Not Full	No	-0.999	10.879
5	1,892.50	0.001	0.01	0	1,883.75	Not Full	No	-0.932	8.749
50	1,904.70	0.001	0.01	0	1,891.59	Not Full	No	-0.619	13.112
51	1,902.00	0.001	0.00	0	1,890.89	Not Full	No	-0.964	11.114
52	1,901.60	0.001	0.01	0	1,891.90	Not Full	No	-0.521	9.704
53	1,902.23	0.001	0.01	0	1,892.67	Not Full	No	-0.609	9.562
54	1,901.27	0.01	0.05	0	1,893.77	Not Full	No	-0.535	7.498
55	1,903.50	0.008	0.04	0	1,895.19	Not Full	No	-0.545	8.309
56	1,905.22	0.002	0.01	0	1,894.68	Not Full	No	-0.606	10.539
57	1,904.23	0.001	0.01	0	1,893.33	Not Full	No	-0.519	10.903
58	1,903.60	0	0.00	0	1,891.77	Not Full	No	-1.192	11.832
59	1,904.56	0	0.00	0	1,892.65	Not Full	Yes	-1.24	11.91
6	1,892.21	0	0.00	0	1,883.37	Not Full	No	-1.295	8.845
60	1,903.51	0	0.00	0	1,893.23	Not Full	No	-0.508	10.281
61	1,905.99	0	0.00	0	1,894.68	Not Full	No	-0.509	11.313
62	1,914.62	0.008	0.04	0	1,896.63	Not Full	No	-0.327	17.987
63	1,907.19	0	0.00	0	1,894.57	Not Full	No	-1.387	12.617
64	1,907.22	0	0.00	0	1,897.27	Not Full	No	-0.351	9.951
65	1,907.94	0	0.00	0	1,895.87	Not Full	No	-0.387	12.071
66	1,909.08	0	0.00	0	1,896.73	Not Full	No	-0.446	12.349
67	1,907.85	0	0.00	0	1,897.80	Not Full	No	-0.354	10.054
68	1,908.00	0	0.00	0	1,899.05	Not Full	No	-0.358	8.948
69	1,908.37	0	0.00	0	1,895.89	Not Full	No	-1.222	12.482
7	1,893.67	0.002	0.01	0	1,883.83	Not Full	No	-0.929	9.839
70	1,908.95	0.001	0.00	0	1,897.63	Not Full	No	-0.528	11.322
71	1,909.06	0	0.00	0	1,897.05	Not Full	No	-0.539	12.012
72	1,909.81	0.001	0.01	0	1,896.47	Not Full	No	-0.518	13.341
73	1,907.32	0	0.00	0	1,895.82	Not Full	No	-0.514	11.497
74	1,906.94	0.001	0.00	0	1,895.66	Not Full	No	-0.511	11.284
75	1,905.39	0.002	0.01	0	1,899.96	Not Full	No	-0.423	5.433
76	1,906.70	0.001	0.01	0	1,898.94	Not Full	No	-0.375	7.765
77	1,908.30	0.002	0.01	0	1,900.07	Not Full	No	-0.408	8.228
78	1,907.93	0.002	0.01	0	1,900.91	Not Full	No	-0.427	7.017
79	1,907.62	0.004	0.02	0	1,899.54	Not Full	No	-0.358	8.078
8	1,889.01	0.022	0.10	0	1,882.82	Not Full	No	-1.037	6.194
80	1,907.90	0.001	0.01	0	1,900.25	Not Full	No	-0.395	7.655
81	1,908.54	0.001	0.01	0	1,901.05	Not Full	No	-0.411	7.491
82	1,909.90	0.001	0.01	0	1,902.03	Not Full	No	-0.423	7.873
83	1,910.84	0	0.00	0	1,903.17	Not Full	No	-0.44	7.67
84	1,910.98	0	0.00	0	1,904.16	Not Full	No	-0.451	6.821
85	1,911.18	0	0.00	0	1,904.96	Not Full	No	-0.463	6.223
86	1,911.32	0	0.00	0	1,905.66	Not Full	No	-0.642	5.665
87	1,911.42	0	0.00	0	1,905.87	Not Full	Yes	-0.628	5.551
88	1,919.44	0	0.00	0	1,909.37	Not Full	No	-0.64	10.073
89	1,920.79	0	0.00	0	1,910.71	Not Full	No	-0.646	10.08
9	1,891.38	0.008	0.04	0	1,883.23	Not Full	No	-1.096	8.152
90	1,920.81	0	0.00	0	1,914.66	Not Full	No	-0.505	6.148
91	1,933.95	0	0.00	0	1,923.47	Not Full	No	-0.536	10.479
92	1,992.71	0	0.00	0	1,982.92	Not Full	No	-0.558	9.791
93	2,000.91	0	0.00	0	1,991.11	Not Full	No	-0.569	9.803
94	2,009.14	0	0.00	0	1,999.26	Not Full	No	-0.544	9.878



95	2,009.59	0.001	0.00	0	2,000.82	Not Full	No	-0.52	8.774
96	2,010.90	0.012	0.06	0	2,002.32	Not Full	No	-0.523	8.577
98	2,033.57	0.01	0.047	0	2,023.63	Not Full	No	-0.604	9.938
99	2,020.90	0	0.001	0	2,010.97	Not Full	No	-0.599	9.932