City of Ashland Comprehensive Sanitary Sewer Collection System Master Plan

MARCH 2022

Prepared By

RH2 Engineering, Inc.
3553 Arrowhead Dr., Suite 200
Medford, OR 97504

With Assistance From
Hansford Economic Consulting LLC

CERTIFICATION

This Comprehensive Sanitary Sewer Collection System Master Plan for the City of Ashland was prepared under the direction of the following professional engineers registered in the State of Oregon.

Zachary Schrempp, PE

Hannah Farris, PE

TABLES

CHARTS

FIGURES

APPENDICES

ES | EXECUTIVE SUMMARY

INTRODUCTION

The City of Ashland (City) contracted with RH2 Engineering, Inc., (RH2) to prepare an updated Comprehensive Sanitary Sewer Collection System Master Plan (CSSCSMP). The previous plan was prepared in 2012 by Keller Associates. The CSSCSMP includes an evaluation of the sanitary sewer collection system and recommendations for capital improvements. This executive summary provides a brief overview of the CSSCSMP findings and results.

The City owns and operates its sanitary sewer collection and treatment system and complies with all regulatory standards for managing a public sanitary system in the state of Oregon. The City's population is approximately 21,554 (certified estimate from Portland State University Population Research Center as of July 1, 2021). The City provides sanitary sewer services through approximately 8,549 customer connections as of 2020.

EXISTING COLLECTION SYSTEM

The collection system consists of approximately 113 miles of gravity sewer mains. The gravity sewer mains are mostly 6-inch or 8-inch diameter. The remaining gravity sewer mains range in size from 4-inch to 24-inch diameter. Most of the gravity mains, where the material is known, are made of concrete. The second most common material for gravity mains is PVC followed by clay. Approximately 35 percent of the gravity sewer mains were installed in 1970 or later and approximately 28 percent were installed before 1970. The oldest known mains in the system are from the early 1900s. **Charts 1-1**, **1-2**, and **1-3** display the gravity main diameter, material, and age distribution.

Seven lift stations pump and convey wastewater in portions of the collection system where gravity flow is not feasible. The largest lift station (LS), Ashland Creek LS, is adjacent to the wastewater treatment plant (WWTP) and has three 75 horsepower (hp) pumps. Two medium sized lift stations, Kestrel LS and North Main LS, have two 7.5 hp and two 10 hp pumps, respectively. The remaining four smaller lift stations (Grandview LS, Shamrock LS, Winburn LS, and Creek Drive LS) each have two pumps ranging from 3 to 5 hp. A summary of the lift stations is presented in **Chapter 1** and **Table 1-1**.

The sewer service area is made up of 12 major drainage basins which were delineated and mapped in preparation of this CSSCSMP and are shown on **Figure 1-1**.

The entirety of the sewer service laterals, called side sewers, are privately owned starting from the connection to the main. Since the side sewers are not City property, information is largely unknown regarding age and material.

An assessment of the wastewater treatment plant (WWTP) condition and operation is outside the scope of this CSSCSMP.

REGULATIONS, POLICIES, AND DESIGN CRITERIA

The Oregon Department of Environmental Quality (DEQ) is the main regulatory agency for the collection system. The City follows all federal, state, and DEQ policies and design criteria and has also adopted its own policies which meet or exceed the requirements of all governing agencies. **Chapter 2** presents the regulations, policies, and design criteria for the collection system. **Chapter 2** is a working document that will be updated by City staff as necessary to adapt to the City's needs and goals.

FLOW PROJECTIONS

Data was collected to assess the current flows through the system and to project 20-year flow rates (for year 2042). Five years of WWTP influent flow and rainfall data were initially provided by the City (2014 through 2019) and later 2020 and 2021 WWTP influent data was provided in order to confirm the flow projections.

Approximately five months of flow monitoring data was collected by V&A Consulting Engineers (V&A) from November 2020 through March 2021 as part of this CSSCSMP. The intent was to identify the average flow and system response to storm events. V&A used eight in-stream flow monitors (4 City-owned and 4 V&A flow monitors) and the City's sanitary sewer supervisory control and data acquisition (SCADA) system to collect data. Rainfall data was also collected within the same timeframe. V&A summarized the data in a report (**Appendix A**) which informs the collection system evaluation in this CSSCSMP.

Growth projections from the City's 2019 *Water Master Plan* were used to estimate future sanitary sewer flows. Some adjustments were made such as excluding irrigation usage from the collection system since irrigation water typically does not drain into the sewer.

The existing average dry weather flow (ADWF) determined by V&A is approximately 1.37 MGD. The existing ADWF calculated from WWTP influent records is approximately 1.9 MGD. The larger value, based on WWTP influent records, is used in this assessment. The V&A results are therefore scaled up by about 39% (1.9 MGD divided by 1.37 MGD minus 100%) in **Chapter 3**.

The peak hour flow (PHF) rate was calculated assuming the 5-year, 24-hour design storm as recommended by the DEQ. The existing PHF is approximately 11.79 MGD and the projected 2042 PHF is 11.98 MGD (**Table 3-4**).

Chapter 3 presents the collection system current and future flows.

CONDITION ASSESSMENT

Gravity Sewer Mains and Manholes

The City performs routine inspections of the collection system including video inspection of gravity sewer mains and photographs of manholes. This data was not in a GIS-ready format during the preparation of this CSSCSMP but the City is working towards entering all of the collected data into its Cartegraph asset management system in the future. The collection system condition assessment is presented in **Chapter 4**.

Side Sewers

Approximately 50 side sewers were evaluated in this CSSCSMP. City crews performed side sewer video inspections and collected customer surveys in areas of the City identified by RH2 to be potential sources of inflow and infiltration (I/I) based on the age of nearby sewer mains, interviews with local plumbers, and the results of the V&A report. Many of the side sewers inspected are made of a combination of polyvinyl chloride (PVC) and acrylonitrile butadiene styrene (ABS) and older materials. Several of the side sewers inspected are Orangeburg pipe. The side sewer condition assessment is presented in **Chapter 4** and a summary of the side sewer inspections is in **Appendix B**.

Lift Stations and Force Mains

RH2 staff visited each of the lift stations on June 16, 2020 to observe the layout and general condition. Of the seven lift stations, the oldest is Shamrock LS which was built in 1972 and is approximately 50 years old. The other 6 lift stations were constructed or updated within the past 30 years. Creek Drive LS, Shamrock LS, and Kestrel LS all have operation and maintenance (O&M) issues based on discussion with City staff. A summary of the lift station site visit observations is included in **Chapter 4** and the field notes are presented in **Appendix C**.

I/I REDUCTION PLAN

Inflow and infiltration (I/I) are common issues in collection systems. Inflow is stormwater runoff that flows directly into the collection system. Infiltration is typically groundwater that reaches the collection system through cracks and breaks in pipes and manholes. Analysis of the flow monitoring performed for this CSSCSMP indicated significant I/I in most of the City's collection system drainage basins. The majority of I/I detected appears to be rainfall dependent based on the flow monitoring program and report prepared by V&A (**Appendix A**). A reduction in I/I will mean less capacity is utilized and could potentially eliminate the need for future capacity related projects. **Chapter 5** presents multiple techniques for identifying sources of I/I, such as in-stream flow monitoring, smoke testing, dye testing, video inspection and analysis, and flow isolations. There are a number of rehabilitation methods that can be implemented to reduce I/I once its source is located. **Chapter 5** describes re-routing of stormwater cross-connections as well as sewer main, manhole, and side sewer rehabilitation/replacement. **Chapter 5** also presents the results of the I/I evaluation and prioritizes addressing I/I in the collection system drainage basins.

Environmental Impacts and Conservation

Recommended maintenance and capital improvement projects should consider the strategies identifies by the City's Climate and Energy Action Plan (CEAP), which aims to reduce greenhouse gases (GHG) and promote conservation, during design for incorporation into construction. The design phase for capital improvements and maintenance projects should consider appropriate measures and focus on minimizing embedded GHG within materials required for construction improvements.

SYSTEM CAPACITY EVALUATION

A system capacity evaluation was performed with a hydraulic model of the collection system in SewerGEMS® software using a built-in dynamic wave solver. The hydraulic model was built and updated for this CSSCSMP as described in **Appendix D – Model Update and Calibration**. System capacity was assessed under existing and future (2042) loading scenarios using the City's criteria presented in **Chapter 2**. Eight sewer main capacity related projects (CIP SM-2 through SM-9) and two lift station projects (CIP LS-1 and LS-2) were identified based on the system capacity evaluation. If I/I reduction is successful, then some of the capacity projects may no longer be necessary. An iterative approach to addressing I/I and system capacity projects is therefore recommended. The system capacity evaluation is presented in **Chapter 6**.

CAPITAL IMPROVEMENT PLAN

Chapter 7 presents the 20-year estimated costs and proposed schedule of recommended collection system capital projects in a capital improvement plan (CIP). The CIP includes I/I evaluation, I/I reduction and gravity collection system improvement, lift station, and miscellaneous projects (such as future planning studies). Planning level estimates of total project costs are presented in **Chapter 7**. The recommended schedule of improvements is broken down by year for the first ten years (2022 to 2032) and then estimated as a lump sum for the following ten years (2033 to 2042). The CIP schedule proposes expenditures of approximately $500,000 to $600,000 annually. A few of the I/I evaluation projects are recommended first to inform the I/I reduction projects and potentially eliminate the need for some capacity-related projects. A summary table and map of the proposed CIP projects are presented in **Chapter 7** (**Table 7-3** and **Figure 7-1**).

FINANCIAL ANALYSIS

Chapter 8 presents a financial plan to support completion of the collection system CIP. The financial plan addresses impacts to the City's wastewater system development charges (SDCs) and impacts on sewer rates paid by existing customers. **Chapter 8** also provides potential funding opportunities to finance the CIP.

The recommended collection system CIP projects total approximately $12.74 million to be spent over the next 20 years. The costs are inflated to approximately $26.35 million to reflect estimated costs at the time of construction.

The City should plan for rate increases in the next fiscal year budget (to be implemented July 1, 2023). It is also recommended that the City pursue available principal forgiveness, grants, and no or low interest loans for wastewater treatment plant improvements to minimize rate impacts on existing customers. The City should also continue to include maintenance of a reserve in the wastewater rates. Refer to **Chapter 8** for details of the financial analysis and recommendations.

1 | EXISTING SYSTEM

SEWER SERVICE AREA

History

The City of Ashland (City) is located along Interstate 5 in south-central Jackson County. The City was incorporated in 1874, and, as of 2021, has grown to a population of approximately 21,554 people[1]. The City owns and operates its sanitary sewer collection and treatment system, which has approximately 8,549 customer connections as of 2020. **Figure 1-1** shows the gravity collection system extents and drainage basins.

As described in further detail in this chapter and shown on **Figure 1-2**, much of the City's gravity collection system was constructed after 1960. Some existing portions of the City's collection system date to the early twentieth century, with many of the oldest sewer mains in the City's Railroad District where early settlement occurred. As shown on **Figure 1-3**, concrete remains the most prevalent pipe material in the City's collection system, but the percentage of polyvinyl chloride (PVC) sewer main in the system is growing over time as new sewer mains are constructed and old sewer mains are replaced.

The City's wastewater treatment plant (WWTP), located along Ashland Creek near the Ashland Dog Park, was originally constructed in 1936. The WWTP originally consisted of a primary clarifier, a trickling filter, a secondary clarifier, and sludge drying beds. Upgrades and configuration changes at the WWTP took place in 1961, 1974, 1998 to 2002, and 2008 to 2013. The current WWTP is an oxidation ditch facility with ultraviolet (UV) disinfection, hollow fiber membranes for tertiary filtration, and post-aeration facilities. Treated effluent from the WWTP is discharged to Ashland Creek, a tributary of Bear Creek.

The City utilizes seven lift stations to convey wastewater from locations where gravity flow to the WWTP is not feasible. With the exception of the Shamrock Lift Station, which was constructed in 1972, the City's lift stations were constructed/upgraded in the 1990s or later.

Topography

The topography of the existing service area is generally rising in elevation from the northwest corner to the southern side of the City, with the highest elevations being the hillsides southwest of the Granite Reservoir. Service area elevations range from approximately 1,700 feet above mean sea level in the northwest to approximately 2,600 feet above mean sea level in the southwest portion of the service area. The City's system is located within the Rogue River watershed.

Climate

Over the course of the year, temperatures typically fall within the range of approximately 30 degrees Fahrenheit to 90 degrees Fahrenheit. Temperatures in the City rarely drop below 20 degrees Fahrenheit or exceed 100 degrees Fahrenheit.

[1] Certified estimate from Portland State University Population Research Center (as of July 1, 2021).

The summers in the City are typically short, hot, dry, and mostly clear. Warm summer weather is typically from early July to late August. Winters are typically cold, wet, and mostly cloudy. The wet season in the City is typically from mid-October until the end of April. The end of November is typically the time of year with the highest precipitation. The mean total annual precipitation in the City is approximately 20 inches.

Water Bodies and Floodplains

Bear Creek, which is generally located to the north of the City, is the largest water body near the City. Ashland Creek, which runs from south to north through the west side of the City and passes through the downtown area, is another significant water body. Ashland Creek, which is tributary to Bear Creek, is the outfall location for the City's WWTP effluent. The City is relocating the outfall to Bear Creek this summer (2022). There are also many small creeks that originate from nearby mountains and hills and are generally tributary to Bear Creek.

Small portions of the City, generally along creeks, are located within the 100-year floodplain. Additionally, there are a number of small wetlands located in the lower elevations of the City.

Service Area Boundaries

The current wastewater collection system service area roughly matches the City limits. The City limits cover approximately 6.6 square miles, and the City's Urban Growth Boundary covers approximately 7.4 square miles. These boundaries are shown on **Figure 1-1**.

EXISTING SEWER FACILITIES

Sewer Drainage Basins

The City's existing sewer service area is comprised of 12 major sewer drainage basins, as shown in **Figure 1-1**. Drainage basins are defined as areas of the City's collection system draining to a single location. As shown on **Figure 1-1**, several of the City's major drainage basins have been divided into multiple sub-basins for clarity.

Basin 1

As shown on **Figure 1-1**, Basin 1 consists of the gravity collection system in the City's northwest corner. Basin 1 is tributary to the Ashland Creek Lift Station. The force mains from the North Main Lift Station (which collects wastewater from Basins 2A and 2B) and the Grandview Lift Station (which collects wastewater from Basin 3) discharge to Basin 1.

Basin 2

Basin 2 has been divided into Sub-Basin 2A and Sub-Basin 2B, as shown on **Figure 1-1**. Both sub-basins drain to the North Main Lift Station. The force main from the North Main Lift Station discharges to Basin 1.

Basin 3

Basin 3 consists of the gravity collection system tributary to the Grandview Lift Station, as shown on **Figure 1-1**. The force main from the Grandview Lift Station discharges to Basin 1.

Basin 4

As shown on **Figure 1-1**, Basin 4 consists of 11 sub-basins located in the central-western portion of the City. Sub-Basins 4A, 4B, 4C, 4D, 4E, 4G, and 4H are located to the west of Ashland Creek, while Sub-Basins 4F, 4I, 4J, and 4K are located to the east of Ashland Creek. The City's Railroad District, which contains some of the oldest portions of the collection system, is located in Basin 4. Basin 4 drains by gravity to the WWTP headworks.

Basin 5

As shown on **Figure 1-1**, Basin 5 is a relatively small basin, located along Oak Street and Clear Creek Drive, north of the railroad tracks. Basin 5 is tributary to the Bear Creek trunkline, which drains to the Ashland Creek Lift Station.

Basin 6

Basin 6 consists of eight small sub-basins (Sub-Basins 6A, 6B, 6C, 6D, 6E, 6F, 6G, and 6H) located along the Bear Creek trunkline, as shown on **Figure 1-1**. All of the Basin 6 sub-basins are tributary to the Bear Creek trunkline, which drains to the Ashland Creek Lift Station.

Basin 7

Basin 7 consists of the gravity collection system tributary to the Kestrel (North Mountain) Lift Station, as shown on **Figure 1-1**. The force main from the lift station discharges to the Bear Creek trunkline, which is tributary to the Ashland Creek Lift Station.

Basin 8

As shown in **Figure 1-1**, Basin 8 consists of two sub-basins, Sub-Basin 8A and Sub-Basin 8B, located in the central portion of the City. Sub-Basin 8A is located to the north of the railroad tracks and is tributary to the Bear Creek trunkline, which drains to the Ashland Creek Lift Station. Sub-Basin 8B is located to the south of the railroad tracks and is tributary to Sub-Basin 8A.

Basin 9

Basin 9 consists of two sub-basins located in the central-eastern portion of the City, as shown on **Figure 1-1**. Sub-Basin 9A, located to the north of Siskiyou Boulevard, drains to the Bear Creek trunkline along Wightman Street. Sub-Basin 9B, located to the south of Siskiyou Boulevard, is tributary to Sub-Basin 9A.

Basin 10

Basin 10 is located in the central-eastern portion of the City, and is entirely north of Siskiyou Boulevard. As shown on **Figure 1-1**, Basin 10 has been divided into two sub-basins. Sub-Basin 10A drains to the north along Walker Avenue, and is tributary to the Bear Creek trunkline, which drains to the Ashland Creek Lift Station. Sub-Basin 10B, which is located entirely south of the railroad tracks, is tributary to Sub-Basin 10A.

Basin 11

As shown on **Figure 1-1**, Basin 11 consists of the gravity collection system in the eastern portion of the City, north of Siskiyou Boulevard and west of Interstate 5. Basin 11 is tributary to the Bear Creek trunkline, which drains to the Ashland Creek Lift Station.

Basin 12

Basin 12 consists of the gravity collection system in the far eastern portion of the City, and is mostly located east of Interstate 5, as shown on **Figure 1-1**. Basin 12 is tributary to the Bear Creek trunkline, which drains to the Ashland Creek Lift Station.

Collection Piping

Gravity Sewer Mains

The City's collection system contains approximately 113 miles of gravity sewer mains. The majority of the mains (approximately 85.5 percent) are 6-inch and 8-inch diameter, as seen in **Chart 1-1**.

Chart 1-2 presents the distribution of gravity mains by material: 48.1 percent are concrete pipe; 29.9 percent are PVC pipe, and 16.3 percent are clay pipe. The remaining 5.7 percent of the sewer mains are constructed from other or unknown materials. The City has two remaining sewer mains constructed with Orangeburg pipe.

A distribution of the gravity mains by age (decade of installation) is presented in **Chart 1-3**. For a significant percentage of the system (approximately 36.6 percent), the installation year is unknown. Approximately 35 percent of the system is known to have been installed in 1970 or later. Approximately 28.4 percent of the mains are known to have been installed before 1970, with the oldest known mains in the City dating to 1905.

Chart 1-1
Gravity Main Diameter Distribution

Diameter (Inches)	Length (Feet)	% of Total
Unknown	13,164	2.2%
4 or smaller	748	0.1%
6	283,229	47.8%
8	222,920	37.7%
10	24,623	4.2%
12	28,247	4.8%
15	8,095	1.4%
21	1,517	0.3%
24	9,536	1.6%
Total	**592,079**	**100%**

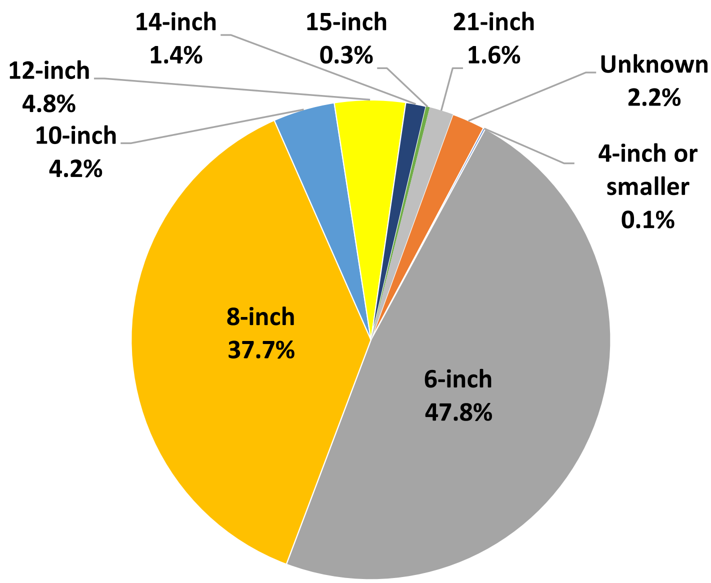


Chart 1-2
Gravity Main Material Distribution

Material	Length (Feet)	% of Total
Unknown	28,229	4.8%
Clay	96,748	16.3%
Concrete	284,507	48.1%
Ductile Iron	731	0.1%
HDPE	4,053	0.7%
Orangeburg	562	0.1%
PVC	177,106	29.9%
Steel	142	0.0%
Total	**592,079**	**100%**

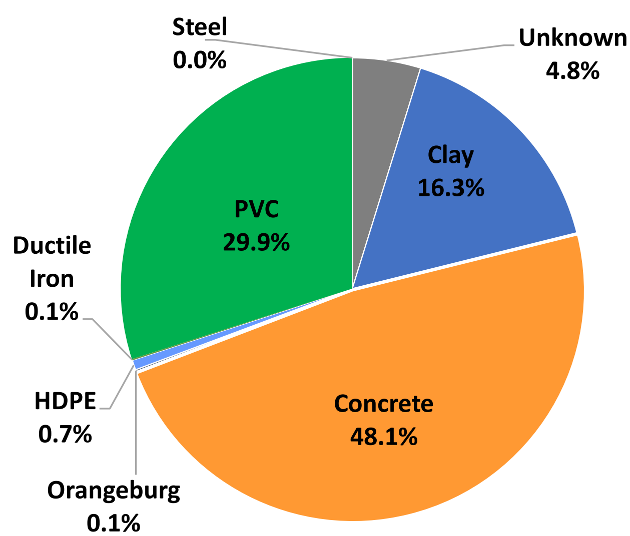
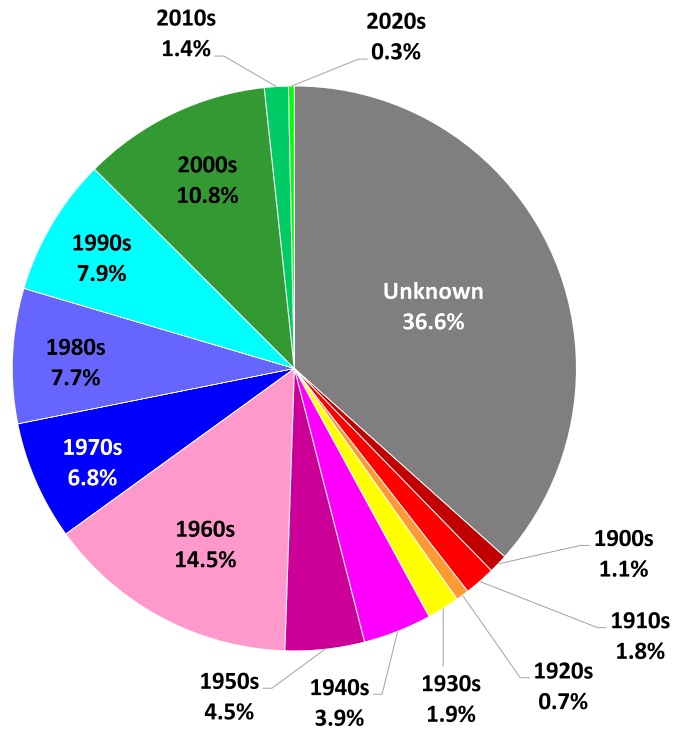


Chart 1-3
Gravity Main Age Distribution

Year Installed	Length (Feet)	% of Total
Unknown	216,729	36.6%
1900s	6,430	1.1%
1910s	10,518	1.8%
1920s	4,404	0.7%
1930s	10,998	1.9%
1940s	23,242	3.9%
1950s	26,896	4.5%
1960s	85,841	14.5%
1970s	40,404	6.8%
1980s	45,674	7.7%
1990s	46,733	7.9%
2000s	64,124	10.8%
2010s	8,109	1.4%
2020s	1,978	0.3%
Total	**592,079**	**100%**



Force Mains

In addition to the gravity sewer mains, the City also has 7 force mains totaling approximately 2,700 linear feet. Additional details about the force mains are included in the **Lift Stations** section of this chapter.

Side Sewers

Privately owned sewer service pipes are called side sewers. In the City, the privately owned side sewers start at the connection to the main.

Privately owned side sewers may be constructed of a variety of materials, depending on when the property was developed or the side sewer was replaced. City staff is aware of multiple existing Orangeburg side sewers throughout the City. Orangeburg pipe is generally beyond its design life; failures and infiltration and inflow are common with this pipe material. Inspections of approximately 50 side sewers were conducted as part of this Comprehensive Sanitary Sewer Collection System Master Plan update; observed side sewer materials are discussed further in **Chapter 4** and **Chapter 5**.

Lift Stations

The City has seven active lift stations. An eighth lift station, Nevada, was abandoned in 2012. A summary of the lift station characteristics is presented in **Table 1-1.**

Table 1-1
Lift Station Characteristics

Lift Station	Ashland Creek	Grandview	N. Main	Kestrel (formerly North Mountain)	Shamrock	Winburn	Creek Drive
Year Constructed/ Updated	2000	2018	2007	1994	1972	1999	2001
Wet Well Diameter (feet)	12	6	6	6	4 x 5	5	5
Wet Well Depth (feet)	23	13	14	13	9	10	19
Force Main Diameter (inches)	18	4	4	6	4	4	4
Force Main Length (feet)	890	400	600	400	238	145	32
Force Main Material	Unknown	PVC c900	Asbestos Cement	Steel	Steel	Ductile Iron	Ductile Iron
No. of Pumps	3	2	2	2	2	2	2
Type	Triplex Submersible	Duplex Submersible	Duplex Submersible	Duplex Suction Lift Self Prime	Duplex Dry Well	Duplex Submersible	Duplex Submersible
Pump Manufacturer	WEMCO	Flygt	Flygt	HYDR-O-MATIC	Chicago	Flygt	Flygt
Pump Horsepower (hp)	75	4	10	7.5	5	3	3
Pump TDH (feet)	82	56	49	23	42	17	20
Pump Capacity (gpm)	2,200 (each)	154 (each)	490 (each)	520 (each)	100 (each)	150 (each)	150 (each)
Sum of Pump Capacities (gpm)[1]	4,600	308	980	1,040	200	300	300
Firm Capacity (gpm)[2]	4,400	154	490	520	100	150	150
Pump Speed (rpm)	1,550	3,415	1,735	870		1,750	1,150
Level Control	Level Transducer	Level Transducer	Level Transducer	Level Transducer	Level Transducer	Level Transducer	Floats
Pump ON level (ft)	unknown[3]	7.0	5.9	3.7	3.2	2.0	unknown[3]
Pump OFF level (ft)	unknown[3]	4.0	3.5	3.4	2	1.0	unknown[3]
Influent Sewer Diameter (inches)	30, 8	8	6	8	6	6	8
Standby Power	Auto-Generator	Manual/Trailer Generator	Manual/Trailer Generator	Manual/Trailer Generator	Manual/Trailer Generator	Manual/Trailer Generator	Bypass Piping

1 = The actual total station capacity is typically less that the sum of pump capacities, due to increased head losses at higher flow rates. Total capacity may also be limited if the LS electrical system is not designed to run all pumps concurrently. Ashland Creek LS capacity assumes two pumps running at full motor speed and the third pump running at 50 percent motor speed.

2 = Firm capacity is the lift station pumping capacity assuming the largest pump is offline.

3 = Pump ON/OFF data not provided.

Ashland Creek Lift Station

The Ashland Creek Lift Station was constructed in 2000 as a triplex submersible pump station. The Ashland Creek Lift Station is the largest lift station in the system. It is located on the northeast corner of the WWTP site and receives flows from the majority of the area served by the collection system. Typically, a single pump is run with a capacity of 2,200 gallons per minute (gpm). The maximum pumping capacity (before a limitation is reached on the WWTP headworks and UV treatment) is 4,500 gpm to 4,600 gpm. This is achieved with two pumps running at full motor speed and the third pump running at 50-percent motor speed.

Ashland Creek Lift Station (June 16, 2020)

The Ashland Creek Lift Station discharges to an 18-inch-diameter force main of unknown material that is 890 feet long.

Grandview Lift Station

The Grandview Lift Station was rebuilt in 2018 as a submersible duplex pump station and represents a "standard" lift station arrangement for the City. The lift station has a duplex pump system with a drop inlet, mixer pump, and ultrasonic sensor (level transducer) for level readings. The lift station piping and valving is configured to accommodate bypass pumping of the force main or wet well.

The Grandview Lift Station discharges to a 4-inch-diameter PVC C900 force main that is approximately 400 feet long.

Grandview Lift Station (June 16, 2020)

North Main Lift Station

The North Main Lift Station was upgraded/replaced in 2007. It is a submersible duplex pump station that follows the City's standard lift station arrangement and is similar to the Grandview Lift Station.

The North Main Lift Station discharges to a 4-inch-diameter asbestos cement (AC) force main that is approximately 600 feet long. The AC force main is planned to be replaced concurrent with upcoming road work.

North Main Lift Station (June 16, 2020)

Kestrel (North Mountain) Lift Station

The Kestrel Lift Station was formerly referred to as the North Mountain Lift Station. The Kestrel Lift Station is a duplex pumping system with self-priming pumps built in 1994. In 2012, City staff reported that the lift station pumps lose prime about three times or more per year. The large pumps squeak when they start running and typically only run for about 20 seconds at a time, which is inefficient. In the *2012 Comprehensive Sanitary Sewer Master Plan* (Keller Associates), the Kestrel Lift Station was recommended for an upgrade, and the City plans to upgrade it soon.

Kestrel (North Mountain) Lift Station (June 16, 2020)

The Kestrel Lift Station discharges to a 6-inch-diameter steel force main that is approximately 400 feet long.

Shamrock Lift Station

The Shamrock Lift Station is a small lift station that services only a few connections. City staff report relatively low flow.

Shamrock Lift Station (June 16, 2020)

Many electrical panels for the lift station are located below ground in the dry well. To access the confined space dry well, City staff needs to bring additional equipment (fall protection and gas meter). Eventually, this lift station should be upgraded to a submersible type pump station with above grade electrical.

The Shamrock Lift Station discharges to a 4-inch-diameter steel force main that is approximately 238 feet long.

Winburn Lift Station

Winburn Lift Station (June 16, 2020)

The Winburn Lift Station is a small lift station. It is located in the parking lot adjacent to the Public Works Community Building. City staff report that the lift station is connected to the on-site generator that also serves the Public Works facility. The Winburn Lift Station serves only three buildings, including the Public Works Community Building.

The original installation had only one pump; however, City crews have since added a second pump. The old float system was abandoned, and a pressure transducer control system was installed.

At the time of this evaluation, no pump run time data was available for review. However, City staff report that the lift station runs very little. A pump test at the lift station was not feasible, as the pumps empty the small wet well so quickly an accurate determination could not be made.

The Winburn Lift Station discharges to a 4-inch-diameter ductile iron force main that is approximately 145 feet long.

Creek Drive Lift Station

Creek Drive Lift Station (June 16, 2020)

The Creek Drive Lift Station is a small submersible duplex pump station. The service area is relatively small, with fewer than 50 homes. Pumping records suggest that the lift station operates on average less than 2.5 hours per week. When the lift station was first inventoried in July 2010, both pumps were plugged, and the upstream gravity sewer pipelines were backed up enough that sewage would bypass the lift station and gravity flow to a nearby main line. City staff reported that the pumps had not been operational for more than a month. Clogging problems frequently plague the lift station. The clogging has been an issue the last 10 years and is believed to be a result of materials (i.e. rags, etc.) that are being flushed by residents. Disposable mop pads were found by City staff in the lift station. Efforts to educate residents have not eliminated the current problems.

While the overflow bypass may prevent sewer from backing up into residences, extended periods of no operation will result in septic conditions and accumulation of deposits within the collection system.

The Creek Drive Lift Station does not have a telemetry system. City staff reported that when the beacon at the lift station turns on, a neighbor notifies the City and maintenance staff are dispatched.

The Creek Drive Lift Station discharges to a 4-inch-diameter ductile iron force main that is approximately 32 feet long.

Wastewater Treatment and Disposal Facilities

The City's WWTP is on the north side of the city at 1295 Oak Street with discharge into Ashland Creek. The WWTP consists of screening and grit removal, biological treatment in an oxidation ditch system with secondary clarification, UV disinfection, and post aeration. Alum addition and a tertiary membrane system are operated from May 1st to November 30th to aid in meeting a seasonal phosphorous limit. Waste solids from the biological process are dewatered and hauled to the landfill for disposal. (Equipment for lime stabilization of the waste solids currently is not used.)

The City's WWTP currently operates and discharges to Ashland Creek under a National Pollutant Discharge Elimination System (NPDES) permit. The current Municipal Separate Storm Sewer System (MS4) Phase II NPDES permit was issued November 30, 2018, with an effective date of March 1, 2019.

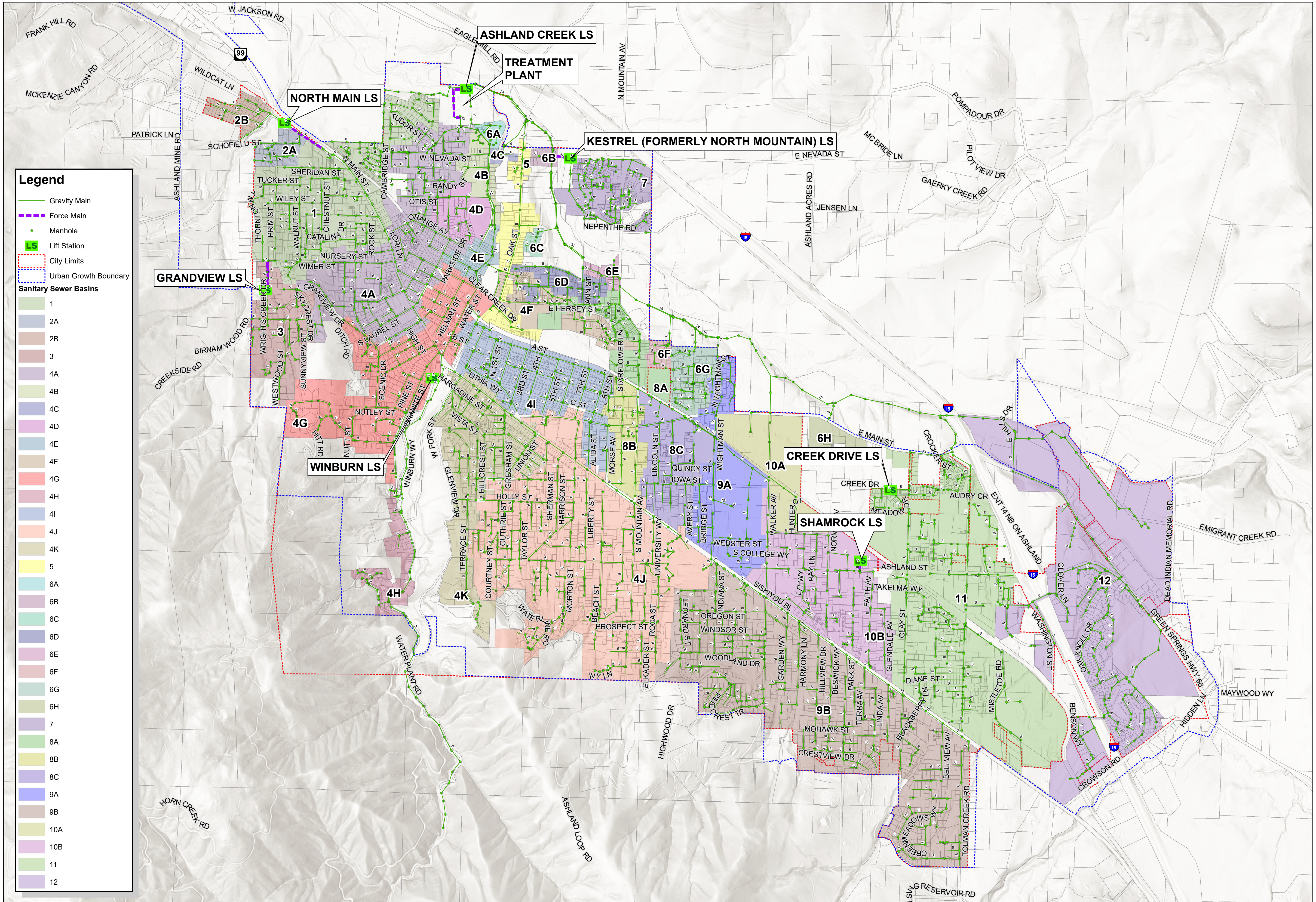
For further information about the City's WWTP, refer to the *Wastewater Facilities Plan* (Keller Associates, May 2014) and technical memorandum *WWTP Facilities Assessment and Major Process Components Improvements Task 1: Load Analysis and Process Modeling* (Jacobs, July 2019).

Telemetry and Supervisory Control

The City's telemetry system uses Wonderware and the software was updated in 2019. Telemetry is on a fiber system. The facilities that are monitored include the WWTP, Ashland Creek Lift Station, Shamrock Lift Station, Winburn Lift Station, Grandview Lift Station, Kestrel (North Mountain) Lift Station, and North Main Lift Station. The Creek Drive Lift Station is the only lift station without telemetry.

Industrial Wastewater Characterization

The City performed an Industrial Users Survey report, and in 2016, the Oregon Department of Environmental Quality notified the City that an approved pretreatment program is not required. Class A reclaimed water is not produced and is not planned to be produced.



This map is a graphic representation derived from the City of Ashland Geographic Information System. It was designed and intended for City of Ashland staff use only; it is not guaranteed to survey accuracy. This map is based on the best information available on the date shown on this map.

Any reproduction or sale of this map, or portions thereof, is prohibited without express written authorization by the City of Ashland.

Vicinity Map

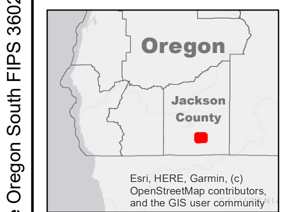


Figure 1-1
Existing Sewer System - Drainage Basins

City of Ashland
Comprehensive Sanitary Sewer Collection System Master Plan

J:\Data\COA\1019-203 San Sewer MP\GIS\Maps\Figure1-1_Existing Sewer System_BasinBoundaries.mxd By:hfarris Coordinate System:NAD 1983 StatePlane Oregon South FIPS 3602 Feet

CITY OF ASHLAND

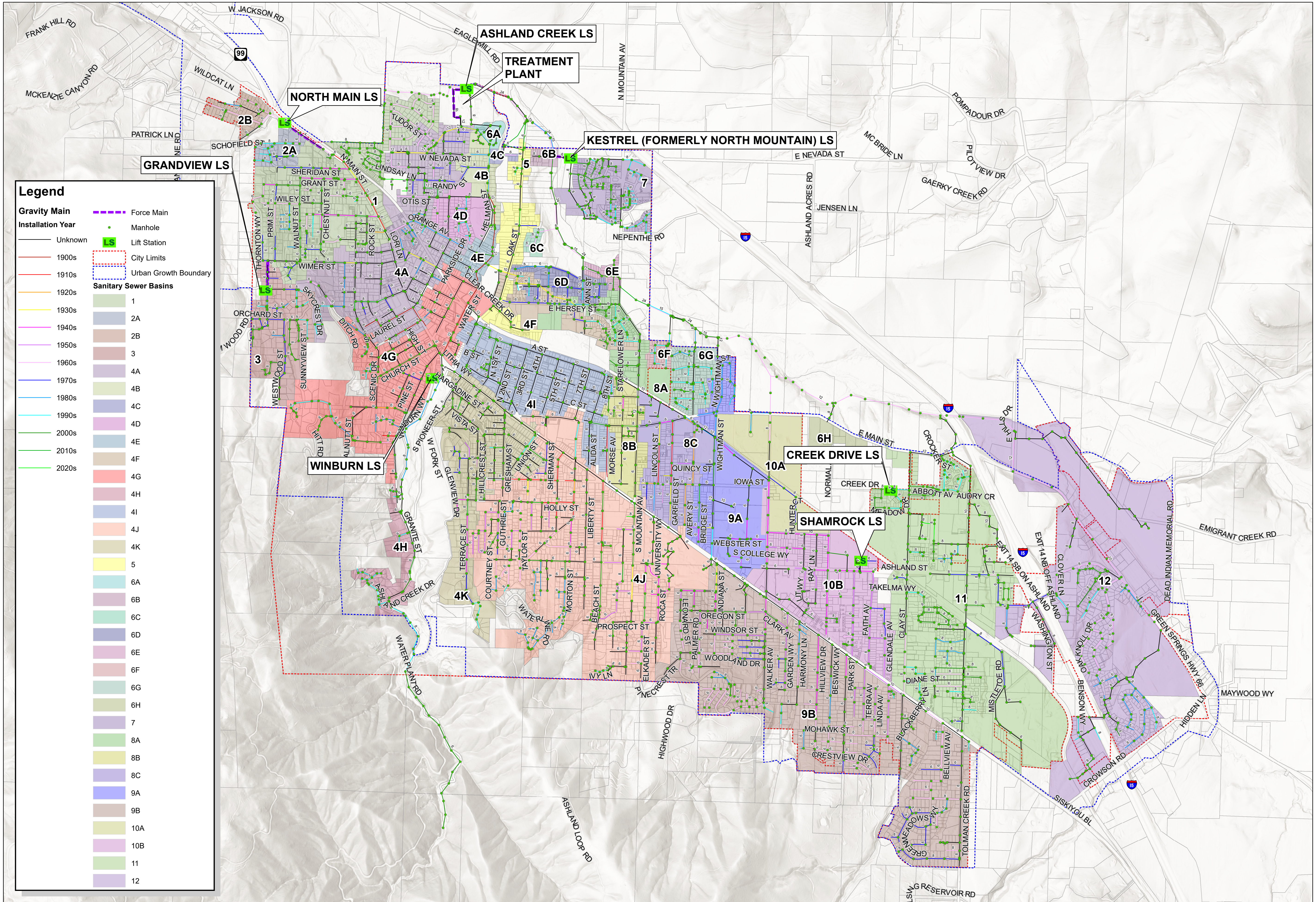
1 inch = 1,000 feet

0 500 1,000 2,000 Feet

Plot Date: 2/11/2022

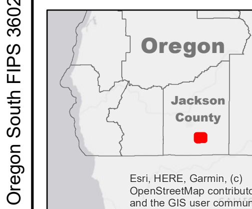
RH2

NORTH



This map is a graphic representation derived from the City of Ashland Geographic Information System. It was designed and intended for City of Ashland staff use only; it is not guaranteed to survey accuracy. This map is based on the best information available on the date shown on this map.

Vicinity Map



Coordinate System:NAD 1983 StatePlane Oregon South FIPS 3602 Feet

By:hfarris

J:\Data\COA\1019-203 San Sewer MP\GIS\Maps\Figure1-2_Existing Sewer System\Figure1-2_Existing Sewer System_Installation_Year.mxd

Figure 1-2
Existing Sewer System - Installation Year

City of Ashland
Comprehensive Sanitary Sewer Collection System Master Plan

CITY OF ASHLAND

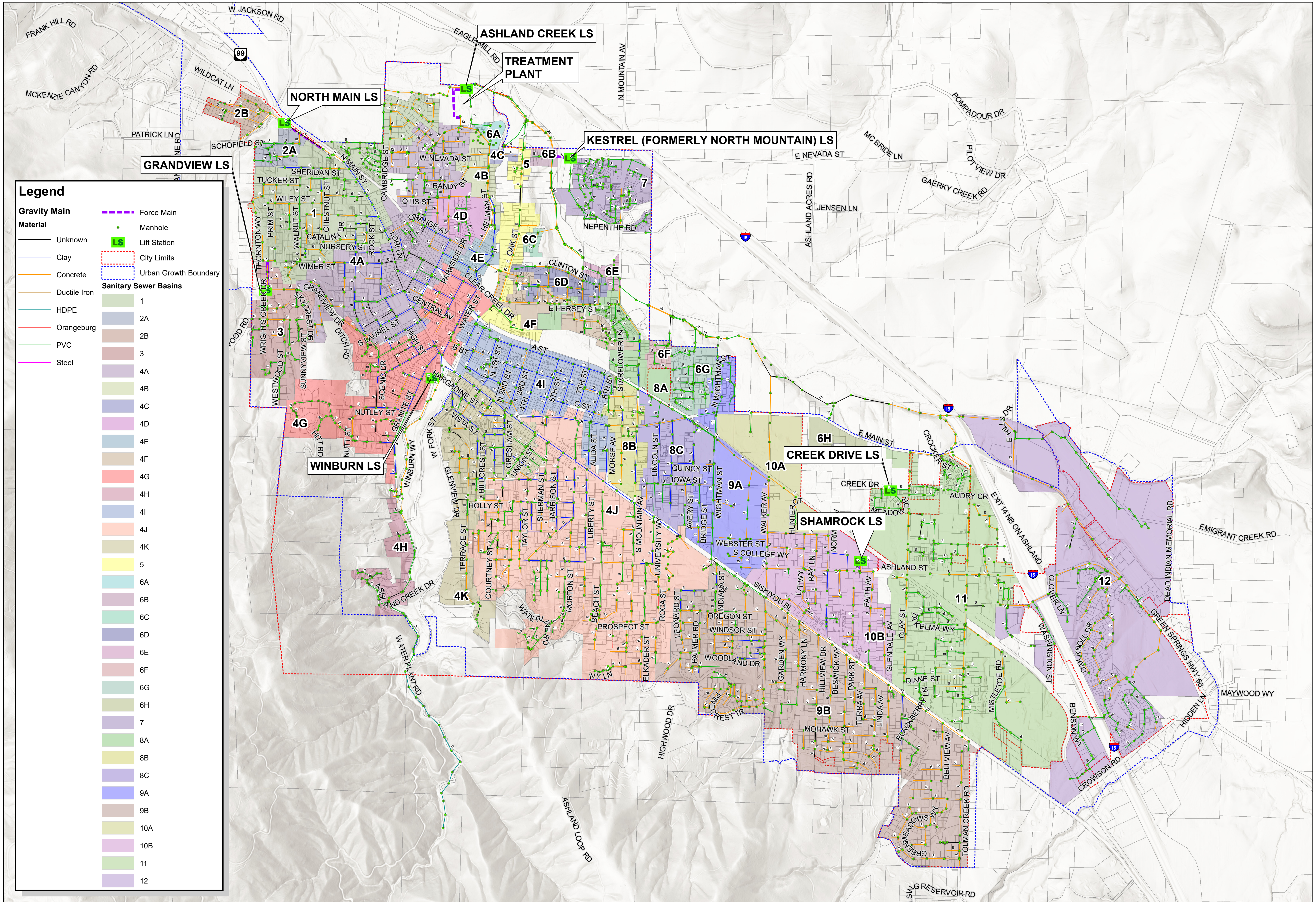
1 inch = 1,000 feet

0 500 1,000 2,000 Feet

Plot Date: 3/24/2022

RH2

NORTH



Vicinity Map

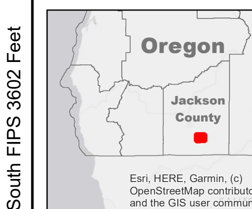


Figure 1-3
Existing Sewer System - Material

City of Ashland
Comprehensive Sanitary Sewer Collection System Master Plan

CITY OF ASHLAND

1 inch = 1,000 feet

0 500 1,000 2,000 Feet

Plot Date: 2/11/2022

RH2

NORTH

Coordinate System:NAD 1983 StatePlane Oregon South FIPS 3602 Feet

By:hfarris

J:\Data\COA\1019-203 San Sewer MP\GIS\Maps\Figure1-3_Existing Sewer System_Material.mxd

2 | REGULATIONS, POLICIES, AND DESIGN CRITERIA

INTRODUCTION

The City of Ashland (City) operates and plans sanitary sewer collection system service for City customers according to the policies, regulations, and design criteria presented in **Tables 2-1**, **2-2**, and **2-3**. The Oregon Department of Environmental Quality (DEQ) is the main regulatory agency for the collection system. The City uses the following policies, regulations, and design criteria to operate an efficient collection system that meets or exceeds its service goals. The information in these tables will be updated by the City as necessary.

Table 2-1
Sewer System Policies

Subject	Policy
Sewer Laterals (AMC 14.09.020)	**Ownership and Responsibility**
(action item: expand and strengthen regulations requiring property owner repair of leaking sewer laterals per 2012 COA SSMP 2.4.3 (2)) Example provided on request	
Definitions	1. “Building Sewer Lateral” refers to the extension of the sewer pipeline from the building drain to the public sewer main line. 2. “Sewer Main” is the public sewer system, typically comprised of 6-inch and larger pipelines located within public rights-of-way or easements. 3. “Sewer Connection” is the location where the sewer lateral connects to the Sewer Main, including any pipe fittings or materials used to make the connection. 4. “Property Owner” means any person, firm, partnership or corporation. 5. “Deficiency of a Service Lateral” means a defect (broken pipe, leaky joints, protruding service, etc.) in the service line or connection to the main line that results in infiltration, obstructs flow, creates a subsurface void, allows wastewater to ex-filtrate, or creates a risk of sanitary sewer overflows.
Responsibility	1. It shall be the responsibility of the property owner to repair or replace any building sewer lateral showing any defect including, but not limited to, leaks, breaks, settlement, or stoppages. Any loss or damage to any public facility caused either by improper installation or maintenance procedures will also be the property owner’s responsibility. 2. The City reserves the right to cease water and/or sewer service to the property owner in the event that a significant deficiency is not corrected in a timely manner by the property owner after being notified by the City. 3. In the event that the City installs or relocates a building sewer lateral within a public right-of-way for purposes other than to correct deficiencies in the property owner’s building sewer lateral, the City shall maintain the sewer lateral for one year from the date of final inspection. Maintenance after this date becomes the responsibility of the property owner. (Ord. 3073, amended, 08/21/2012)

Table 2-1 (continued)
Sewer System Policies

Subject	Policy
Sewer Overflows (proposed new policy)	**Overflow Prevention**
	The City has implemented programs to prevent overflows of wastewater in the existing system, and requires all new construction to convey peak flows and storm events without overflowing the sewer during the design storm event.
New Development (proposed new policy)	**Oversizing Pipes**
	When land outside a new development will logically direct flow into a storm drain or sanitary sewer within the new development, the system shall be "public" and shall be extended to one or more of the upstream development boundaries. The pipes shall be sized to accommodate all off-site flows, based on a fully developed condition using the current Comprehensive Plan and the cost shall be borne by the developer.
On-Site Sewerage Systems (AMC Ch. 14)	**Construction and Repair**
	Refer to AMC Chapter 14.
Goals (proposed new policy)	**Level of Service**
	SSOs, Backups, and Public Health Goals - The City's overall level of service goals are as follows: • The City shall efficiently convey sanitary flows in a manner that protects the safety and health of the public and the environment. • Sanitary sewer overflows (SSO), backups, and other service interruptions are to be prevented during peak instantaneous flows associated with the 5-year, 24-hour storm intensity.

Table 2-1 (continued)
Sewer System Policies

Subject	Policy
Prohibited Discharge to Sewers (proposed new policy)	**Non-Sanitary Sewer Discharge**
	No person shall discharge or cause discharge of any storm water, surface water, ground water, roof run-off, sub-surface drainage, uncontaminated cooling water, swimming pool water, or unpolluted industrial process water to any sanitary sewer.
Equipment Inventory (proposed new policy)	**Equipment Inventory Required**
	The City shall maintain an inventory of all City-owned equipment, supplies, parts, and service vehicles used for maintenance of sewer facilities. The inventory should include planned replacement dates as applicable.
Emergency Response Plan (proposed new policy)	**Updates Required**
	On a regular basis, the City shall update an Emergency Response Plan that focuses on problems created by major disasters (such as earthquakes, floods, or windstorms). The plan should ensure that adequate emergency provisions and procedures are in place to provide sewer services to the extent possible during an emergency event. The City's Emergency Management Plan can be found here: https://www.ashland.or.us/Files/AshlandEMP_FullPlan_Final_07312018.pdf.
Hazard Mitigation Plan (proposed new policy)	**Vulnerability/Hazard Mitigation Plans Required**
	On a regular basis, the City shall update and maintain a Vulnerability Assessment & Hazard Mitigation Plan addressing risks associated with natural and human-made hazards to the sewer. The plan should identify how the public and environment may be damaged by such a hazard and provide detailed procedures for responding to such an act to minimize harm to the public. The Vulnerability Assessment shall not be made available to the public. The City's Emergency Management Plan addresses vulnerability and hazard mitigation.

Table 2-2
Sewer System Regulations

Subject	Regulation
Phosphorous Loading (AMC 14.09.010)	**Phosphate Ban**
Definitions	1. "Cleaning agent" means any product, including but not limited to soaps and detergents, containing a surfactant as a wetting or dirt emulsifying agent and used primarily for domestic or commercial cleaning purposes, including, but not limited to the cleansing of fabrics, dishes, food utensils, and household and commercial premises. Cleaning agent shall not mean foods, drugs, cosmetics, insecticides, fungicides and rodenticides, or cleaning agents exempt from this Ordinance. 2. "Phosphorus" means elemental phosphorus. 3. "Person" means any person, firm, partnership or corporation.
Prohibition	No person may sell or distribute for sale within the City of Ashland City Limits, any cleaning agents containing more than 0.5 percent phosphorus by weight except cleaning agents used in automatic dishwashing machines shall not exceed 8.7 percent phosphorus by weight.
Exemptions	This Ordinance shall not apply to any cleaning agent: 1. Used in dairy, beverage, or food processing equipment. 2. Used as an industrial sanitizer, brightener, acid cleaner or metal conditioner, including phosphoric acid products or trisodium phosphate. 3. Used in hospitals, veterinary hospitals or clinics, or health care facilities. 4. Used in agricultural production and the production of electronic components. 5. Used in a commercial laundry for laundry services provided to hospital or health care facility or for a veterinary hospital or clinic.

Table 2-2 (continued)
Sewer System Regulations

Subject	Regulation
Phosphorous Loading (AMC 14.09.010)	**Phosphate Ban**
Exemptions (continued)	6. Used by industry for metal cleaning or conditioning. 7. Used in any laboratory, including a biological laboratory, research facility, chemical, electronics or engineering laboratory. 8. Used for cleaning hard surfaces, including household cleansers for windows, sinks, counters, stoves, tubs or other food preparation surfaces, and plumbing fixtures. 9. Used as a water softening chemical, antiscale chemical or corrosion inhibitor intended for use in closed systems, such as boilers, air conditioners, cooling towers or hot water systems. 10. For which the Council determines that imposition of this Ordinance will either: a. create a significant hardship on the user; or b. be unreasonable because of the lack of an adequate substitute cleaning agent.
Remedy for Violation	Any person who violates any provision of this Chapter is subject to Section 1.08.020 of the Ashland Municipal Code. In addition to other legal and equitable remedies available to the City of Ashland, including restriction or termination of service: Violation of any section of this chapter AMC 14.09 is a Class II violation. (Ord. 3137, amended, 2017; Ord. 3029, amended, 08/03/2010; Ord. 2623, amended, 1991)

Table 2-2 (continued)
Sewer System Regulations

Subject	Regulation
FOG **Plumbing Code** **(proposed revised regulation)** **(Action item: Add FOG regulations to COA Municipal Code per 2012 COA SSMP 2.4.2)**	**FOG**
Definitions Plumbing Code 15.16.410	"BMP" Best Management Practice "FSE" Food Service Establishment. Businesses such as restaurants, cafes, lunch counters, cafeterias, bars, clubs, hotels, hospitals, factories, school kitchens, or other establishments that serve or prepare food. "F.O.G. (FOG)" means fats, oils, and grease. "FOG control plan" means a document, signed by the business owner, outlining FOG issues within the facility and how they are to be addressed. "Grease trap" means an indoor hydromechanical grease interceptor, typically with a holding capacity of 55 gallons or less, designed for the purpose of removing and preventing fats, oils, and grease from entering the sanitary sewer system. Such traps are typically compact under-the-sink units that are near food preparation areas. "Grease interceptor" means an outdoor gravity grease interceptor, typically with a holding capacity of 500 gallons or more, designed for the purpose of removing and preventing fats, oils, and grease from entering the sanitary sewer collection system. These devices are often below-ground units in outside areas and are built as two – or three-chamber baffled tanks. "Vent Hood" A vent hood ,kitchen hood, exhaust hood, or range hood is a device containing a mechanical fan that hangs above the stove or cooktop in the kitchen. It removes airborne grease, combustion products, fumes, smoke, heat, and steam from the air by evacuation of the air and filtration.
BMPs Plumbing Code 15.16.420	All FSEs shall comply with the BMPs listed in the City of Ashland FOG Guidebook.

Table 2-2 (continued)
Sewer System Regulations

Subject	Regulation
Conditions of FOG Pretreatment and FOG Plan Requirement Plumbing Code 15.16.430	FOG Pretreatment and FOG Plan required when: A. FSEs where FOG may be part of the waste stream shall have grease traps, grease interceptors, or other approved pretreatment facilities in place to prevent the discharge of FOG to the sewer system. B. All FSEs shall have an approved and implemented FOG control plan, and a business license for the business shall not be renewed or issued without an approved plan being on file with the city.
FOG Plan Requirements Plumbing Code 15.16.440	All FOG plans shall include the following: A. A description of the facility type and a summary of products made and/or service provided. B. A description of any food processing that occurs on site, including but not limited to the type of food service (sit down or take out), types of cooking (saute, deep fry, etc.), a description of the menu, and a list of kitchen fixtures with potential to contribute FOG to the sanitary sewer. C. Schematics of process areas illustrating drains and discharge points connected to the sewer. D. A description of current reduction, recycling, treatment activities, and best management practices. E. Specific performance goals and implementation schedule including cleaning frequency. Include cleaning and waste disposal procedures if business will self-clean grease trap.
Installation Requirements Plumbing Code 15.16.450	A. All FOG pretreatment facilities shall be installed, maintained, and operated by the business owner at their own expense. The pretreatment facility shall be adequately sized and located in a manner that provides ready and easy accessibility for cleaning and inspection at all times. B. The grease interceptors must meet, at a minimum, the specifications of the current Uniform Plumbing Code and International Building Code adopted by the city at the time of construction. No food waste disposal shall be connected to or discharged into any grease trap or interceptor. No toilets shall discharge into an interceptor.

Table 2-2 (continued)
Sewer System Regulations

Subject	Regulation
Installation Requirements (continued) Plumbing Code 15.16.450	C. Increased volume of discharge (increased business) can become a factor, regarding the efficiency of the grease trap(s). As discharge volumes increase, the need for a larger grease trap(s) or an exterior grease interceptor may be necessary. If the facility’s waste stream discharge is not maintained within city standards, a pretreatment system upgrade will be required at the discharger’s expense.
Effluent Testing Plumbing Code 15.16.460	The City of Ashland may require periodic testing of effluent by businesses when the city has a reasonable belief that the business is not meeting the FOG discharge standards set forth in **Prohibited Discharge to Sewers** (proposed new language at the end of this table) based on: A. Downstream testing; or B. Evidence of FOG buildup downstream; or C. Discharger records that are incomplete, false, or not made available for inspection; or D. Evidence of tampering with pretreatment equipment; or E. Evidence of use by the business of degreasers, “enzymes” or other chemicals which keep grease in suspension past the grease trap or interceptor; or F. Other reasons established by facts which warrant a belief that the discharge standards are violated.
Recordkeeping Plumbing Code 15.16.470	Records and certification of maintenance, including copies of grease interceptor cleaning invoices, shall be made readily available to the city for review and inspection, and must be maintained by the business for a minimum of two years, or longer upon notification by the city. Copies of all maintenance and cleaning reports shall be sent in to the city within 10 days of service.

Table 2-2 (continued)
Sewer System Regulations

Subject	Regulation
Grease Traps, Grease Interceptors, and Vent Hood Cleaning and Maintenance Plumbing Code 15.16.480	A. The grease trap or grease interceptor shall be kept in continuous operation at all times and shall be maintained to provide efficient operation. Businesses shall not allow the addition of emulsifying agents for the purposes of emulsifying polar or nonsolid FOG. Interceptor cleaning shall be done only by a service contractor qualified to perform such cleaning. All material removed shall be disposed of in accordance with all city, county, state, and federal regulations. B. Grease Interceptor Cleaning. 1. Grease interceptor maintenance shall include quarterly (four times annually) pumping and cleaning of the interceptor, which shall be set forth in the FOG plan. The business may request to modify the quarterly cleaning frequency, by demonstrating that all solids and grease layers reported over the previous 12 months were less than 15 percent of the interceptor's capacity. The city reserves the right at any time to modify the FOG plan to increase the cleaning frequency, if the grease interceptor's solids and grease layer exceed 25 percent of its capacity at any time in the previous 12 months. 2. Grease interceptor maintenance shall include removal of all FOG, solids and water from the grease interceptor. Skimming the surface layer of waste material, partial cleaning of the interceptor or use of any method that does not remove entire contents of the collection device does not constitute maintenance under this chapter. After a complete evacuation, the walls, top and bottom of the interceptor shall then be thoroughly scraped and the residue removed. The grease interceptor shall be filled with clean water before returning to service. C. Grease Trap Cleaning. 1. Grease trap maintenance shall occur at the intervals set forth in the FOG plan, which shall not exceed 90 days. Grease trap maintenance shall include removal of the grease layer, scraping of baffles and removal of the sediment layer. The grease trap shall be filled with clean water before returning to service. A cleaning company, licensed to do business in the City of Ashland, may be employed to pump out the trap.

Table 2-2 (continued)
Sewer System Regulations

Subject	Regulation
Grease Traps, Grease Interceptors, and Vent Hood Cleaning and Maintenance Plumbing Code 15.16.480 (continued)	2. Self-Cleaning. A business may be allowed under its FOG plan to self-clear its grease trap(s) located inside a building provided: a. The grease trap is no more than 55 gallons in liquid/operating capacity. b. Whenever the grease trap is inspected or cleaned, seams and pipes are checked for leaks, and the baffles and flow-regulating devices checked for effective operation. c. All FOG and food waste (including caked-on FOG and waste) is removed from the grease trap and its baffles. d. Oil and grease are skimmed from the surface of the water and placed in a watertight container. e. Solids are removed from the bottom of the grease trap and placed in a watertight container. f. The grease trap is filled with clean water before returning to service. g. The business records the date of cleaning and the amount of material removed from the grease trap in a maintenance log, and reports the information to the city under the terms of the FOG plan. h. All grease trap waste is placed in a leak-proof, sealable container(s) located on the premises, and shall be disposed of by either: i. Contracting with a licensed cleaning company to pick up the collected waste; or ii. Absorbing all free liquid with a dry absorbent and dispose as solid waste in a watertight container. D. Vent Hood Cleaning. 1. Clean vent hood and filters regularly. Have a licensed and certified company clean your vent hood and filters. Waste FOG scraped off, or wiped off, as well as rags, paper towels or other absorbent materials used must be disposed of into trash containers. If water is used in cleaning procedures, it should be discharged into the grease interceptor or hauled away by the service company. 2. Keep maintenance log to document the frequency of service. The maintenance log serves as a record of the cleaning frequency and can help the FSEs manager

Table 2-2 (continued)
Sewer System Regulations

Subject	Regulation
Grease Traps, Grease Interceptors, and Vent Hood Cleaning and Maintenance Plumbing Code 15.16.480 (continued)	reduce cost. Keep copies of the cleaning manifest for the City's Industrial Waste Inspector to review while conducting inspections.
Recycling FOG Plumbing Code 15.16.490	1.Collect and recycle used cooking oil in appropriate barrels for recycling 2. Keep records and receipts of pick-ups by hauling and rendering companies 3. Plan ahead and schedule pick-up of rendering/recycling barrels before they are full. It is a violation of this chapter to discharge any waste, including FOG and solid material, removed from the grease trap to any drainage piping connected to the sanitary sewer or the storm drainage system. COAMC 15.16
Prohibited Discharge to Sewers (proposed new regulation)	**Non-Sanitary Sewer Discharge**
	No person shall discharge or cause discharge of any storm water, surface water, ground water, roof run-off, sub-surface drainage, uncontaminated cooling water, swimming pool water, or unpolluted industrial process water to any sanitary sewer.

Table 2-3
Sewer System Design Criteria

Subject	Design Criteria
Surcharging (proposed new design criteria)	**Allowable Surcharge**
	New facilities shall be designed to prevent the hydraulic grade line (HGL) from exceeding 75% of pipe capacity. Existing facilities shall be allowed to experience surcharging 2.5 ft above invert. Conveyance trunks without services shall be allowed to experience surcharges 2 ft below manhole rim elevations.
Design Flows (proposed new design criteria)	**Pipe Capacity**
	Sewer flows are composed of residential, institutional, commercial, and industrial sewage, along with infiltration and inflow. Sewers must be capable of conveying the ultimate peak hour flows of these wastewater sources as estimated using the design storm. In accordance with all applicable federal, state, and local regulations, in particular DEQ guidelines, the City should design its sewer facilities to adequately and reliably convey instantaneous flows associated with the 5-year, 24-hour storm intensity, without overflowing or discharging to any water bodies.
Pipe Size (proposed new design criteria)	**Minimum Pipe Size**
	The minimum allowable sewer line size in a public street is eight inches in diameter.

Table 2-3 (continued)
Sewer System Design Criteria

Subject	Design Criteria
Pipe Slope (proposed new design criteria)	**Minimum Pipe Slope**
	Peak design flow design depth shall not exceed 0.75 full. The minimum design velocity shall be 2 feet per second (fps). The minimum design slope for 8-inch mainline sewers is 1 percent.
Gravity Flow (proposed new criteria)	**Gravity Flow Preferred**
	Where possible, gravity flow is preferred over lift.
Design Standards (proposed new design criteria)	**City Standards**
	All sanitary sewers and appurtenant structures shall be designed and constructed in conformance with Sections 2.03 and 2.04 of *Engineering Design Standards for Public Improvements* (City of Ashland, January 1st, 2006).
Infrastructure Planning (proposed new design criteria)	**Siting Preferences**
(Action Item: include language in COA Engineering Design Standards Section 2.03b.)	New wastewater infrastructure will be sited outside of stream corridors, wetlands, and significant tree groves whenever feasible.

3 | FLOW PROJECTIONS

INTRODUCTION

This chapter presents the flow projections for the City of Ashland (City) wastewater collection system. Existing flow rates in the collection system are determined based on historical data, flow monitoring data, and extrapolation using Oregon Department of Environmental Quality (DEQ) guidelines. Future flow rate projections are developed utilizing the demographic projections used in the City's 2019 *Water Master Plan*.

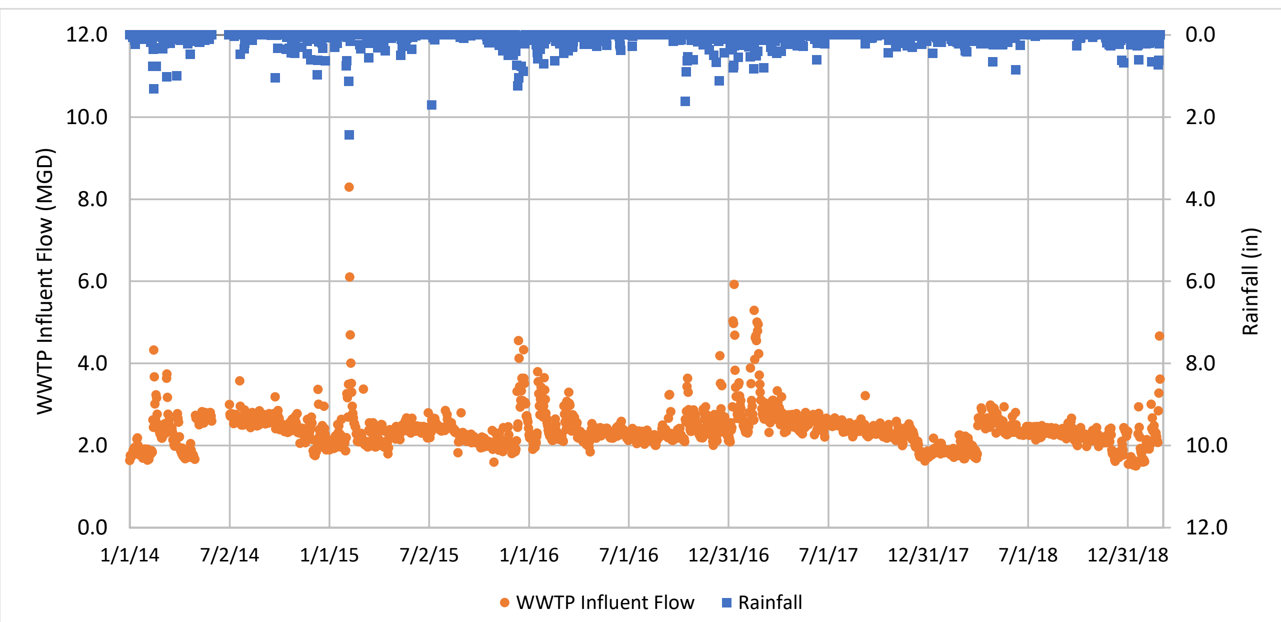
The flow projections for the collection system are used to determine the size of gravity collection piping, lift station facilities, and force main piping, and inform the sizing of treatment facilities. DEQ guidelines state that the gravity collection system and wastewater pump stations should be capable of conveying the peak hourly flow associated with the 5-year, 24-hour storm event.

HISTORICAL WWTP FLOW DATA

The City provided daily Wastewater Treatment Plant (WWTP) influent flow (split between gravity and Ashland Creek Lift Station (LS) components) and rainfall data for the majority of the January 2014 – February 2019 period. RH2 reviewed this data to determine baseline average dry weather flow (ADWF), average annual flow and significant peak flow events. The total WWTP influent and rainfall are shown in **Chart 3-1**.

Chart 3-1

Historical Daily WWTP Influent Flow Rate and Rainfall



Average Dry Weather Flow

The collection system appears to experience peak dry weather flows in the summer rather than winter, a trend which appears to have continued in 2020 and 2021 during the COVID-19 pandemic. The reason for this is unclear; it is possible that irrigation water infiltrates into the sanitary sewer system during summer months. In July and August 2018, a period of time during the summer, prior to the COVID-19 pandemic, when the total rainfall was approximately 0.04 inches, WWTP influent records showed that the system ADWF was approximately 2.3 million gallons per day (MGD). Average dry weather flows during the in-stream flow monitoring period (November 2020 through March 2021, described later in this chapter) were estimated to be approximately 1.9 MGD based on a review of WWTP records.

Average Annual and Peak Flows

The WWTP influent records were analyzed to determine the approximate average annual flow (AAF) and peak daily flow (PDF) for years 2014 – 2018. These flowrates and associated peaking factors are presented in **Table 3-1**.

Table 3-1

WWTP Peaking Factors

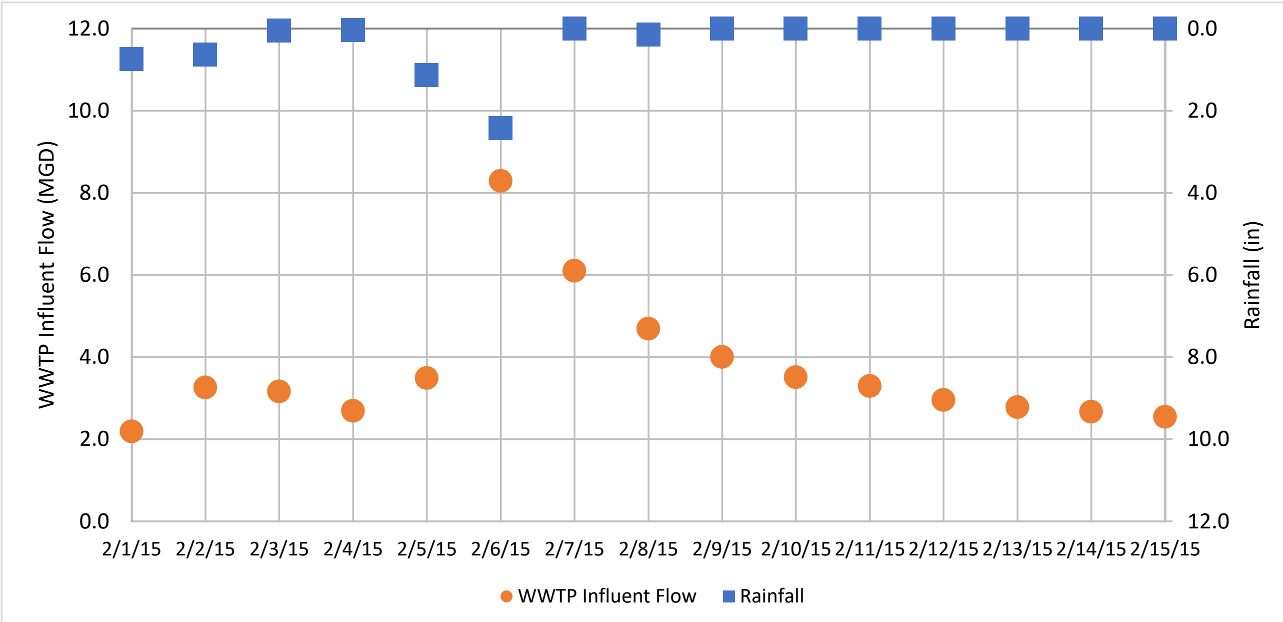
Year	Average Annual Flow (MGD)	Peak Daily Flow (MGD)	PDF/AAF Peaking Factor
2014 [1]	2.38	4.32	1.81
2015	2.35	8.29	3.53
2016	2.39	4.18	1.75
2017	2.56	5.92	2.31
2018	2.20	2.98	1.35

1 = Incomplete data set, missing June 2014.

The highest daily influent flows observed during the available historical WWTP flow record occurred on February 6th and 7th, 2015. Approximately 2.43 inches of rain fell on February 6th. This storm resulted in overflows in several areas of the collection system and at the WWTP. The influent flow and rainfall data associated with this storm is shown on **Chart 3-2**.

Chart 3-2

Historical Daily WWTP Influent Flow Rate and Rainfall: February 2015 Storm Event



For the purposes of the Comprehensive Sanitary Sewer Collection System Master Plan (CSSCSMP) analysis, it was desired to estimate the peak hourly flow associated with the 5-year, 24-hour storm event. The National Oceanic and Atmospheric Administration (NOAA) *Precipitation Frequency Atlas of the Western United States* isopluvials show a rainfall total for the City of approximately 2.5 inches for the 5-year, 24-hour storm. Peak daily and peak hourly flows for separate collection system basins are based on this information (presented in the **Peak Flows** section at the end of the chapter). The rainfall total and collection system response shown on **Chart 3-2**, roughly equivalent to a 5-year, 24-hour storm, are used for comparison with the peak day flow calculations presented later in this chapter.

FLOW MONITORING PROGRAM

As part of the CSSCSMP effort, V&A Consulting Engineers (V&A) conducted sanitary sewer flow monitoring in the City's collection system. V&A's report, referenced throughout this chapter, is included as **Appendix A**.

The flow monitoring program consisted of a total of eight in-stream flow monitors and supervisory control and data acquisition (SCADA) data collected from the City's lift stations from approximately November 2020 through March 2021. Rainfall data was also collected concurrently. Table 1-2 on Page 12 of the V&A report, reproduced in part below in **Table 3-2**, lists the flow monitor locations and the corresponding monitored basins from **Figure 1-1**.

Table 3-2

Measured and Adjusted Existing Flows

Flow Monitor Location	Basins Monitored[1]	Basin Acreage	Average Dry Weather Flow - V&A Report (MGD)	Adjusted Existing Average Dry Weather Flow[2] (MGD)	Total I/I per Acre - V&A Report (R-Value)[3]	Adjusted Total I/I per Acre (R-Value)[4]
V1	1, 2A	210	0.049	0.068	0.41%	0.57%
V2	4A, 4B, 4C, 4D, 4E, 4F, 4G, 4H, 4K	678	0.193	0.267	1.72%	2.38%
V3	4I, 4J	550	0.240	0.332	2.97%	4.11%
V4	9A, 9B	551	0.222	0.307	1.51%	2.09%
C1	6F, 6G, 6H, 8A, 8B, 8C	384	0.073	0.101	1.91%	2.64%
C2	10A, 10B	221	0.103	0.142	1.57%	2.17%
C3	11	402	0.154	0.213	1.26%	1.74%
C4	12	436	0.054	0.075	1.61%	2.23%
Ashland Creek LS	5, 6A, 6B, 6C, 6D, 6E	238	0.213	0.295	2.49%	3.44%
Grandview LS	3	73	0.040	0.055	2.58%	3.57%
North Main LS	2B	19	0.010	0.014	0.36%	0.50%
Kestrel LS	7	59	0.023	0.032	0.33%	0.46%
Total		**3,821**	**1.374**	**1.900**		

1 = Calculated by subtraction for V1, V2, C1, and Ashland Creek LS. Reference Table 1-2 in V&A report, in **Appendix A**.
2 = ADWF scaled to estimated WWTP dry weather influent flow.
3 = Defined as percentage of rainfall volume that reaches the sanitary sewer collection system.
4 = Scaled per Footnote 2.

Average Dry Weather Flow

As shown in **Table 3-2**, V&A determined the existing ADWF, or average flow rate from days without noticeable inflow and infiltration (I/I) response, was approximately 1.374 MGD.

As stated previously, WWTP influent records corresponding with the flow monitoring period were reviewed and it was estimated that the system ADWF during this period was approximately 1.9 MGD. Accordingly, the V&A estimates were scaled up to the WWTP influent estimates utilizing a global scalar, as shown in **Table 3-2**.

ADWF Flow Projections

Per the calculations performed for the City's 2019 *Water Master Plan*, the demand of the water system is anticipated to increase by approximately 7.2 percent from 2020/2021 to 2042. Approximately 19% of existing water consumption is irrigation, which would not typically enter the sanitary sewer collection system, so the projected demand increase was adjusted accordingly to approximately 5.9 percent. As shown in **Table 3-3**, this multiplier was applied to the existing ADWF to determine the projected 2042 ADWF.

Table 3-3

Projected ADWF

Basins	Basin Acreage	Adjusted Existing Average Dry Weather Flow (MGD)	Projected 2042 Average Dry Weather Flow (MGD)
1, 2A	210	0.068	0.072
4A, 4B, 4C, 4D, 4E, 4F, 4G, 4H, 4K	678	0.267	0.283
4I, 4J	550	0.332	0.351
9A, 9B	551	0.307	0.325
6F, 6G, 6H, 8A, 8B, 8C	384	0.101	0.107
10A, 10B	221	0.142	0.151
11	402	0.213	0.225
12	436	0.075	0.079
5, 6A, 6B, 6C, 6D, 6E	238	0.295	0.312
3	73	0.055	0.059
2B	19	0.014	0.015
7	59	0.032	0.034
Total	**3,821**	**1.900**	**2.012**

Peak Flows

The I/I associated with each basin for the 5-year, 24-hour storm was estimated by multiplying the total rainfall by the basin area and the adjusted R-value for the basin from **Table 3-2**. The I/I component was added to the ADWF from **Table 3-3** to estimate the peak day flow resulting from the 5-year, 24-hour storm. The peak hour flow for each basin was then extrapolated from the ADWF (estimated to be exceeded approximately 87% of the time based on a review of historical WWTP influent flow data) and peak day flow by means of a probability graph. Estimated peak flows for the existing and 2042 collection system are reported in **Table 3-4**, and peaking factors are shown in **Table 3-5**.

Table 3-4

Peak Flow Rates

Basins Monitored	Basin Acreage	Adjusted Total I/I per Acre (R-Value)	Projected I/I Flow Rate 5-yr, 24-hr Storm[1] (MGD)	Existing Peak Day Flow 5-yr, 24-hr Storm (MGD)	Existing Peak Hourly Flow 5-yr, 24-hr Storm (MGD)	2042 Peak Day Flow 5-yr, 24-hr Storm (MGD)	2042 Peak Hourly Flow 5-yr, 24-hr Storm (MGD)
1, 2A	210	0.57%	0.081	0.149	0.175	0.153	0.185
4A, 4B, 4C, 4D, 4E, 4F, 4G, 4H, 4K	678	2.38%	1.095	1.362	1.960	1.377	1.990
4I, 4J	550	4.11%	1.533	1.865	2.740	1.885	2.760
9A, 9B	551	2.09%	0.781	1.088	1.430	1.106	1.480
6F, 6G, 6H, 8A, 8B, 8C	384	2.64%	0.689	0.789	1.270	0.795	1.275
10A, 10B	221	2.17%	0.326	0.468	0.620	0.477	0.622
11	402	1.74%	0.475	0.688	0.900	0.701	0.920
12	436	2.23%	0.659	0.734	1.220	0.738	1.250
5, 6A, 6B, 6C, 6D, 6E	238	3.44%	0.556	0.851	1.080	0.868	1.100
3	73	3.57%	0.177	0.232	0.320	0.235	0.321
2B	19	0.50%	0.006	0.020	0.022	0.021	0.023
7	59	0.46%	0.018	0.050	0.056	0.052	0.057
	3,821		**6.397**	**8.297**	**11.793**	**8.408**	**11.983**

1 = Approximately 2.5 inches of rain per NOAA *Precipitation Frequency Atlas of the Western United States* .

Table 3-5

Peaking Factors

Basins Monitored	Existing Peaking Factors			Projected 2042 Peaking Factors		
	PDF_5/ADWF	PHF_5/PDF_5	PHF_5/ADWF	PDF_5/ADWF	PHF_5/PDF_5	PHF_5/ADWF
1, 2A	2.19	1.18	2.58	2.13	1.21	2.58
4A, 4B, 4C, 4D, 4E, 4F, 4G, 4H, 4K	5.10	1.44	7.34	4.87	1.44	7.04
4I, 4J	5.62	1.47	8.26	5.36	1.46	7.86
9A, 9B	3.54	1.31	4.66	3.40	1.34	4.55
6F, 6G, 6H, 8A, 8B, 8C	7.82	1.61	12.58	7.44	1.60	11.93
10A, 10B	3.29	1.32	4.35	3.16	1.31	4.12
11	3.23	1.31	4.23	3.11	1.31	4.08
12	9.82	1.66	16.34	9.34	1.69	15.81
5, 6A, 6B, 6C, 6D, 6E	2.89	1.27	3.67	2.78	1.27	3.53
3	4.20	1.38	5.79	4.02	1.36	5.48
2B	1.46	1.09	1.59	1.44	1.09	1.57
7	1.57	1.12	1.76	1.54	1.10	1.69
Collection System Average	**4.37**	**1.42**	**6.21**	**4.18**	**1.43**	**5.96**

As shown in **Table 3-4**, existing peak hourly flow during the 5-year, 24-hour storm is projected to be approximately 11.8 MGD, increasing slightly to approximately 12.0 MGD as ADWF increases over the 20-year planning period. System-wide peaking factors are anticipated to remain relatively constant as shown in **Table 3-5**. It was assumed for the future projections that I/I in the system would not increase over time. This is based on the assumption that while the collection system continues to age and expand, the City will perform rehabilitation and replacement of components to maintain the I/I component of flow at existing levels. Should the City opt for a more or less aggressive approach to I/I management, the projected peak flows and peaking factors in **Table 3-4** and **Table 3-5** and corresponding capacity analyses may need revisions.

4 | CONDITION ASSESSMENT

INTRODUCTION

This chapter presents the condition assessment of the existing City of Ashland (City) collection system including gravity sewer mains, manholes, side sewers, lift stations, and force mains. The information used to assess the collection system was obtained from site visits and data provided by the City. This chapter addresses remaining useful life (RUL) of the collection system elements and any maintenance or operation issues discovered during analysis.

GRAVITY SEWER MAINS AND MANHOLES

Overview

The lifespan of a gravity sewer main varies significantly based on material, installation technique, maintenance, and other factors, but is typically expected to be in the range of 50 to 100 years. Orangeburg pipe still in service is nearly always considered to have reached the end of its useful life, and gravity mains constructed from other legacy materials such as concrete, clay, cast iron, and steel also may be nearing or have surpassed their RUL. Higher inflow and infiltration (I/I) flow rates are also typically associated with areas of the collection system constructed with these older materials.

Unless targeted rehabilitation has taken place, manholes are generally assumed to be similar in age and condition to surrounding sewer mains. Modern manholes are typically constructed from precast concrete; older structures may be constructed of brick. Aging manholes will experience varying degrees of deterioration and can become significant sources of I/I in the collection system.

Condition Assessment of City's Gravity Sewer Mains and Manholes

Visual Inspection Data

The City conducts regular video inspections to establish a visual condition assessment of the gravity collection system. The videos are recorded and standard pipe assessment certification program (PACP) codes are used to describe pipe defects, I/I observations, and maintenance concerns. Manholes are also photographed from the surface for the City's records. At the time of the preparation of this plan, this information was not in a GIS-ready format allowing for efficient analysis, but the City is working towards incorporating this information into its Cartegraph asset management system where it can be used in the future to inform operation and maintenance (O&M) and capital improvement program (CIP) decisions.

GIS Data Analysis

The City's GIS data was analyzed, with a focus on installation year and pipe material, to better inform the remaining useful life of the gravity collection system.

As shown on **Chart 1-2** and **Figure 1-3**, the City has two remaining Orangeburg sewer mains, totaling approximately 562 linear feet (LF), located in Basin 4J. These sewer mains should be considered to have exceeded their useful lifespan and should be prioritized for replacement due to the reputation of structural failure of extant Orangeburg pipe.

As shown on **Chart 1-3** and **Figure 1-2**, approximately 16,948 LF, or 2.9 percent, of the gravity sewer mains in the collection system are known to have been constructed before 1920 and are over 100 years old. These mains are generally located in the older/downtown areas of the City and are constructed from clay pipe, which has been demonstrated in some collection systems to have an extremely long lifespan if properly installed and maintained. Issues with clay pipe joints are common. For system planning purposes, these mains should be considered to have exceeded their useful lifespan due to advanced age. The City may consider leaving these mains in service if video inspection and flow monitoring data demonstrate sufficient structural integrity and minimal I/I. Manholes associated with these sewer mains are likely of similar age and in need of similar inspection and evaluation to determine if they are suitable for continued service.

Approximately 25.4 percent of the City's gravity mains are known to have been constructed from 1920 to 1970 (i.e. between approximately 50 and 100 years old), as shown on **Chart 1-3** and **Figure 1-2**. Mains of this age are predominately constructed from concrete and are found throughout the collection system, as shown on **Figure 1-3**. These mains should be considered to be nearing or having reached their expected useful lifespan and should be identified for eventual replacement based on video inspection and flow monitoring results. Manholes associated with these sewer mains are likely of similar age and in need of similar inspection and evaluation to determine if they are suitable for continued service.

Additionally, approximately 37.1 percent of the City's gravity mains are of unknown age, as shown on **Chart 1-3** and **Figure 1-2**. The City should determine the installation year for as many of these mains as possible to better inform the asset management program. In lieu of installation year information, the best alternative is to evaluate the video inspection and observed I/I and flow monitoring results to attempt to characterize the remaining useful life of these mains and associated manholes.

Gravity mains known to have been installed in the 1970s or later (i.e. generally less than 50 years old) comprise approximately 34.5 percent of the collection system, as shown on **Chart 1-3**. These mains are found throughout the collection system, as shown on **Figure 1-2**. Installation of concrete pipe was still prevalent in the 1970s, switching mostly to polyvinyl chloride (PVC) in the 1980s and later. Because these pipes and associated manholes were installed relatively recently, they are generally considered to have some remaining useful life. However, video inspection, observed I/I, and flow monitoring data should be taken into account to inform decisions regarding rehabilitation or replacement of these areas of the collection system.

SIDE SEWERS

Overview

Side sewers connected to the City's collection system are owned and maintained by the private property owners. Side sewers often are not maintained, rehabilitated, or replaced unless a pipe failure/collapse or backup impacts a property owner, and can be a significant source of I/I in the collection system. Side sewers are not necessarily constructed at the same time or of the same material as the gravity main they connect to; they may have been constructed at a later date for various reasons (e.g. infill development, latecomer connections, and side sewer replacements).

Condition Assessment of Side Sewers Connected to Collection System

As part of the CSSCSMP, approximately 50 side sewers throughout the system were inspected to determine their condition, with a focus on areas that were known to have higher I/I flow rates. A summary of the side sewer inspection results is included in **Appendix B**. Many of the side sewers that were inspected were constructed of combinations of PVC/acrylonitrile butadiene styrene (ABS) and older materials; several of the inspected side sewers were believed to be constructed of Orangeburg pipe. Side sewers constructed of Orangeburg and older pipe materials are likely beyond or approaching the end of their expected useful life and may be significant sources of I/I.

Several plumbing companies doing side sewer work within the City were interviewed by phone in May 2020. The results of these interviews indicate that most side sewer failures in the City are Orangeburg and concrete pipes installed in the 1970s and earlier; Orangeburg side sewers often have complete erosion of the pipe invert. Clay pipes, generally installed prior to World War II, are subject to root intrusion but are generally less problematic than Orangeburg and concrete pipes. PVC has generally been installed since the late 1970s.

LIFT STATIONS AND FORCE MAINS

Overview

The lifespan of a lift station and its component parts varies. While a lift station structure might be expected to last 50 years or more, mechanical components such as pumps and valves would typically be replaced at least once within the lifespan of the lift station. A force main is generally constructed of similar materials to a water distribution main and can be expected to have a lifespan similar to a water main, in the range of 50 to 75 years.

Condition Assessment of Lift Stations and Force Mains

RH2 and the City conducted an on-site assessment of the lift stations in June 2020. The results recorded during the lift station assessment are included in **Appendix C** and are summarized below.

Ashland Creek LS

The Ashland Creek Lift Station (LS) is approximately 20 years old; therefore, it is expected to have significant remaining useful life from a structural standpoint. The pumps received upgraded impellers approximately 10 years ago and are understood to be in good mechanical condition. The pump station does not have any significant condition or O&M issues. Debris accumulation in the wetwell is generally a minor concern; some accumulation occurs on the chains of the submersible pumps, and they are pulled annually for cleaning. The City has experienced some issues with the supervisory control and data acquisition (SCADA) autodialer and is addressing the issues. The on-site generator that provides automatic backup power to this critical lift station is understood to be reliable. The force main material is unknown but is assumed to have been constructed with modern materials at approximately the same time as the lift station.

Based on its current condition, this lift station is expected to continue to provide reliable service to the City for many years. However, capacity issues at this lift station may be a concern, as described in **Chapter 6**. Construction of additional pumping capacity (if the WWTP can receive the increased flows) or construction of storage may be required to minimize the risk of overflows.

North Main LS

The North Main LS is approximately 15 years old; therefore, it is expected to have significant remaining useful life from a structural and mechanical standpoint. This station pumps into an older asbestos cement force main that is likely approaching or past the end of its expected useful life. The City has had few issues with the force main and does not view its replacement as a priority from an O&M standpoint, but should plan for the replacement of this force main in the relatively near future due to its age and material type. The force main likely will be replaced concurrently with upcoming road work.

Grandview LS

The Grandview LS is less than 5 years old and is in excellent structural and mechanical condition. The lift station discharges via a PVC force main that was installed at approximately the same time as the lift station. This lift station is expected to continue to provide reliable service to the City for many years.

Winburn LS

The Winburn LS is a very small lift station that is approximately 25 years old. The ductile iron force main is assumed to have been installed at the same time as the lift station; the force main alignment, which crosses a creek, was unclear at the time of the site visit. This lift station has relatively low criticality and is expected to continue to provide reliable service to the City for many years.

Creek Drive LS

The Creek Drive LS is approximately 20 years old. The station and force main do not have any known structural or mechanical issues, but the station has significant O&M issues with clogging due to non-dispersible materials. Because customer education has been ineffective in preventing the issue, the City may wish to implement macerating or screw impeller type pumps in this lift station to mitigate the O&M issues. With these improvements, the lift station can be expected to continue to provide reliable service for many years.

Shamrock LS

The Shamrock LS is another very small lift station and is the City's oldest, at approximately 50 years. The lift station discharges to a steel force main that is assumed to have been constructed at the same time as the lift station. This station has several O&M issues, such as below-grade electrical panels and access complexities. Due to its age and O&M issues, this station should be considered to be approaching or have reached its expected useful life and is identified for replacement with a submersible-style lift station in the near future.

Kestrel LS

The Kestrel LS is approximately 30 years old. The City has numerous O&M issues with this lift station, including ragging, FOG, occasional loss of prime, squeaking on startup, and short cycle times. Due to these issues, the lift station requires considerably more maintenance when compared to other City lift stations. The force main is constructed from steel pipe; the force main alignment, which crosses a creek, was unclear at the time of the site visit. Due to the O&M issues, age of the lift station and force main, and the fact that it serves a significant tributary area, this station should be considered for significant rehabilitation or replacement to continue providing reliable service to the City.

5 | I/I REDUCTION PLAN

INTRODUCTION

This chapter presents the infiltration and inflow (I/I) reduction evaluation for the existing City of Ashland (City) collection system. This evaluation is based on the flow monitoring program conducted by V&A Consulting Engineers (V&A). Each basin monitored by V&A is evaluated individually, and basins are prioritized based on observed I/I. Further I/I evaluation and reduction opportunities are presented; cost estimates for proposed projects are included in **Chapter 7 Capital Improvement Plan**.

INFLOW

As described in Section 3.3.3 of V&A's flow monitoring report (**Appendix A**), inflow is stormwater runoff that flows directly into the collection system. Examples of inflow sources in the public right-of-way may include stormwater catch basin cross-connections and inundated manhole covers. Examples of inflow sources on private property may include roof and yard drains, sump pumps, and missing side sewer cleanout caps. **Table 5-1** shows the relative inflow ranking per monitored basin from the V&A flow monitoring report.

Table 5-1

Flow Monitoring Program – I/I Ranking

Flow Monitor Location	Basins Monitored[1]	Basin Acreage	Inflow Ranking V&A Report	Rainfall-Derived Infiltration Ranking V&A Report	Total I/I Ranking V&A Report	Adjusted Total I/I per Acre (R-Value)[2]
V1	1, 2A	210	8	10	10	0.70%
V2	4A, 4B, 4C, 4D, 4E, 4F, 4G, 4H, 4K	678	10	4	5	2.93%
V3	4I, 4J	550	3	2	1	5.06%
V4	9A, 9B	551	5	9	7	2.57%
C1	6F, 6G, 6H, 8A, 8B, 8C	384	2	1	2	3.25%
C2	10A, 10B	221	11	8	8	2.67%
C3	11	402	9	7	9	2.15%
C4	12	436	4	3	3	2.74%
Ashland Creek LS	5, 6A, 6B, 6C, 6D, 6E	238	6	6	6	4.24%
Grandview LS	3	73	1	5	4	4.39%
North Main LS	2B	19	7	12	12	0.61%
Kestrel LS	7	59	12	11	11	0.56%
Total		**3,821**				

1 = Calculated by subtraction for V1, V2, C1, and Ashland Creek LS. Reference Table 1-2 in V&A report in **Appendix A**.
2 = Per **Table 3-1**.

Because inflow is caused by direct connections to the sanitary sewer collection system, it typically mimics the intensity and duration of rainfall and can be a major component of peak system flow rates. From a rehabilitation standpoint, inflow has the advantage of being somewhat easier to detect and isolate than infiltration, as it is typically derived from point sources. Removing inflow sources from the collection system can reduce the peak flow rates that must be conveyed through pipes and lift stations and handled at the treatment facility.

INFILTRATION

As described in Section 3.3.3 of V&A's flow monitoring report (**Appendix A**), infiltration is typically groundwater that reaches the collection system indirectly through cracks, breaks, and other points of entry in pipes and manholes caused by deterioration. Infiltration typically does not peak as rapidly as inflow, and infiltration rates are often elevated for a period of time after rainfall stops due to elevated groundwater levels. V&A's report noted that the system generally does not appear to have much dry weather groundwater infiltration; most observed infiltration was rainfall dependent. **Table 5-1** shows the relative rainfall-dependent infiltration ranking per monitored basin from the V&A flow monitoring report.

Infiltration can be more difficult to detect and remedy than inflow, as infiltration is often a widespread problem in aging areas of the collection system. Reducing infiltration can reduce pumping and treatment costs as the long-term infiltration volume can be significant.

ENVIRONMENTAL IMPACTS AND CONSERVATION

A reduction in I/I in the collection system would reduce the total treatment necessary resulting in a reduction of energy and chemical consumption at the treatment facility. Conservation and reduction of greenhouse gases aligns with the City's Climate and Energy Action Plan goals.

TECHNIQUES FOR FURTHER PINPOINTING I/I

The flow monitoring program and condition assessment conducted for this Comprehensive Sanitary Sewer Collection System Master Plan (CSSCSMP) provide a high-level assessment of the entire collection system and assist with prioritizing I/I reduction efforts on a basin-by-basin basis. However, additional investigation is recommended to pinpoint I/I within the high-priority basins. This section describes potential techniques.

Additional Flow Monitoring

For some of the larger basins, additional in-stream flow monitoring may be warranted to better pinpoint I/I sources within the basin. Although in-stream flow monitoring is relatively expensive, the insight provided from collecting actual flow data is highly valuable in targeting I/I.

Smoke Testing

Smoke testing of the sewer mains is an effective technique for locating cracks, breaks, missing cleanout caps, cross-connected catch basins/roofs/yard drains, and other pathways where I/I is entering the collection system. Smoke testing is relatively inexpensive and provides significant insight in locating sources of I/I. There are some known limitations to smoke testing; for example, a cross-connected catch basin that drains via a down-turned elbow or a sump pump connected to the sanitary sewer will not be exposed by smoke testing.

The City has performed smoke testing in the past but, based on discussions with City staff, were not able to identify sources of I/I. If records from the previous smoke tests are available then they could be used to reduce costs for the evaluations proposed in **Chapter 7**.

Dye Testing

Dye testing can be utilized in conjunction with smoke testing to identify suspected I/I sources. Catch basins with downturned elbows, sumps, and other drains or suspected I/I sources can have dyed water added, and the immediately downstream sewer main line flows can be observed to see if any of the dyed water appears.

Additional Main Line Video Inspection Analysis

The City has a robust main line video inspection program; however, the data is not currently cataloged in a fashion that allows for efficient data analysis. Conversion of the video inspection data reports to GIS format will allow geographic and statistical analysis of pipe defects and observed I/I sources and assist with prioritization of I/I rehabilitation projects.

Additional Side Sewer Video Inspections and Customer Surveys

The side sewer video inspections and customer surveys conducted as part of this CSSCSMP provided a system-wide overview. When targeting I/I in an individual basin, additional side sewer video inspections and customer surveys are warranted to better characterize the condition of side sewers and determine if rehabilitation would be likely to reduce I/I.

Sump pumps discharging to the sanitary sewer are a potentially significant source of I/I. At least one local plumbing company that was interviewed during the preparation of the CSSCSMP stated that it has observed a significant number of sump pumps in the City that are utilized to help keep basements and crawl spaces dry. The City should consider developing an inspection program that allows better identification and remediation of sump pumps on private property that are discharging to the sanitary sewer.

Flow Isolations

Flow isolations with portable weirs are an option for determining the relative location and intensity of groundwater infiltration into the sanitary sewer system. Flow isolations are relatively labor intensive, typically performed during dry weather, and serve primarily to detect baseline infiltration. I/I response that is closely tied to rainfall is difficult to pinpoint accurately with flow isolations. Because the system appears to have relatively low dry weather groundwater infiltration, it is not anticipated that flow isolations would frequently be applied to pinpoint I/I in the City’s collection system.

I/I REHABILITATION METHODS

This section describes potential methods for removing I/I sources from the collection system. The application of these methods varies by basin and is based on the results of applying the techniques described previously for pinpointing I/I. It is important to develop an I/I rehabilitation strategy well-rooted in physical evidence and data; replacing or rehabilitating portions of the system simply due to age or material type may not result in a significant reduction of I/I.

Re-Routing of Stormwater Cross-Connections

Inflow sources such as sump pumps and catch basins, roof, and yard drains that are connected to the sanitary sewer can be significant contributors to total I/I. These sources can be relatively easy to identify and straightforward to properly re-route. The appropriate approach will vary, but can include connecting these inflow sources to the stormwater collection system or establishing infiltration drains to properly handle the runoff. Identifying and addressing these inflow sources should be a priority in any I/I rehabilitation project.

Sewer Main Rehabilitation or Replacement

Sewer mains can be significant sources of infiltration depending on their physical condition. Traditional open-cut replacement, trenchless, and semi-trenchless techniques such as pipe bursting and cured-in-place pipe are all potential options for replacing sewer mains that have excessive I/I. Trenchless sewer main replacement requires attention to re-establishment of lateral/side sewer connections. Simply cutting a hole in the liner to re-establish the service connection may immediately re-introduce groundwater infiltration to the sewer main. Various lateral connection sealing methods are available, and an appropriate solution should be selected and applied.

Manhole Rehabilitation or Replacement

Manholes can be sources of both infiltration and inflow. Groundwater infiltration through the structure is common, and inflow can occur if the manhole rim is set at an elevation where it can be inundated with stormwater runoff. Rehabilitation can consist of total replacement of the structure, various manhole lining techniques, and other repairs such as adjusting the rim elevation.

Side Sewer Rehabilitation or Replacement

Like sewer mains, side sewers can be significant sources of infiltration; side sewers often receive little maintenance and may be in poor overall condition. In the City, side sewers are owned and maintained by property owners. However, if rehabilitation of side sewers can be shown to be of significant benefit to the sanitary sewer collection and treatment system, there are potential avenues for utility funds to be applied to side sewer rehabilitation.

Rehabilitation of side sewers is typically by open-cut replacement, trenchless (cured-in-place pipe), or semi-trenchless (pipe bursting) methods.

I/I REDUCTION PRIORITIZATION AND PROPOSED PROJECTS

As described in the V&A flow monitoring report and shown in **Table 5-1**, certain areas of the collection system have significantly worse I/I than other areas, and it is logical to focus I/I reduction efforts on these areas. This section describes the high-priority basins and makes recommendations for additional investigation and rehabilitation. For reference, the basins described in the following sections are shown on **Figure 1-1**.

Basins 4I and 4J (Includes Railroad District)

Basins 4I and 4J were ranked highest by V&A for total I/I. As shown in **Table 5-1**, these basins have high rankings for both inflow and rainfall-dependent infiltration, as well as the highest total I/I per acre in the collection system. As shown in **Table 3-3**, these basins are estimated to contribute 1.889 million gallons (MG) of I/I during a 5-year, 24-hour storm.

As shown on **Figure 1-2**, the installation years of sewer mains and manholes in these basins are generally either unknown or from the early 20th century. The prevalence of clay and concrete pipe, as well as some Orangeburg pipe, as shown on **Figure 1-3**, also indicates the advanced age of the collection system infrastructure in these basins. The ten side sewer inspections and surveys conducted in these basins (**Appendix C**) showed side sewers in generally poor condition with a history of maintenance issues and at least two crawl space sump pumps.

These basins should be a high-priority area for the City to conduct additional pinpointing of I/I and complete I/I rehabilitation. A potential approach for reducing the I/I in these basins is described in **Chapter 7** in Capital Improvement Plan (CIP) I1. The areas of these basins known to be constructed in the early 20th century and of older pipe materials should be the focus of I/I pinpointing techniques. Areas that were constructed later and of modern materials such as PVC should also be investigated but should be considered lower priority.

Basins 6F/6G/6H/8A/8B/8C

Basin 6F/6G/6H/8A/8B/8C were ranked second highest by V&A for total I/I. As shown in **Table 5-1**, these basins have very high rankings for both inflow and rainfall-dependent infiltration, as well as the fourth-highest total I/I per acre in the collection system. As shown in **Table 3-3**, these basins are estimated to contribute 0.848 MG of I/I during a 5-year, 24-hour storm.

As shown on **Figure 1-2** and **1-3**, sewer mains in Basins 8A/8B/8C were generally constructed in the early 20th century, while basins 6F/6G/6H were generally constructed more recently with modern materials. The sections of the Bear Creek interceptor falling within this flow monitoring basin are generally aging concrete pipe installed in the mid-20th century. Side sewer video inspections shown in **Appendix C** identified a side sewer in Basin 8C that was in poor condition and believed to be constructed from Orangeburg pipe.

Because of the similarity in construction to Basins 4I and 4J, Basins 8A/8B/8C should be a high-priority area for the City to conduct additional I/I pinpointing efforts. Due to its age and criticality, the Bear Creek interceptor in this area should also be evaluated. CIP I2, described in **Chapter 7**, includes a potential approach for reducing the I/I in these basins. Because these basins are tributary to the Ashland Creek Lift Station, which is believed to have potential capacity issues during peak flow events, reduction of I/I in these basins is particularly important.

Basin 12

Basin 12, which includes the airport and eastern limits of the collection system, was ranked third highest by V&A for total I/I. As shown in **Table 5-1**, the basin ranked highly for both inflow and rainfall-dependent infiltration. As shown in **Table 3-3**, the basin is estimated to contribute 0.812 MG of I/I during a 5-year, 24-hour storm.

As shown on **Figure 1-2** and **1-3**, the basin has a significant number of mid-20th century concrete sewer mains, but also has numerous newer PVC mains. Minimal side sewer inspection information was available; one observed side sewer was constructed with modern materials, as shown in **Appendix C**.

Basin 12 should be a high-priority area for the City to conduct additional I/I pinpointing efforts. Although the total I/I was ranked lower than other older basins such as the Railroad District, the generally newer sewer mains in this basin may have more point source I/I that can be rehabilitated at a lower cost when compared to a century old basin that has severe overall deterioration and little expected remaining useful life. CIP I3, described in **Chapter 7**, includes a potential approach for reducing I/I in this basin. I/I reduction efforts in this basin also have the benefit of reducing the required pumping capacity at the Ashland Creek Lift Station.

Basin 3 (Grandview LS)

Basin 3, tributary to the Grandview LS, was ranked fourth highest by V&A for total I/I. Although this basin is small and only expected to contribute approximately 0.218 MG of I/I to the collection system during the 5-year, 24-hour storm (**Table 3-3**), the basin has the second highest total I/I per acre in the collection system (**Table 5-1**).

As shown on **Figure 1-2** and **1-3**, the basin is generally composed of concrete and PVC sewer mains installed in the 1970s or later. As described in **Appendix C**, a side sewer was video inspected and found to be constructed of PVC, with clear running water observed in the side sewer.

Because of its small size and high I/I ranking, Basin 3 should be a high priority for the City to pinpoint and rehabilitate I/I. The small basin size and ability to easily use the Grandview LS for flow monitoring will make I/I pinpointing and rehabilitation relatively straightforward in this basin. The City could consider Basin 3 for an I/I rehabilitation pilot project before moving on to larger basins. CIP I4, described in **Chapter 7**, includes a potential approach for reducing I/I in this basin.

Basins 4A/4B/4C/4D/4E/4F/4G/4H/4K

Basins 4A/4B/4C/4D/4E/4F/4G/4H/4K, which comprise a significant area of the collection system around Ashland Creek, were ranked fifth highest by V&A for total I/I, with a high ranking for rainfall-dependent infiltration. As shown in **Table 3-3**, these basins, which flow by gravity to the WWTP, are estimated to contribute approximately 1.348 MG of I/I during 5-year, 24-hour storm. As shown on **Figure 1-2** and **1-3**, these basins contain a significant amount of older sewer mains constructed from legacy materials. **Appendix C** shows side sewers constructed from a variety of materials, some maintenance issues, flowing clear water observed in some side sewers, and a number of residences reporting active sump pumps.

These basins should be ranked moderate to high priority by the City for pinpointing and reducing I/I. CIP I5 in **Chapter 7** includes a potential approach for reducing I/I in these basins. Other areas, such as the Railroad District and Basin 12, should be prioritized due to higher overall I/I ranking. However, many of the aging sewer mains in Basins 4A/4B/4C/4D/4E/4F/4G/4H/4K are likely approaching or have reached the end of their expected useful life and will likely need to be replaced in the next few decades.

Basins 5/6A/6B/6C/6D/6E

Basins 5/6A/6B/6C/6D/6E, ranked sixth overall for total I/I by V&A, have the third-highest total I/I per acre in the collection system, and are estimated to contribute approximately 0.685 MG of I/I during a 5-year, 24-hour storm (**Table 3-3)**. As shown on **Figure 1-2** and **1-3**, sewer mains in these basins are generally constructed of concrete and PVC installed in the second half of the 20th century and include a portion of the Bear Creek interceptor. Per **Appendix C**, a variety of side sewer materials were observed in the inspections conducted in these basins. Some side sewer maintenance issues were also noted, and both of the homes that responded to the survey had crawl space sump pumps.

These basins should be ranked moderate priority by the City for pinpointing and reducing I/I. CIP I6 in **Chapter 7** includes a potential approach for reducing I/I in these basins.

Basins 9A/9B

Basins 9A/9B, ranked seventh overall for total I/I by V&A, have a moderate inflow ranking and a low rainfall-dependent I/I ranking. An I/I contribution of approximately 0.962 MG is expected from these basins during a 5-year, 24-hour storm per **Table 3-3**. As shown on **Figure 1-2** and **1-3**, concrete is the prevailing sewer main construction material in these basins, with some areas of PVC and clay. Sewer mains in these basins were generally installed in the mid-20th century, with a few dating to the 1930s. **Appendix C** describes a number of inspected side sewers in these basins, including observations of Orangeburg pipe and numerous maintenance issues. One surveyed property had a sump pump.

These basins should be ranked moderate to low priority by the City for pinpointing and rehabilitation of I/I. CIP I7 in **Chapter 7** includes a potential approach for reducing I/I in these basins.

Basins 10A/10B

Basin 10A/10B, ranked eighth overall and listed as priority eight, has low inflow and rainfall-dependent infiltration (RDI) rankings. These basins are estimated to contribute 0.401 MG of I/I during the 5-year, 24-hour storm. As shown on **Figure 1-2** and **1-3**, concrete is the prevailing sewer main construction material in these basins. Most mains were installed in the mid-20th century. Some side sewer maintenance issues are described in **Appendix C**.

These basins should be ranked moderate to low priority by the City for pinpointing and reducing I/I. CIP I8 in **Chapter 7** includes a potential approach for reducing I/I in these basins.

Basin 11

Basin 11 was ranked ninth out of 12 basins for total I/I by V&A and is estimated to contribute approximately 0.586 MG of I/I during the 5-year, 24-hour storm per **Table 3-3**. As shown on **Figure 1-2** and **1-3**, both concrete and PVC sewer mains constructed in the second half of the 20th century are prevalent in this basin. Minimal side sewer inspection data was available.

This basin should be ranked moderate to low priority by the City for pinpointing and reducing I/I. CIP I9 in **Chapter 7** includes a potential approach for reducing I/I in these basins.

Basin 1/2A

Basins 1 and 2A were ranked tenth out of 12 basins for total I/I by V&A, with an estimated I/I contribution of only 0.100 MG during a 5-year, 24-hour storm per **Table 3-3**. Accordingly, these basins should be considered relatively low priority for further I/I reduction and rehabilitation.

Basin 7 (Kestrel LS)

Basin 7 (tributary to the Kestrel LS) was ranked eleventh out of 12 basins for total I/I by V&A. With an estimated I/I contribution of only 0.023 MG of I/I during a 5-year, 24-hour storm per **Table 3-3**, this basin should be considered low priority for further I/I reduction and rehabilitation.

Basin 2B (North Main LS)

Basin 2B (tributary to the North Main LS) was ranked the lowest for total I/I of all basins monitored by V&A. With an estimated I/I contribution of only 0.008 MG during a 5-year, 24-hour storm per **Table 3-3**, this basin should be considered very low priority for further I/I reduction and rehabilitation.

6 | SYSTEM CAPACITY EVALUATION

INTRODUCTION

This chapter presents the capacity evaluation of the existing City of Ashland (City) wastewater collection system. Individual sewer system components were analyzed to determine their ability to meet policies and design criteria under both existing and projected 2042 flow conditions. The policies and design criteria are presented in **Chapter 2**, and the wastewater flow projections are presented in **Chapter 3**. The capital improvement projects resulting from the existing and projected flow conditions analyses are presented in **Chapter 7**.

CRITERIA

As described in **Table 2-3** in **Chapter 2**, the following criteria were applied for the system capacity evaluation:

- Sewers must be capable of conveying the peak hour flow (PHF) associated with the 5-year, 24-hour storm without overflowing.
- Existing facilities shall be allowed to experience surcharging up to 2.5 ft above invert. Conveyance trunks without services shall be allowed to experience surcharges limited to 2 feet below manhole rim elevations.
- New facilities shall be designed to prevent the hydraulic grade line (HGL) from exceeding 75% of pipe capacity.

The existing and 2042 projected peak hour flow rates described in **Chapter 3** were utilized for the collection system analyses. Where areas of the existing collection system experienced surcharging in excess of the allowances described previously, improvements were identified with the goal of meeting the HGL requirements for new facilities.

COLLECTION SYSTEM ANALYSES

Hydraulic Model

Background

A computer-based hydraulic model of the existing sewer system was created for the analyses using the SewerGEMS® program and its built-in dynamic wave solver. The development and calibration of the hydraulic model is described in **Appendix D**. Separate scenarios were developed for evaluation of existing and 2042 PHF.

Existing PHF Scenario

The existing PHF scenario, utilizing the flow rates shown in **Table 3-4**, was run in the hydraulic model and the results are shown on **Figure 6-1**. The figure shows several locations where surcharging and overflows may occur in the collection system during peak hour flows. In the gravity collection system, overflows may occur on A Street and along the Bear Creek Interceptor. In addition, surcharging without overflows will likely occur in other areas of the system.

As-built drawings, pump curves, and pump on/off setpoints were not available for all pumps and all lift stations. Since insufficient information was available to accurately characterize the true operating points of the pumps at most lift stations, it was assumed for the hydraulic model analyses that the lift stations had sufficient pumping capacity to convey the peak hour influent flow rates. However, as described later on in this chapter, the Ashland Creek and Grandview Lift Stations (LS) may not have sufficient firm capacity to convey the PHF rate. Accordingly, additional surcharging and overflows beyond what is shown on **Figure 6-1** may occur at or upstream of these lift stations. The hydraulic model still calibrated well, as described in **Appendix D**, even though some pumping operational information was assumed.

2042 PHF Scenario

The 2042 PHF scenario, utilizing the flow rates shown in **Table 3-4**, was run in the hydraulic model and the results are shown on **Figure 6-2**. The flow rates are similar, but slightly higher than those utilized for the existing PHF scenario. Accordingly, the results are generally similar to those shown on **Figure 6-1**, with some additional surcharging shown. The same assumptions regarding lift station capacity applied to the existing PHF scenario were also applied to the 2042 PHF scenario.

2042 PHF Scenario with CIP Projects

The 2042 PHF scenario was utilized as a basis to determine the capacity-related CIP projects required to meet the criteria described previously in this chapter. Existing facilities were identified as deficient if the surcharging limitations were exceeded, and replacement facilities were sized utilizing the 75% of pipe capacity requirement for the alignment that was replaced/upsized. Depth in the middle section of the pipe was utilized to evaluate the 75%-full criteria. Actual upstream and downstream depths may be higher or lower depending on hydraulic conditions. The recommended capacity related gravity collection system CIP projects are as follows:

- Upsize Bear Creek Interceptor from approximately North Wightman Street to Tolman Creek Road (CIP SM2)
- Upsize constriction on North Wightman Street north of East Main Street (CIP SM3)
- Upsize sewer main in A Street from North 1st Street to 8th Street (CIP SM4)
- Upsize bottleneck upstream of West Nevada Street (CIP SM5)
- Upsize sewer main in Siskiyou Boulevard from Morton Street to Beach Street (CIP SM6)
- Upsize sewer main in Siskiyou Boulevard at intersection with Wightman Street and Indiana Street (CIP SM7)
- Upsize sewer main in Homes Avenue from Walker Avenue to Normal Avenue (CIP SM8)
- Upsize sewer main in Mountain View Cemetery (CIP SM9)

These CIP projects are described in greater detail in **Chapter 7** and shown on **Figure 7-1**.

Lift Stations

In conjunction with the gravity collection system, the lift stations were evaluated to ensure sufficient capacity to convey the peak hour flow associated with the 5-year, 24-hour storm. **Table 6-1** presents the existing lift station firm capacities from **Chapter 1** and the approximate peak hour influent flow rate to each of the lift stations under existing and 2042 conditions.

Table 6-1

Lift Station Capacity Evaluation

Lift Station	Existing Firm Capacity (gpm)[1]	Existing PHF Influent Flowrate (gpm)[2]	Existing Surplus/Deficient Capacity (gpm)	2042 PHF Influent Flowrate (gpm)[2]	2042 Surplus/Deficient Capacity (gpm)
Ashland Creek	4,400	5,200	-800	5,300	-900
Grandview	154	236	-82	238	-84
North Main	490	29	461	30	460
Kestrel	520	59	461	60	460
Shamrock	100	21	79	21	79
Winburn	150	4	146	4	146
Creek Drive	150	18	132	18	132

1 = Per Table 1-1.

2 = Approximate maximum influent flowrate from hydraulic model.

As shown in **Table 6-1**, the Ashland Creek and Grandview LS do not have sufficient firm capacity to convey the design peak hour influent flow rates. The following CIP projects have been identified to increase the capacity of these stations and are described in greater detail in **Chapter 7**.

- Upsize capacity of Ashland Creek LS (CIP LS1)
- Upsize capacity of Grandview LS (CIP LS2)

Table 6-2 presents the estimated emergency response time required in the event of electrical, mechanical, or other failure at each of the pump stations where the existing pump setpoints were provided. The methodology utilized for the calculation is described in the table footnotes.

Table 6-2

Estimated Required Emergency Response Time

Lift Station	Existing Required Response Time (min)[1]	2042 Required Response Time (min)[1]
Ashland Creek	Unknown[2]	Unknown[2]
Grandview	4	4
North Main	52	50
Kestrel	30	29
Shamrock	34	34
Winburn	257	257
Creek Drive	Unknown[2]	Unknown[2]

1 = Required response time in the event of station failure during peak hour flow. Calculated based on wetwell volume between lead pump on setpoint + 1 foot (assumed alarm setpoint) and ground elevation. Does not account for possible surcharging and overflows in the upstream collection system that may occur before wetwell overflow.
2 = Pump setpoint information not available.

The analysis shows that, for the lift stations where pump setpoint information was available, the City generally will have 30 minutes or longer to respond and implement bypass pumping before wetwell overflow occurs (as described in the table footnotes, this assumes that the wetwell will be the first overflow point, prior to any overflows in the upstream collection system). The exception to this is the Grandview LS, which would potentially overflow only a few minutes after alarm if a failure occurred during peak hour flows. The City may want to consider I/I reduction projects in the upstream basin and/or permanent backup power with automatic transfer at this lift station.

ALTERNATIVES ANALYSIS

The following section discusses the capacity-related CIP projects and the alternative approach of reducing I/I for each project. I/I reduction impacts on WWTP energy usage is also discussed.

Increasing Capacity vs. Reducing I/I

The effectiveness of I/I reduction projects varies depending on numerous factors. Depending on the level of commitment in pinpointing I/I and targeting all identified sources (including those on private property), I/I reduction projects can have varying degrees of success. Accordingly, to be conservative, the capacity-related improvement projects described in **Chapter 7** do not assume any I/I reduction will be achieved in the system. However, successful I/I reduction projects may reduce the intensity of surcharging/overflows, and in some cases may eliminate the need for an upsizing project entirely. The following sections describe the potential of I/I reduction to reduce the need for the capacity-related CIP projects.

Gravity Collection System Capacity-Related CIP Projects

The projects described in the following section are capacity-related improvement projects in the gravity collection system. These projects (and others not specifically related to capacity) are described in greater detail in **Chapter 7**.

CIP SM2: Bear Creek Interceptor from North Wightman Street to Tolman Creek Road

This section of this alignment east of Walker Avenue is anticipated to carry a peak flow rate of approximately 1,700 gpm in 2042, while the section to the west of Walker Avenue is anticipated to carry a peak flow rate of approximately 2,200 gpm. Calculated full flow capacities in the existing 12-inch diameter sewer main are less than 1,000 gpm in many areas of the alignment due to shallow slopes. Based on the tributary basin flow rates presented in **Chapter 3**, a substantial I/I reduction would be required to eliminate the need for this capacity improvement project. However, any I/I reduction will reduce the magnitude of surcharging and overflows experienced during peak flows.

CIP SM3: North Wightman Street from East Main Street, North to Existing 12" Sewer Main

This project represents a bottleneck in the collection system between two sections of larger diameter pipe, so it would still be recommended if I/I reductions were achieved. The existing sewer main has a calculated full flow capacity of approximately 900 gpm and is anticipated to carry a 2042 peak flow rate of approximately 1,000 to 1,100 gpm.

CIP SM4: A Street from North 1st Street to 8th Street

This project replaces an extremely old sewer main in the downtown area and conveys most of the flow from Basins 4I and 4J. Due to the age, criticality, and capacity limitations of the existing main, the project is recommended for completion regardless of upstream I/I reductions. The 2042 peak flow rates at the downstream end of the alignment are anticipated to approach 1,800 gpm, while the existing calculated full-flow capacity along the majority of the alignment is less than 700 gpm. If upstream I/I rehabilitation projects reduce the peak flow rates, the diameter of the main installed could potentially be reduced in diameter, but the cost savings of reducing pipe diameter by one nominal size are generally insignificant in the context of total sewer main replacement.

CIP SM5: Bottleneck Upstream of West Nevada Street

This project represents a bottleneck in the collection system between two sections of larger diameter pipe, so its completion would still be recommended if I/I reductions were achieved. The calculated full flow capacity is less than 200 gpm along portions of the alignments. 2042 peak flow rates along the alignments is estimated to range from approximately 250 to 350 gpm.

CIP SM6: Siskiyou Boulevard from Morton Street to Beach Street

This upsizing project is associated with the need to convey an estimated 2042 peak flow rate of over 900 gpm through a portion of the alignment; existing calculated full flow capacity is approximately 700 gpm. Upstream I/I reduction in Basin 4J will reduce the magnitude of surcharging and/or overflows during peak flow conditions.

CIP SM7: Siskiyou Boulevard, Intersection with Wightman Street and Indiana Street

This upsizing project is associated with the need to convey an estimated 2042 peak flow rate approaching 900 gpm through a portion of the alignment. Existing calculated full flow capacity is approximately 600 gpm. Upstream I/I reduction in Basin 9B will reduce the magnitude of surcharging and/or overflows during peak flow conditions.

CIP SM8: Homes Avenue from Walker Avenue to Normal Avenue

This main may need to convey 300 gpm or more during 2042 peak hour flow rates, which may exceed the capacity of the existing mains. A portion of the existing alignment has a calculated full flow capacity of approximately 150 gpm. The Shamrock LS is responsible for a significant component of the peaking flow rates in this area. Reducing the discharge flow rate when the LS is replaced (CIP LS5) may reduce the need for this CIP project.

CIP SM9: Mountain View Cemetery Sewer Main

This main may need to convey 200 gpm or more during 2042 peak hour flow rates, which may exceed the capacity of the existing mains. A portion of the existing alignment has a calculated full flow capacity of less than 120 gpm. The Shamrock LS is responsible for a significant component of the peaking flow rates in this area. Reducing the discharge flow rate when the LS is replaced (CIP LS5) may reduce the need for this CIP project.

Lift Station Capacity-Related CIP Projects

The projects described in the following section are capacity-related lift station improvement projects. These projects (and others not specifically related to capacity) are described in greater detail in **Chapter 7**.

CIP LS1 – Upsize Capacity of Ashland Creek LS

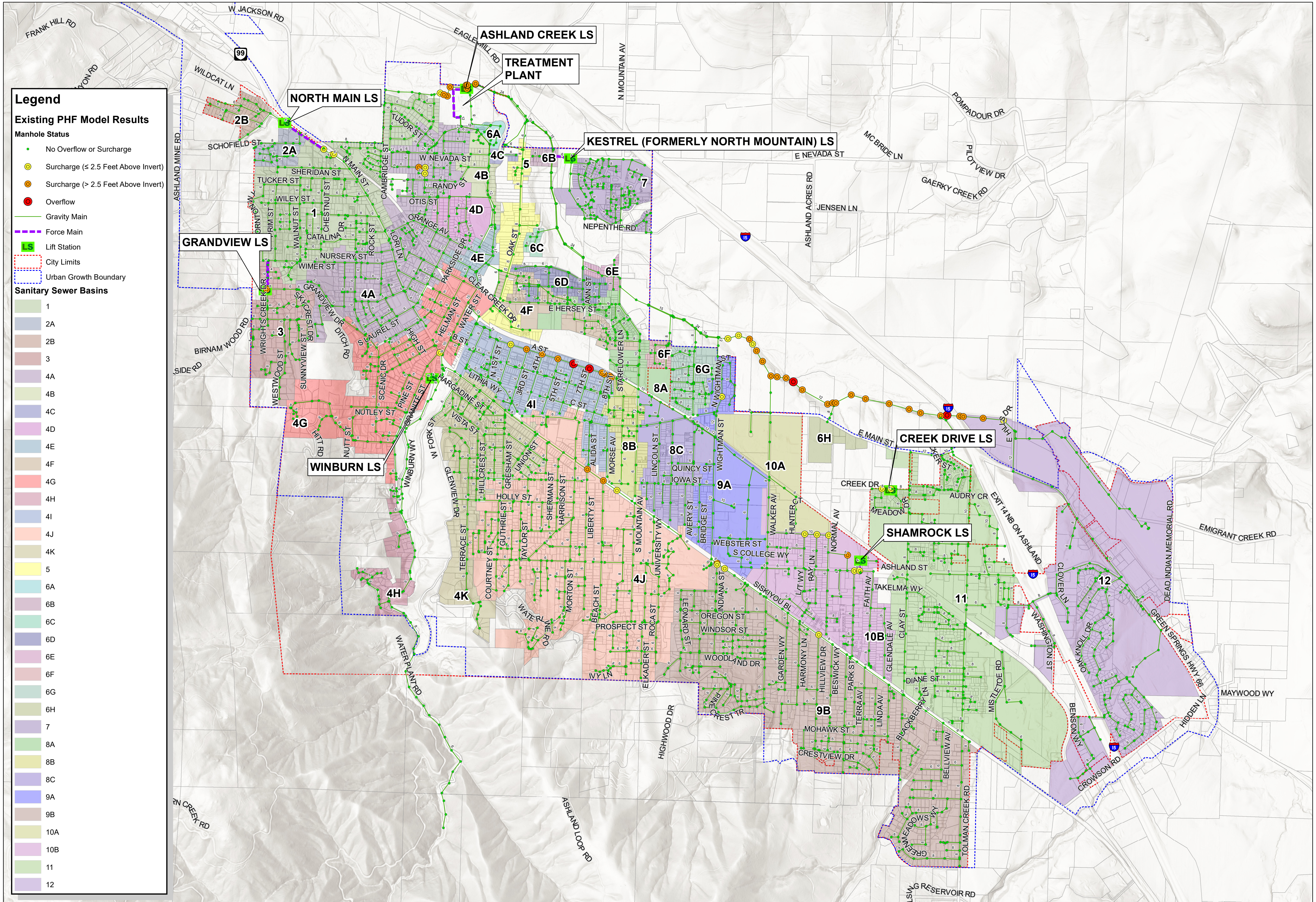
It is estimated that the Ashland Creek LS will need to convey approximately 5,300 gpm during 2042 peak hour flow rates, which exceeds the present firm capacity of 4,400 gpm. Because a significant portion of the gravity collection system is tributary to the Ashland Creek LS, I/I reduction efforts will reduce the magnitude of surcharging and overflows that occur at the station. However, due to its criticality, the City should still consider expanding the capacity of this station to handle design peak flows.

CIP LS2 – Upsize Capacity of Grandview LS

The estimated 2042 peak flow rate of approximately 240 gpm from Basin 3 exceeds the firm capacity of the Grandview LS by approximately 90 gpm. This basin is an excellent candidate for I/I reduction efforts (CIP I4) prior to the lift station upsizing project, as the majority of peak flow rates are expected to be from I/I entering the relatively small basin. Depending on the success of I/I reduction projects in Basin 3, CIP LS2 may be unnecessary.

WWTP Energy Use and I/I Reduction

I/I reduction efforts will reduce the volume of flow entering the WWTP, and accordingly will reduce the amount of energy consumed at the WWTP. Actual energy cost per gallon removed was not available, and actual I/I reduction from construction projects is difficult to estimate. However, when I/I construction projects are proposed based on the results of the I/I evaluation projects, (CIP I#) described in **Chapter 7**, analyses can then be performed estimating the volume of I/I that may be removed from the collection system and the corresponding energy use reduction at the WWTP.



This map is a graphic representation derived from the City of Ashland Geographic Information System. It was designed and intended for City of Ashland staff use only; it is not guaranteed to survey accuracy. This map is based on the best information available on the date shown on this map.

Any reproduction or sale of this map, or portions thereof, is prohibited without express written authorization by the City of Ashland.

This material is owned and copyrighted by the City of Ashland.

Vicinity Map

Oregon

Jackson County

Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community

Figure 6-1
Existing System Capacity Analysis

City of Ashland
Comprehensive Sanitary Sewer Collection System Master Plan

Coordinate System: NAD 1983 StatePlane Oregon South FIPS 3602 Feet

By: hfarris

C:\Users\hfarris\Desktop\Figure6-1_ExistingSystemCapacity.mxd

CITY OF ASHLAND

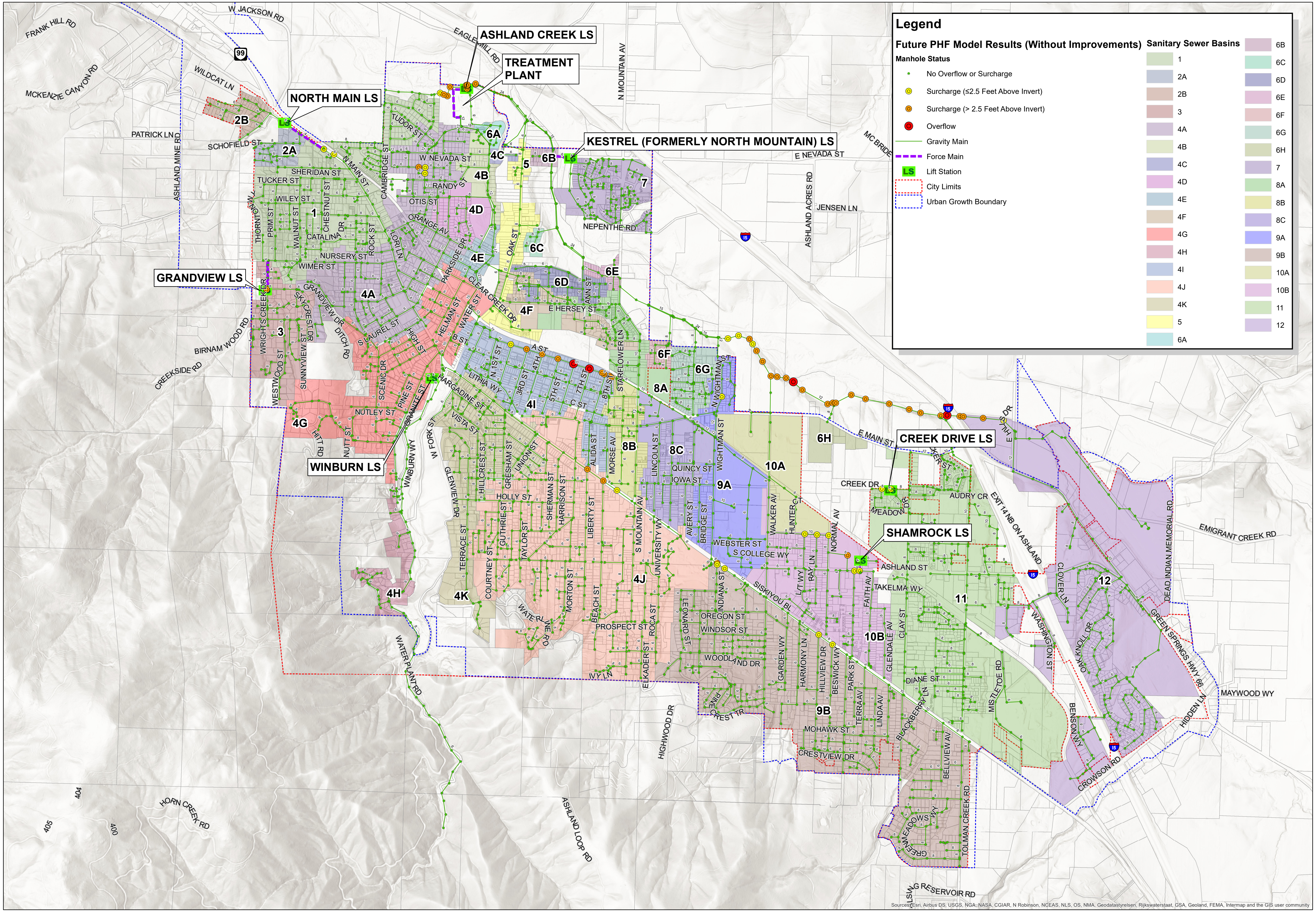
1 inch = 1,000 feet

0 500 1,000 2,000 Feet

Plot Date: 4/5/2022

RH2

NORTH



Vicinity Map

Oregon
Jackson County

Figure 6-2 Future System Capacity (without Improvements)

City of Ashland
Comprehensive Sanitary Sewer Collection System Master Plan

Coordinate System:NAD 1983 StatePlane Oregon South FIPS 3602 Feet

By:hfarris

J:\Data\COA\1019-203 San Sewer MP\GIS\Maps\Figure6-2_FutureCapacity_WithoutImprovements.mxd

CITY OF ASHLAND

1 inch = 1,000 feet

0 500 1,000 2,000 Feet

Plot Date: 4/5/2022

RH2

NORTH

7 | CAPITAL IMPROVEMENT PLAN

INTRODUCTION

This chapter presents the 20-year capital improvement plan (CIP) for the City of Ashland's (City) sanitary sewer collection system. As discussed in **Chapter 4** (Condition Assessment), **Chapter 5** (I/I Reduction Plan), and **Chapter 6** (System Capacity Evaluation), a number of collection system improvement projects are required to provide the desired level of service to the City's customers. In some areas, the City has flexibility in applying its resources towards capacity improvements or reduction of I/I, as both can result in progress towards a system capable of conveying the peak hour flow associated with a 5-year, 24-hour storm. **Chapter 8** describes the financial analysis associated with the CIP.

A Capital Improvement Plan number, herein referred to as a CIP number, has been assigned to each improvement. Numbers were assigned to the improvements as shown on **Figure 7-1**. The improvements are organized and presented in this chapter according to the following primary categories. *Note: The number symbol will be replaced with a corresponding improvement number in the descriptions.*

- I/I Evaluation Projects (CIP I#)
- I/I Reduction and Gravity Collection System Improvement Projects (CIP SM#)
- Lift Station Projects (CIP LS#)
- Miscellaneous Improvements (CIP M#)

The remainder of this chapter presents a brief description of each group of improvements, the criteria for prioritization, the basis for the cost estimates, and the schedule for implementation.

For planning purposes, the improvement projects described herein are based on one alternative route or conventional concept for providing the necessary improvement. Other methods of achieving the same result, such as obtaining flow capacity increases by adding one large gravity main versus using multiple gravity pipes, force main/gravity main combinations, or multiple force mains, should be considered during design to ensure the best and lowest cost alternative design is selected. Further evaluation should be performed when more information is available regarding when and where future developments will occur.

I/I EVALUATION PROJECTS

The first group of CIP projects described in this chapter address the further pinpointing and reduction of I/I in the collection system. The basins are presented in order of priority for I/I rehabilitation, based on the analyses described in **Chapter 5**. For each basin or set of basins, it is recommended that investigation to pinpoint I/I be conducted before rehabilitation or replacement of the collection system takes place. This will improve the likelihood of directly targeting and removing I/I, and best applying the City's financial resources. **Table 7-1** lists the estimated unit costs for several I/I techniques, assuming that the City contracts for these services. If City staff complete these evaluations, the total cost may be lower.

It is recommended that the I/I evaluation projects are performed in an iterative process starting with CIP I4 as a pilot program. If CIP I4 is successful at pinpointing I/I then the additional I/I targeting projects should be carried out. However, if CIP I4 is unsuccessful at locating I/I sources then the I/I pinpointing projects should be skipped and the City should proceed with a systematic annual program for I/I reduction, project CIP SM1, in the basins that are known to have the highest I/I.

Table 7-1

I/I Evaluation Technique Unit Costs

I/I Evaluation Technique	Estimated Unit Cost
In-stream Flow Monitoring	$5000/location/month
Smoke Testing	$1.30/LF of sewer main
Side Sewer Video Inspection	$500/ea

CIP I1: Pinpoint I/I Sources in Basins 4I/4J

Description: As described in **Chapter 5**, Basins 4I and 4J (which includes the Railroad District) are a significant source of I/I entering the collection system. This project will further pinpoint sources of I/I in these basins to better inform the scope of CIP SM1.

Project: Pinpoint I/I sources in Basins 4I and 4J and make recommendations for I/I reduction projects (CIP SM1).

Estimated Cost:

- Additional flow monitoring - $20,000.
- Smoke and dye testing - $125,000.
- Additional side sewer video inspections - $10,000.
- Engineering analysis and report - $20,000
- **Total:** $175,000

CIP I2: Pinpoint I/I Sources in Basins 8A/8B/8C

Description: As described in **Chapter 5**, Basins 8A/8B/8C are believed to be a significant source of I/I entering the collection system. This project will further pinpoint sources of I/I in these basins to better inform the scope of CIP SM1.

Project: Pinpoint I/I sources in Basins 8A/8B/8C and the Bear Creek Interceptor in the vicinity. Make recommendations for I/I reduction projects (CIP SM1).

Estimated Cost:

- Additional flow monitoring - $10,000.
- Smoke and dye testing - $49,000.
- Additional side sewer video inspections - $5,000.
- Engineering analysis and report - $10,000
- **Total:** $74,000

CIP I3: Pinpoint I/I Sources in Basin 12

Description: As described in **Chapter 5**, Basin 12 is believed to be a significant source of I/I entering the collection system. This project will further pinpoint sources of I/I in this basin to better inform the scope of CIP SM1.

Project: Pinpoint I/I sources in Basin 12 and make recommendations for I/I reduction projects (CIP SM1).

Estimated Cost:

- Additional flow monitoring - $10,000.
- Smoke and dye testing (by City) - $52,000.
- Additional side sewer video inspections - $5,000.
- Engineering analysis and report - $10,000
- **Total:** $77,000

CIP I4: Pinpoint I/I Sources in Basin 3

Description: As described in **Chapter 5**, Basin 3 is believed to be a significant source of I/I entering the collection system. This project will further pinpoint sources of I/I in these basins to better inform the scope of CIP SM1. Due to the small size of this basin, it can be considered as an I/I reduction pilot project.

Project: Pinpoint I/I sources in Basin 3 and make recommendations for I/I reduction projects (CIP SM1).

Estimated Cost:

- Additional flow monitoring - $5,000.
- Smoke and dye testing - $16,000.
- Additional side sewer video inspections - $2,000.
- Engineering analysis and report - $10,000
- **Total:** $33,000

CIP I5: Pinpoint I/I Sources in Basins 4A/4B/4C/4D/4E/4F/4G/4H/4K

Description: As described in **Chapter 5**, Basins 4A/4B/4C/4D/4E/4F/4G/4H/4K are believed to be a significant source of I/I entering the collection system. This project will further pinpoint sources of I/I in these basins to better inform the scope of CIP SM1.

Project: Pinpoint I/I sources in Basins 4A/4B/4C/4D/4E/4F/4G/4H/4K and make recommendations for I/I reduction projects (CIP SM1).

Estimated Cost:

- Additional flow monitoring - $30,000.
- Smoke and dye testing - $171,000.
- Additional side sewer video inspections - $15,000.
- Engineering analysis and report - $20,000
- **Total:** $236,000

CIP I6: Pinpoint I/I Sources in Basins 5/6A/6B/6C/6D/6E

Description: As described in **Chapter 5**, Basins 5/6A/6B/6C/6D/6E are believed to be a significant source of I/I entering the collection system. This project will further pinpoint sources of I/I in these basins to better inform the scope of CIP SM1.

Project: Pinpoint I/I sources in Basins 5/6A/6B/6C/6D/6E and the Bear Creek Interceptor in the vicinity. Make recommendations for I/I reduction projects (CIP SM1).

Estimated Cost:

- Additional flow monitoring (by City) - $10,000.

- Smoke and dye testing (by City) - $41,000.
- Additional side sewer video inspections (by City) - $5,000.
- Engineering analysis and report - $10,000
- **Total:** $66,000

CIP I7: Pinpoint I/I Sources in Basins 9A/9B

Description: As described in **Chapter 5**, Basins 9A/9B are believed to be a significant source of I/I entering the collection system. This project will further pinpoint sources of I/I in these basins to better inform the scope of CIP SM1.

Project: Pinpoint I/I sources in Basins 9A/9B and make recommendations for I/I reduction projects (CIP SM1).

Estimated Cost:

- Additional flow monitoring - $20,000.
- Smoke and dye testing - $124,000.
- Additional side sewer video inspections - $10,000.
- Engineering analysis and report - $20,000
- **Total:** $174,000

CIP I8: Pinpoint I/I Sources in Basins 10A/10B

Description: As described in **Chapter 5**, Basins 10A/10B are believed to be a significant source of I/I entering the collection system. This project will further pinpoint sources of I/I in these basins to better inform the scope of CIP SM1.

Project: Pinpoint I/I sources in Basins 10A/10B and make recommendations for I/I reduction projects (CIP SM1).

Estimated Cost:

- Additional flow monitoring (by City) - $10,000.
- Smoke and dye testing (by City) - $38,000.
- Additional side sewer video inspections (by City) - $5,000.
- Engineering analysis and report - $10,000
- **Total:** $63,000

CIP I9: Pinpoint I/I Sources in Basin 11

Description: As described in **Chapter 5**, Basin 11 is believed to be a significant source of I/I entering the collection system. This project will further pinpoint sources of I/I in these basins to better inform the scope of CIP SM1.

Project: Pinpoint I/I sources in Basin 11 and make recommendations for I/I reduction projects (CIP SM1).

Estimated Cost:

- Additional flow monitoring (by City) - $15,000.
- Smoke and dye testing (by City) - $64,000.
- Additional side sewer video inspections (by City) - $8,000.

- Engineering analysis and report - $15,000
- **Total:** $102,000

I/I REDUCTION AND GRAVITY COLLECTION SYSTEM IMPROVEMENT PROJECTS

The second group of CIP projects described in this chapter address construction of gravity collection system projects to reduce I/I, improve capacity in the collection system, and resolve other deficiencies. As described in **Chapter 6**, the collection system has several capacity deficiencies which will likely result in surcharging and/or overflows if the system experiences the existing peak hour flow estimated in **Chapter 3**. The upsizing projects described in this section are intended to provide sufficient capacity to convey the projected 2042 peak hourly flow described in **Table 3-3** without reductions in I/I. The City's commitment to reducing I/I in the collection system may result in the ability to delay or reduce the scope of some upsizing projects, depending on the success of I/I reduction efforts.

Project costs for the proposed improvements were estimated based on costs of similar recently constructed sewer projects and are presented in 2022 dollars. The unit costs for each pipe size are based on estimates of all construction-related improvements, such as materials and labor for installation, services, manholes, connections to the existing system, trench restoration, asphalt surface restoration, and other work for a complete installation. Project cost estimates for sewer pipe projects were determined from the unit costs (i.e., cost per foot-length) shown in **Table 7-2** and the proposed diameter and approximate length of each improvement. The costs shown in **Table 7-2** include indirect costs estimated at 50 percent of the construction cost for engineering preliminary design, final design, construction contract administration, project administration, permitting, and legal and administrative services.

Table 7-2

Gravity Sewer Pipe Unit Costs

Sewer Main Diameter (in.)	Project Cost per Linear Foot (2022 $ per LF)
8	$275
10	$285
12	$295
15	$320
18	$350
24	$375

The final cost of the projects will depend on actual labor and material costs, actual site conditions, productivity, competitive market conditions, final project scope, final project schedule, and other variable factors. As a result, the final project costs will likely vary from those presented. Because of these factors, funding needs must be carefully reviewed prior to making specific financial decisions or establishing final budgets.

CIP SM1: Annual I/I Reduction and Collection System Replacement Project Allowance

Description: The City is committed to reducing I/I and has the general goal of replacing the entire collection system on an interval of approximately 100 years. Replacement of the entire collection system over a 100-

year span would require an average annual investment of approximately $2M based on the project cost per linear foot described in **Table 7-2**. It is assumed that this level of investment in the sewer system is currently unrealistic, and some of this work is anticipated to be completed at discounted rates by City crews, or by less-costly trenchless methods. An annual allowance of $100,000 has been identified for this project.

Project: Based on the results of CIP Projects I1 through I9, prioritize replacement of the collection system in areas where I/I is identified to be the most significant. Replace other areas of the collection system as necessary due to age, structural issues and other defects.

Estimated Cost: $100,000 annually.

CIP SM2: Bear Creek Interceptor from North Wightman Street to Tolman Creek Road

Description: Based on the results of the capacity analyses described in **Chapter 6**, the system may experience surcharging and/or overflows under peak flow conditions along the section of the Bear Creek Interceptor located between approximately North Wightman Street and Tolman Creek Road. This section of the interceptor is constructed primarily of 12-inch diameter concrete and unknown pipe material installed in the 1960s.

Project: Replace the section of the interceptor from approximately North Wightman Street to approximately Walker Avenue (approximately 1,700 LF) with 18-inch diameter PVC sewer main. Replace the section of the interceptor from approximately Walker Avenue to approximately Tolman Creek Road (approximately 4,100 LF) with 15-inch diameter PVC sewer main. Inverts along the alignment should be adjusted to mitigate existing shallow slopes.

Estimated Cost: $2,000,000

CIP SM3: North Wightman Street from East Main Street, North to Existing 12" Sewer Main

Description: Based on the results of the capacity analyses described in **Chapter 6**, the system may experience surcharging and/or overflows under peak flow conditions due to a constriction in North Wightman Street north of East Main Street. Approximately 1,050 LF of existing 8-inch diameter PVC sewer separates the upstream 12-inch diameter sewer main in Wightman Street south of East Main Street from the downstream 12-inch diameter sewer main that drains to the Bear Creek interceptor.

Project: Upsize approximately 1,050 LF of existing sewer main to 12-inch diameter to reduce the hydraulic constriction in the collection system.

Estimated Cost: $310,000

CIP SM4: A Street from North 1st Street to 8th Street

Description: Based on the results of the capacity analyses described in **Chapter 6**, the system may experience surcharging and/or overflows under peak flow conditions along A Street between approximately North 1st Street and 8th Street. This alignment (approximately 2,600 LF) is constructed primarily of 10-inch diameter clay sewer pipe of unknown age.

Project: Upsize approximately 2,600 LF of existing sewer main to 18-inch diameter PVC to alleviate the risk of surcharging and overflows. Adjust sewer main inverts to mitigate existing shallow slopes.

Estimated Cost: $910,000

CIP SM5: Bottleneck Upstream of West Nevada Street

Description: Based on the results of the capacity analyses described in **Chapter 6**, the system may experience surcharging and/or overflows under peak flow conditions due to constrictions in the collection system upstream of West Nevada Street. The specific project locations are shown on **Figure 7-1** and are summarized in a bulleted list below. These projects generally consist of upsizing sections of 6-inch diameter sewer main that separate upstream and downstream 12-inch diameter sewer mains.

- Approximately 325 LF of 12-inch diameter sewer main on easement between West Nevada Street and Cambridge Street
- Approximately 225 LF of 12-inch diameter sewer main in Cambridge Street
- Approximately 140 LF of 12-inch diameter sewer main on easement between Cambridge Street and Randy Street
- Approximately 170 LF of 12-inch diameter sewer main in Otis Street between Drager Street and Willow Street

Project: Upsize approximately 860 LF of existing sewer main to 12-inch diameter to reduce the hydraulic constriction in the collection system.

Estimated Cost: $260,000

CIP SM6: Siskiyou Boulevard from Morton Street to Beach Street

Description: Based on the results of the capacity analyses described in **Chapter 6**, the system may experience surcharging and/or overflows under peak flow conditions due to a lack of capacity in the existing 8-inch diameter sewer main in Siskiyou Boulevard between Morton Street and Beach Street (approximately 830 LF).

Project: Upsize approximately 830 LF of existing 8-inch diameter sewer main to 10-inch diameter to improve collection system conveyance capacity. The cost estimate is increased for this project due to a congested area.

Estimated Cost: $290,000

CIP SM7: Siskiyou Boulevard, Intersection with Wightman Street and Indiana Street

Description: Based on the results of the capacity analyses described in **Chapter 6**, the system may experience surcharging and/or overflows under peak flow conditions due to a constriction in Siskiyou Boulevard at the intersection with Wightman Street and Indiana Street. Approximately 160 LF of existing 8-inch diameter sewer main separate upstream and downstream 12-inch diameter sewer main.

Project: Upsize approximately 160 LF of existing 8-inch diameter sewer main to 12-inch diameter to alleviate the constriction.

Estimated Cost: $50,000

CIP SM8: Homes Avenue from Walker Avenue to Normal Avenue

Description: Based on the results of the capacity analyses described in **Chapter 6**, the system may experience surcharging and/or overflows under peak flow conditions due to a lack of capacity in the existing 8-inch and 10-inch diameter concrete sewer main (installed 1940s) in Homes Avenue from Walker Avenue to Normal Avenue (approximately 1,370 LF).

Project: Replace approximately 1,370 LF of existing 8-inch and 10-inch diameter concrete sewer main with 12-inch diameter PVC.

Estimated Cost: $410,000

CIP SM9: Mountain View Cemetery Sewer Main

Description: Based on the results of the capacity analyses described in **Chapter 6**, the system may experience surcharging and/or overflows under peak flow conditions due to a lack of capacity in the existing 6-inch diameter clay sewer main in Mountain View Cemetery between Ashland Street and Normal Avenue (approximately 790 LF).

Project: Replace approximately 790 LF of existing 6-inch diameter clay sewer main with 8-inch diameter PVC.

Estimated Cost: $220,000

CIP SM10: Maple Street from Chestnut Street to Scenic Drive

Description: The City has identified the 6-inch diameter concrete sewer main (installed 1940s) in Maple Street from Chestnut Street to Scenic Drive as a priority replacement project.

Project: Replace approximately 760 LF of existing 6-inch diameter concrete sewer main with 8-inch diameter PVC.

Estimated Cost: $210,000

CIP SM11: South Mountain Avenue from Prospect Street to Ashland Street

Description: The City has identified the 6-inch diameter concrete sewer main (installed 1930s) in South Mountain Avenue from Ashland Street to Prospect Street as a priority replacement project.

Project: Replace approximately 1,270 LF of existing 6-inch diameter concrete sewer main with 8-inch diameter PVC.

Estimated Cost: $350,000

CIP SM12: Iowa Street and Harrison Street Sewer Mains

Description: The City has identified the circa 1912 6-inch diameter (clay and unknown material) sewer mains in Iowa Street from Gresham Street to Harrison Street and in Harrison Street from Iowa Street to Siskiyou Boulevard as a priority replacement project.

- Approximately 1,370 LF of 8-inch diameter sewer main in Iowa Street from Gresham Street to Harrison Street
- Approximately 1,070 LF of 8-inch diameter sewer main in Harrison Street from the manhole south of Iowa Street to Siskiyou Boulevard

Project: Replace approximately 2,440 LF of existing 6-inch diameter sewer main with 8-inch diameter PVC.

Estimated Cost: $680,000

CIP SM13: Replacement of Orangeburg Sewer Mains

Description: Approximately 560 LF of 6-inch diameter Orangeburg sewer mains remain in service on Roca Street south of the intersection with Fern Street, and on easement south of the west end of Prospect Street. Orangeburg pipe is beyond its useful lifespan and at risk of structural failure, and should be prioritized for replacement.

Project: Replace approximately 560 LF of existing 6-inch Orangeburg sewer main with 8-inch diameter PVC.

Estimated Cost: $160,000

LIFT STATION PROJECTS

The third group of CIP projects described in this chapter address construction of lift station improvements to address capacity deficiencies and other problems. The lift station capacity improvement projects described in this section are intended to provide sufficient capacity to convey the projected 2042 peak hourly flow described in **Table 3-3** without reductions in I/I. The City's commitment to reducing I/I in the collection system may result in the ability to delay or reduce the scope of some upsizing projects, depending on the success of I/I reduction efforts.

Project costs for the proposed improvements were estimated based on costs of similar recently constructed projects, including indirect costs, and are presented in 2022 dollars.

CIP LS1 – Upsize Capacity of Ashland Creek LS

Description: The existing capacity of the Ashland Creek Lift Station (LS)(approximately 4,500 to 4,600 gpm per **Chapter 1**) is insufficient to pump the estimated 2042 design peak flow rate tributary to the lift station (estimated to be approximately 5,300 gpm). As described in **Chapter 1**, the lift station's maximum flow rate may be limited by the WWTP headworks and UV treatment process. Accordingly, additional improvements may be required at the WWTP. These potential improvements have not been evaluated as part of this CSSCSMP. Surcharging of manholes in the vicinity of the treatment plant may occur depending on the control settings for the pumps. The CSSCSMP analyses assumed that this surcharging could be mitigated by modifying these controls and that upsizing pipes in the WWTP vicinity to meet City design surcharging standards described in **Chapter 2** was not necessary.

Project: Upsize the Ashland Creek LS to a firm capacity of approximately 5,300 gpm to ensure that the lift station can convey the design peak hour flow from the collection system. Note: WWTP data may be required to support this discharge flow rate but was not evaluated as part of the CSSCSMP.

Estimated Cost: $1,100,000

CIP LS2 – Upsize Capacity of Grandview LS

Description: The estimated 2042 design peak flow rate tributary to the Grandview LS is estimated to be approximately 240 gpm, which exceeds the 154 gpm firm capacity described in **Chapter 1**. Because a significant component of flow in the Grandview LS basin (Basin 3) is attributable to I/I (reference **Chapter 5**), this project may be delayed or determined to be unnecessary depending on the results of any I/I reduction projects which are completed in the basin.

Project: Upsize the Grandview LS firm capacity to approximately 250 gpm. The 4-inch diameter force main may also need to be upsized depending on the selected pumping capacity.

Estimated Cost: $300,000

CIP LS3: Replacement of Kestrel LS

Description: The Kestrel LS is approximately 30 years old and has numerous O&M-related issues. It is recommended that the station be replaced in the near future to address these problems. The steel force main should also be evaluated for potential replacement with a new force main constructed with modern materials.

Project: Replace the Kestrel LS with a 520 gpm duplex submersible configuration lift station. Replace the existing force main with approximately 400 LF of 6-inch-diameter DI, PVC, or HDPE pipe. The City's FY2019 20-year CIP budgeted $350,000 for this project to be completed in FY2030.

Estimated Cost: $1,000,000

CIP LS4: Pump Replacement at Creek Drive LS

Description: The Creek Drive LS experiences frequent clogging with non-dispersable materials. Customer education has been ineffective in preventing the issue from recurring.

Project: Replace the Creek Drive LS pumps with macerating or screw-impeller-type pumps that can better handle the non-dispersable materials that frequently clog the wetwell.

Estimated Cost: $60,000

CIP LS5: Replacement of Shamrock LS

Description: The Shamrock LS is approximately 50 years old and has several O&M-related issues. It is recommended that the station be replaced in the near future with a modern submersible lift station. The steel force main should also be replaced with a new force main constructed with modern materials.

Project: Replace the Shamrock LS with a 100 gpm duplex submersible configuration lift station. Replace the existing force main with approximately 240 LF of 4-inch diameter DI, PVC, or HDPE pipe.

Estimated Cost: $550,000

CIP LS6: Replacement of North Main Lift Station Force Main

Description: While the lift station itself is of relatively recent construction, the North Main LS discharges to an aging 4-inch diameter asbestos cement (AC) force main that is approximately 600 feet in length. Due to the age of this force main and the unsuitable material, it is recommended that it be preventively replaced.

Project: Replace the existing North Main LS AC force main with approximately 600 LF of 4" DI, PVC or HDPE pipe.

Estimated Cost: $180,000

MISCELLANEOUS PROJECTS

The final group of CIP projects described in this chapter address miscellaneous projects that do not fit into the other three CIP categories. Costs are presented in 2022 dollars.

CIP M1: CSSCSMP Update

Description: In order to update flow projections and re-cast the CIP as necessary, the CSSCSMP should be updated on an interval of approximately 10 years.

Project: Update the City's CSSCSMP on a 10-year interval.

Estimated Cost: $300,000/update

PRIORITIZING IMPROVEMENTS

The existing system improvements were prioritized by the City based on the perceived need for the improvement to be completed prior to projects with fewer deficiencies or less risk of damage due to failure of the system. Future projects that are not identified as part of the City's CIP may become necessary. Such projects may be required to remedy an emergency situation or address unforeseen problems. Due to budgetary constraints, the completion of such projects may require modifications to the recommended CIP. The City retains the flexibility to reschedule, expand, or reduce the projects included in the CIP and to add new projects to the CIP, as best determined by rate payers and the City Council, when new information becomes available for review and analysis.

SCHEDULE OF IMPROVEMENTS

The results of prioritizing the improvements were used to assist in establishing an implementation schedule that can be used by the City for preparing its CIP. The implementation schedule for the proposed improvements is shown in **Table 7-3**. It should be noted that the implementation schedule shown is, to some extent, flexible. The implementation schedule should be modified based on City preferences and budget. The City should review **Table 7-3** at least annually and reprioritize as necessary to match budget, flows, growth, and other City conditions/priorities. The City will identify and schedule the I/I evaluation studies (CIP I#) and allocate the annual replacement project allowance (CIP SM1) during the annual budget process. This provides the City with the flexibility to coordinate these projects with road or other projects within the same area.

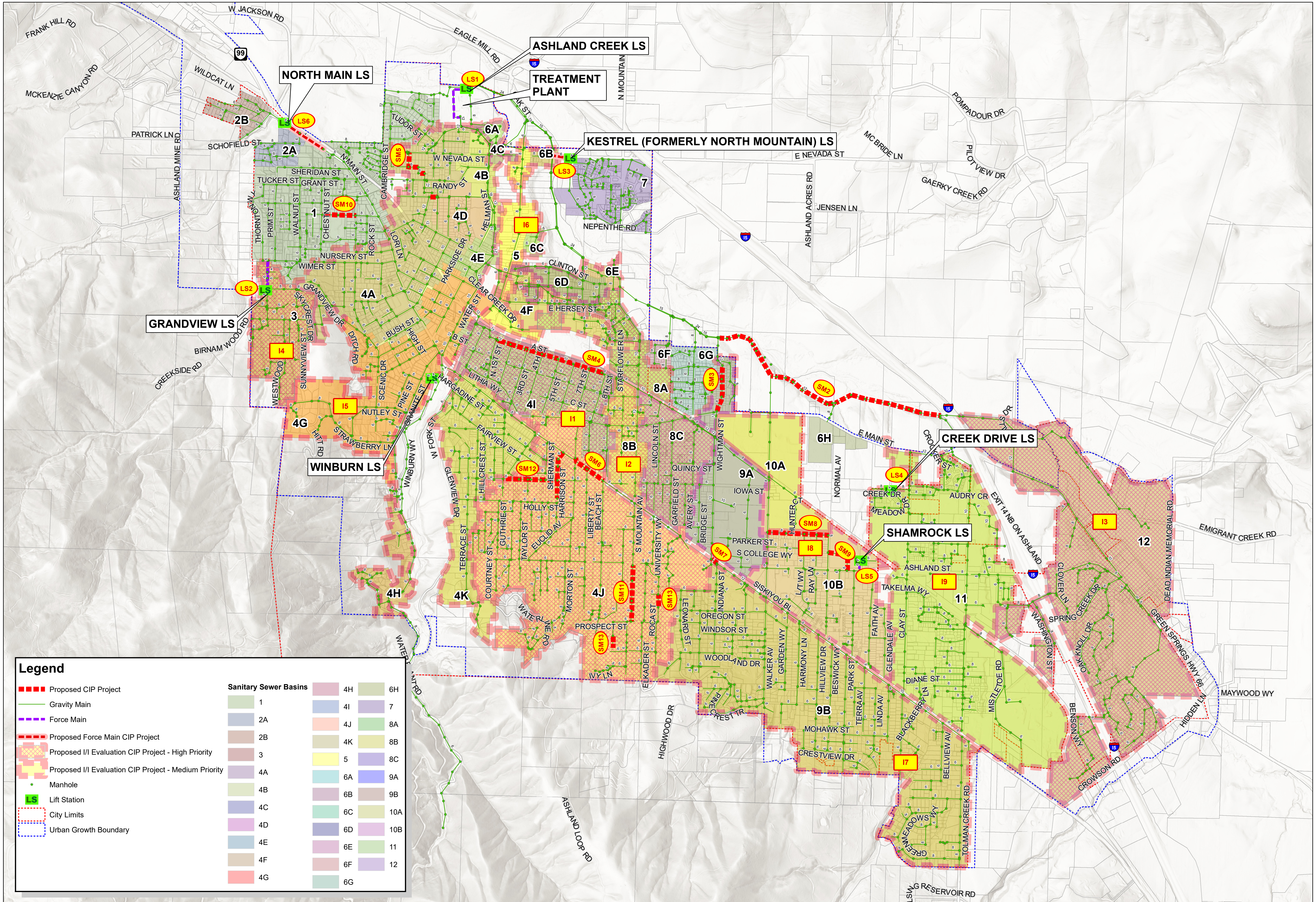
Future Project Cost Adjustments

All cost estimates shown in the tables are presented in 2022 dollars. Therefore, it is recommended that future costs be adjusted to account for the effects of inflation and changing construction market conditions at the actual time of project implementation. Future costs can be estimated using the Engineering News Record Construction Cost Index or by applying an estimated rate of inflation that reflects the current and anticipated future market conditions.

Table 7-3

Proposed CIP Implementation Schedule

CIP No.	Project Description	Estimated Cost (2022 $)	Schedule of Improvements Planned Year of Project and Estimated Cost in 2022 $											
			2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033 to 2042
	I/I Evaluation Projects													
I1	Pinpoint I/I Sources in Basin 4I/4J	$175,000		$88K	$88K									
I2	Pinpoint I/I Sources in Basins 8A/8B/8C	$74,000		$37K	$37K									
I3	Pinpoint I/I Sources in Basin 12	$77,000		$39K	$39K									
I4	Pinpoint I/I Sources in Basin 3	$33,000	$33K											
I5	Pinpoint I/I Sources in Basins 4A/4B/4C/4D/4E/4F/4G/4H/4K	$236,000											$118K	$118K
I6	Pinpoint I/I Sources in Basins 5/6A/6B/6C/6D/6E	$66,000												$66K
I7	Pinpoint I/I Sources in Basins 9A/9B	$174,000												$174K
I8	Pinpoint I/I Sources in Basins 10A/10B	$63,000												$63K
I9	Pinpoint I/I Sources in Basin 11	$102,000												$102K
Total - I/I Evaluation Projects		**$1,000,000**	**$33K**	**$163K**	**$163K**	**$0K**	**$0K**	**$0K**	**$0K**	**$0K**	**$0K**	**$0K**	**$118K**	**$523K**
	I/I Reduction and Gravity Collection System Improvement Projects													
SM1	Annual I/I Reduction and Collection System Replacement Project Allowance	$2,100,000	$100K	$100K	$100K	$100K	$100K	$100K	$100K	$100K	$100K	$100K	$100K	$1.0M
SM2	Upsize Bear Creek Interceptor from Wightman Street to Tolman Creek Road	$2,000,000		$400K	$400K	$400K	$400K	$400K						
SM3	North Wightman Street from East Main Street, North to Existing 12" Sewer Main	$310,000									$155K	$155K		
SM4	A Street from North 1st Street to 8th Street	$910,000										$303K	$303K	$303K
SM5	Bottleneck Upstream of West Nevada Street	$260,000												$260K
SM6	Siskiyou Boulevard from Morton Street to Beach Street	$290,000												$290K
SM7	Siskiyou Boulevard, Intersection with Wightman Street and Indiana Street	$50,000												$50K
SM8	Homes Avenue from Walker Avenue to Normal Avenue	$410,000												$410K
SM9	Mountain View Cemetery Sewer Main	$220,000												$220K
SM10	Maple Street from Chestnut Street to Scenic Drive	$210,000												$210K
SM11	South Mountain Avenue from Prospect Street to Ashland Street	$350,000												$350K
SM12	Iowa Street from Gresham Street to Fairview Street	$680,000												$680K
SM13	Replacement of Orangeburg Sewer Mains	$160,000												$160K
Total - I/I Reduction and Gravity Collection System Improvement Projects		**$7,950,000**	**$100K**	**$500K**	**$500K**	**$500K**	**$500K**	**$500K**	**$100K**	**$100K**	**$255K**	**$558K**	**$403K**	**$3.9M**
	Lift Station Projects													
LS1	Upsize Capacity of Ashland Creek Lift Station	$1,100,000							$550K	$550K				
LS2	Upsize Capacity of Grandview Lift Station	$300,000									$300K			
LS3	Replacement of Kestrel Lift Station	$1,000,000												$1.0M
LS4	Pump Replacement at Creek Drive Lift Station	$60,000												$60K
LS5	Replacement of Shamrock Lift Station	$550,000												$550K
LS6	Replacement of North Main Lift Station Force Main	$180,000												$180K
Total - Lift Station Projects		**$3,190,000**	**$0K**	**$0K**	**$0K**	**$0K**	**$0K**	**$0K**	**$550K**	**$550K**	**$300K**	**$0K**	**$0K**	**$1.8M**
	Miscellaneous Projects													
M1	CSSCSMP Update	$600,000												$600K
Total - Miscellaneous Projects		**$600,000**	**$0K**	**$0K**	**$0K**	**$0K**	**$0K**	**$0K**	**$0K**	**$0K**	**$0K**	**$0K**	**$0K**	**$600K**
Total Estimated Project Costs		**$12,740,000**	**$133K**	**$663K**	**$663K**	**$500K**	**$500K**	**$500K**	**$650K**	**$650K**	**$555K**	**$558K**	**$521K**	**$6.8M**



This map is a graphic representation derived from the City of Ashland Geographic Information System. It was designed and intended for City of Ashland staff use only; it is not guaranteed to survey accuracy. This map is based on the best information available on the date shown on this map.

Any reproduction or sale of this map, or portions thereof, is prohibited without express written authorization by the City of Ashland.

Vicinity Map

Oregon

Jackson County

Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community

Figure 7-1
Proposed CIP Projects

Coordinate System: NAD 1983 StatePlane Oregon South FIPS 3602 Feet

By: hfarris

J:\Data\COA\1019-203 San Sewer MP\GIS\Maps\Figure7-1_Proposed_CIP_Projects.mxd

CITY OF ASHLAND

1 inch = 1,000 feet

0 500 1,000 2,000 Feet

Plot Date: 3/24/2022

RH2

NORTH

8 | FINANCIAL ANALYSIS

INTRODUCTION

The capital improvement plan (CIP) identifies approximately $12.74 million in necessary sanitary sewer collection improvements over the next 20 years. The costs are inflated in this chapter to reflect estimated costs at time of construction. The total inflated costs are approximately $26.35 million. Total costs in current (2022) dollars and inflated dollars are shown in **Table 8-1**.

Table 8-1

Summary of Sanitary Sewer Capital Costs

Improvement Project	Years 0-5	Years 6-10	Years 11-20	Estimated Total Cost
Estimates in Current Dollars				
I&I Evaluation Projects	$359,000	$118,000	$523,000	$1,000,000
I&I Reduction and Gravity Collection Projects	$2,600,000	$1,416,000	$3,933,000	$7,949,000
Lift Station Projects	$0	$1,400,000	$1,790,000	$3,190,000
CSSCSMP Update	$0	$0	$600,000	$600,000
Total Projects Current Dollars	**$2,959,000**	**$2,934,000**	**$6,846,000**	**$12,739,000**
Estimates in Future Inflated Dollars				
I&I Evaluation Projects	$459,000	$243,000	$1,279,000	$1,981,000
I&I Reduction and Gravity Collection Projects	$3,683,000	$2,748,000	$9,621,000	$16,052,000
Lift Station Projects	$0	$2,471,000	$4,379,000	$6,850,000
CSSCSMP Update	$0	$0	$1,468,000	$1,468,000
Total Projects Inflated Dollars	**$4,142,000**	**$5,462,000**	**$16,747,000**	**$26,351,000**

Source: RH2 Engineering and HEC, March 2022.

Note: Totals may not add exactly due to rounding.

This chapter presents a financial plan to support completion of the collection system CIP for the next 20 years, as well as City-identified CIP needs to treat and dispose of wastewater projected through the fiscal year ending 2027. Included in the CIP are infrastructure projects that will benefit both existing and future City sewer customers; as such, the financial plan addresses impacts to the City's wastewater System Development Charges (SDCs), and impacts on sewer rates paid by existing customers. The chapter begins with a review of potential funding mechanisms to finance the CIP and recommendations.

POTENTIAL FUNDING MECHANISMS

The City is eligible to apply for financial assistance from several State of Oregon and federal low-cost funding programs. Given the different criteria for best available funding by agency, it can be beneficial to attend a "one-stop" meeting with the funding agencies. Every month the funding agencies meet to discuss applications for funding; the best terms may be made by combining offers from more than one agency. The most applicable State funding programs for the City's sewer CIP include the following:

Clean Water State Revolving Loan Fund (CWSRF). The CWSRF program is part of a national funding program spearheaded by the U.S. Environmental Protection Agency (EPA). Each year funds are disbursed to each state and states must capitalize the grants with additional funding, typically through the sales of state general obligation (GO) bonds. Loan repayments also add to the pool of available funding. The program is managed by the Department of Environmental Quality (DEQ) in Oregon. Typical loan terms are 30 years with interest rates as low as 60% of market rates. The most favorable financing terms, and sometimes partial grant funding or principal forgiveness, are available to distressed communities and places with declining populations. Distressed communities are defined by Oregon Administrative Rule 123-0024-0031 based on a prescribed formula that accounts for the unemployment rate, per capita personal income, worker payroll, and change in employment data.

Ineligible projects include projects primarily to serve future population growth. Sewer systems may submit a letter of interest any time online to begin the loan process.

Water/Wastewater Financing Program. This funding program is managed by the Oregon Infrastructure Finance Authority (IFA). The program provides up to $10 million per project through a combination of direct and/or bond funded loans. The maximum loan term is 30 years or the useful life of project assets, whichever is less. The program provides grant awards up to $750,000 based on financial review. An applicant is not eligible for grant funds if their annual median household income is greater than or equal to 100 percent of the State's median household income for the same year.

Oregon Community Development Block Grant (CDBG). Another program administered by the State but funded federally is the Community Development Block Grant program. The US Department of Housing and Urban Development provides funding for a variety of economic development related projects targeted at residential communities of low to moderate income. This is a grant only program and it is competitive; sewer infrastructure projects compete with other infrastructure projects (e.g., roads, bridges, etc.) for funding. The maximum grant amount is $3 million. The program is managed by the Oregon Business Development Commission (OBDC) and the grants are managed by the IFA.

Other Federal funding programs also may be suitable to fund sewer infrastructure in the City; for example, the U.S. Economic Development Administration has public works grants available; however, matching funds are required. The Water Infrastructure Finance and Innovation Act of 2014 (WIFIA) also supports wastewater projects; however, it will only support up to 49% of total project costs. WIFIA supports larger projects; a project must be at least $5 million for a city with a population less than 25,000. Funding possibilities for projects can be researched at grants.gov.

Municipal Bonds. In addition to the State and Federal financing programs discussed previously, the City can issue bonds to finance projects that cannot be funded with available sewer rates, SDCs, and sewer fund cash reserves, provided there is sufficient cash flow to repay the bonds. Usually, cities finance sewer utilities improvements with the sale of GO bonds or revenue bonds. The primary difference between these two types of bonds is that GO bonds are backed by the full faith and credit of the city, meaning any discretionary revenues can be used to service debt, whereas revenue bonds are repayable solely by the sewer enterprise fund. There are advantages and disadvantages to each type of bond; of note, revenue bonds do not require voter approval (GO bonds do). Another financing vehicle often used is formation of a local improvement district (LID). A LID only provides funding for a project of benefit to a specific geographic area; the beneficiaries of the improvements pay assessments to either cash fund or make debt service payments for the infrastructure improvements.

CIP Funding Plan Recommendations

The financing plan that is recommended and presented in this chapter is based on the assumed need to complete all of the facilities in the CIP in the next 20 years, and uses cash (pay as you go) for the Comprehensive Sanitary Sewer Collection System Master Plan (CSSCSMP) projects. The City can sell either GO bonds or revenue bonds to fund the majority of improvements at the wastewater treatment plant that are not already being financed with a DEQ loan.

In the event that costs escalate greater than presented in this chapter, or an economic crisis takes hold that reduces the revenue stream from customer payments, the City will have to delay construction of projects.

SYSTEM DEVELOPMENT CHARGES

One-time fees are collected from new development to mitigate capital costs associated with improving the sewer system to accommodate greater sewer generation. The City's authority to charge wastewater SDCs is codified in Oregon Revised Statutes 223.297 – 223.314. The City uses the full extent of the law to collect two fee components in the wastewater SDCs. These include:

1. **Reimbursement Fee**. This fee component reimburses existing customers for providing up-front funding of facilities that will benefit future customers; and
2. **Improvement Fee**. Costs to improve the sewer system to serve future customers are captured in this fee component. The costs of compliance activities are also captured in this fee component. Examples of compliance costs include master plan updates and rate and fee studies to support capital expenditures.

Growth

The CSSCSMP primarily addresses service to existing customers; however, the recommended improvements will also maintain and provide capacity to collect wastewater from new growth. Total growth assumed for purposes of the financial plan is water demand from the 2019 *Water Master Plan* less the estimated irrigation demand (approximately 19% of total City water demand). The CSSCSMP estimates that average dry weather effluent flow will increase 6% from 1.9 million gallons per day (MGD) to 2.0 MGD over the next 20 years. The growth estimate is shown in **Table 8-2**.

Table 8-2

Projected Growth in Average Dry Weather Flow

Condition	Average Dry Weather Flow (MGD)
Existing	1.900
Projected 2042	2.012
Change	**0.112**
Increase	**5.9%**
Share of Flow in 2042	
Existing Customers	94.4%
New Customers	5.6%

Costs allocated to existing customers should be recovered through monthly sewer charges. Costs allocated to future customers should be recovered through wastewater SDCs. The total costs allocated to future (new) customers is shown in **Table 8-3**. The allocated cost of $709,000 should be included in the City's next update of the wastewater SDC. Note that current costs (rather than inflated costs) are used in SDC calculations since the City updates its SDCs each year using the change in the Engineering News Record Construction Index for Seattle, Washington.

The estimated costs of $12.74 million in today's dollars are detailed in **Appendix E**, **Table E-1**, and the inflated estimated costs of $26.35 million in future dollars are detailed in **Appendix E**, **Table E-2**.

Table 8-3

Allocation of CSSCSMP Costs

Improvement Project		Current Dollars	Inflated Dollars
I&I Evaluation Projects		$1,000,000	$1,982,000
I&I Reduction and Gravity Collection Projects		$7,949,000	$16,052,000
Lift Station Projects		$3,190,000	$6,850,000
CSSCSMP Update		$600,000	$1,468,000
Total Projects		**$12,739,000**	**$26,352,000**
Cost Responsibility			
Existing Customers	94%	$12,030,000	$24,885,000
New Growth	6%	$709,000	$1,467,000
Total		**$12,739,000**	**$26,352,000**

Source: RH2 Engineering and HEC, March 2022.

Note: Totals may not add exactly due to rounding.

Wastewater SDC Recommendations

It is recommended that the City:

1. Update the wastewater SDC as soon as possible to reflect the current value of assets of the system for the reimbursement fee and the anticipated new facilities costs for the improvement fee. The current SDC is most likely under collecting as it has not been updated (aside from annual inflation adjustments) for many years;
2. Continue to update the wastewater SDC whenever estimated costs are revised pursuant to an update of the City's CSSCSMP, or whenever there are land use changes that would affect projected growth in the City; and
3. Continue to update the wastewater SDC each year using the change in the Engineering News Record Construction Cost Index for Seattle, Washington.

SEWER RATES

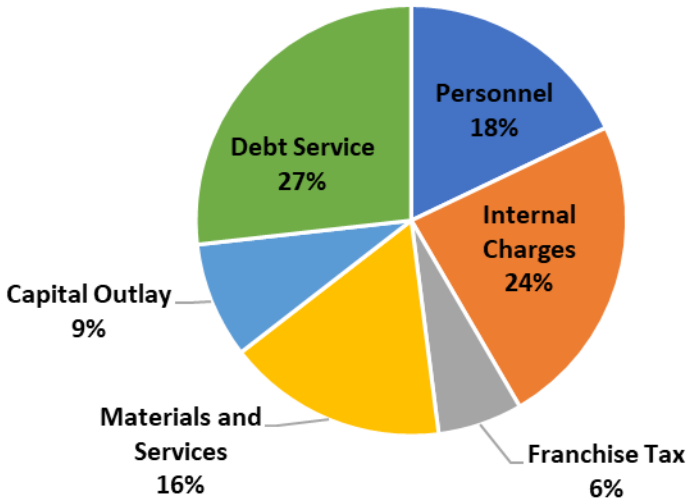
Monthly sewer fees paid by existing customers are called sewer rates. Sewer rates are paid monthly by more than 8,000 customers, of which more than 82% are single-family residential customers. Other customers include multi-family residential, senior housing, churches, schools, lodging establishments, industrial, commercial, and educational/government customers.

Sewer rates pay for the annual revenue requirement of the wastewater enterprise which includes typical operating costs (e.g., personnel, utilities, materials, and services) and debt service, as well as capital costs in the CIP that benefit existing customers. The revenue requirement for the next 5 bienniums is projected using historical wastewater fund financial information and the current biennium budget.

Chart 8-1 shows the historical City wastewater enterprise fund expenses components. The largest cost components of the wastewater system are debt service, internal charges, and personnel.

Chart 8-1

Wastewater Enterprise Fund Annual Expenses



Revenue Requirement

The revenue requirement was projected for the next 10 years (5 biennium budget cycles) to account for anticipated CIP expenditures and increased annual operating costs using the 2023 biennium budget as the base year. A summary of the past 6 years of revenues and expenditures, and the budget for fiscal year 2022, is provided in **Table 8-4**.

Historically, revenues have covered expenses of the wastewater fund and a prudent fund balance has been maintained. **Appendix E**, **Tables E-3** and **E-4** provide detailed historical revenue and expense information.

Table 8-4

Historical and Budgeted Wastewater Fund Revenues and Expenses

	2016	2017	2018	2019	2020	2021	2022 Budget
Revenues	$7,550,857	$7,702,614	$8,032,524	$8,725,663	$8,232,695	$6,807,174	$10,839,450
Expenses	$6,146,760	$6,359,835	$8,237,895	$7,535,821	$6,973,564	$9,323,312	$12,506,815
Net Revenues	**$1,404,097**	**$1,342,779**	**($205,371)**	**$1,189,842**	**$1,259,131**	**($2,516,138)**	**($1,667,365)**
Year-End Fund Balance	**$5,590,371**	**$6,799,197**	**$6,421,847**	**$7,716,925**	**$9,022,223**	**$6,199,485**	**$4,532,120**

Operating Costs. Staffing costs are projected to increase annually 5.5%, and materials and supplies 3.0% per year. Franchise tax, which is based on wastewater revenues, is projected to increase 6.0% per year, and internal charges 1.5% per year. Historical average annual increases, which the projections are based on, are shown in **Appendix E**, **Table E-5**.

Debt Service. The City currently has a small amount of debt service for previously sold GO bonds benefiting the wastewater system. In addition, the City has two loans with DEQ that are being drawn upon to pay for riparian restoration and the wastewater treatment plant outfall relocation. The financing strategy presented in this chapter includes additional new debt to complete several other improvements at the wastewater treatment plant. Estimated new debt and annual debt service associated with financing these improvements is shown in **Table 8-5**. Tables showing current GO bond debt and estimated DEQ debt service are provided in **Appendix E**, **Tables E-6** and **E-7**.

Capital Projects and System Rehabilitation. Wastewater treatment plant capital project costs are to be paid for with the rates shown in **Appendix E, Table E-8**. Note that the outfall relocation project costs have not been inflated in the table but they are expected to increase. The City is currently working with DEQ to amend their financing agreement to cover the full cost of the project.

System rehabilitation costs are included in the estimate of CSSCSMP costs. The amount included for system rehabilitation in the rates is about 6% of annual replacement costs. System rehabilitation costs are shown in **Appendix E**, **Table E-9**.

Table 8-5

Estimated New Wastewater Fund Debt

Item		Series A	Series B
Bond-Funded Improvements			
WWTP Process Improvements (Miscellaneous)		$556,550	$682,765
WWTP Process Improvements (Headworks)		$4,466,524	$0
WWTP Process Improvements (Harmonics)		$137,984	$0
Secondary Clarifier 2 Improvements		$1,029,659	$0
Membrane Replacement (two trains)		$0	$1,655,225
Biosolids Treatment Improvements		$0	$355,693
Total Construction Proceeds		**$6,190,717**	**$2,693,683**
Bond Sizing			
Capitalized Interest	*6 months*	$170,240	$74,080
Issuance Costs	*3%*	$185,720	$80,810
Underwriter's Discount	*1%*	$61,910	$26,940
Bond Reserve Fund	*1 year debt service*	$604,000	$262,840
Estimated Bond Size		$7,212,590	$3,138,350
Bond Size Adjusted for Rounding	*1.166 bond load*	**$7,218,000**	**$3,141,000**
Estimated Annual Debt Service [1]		**$604,000**	**$262,840**

Source: HEC estimates based on planned CIP.

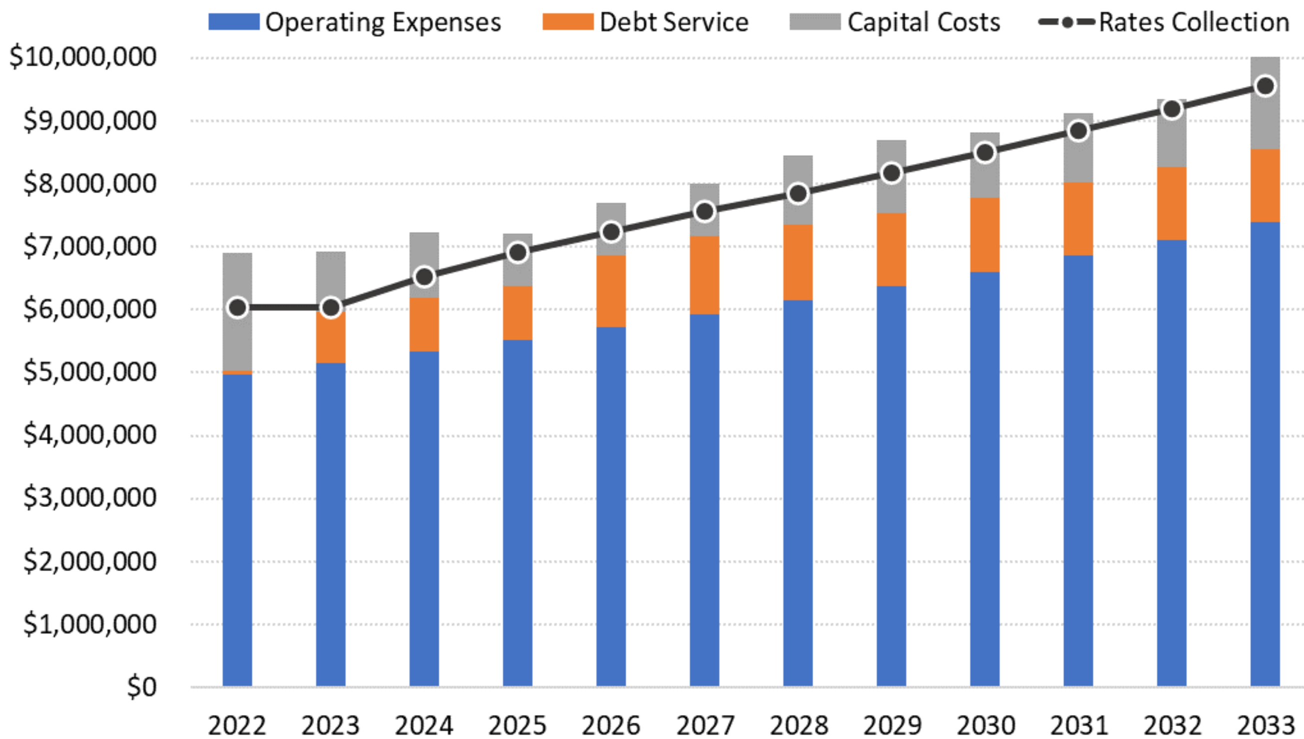
[1] Debt service estimate based on sale of revenue bonds with the following terms:
interest rate: 5.5%
years: 20

The projected revenue requirement is presented in **Appendix E**, **Table E-10. Chart 8-2** illustrates the revenue requirement and amount that is estimated would be collected in sewer rates over the next 10 years if rates are increased each year as shown below.

	Fiscal Year Ending										
	2023	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**	**2033**
	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11
Rates Increase	*0.00%*	*8.00%*	*6.00%*	*4.50%*	*4.50%*	*4.00%*	*4.00%*	*4.00%*	*4.00%*	*4.00%*	*4.00%*

Chart 8-2

Projected Revenue Requirement

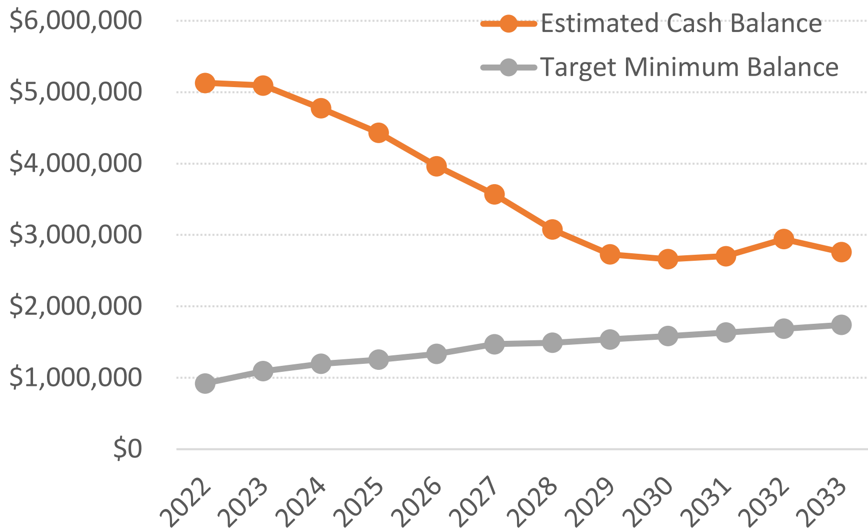


The total amount collected in rates may be greater or less than the projected revenue requirement for any year; reserves will be used in years that revenue collection is less than actual expenses. In years of excess collection, cash may be held in reserve for a future year with less revenues than expenses.

Chart 8-3 shows the projected cash balance of the wastewater fund with increases in rates shown previously, ensuring that a minimum cash balance of 15% of revenues plus debt service (excludes GO debt) is maintained. Support tables showing detail of the projected cash balance of the wastewater fund are provided in **Appendix E**, **Table E-11**.

Chart 8-3

Projected Wastewater Fund Cash Balance



The calculated sewer rates are presented in **Table 8-6** for the next three bienniums.

Table 8-6

Calculated Sewer Rates

Customer Type	Current Rate	Projected Rates						
		1-Jul-22	1-Jul-23	1-Jul-24	1-Jul-25	1-Jul-26	1-Jul-27	1-Jul-28
			Biennium 1		Biennium 2		Biennium 3	
Residential		**0.00%**	**8.00%**	**6.00%**	**4.50%**	**4.50%**	**4.00%**	**4.00%**
Monthly Service Charge, per unit	$33.94	$33.94	$36.66	$38.85	$40.60	$42.43	$44.13	$45.89
Quantity Charge, per cf	$0.05064	$0.05064	$0.05469	$0.05797	$0.06058	$0.06331	$0.06584	$0.06847
Commercial, Industrial, Governmental								
Monthly Service Charge	$35.41	$35.41	$38.24	$40.54	$42.36	$44.27	$46.04	$47.88
Quantity Charge, per cf	$0.05621	$0.05621	$0.06071	$0.06435	$0.06724	$0.07027	$0.07308	$0.07601
Greenhouses, Churches, Schools (K-12) operating 9 months/yr								
Monthly Service Charge	$35.41	$35.41	$38.24	$40.54	$42.36	$44.27	$46.04	$47.88
Quantity Charge, per cf	$0.05621	$0.05621	$0.06071	$0.06435	$0.06724	$0.07027	$0.07308	$0.07601
Bed & Breakfasts & Ashland Parks Bathrooms								
Monthly Service Charge	$35.41	$35.41	$38.24	$40.54	$42.36	$44.27	$46.04	$47.88
Quantity Charge, per cf	$0.05621	$0.05621	$0.06071	$0.06435	$0.06724	$0.07027	$0.07308	$0.07601

Source: City of Ashland and HEC 2021 rates analysis.

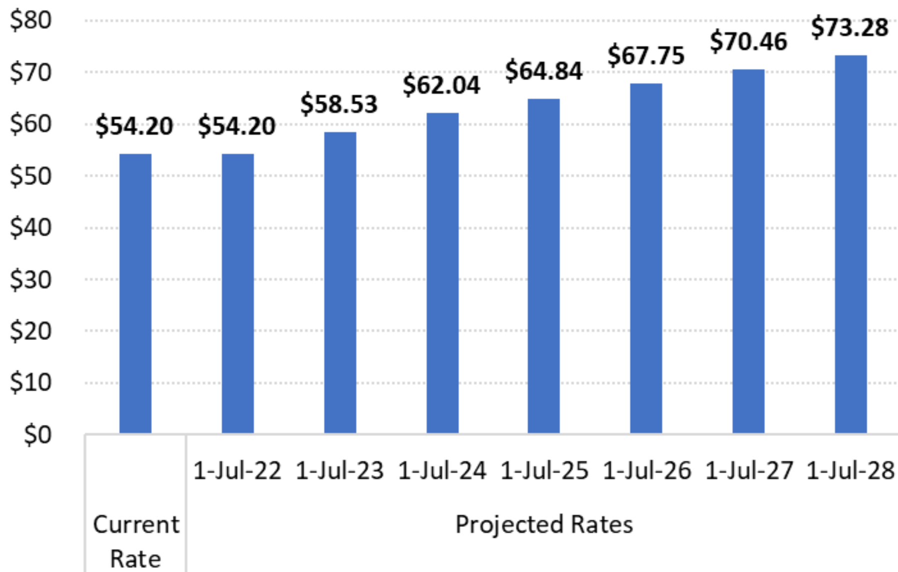
[1] avg. winter water use >400 cf.

Bill Impacts

Chart 8-4 shows the wastewater bill for a typical single-family home using 400 cubic feet of water per month during the winter months. The total sewer bill for a typical residential customer would increase from $54.20 to $73.28 over the next 7 fiscal years.

Chart 8-4

Single-Family Home Bill Impact



A general rule of thumb is that sewer bills should not exceed 2.0% of median household income. Using the US Census Bureau's most recent data, the City's sewer bill for a typical home is 1.1% of median household income, as shown in **Table 8-7**. Even if the median household income were not to increase over the next 2 years, the sewer bill would remain within affordability guidelines with the first calculated 8% rate increase in fiscal year 2024 (effective July 1, 2023).

Table 8-7

Sewer Bill Affordability

Item	Current	FY2024
Affordability Rate		
Monthly Bill	**$54.20**	**$58.53**
Median Household Income (one month)	$4,863.67	$4,863.67
Bill as Percentage of MHI	**1.11%**	**1.20%**

Source: 2020 American Community Survey, US Census Bureau.

Sewer Rates Recommendations

It is recommended that the City:

1. Aggressively pursue available principal forgiveness, grants, and no or low interest loans through the CWSRF program administered by DEQ for wastewater treatment plant improvements to minimize rate impacts on existing customers;
2. Plan for rate increases in the next biennium budget, starting with fiscal year 2023/24, which would be implemented July 1, 2023. Review available cash and fund expense projections at least every other year in concert with the biennium budget process, and seek City Council policy direction on rate setting (ceilings for increases or CIP expenditures for example, and low-income households and seniors financial assistance); and
3. Continue to include maintenance of a prudent reserve in the wastewater rates.