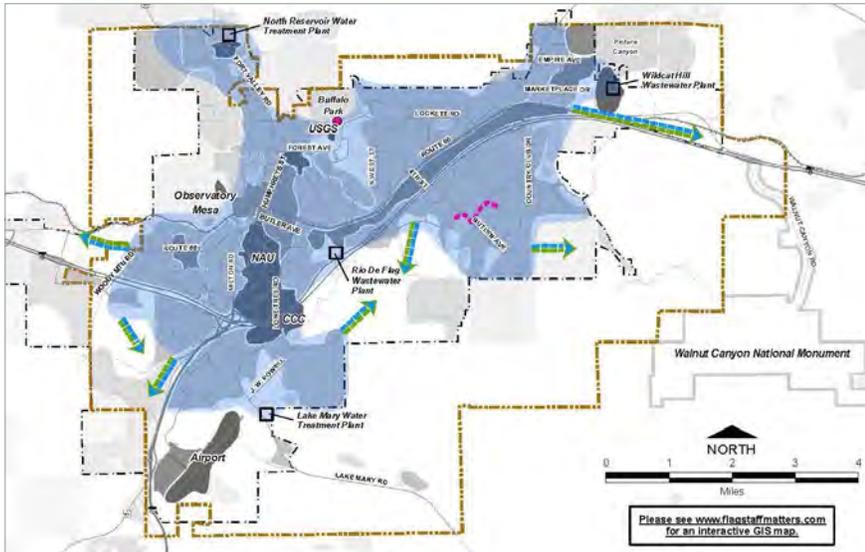




Executive Summary

City of Flagstaff Sewer Master Plan



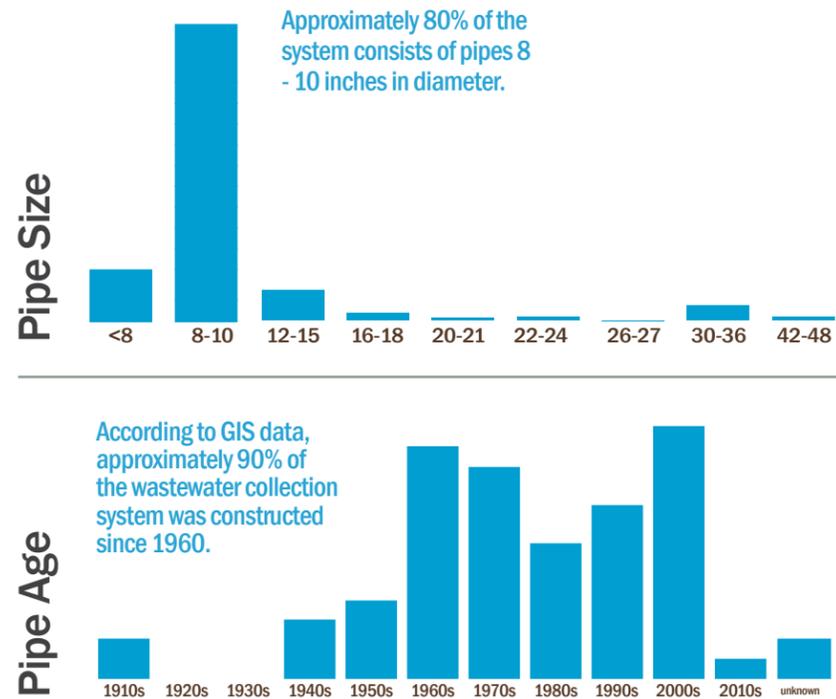
The City of Flagstaff Utilities Division owns and operates water and wastewater systems that serve primarily the Flagstaff regional planning area. The systems include water supply, treatment, storage, and distribution; and wastewater collection, treatment, and reclaimed water storage and distribution. The Utilities Division's overall mission statement is **"To professionally and cost effectively provide water, wastewater and stormwater services that meet the present and future environmental, health, and safety needs of the community."** To support their mission, the Division is developing a Utilities Integrated Master Plan (UIMP). The purpose of the overall UIMP is to provide the City's Utilities Division guidance for long-term planning, quantify the needs of water resources, and determine the necessary water, wastewater, and reclaimed water infrastructure needed over time. The Flagstaff Sewer Master Plan addresses the wastewater collection system component of the UIMP. It documents the existing status of the collection system, and outlines a capital improvement plan to improve the reliability of the system and to provide adequate capacity for the next 10 years.

Utilities Integrated Master Plan

The City's UIMP is composed of five primary chapters. The first chapter, originally developed in 2011, provides a summary and discussion of water resources and water production in Flagstaff. Chapters 2 through 4 describe the existing water, wastewater, and reclaimed water infrastructure systems. The basis for the analyses and recommendations within the UIMP are founded in the previous (2001) and recently updated (2014) voter approved Regional Plan, and developments already approved by City Council. Actual water use, as documented in the City's utility billing system and as geo-coded in the City's Geographical Information System (GIS) system, were used to support and calibrate the utility system's analyses.

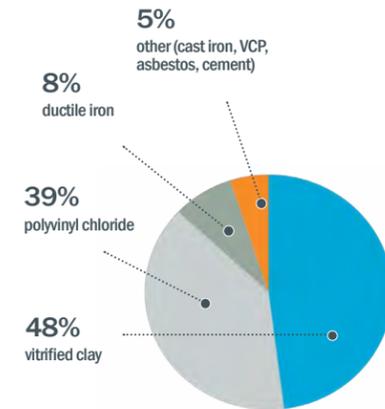
Flagstaff Regional Plan

As previously noted, one of the foundation documents for the UIMP is the Flagstaff Regional Plan. The recently updated Regional Plan (2030) is intended to guide land use decisions in the City of Flagstaff and surrounding areas within the Flagstaff Municipal Planning Organization planning boundary. The Regional Plan provides overall framework for development of the UIMP and it provides detailed planning area information that is used in the UIMP. Included as part of the Regional Plan is the Land Use Plan which provides detailed planning area information for the UIMP. The land use plan serves as the basis for developing water demand and wastewater flow projections and the hydraulic models for the respective utility systems.



Pipe Material

The most widely represented pipe materials are polyvinyl chloride (PVC) and vitrified clay. Most new construction has used PVC pipe as the material of choice.



Wastewater Collection System

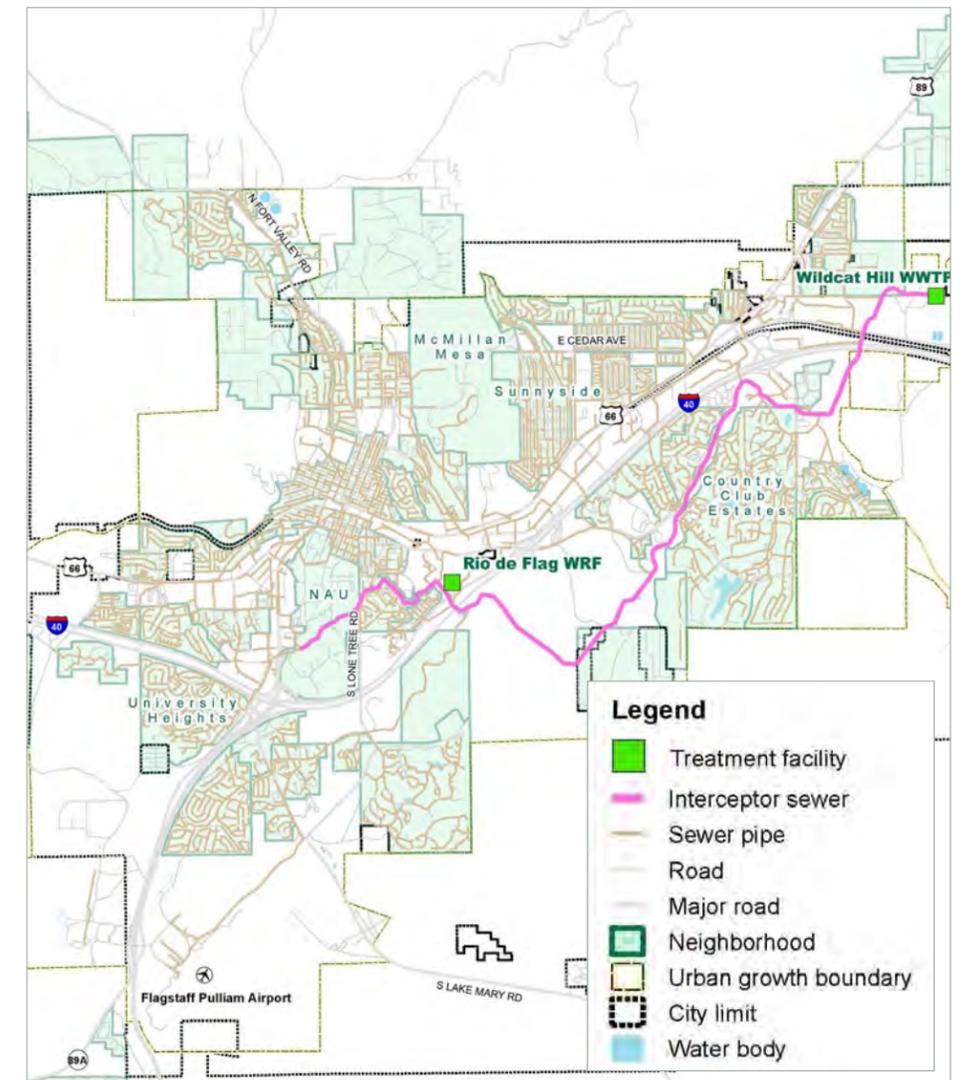
As documented in the City's GIS database, the wastewater collection system includes approximately 277 miles of sanitary sewers and over 7,400 manholes. The City does not own or maintain force mains or lift stations. The number of service connections or laterals is estimated to be nearly 18,500 with approximately 90 percent residential connections and the remaining 10 percent commercial, industrial, manufacturing, and Northern Arizona University (NAU) connections.

Existing System Scenario

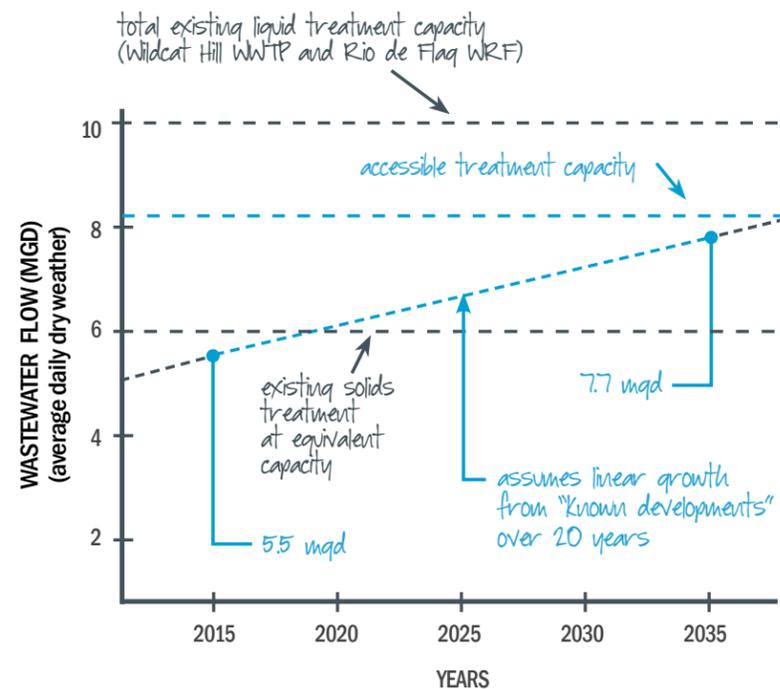
The existing conditions modeling scenario represents the existing collection system under current flow conditions. This modeling scenario identifies the hydraulic deficiencies that are currently within the system. Based on discussions with City staff, the model predictions generally support their observations. In general, this modeling scenario provides an initial priority ranking of required sewer improvements (or infiltration/inflow reduction) since sewers that are currently undersized should be up-sized prior to addressing problems associated with future flows. In addition to 53,000 feet of sewers to be replaced under the Annual Replacement Program, the Master Plan identifies 36,000 feet of sewers to be replaced to relieve current and projected surcharge conditions.

Collection System Hydraulic Model

Hydraulic modeling of the City's trunk sewer system was performed to identify hydraulic capacity deficiencies in the existing wastewater sewer collection system for both existing and future planning scenarios. As part of the modeling effort, a hydrologic/hydraulic model was constructed. Seven flow monitoring stations were used to gather dry and wet weather flows from major sewer collection areas. This data was used to calibrate the hydraulic model.



Wastewater Treatment System



Existing Plants

The two existing plants treat all wastewater collected in the sewer service area. The Wildcat Hill WWTP has a capacity of 6 mgd (average dry weather flow) and the Rio de Flag WRF has a capacity of 4 mgd. Much of the treated water is recycled for irrigation and reuse at Snowbowl Ski Resort while the remainder is discharged to the Rio de Flag WRF. The residual solids from Rio de Flag WRF are returned to the sewer to be processed at Wildcat Hill WWTP. All solids processing and disposal activities are conducted at the Wildcat Hill WWTP.

Future Needs

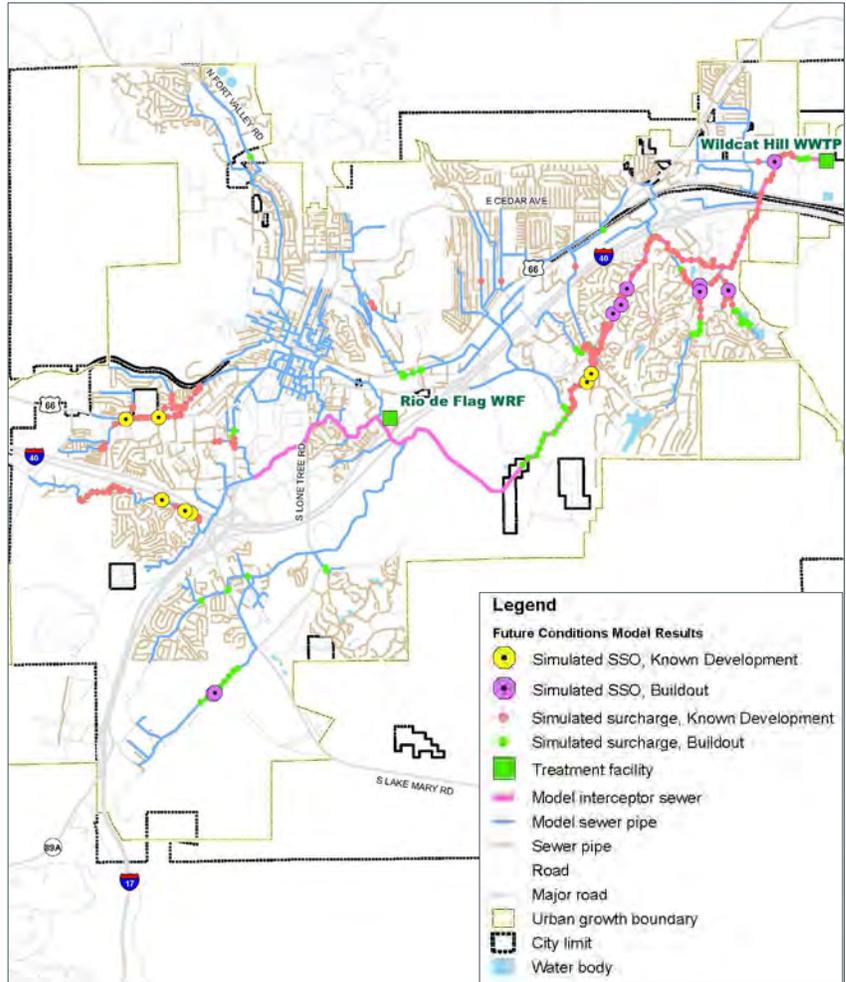
The total, existing liquid treatment capacity is sufficient for the flow increases estimated through the planning horizon. However, the full 4mgd capacity at Rio de Flag WRF may not be useable with existing infrastructure due to limited wastewater flow upstream of the WRF. Solids processing and disposal strategies will need to be addressed in the near future. The plan recommends a solids handling master plan be completed to identify optimal solutions for the City.

Wastewater System Capital Improvements

The recommended Capital Improvement Plan (CIP) for the City wastewater collection system addresses existing and predicted future deficiencies in the system and provides guidance for expanding the system to meet the City's future growth needs. Capital improvements have been developed based on the Known Development future conditions planning scenario. These include sewer replacements that will be required to convey future flows and service new areas brought into the City's collection system.

Future System Scenario

Surcharged gravity sewers for the Known Development future conditions planning scenario are shown in the map to the right. Sewers that must be up-sized to prevent excessive surcharging that could lead to basement backups and/or sanitary sewer overflows (SSOs) are also shown in the map. The detailed results for modeled sewers with surcharge or SSOs are shown in Appendix D for the future conditions planning scenarios. Known Development future conditions planning results should be consulted for selecting pipe sizes rather than the results of the existing conditions or build-out modeling.



Detailed Summary Sheets

Appendix F in the Master Plan document includes detailed summary sheets for each of the recommended CIP projects. Funding for each future CIP project is identified by O&M/Rates or Growth/Capacity.

Project Number: Collections 7

Planning Period: Priority __

Description: South Milton Road Sewer (at West University Avenue)

Justification: Replace 8&10-inch sewer with 10&12-inch diameter sewer. Serve in-fill development. Serve new development. Undersized

Conceptual Cost:

Project Number:	Collections 7
Construction Cost:	
Project Cost:	\$1,700,000

Facility Design:

Project Number:	
Type:	
Quantity:	

Funding Categories:

Service Area

Sewer Collections Capital Improvement Program Project Details											
Funding (%)	Growth/ Capacity	O&M/ Rates	Project Description	City CIP Number	Justification/Trigger	Quantity or Diameter (in) Length (ft)	Total Project Cost	Priority	Ranking Council Goals	Criticality	O&M
0	100		Annual Sewer Replacement Program (One Mile) - Various Sewer Main - Various streets (to be prioritized based on system benchmarking)		Aging Infrastructure, Condition, High Maintenance, Serve In-Fill Development, Council priority	8-15 5280/yr (10 yrs)	\$14,000,000	1			
40	60		Flagstaff Interceptor (Country Club to Wildcat Hill WWTP)		Aging Infrastructure, Condition, High Maintenance, Serve In-Fill Development, Council priority	42 10,180	\$5,990,000	2			
0	100		Aging Mainline Rehabilitation and Replacement (to be prioritized with previous studies and system benchmarking)		Aging Infrastructure, Condition Assessment, High Maintenance Costs	92 MI per year (10 yrs)	\$4,500,000	3			
100	0		West side Interceptor Improvements Replace 8" Bottleneck on Thompson Required to handle growth on west-side - WL Gate		Serve In-Fill Development, Serve New Development, Undersized	18 1,980	\$500,000	4			
80	20		East Industrial (near North Park Drive)		Serve In-Fill Development, Serve New Development, Undersized	18 1,154	\$290,000	5			

Summary Spreadsheets

The Master Plan includes recommended CIP projects.