

EXECUTIVE SUMMARY

ES.1 INTRODUCTION

The City of Grants Pass (City) owns and maintains a sanitary sewer system to convey wastewater from residential, commercial, and industrial areas for treatment at the Water Restoration Plant (WRP). The collection system has evolved over time through a series of upgrades and expansions. Currently the system consists of nearly 175 miles of conveyance pipes and five pump stations. The oldest pipes on record in the system date from 1920.

To manage collection system assets and plan for improvements needed to accommodate growth, the City updates its Wastewater Collection System Master Plan (CSMP) on a regular basis. This provides information that allows the City to achieve its strategic goal to "Maintain, Operate and Expand our Infrastructure to Meet Community Need" relative to the wastewater collection system.

This 2016 CSMP update proceeds from the last update, adopted in 2004. A number of the recommended collection system improvements from the 2004 CSMP have been implemented. Additionally, the City has expanded and adopted new Urban Growth Boundary (UGB) and Urban Reserve Area (URA) in 2014. This update takes the system in its current condition (2015) and projects requirements for the short-term planning year of 2025 and on through the long-term planning year of 2035. The CSMP update also evaluates build-out conditions of the wastewater system service area. The City intends to use this as a guide for operation, maintenance, and expansion of the sewer system through the planning period.

This 2016 update of the CSMP included the five primary work elements:

1. Basis of Planning.
2. Flow Projections.
3. Condition of Existing Assets.
4. Collection System Analysis.
5. Capital Project Development Plan.

Each of these work elements are summarized in this section, including a summary of the capital improvement plan.

ES.2 BASIS OF PLANNING

The City is located in the Rogue River Valley in the Klamath Mountain Range of Oregon. The City owns, maintains, and operates sanitary sewer pipelines and pump stations within their service area which includes areas inside the City's current Urban Growth Boundary (UGB) and

Redwood service area that is outside the UGB. The total service area encompasses approximately 8,522 acres with a population of 44,500¹. The City collects wastewater from residential, commercial, institutional, and industrial customers within this service area. Figure ES.1 illustrates the City's existing sewer service area, Urban Growth Boundary (UGB), Study Area, and Urban Reserves.

The Study Area comprises of the following collection systems:

- The City of Grants Pass sewer collection system which includes historic Fruitdale - Harbeck collection system and Redwood Sanitary Sewer Service District (RSSSD).
- Several expansion areas such as the area located North of Interstate 5 (I-5) and the Spalding area that were included as part of UGB expansion in 2014.

The total Study Area is approximately 9,892 acres (1,370 acres increase from existing service area). The CSMP Update team worked collaboratively with City's Wastewater Engineering and Planning Group to develop existing and future land use information. This information was used to project wastewater generation within the Study Area. Maps of the City's existing and future land use within the Study Area are presented in Chapter 1.

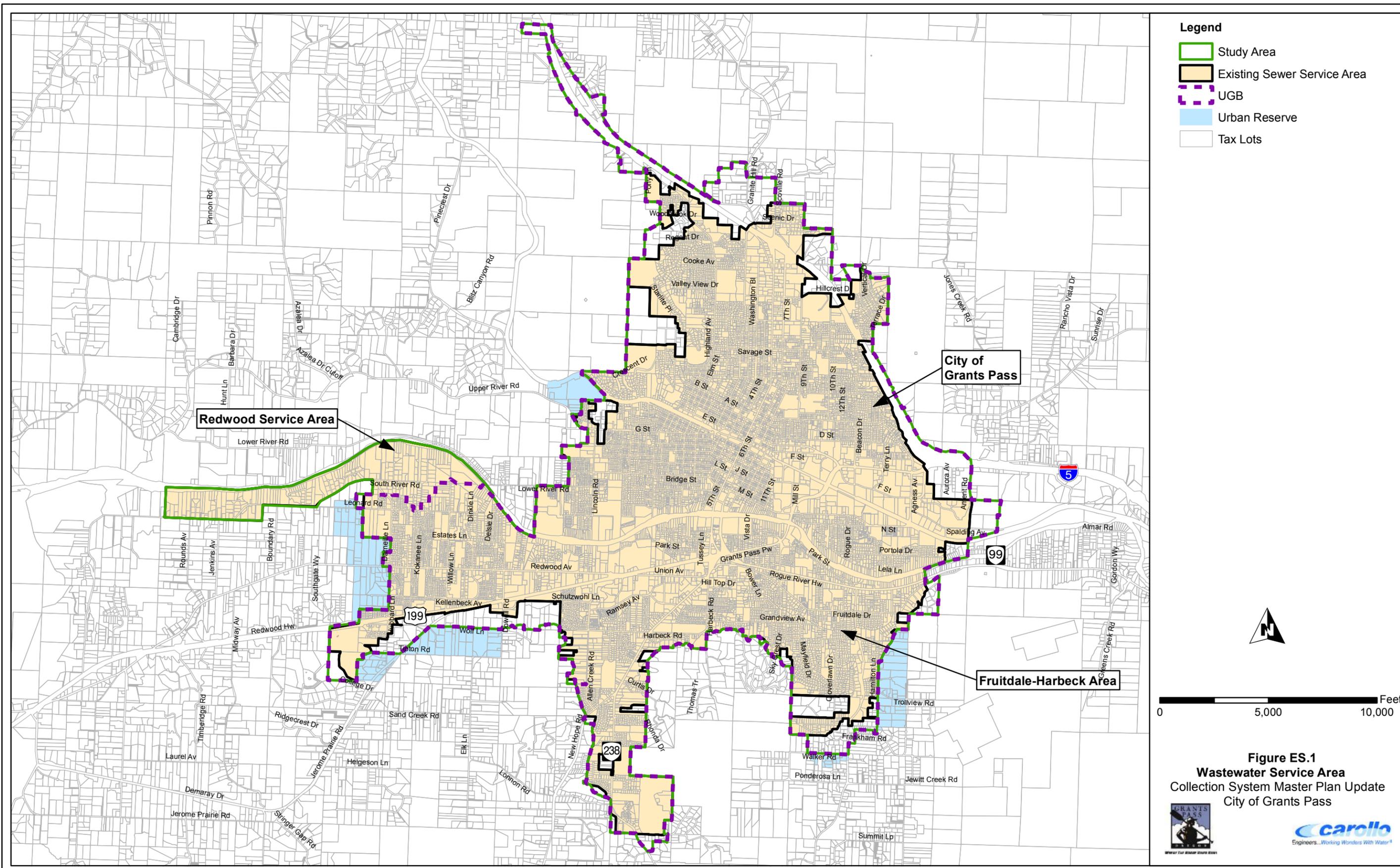
In addition to the land use, this CSMP also presents Policies and Criteria (Chapter 2) that guide the development and financing of the infrastructure required to provide wastewater service, and document the City's commitments to current wastewater system customers, as well as those considering service from the City. These policies and criteria align with City's current Municipal Code, Development Code, Comprehensive Community Development Plan, and Sanitary Sewer Standards and Specifications.

ES.3 FLOW PROJECTIONS

A flow monitoring program was performed by the City from October 2011 through the beginning of February 2012. Data from the flow monitoring program was used to characterize both dry weather and wet weather flows in the City's service area. Flow monitoring data was also used to calibrate the City's collection system hydraulic model and identify areas with high inflow and infiltration (I/I).

The purpose of the flow monitoring program is to determine average dry weather flow (ADWF), define the collection system's weekday and weekend diurnal flow patterns, and develop land use flow factors that facilitate the development of flow projections.

¹ Source: Population estimate for the existing service area (2015) from City of Grants Pass Water Restoration Plant Facilities Plan Update, 2014.



- Legend**
- Study Area
 - Existing Sewer Service Area
 - UGB
 - Urban Reserve
 - Tax Lots

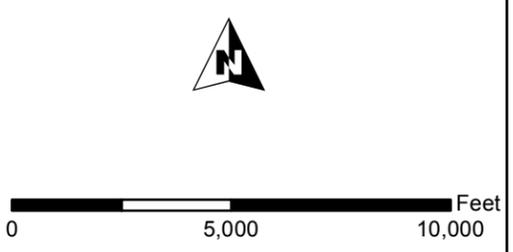


Figure ES.1
Wastewater Service Area
 Collection System Master Plan Update
 City of Grants Pass



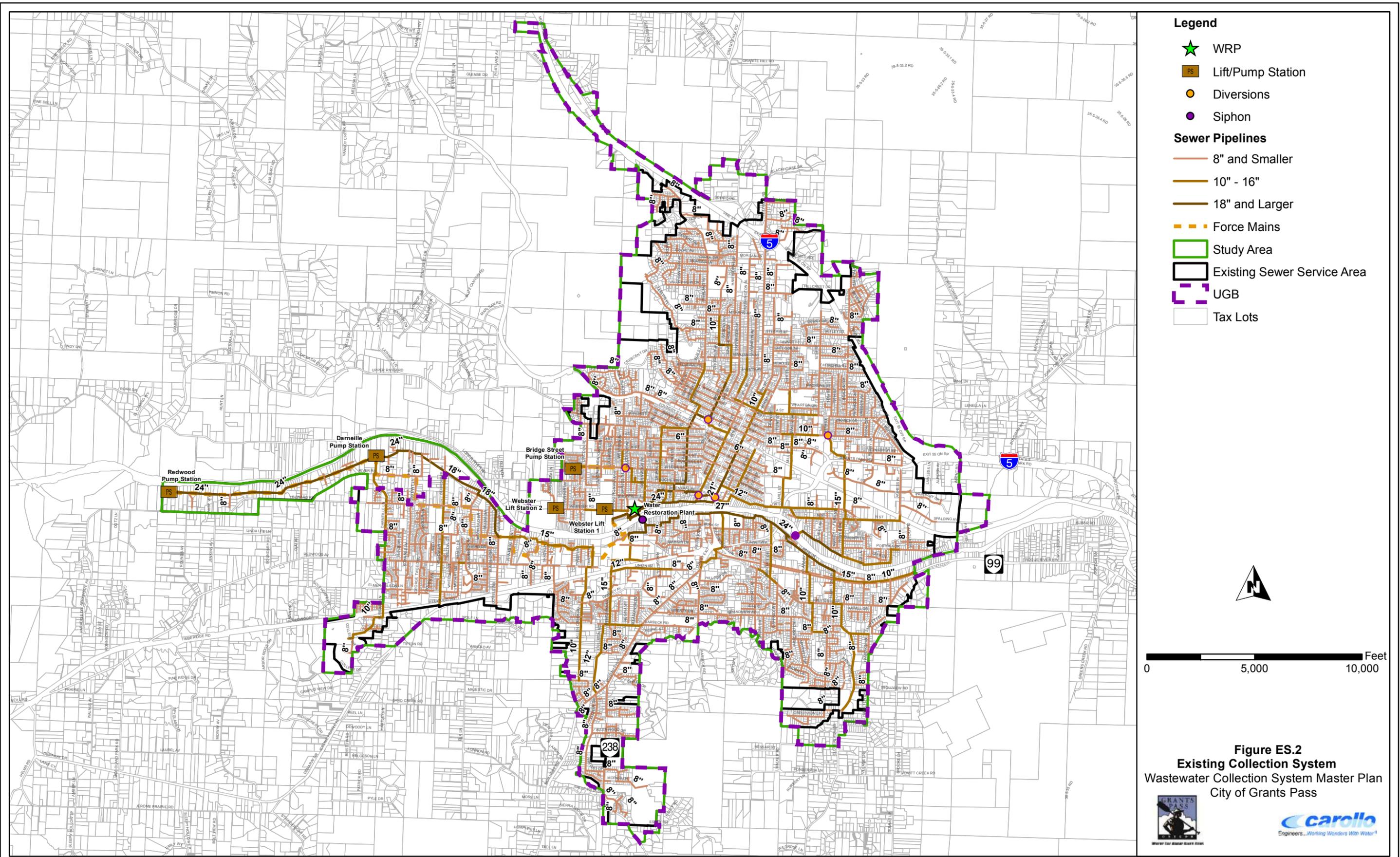
Peak hour flows were developed by using the City’s hydraulic model, which was calibrated against the flow metering data. Peak hour flows are used to evaluate the capacity of the current wastewater system for conveying existing and future flows, and thereby identify necessary capacity improvements. Peak hour flows for each basin were derived for a 5-year, 24-hour custom design storm based on historical storm events that have occurred in Grants Pass. Current peak hour flows into the WRP during the design storm amount to 27.2 mgd. Year 2035 PHF during the design storm are projected to be 37.6 mgd, as shown in Table ES.1.

Table ES.1 Existing and Projected Wastewater Flows to WRP Wastewater Collection System Master Plan City of Grants Pass			
Condition⁽³⁾	Average Dry Weather Flow (ADWF) (mgd)	Peak Wet Weather Flow (PWWF)⁽¹⁾ (mgd)	Peaking Factor (PWWF:ADWF)⁽²⁾
Existing - Year 2015	5.2	27.2	5.2
Short-Term - Year 2025	7.0	32.9	4.7
Long-Term - Year 2035	9.1	37.6	4.1
Notes:			
(1) The PWWF flow (design flow) is the peak hourly flow.			
(2) Peaking factor is the Peak Wet Weather Flow divided by the Average Dry Weather Flow.			
(3) These conditions represent the flows to the WRP with capacity deficiencies; PWWF truly represents the peak hour flow, without dampening due to upstream capacity deficiencies.			

ES.4 EXISTING SYSTEM AND CONDITION ASSESSMENT

Throughout the entire sewer system, the City maintains approximately 175 miles of gravity mains up to 48-inch in diameter, 6 miles of force mains, and 5 pump stations that collect and convey wastewater to the Water Restoration Plant (WRP) located at 1200 SW Greenwood Ave. The pump stations were originally constructed between 1967 and 2000. Firm pump station capacities range from 100 to 2,920 gallons per minute (gpm). Figure ES.2 presents the City's existing collection system.

A pipeline remaining useful life assessment was performed for the entire sewer system. In total, approximately 522,578 LF of pipes, or 54.5 percent of the existing collection pipes with known installation year are expected to reach the end of their useful life by 2035.



- Legend**
- ★ WRP
 - PS Lift/Pump Station
 - Diversions
 - Siphon
- Sewer Pipelines**
- 8" and Smaller
 - 10" - 16"
 - 18" and Larger
 - - - Force Mains
 - ▭ Study Area
 - ▭ Existing Sewer Service Area
 - ▭ UGB
 - ▭ Tax Lots

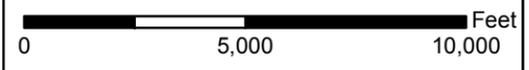


Figure ES.2
Existing Collection System
 Wastewater Collection System Master Plan
 City of Grants Pass



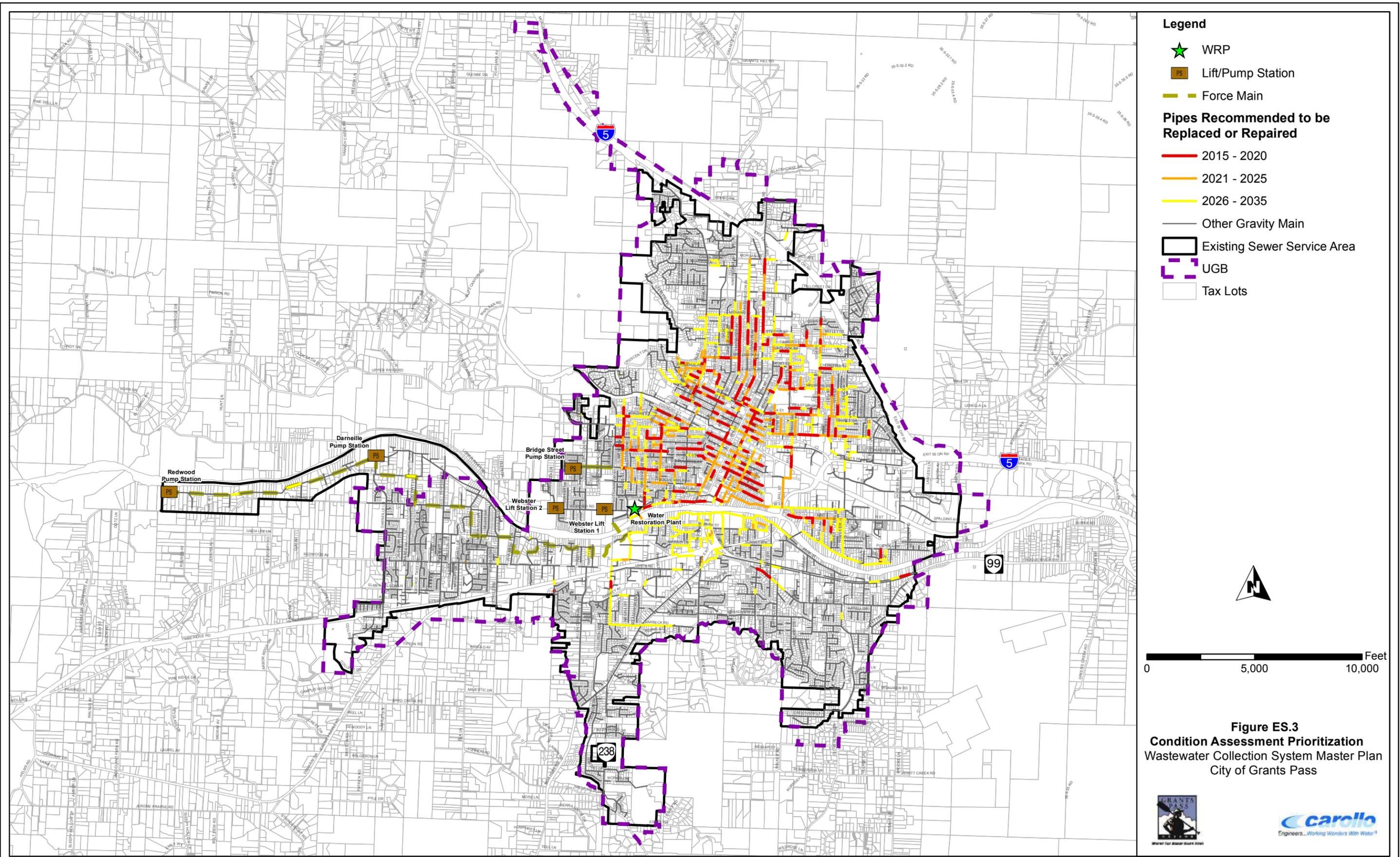
The City keeps track of maintenance and structural data using a GIS database. Data from 2010 through 2015 was evaluated to assess collection system condition. As part of the previous Master Plan, the City developed a customized scoring method using weighting factors to rank pipe defects and issues based on its magnitude. Both method and factors were updated to match the new data provided by the City. Data evaluated includes:

- 6-Month Cleaning.
- Rocks and Sand.
- Grease.
- Roots.
- Structural Holes.
- Structural Cracks.
- Corrosion.

Approximately 250,000 LF of collection system pipes will need to be replaced over the next 20 years; about 6.5 percent (%) of the collection system per year. Table ES.2 compares the linear feet of pipes reaching its RUL by planning period with the combined maintenance and structural score. Cells highlighted in red are recommended to be replaced in the next 5 years, the pipes in orange, between 2021 and 2025 and the pipes in yellow in the Long-Term planning period (after 2025). All pipes highlighted in either red, orange, or yellow on Figure ES.3 are included in the CIP under the repair and replacement program (Chapter 6 - CIP).

A summary of condition assessment rating for each pump station is presented in Table ES.3. Each pump station was assessed on six categories based on a rating scale of 1 to 5 (1 being poor condition/least favorable and 5 is most favorable). These were based on visual inspection of the facilities, input from the City, and existing pump station records.

Based on these assessments, Webster Lift Station No. 1 and Bridge Street Pump Station will be replaced and rehabilitated, respectively within the current 5-year Capital Improvement Plan (CIP). The Webster Lift Station No. 2 is recommended to be replaced in the short-term (before 2025). Darneille Pump Station alternative analysis is recommended to be completed within the current 5-year CIP. Further discussion on Darneille Pump Station recommendation is located in Chapter 5 - Capacity Analysis.



- Legend**
- WRP
 - Lift/Pump Station
 - Force Main
 - Pipes Recommended to be Replaced or Repaired**
 - 2015 - 2020
 - 2021 - 2025
 - 2026 - 2035
 - Other Gravity Main
 - Existing Sewer Service Area
 - UGB
 - Tax Lots

0 5,000 10,000 Feet

Figure ES.3
Condition Assessment Prioritization
 Wastewater Collection System Master Plan
 City of Grants Pass



Table ES.2 Weighting Factors for Condition Assessment Wastewater Collection System Master Plan City of Grants Pass											
Combined Maintenance and Structural Score											
RUL Score		0	1-5	6-10	11-15	16-20	21-25	26-30	31-35	36-40	Total (ft)
	Over 20 years of RUL	394,765	43,353	10,276	4,297	0	339	0	210	0	452,516
	Between 10 and 20 years of RUL	129,246	67,246	52,722	20,024	8,336	3,489	1,341	462	0	283,159
	Between 0 and 10 years of RUL	32,119	28,721	18,855	7,108	4,396	1,542	445	343	543	94,481
	0 years of RUL	28,674	32,909	24,124	21,892	14,938	10,344	7,007	1,215	1,477	142,590
	Total Length (ft)	584,804	172,228	105,976	53,321	27,671	15,714	8,793	2,230	2,020	972,745
	Percentage (%)	60.1%	17.7%	10.9%	5.5%	2.8%	1.6%	0.9%	0.2%	0.2%	100.0%
	Proposed Replacement Year										
	Proposed Replacement Year	Length (ft)	Percent System (%)								
	After 2035	722,267	74.3%								
	2026-2035	121,745	12.5%								
	2021-2025	64,141	6.6%								
	2015-2020	64,604	6.6%								
	Total (ft)	972,745	100.0%								

**Table ES.3 Pump Station Condition Assessment Summary
 Wastewater Collection System Master Plan
 City of Grants Pass**

Pump Station	Structural	Mechanical	Electrical	I&C	Site/ Civil	O&M	Rehab Anticipated During Planning Period?
Webster No. 1	1	1-2	1	1	2	1	Yes, under construction
Webster No. 2	1	1-2	1	1	3	1	Yes, before 2025
Bridge Street	4	2	4	4	5	3	Yes, Before 2020
Redwood	5	5	5	5	4	4	No
Darneille	1 (wet well) 2 (superstructure)	2-4	5	5	4	2	Yes, Before 2025

Rating Scale:
 (1) Poor condition.
 (2) Needs work.
 (3) Can live with it.
 (4) Performs well.
 (5) Want to see this at all our sites.

ES.5 HYDRAULIC MODEL DEVELOPMENT

The hydraulic model of the City's collection system uses Innowyze's H2OMapSWMM software package and includes pipelines 8-inches and larger plus force mains. The model was used to assess the conveyance capacity of the existing collection system and perform "what if" scenarios to assess the impacts of future developments and land use changes.

The model was calibrated against field measured data recorded during the City's flow monitoring program for both dry and wet weather conditions. The dry weather flow (DWF) calibration ensures an accurate depiction of base wastewater flow generated within the study area and the wet weather flow (WWF) calibration consists of calibrating the hydraulic model to a specific storm event or events to simulate the peak and volume of infiltration/inflow (I/I) into the sewer system.

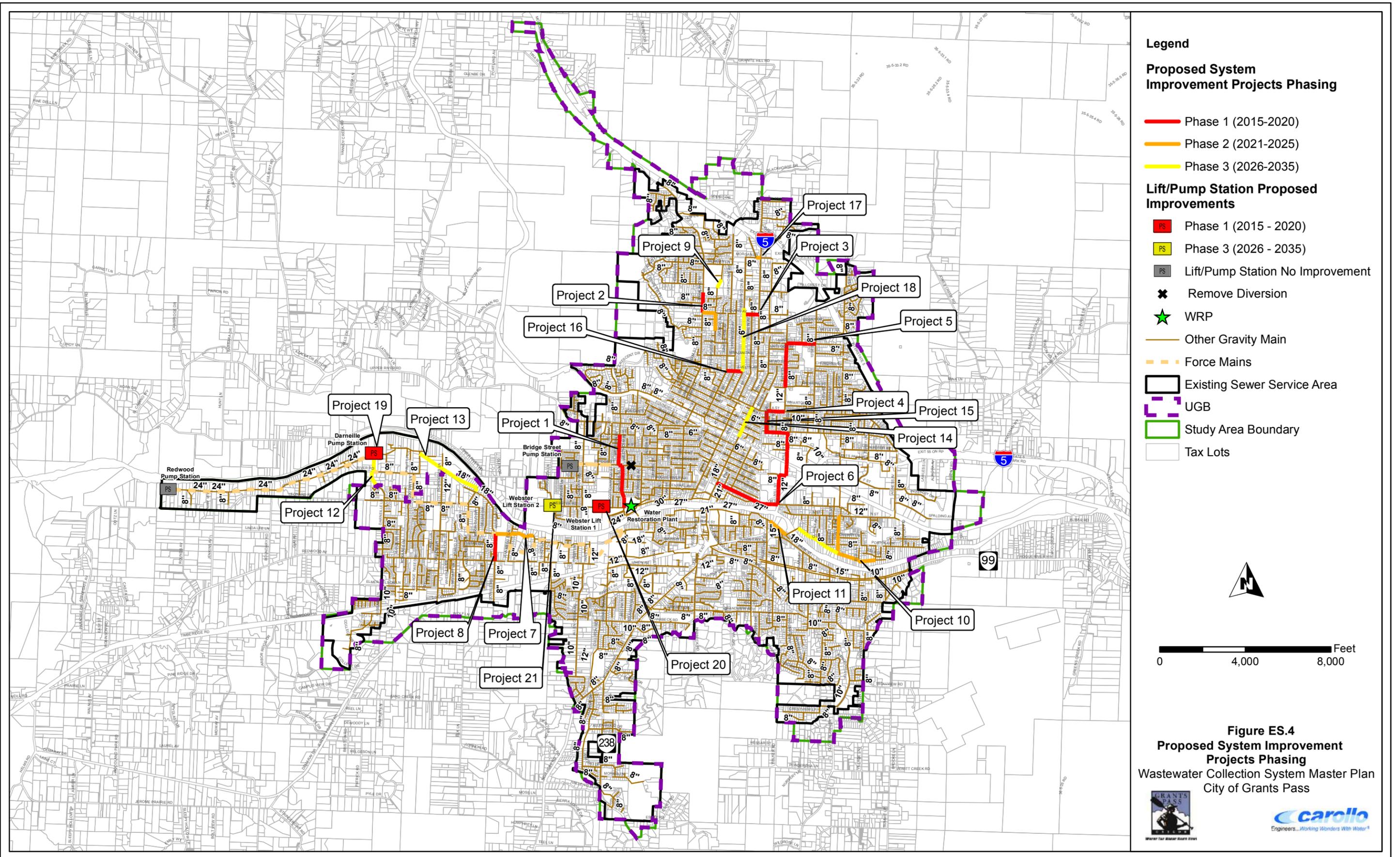
The baseline wastewater loads were allocated based on land use data provided by the City and wastewater flow coefficients developed for each land use type into the calibrated model. The flow coefficients and land use data provide a means to transform a specific land use category into an average dry weather flow.

ES.6 CAPACITY EVALUATION AND PROPOSED IMPROVEMENTS

A capacity evaluation of the collection system was performed using the calibrated hydraulic model and system evaluation criteria established in the Basis of Planning task (Chapters 1 and 2). The capacity analysis identified areas in the existing sewer system where flow restrictions occur or where pipe capacity is insufficient to convey design flows. Sewers that lack sufficient capacity to convey design flows create bottlenecks in the collection system that can potentially cause sanitary sewer overflows (SSOs). In addition to the existing system, short-term (Year 2025) and long-term (Year 2035) scenarios were performed.

A total of about 40,744 linear feet of pipes ranging from 12-inch to 27-inch are recommended to alleviate capacity deficiencies identified for all three planning conditions (existing, 2025, and 2035). Additionally, three pump station capacity deficiencies for conveying future flows were identified. It is projected that the capacity of Darneille pump station will need to be increased within the Phase 1 planning period. The Webster No. 1 is currently under construction for the anticipated capacity required through the planning period. The Webster No. 2 lift station is expected to require additional capacity by 2035.

Figure ES.4 illustrates the improvements recommended to mitigate capacity deficiencies in the existing sewer collection system and improvements to accommodate future growth as identified by the hydraulic analysis. Details of each improvement are provided in Chapter 5 - System Analysis.



ES.7 CAPITAL IMPROVEMENTS PLAN

The existing system condition assessment and capacity analysis through the planning period identified several improvements throughout the Study Area as presented in Chapters 4 and 5. The proposed City's Capital Improvement Plan (CIP) takes these recommended improvements and prioritizes based on the following factors:

- Upgrading existing facilities to mitigate current capacity deficiencies, and
- Building new trunks necessary to serve future users.

It is recommended that improvements to mitigate existing deficiencies be constructed as soon as possible. The deficiencies in the future system have a significant total capital cost that is best distributed based on the order in which the City develops. The resulting CIP provides the City with a guideline for planning and budgeting of its sewer system.

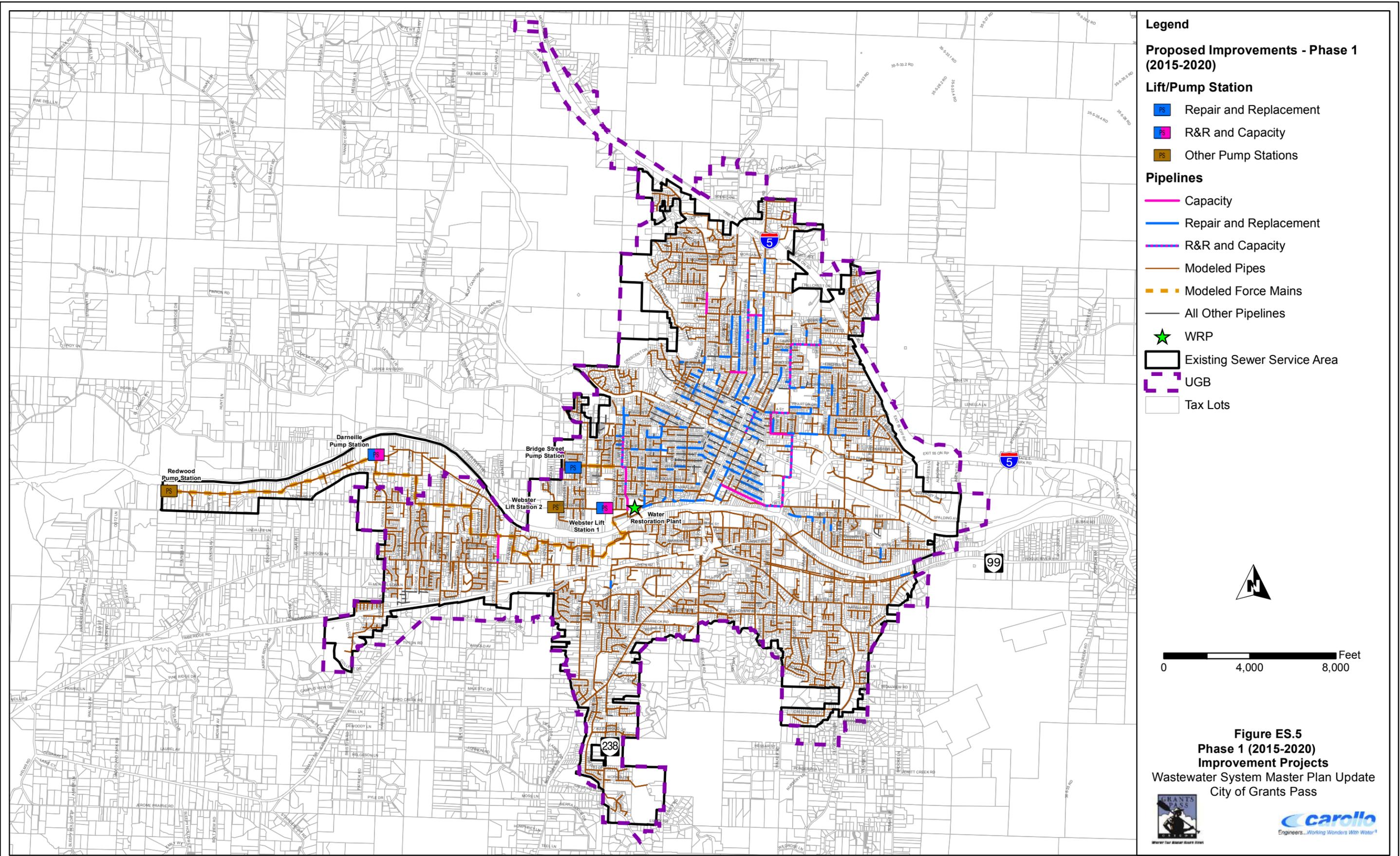
The cost estimates presented in the CIP have been prepared for general master planning purposes and for guidance in project evaluation and implementation. Final costs of a project will depend on actual labor and material costs, competitive market conditions, final project scope, implementation schedule, and other variable factors such as preliminary alignment generation, investigation of alternative routings, and detailed utility and topography surveys.

The Association for the Advancement of Cost Engineering (AACE) defines an Order of Magnitude Estimate, deemed appropriate for master plan studies, as an approximate estimate made without detailed engineering data. It is normally expected that an estimate of this type would be accurate within plus 50 percent to minus 30 percent.

Table ES.4 provides a summary of the existing and future user cost share for the proposed projects by phase. The CIP is split into four categories: repair/replacement, capacity, expansion, and general projects. Throughout the planning period \$65,286,000 (60.0%) is budgeted for repair and replacement projects, \$22,327,000 (20.5 percent) is budgeted for capacity and R&R projects, \$20,373,000 (18.7%) is budgeted for expansion projects, and \$750,000 (0.7%) is budgeted for general projects. Figures ES.5 to ES.7 illustrate the Phase 1, Phase 2, and Phase 3 improvement projects, respectively, for all repair and replacement, capacity, and expansion projects.

Table ES.4 CIP Summary by Implementation Phase Wastewater Collection System Master Plan City of Grants Pass				
Project Type	Phase 1 (2015-2020)	Phase 2 (2021-2025)	Phase 3 (2026-2035)	Total Capital Cost (\$)
Repair & Replacement	\$ 16,977,000	\$ 16,130,000	\$ 32,179,000	\$ 65,286,000
Capacity and R&R	\$ 13,135,000	\$ 4,946,000	\$ 4,246,000	\$ 22,327,000
Expansion	\$ –	\$ 2,971,000	\$ 17,220,000	\$ 20,373,000
General	\$ 150,000	\$ 300,000	\$ 300,000	\$ 750,000
Total (\$)	\$ 30,262,000	\$ 24,529,000	\$ 53,945,000	\$ 108,736,000
Annual Total (\$)	\$ 5,044,000	\$ 4,906,000	\$ 5,395,000	\$ 5,178,000

As seen in Table ES.4, the CIP recommends investing \$30.3M into the wastewater system for Phase 1 (2015-2020). This high cost includes several critical programs, including \$13.9M for capacity improvements (also benefiting system condition) to reduce surcharging manholes, and \$17M in repair projects to address aging infrastructure. The annual Phase 1 cost for all recommended programs is approximately \$5.0M per year from 2015 to 2020. For the Phase 2 (2021-2025), the CIP recommended an additional \$24.5M be invested to continue these programs. The annual Phase 3 cost is approximately \$5.4M per year from 2026 to 2035. The total CIP cost, including contingencies and allied costs, is approximately \$108.7M.



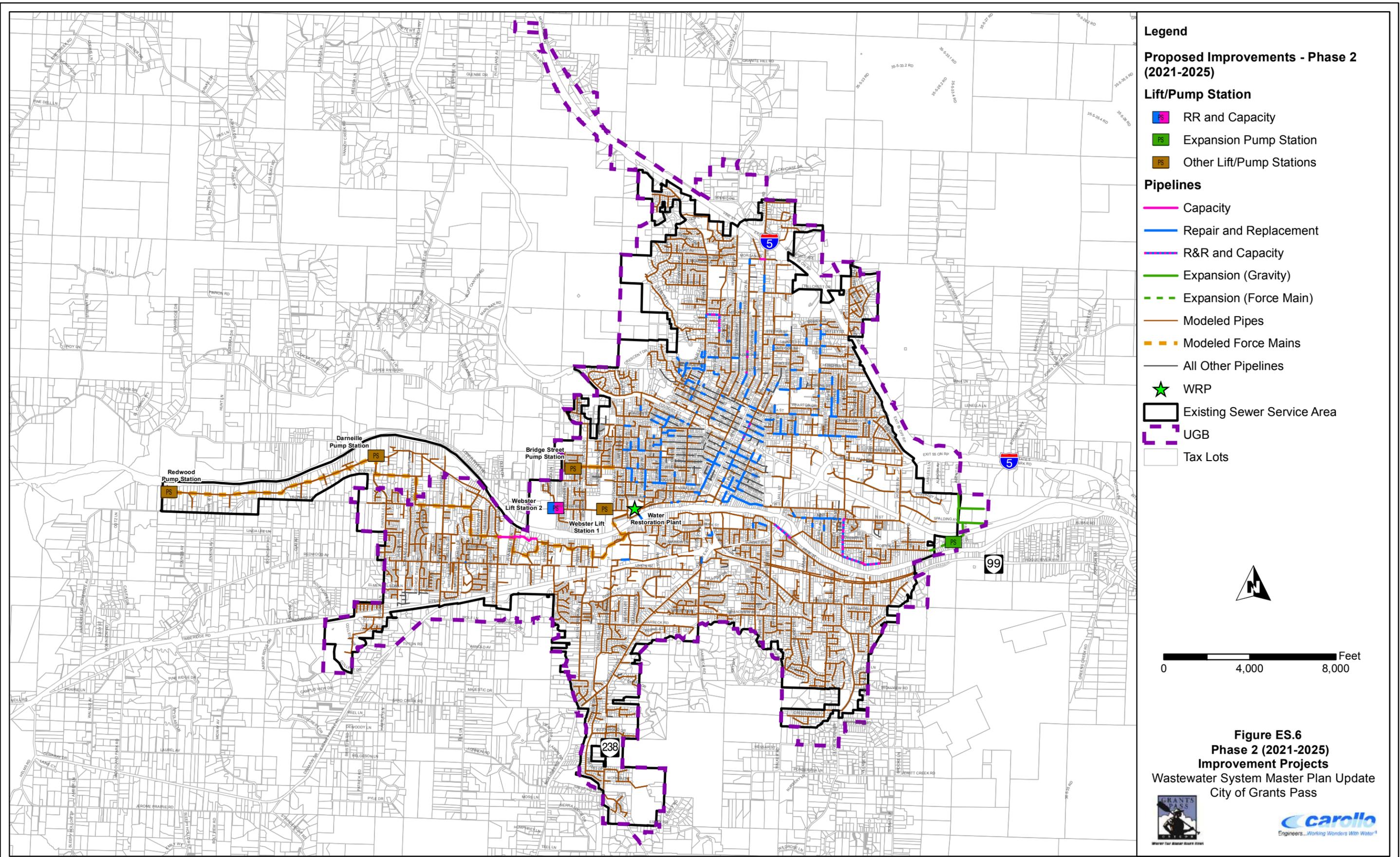
- Legend**
- Proposed Improvements - Phase 1 (2015-2020)**
- Lift/Pump Station**
- PS Repair and Replacement
 - PS R&R and Capacity
 - PS Other Pump Stations
- Pipelines**
- Capacity
 - Repair and Replacement
 - R&R and Capacity
 - Modeled Pipes
 - Modeled Force Mains
 - All Other Pipelines
- ★ WRP
 - Existing Sewer Service Area
 - UGB
 - Tax Lots



0 4,000 8,000 Feet

Figure ES.5
Phase 1 (2015-2020)
Improvement Projects
 Wastewater System Master Plan Update
 City of Grants Pass



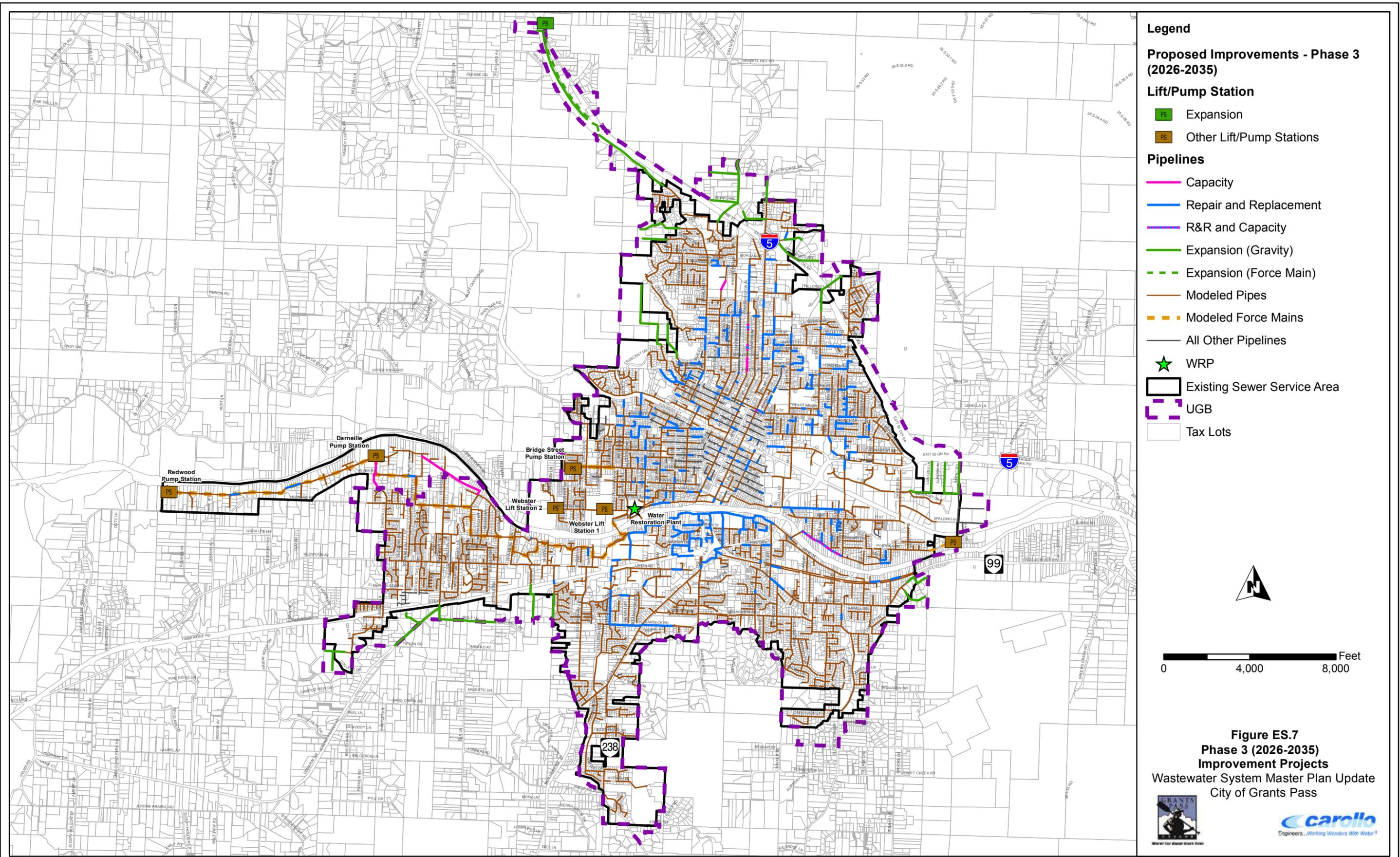


- Legend**
- Proposed Improvements - Phase 2 (2021-2025)**
- Lift/Pump Station**
- RR and Capacity
 - Expansion Pump Station
 - Other Lift/Pump Stations
- Pipelines**
- Capacity
 - Repair and Replacement
 - R&R and Capacity
 - Expansion (Gravity)
 - Expansion (Force Main)
 - Modeled Pipes
 - Modeled Force Mains
 - All Other Pipelines
- WRP
 - Existing Sewer Service Area
 - UGB
 - Tax Lots



Figure ES.6
Phase 2 (2021-2025)
Improvement Projects
 Wastewater System Master Plan Update
 City of Grants Pass





- Legend**
- Proposed Improvements - Phase 3 (2026-2035)**
- Lift/Pump Station**
- Expansion
 - Other Lift/Pump Stations
- Pipelines**
- Capacity
 - Repair and Replacement
 - R&R and Capacity
 - Expansion (Gravity)
 - Expansion (Force Main)
 - Modeled Pipes
 - Modeled Force Mains
 - All Other Pipelines
- WRP
- Existing Sewer Service Area
- UGB
- Tax Lots



0 4,000 8,000 Feet

Figure ES.7
Phase 3 (2026-2035)
Improvement Projects
 Wastewater System Master Plan Update
 City of Grants Pass

