COLLECTION SYSTEM ANALYSIS

5.1 INTRODUCTION

This chapter describes the capacity analysis of the City's collection system based on the projected growth scenarios, developed in Chapter 3 - Flow Projections, identifies deficiencies from future infill and new development, and proposes improvements to mitigate these deficiencies.

An existing H2OMAP® SWMM hydraulic model of the City's collection system was developed by Carollo in 2012, and was used to perform the capacity analysis for the two growth scenarios described herein. Development and calibration of the City's hydraulic model is described in Appendix E.

5.2 HYDRAULIC MODEL DEVELOPMENT

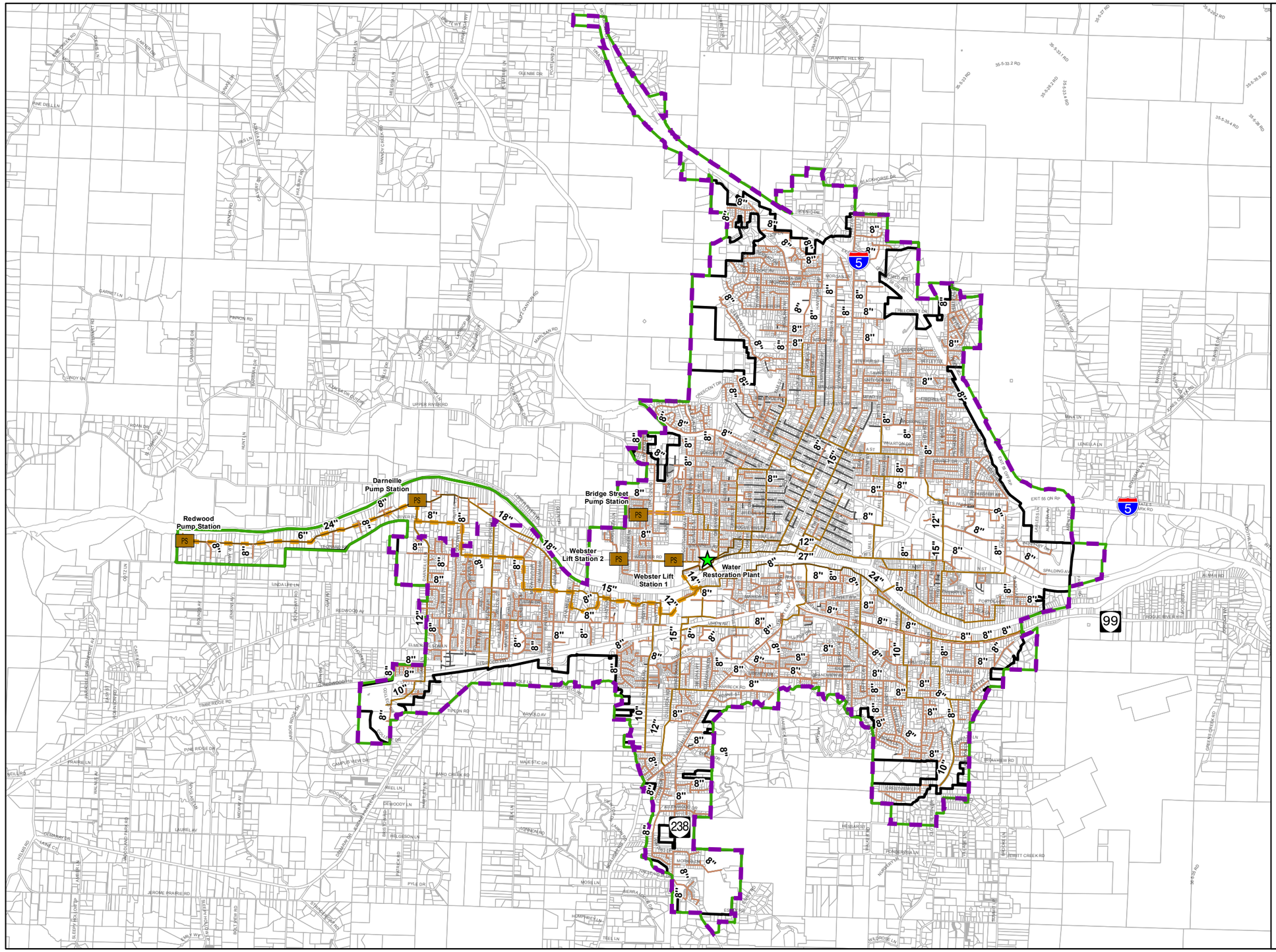
A wastewater collection system model is a simplified representation of the real sewer system. Sewer system models can assess the conveyance capacity for a collection system. Sewer system models can also perform "what if" scenarios to assess the impacts of future developments and land use changes. The model was the primary tool to evaluating the collection system.

The City updated and calibrated its collection system model in 2012 and details on this task can be found in Appendix E. The sections below summarize the important information to the purpose of this plan.

5.2.1 Hydraulic Model Update

The City's hydraulic model was converted to Innovyze's H2OMap SWMM in 2012. The hydraulic modeling engine for the H2OMap SWMM software package uses the Environmental Protection Agency's (EPA) Storm Water Management Model (SWMM), which is widely used throughout the world for planning, analysis, and design related to stormwater runoff, combined sewers, sanitary sewers, and other drainage systems. Version 14 of H2OMap SWMM is used to perform the capacity analysis as part of this plan. The conversion and update is documented in Appendix E.

Figure 5.1 illustrates the City's modeled collection system.



Legend

- WRP
- Lift/Pump Station

Non-Modeled Pipelines

- Non-Modeled Pipelines

Modeled Pipes

- 8" and Smaller
- 10" to 16"
- 18" or Larger
- Force Mains
- Study Area
- Existing Sewer Service Area
- UGB
- Tax Lots

N

0 4,000 8,000 Feet

Figure 5.1
Modeled Collection System
Collection System Master Plan Update
City of Grants Pass

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5.2.2 Hydraulic Model Calibration

Model calibration is a crucial component of the hydraulic modeling effort. The purpose of the sanitary sewer collection system hydraulic model is to estimate, or predict how, the collection system will respond under a given set of conditions. To this end, the model was calibrated against field measured data recorded during the City's flow monitoring program.

Calibrating the model to match data collected during the flow monitoring program ensures the most accurate results possible. The calibration process consists of calibrating to both dry and wet weather conditions.

For this project, both dry and wet weather calibration were conducted. Dry weather flow (DWF) calibration ensures an accurate depiction of base wastewater flow generated within the study area. 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 amount of I/I is essentially the difference between the WWF and DWF components.

The model was calibrated in accordance with international modeling standards. The Wastewater Planning Users Group (WaPUG), a section of the Chartered Institution of Water and Environmental Management, has established principles for model verification that have been generally agreed-upon. The wet weather calibration for this project focused on meeting the recommendations on model verification contained in the “Code of Practice for the Hydraulic Modeling of Sewer Systems,” version 3.001, published by the WaPUG.

The WaPUG criteria for hydraulic model calibration are summarized below:

- **Dry Weather Flow Calibration.** The DWF hydrographs should closely follow each other in shape and magnitude, and meet the following criteria as a general guide:
  - Timing of flow peaks and troughs should be within one hour.
  - The peak flow rate should be in the range of ±10 percent.
  - The volume of flow (or average flow) should be in the range of ±10 percent, with care taken to exclude periods of missing or inaccurate data.

- **Wet Weather Flow Calibration.** The WWF hydrographs should closely follow each other in shape and magnitude until the flow has substantially returned to the dry weather flow rates, and meet the following criteria as a general guide:
  - Timing of flow peaks and troughs should be similar having regard to the duration of the event.
  - The peak flow rate should be in the range of +25 percent to -15 percent.
  - The volume of flow (or average flow) should be in the range of +20 percent to -10 percent, with care taken to exclude periods of missing or inaccurate data.

Calibration results and additional information on the calibration are detailed in Appendix E.

5.3 SYSTEM EVALUATION CRITERIA

Capacity analysis of the wastewater collection system was performed in accordance with the criteria established in this chapter. The City's Sewer Standards for Design, Construction, and Testing of the Sanitary Sewer System stipulate general policies of the City and outline sewer design criteria. Some of these criteria are discussed below; for criteria that are not discussed in this section, the reader should assume that the design criteria conform to the Sewer Standards. Sewer pipe capacities are dependent on many factors, including roughness of the pipe, the maximum allowable depth of flow, minimum velocity, and slope of pipe. Assumptions of these factors are discussed below.

5.3.1 Design Criteria

Design Criteria including Manning Coefficient (n), velocities and minimum slopes and change in pipe size are detailed in Table 2.4 located in Chapter 2 – Policies and Criteria.

5.3.2 Performance Criteria

5.3.2.1 Design Storm

The hydraulic capacity analysis was performed using a customized 5-year, 24-hour design storm with antecedent rainfall. The design storm is discussed in Chapter 3 - Flow Projections.

5.3.2.2 Conveyance System

The primary criterion used to identify capacity-deficient trunk sewers or to size new improvements is the maximum flow depth to pipe diameter ratio (d/D). The d/D value is defined as the depth (d) of flow in a pipe during peak flow conditions divided by the pipe's diameter (D). The operating criterion varies for existing sewers and for new sewers.

When evaluating existing sewers, using a conservative d/D ratio may lead to unnecessary replacement of existing pipelines. During PWWF, water levels were allowed to rise up to two feet above the pipe crown within the manhole. Sewers were allowed to surcharge under these maximum flow conditions. If the flow depth was greater than the maximum allowed, then the sewer was deemed deficient and a larger sewer was proposed to provide greater flow capacity.

When designing new sewers, it is common practice to adopt variable flow depth criteria for different pipe sizes. Design d/D ratios typically range from 0.5 to 0.92, with the lower values used for smaller pipes, which may experience flow peaks greater than design flow or may experience blockages from debris, paper or rags. The City's Sewer Standards define the acceptable d/D values for design of new sewers. Sewers equal to or less than 15-inches in diameter shall be designed to flow half full (d/D of 0.5) at peak flow rates. Sewers 18 inches and greater in diameter shall be designed to flow at a d/D of 0.75 at peak flow rate.

The maximum allowable d/D ratios for design flow conditions are summarized in Table 5.1. These design flow depths are relatively conservative and provide for some flexibility capacity if projected flows change as a result of modifications in flow generation assumptions or land uses.

Table 5.1 Flow Depth Criteria Used in Modeling Wastewater Collection System Master Plan City of Grants Pass	
Existing Sewers	
Flow Condition	**Maximum Surcharge Depth**
Peak Wet Weather Flow (Design Flow)	Two feet above pipe crown in manhole
New Sewers	
Diameter	**Design Flow Maximum d/D Ratio**
Less than or equal to 15-inches	0.50
Greater than or equal to 18-inches	0.75

5.3.2.3 Lift Stations and Force Mains

According to City Sewer Standards and as presented in Chapter 2 – Policies and Criteria, pump capacity shall be provided to handle the ultimate peak flow, also known as the peak wet weather flow (PWWF), from a tributary area with the largest pump out of service. Therefore, the City's sewage lift stations should have sufficient firm capacity (capacity with the largest pump out of service) to pump the PWWF until the end of the planning period (2035).

The evaluation of existing force mains is based on a maximum pipe velocity of 9 feet per second (fps) as well as a pressure limitation of 200 feet (approximately 85 psi) at the pump station, as this upper limit encroaches on the need for series pumping systems. Beyond this natural pressure boundary of non-clog wastewater pumps, the availability of acceptable pumps is inconsistent.

5.4 COLLECTION SYSTEM CAPACITY EVALUATION

A capacity analysis of the modeled collection system was performed using the City's calibrated hydraulic model and using the system evaluation criteria outlined above. The capacity analysis entailed identifying areas in the sewer system where the planning criteria for surcharging was exceeded, or where the capacity of pump stations was exceeded. The collection system was evaluated for the existing, short-term (2025) and, long-term (2035) conditions, based on the PWWF generated using the 5-year, 24-hour design storm. The City has several Urban Reserve Areas (URA) they are looking to expand to, but are currently not incorporated in their UGB and study area. Analysis for these areas is presented independently in Appendix A.

5.4.1 Gravity Collection System Evaluation

The capacity analysis entailed identifying areas in the sewer collection system where flow restrictions occur or where capacity is insufficient to convey PWWF.

5.4.1.1 Surcharge Due To Backwater

Pipelines with a Hydraulic Grade Line (HGL) that encroached within two feet above pipe crown in manhole are not necessarily capacity deficient. Surcharging of a pipe can occur due to backwater effects of a downstream pipe, not due to insufficient capacity of the pipe itself. If the downstream pipe is capacity deficient, it can cause backup - and even reversal - of flow in the upstream pipe, resulting in surcharge of the upstream pipe that otherwise is not capacity limited. If the downstream pipe capacity is increased, then the upstream pipe may no longer require capacity improvements. An illustration of backwater effects is shown in Figure 5.2. Therefore, it is recommended that the City address downstream issues to limit the overall cost of the CIP, rather than backwater improvements.

For this reason, the hydraulic model was analyzed to identify the pipeline segments that are the cause of the surcharged conditions.

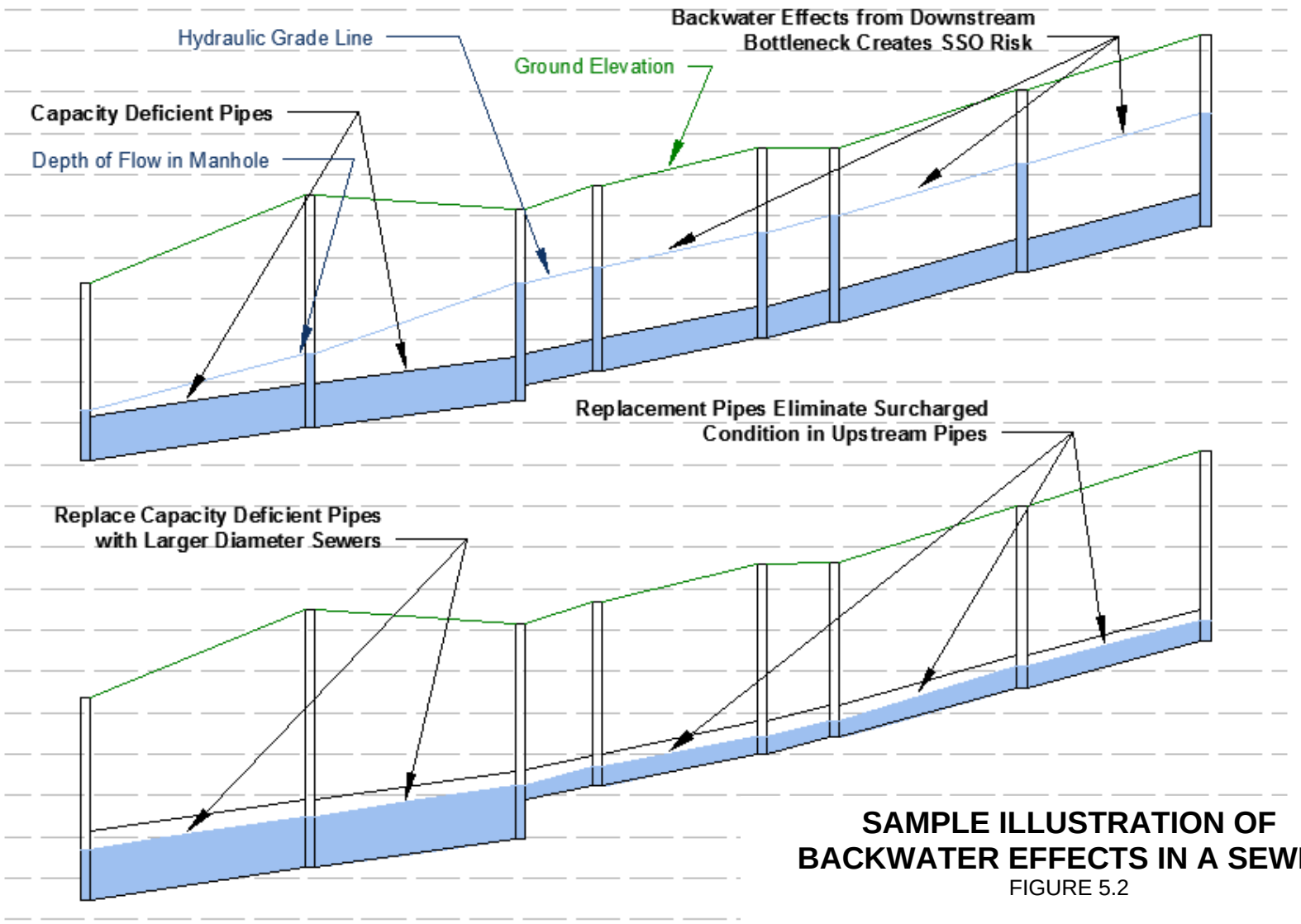
5.4.1.2 Existing System

For the existing sewer collection system, the PWWF was routed through the hydraulic model. In accordance with the established criteria for existing sewers, manholes where the HGL encroached within two feet of the pipe crown were identified. Capacity deficiencies were identified that will require improvements prior to serving future users.

In general, the small sewer main lines (8 inches) throughout the City have sufficient capacity to convey existing and future flows. The primary capacity issues derive from the larger trunk lines or interceptors that receive flow from multiple collection basins, and that convey sewage to the WRP.

There are 5 main pockets of deficiencies flagged in the hydraulic model under existing conditions. The deficiencies are mainly located in wastewater basins I, H, B, and T. Deficiencies in Basin Z are due to Darneille Pump Station’s incapacity to convey existing PWWF.

Following the completion of the existing system analysis, improvement projects and alternatives were identified in order to mitigate existing system pipeline capacity deficiencies. The recommended improvement projects are discussed in greater detail in Section 5.5.



SAMPLE ILLUSTRATION OF BACKWATER EFFECTS IN A SEWER

FIGURE 5.2

CITY OF GRANTS PASS
WASTEWATER COLLECTION SYSTEM MASTER PLAN

5.4.1.3 New Sewers Assumptions

Assumptions on where future flow will be routed into the existing conveyance system were presented in Chapter 3 - Flow Projections. These were further analyzed as part of this chapter to develop high-level conceptual projects on how to connect the identified major growth areas.

The proposed improvements to serve future users are sized for build-out conditions. As the City continues to grow, it is recommended that the proposed pipeline diameters be constructed so that the facilities have sufficient capacity for build out conditions. The timing for the development of these areas is discussed in the sections below.

Three areas were identified as challenging mainly due to physical constraints:

- Spalding Area, and South Rogue River.
- South Highway.
- North I-5, and west NW Starlite Ln.

These three areas are described in more detailed in the sections below and conceptual projects to connect these areas to the existing system are presented in Figures 5.3 to 5.5. Other growth areas are considered more straightforward as it mainly consists in extending existing pipes into the undeveloped parcels, and are therefore not further evaluated.

5.4.1.3.1. Spalding Area and South Rogue River

This area is located in the east of the City's conveyance system, just north of the Rogue River. Carollo completed a technical memorandum in 2015 to provide an opinion of the capital cost to provide wastewater service to the Spalding industrial area. This analysis confirmed that a pump station located approximately west of Jones Creek on the eastern edge of the Urban Growth Boundary (UGB) and a force main are needed to convey flows from the Spalding industrial area to the existing sewer in Portola Drive. Appendix F is a TM detailing the analysis performed by Carollo in 2015 for the Spalding Area.

Figure 5.3 shows the location of the new proposed pump station and force main and piping to develop in both short- and long-term planning periods.

Due to the expected partial development of this area in the short-term planning period (2025), the proposed pump station will need to be constructed before 2025 when the area is scheduled to start developing. However, the infrastructure will be sized to handle projected build-out 2035 PWWFs. High-level planning analysis revealed that the estimated build-out ADWF is 55 gpm, while the projected PWWF is 110 gpm under build-out conditions.

5.4.1.3.1. South Highway

This growth area is located south of the Redwood Highway. Most of the area is planned to connect to the sewer pipe located along Willow Ln. Eight-inch gravity pipes are recommended to collect flows in this area, as shown on Figure 5.4.

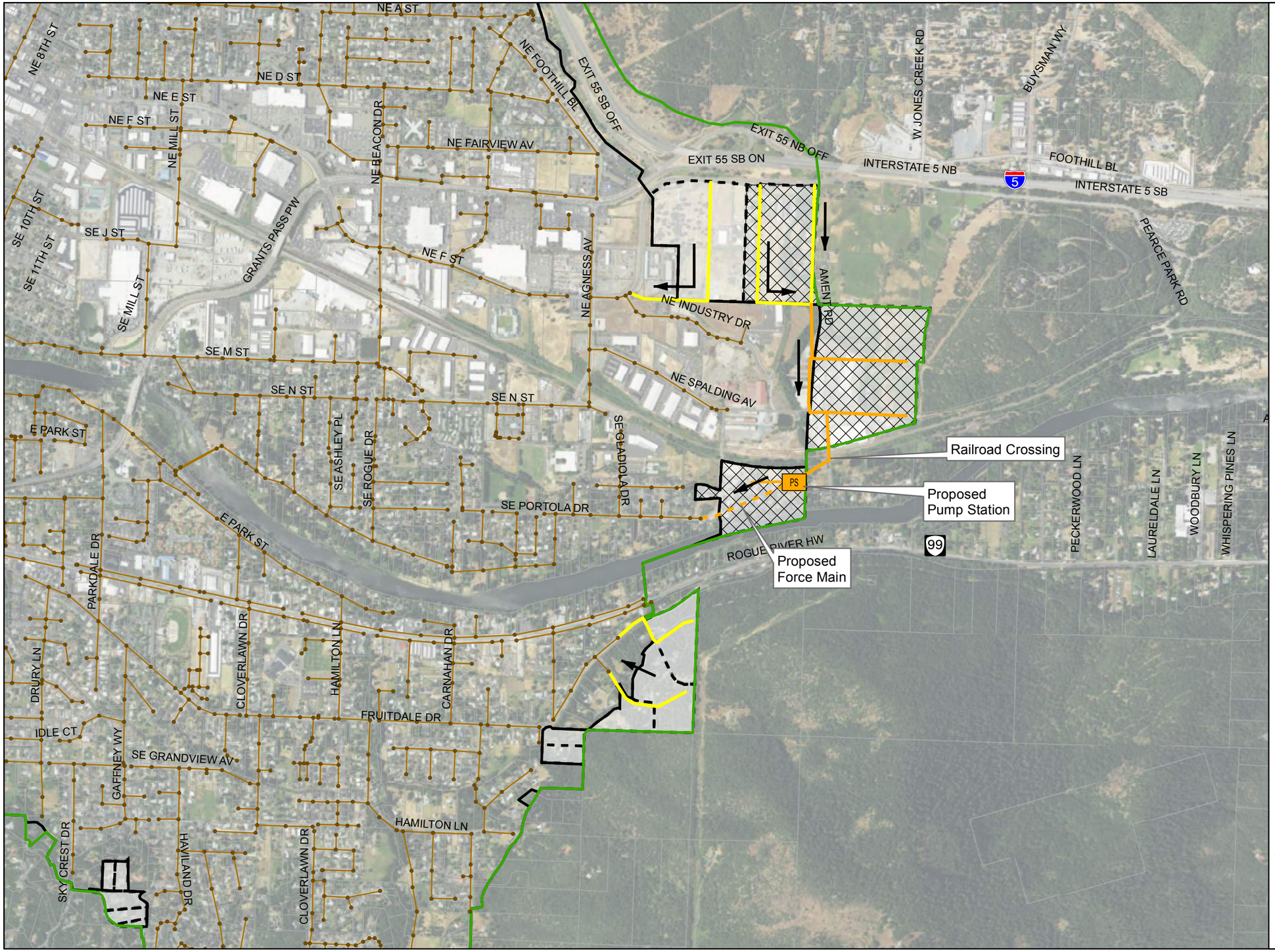
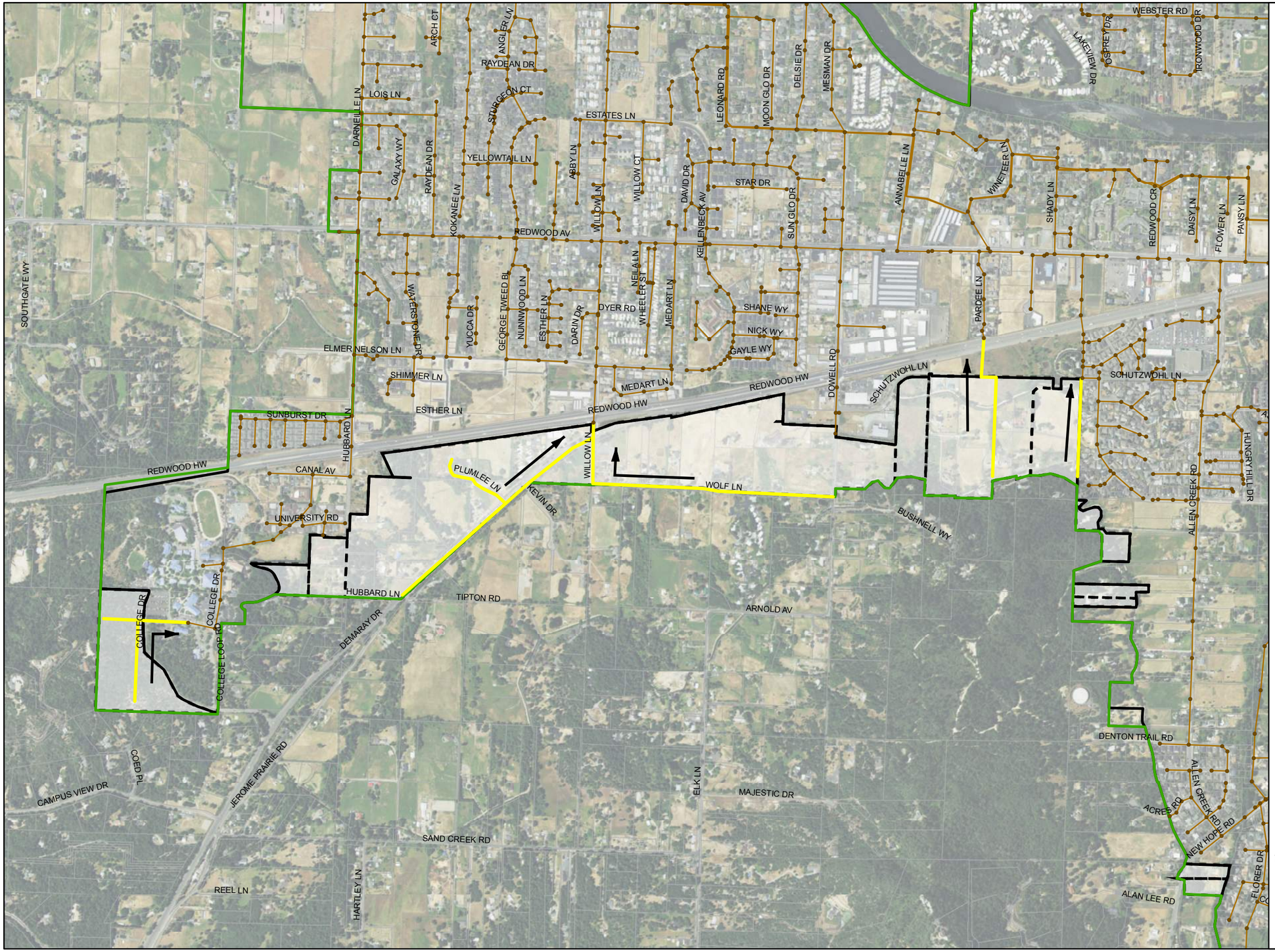


Figure 5.3
Spalding Area and South Rogue River Proposed Connection Projects
Wastewater Collection System Master Plan
City of Grants Pass



Legend

- Long-Term Proposed Gravity Main (2035)
- Flow Direction
- Existing Manholes
- Existing Pipeline
- Existing Sewer Service Area
- Study Area Boundary
- Future Growth Areas to Serve
- Tax Lots

N

0 1,000 2,000 Feet

Figure 5.4
South Highway Area
Proposed Connection Projects
Wastewater Collection System Master Plan
City of Grants Pass

5.4.1.3.1. North I-5 and West NW Starlite Ln

The growth area located north of I-5 is challenging to connect to the existing system for several reasons:

1. Growth occurs on the other side of the highway from where the existing piping system is located.
2. Topology in the area varies significantly.

Highway crossings and a new pump station are recommended to connect these areas to the existing collection system. Figure 5.5 illustrates the proposed infrastructures.

Due to the cost and complexity of crossing I-5, it is recommended that a large diameter crossing be constructed to tie into the existing system. Three crossings are proposed in order to route al the flow from these to the existing system:

- At the intersection of Highland Avenue with I-5,
- Across I-5 at the latitude of Cherokee Ln dead-end, and
- At the intersection of Heidi Lane with I-5.

A typical Jack and Bore is the recommended technology to cross I-5. Jack and Bore is a trenchless method of horizontal boring construction. Pipe ramming can also be considered, but is not recommended due to potential impacts of vibration on the highway during construction.

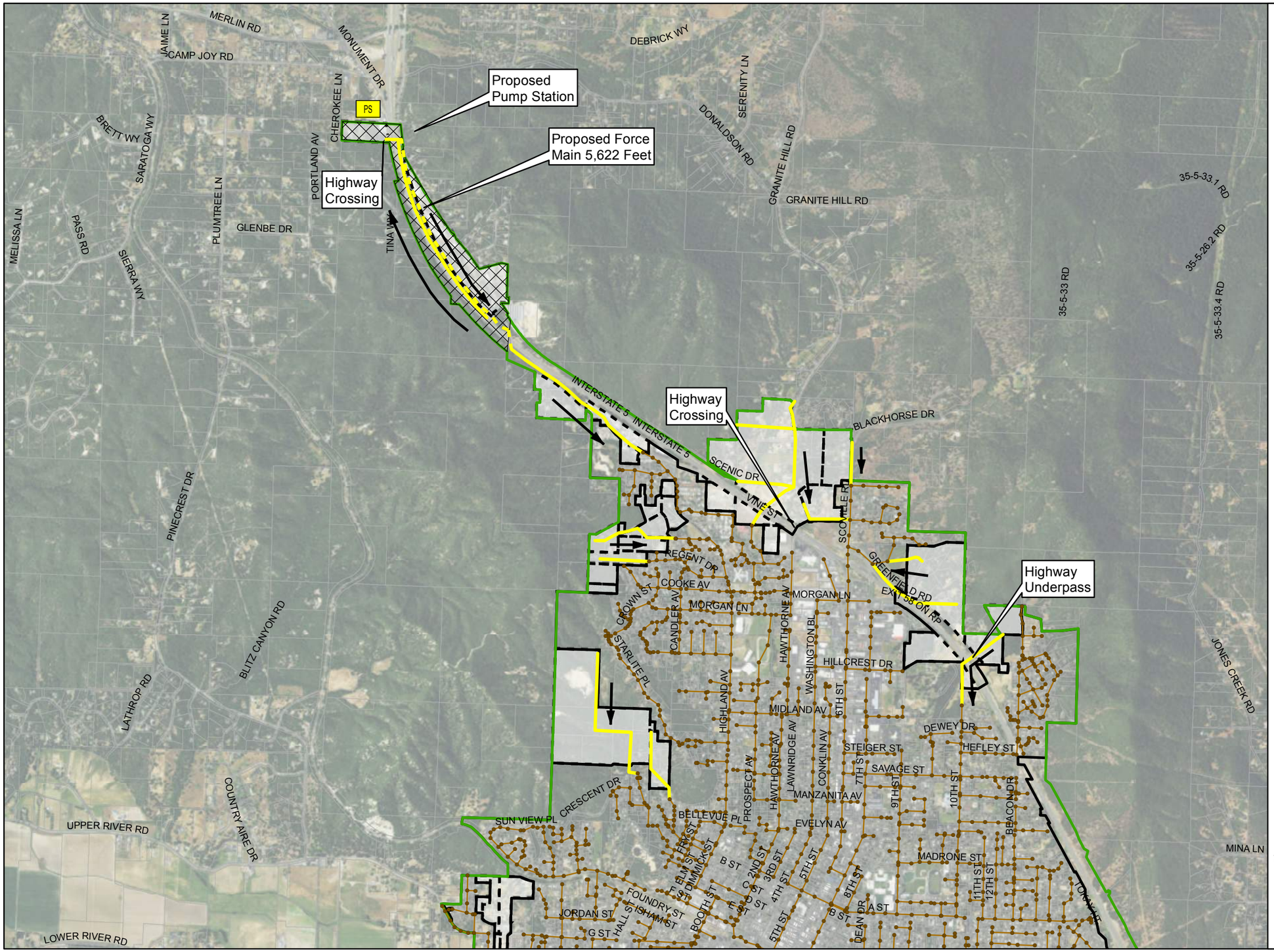
A new pump station is necessary to capture flows coming from the north-west, as the slope gradient in this area is towards the west, and the flow needs to be routed to the east to the existing system. The area that this new pump station would catch is highlighted on Figure 5.5. High-level planning analysis was performed to size both pump station and force main. The new pump station and force main will need to be able to handle projected build-out flows from this area. Build-out ADWF for the area is estimated at 35 gpm, while the projected PWWF is 95 gpm.

5.4.1.4 Short-Term Planning Period (Year 2025)

The 2025 system analysis was performed in a similar manner to the existing system analysis. The Short-Term scenario evaluated whether or not the sewers are adequately sized to convey the 2025 PWWFs.

The additional projected flows from the future 2025 development intensify the capacity issue, exacerbating the existing deficiency. The additional pockets of deficiencies are located in basins A, V, F, H, T; and J.

Deficiencies observed in Basin A are mostly due to the fact that the Webster No. 1 Pump Station becomes capacity deficient and the flow that this pump station cannot handle backs up in the system upstream causing the HGL to raise above the recommended criteria. The additional deficiencies located in Basin J are mainly due to the connection of part of the Spalding industrial area to the existing collection system.



Legend

- PS — Long-Term Proposed Pump Station (2035)
- Long-Term Proposed Gravity Main (2035)
- Long-Term Proposed Foce Main (2035)
- New Pump Station Tributary Area
- Flow Direction
- Existing Manholes
- Existing Pipeline
- Existing Sewer Service Area
- Study Area Boundary
- Future Growth Areas to Serve
- Tax Lots

N

0 2,000 4,000 Feet

Figure 5.5
North I-5 Area and West
NW Starlite PL Area Proposed
Connection Projects
Wastewater Collection System Master Plan
City of Grants Pass

There were several deficiencies identified as resulting solely from the new development proposed in the short-term planning period. These additional locations not satisfying the performance criteria are shown on Figure 5.6 in orange.

5.4.1.5 Long-Term Planning Period (Year 2035)

The 2035 system analysis was performed in a similar manner to the existing and 2025 system analyses. The purpose of the 2035 system evaluation is to verify that the existing system improvements were appropriately sized to convey build out PWWFs, and to identify the locations of sewers that are adequately sized to convey existing PWWFs, but cannot convey build out PWWFs. It is to be noted that it is assumed that the study area will be completely build-out in 2035.

At build out, the City's wastewater flows are expected to almost double compared to existing conditions. As such, there are some areas of the existing collection system that cannot convey the build out PWWF without flows backing up above allowable levels. The observed additional deficiencies in 2035 are located in the same basins as the existing and 2025 deficient spots. The deficiencies worsen due to additional flows in the system and the connection of all growth areas in the upstream of the collection system. No new area is flagged under build-out conditions.

These locations are shown on Figure 5.6 in yellow. Figure 5.6 clearly shows the impact of connecting the growth areas located in the outskirts of the existing system (green parcels on the figure).

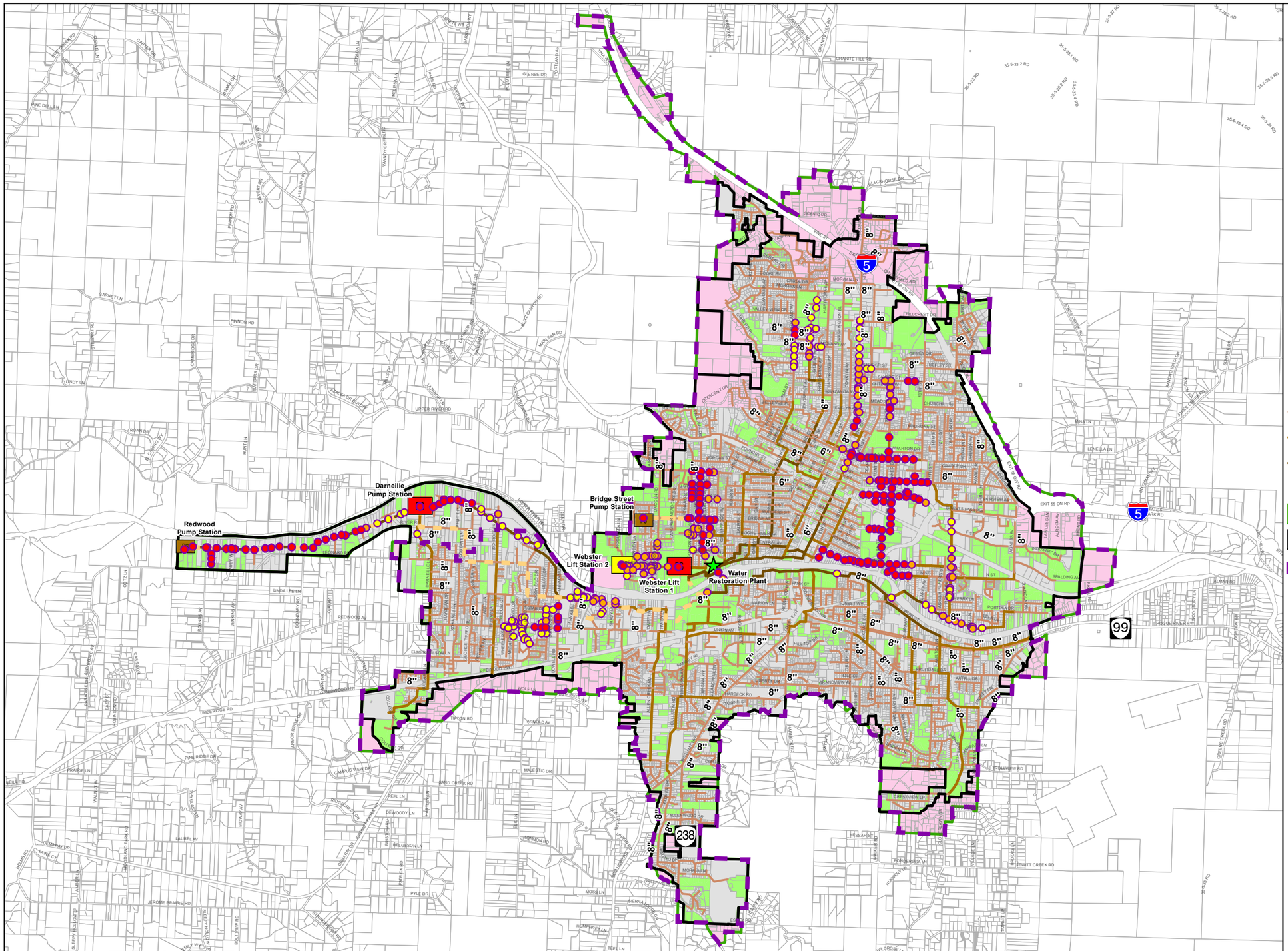
5.4.2 Pump Station Evaluation

Ensuring that pump stations have adequate capacity to convey peak flows is important for preventing unwanted wastewater overflows at pump stations. In accordance with the established planning criteria, the City's existing modeled lift stations were evaluated to determine if each one has available capacity to convey existing and future PWWFs. Lift stations with an influent PWWF above the existing firm capacity were flagged as deficient.

If a pump station has inadequate capacity to pump peak flows, the water level in the wet well may rise to the overflow point, discharging wastewater to stormwater collection systems that eventually discharge to water bodies. The following sections present the pump station capacity evaluation, which compares the estimated current and future peak flows to the pump station firm capacities. Recommendations to address identified deficiencies are presented in Section 5.5.

The City's hydraulic model includes five pump stations located in the City's study area. Table 5.2 summarizes the results of the lift station evaluation. The firm capacity of each pump station is compared to the projected PWWFs coming from each pump station tributary area for the existing, short-term and long-term conditions. The firm capacity of a pump station is defined as the capacity with the largest pump out of service.

The design data includes the number of pumps, individual pump capacity, firm capacity, and total capacity.



Legend

- Existing Deficiencies (> 2 ft above pipe crown)
- 2025 Deficiencies (>2ft above pipe crown)
- 2035 Deficiencies (>2ft above pipe crown)
- PS Existing Lift/Pump Station Deficency
- PS 2035 Lift/Pump Station Deficency

Development Type

- 2035 Development
- 2025 Development
- Existing Developed
- WRP
- PS Lift/Pump Station

Pipelines

- 8" and Smaller
- 10" - 16"
- 18" and Larger
- Force Mains
- Study Area Boundary
- Existing Sewer Service Area
- UGB
- Tax Lots

N

0 4,000 8,000 Feet

Figure 5.6
Collection System Capacity Analysis Deficiencies
Wastewater Collection System Master Plan
City of Grants Pass

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Table 5.2	Pump Station Evaluation Wastewater Collection System Master Plan City of Grants Pass						
		Existing		Short-Term (2025)		Long-Term (2035)	
Pump Station	Firm Capacity	Modeled PWWF (mgd)	Deficiency	Modeled PWWF (mgd)	Deficiency	Modeled PWWF (mgd)	Deficiency
Bridge Street	0.94	0.48	0.46	0.71	0.22	0.92	0.02
Webster No. 1	0.14	0.28	-0.14	0.50	-0.36	0.66	-0.52
Webster No. 2	0.14	0.02	0.13	0.10	0.04	0.23	-0.08
Darneille	4.20	6.10	-1.90	6.80	-2.60	7.78	-3.58
Redwood	0.48	0.52	-0.04	0.53	-0.05	0.55	-0.06

Notes:
(1) Assumes piping improvements upstream of each pump station is incorporated.
(2) Assumes Darneille and Redwood pump stations are working independently (no flow is diverted from Darneille to Redwood Pump Station).

As shown in Table 5.2, three of the five modeled lift stations were flagged as deficient under both existing and 2025 conditions. An additional pump station (Webster PS No. 2) becomes not adequately sized to convey the model simulated 2035 PWWF.

5.4.2.1 Bridge Street Pump Station

This pump station is adequately sized to convey all estimated existing, 2025, and 2035 PWWFs.

5.4.2.2 Webster No. 1 Lift Station

This lift station is capacity deficient under existing, 2025, and 2035 conditions by 0.14 mgd, 0.36 mgd, and 0.52 mgd, respectively. The Webster No. 1 Lift Station receives flow from the Webster No. 2 Lift Station and residential development. The insufficient capacity of Webster No. 1 causes upstream surcharging above the design goal. The hydraulic model suggests that once build-out of the study area is achieved, that the insufficient capacity at Webster No. 1 could cause sanitary sewer overflows (SSOs) from manholes upstream of the pump station.

This lift station will be replaced in 2016 and the new lift station is currently under design. The anticipated design capacity is 0.57 mgd (395 gpm) with an ultimate capacity of 0.69 mgd (480 gpm).

5.4.2.3 Webster No. 2 Lift Station

This lift station currently collects flow from a relatively small residential area, and has sufficient capacity to convey the PWWFs from the existing and short-term conditions. However, the projected development from the 2035 condition adds residential area that will generate PWWFs that exceeds the firm capacity of this lift station. The total deficiency for the peak hour flows is minimal and is approximately 0.08 mgd.

5.4.2.4 Darneille Pump Station

The Darneille Pump Station is the largest of the City's pump stations and receives flows from the southwest portion of the City. The tributary area for this pump station is shown on Figure 4.4 located in Chapter 4 - Existing System and Condition Assessment. The total existing capacity of this pump station is 4,380 gpm (6.3 mgd) and the firm capacity is 2,920 gpm (4.2 mgd).

The hydraulic model shows the Darneille Pump station cannot handle PWWFs starting under existing conditions. The existing deficiency is estimated at 1.90 mgd, while the short-term (2025) deficiency is projected to increase to 2.60 mgd. Long-term (2035) scenario requires a capacity increase of the pump station of 3.58 mgd, which corresponds to a hydraulic capacity increase of more than 85% over its existing firm capacity.

Hydraulic modeling results also show that the 14-inch force main downstream of the dual 12-inch force mains upstream of the WRP exceeds the threshold of 9 fps in both 2025 and 2035 planning conditions. Velocity in the 14-inch force main under 2025 PWWF condition reaches 9.8 fps (6.8 mgd) while it reaches up to 11.3 fps (7.8 mgd) under the 2035 PWWF condition.

5.4.2.5 Redwood Pump Station

The Redwood Pump Station is located on the western edge of the City's study area. The assumption to operate Redwood and Darneille pump stations separately is made for the capacity evaluation. Due to the assumption to send the flows from the Darneille PS tributary area directly to the WRP and not divert towards Redwood PS, the Redwood PS receives flow from a relatively small tributary area. The analysis shows this pump station to be deficient starting under existing conditions. Relatively minimal growth is expected in this pump station tributary area and the estimated capacity deficiency only increases from 0.04 mgd under existing conditions to 0.06 mgd under long-term (2035) conditions.

5.4.3 Capacity Evaluation Summary

Several locations were identified starting under existing conditions to violate the capacity criteria of the HGL not exceeding two feet above pipe crown. These deficiencies are mainly located on larger trunks collecting most of the flow from the system.

Four pump station capacity deficiencies for conveying future flows are identified for the City's collection system. It is projected that Webster No. 1, Darneille and Redwood pump stations are deficient under the existing conditions and that Webster No. 2 becomes deficient under the Long-term (2035) conditions. Project to increase capacity at Webster No. 1 Lift Station is already underway.

Figure 5.6 summarizes all the capacity deficiencies flagged in this analysis based on the performance criteria presented in Section 5.3.2.

5.5 RECOMMENDED COLLECTION SYSTEM IMPROVEMENTS

This section presents the proposed sewer improvements on both pipes and pump stations to correct existing, short-term and long-term identified deficiencies and to serve future users.

5.5.1 Pipe Improvement Assumptions

When an increase to capacity is required, existing sewers can be upgraded or a parallel or relief sewer can be constructed. For the purposes of this study, unless otherwise stated, we assumed that a capacity deficient sewer would be upgraded to a larger diameter. The upgraded pipeline generally followed the same slope as the existing pipeline, with the exception where survey data revealed negative or flat slopes in an existing alignment.

In essence, there are two alternatives for every trunk sewer project, but the decision to replace or construct a parallel sewer should be made during the preliminary design phase.

During the preliminary design phase, the existing sewer should be inspected by closed circuit television (CCTV) to determine its structural condition. If severely deteriorated, the existing sewer should be upgraded. If moderately deteriorated, slip lining or cured-in-place pipe lining can rehabilitate the existing sewer.

As the City continues to grow, it is recommended that the proposed pipeline diameters be constructed so that the facilities have sufficient capacity for build out conditions. Building a smaller interim project with the plans of upsizing in the future to account for further growth is not recommended due to the extended useful life of the improvements proposed herein. The proposed pipe diameter represents the ultimate diameter for build out conditions.

Both Figure 5.7 and Table 5.3 should be used together to locate the proposed improvement and to gain details of the improvement (length, diameter, street location, etc.). The improvement identification number links the figure and table. The improvements summarized in Table 5.3 use a cross-referenced number system. The columns used in Table 5.3 refer to the following:

- **Project ID**: Assigned unique identifier associated with each improvement project. This is an alphanumeric number that starts with one letter indicating the type of improvement P= Pipe, LS = Lift Station and continues with a number and a letter.
- **Type of improvement**: Pipelines, lift stations, force mains, and jacked steel casings.
- **Street Description**: Street in which the improvement is proposed.
- **Installation Year**: This is the year or decade the existing pipe was initially installed.
- **Existing Size**: This is the size of the existing pipeline/facility. It represents the diameter of the existing pipelines (inches), and the total capacity of lift stations (mgd).
- **Proposed Size**: This is the size of the proposed improvement. It represents the diameter of the proposed pipelines (inches), and the total capacity of lift stations (mgd). Additionally, for jacked steel casings, the size of the casing as well as the carrier pipe are indicated (inches).

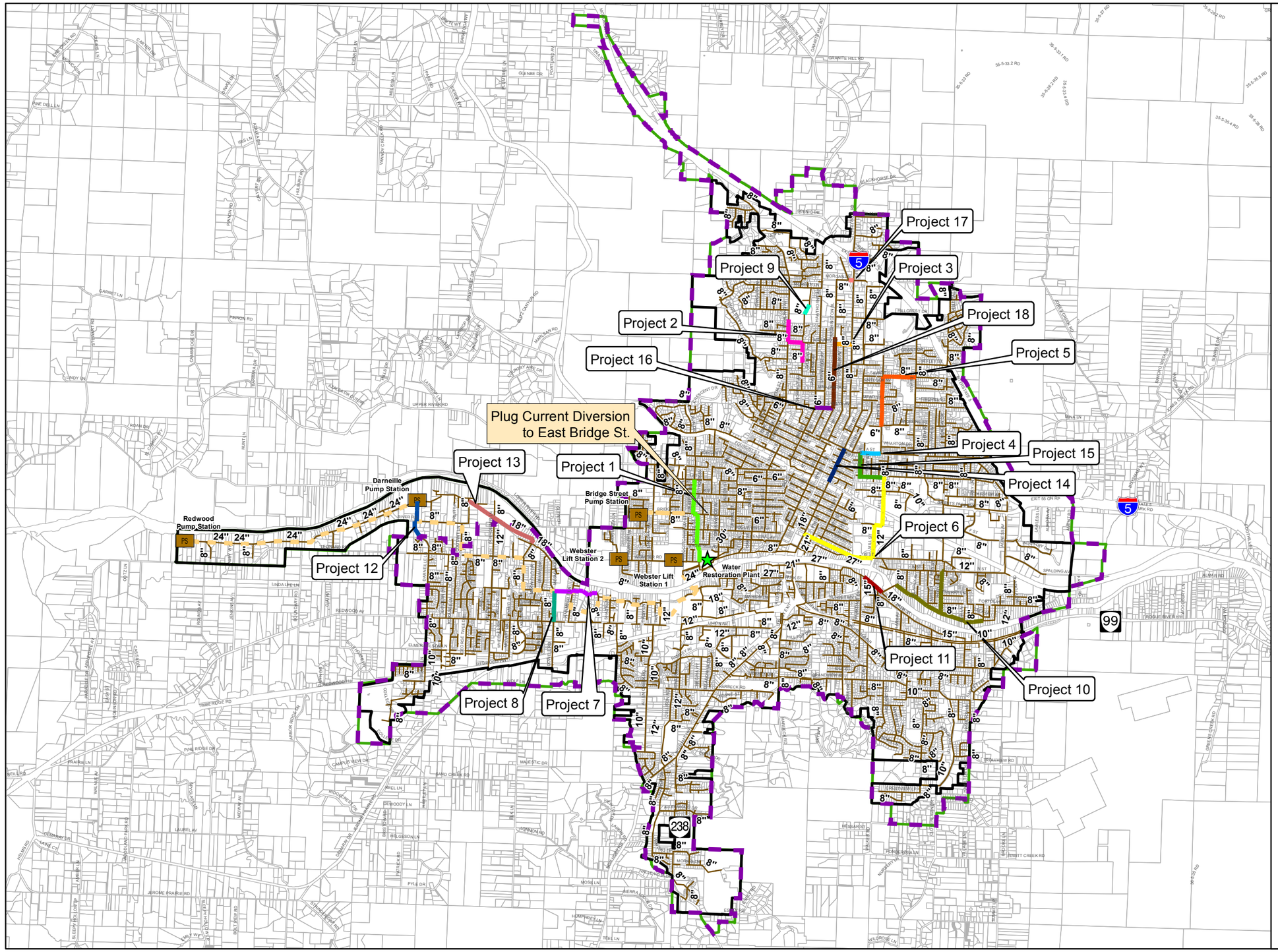
- **Action**: Indicates whether the proposed improvement is a replacement pipeline, parallel pipeline, or a new facility.
- **Length**: Estimated length of the proposed improvement (in feet). It should be noted that the length estimates do not account for re-routing the alignment to avoid unknown conditions.
- **Reason**: This section explains the reason why this improvement is proposed and needed (surcharging, flow diversions,…)

5.5.2 Recommended System Piping Improvements

This section provides a description of the recommended improvements to alleviate the capacity issues under the three planning conditions. Improvements to provide sufficient capacity throughout the system include upgrades to pipe diameters and pump stations capacities. Figure 5.7 illustrates the proposed sewer improvements required to meet the planning criteria, including the proposed pipeline diameter for the improvement.

In accordance with the established planning criteria, new sewer pipelines were sized such that the maximum flow depth to pipe diameter ratio (d/D) did not exceed the values summarized in Table 5.2. In other words, flows in recommended improvements were not allowed to surcharge during PWWF conditions.

Table 5.3 provides more detail of each improvement, including the diameter and length of the improvement, and corresponds to the improvements shown in Figure 5.7.



Legend

Proposed Pipe Capacity-Related Improvement Projects

- Project 1 - SW Western Street / SW Spruce Street
- Project 2 - NW Highland Street / NW Prospect Street
- Project 3 - NW Midland Ave
- Project 4 - NE A Street
- Project 5 - NE Savage Street / NE 9th Street
- Project 6 - SE Mill Street / SE Rogue View Lane
- Project 7 - Anabelle Ln
- Project 8 - Leonard Road
- Project 9 - Gilbert Creek Park
- Project 10 - Rogue Drive / SE Blue Bird Drive
- Project 11 - Park Street
- Project 12 - Darneille Lane
- Project 13 - Mesman Drive to Coutant Lane
- Project 14 - NE 7th Street
- Project 15 - NE Dean Dr / NE D St
- Project 16 - NW Evelyn Ave
- Project 17 - NW Morgan Ln
- Project 18 - NW Washington Blvd
- WRP
- Lift/Pump Station
- Other Gravity Mains
- Force Mains
- Study Area Boundary
- Existing Sewer Service Area
- UGB
- Tax Lots

0 4,000 8,000 Feet

Figure 5.7
Proposed Pipe Capacity-Related Improvement Projects
Wastewater Collection System Master Plan
City of Grants Pass

carollo
Engineers...Working Wonders With Water

Table 5.3 Proposed Pipe Projects Improvements
Wastewater Collection System Sewer Master Plan
City of Grants Pass

Project ID	Type of Improvement	Street Description	Installation Year	Existing Size (inch/MGD)	Proposed Size (inch)	Action	Length (ft)	Reason
Project 1 - SW Western Street / SW Spruce Street								
P-1A	Pipe	Along SW Western Ave between I St and K St	1947	8	12	Replace	581	Surcharging over performance criteria
P-1B	Pipe	Along SW Western Ave between K St and SW Bridge St	1947	10	15	Replace	546	Surcharging over performance criteria
P-1C	Pipe	Along SW Spruce St between SW Bridge St and Webster Rd	1966	8	18	Replace	1,998	Surcharging over performance criteria
P-1D	Pipe	Along SW Bridge St between SW Western Ave and SW Westhom Ave	1947	10	18	Replace	481	Surcharging over performance criteria
P-1E	Plug	Plug pipe to east Bridge St and reroute Bridge St Pump Station 8-inch force main to Spruce St	-	10	-	Plug	-	Diversion not needed anymore - alleviate Basin C
Project 2 - NW Highland Street / NW Prospect Street								
P-2A	Pipe	Along NW Highland Ave between 300 ft north of NW Parker Dr and NW Midland Ave	1966	8	12	Replace	939	Surcharging over performance criteria
P-2B	Pipe	Along NW Midland Ave between NW Highlands Ave and NW Prospect Ave	1963	8	12	Replace	623	Surcharging over performance criteria
P-2C	Pipe	Along NW Prospect Ave between NW Midland Ave and 150 feet south of NW Sandy Dr	1963	10	15	Replace	834	Surcharging over performance criteria
Project 3 - NW Midland Ave								
P-3A	Pipe	Along Midland Ave between NW 6th St and NW Washington Blvd	-	-	12	New	710	Divert flows away from NW 6th St on NW Washington Blvd to help with surcharging on 6th Street
Project 4 - NE A Street								
P-4A	Pipe	Along NE A St between NE 9th St and NE 7th St	1926	12	18	Replace	844	Surcharging over performance criteria
Project 5 - NE Savage Street / NE 9th Street								
P-5A	Pipe	Along NE Savage St between NE 10th St and NE 9th St and along NE 9th St between NE Savage St and NE Josephine St	1928 - 1947	8	12	Replace	3,431	Surcharging over performance criteria
Project 6 - SE Mill Street / SE Rogue View Lane								
P-6A	Pipe	Along SE Mill St between NE D St and SE M St	1947	12	18	Replace	3,755	Surcharging over performance criteria
P-6B	Pipe	Along SE M St between SE Mill St and SE 12th St	1947	12	21	Replace	907	Surcharging over performance criteria
P-6C	Pipe	Along SE M St between SE 12th St and SE 7th St	-	-	21	New	2,177	Replace existing pipe south of SE M St difficult to access.
Project 7 - Annabelle Lane								
P-7A	Pipe	RSSD Interceptor between Wineteer Ln To Leonard Rd	1974	15	21	Replace	1,948	Surcharging over performance criteria
Project 8 - Dowell Road								
P-8A	Pipe	Along Dowell Rd between Redwood Ave to south of Mesman Dr	1974	8	12	Replace	888	Surcharging over performance criteria
P-8B	Pipe	Along Dowell Rd between south of Mesman Dr and intersection of Leonard Rd with Mesman Dr	1974	8	15	Replace	384	Surcharging over performance criteria
Project 9 - Gilbert Creek Park								
P-9A	Pipe	Along Gilbert Creek Park 500 ft north of NW Parker Dr and west of NW Hawthorne Ave	1967	8	12	Replace	451	Surcharging over performance criteria

Table 5.3 Proposed Pipe Projects Improvements
Wastewater Collection System Sewer Master Plan
City of Grants Pass

Project ID	Type of Improvement	Street Description	Installation Year	Existing Size (inch/MGD)	Proposed Size (inch)	Action	Length (ft)	Reason
Project 10 - Rogue Drive / SE Blue Bird Drive								
P-10A	Pipe	Along Rogue Dr between SE N St and SE Blue Bird Dr	1962 - 1967	15	18	Replace	1,831	Surcharging over performance criteria
P-10B	Pipe	Through properties on north bank of river, south of Waterman Ln and Lela Ln to Blue Bird Dr	1962	12	15	Replace	1,890	Surcharging over performance criteria
P-10C	Pipe	Through properties on north bank of river, from Blue Bird Dr to just upstream of pipe split under Rogue River	1962	18	24	Replace	2,208	Surcharging over performance criteria
Project 11 - Park Street								
P-11A	Pipe	Through properties on south bank of the river between Mystic Dr and Gold River Ln	1962	18	27	Replace	202	Surcharging over performance criteria
P-11B	Pipe	Through properties on south bank of the river between Gold River Dr and SE Acacia Ln	1962	24	27	Replace	795	Surcharging over performance criteria
Project 12 - Darneille Lane								
P-12A	Pipe	Along Darneille Ln between the intersection of Darneille Ln with SW Harvest Dr and Darneille PS	1974	12	18	Replace	1,551	Surcharging over performance criteria
Project 13 - Mesman Drive to Coutant Lane								
P-13A	Pipe	RSSD Interceptor between Mesman Dr and Schroeder Ln	1974	18	21	Replace	2,047	Surcharging over performance criteria
P-13B	Pipe	RSSD Interceptor between Schroeder Ln and Coutant Ln	1974	18	24	Replace	1,282	Surcharging over performance criteria
Project 14 - NE 7th Street								
P-14A	Pipe	Along NE 7th Street between NE A St and NW F St	1926	12	18	Replace	1,531	Surcharging over performance criteria
Project 15 – NE Dean Drive/ NE D Street								
P-15A	Pipe	Along NE Dean Dr and NE D St from NE A St to SE Mill St	-	-	18	New	2,009	Divert flows from wastewater basin H towards basin I and help with deficiencies on 7th Street
Project 16 – NW Evelyn Avenue								
P-16A	Pipe	Along Evelyn Ave between NW 6th St and NW 2nd St	-	-	8	New	727	Divert flows from wastewater basin G towards basin C and help with deficiencies on 6th Street and 7th Street
Project 17 – NW Morgan Lane								
P-17A	Pipe	Along Morgan Ln between NW 6th St and NW Washington Blvd	-	-	12	New	208	Divert flows away from 6th Street on NW Washington Blvd to help with surcharging on 6th Street
Project 18 - NW Washington Boulevard								
P-18A	Pipe	Along NW Washington Blvd between NW Midland Ave and NW Manzanita Ave	1947	8	12	Replace	2,239	Surcharging over performance criteria due to diversion of flows from 6th St to this trunk.
P-18B	Pipe	Along NW Washington Blvd between NW Manzanita Ave and NW Evelyn Ave	1947	10	12	Replace	727	Surcharging over performance criteria due to diversion of flows from 6th St to this trunk.

5.5.2.1 Project 1 - SW Western Street / SW Spruce Street

The sewer pipes located in wastewater basin B, along Western Avenue and SW Spruce Street severely lacks capacity to convey design flows and shows significant surcharging starting under existing conditions.

Project 1 consists of replacing approximately 3,955 feet of existing 8- and 10-inch pipes with 12-, 15-, and 18-inch pipes. The portion of the sewer along Bridge Street shows a very low slope (approximately zero based on available GIS data). It is recommended that the slope in this segment be increased to keep the recommended diameters consistent with upstream and downstream pipelines and help with low velocities and deposits. Two force mains (one 4-inch and one 8-inch) discharge to Manhole No. B111 and Manhole B195 respectively, into an existing 8-inch pipe.

Once this project completed, the pipe flowing east Bridge Street located on Bridge Street can be removed or plugged. This existing 10-inch diversion splits flow from Bridge Street to both SW Spruce Street and west on Bridge Street. Removing this connection will alleviate existing and build-out capacity issues caused by peak flows along SW Silver Maple Way. Additionally, flow was flowing towards wastewater basin C, where manholes are shallow and risk of overflow higher. The 8-inch force main discharges to manhole B195 downstream of the 10-inch diversion to the east. The force main connection will need to be rerouted to west of the 10-inch diversion to be plugged so flows from the 8-inch force main flow to SW Spruce Street. Flows are now diverted and rerouted to the Spruce Street sewer.

5.5.2.2 Project 2 – NW Highland Street / NW Prospect Street

The existing trunk traveling south on NW Highland Ave, east on NW Midland Ave, and south on NW Prospect Ave lacks the hydraulic capacity to convey modeled peak flows. Project 2, located in wastewater basin F consists of upsizing about 2,396 feet of existing 8-, and 10-inch diameter sewers with new 12- and 15-inch diameter pipes.

In the existing condition, surcharging above the criteria occurs in NW Highlands Street only, while surcharging above two above pipe crown occurs in NW Prospect Street under 2025 conditions. Therefore, the projected infill and new development served by this trunk intensifies the recommendations related to this improvement.

5.5.2.3 Project 3 – NW Midland Avenue

The existing interceptors that run along NE 7th Street and NE 6th Street shows surcharging above the performance criteria and lacks the hydraulic capacity to convey modeled peak flows. Field observations collected by City maintenance staff showed that the existing sewers on NE 6th Street and NE 7th Street surcharge in the manholes during high flows, which confirms the results obtained using hydraulic modeling.

Both NE 6th Street and NE 7th Street are some of the largest and busiest streets of the City. The City expressed its desire of finding an improvement solution that would not impact these two arterials significantly. This project consists of diverting flows from NE 6th St to NW Washington Boulevard. Additional diversion pipes are implemented (Projects 15, 16, and 17) to free some capacity in the NE 6th Street and NE 7th Street sewers.

Project 3 consists of constructing 710 feet of new 12- inch sewers along NW Midland Ave between NE 6th St and NW Washington Blvd. The implementation of all four diversions in the short-term allows to divert enough flow away from NE 6th St to prevent replacing the NE 6th St Trunk where deficiencies are observed.

5.5.2.4 Project 4 – NE A Street

The existing trunk sewer that runs along NE A Street, between NE 9th Street and NE 7th Street, is flagged as capacity deficient in the hydraulic model starting under existing conditions, which results in surcharging above the planning criteria during PWWF.

Project 4 consists of replacing approximately 844 feet of existing 12-inch pipe with a new 18-inch pipeline. Resolving the surcharging issue in this segment along NE A Street removes the flow bottlenecking issue in this trunk, resulting in higher peak flows through the NE 7th Street interceptor. Therefore, it will be strategic to coordinate construction of the NE A Street improvements with the NE 7th Street interceptor improvements (see Project 14 - NE 7th Street) to ensure sufficient downstream capacity in the system to convey design peak flows.

5.5.2.5 Project 5 – NE Savage Street / NE 9th Street

The existing 8-inch trunk along NW Savage Street and NE 9th Street has insufficient capacity to convey design flows and creates bottlenecks.

Project 5 consists of upsizing 3,431 feet of the existing 8-inch pipe with a 12-inch trunk. Some of the current pipes in this project have low slopes, which increases the HGL in some pipes to above the design d/D value of 0.5. During design of the new pipes, it is recommended to maximize pipe slopes to avoid flat slopes and minimize d/D values.

5.5.2.6 Project 6 – SE Mill Street / SE Rogue View Ln

The existing 12-inch trunk travelling along SE Mill Street (beginning south of the train tracks), SE M Street, and along the river easement to SE 8th Street lacks capacity to convey the modeled design flow. Surcharging above the performance criteria in the manholes along this section is observed starting under existing conditions.

Existing pipelines alignment may be challenging to implement due to their location along an easement through riverside properties. However, the capacity deficiency in this segment is significant, and should be a priority to alleviate. This project is part of the backbone of the system and was constructed in 1947, and as the system grows, it is important that these interceptors be sized adequately.

Access to the manholes is poor along this section of pipes. Therefore, instead of replacing the existing pipelines, a new pipeline will be installed along M Street west from the intersection of Mill Street to the SE 8th Street and then south on SE 8th Street to a new crossing west of NE 7th Street to connect to the 21-inch along SE 7th St, connecting to the existing 30-inch trunk line going to the WRP. The old existing 12-inch pipe could then be lined without concerns about its capacity in the future, improving accessibility of major trunks.

Project 6 also recommends that 907 feet of existing 12-inch pipes located just south of the train tracks to SE 8th Street be replaced with 21-inch diameter pipes and 3,755 feet of existing 12-inch pipes with a new 18-inch sewer along SE Mill Street from NE D Street to SE M Street. This project will need to be coordinated with the implementation of Project 15, which diverts flows from wastewater basin H towards the Mill Street trunk instead of the NE 7th Street trunk. The current pipe immediately downstream of the train tracks has a low slope. During design of this project, the slope of this pipe is recommended to be maximized to minimize the d/D value during PWWF.

5.5.2.7 Project 7 - Annabelle Lane

The primary interceptor in the Redwood area runs westerly along the Rogue River. While portions of this pipeline surcharge during the PWWF due to low pipe slopes, only one section of the pipeline, between Wineteer Lane and Dowell Road, experiences surcharging above the performance criteria. Therefore, this segment of 15-inch pipeline is capacity deficient and 1,948 feet of pipes are recommended to be replaced with a 21-inch diameter. Per hydraulic modeling, this projected deficiency starts occurring in the short-term conditions. It is to be noted that the dual 12-inch force mains are parallel to this segment. Easements for construction of the dual force mains took a considerable amount of time to obtain and easements for the gravity portion of the sewer system were not enlarged at that time as well.

Project 7 consists of replacing the existing 1,948 feet of 15-inch pipe with a 21-inch pipe, which is greater than the upstream (15-inch) and downstream (18-inch) pipe diameters. The recommendation for the larger 21-inch pipe diameter is necessary based on existing pipe slopes of this segment and a design d/D value of 0.75. During design of this improvement project, the slope of these pipes should be maximized to minimize the d/D value during PWWF.

5.5.2.8 Project 8 - Dowell Road

The existing 8-inch sewer along Dowell Road, located between Redwood Avenue and the intersection of Leonard Road with Mesman Drive, lack sufficient capacity to convey the model design flow. Surcharging above the performance criteria is observed starting under existing conditions.

Project 8 consists of replacing the existing 8-inch main with 888 feet of 12-inch and 384 feet of 15-inch pipes. While there are similar flow rates through the entire improvement segment, the upgrade to the 15-inch for a portion of the improvement is necessary to maintain the design d/D

value of 0.5 based on existing pipe slopes. During design of this improvement project, the slope of this pipe should be maximized to minimize the d/D value during PWWF.

5.5.2.9 Project 9 - Gilbert Creek Park

The existing trunk traveling south through the football field and track of the North Middle School lacks the hydraulic capacity to convey build-out design flows. Project 9 consists of replacing 451 feet of existing 8-inch diameter pipe with a new 12-inch diameter trunk sewer. This improvement is located north of project 2, and helps to reduce capacity deficiencies in this area of the City. The pipe to replace is flat relatively to the surrounding pipe, which creates a bottleneck along this line. Upsizing this pipe will help alleviate the surcharging caused by this section of pipe.

5.5.2.10 Project 10 - Rogue Drive / SE Blue Bird Drive

The existing interceptor that runs along the north bank of the Rogue River, just south of SE Rogue Drive, SE Blue Bird Drive, and SE Oriole Street, experiences surcharging above the stated surcharging criteria and lacks the hydraulic capacity to convey the design flows starting in the short-term planning period. This deficiency is mainly due to the connection of the Spalding industrial area to the existing collection system. Project 10 will need to be implemented concurrently with the construction of the Spalding pump station.

Project 10 runs from south of Waterman Lane and Lela Lane to just upstream of the split pipeline flowing under the Rogue River, and along Rogue Drive. To alleviate the identified deficiencies, approximately 4,098 feet of 15- , and 24-inch pipelines are recommended to replace the existing 12- and 18- inch sewers, respectively along SE Blue Bird Drive and 1,831 feet of 18-inch to replace the existing 15-inch along Rogue Drive.

This project has many easement issues. There is, however, very limited possibility to build a new trunk line in this part of the system and convert this section of pipes into a local collector line only as recommended for project 6 - SE Mill Street / SE Rogue View Lane because of the depth of the existing transmission main. Access to manholes is very poor along this section of piping and there is a need to improve it to facilitate repair and maintenance from the City crew.

This interceptor receives wastewater flow from a large portion of the eastern side of the City, and is impacted by the development proposed in this area.

5.5.2.11 Project 11 – Park Street

The existing interceptor located downstream of the siphon south of the Rogue River along Park Street experiences surcharging above the stated surcharging criteria and lacks capacity immediately downstream the siphon causing backwater and high HGL in the siphon. To alleviate the deficiency, the segment of pipe located between the siphon and the 27-inch sewer between MH K158 and MH M170 will need to be upsized. Project 11 consists of upsizing 202 feet of 18-inch and 795 feet of existing 24-inch with 24-inch and 27-inch diameter sewers, respectively. Hydraulic capacity of the siphon was checked and the siphon appears adequately sized to convey build-out 2035 PWWFs.

5.5.2.12 Project 12 - Darneille Lane

Portions of the existing trunk sewer that runs along Darneille Lane, between SW Harvest Drive and the Darneille Pump Station are capacity deficient and result in surcharging above the planning criteria during build-out PWWF.

There are two separate parts to project 12, which include replacing a total of 1,551 feet of existing 12-inch sewers with 18-inch pipelines. These two segments of pipeline currently experience surcharging above the criteria primarily mainly due to their slopes. Resolving the surcharging issue in this segment removes surcharging above the criteria and helps prevent flow bottlenecking upstream of the Darneille Pump Station.

5.5.2.13 Project 13 – Mesman Drive to Coutant Lane

This improvement is located along the primary interceptor in the Redwood area that runs westerly along the Rogue River. The additional flow from build-out conditions causes surcharging above the planning criteria for the portion of the interceptor between Mesman Drive and Coutant Lane.

Project 13 consists of replacing the existing 18-inch main with 2,047 feet of 21-inch pipeline and 1,282 feet of 24-inch. Lower pipe slopes in this portion of the interceptor contribute to surcharging and require the use of a larger diameter interceptor. During the design of this project, slopes of these pipes should be maximized to minimize the d/D value during PWWF. As part of these improvements, the City needs to get better access to this line for future repair and maintenance of these new pipelines.

5.5.2.14 Project 14 - NE 7th Street

Portions of the existing trunk sewer that runs along NE 7th Street, south of A Street, are capacity deficient which results in surcharging above the planning criteria during build-out PWWF. This deficiency is a Long-Term period issue that should be address when development occurs upstream and the flows are augmenting.

Project 14 consists of replacing the existing 1,531 feet of 12-inch with an 18-inch pipeline along NE 7th Street between NE F Street and NE A Street.

For the improvements located along NE 7th Street between NE A Street and the train tracks, the d/D criteria for the 18-inch improvement is exceeded in some locations. This is mainly due to the existing low pipe slopes in these areas. During design of the improvements, it will be important to maximize pipe slopes in this area to minimize d/D values.

5.5.2.15 Project 15 – NE Dean Dr / NE D Street

Flows from wastewater basin H currently flows west on NE A Street towards NE 7th Street, overloading the NE 7th Street trunk. The City expressed its desire of finding an improvement solution that would impact the NE 6th Street and NE 7th Street trunks minimally, as both NE 6th Street and NE 7th Street are some of the largest and busiest streets of the City.

A new pipeline along NE Dean Drive and NE D Street from NE A Street to SE Mill Street is proposed. The purpose of this new collector is to redirect flows away from NE 7th Street towards wastewater basin I. Project 15 consists of constructing 2,009 feet of new 18-inch pipeline. Project 6 will need to be implemented as soon as this diversion becomes on-line.

5.5.2.16 Project 16 – NW Evelyn Street

Projects 3 and 17 consist of routing flows from NW 6th Street to Washington Boulevard to help alleviate the 6th Street trunk located on one of the busiest streets of the City. Project 16 also routes these diverted flows from NW 6th Street towards NW 2nd Street.

This improvement consists of redirecting flows from Washington Boulevard towards wastewater basin C and NW 2nd Street. The existing sewer on NW 2nd Street has capacity availability and is able to receive diverted flows from NE 6th Street with no additional improvements.

Project 16 consists of constructing 1,446 feet of new 12-inch sewer along NW Evelyn Street between Washington Boulevard and NW 2nd Street.

5.5.2.17 Project 17 – NW Morgan Lane

Flows from part of the North I-5 area (wastewater basin GG on Figure 4.2) is planned to be connected to the NE 6th Street trunk, significantly increasing future flows in this collector. Project 17 consists of constructing 208-feet of new 8-inch sewer between manholes G113 and G58.

This improvement is located along NW Morgan Lane. This project consists of creating a new diversion from NE 6th Street to NW Washington Boulevard to relieve both NE 6th Street and NE 7th Street, and free capacity in the NE 6th Street sewer trunk.

5.5.2.18 Project 18 - NW Washington Boulevard

As shown with Projects 3 and 17, flows from the NE 6th St trunk are diverted to NW Washington Blvd to alleviate the 6th St Trunk located on one of the busiest streets of the City. NW Washington Blvd now gets significant flows from 6th St in the future and capacity in this trunk becomes insufficient (above 2ft above pipe crown) in the long-term (2035).

In order to keep moving flows away from NE 6th St to the Washington Blvd trunk, Washington Blvd would need to be upsized in the long-term between Midland Ave and Evelyn Ave.

Project 18 consists of upsizing 2,966 of existing 8-inch and 10-inch sewer with a 12-inch sewer along NW Washington Blvd between NW Midland Ave and NW Evelyn Ave.

Project 18 is only required under build-out conditions (year 2035) and the City should take advantage of any pavement or other projects along NW 6th Street to replace this sewer pipe segment.

5.5.3 Recommended Pump Station Improvements

The capacity analysis performed on the pump stations in this study resulted in the identification of a variety of planning options in terms of improvements to pump stations and routing of flow, particularly with respect to the Darneille Pump Station. Three potential options are presented and a cost / feasibility comparison is performed as part of Chapter 6 – Capital Improvement Project.

Of the City's five pump stations, three are proposed for improvements to increase firm capacity to pump the PWWF.

5.5.3.1 Bridge Street Pump Station

Bridge Street Pump Station is capable of handling PWWFs under all scenarios, and therefore, no improvements are recommended for this pump station based on the capacity evaluation. However, the condition assessment analysis performed in Chapter 4 – Existing System and Condition Assessment revealed that the Bridge Street Pump Station is in poor condition and needs immediate attention.

5.5.3.2 Webster No. 1 Lift Station

The hydraulic model suggests that once the study area is build-out, the insufficient capacity at Webster No. 1 could cause sanitary sewer overflows (SSOs) from manholes upstream of the pump station. Upgrading this lift station before infill and new development occurs upstream of this area will be important to ensuring sufficient capacity in the collection system.

This lift station is currently under design and is being sized to convey projected build-out flows for the design storm. No challenges will exist when the new Lift Station is in place. Construction is planned to begin in 2016.

5.5.3.3 Webster No. 2 Lift Station

This lift station is expected to be deficient by year 2035. The 2035 deficiency for the peak hour flows is minimal, and equals approximately 0.08 mgd. While it is recommended that Webster No. 2 be upgraded to facilitate the additional flows for build-out of this area, other lift station improvements should rank higher in priority based on the magnitude of their deficiencies in comparison to Webster No. 2. Improvements to this lift station can be made when the station reaches its useful life and pumps need to be upgraded.

5.5.3.4 Darneille Pump Station

As shown in Table 5.2, Darneille Pump Station is significantly undersized to handle PWWFs starting under existing conditions. By 2035, PWWF is projected to be almost twice as much as current pump station firm capacity. This area serves the Redwood service area and flow monitoring revealed significant amount of Inflow and Infiltration on these basins. Inflow is an issue upstream of the Darneille Pump Station where significant flow enters the system through leaking manholes and private sewer laterals. In this area, most of the main lines are either relatively new or free from defects such as cracks, holes, or missing pipes. It is recommended

that the City looks into its direct inflow issue in this area in an attempt to reduce peak flows to the Darneille Pump Station.

The upgrade to the Darneille Pump Station pumping capacity is necessary to resolve the capacity limitations and eliminate upstream surcharging that is currently greater than the 2-feet criteria. In addition, increasing the pumping capacity at Darneille will reduce the related capacity issues at Redwood Pump Station that occur when all flow that Darneille pump station cannot handle is diverted towards Redwood Pump Station.

Five high level options were developed as part of this Plan to improve Darneille Pump Station.

1. Option 1: Darneille Pump Station Upgrade - This option consists of upgrading the existing Darnielle Pump Station to the firm capacity of 7.8 mgd and allow higher than design criteria velocities through the 14-inch force main under the bridge crossing the Rogue River upstream of WRP. The Redwood diversion will be removed.

   This option will be the easiest to gain approvals from the regulatory agencies and simplest for the O&M personnel since there will not be any significant changes in the operation. However, this option does not provide River crossing redundancy that the City desires. Any upgrade to the existing pump station has to include processes which significantly remove plastics and Fat, Oil, and Grease (FOG) from the discharge pipelines.

2. Option 2: New Pump Station and River Crossing - This option consists of building a new pump station south of the Rogue River and along Dowell. Road A new river crossing for a new 14-inch force main is needed along with a force main north of and along the Rogue River to the WRP. Any new pump station design needs to include provisions for the removal of plastics for the force main system and better management of FOG.

3. Option 3: Peak Flow Storage - This option consists of building an equalizing tank at the Darneille Pump Station site to hold a peak flow of 1.5 mgd and upgrade the Darneille Pump Station to the maximum capacity the 14-inch force main across the Rogue River can handle without exceeding velocity criteria (i.e. 6.5 mgd).

4. Option 4: Redwood Treatment and Discharge - This option consists of using the discharge permit to the Rogue River the City has at the Redwood Pump Station. Under this option, the Darneille Pump Station is upgrades to the maximum capacity of the 14-inch force main upstream of the WRP. Peak flows above this value will be routed towards the Redwood Pump Station through the existing diversion. The Redwood Pump Station will then need to be upgraded to handle this additional peak flow. A new physical/chemical treatment system will be installed at the Redwood Pump Station before discharging peak flows to the Rogue River during wet weather season.

5. Option 5: Treatment with Natural Systems - This option consists of routing Peak Flows from the Darneille Pump Station across the Rogue River north, to the 250 acres site owned by the City for natural treatment.

Option 5 will be similar to Option 4 except the final effluent will be applied to engineered treatment wetlands. This provides the City with thermal load offset that may be imposed by DEQ in the future. In addition, this option provides the City with River crossing redundancy.

A recommendation for Darneille Pump Station should be made following an Alternative Analysis evaluating costs and other parameters in further detail to develop a recommended solution to the capacity limitations at the Darneille Pump Station. Maps illustrating the proposed options are located in Appendix G. A summary of alternative analysis is presented in Table 5.4. This table compares each alternative against five parameters presented below, using a rating scale of 1 to 5 (1 being least favorable and 5 is most favorable):

1. Ease to get regulatory approval,
2. Provides redundant river crossing,
3. Offsets existing WRP expansion/provides additional thermal benefits,
4. Reduces operational and maintenance challenges, and
5. Cost implication to the City.

Table 5.4 Darneille Pump Station Improvement Options
Wastewater Collection System Master Plan
City of Grants Pass

Option	Regulatory	River Xing Redundancy	New Treatment	O&M	Flow Division	Cost
Option 1	5	1	3	5	2	5
Option 2	4	5	3	5	3	4
Option 3	5	1	3	3	3	3
Option 4	2	1	5	3	5	2
Option 5	2	5	5	2	5	1

5.5.3.5 Redwood Pump Station

Redwood Pump Station becomes slightly deficient in 2035 by 0.06 mgd. The evaluation of Redwood Pump Station should be included in the Alternatives Analysis for Darneille Pump Station.

The City developed a special planning criteria should be utilized for the capacity assessment of the Redwood Pump Station to utilize available temporary storage in pipelines. The PWWF firm capacity criteria for the Redwood Pump station was changed for Basin Z. Instead of recommending that the pump station be designed to pump the PWWF with its firm capacity, it is recommended that the existing pump station remain as it is currently, and that the pipes upstream of Redwood be allowed to surcharge up to 3 feet below the manhole rim. If surcharging occurred upstream of the Redwood Pump Station above the 3-foot criteria, a pump

station improvement would be recommended. For all planning scenarios evaluated, the 3-feet below manhole rim criteria are met for the upstream pipelines.

Additionally, minimal growth is expected in wastewater basin Z and sewers in this part of the system are relatively deep; therefore, the City was confident in changing the performance criteria to 3 feet below manhole rim for the manholes located in the Redwood pump station tributary area.

5.5.4 Project Phasing

Prioritizing the required capital improvements for the City's sewer collection system is an important aspect of this study. The improvement projects were prioritized based on the following factors:

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

Improvements to existing facilities will provide sufficient capacity to mitigate existing issues and to convey increased flows resulting from future growth. Future development will require the construction of sewers to serve new users. To assist in future planning, all proposed improvements presented above are grouped in accordance with four priorities that were defined upon urgency of needs:

- Phase 1 (2015-2020): Proposed facilities located in areas flagged as deficient under existing modeling conditions for the design storm that needs to be addressed first. Timing for these projects is planned between 2015 and 2020.
- Phase 2 (2021- 2025): Proposed facilities located in areas flagged as deficient under Short-Term (2025) modeling conditions for the design storm and proposed facilities to service major growth areas to be developed in the short-term.
- Phase 3 (2026-2035): Proposed facilities located in areas flagged as deficient under Long-Term (2035) modeling conditions for the design storm and proposed facilities to service major growth areas to be developed in the long-term.

The projects were phased based on the best available information for how the City will develop moving forward. The actual implementation of the improvements serving future users ultimately depends on growth. The priorities presented below are estimates, and will change with the City's planning assumptions or growth projections, which could increase or decrease the priority of each improvement. Table 5.5 shows all projects allocated to the three phasing period.

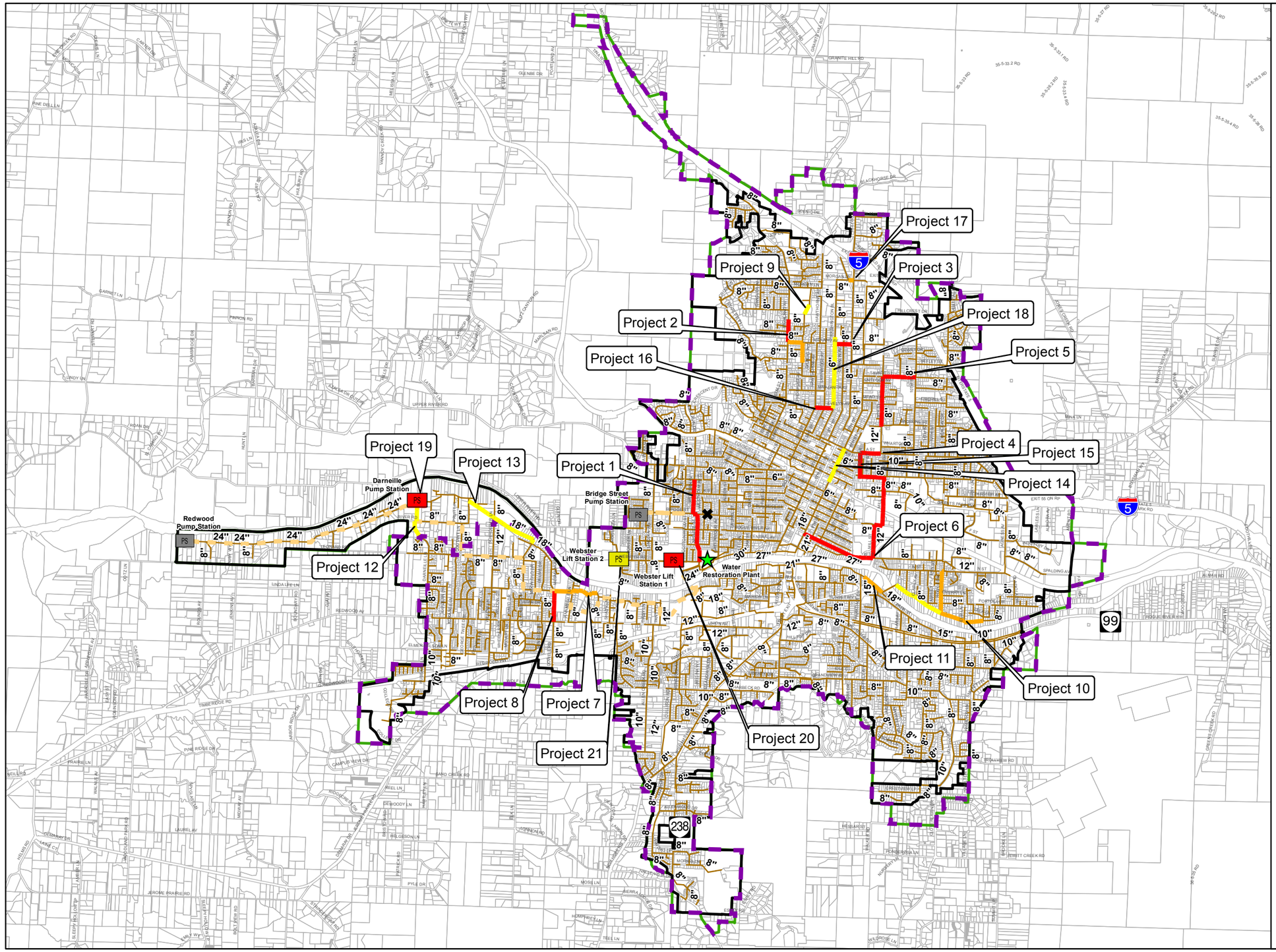
Figure 5.8 illustrates the recommended projects by priority phasing.

Table 5.5 Proposed Projects Phasing Assumptions
Wastewater Collection System Master Plan
City of Grants Pass

Project Description			Project Phasing		
Improv. ID	**Type of Improv.**	**Description/Street**	**Phase 1 2015-2020**	**Phase 2 2021-2025**	**Phase 3 2026-2035**
Project 1 - SW Western Street / SW Spruce Street					
P-1A	Pipe	Along SW Western Ave between I St and K St	x		
P-1B	Pipe	Along SW Western Ave between K St and SW Bridge St	x		
P-1C	Pipe	Along SW Spruce St between SW Bridge St and Webster Rd	x		
P-1D	Pipe	Along SW Bridge St between SW Western Ave and SW Westhom Ave between Manholes B31 and B30	x		
P-1E	Plug	Plug pipe to east Bridge St (between B108 and B21) and reroute Bridge St Pump Station 8-inch force main (from B108) to SW Spruce St sewer	x		
Project 2 - NW Highland Street / NW Prospect Street					
P-2A	Pipe	Along NW Highland Ave between 300 ft north of NW Parker Dr and NW Midland Ave	x		
P-2B	Pipe	Along NW Midland Ave between NW Highlands Ave and NW Prospect Ave		x	
P-2C	Pipe	Along NW Prospect Ave between NW Midland Ave and 150 feet south of NW Sandy Dr		x	
Project 3 - NW Midland Ave					
P-3A	Pipe	Along Midland Ave between NW 6th St and NW Washington Blvd	x		
Project 4 - NE A Street					
P-4A	Pipe	Along NE A St between NE 9th St and NE 7th St	x		
Project 5 - NE Savage Street / NE 9th Street					
P-5A	Pipe	Along NE Savage St between NE 10th St and NE 9th St and along NE 9th St between NE Savage St and NE Josephine St	x		
Project 6 - SE Mill Street / SE Rogue View Lane					
P-6A	Pipe	Along SE Mill St between NE D St and SE M St	x		
P-6B	Pipe	Along SE M St between SE Mill St and SE 12th St	x		
P-6C	Pipe	Along SE M St between SE 12th St and SE 7th St	x		
Project 7 - Annabelle Lane					
P-7A	Pipe	RSSD Interceptor between Wineteer Ln To Leonard Rd		x	
Project 8 - Dowell Road					
P-8A	Pipe	Along Dowell Rd between Redwood Ave to south of Mesman Dr	x		
P-8B	Pipe	Along Dowell Rd between south of Mesman Dr and intersection of Leonard Rd with Mesman Dr	x		
Project 9 - Gilbert Creek Park					
P-9A	Pipe	Along Gilbert Creek Park 500 ft north of NW Parker Dr and west of NW Hawthorne Ave			x
Project 10 - Rogue Drive / SE Blue Bird Drive					
P-10A	Pipe	Along Rogue Dr between SE N St and SE Blue Bird Dr		x	
P-10B	Pipe	Through properties on north bank of river, south of Waterman Ln and Lela Ln to Blue Bird Dr		x	
P-10C	Pipe	Through properties on north bank of river, from Blue Bird Dr to just upstream of pipe split under Rogue River			x
Project 11 - Park Street					
P-11A	Pipe	Through properties on south bank of the river between Mystic Dr and Gold River Ln		x	
P-11B	Pipe	Through properties on south bank of the river between Gold River Dr and SE Acacia Ln		x	
Project 12 - Darneille Lane					
P-12A	Pipe	Along Darneille Ln between the intersection of Darneille Ln with SW Harvest Dr and Darneille PS			x

Table 5.5 Proposed Projects Phasing Assumptions
Wastewater Collection System Master Plan
City of Grants Pass

Project Description			Project Phasing		
Improv. ID	**Type of Improv.**	**Description/Street**	**Phase 1 2015-2020**	**Phase 2 2021-2025**	**Phase 3 2026-2035**
Project 13 - Mesman Drive to Coutant Lane					
P-13A	Pipe	RSSD Interceptor between Mesman Dr and Schroeder Ln			x
P-13B	Pipe	RSSD Interceptor between Schroeder Ln and Coutant Ln			x
Project 14 - NE 7th Street					
P-14A	Pipe	Along NE 7th Street between NE A St and NW F St			x
Project 15 - NE Dean Dr / NE D St					
P-15A	Pipe	Along NE Dean Dr and NE D St from NE A St to SE Mill St	x		
Project 16 - NW Evelyn Ave					
P-16A	Pipe	Along Evelyn Ave between NW 6th St and NW 2nd St	x		
Project 17 - NW Morgan Ln					
P-17A	Pipe	Along Morgan Ln between NW 6th St and NW Washington Blvd		x	
Project 18 - NW Washington Boulevard					
P-18A	Pipe	Along NW Washington Blvd between NW Midland Ave and NW Manzanita Ave			x
P-18B	Pipe	Along NW Washington Blvd between NW Manzanita Ave and NW Evelyn Ave			x
Project 19 - Darneille Pump Station					
PS-19A	Pump Station	Alternatives Analysis Study	x		
PS-19B	Pump Station	Darneille PS	x		
Project 20 - Webster No.1 Lift Station					
PS-20A	Pump Station	Webster No. 1 PS	x		
Project 21 - Webster No.2 Lift Station					
P-21A	Pump Station	Webster No. 2 PS			x
Project 22 - Spalding Area Development Expansion					
PS-22A	Pump Station	SE Portola Dr		x	
P-22B	Force Main	From Spalding PS to NE Portola Dr		x	
P-22C	Gravity	In Spalding Area		x	
P-22D	Gravity	In Spalding Area			x
P-22E	Casing	Railroad crossing		x	
Project 23 - North I-5 Area Development Expansion					
PS-23A	Pump Station	Monument Dr and I-5			x
P-23B	Force Main	From I-5 PS to pipe on Pony Ln and NW Highland Ave			x
P-23C	Gravity	In I-5 North Area			x
P-23D	Casing	I-5 Crossings (3)			x
Project 24 - South Highway Development Expansion					
P-24A	Gravity	In South Highway Area			x
Project 25 - South Rogue River Development Expansion					
P-25A	Gravity	In South Rogue River Area			x
Project 26 - West NW Starlite Ln Development Expansion					
P-26A	Gravity	In West NW Starlite Ln Area			x



Legend

Proposed System Improvement Projects Phasing

- Phase 1 (2015-2020)
- Phase 2 (2021-2025)
- Phase 3 (2026-2035)

Lift/Pump Station Proposed Improvements

- Phase 1 (2015 - 2020)
- Phase 3 (2026 - 2035)
- Lift/Pump Station No Improvement
- Remove Diversion
- WRP
- Other Gravity Main
- Force Mains
- Existing Sewer Service Area
- UGB
- Study Area Boundary
- Tax Lots

N

0 4,000 8,000 Feet

Figure 5.8
Proposed System Improvement Projects Phasing
Wastewater Collection System Master Plan
City of Grants Pass

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5.5.5 Proposed Improvements Summary

A total of about 40,744 linear feet of pipes ranging from 12-inch to 27-inch are recommended to alleviate capacity deficiencies identified in this chapter for all three planning conditions (existing, 2025, and 2035). Three out of the five City's pump stations will need to be upgraded in the near future in order to handle the projected PWWFs with the largest pump out of service. Table 5.6 shows all projects identified phased in this chapter for capacity purposes.

These improvements will be combined with the recommended improvements that were recommended for condition purposes in Chapter 4 - Existing System and Condition Assessment. If projects are overlapping between capacity and condition projects, it is assumed that the highest phase between the two will be picked. Therefore, phasing of these projects might slightly change in Chapter 6 - CIP and some projects might be moved forward for condition purposes.

Costs estimates will be provided for each project in Chapter 6 – Capital Improvement Plan.

Table 5.6 Improvement Projects Summary
Wastewater Collection System Master Plan
City of Grants Pass

Proposed Project	Phase 1	Phase 2	Phase 3
Existing Pipe Upsize(1)	20,377 ft	8,331 ft	12,036 ft
System Expansion (New Pipes) (2)	-	6,906 ft	57,461 ft
Darneille PS(3)	X		
Webster No.1(3)	X		
Webster No.2(3)			X
New Spalding PS(2)		X	
New North I-5 PS(2)			X

Notes:
(1) Summary of section 5.5.1 of this Chapter.
(2) Summary of section 5.4.1.3 of this Chapter, and summarizes the proposed new pipes in Figures 5.3, 5.4, and 5.5 to connect the new growth areas to the existing collection system.
(3) Summary of section 5.4.2 of this Chapter.