

## ORDINANCE NO. 2231

### AN ORDINANCE AMENDING THE TEXT OF CHAPTER 8 OF THE BEND AREA GENERAL PLAN, PUBLIC FACILITIES AND SERVICES, AND ADOPTING A GOAL 11 COLLECTION SYSTEM PUBLIC FACILITY PLAN FOR THE BEND AREA GENERAL PLAN.

#### Findings

A. On October 3, 2014, the City submitted a Notice of Proposed Amendment pursuant to ORS 197.610 to the Oregon Department of Land Conservation and Development. The City's Notice proposed amendments to the text of Chapter 8, Public Facilities and Services, of the Bend Area General Plan and adoption of a Goal 11 Collection System Public Facility Plan.

B. On November 10, 2014, the Bend Planning Commission conducted a public hearing on the Collection System Public Facility Plan, and the related amendments to Chapter 8 of the Bend Area General Plan. This hearing was continued until November 24, 2014 to provide additional time for public comment. At the close of the hearing held on November 24, 2014, the Planning Commission unanimously voted to forward the proposed Collection System PFP and Chapter 8 amendments on to the City Council with a recommendation to approve.

D. The City Council held a public hearing on December 3, 2014 on the Collection System Public Facility Plan and related amendments to Chapter 8 of the Bend Area General Plan. Notice of the hearing before the City Council was published in the Bend Bulletin on November 13, 2014. The City Council has considered the evidence in the record, including the evidence and the testimony submitted at the public hearings.

#### THE CITY OF BEND ORDAINS AS FOLLOWS:

Section 1. Chapter 8 of the Bend Area General Plan, Public Facilities, dated February 2013 is amended with the December 2014 version attached as Exhibit "A."

Section 2. The Goal 11 Collection System Public Facility Plan, attached as Exhibit "B" and dated December 2014, is adopted and incorporated by reference in the Bend Area General Plan.

Section 3. The City Council adopts the following as findings:

1. Findings in Support of the Adoption of the Goal 11 Collection System Public Facility Plan and amendments to Chapter 8 of the Bend Area General Plan dated October 2014, File PZ14-0855.

First Reading: December 3, 2014

Second Reading: December 17, 2014

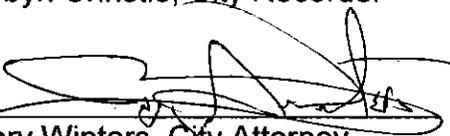
Adopted by roll call vote by the City Council on December 17, 2014.

|      |                            |          |
|------|----------------------------|----------|
| YES: | Mayor Jim Clinton          | NO: none |
|      | Councilor Jodie Barram     |          |
|      | Councilor Mark Capell      |          |
|      | Councilor Scott Ramsay     |          |
|      | Councilor Victor Chudowsky |          |
|      | Councilor Doug Knight      |          |
|      | Councilor Sally Russell    |          |

  
\_\_\_\_\_  
Jim Clinton, Mayor

Attest:

  
\_\_\_\_\_  
Robyn Christie, City Recorder

  
\_\_\_\_\_  
Mary Winters, City Attorney

# Bend Area General Plan

## *Chapter 8: Public Facilities and Services*

---

### TABLE OF CONTENTS

|                                          |    |
|------------------------------------------|----|
| PREAMBLE .....                           | 1  |
| GOALS.....                               | 1  |
| OVERVIEW .....                           | 1  |
| SEWER COLLECTION SYSTEM FACILITIES ..... | 2  |
| WATER FACILITIES AND SYSTEMS.....        | 7  |
| STORM DRAINAGE FACILITIES AND SYSTEMS .  | 11 |
| SOLID WASTE DISPOSAL.....                | 12 |
| OTHER URBAN UTILITIES.....               | 14 |
| PUBLIC BUILDINGS AND FACILITIES.....     | 14 |
| POLICIES.....                            | 17 |
| Sewer Collection System Facilities       |    |
| Water Facilities and Systems             |    |
| Storm Drainage Facilities and Systems    |    |
| Solid Waste Disposal                     |    |
| Public Buildings and Facilities          |    |

### **NOVEMBER 1998**

Amended January 5, 2009; Ordinance NS-2112

Amended April 3, 2013 – Ordinance NS-2194

**Amended December 19, 2014 – Ordinance NS-XXXX**

Amendments subject to acknowledgment by the State

# BEND AREA GENERAL PLAN

## PREAMBLE

Consideration of the public and private facilities and services within the Bend Urban Growth Boundary is an important focus of the Plan. Several of these services — water, sanitary sewers, energy supplies, and communications — are the backbone needed to support and encourage urban level development. Other urban services such as refuse disposal, emergency services, and storm water disposal are also necessary parts of the mix of urban services. Although most of these facilities and services have a planning horizon greater than 20-years, they are still driven by the population and land use needs forecast in the General Plan.

## GOALS

Adequate public facilities are the key to efficient and stable urban development. The goals below provide general guidance for maintaining and improving the level and quality of urban services as growth occurs in Bend. The citizens and elected officials strive:

To have public and private utility systems provide adequate levels of service to the public at reasonable cost;

For the city, county, and special districts to coordinate the provision of adequate urban services in an efficient and timely manner to support urban development;

For new development to pay its fair share of the cost of major facilities needed to support development;

To ensure that public services will not negatively impact the environment or the community; and

To locate and operate public buildings and other public facilities to best serve the needs of the residents.

## OVERVIEW

The Public Facilities and Services chapter describes existing facilities and utilities in Bend and also describes what city facilities are needed to meet projected growth. The listing of city water and sewer projects planned for and expected over the next twenty years provides a framework for decisions on when, where, and how public facilities will be provided to support the projected growth. The city will use the listing of projects as a basis for its annual capital improvement budget.



## SEWER COLLECTION SYSTEMS FACILITIES

The City adopted a public facility plan for sewer collection by Ordinance No. 2111 in 2009. The plan was based on the city's 2007 Collection System Master Plan and identifies future improvements to the sewerage collection facilities required to serve long range growth in Bend. However, the city's 2009 Public Facility Plan adopted by the City Council was never acknowledged by the state.

In response to the 2008 UGB Expansion Remand, the City began a comprehensive planning process to update the previous Collection System Master Plan developed in 2007. This planning effort has built on information from the previous master plan, leveraged improvement concepts and utilized system information collected and analyzed in that report. The adopted 2014 Collection System Public Facility Plan replaces the 2009 Public Facility Plan and provides guidance and sound stewardship of the City's sewer collection system for the 2013 – 2033 planning period.

### **Service Area**

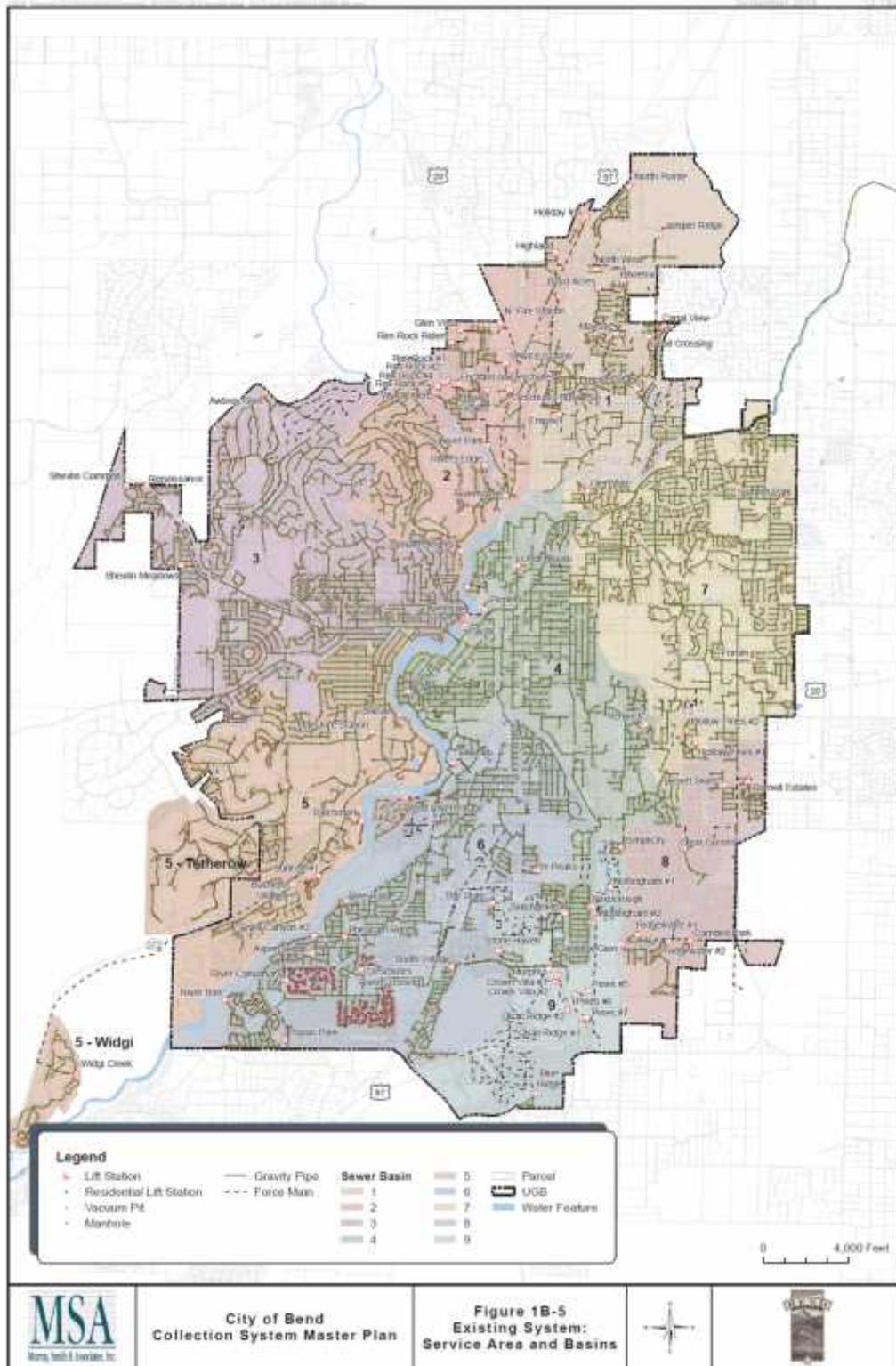
The collection system service area includes all areas within the city limits of Bend and the Urban Growth Boundary that are either currently served by the City's wastewater collection system or will be served by the system within the 20-year planning period. To determine the future development projections within the UGB, the City relied upon and applied the adopted General Plan designations.

The City's Collection System Public Facility Plan separates the primary collection system into nine major sewer basins covering the approximate 35 square miles of the UGB. These nine major sewer basins are further sub-divided into several smaller sewer sub-basins for the purpose of determining flow capacity. The wastewater analysis and future forecasts consider existing customers, future customers and the conversion of septic to sewer connections within the UGB. There are currently 3,103 residential units and 158 non-residential acres that are served by a County permitted septic system within the UGB. Within the 20-year planning period it is assumed that these residential units and non-residential acres will redevelop and/or connect to the city's collection system.



# BEND AREA GENERAL PLAN

**Figure 8-1**  
**Existing System Service Area and Basins**



## **Municipal System**

The City's primary wastewater collection system is generally comprised of manholes, gravity pipelines, City-owned lift stations and force mains that convey sewage to the wastewater reclamation facility through 249 miles of gravity pipe and 69 miles of force main and pressure sewer pipeline. Most of the gravity collection system was constructed in the late 1970's, when the City received federal funding to construct a centralized wastewater treatment plant. The City completed its sewerage collection system and treatment plant in 1983. Since that time a number of upgrades have occurred in both the plant and collection system. The wastewater treatment plant has capacity for an average flow of approximately seven million gallons a day. Figure 8-1 charts the average daily flows at the wastewater treatment plant and shows a gradual increase of the average daily flow. The flow data includes seasonal wet weather events.

**Table 8-1  
Annual Average Flow from Historical Records at the WRF**

| <b>Year Average Daily Flow</b> | <b>Year Average Daily Flow</b> |
|--------------------------------|--------------------------------|
| 2007                           | 5.4 <sub>1</sub>               |
| 2008                           | 7.2 <sub>2</sub>               |
| 2009                           | 5.6                            |
| 2010                           | 5.5                            |
| 2011                           | 5.3                            |
| 2012                           | 5.4                            |
| 2013                           | 5.9 <sub>1</sub>               |

*1) 2007 and 2013 average calculated from flow meter data (2-month period).*

*2) Suspected error in inflow data at the WWTP. Inflow meter was recalibrated after 7/20/2009.*

The master plan for the wastewater reclamation facility (WRF) was completed in 2008 by Carollo Engineering. The plan for the WRF was submitted to the Department of Land Conservation and Development in 2009. The Land Conservation and Development Commission (LCDC) acknowledged the 2008 plan for the WRF through Order 001795 in November 2010. The WRF Master Plan identifies short term and long term capacity improvements that will enable the City of Bend to minimize expansion costs by fully utilizing the existing facilities. The 2014 Collection System Public Facilities Plan proposes improvements to increase the capacity of the collection system to 11.9 MGD within the 20-year planning period. The design of the WRF was completed in 2012, with construction beginning in the summer 2013. The City expects the WRF expansion to be completed by 2016.

## **Optimization**

The City utilized an optimization process to determine the combination of system improvements that would satisfy hydraulic performance criteria and minimize overall life-cycle costs. The optimization model enables an exhaustive and objective evaluation of feasible collection system improvement alternatives. The optimization software, Optimizer WCS™, is a decision-support software program that integrates improvement alternatives, comprehensive life-cycle costs, design criteria and the calibrated hydraulic model of the



# BEND AREA GENERAL PLAN

collection system. In a single optimization analysis, the software evaluates over 100,000 possible solution configurations and assesses life-cycle cost and hydraulic performance simultaneously while sizing system improvements. Over the course of this project, over one hundred individual optimization runs were completed, representing a total analysis of more than 10 million trial solutions.

The optimization process identified short-term and long-term capacity upgrade projects to be phased over the 20-year planning period.

## **Capital Improvement Program**

The Capital Improvement Program (CIP) describes proposed improvements that are required in both the short-term (1-5 year) and long-term (6 to 10 years and 11 to 20 years) to provide reliable sewer collection throughout the City's current UGB.

In response to existing and future hydraulic deficiencies, condition deficiencies and other operational issues identified by O&M staff, there are several major projects that the City should undertake in the short-term (1 to 5 years). Below is the list of short-term projects and estimated project cost in 2013 dollars.

1. Southeast Interceptor (SEI) Phase 1 - \$19,681,000.
2. Colorado Lift Station - \$4,208,000.
3. North Area Improvements - \$1,370,000.
4. Plant Interceptor Rehabilitation - \$5,400,000.
5. Valhalla Sewer Relocation and Odor Control - \$1,616,000.
6. Condition-Related Lift Station Improvements - \$5,667,000.

There are also a number of recommended long-term (year 6 through build-out) improvement projects required to support anticipated increases in collection system flow within the existing UGB, provide service to unsewered areas, and to plan for ongoing system repair and replacement. Below are the primary long-term projects and the estimated project costs in 2013 dollars.

Southeast Interceptor, Phase 2 - \$8,379,000.

Northeast Interceptor - \$15,086,000.

Decommissioning of Lift Stations - \$700,000.

Long-Term Repair and Replacement Program \$27,070,000.

Local Area Improvements – \$5,000,000.

Ongoing Sewer Flow Monitoring, Modeling, and Planning Projects - \$1,500,000.



The actual project costs will likely vary from the estimates presented. In addition, the project estimates will change over time due to fluctuations in actual labor and material costs, competitive market conditions, site conditions, final project scope, implementation schedule, continuity of personnel, and other unforeseeable factors. Because of these factors, project feasibility, benefit-to-cost ratios, risks and funding must be carefully reviewed prior to making specific financial decisions or establishing project specific budgets.

### **Sewer Collection System Financial Strategy**

The City's financial strategy for the collection system considers the current and future financial obligations of the utility, operation and maintenance needs, fiscal policy achievement and the ability to support the completion of the capital projects identified in this CSMP update.

The overall goal of the financial plan is to have the annual water reclamation utility total resources (rates and fees) set at a sufficient level to meet annual uses (operations, maintenance, debt service, capital costs and fiscal policy achievement) to ensure a self-supported utility. The primary source of funding for the utility is derived from ongoing monthly charges for service, with additional revenue coming from miscellaneous fees/charges, interest income and system development charges (SDCs). The City Council controls and approves the level of user charges as needed to meet financial objectives.

The financial plan considers the total system costs of providing water reclamation services, both operating and capital. The following elements were completed as part of the financial plan:

**Capital Funding Plan.** Identifies the total Capital Improvement Plan (CIP) funding obligations of the planning period. The plan defines a strategy for funding the CIP including an analysis of available resources from rate revenues, existing reserves, system development charges, debt financing, and any special resources that may be readily available (e.g., grants, developer contributions, etc.). The capital funding plan impacts the financial plan through the use of debt financing (resulting in annual debt service) and the assumed rate revenue available for capital funding.

**Operating Forecast.** Identifies future annual non-capital costs associated with the operating, maintenance, and administration of the water reclamation system. Included in the financial plan is a reserve analysis that forecasts cash flow and fund balance activity along with testing for satisfaction of actual or recommended minimum fund balance policies. The financial plan ultimately evaluates the sufficiency of utility revenues in meeting all obligations, including cash uses such as operating expenses, debt service, capital outlays, and reserve contributions, as well as any coverage requirements associated with long-term debt. The plan also identifies the future adjustments required to fully fund all utility obligations in the projection period.

The City Council approved a nine percent rate increase effective on October 1, 2014. All monthly rates (monthly rate and volume rate) will increase uniformly by nine percent.



# BEND AREA GENERAL PLAN

Residential customers inside the city will pay a monthly rate of \$48.36 per dwelling unit, and residential customers outside the city will pay a monthly rate of \$49.82 per dwelling unit. The financial plan indicates that an additional 3.1 percent per year increase will be needed to meet the water reclamation utility rate revenue requirement within the 10-year financial planning horizon.

## **System Development Charges**

SDCs are one-time fees imposed on new and increased development to recover the cost of system facilities needed to serve that growth. An SDC can include two major components:

- A reimbursement fee that reflects the cost of existing infrastructure with capacity that is available to serve growth
- An improvement fee that reflects the portion of the cost of future projects that is attributable to providing capacity for growth.

The financial plan above assumes that the city's sewer SDC remains at its current level of \$2,986 per equivalent dwelling unit. The City has recently initiated an SDC study, which will have a separate public process. That process is expected to begin late 2014 and be complete by June of 2015 and will incorporate all new information contained in this plan to determine the appropriate SDC and its implementation.

## **WATER FACILITIES AND SYSTEMS**

The quality of water in the Bend urban area is a matter of major importance. Not only is water necessary for the needs of residential, commercial, and industrial users, but it supports many of the recreational and scenic opportunities that make the Bend area a desirable place to live.

In 2006, the city engaged in an update to the water system master plan to serve the existing urban growth boundary, the urban reserve area identified in this plan, and potential areas for future expansion of the UGB. This 2006 master plan followed the development and approval of a water management and conservation plan (WMCP) in 2004. The City relied on these documents, water planning documents from the Avion Water Company and Roats Water Company, and reports from the City Engineer updating information from the 2007 Water Master Plan to develop an updated Goal 11 water public facility plan (PFP) for the existing Bend UGB. This 2013 Water PFP is incorporated as the Goal 11 public facility plan for water and identifies the capital improvements needed to serve the existing and future development within Bend's UGB.



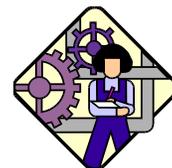
## **Municipal System**

The City of Bend is one of three water suppliers within the UGB. The city's water system in 2006 included about 22,000 service connections. Since 1926, the City of Bend's main source of water has been from Bridge Creek in the Tumalo Creek watershed. Tumalo Creek originates on the eastern slopes of Ball Butte and Broken Top Mountain about 20 miles west of Bend in a protected watershed area, which lies within the Deschutes National Forest. Figure 8-2 shows the annual water use from 1998-2005 in acre feet. Figure 8-3 shows the annual water use pattern, using daily use data from 2005.

The Deschutes Watershed has excellent water quality, considering both chemical and bacteriological quality with only chlorination treatment. The water is a consistent 48 °F. winter and summer, and is clear with the exception of slightly turbidity during periods of high runoff from the watershed. These periods occur only occasionally, and last only a few days. The 1986 Safe Drinking Water Act required that all surface water systems in the nation provide filtration unless stringent watershed control, raw water quality and disinfection systems were met. In 1992 the city demonstrated sufficient evidence to meet the criteria, and obtained an exemption from the Surface Water Treatment Rules contained in the 1986 Act. The Bridge Creek source can deliver up to 13.5 million gallons per day. The City supplements the Bridge Creek source with deep groundwater wells. In 2006 the city had 21 wells on line to supplement the Bridge Creek source. These wells increase the delivery capacity of the city system to approximately 36 million gallons per day. In addition, the city has 28.0 million gallons of reservoir storage. The city's 475 miles of water distribution system is primarily composed of ductile iron pipe.

The city water system historically provided metered service for industrial, commercial, and multifamily developments. However, the city was one of the last major water systems in the state to use flat rate (non-metered) billing for residential service connections. As of December 2004, the City has become fully metered for all customers. This included conversion to automated meter reading technology, as well as installation of premise isolation cross connection protection at every service connection as part of our Safe Drinking Water Program. In 2004, the City updated its required Water Management and Conservation Plan which outlines various conservation related benchmarks, in order to meet conditions by the Oregon Water Resources Department as part of obtaining new water rights to meet the needs of growth.

The city's 2007 Water System Master Plan Update identifies water supply, transmission, and storage needs throughout the city's service territory within the UGB. Additional wells, reservoirs, main transmission lines, and smaller distribution lines will be needed to meet the projected urban area growth.



# BEND AREA GENERAL PLAN

Figure 8-2

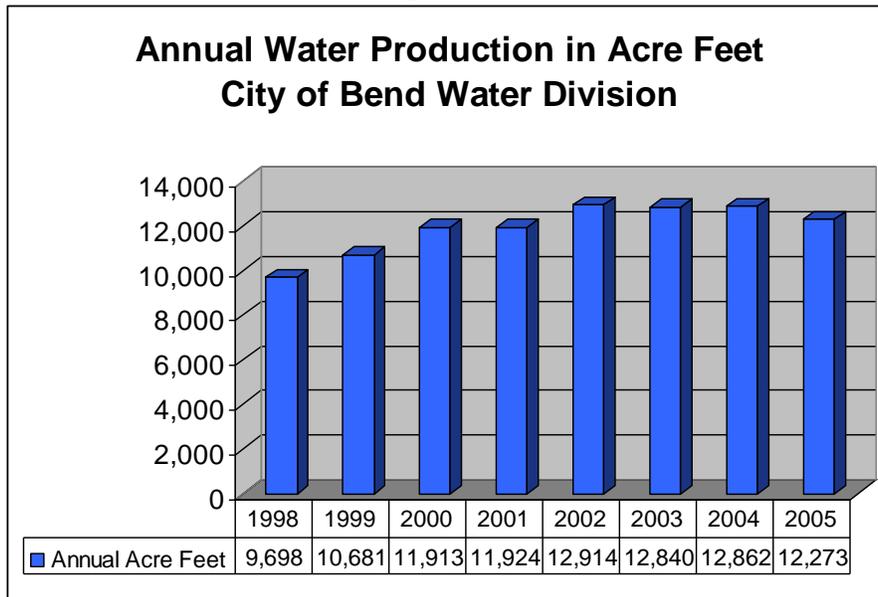
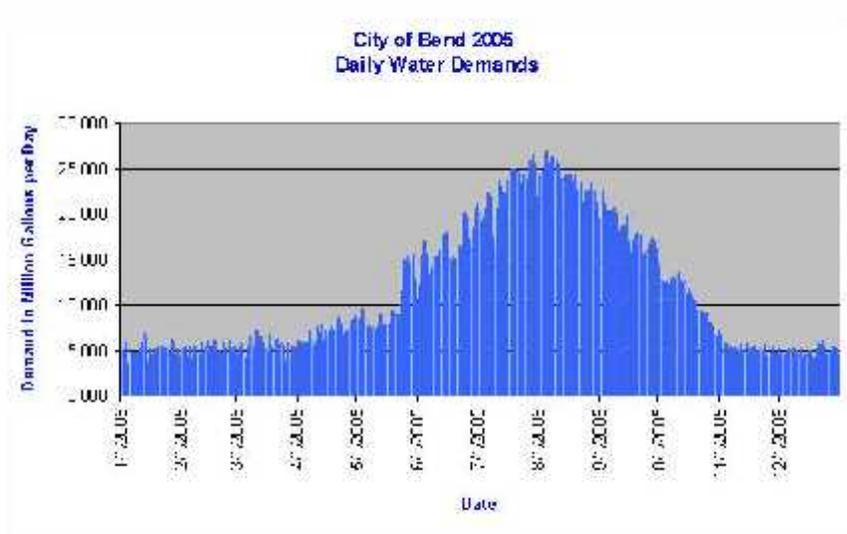
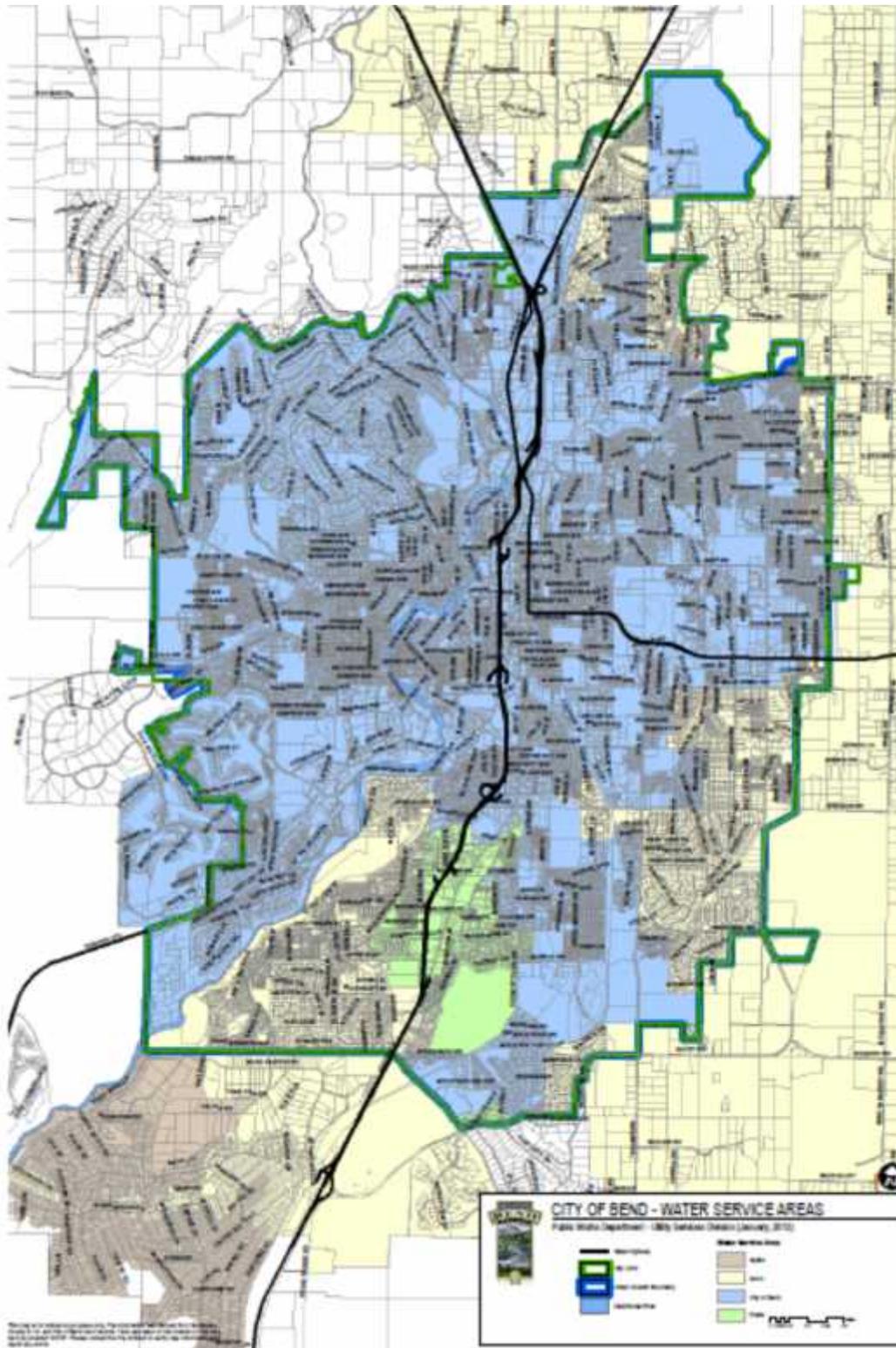


Figure 8-3



**Figure 8-4**  
**Water Utilities in the Bend Urban Growth Boundary**



# BEND AREA GENERAL PLAN

## **Private Providers**

Currently, the City of Bend serves water to approximately 70% of the customers within the UGB. There are two private utilities supplying domestic water to the majority of the remaining customers. Approximately 9,200 service connections within the UGB are furnished domestic water through private water systems. Figure 8-4 shows the extent of both the city's service area (blue) and the private providers; Avion (light yellow or tan) and Roats (green). The City has entered into franchise agreements with Avian Water (See Ordinance NS-1514, as amended) and Roats Water Company (See Ordinance NS-1747) through which the City has agreed to Avion Water Company and Roats Water Company providing water to its customers in the city's boundary. Both franchise agreements have been incorporated into the City Code under Chapter 11, Franchises. In addition, the City's water system has inter-ties with both Avion and Roats, which also have inter-ties between their respective systems.

## **Water System Financing**

Table 8-2 lists the various water improvement projects the city plans to construct through the year 2028 to support the projected growth and land uses in the Bend urban area. The description, location, timing and estimated cost of listed facilities may change as a result of subsequent design studies, capital improvement programs, environmental studies, and changes in funding sources. City facilities may be constructed earlier than planned by an owner/developer choosing to develop an area prior to the scheduled extension or expansion of facilities by the city.

The city has adopted System Development Charges (SDCs), as allowed under state law, to help pay for new facilities. SDCs are levied against all new uses at the time of development. These fees are earmarked for major system improvements identified in the city's 2007 Water System Master Plan Update such as reservoirs, wells, transmission lines, and treatment facilities. As of fiscal year 2006-07, the water System Development Charge is 100 percent of the allowable maximum charge. The City Council determined that this rate reflects the proportionate share of system improvement costs that can be attributed to new growth. The remaining share of system improvement costs benefit the whole community and are collected as a part of the monthly user fees. For more information about short and long term projects for the City's water system please see the 2013 Water Public Facilities Plan.

## **STORM DRAINAGE FACILITIES AND SYSTEMS**

For many years, the City of Bend's drainage system has depended primarily on underground injection (dry wells and drill holes) to discharge stormwater into the fractured volcanic rock that underlies much of the City. Dry wells do not work well in areas underlain by layers of impermeable material unless those layers are penetrated. Drill holes are an



alternative to dry wells, intended to penetrate impermeable layers to reach more permeable material beneath them.

Bend does not have a city-wide system of pipes collecting and transporting stormwater for treatment. The lack of defined drainage ways, the expense of digging in rock, and the difficult topography have limited the installation of piping. The existing piped system to the Deschutes River is limited to about 14 miles of pipe and 28 river outfalls. There are approximately 4,600 dry wells and 1,000 drill holes on public property in the City and an unknown number on private property. Including interconnections between inlets and UICs, there are 47 miles of pipe total throughout the City.

### **Water Quality and Stormwater Management**

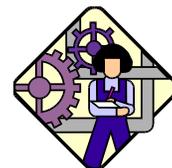
A large part of Bend's drinking water comes from a deep, very high-quality and abundant aquifer beneath the City that is fed by snow melt high in the Cascade Mountains. The City and its residents are committed to protecting this valuable resource along with protecting surface water quality. Protection of all groundwater including perched water and seasonal high groundwater is required by the State of Oregon. To comply with the regulations for both stormwater and groundwater, the City prepared an Integrated Stormwater Management Plan (ISWMP). The ISWMP is a living document that is updated as necessary to meet requirements of the permits and the needs of the City.

The ISWMP outlines a comprehensive program to protect the quality of the Deschutes River and the City's groundwater. The ISWMP identifies a number of BMPs for preventing pollutants from entering stormwater or removing them before the water is discharged to the river or underground. The following BMPs are required elements of the Phase II (surface water) program:

- Public Education and Outreach
- Public Involvement and Participation
- Illicit Discharge Detection and Elimination
- Construction Site Stormwater Management Activities
- Post-Construction Stormwater Management in New Development and Redeveloped Areas
- Pollution Prevention/Good Housekeeping for Municipal Operations

Bend's ISWMP also addresses monitoring and protecting drinking water sources provisions to meet UIC requirements.

In August 2014 the City adopted its first Stormwater Master Plan (SMP). The City relied on these documents and prior planning documents to develop a Goal 11 stormwater public facility plan (PFP) for the existing Bend UGB. This 2014 Stormwater PFP is incorporated as the Goal 11 public facility plan for stormwater and provides a stormwater management strategy and identifies the capital improvements needed to serve the existing and future development within Bend's UGB.



# BEND AREA GENERAL PLAN

## Stormwater Funding Strategy

In 2007 the City Council established a Stormwater Utility Fee for the sole purpose of funding Stormwater infrastructure projects and programs. The SMP provides a cost strategy. The proposed stormwater public improvements have a 20-year capital cost of \$25.2 Million. Utility operating revenue needs were modeled to range from \$2.5 Million/year at present to \$5.4-\$5.6 Million/year by FY2032-33 depending on the rate assessment approach taken. Monthly stormwater utility rate increases were estimated in two ways: a gradual rate increase and an accelerated rate increase. The immediate calculated monthly stormwater utility rates were modeled to be between \$4.36 and \$5.80 per ERU and the FY 2032-33 monthly stormwater utility rates would be anticipated between \$6.53 and \$6.80 per ERU depending on the rate adjustment approach taken. Below is the City's 2013-2014 Stormwater Budget.

**Table 8.2  
Stormwater Management Budget for Fiscal Year 2013-2014**

| <b>Stormwater Management Budget<br/>(Fiscal Year 2013-2014):</b>                                                                                 |                    |
|--------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|
| Operation and Maintenance                                                                                                                        | \$1,240,000        |
| Engineering and Project Management                                                                                                               | \$580,700          |
| Capital Improvement Projects                                                                                                                     | \$2,750,000(1)     |
| Water Quality Management                                                                                                                         | \$378,000          |
| Utility Administration & Public Response                                                                                                         | \$576,000          |
| <b>Total</b>                                                                                                                                     | <b>\$5,524,700</b> |
| <b>Note:</b>                                                                                                                                     |                    |
| (1) Current Capital Improvement Budget is \$2,750,000, based on carryover from previous years and an annual budget currently averaging \$300,000 |                    |

## SOLID WASTE DISPOSAL

Solid waste disposal for the urban area occurs at one county facility, the Knott Landfill, just outside of the Urban Growth Boundary on the east side of 27th Street. Deschutes County studies estimate that Knott Landfill will reach capacity by the year 2025. However, the recent trend of 10 to 18 percent annual increases in municipal solid waste flows may shorten that lifespan.

A second landfill intended for construction debris and demolition material located adjacent to Simpson Avenue within the Urban Growth Boundary was in operation prior to 1997. This demolition landfill site owned by Deschutes County is about 80 acres in size, and abuts residential lands on the north, and west, and commercial development along its east and south sides.



Collection of solid waste is done by private providers under City and County franchises. In 2005, it was estimated that about 92 percent of the households in the Bend Urban Growth Boundary had signed up for a weekly collection service. The two garbage haulers in the Bend urban area, Bend Garbage and Cascade Disposal, provide weekly curbside pickup of municipal solid waste and recyclable materials. Recyclables picked up at curbside include aluminum, corrugated cardboard, paper bags, magazines and catalogs, newspaper, glass, plastic bottles, tin cans, mixed waste paper (junk mail and cereal boxes) and used motor oil.

The Department of Environmental Quality's 2005 Waste Diversion Report indicated that 160,707 tons of waste were deposited in Knott Landfill and 62,523 tons of waste were "diverted" (recycled by households and businesses either through curbside service, or dropped off at the county's yard debris mulch program, as well as recycling occurring out of the solid waste system such as bottle bill returns and the scrap metal industry). When backyard composting and efforts in waste prevention and reuse are considered, the percentage of solid waste material being recycled increases from approximately 28 percent to approximately 34 percent.

## OTHER URBAN UTILITIES

Electricity within the urban area is provided by Pacific Power and Central Electric Cooperative. Cascade Natural Gas Company provides natural gas service to most parts of the urban area. Adequate electric and natural gas resources exist to serve the Bend urban area through the planning period.

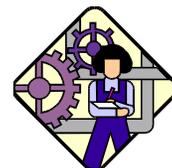
Local (land-line) telecommunication services are provided by Qwest. Many private companies compete to provide long distance and cellular phone services. Cable television service within the urban area is provided by Bendbroadband, which also provides phone and high-speed internet service. Private utility providers within the city limits operate under non-exclusive franchise agreements with the city.

## PUBLIC BUILDINGS AND FACILITIES

### Downtown Facilities

The Bend City Hall at the south end of downtown was built in 1989 and expanded in 1992. City Hall comprises an area of approximately 26,000 square feet. Also located at the south end of downtown are the Bend-La Pine School District Administrative offices, the Deschutes County historical museum, the Bend Public library, and other public buildings.

The County courthouse and various County offices are located in several buildings at the north end of the downtown area. A new 80,000 square foot administration building was constructed in 2004. Half of this facility is leased to the State Department of Human Services and Department of Justice.



# BEND AREA GENERAL PLAN

The Bend Metro Parks and Recreation District offices are located between the Old Mill District and the Deschutes River.

## **Fire Department Facilities**

The Bend Fire Department serves the city, the urban area, and some areas beyond the Urban Growth Boundary through the Rural Fire District service contract. The Bend Fire Department covers approximately 164 square miles for fire protection and 1,450 square miles for ambulance operations. The “Main Station” (Old Station 301) was built in 1920 and was located downtown at 5 NW Minnesota Avenue. After serving the Bend Fire Department as the main station and the administrative office for 80 years, the department moved out of the station in 2000 to its new location at 1212 SW Simpson Avenue in order to provide better, faster coverage for the community. Old Station 301 was remodeled and became a mixed-use facility including dining, retail, office and residential spaces. The Fire Administration Building at 1212 SW Simpson Avenue was constructed in 2000. It houses the department administrative, prevention and support staff. The “West Station” (Station 301) is also located at 1212 SW Simpson Avenue, on the west side of Bend near Century Drive. The station is 12,000 square feet in size and was built for a cost of \$1.6 million in 2000. The “Tumalo Station” (Station 302) is located at 19850 4<sup>th</sup> Street in the unincorporated community of Tumalo, between Bend and Sisters. The station was built in the early 1970s. The “South Station” (Station 303) at 61080 County Club Drive was also built in 2000. The “East Station” (Station 304) at 62420 Hamby Road was built in 2003 and is the newest station. The “North Station” (Station 305) at 63377 Jamison Street was built in 2000 and is located on a seven-acre parcel next to the Deschutes County Sheriff’s Office. Located behind Station 305, the department Training Center includes a five-story tower with attached garage, numerous training props, and a driver training area. The Training Center also features a classroom and training office building located near the tower. The Fire Department is planning on building a “Central Station” on the Pilot Butte City Campus within the next ten years in order to better serve the rapidly growing central-east section of Bend.

## **Law Enforcement Facilities**

Law Enforcement services in the urban area are provided by the City of Bend Police Department and the Deschutes County Sheriff’s Department. The Oregon State Police regional headquarters is also located in Bend. The City of Bend Police Department was located in City Hall until 2002, when a new 27,000 square foot building was constructed at the intersection of 15th Street and US Highway 20 to better accommodate and headquarter all police business. As with all other departments at the City, faster than anticipated growth has created a need for additional staff to serve the community and this has, in turn, created the need for additional space. As a result, the Police Building was expanded to include another 19,000 square feet, and now also houses the Bend Municipal Court. .



In 1997, Deschutes County constructed a new public safety complex off of Highway 20. Within this complex there is a 228-bed adult jail, the Sheriff's Office, the Adult Parole and Probation offices and transitional housing. The County also constructed the Health and Human Services building off 27th Street on the east side of Bend. This building provides space for the County's Mental Health and Health Departments.

### **Public Works Facilities**

The City's Public Works Facilities are located in three primary areas: The Pilot Butte Campus Site, which is located west of 15th Street between Highway 20 and Bear Creek Road, the Boyd Acres offices, and the Water Reclamation site, which is located northwest of the Bend Airport on McGrath Road. Numerous additional satellite facilities that house vehicles, utility equipment or materials are located throughout the service area.

The Pilot Butte City Campus site houses Public Works administration and all departmental divisions except Water Reclamation. City Council authorized a substantial master planning effort for this site in 2006 in order to determine space needs for the next twenty years for the Public Works, Police, Community Development and Fire Departments, all of whom will have facilities on the site.

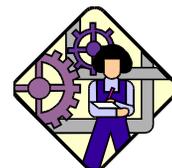
The existing main Public Works building houses Public Works administration and provides crew spaces for the Street and Water Divisions. This 41,000 square foot building will likely undergo significant, phased-in changes in the next seven years in order to bring the building into Code and ADA compliance as well as provide for the anticipated 20 year needs of the department.

A new facility to house Public Transportation operations was recently constructed, at the southwest corner of the Pilot Butte Campus site. The construction was largely funded through a \$4 million *ConnectOregon* grant, and includes a 5,500 square foot transit operations office, five vehicle maintenance bays and space for transit vehicle parking. The City's public transit program is operated by Cascade East Transit through Central Oregon Intergovernmental Council. The transfer of this program to COIC began in 2010 and was completed in 2011.

The Water Reclamation facility is located outside of the UGB on 1,600 acres northeast of Bend and includes eight main structures. A new Headworks building was constructed in 2008. This facility will be heated by hot water that is heated by methane gas captured from the waste products entering the facility. New facilities completed within the last five years include a new training building, a Level IV filtration facility and a new digester. The new facilities plan for the plant was completed in 2008, and acknowledged by the Land Conservation and Development in 2010. This plan provides for an expansion and upgrade plan for water reclamation to serve the City up to the year 2030.

### **The Bend Airport**

The Bend Municipal Airport is located on 415 acres situated five miles east of the city limits of Bend. Owned by the City of Bend, the airport is located in Deschutes County and is



# BEND AREA GENERAL PLAN

currently outside the Bend Urban Growth Boundary. Airport facilities consist of a single instrument capable runway, 5005 feet in length, a full parallel taxiway, more than 60 hangar and industrial buildings, and parking facilities for aircraft and vehicles. The Bend Municipal Airport is identified by the Oregon Department of Aviation as a Category 2, High Activity Business/General Aviation airport, with approximately 200 based aircraft and an estimated 42,000 operations in 2005.

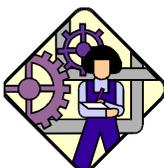
Over the past few years, demand at the Bend Airport has increased significantly. Continued business expansion by the existing tenants, the addition of Epic Aircraft in 2005, and continued growth and demand has wrought a dramatic increase in activity at the Airport. The corresponding demand for new services and facilities provides challenges to current funding levels.

Current improvements to the Airport infrastructure include the relocation of the single runway at the Airport to meet federal design standards and provide an adequate surface for the existing aircraft fleet mix. This project, beginning in 2007, is scheduled for completion in 2008. Following the runway relocation project, development of an eastside parallel taxiway will be planned for construction in 2009, with completion scheduled for the same year. At this time, it is anticipated that a new Airport Master Plan to clarify the future direction of the Airport and to meet future user needs will be initiated.

## POLICIES

### **Sewer Collection Facilities**

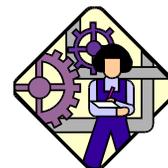
1. All new development within the Urban Growth Boundary should be connected to City sewer.
2. The city is the primary provider of sewage collection and treatment services for the City's service area under Statewide Planning Goal 11.
3. To reduce the reliance on individual sewage disposal systems within the Urban Growth Boundary the city will work with unsewered neighborhoods to find solutions for sewer service.
4. The city shall collect a sufficient amount of revenue to allow the creation of capital project reserves and to replace aging infrastructure in addition to operational needs of the utility.
5. Staff shall report to Council on an annual basis regarding the status of the Collection System Master Plan, Capital Improvement Projects and capacity issues within the collection system.



6. The City will annually update its financial model as part of the review of sewer rates and report to Council on any changes in the 20-year financial outlook and subsequent rate impacts.
7. The master plan shall be updated at least every 5 years with official review and adoption by Council.
8. The preference of the City is to serve development through gravity conveyance and use of the Water Reclamation Facility.
9. If lift stations are required to serve new development, regional pump stations shall be relied upon to the extent practicable versus individual or smaller lift stations.
10. These policies will be implemented through the City of Bend Public Improvement Construction Procedure Standards & Specifications.
11. The City should look for reasonable opportunities to decommission energy- and maintenance-intensive lift stations as part of new development or other City infrastructure projects.
12. The City will consider the conservation and water reuse measures in the Water Management and Conservation Plan in infrastructure planning to reduce overall impacts to the sewer collection and treatment system.

### **Water Facilities and Systems**

13. The City of Bend is the provider of water service for the City's service area under Statewide Planning Goal 11.
14. Avion Water Company is the provider of water service for its franchise area under Statewide Planning Goal 11 and pursuant to the franchise agreement between the City and Avion adopted under Ordinance NS 1514, as amended.
15. Roats Water Company is the provider of water service for its franchise area under Statewide Planning Goal 11 and pursuant to the franchise agreement between the City and Roats adopted under Ordinance NS 1747.
16. Within the urban planning area, public and private water systems shall be consistent with City Standards and Specifications for construction and service capabilities.
17. The City shall continue to coordinate with private providers and irrigation districts in matters of water concerns within the Urban Growth Boundary.
18. The City shall continue to implement a water conservation program that emphasizes education, enforcement, metering, and other methods to use water efficiently.



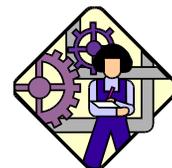
# BEND AREA GENERAL PLAN

## Storm Drainage Facilities and Systems

19. The City of Bend is the stormwater utility for the city limits and urban growth boundary. As the utility, the City shall review its Stormwater Master Plan and Integrated Stormwater Management Plan as needed for compliance with changes in state or federal requirements and at least every five years.
20. The City will initiate funding options (e.g., SDCs, grants, low-income loans) for stormwater capital projects in accordance with applicable laws.
21. Due to the lack of a defined drainage pattern for most of the urban area, development shall, to the extent practicable, contain and treat storm drainage on-site. In instances where containing storm drainage on-site would not be safe or practicable, the developer shall enter into a formal and recorded arrangement with the City or a private party to adequately address the storm drainage off site such as a regional control.
22. The use of stormwater disposal systems shall be coordinated with the Oregon Department of Environmental Quality and Water Resources Department to protect ground water and surface water.
23. The City shall work to minimize the discharge of untreated stormwater run-off from streets directly into the Deschutes River and Tumalo Creek.
24. All public and private stormwater facilities shall be designed and operated in accordance with the City's Stormwater Master Plan and shall meet appropriate drainage quantity and quality requirements, including, but not limited to, the requirements of the City's National Pollutant Discharge Elimination System (NPDES) MS4 Stormwater Permit, Integrated Stormwater Management Plan, WPCF UIC Permit and any applicable Total Maximum Daily Load requirements (TDML) requirements. Underground injection and surface discharges to the Deschutes River or Tumalo Creek shall only be approved when other alternatives, such as retention basins or bioinfiltration swales, are not reasonably available. Low impact site designs shall be a required part of all new development and redevelopment projects.
25. The ability to provide stormwater facilities for developments proposed for annexation into the City shall be a consideration for annexation approval.
26. The City shall reduce the quantity of runoff and discharge of pollutants to the maximum extent practicable by integrating stormwater runoff controls into new development and redevelopment land use decisions. Controls may be required to minimize illicit discharges or pollutants of concern.



27. The City shall implement and enforce requirements for an erosion and sediment control program for public and private construction and post-construction activities.
28. All developments shall evaluate the potential of a land parcel to detain excess stormwater runoff and require incorporation of appropriate controls, for example through the use of detention facilities to address quantity, flow, and quality concerns.
29. The City shall seek efficiencies and consistency by working with other municipalities and stakeholders within Central Oregon on land use issues to address flood control, watershed health and stormwater pollution prevention.
30. Hazard and resource areas with the following characteristics shall be considered unsuitable for urban development:
  - flood zones;
  - water supply watersheds; and
  - riparian corridors and natural drainageways.
31. Development on slopes in excess of 10 percent shall require special consideration to prevent construction-related and post-construction erosion.
32. The City shall regulate development near water courses to reduce erosion and pollution and to provide open, natural areas.
33. Land uses that pose a major threat to water quality, including commercial and industrial uses such as automobile dismantlers, waste transfer disposal facilities, light industries, and other uses that have a significant potential for pollution, shall not be located within the vicinity of stream, percolation facilities, reservoirs, drill holes or where pollutants could easily come in contact with flood waters, high groundwater, flowing rivers, or reservoirs. Such uses shall be required to reduce any threat of pollution to an insignificant level as a condition of approval.
34. As part of site approval, or as a condition on tentative maps, as necessary, the City shall require permanent stormwater pollution control site design or treatment measures or systems and an ongoing method of maintenance over the life of the project.
35. The City shall minimize particulate matter pollution through controls over new and redevelopment (including erosion and sediment controls on grading, quarrying, vegetation removal, construction, and demolition), industrial processes, parking lots and other activities that pose a threat to water quality.
36. The City shall require the following stormwater protection measures for all new development and redevelopment proposals during the planning, project review, and permitting processes:
  - Submit geotechnical site assessments when dry wells or other infiltration or injection systems are proposed.



# BEND AREA GENERAL PLAN

- Avoid conversion of areas particularly susceptible to erosion and sediment loss (e.g., steep slopes) or establish development guidance that identifies these areas and protects them from erosion and sediment loss.
  - Retain natural drainage channels in their natural state to prevent undue erosion of banks or beds, and preserve or restore areas that provide water quality or quantity benefits and/or are necessary to maintain riparian and aquatic biota.
  - Promote site development that limits impacts on, and protects the natural integrity of topography, drainage systems, and water bodies.
  - Promote integration of stormwater quality protection into construction and post-construction activities at all development and redevelopment sites.
37. The City shall work to reduce transportation-related sources of water pollution, particularly in stormwater pollution. Any means and actions that result in a reduction in vehicle-miles-traveled would benefit congestion and reduce both air and water pollution.
38. The City shall recognize and publicize the relationship between air pollution and water pollution in the deposition of airborne contaminants, including metals and fine particulate matter onto streets and other surfaces.
39. To minimize illicit discharge to stormwater and groundwater from septic systems, the City shall require lots with onsite sewage disposal to connect to the city sanitary sewer whenever state rules governing connection are met.

## **Solid Waste Disposal**

40. The City and County shall encourage recycling beyond the level required by state law as an alternative to landfill disposal.
41. The County shall reduce dust and blowing refuse at the landfills in order to ensure as few adverse impacts as possible from these facilities.
42. The City shall explore methods, including mandatory garbage service, to gain 100 percent disposal of waste at designated landfill sites and discourage the dumping of wastes on public and private lands.
43. The City shall coordinate with Deschutes County on the creation of a new solid waste management plan.

## **Public Buildings and Facilities**

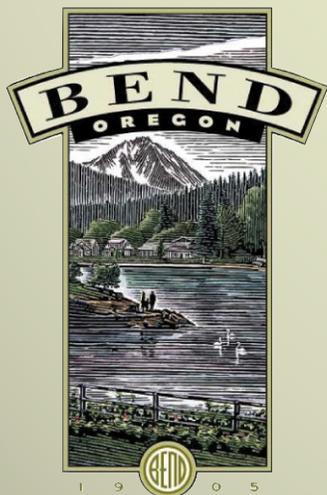
44. Public buildings and facilities shall be located so as to provide convenient public use and to provide maximum service for the greatest economy. Governmental offices shall locate downtown when practicable. Other governmental facilities, reservoirs, landfills and correctional facilities shall be located in areas with good



public access to principal streets.

45. The County Public Works facility shall be planned and zoned with a Public Facilities designation. The uses allowed at the site from among those uses listed in a Public Facility zone shall be limited to public works and transportation facilities and yards and public service uses in existing facilities as such facilities may be expanded and accessory uses thereto. Commercial or manufacturing uses shall not be allowed at this site.





**CITY OF BEND**  
COLLECTION SYSTEM  
PUBLIC FACILITY PLAN  
CITY PROJECT NO. SW12AA

**CITY OF BEND – COLLECTION SYSTEM PUBLIC FACILITY PLAN  
TABLE OF CONTENTS**

---

|                                                                        | Page |
|------------------------------------------------------------------------|------|
| Introduction and Summary . . . . .                                     | 1    |
| PFP Goal 11 Compliance Components . . . . .                            | 1    |
| OAR 660-11-0010(1)(a) – Inventory and General Assessment . . . . .     | 1    |
| Existing System Condition Evaluation . . . . .                         | 2    |
| OAR 660-11-0010(1)(d) – General Location of Service Area . . . . .     | 33   |
| OAR 660-11-0010(1)(e) – Provider(s) Identification . . . . .           | 35   |
| OAR 660-11-0010(1)(b) – Public Facility Project Descriptions . . . . . | 35   |
| OAR 660-11-0010(1)(c) – Rough Cost Estimates . . . . .                 | 35   |
| OAR 660-11-0010(1)(f) – Project Need-Time Estimate . . . . .           | 35   |
| OAR 660-11-0010(1)(g) – Provider Funding . . . . .                     | 72   |
| Financial Plan . . . . .                                               | 72   |
| Current Financial Structure . . . . .                                  | 73   |
| Fiscal Policies and Other Constraints . . . . .                        | 73   |
| Operating Costs . . . . .                                              | 73   |
| Capital Costs . . . . .                                                | 74   |
| Projected Revenue Requirements . . . . .                               | 75   |
| Current and Projected Rates . . . . .                                  | 76   |
| Affordability Analysis . . . . .                                       | 76   |
| System Development Charges . . . . .                                   | 77   |
| Conclusion . . . . .                                                   | 78   |

**LIST OF TABLES**

---

|                                                                                          |    |
|------------------------------------------------------------------------------------------|----|
| Table 1B-1 – Gravity Pipe Installation Year and Diameter Summary . . . . .               | 4  |
| Table 1B-2 – Gravity Pipe Installation Year and Material Summary . . . . .               | 5  |
| Table 1B-3 – Gravity Pipe Material and Diameter Summary . . . . .                        | 6  |
| Table 1B-4 – Gravity Pipe Condition Assessment by Category . . . . .                     | 10 |
| Table 1B-5 – Gravity Pipe Condition Assessment by Age . . . . .                          | 10 |
| Table 1B-6 – Gravity Pipe Condition Assessment by Size . . . . .                         | 11 |
| Table 1B-7 – Gravity Pipe Condition Assessment by Material . . . . .                     | 11 |
| Table 1B-8 – Lift Stations within the Primary Collection System . . . . .                | 13 |
| Table 1B-9 – Summary of Bend’s Existing Lift Stations . . . . .                          | 14 |
| Table 1B-10 – Lift Station Capacity . . . . .                                            | 19 |
| Table 1B-11 – Lift Station Condition Assessment Summary Components . . . . .             | 22 |
| Table 1B-12 – Lift Stations Requiring Significant Improvements Immediately . . . . .     | 24 |
| Table 1B-13 – Lift Stations Requiring Significant Improvements within 5 Years . . . . .  | 24 |
| Table 1B-14 – Lift Stations Requiring Significant Improvements within 10 Years . . . . . | 25 |
| Table 1B-15 – Lift Stations Requiring No Major Improvements within 10 Years . . . . .    | 25 |
| Table 1B-16 – Primary Collection System’s Vacuum Sewer Mains . . . . .                   | 28 |

|                                                                                      |    |
|--------------------------------------------------------------------------------------|----|
| Table 1B-17 – Force Mains & Common Pressure Mains Installation Year & Diameter ..... | 30 |
| Table 1B-18 – Force Mains & Common Pressure Mains Installation Year & Material ..... | 31 |
| Table 1B-19 – Force Mains & Common Pressure Mains Material/Diameter Summary .....    | 31 |
| Table 1B-20 – Summary of Short-Term (1- to 5-Year) Improvements .....                | 38 |
| Table 1B-21 – Summary of Long-Term (6- to 10-Year) Improvements .....                | 54 |
| Table 1B-22 – Summary of Long-Term (11- to 20-Year) Improvements .....               | 61 |
| Table 1B-23 – Required Rate Revenues.....                                            | 75 |
| Table 1B-24 – Residential Rate Affordability.....                                    | 77 |

**LIST OF FIGURES**

---

|                                                                    |    |
|--------------------------------------------------------------------|----|
| Figure 1B-1 – Existing System: Gravity Pipe Diameter .....         | 7  |
| Figure 1B-2 – Existing System: Gravity Pipe Installation Year..... | 8  |
| Figure 1B-3 – Existing System: Gravity Pipe Material.....          | 9  |
| Figure 1B-4 – Gravity Pipe Condition Deficiency Assessment .....   | 12 |
| Figure 1B-5 – Existing System: Service Area and Basins .....       | 17 |
| Figure 1B-6 – Lift Station Condition Deficiency Assessment .....   | 27 |
| Figure 1B-7 – Existing System: Vacuum Sewer Service Area .....     | 29 |
| Figure 1B-8 – Existing System: Force Main Diameter .....           | 32 |
| Figure 1B-9 – Existing System: Regional Map.....                   | 34 |
| Figure 1B-10 – Capital Improvement Program Project Locations.....  | 71 |
| Figure 1B-11 – Cost Escalation Rates .....                         | 74 |

**CITY OF BEND**  
**GOAL 11 COLLECTION SYSTEM PUBLIC FACILITY PLAN**

---

**Introduction and Summary**

This public facility plan (PFP) has been created in compliance with the requirements of Goal 11, Public Facilities Planning, and the implementing rule for the planned land uses under the Bend Area General Plan (BAGP). It is based on and supported by the City of Bend's (City) adopted Collection System Master Plan (CSMP), which is incorporated by reference. The improvements listed in this PFP were identified in the CSMP and describe service areas within the urban growth boundary (UGB) and previously approved areas outside the UGB.

The purpose of the plan is to help assure that development within the UGB is guided and supported by the types and levels of urban facilities and services appropriate for the needs and requirements of the areas to be served, and that those facilities and services are provided in a timely, orderly and efficient arrangement, as required by Goal 11 and its implementing administrative rule at Oregon Administrative Rule (OAR) 660-011.

**PFP Goal 11 Compliance Components**

This PFP includes the following Goal 11 compliance components:

- a) An inventory and general assessment of the condition of all the significant public facility systems which support the land uses designated in the acknowledged 1998 Bend Area General Plan;
- b) A list of the significant public facility projects which are to support the land uses designated in the acknowledged comprehensive plan;
- c) Rough cost estimates of each public facility project;
- d) Maps or written description of each public facility project's general location or service area;
- e) Policy statement(s) or urban growth management agreement identifying the provider of each public facility system. If there is more than one provider with the authority to provide the system within the area covered by the public facility plan, then the provider of each project shall be designated;
- f) An estimate of when each facility project will be needed; and
- g) A discussion of the City's existing funding mechanisms and the ability of these and possible new mechanisms to fund the development of each public facility project or system.

**OAR 660-11-0010(1)(a) – Inventory and General Assessment**

The City's primary wastewater collection system is generally comprised of manholes, gravity pipelines, lift stations and force mains that convey sewage to its water reclamation facility (WRF). In general, gravity and pressurized pipelines convey wastewater from the residential and commercial areas to the core of the system, where a large sewer interceptor ultimately

transfers the sewage to the WRF. Due to the varied topography and lack of localized and regional gravity pipes in the City, 86 small, regional lift stations have been constructed to convey sewage to the WRF.

### **Existing System Condition Evaluation**

The condition assessment evaluates the current physical state or performance of an asset and compares the current condition to a “like-new” condition. The evaluation is the result of City Operations & Maintenance (O&M) Department manhole inspections, visual pipe inspections, closed-circuit television (CCTV) inspections and O&M personnel input. These condition assessments were developed over the course of several meetings, workshops, document deliverables, and staff interviews, and were entirely based on information provided by O&M.

The components of the collection system subject to condition evaluation include the gravity piping and lift stations. Information related to replacement costs for force mains and pressure systems is included; however, the City has not inspected their condition. Historically, some developments were served by shallow gravity pipes and common pressure mains to expedite sewer service hook-ups. This has led to many small area and residential lift stations, which have increased O&M requirements. These lift stations often feed into a common pressure main with multiple pumping system tie-ins. The City no longer allows this type of sewer system installation and wants to replace the common pressure systems with either gravity systems, or pumping systems with dedicated force mains. The proposed Southeast and Northeast interceptors will allow for the decommissioning of many lift stations with gravity service. A local-area improvement fund is also being proposed as part of the capital improvement plan that will, over time, provide sewer service to unsewered areas and improve poorly performing portions of the existing collection system.

### ***Condition Rating of Plant Interceptor***

The existing plant interceptor is comprised of a gravity pipeline and a double-barrel siphon near the WRF. The interceptor begins near the North Unit Canal crossing of Purcell Boulevard and discharges to the WRF. The gravity portion is 19,738 feet long and is comprised of 30-, 36-, and 42-inch reinforced concrete pipe. The double-barrel siphons are 21- and 36-inch diameter reinforced concrete pipe each approximately 4,882 feet long. In 2013, the gravity portion of the plant interceptor and the siphon were inspected by an independent consultant. The gravity portion was evaluated using a combination of digital scanning, laser profiling, and sonar profiling. The siphon was inspected using sonar profiling. The manholes and access structures along the plant interceptor were inspected using a combination of digital scanning and man-entry inspection.

In summary, approximately 31% of the gravity plant interceptor was rated grade-5, and approximately 37% contained grade-4 defects. The sonar profiling of the siphon did not detect any structural issues in the siphon pipes. However, there was a large accumulation of grease and debris detected in the siphon pipes. The majority of manholes were in good condition, with only ten exhibiting grade-4 or grade-5 defects (requiring near-term improvements).

### ***Condition Rating of Gravity Pipelines***

The City's collection system is comprised of gravity pipes between 4 and 72 inches in diameter and totaling approximately 348.5 miles. Based on information provided by the City's GIS, Tables 1B-1 through 1B-3 present a summary of the physical characteristics of the primary collection system's gravity piping. In order to understand phases and trends in the construction of the system, two attributes have been summarized together: Table 1B-1 presents installation year and diameter, Table 1B-2 installation year and material, and Table 1B-3 material and diameter. Figures 1B-1, 1B-2, and 1B-3 present diameter, installation year, and materials, respectively.

**Table 1B-1  
Gravity Pipe Installation Year and Diameter Summary**

| Diameter<br>(inch) | Installation Year - Length (1,000 feet) |                 |              |              |              |              |                 | Percent         |
|--------------------|-----------------------------------------|-----------------|--------------|--------------|--------------|--------------|-----------------|-----------------|
|                    | 1913                                    | 1960 to 1969    | 1970 to 1979 | 1980 to 1989 | 1990 to 1999 | 2000 to 2013 | Unknown         |                 |
| 4                  | -                                       | -               | 0.1          | -            | 1.0          | -            | -               | <b>0.1%</b>     |
| 6                  | 0.3                                     | 0.2             | 45.4         | 2.5          | 5.6          | 3.6          | 0.1             | <b>3.1%</b>     |
| 8                  | 8.2                                     | 0.2             | 330.4        | 78.2         | 448.0        | 655.5        | 0.8             | <b>82.7%</b>    |
| 10                 | 2.2                                     | -               | 21.3         | 13.3         | 20.7         | 9.3          | -               | <b>3.6%</b>     |
| 12                 | 2.1                                     | -               | 14.6         | 2.9          | 22.2         | 7.3          | -               | <b>2.7%</b>     |
| 15                 | 0.1                                     | -               | 16.4         | 1.5          | 10.0         | 8.4          | -               | <b>2.0%</b>     |
| 16                 | 2.5                                     | -               | 1.4          | -            | -            | -            | -               | <b>0.2%</b>     |
| 18                 | -                                       | -               | 2.8          | -            | 16.4         | 5.0          | -               | <b>1.3%</b>     |
| 20                 | 1.6                                     | -               | -            | -            | -            | -            | -               | <b>0.1%</b>     |
| 21                 | -                                       | -               | 6.0          | 7.1          | 4.6          | 1.5          | -               | <b>1.0%</b>     |
| 24                 | -                                       | -               | 9.0          | 0.5          | 2.5          | 0.1          | -               | <b>0.7%</b>     |
| 27                 | 0.6                                     | -               | 10.4         | 0.9          | -            | 0.2          | -               | <b>0.7%</b>     |
| 30                 | -                                       | -               | 4.2          | 1.4          | -            | 0.1          | -               | <b>0.3%</b>     |
| 36                 | -                                       | -               | 2.6          | 16.7         | -            | 0.7          | -               | <b>1.1%</b>     |
| 42                 | -                                       | -               | -            | 8.8          | -            | -            | -               | <b>0.5%</b>     |
| 48                 | -                                       | -               | -            | -            | -            | <0.1         | -               | <b>&lt;0.1%</b> |
| 72 <sup>1</sup>    | -                                       | -               | -            | -            | 0.1          | -            | -               | <b>&lt;0.1%</b> |
| <b>Percent</b>     | <b>1.0%</b>                             | <b>&lt;0.1%</b> | <b>25.2%</b> | <b>7.3%</b>  | <b>28.9%</b> | <b>37.6%</b> | <b>&lt;0.1%</b> | <b>100%</b>     |

<sup>1</sup> Serves as in-pipe storage just upstream of Shevlin Lift Station.

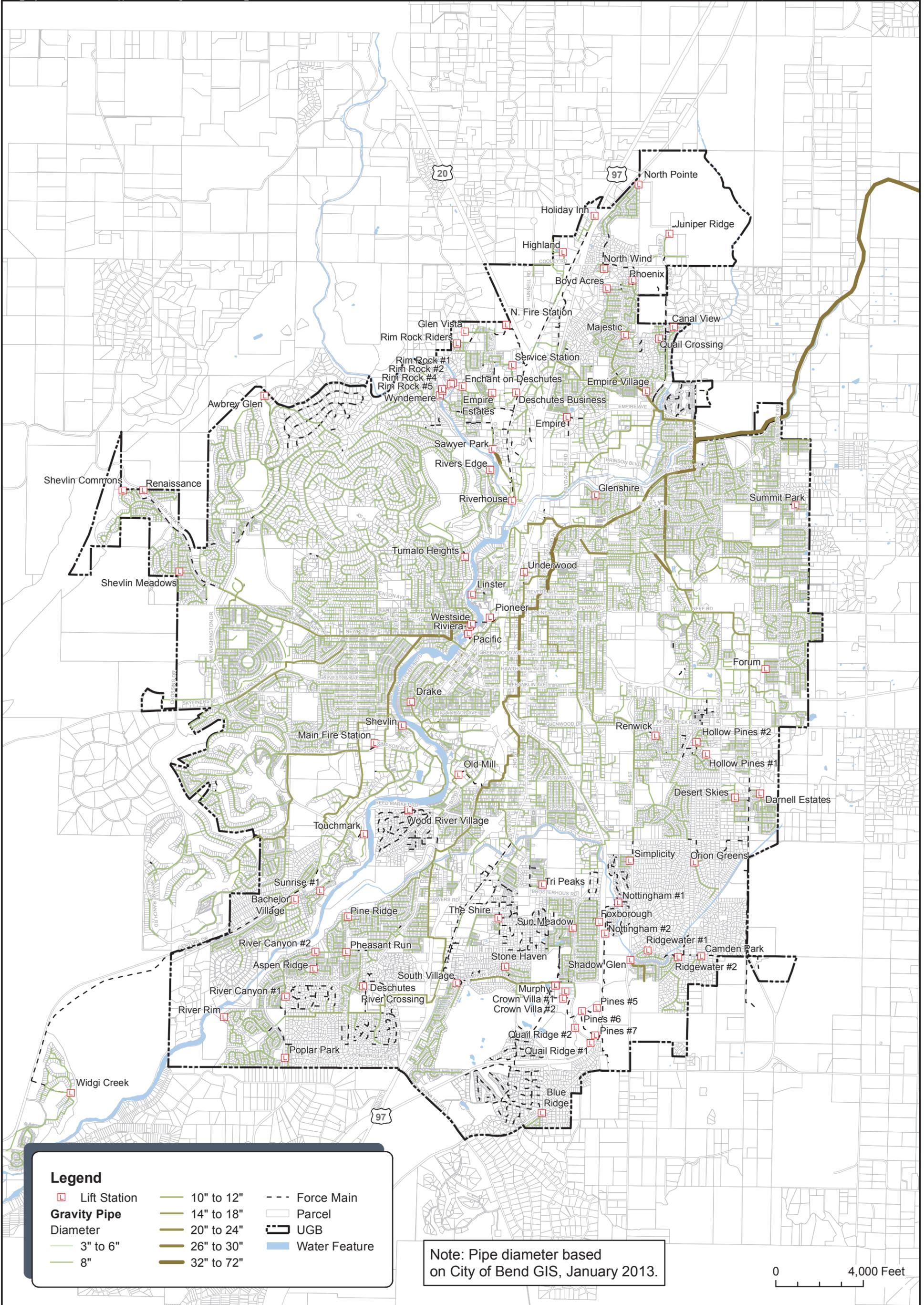
**Table 1B-2  
Gravity Pipe Installation Year and Material Summary**

| Material                            | Installation Year - Length (1,000 feet) |                 |              |              |              |              |                 | Percent     |
|-------------------------------------|-----------------------------------------|-----------------|--------------|--------------|--------------|--------------|-----------------|-------------|
|                                     | 1913                                    | 1960 to 1969    | 1970 to 1979 | 1980 to 1989 | 1990 to 1999 | 2000 to 2013 | Unknown         |             |
| Asbestos Cement (AC)                | -                                       | -               | 0.7          | -            | -            | -            | -               | <0.1%       |
| Cast Iron (CAS)                     | -                                       | -               | 0.2          | -            | -            | -            | -               | <0.1%       |
| Concrete Pipe (non-reinforced) (CP) | 1.7                                     | -               | 2.5          | -            | -            | -            | -               | 0.2%        |
| Clay Tile (CT)                      | 13.3                                    | -               | 1.1          | -            | 0.1          | -            | -               | 0.8%        |
| Ductile Iron Pipe (DIP)             | 0.2                                     | -               | 0.8          | -            | 0.7          | <0.1         | -               | 0.1%        |
| High Density Polyethylene (HDPE)    | -                                       | -               | -            | -            | -            | 6.9          | -               | 0.4%        |
| Polyvinyl Chloride (PVC)            | 1.1                                     | 0.4             | 318.1        | 99.2         | 530.4        | 684.0        | 0.8             | 88.8%       |
| Reinforced Concrete Pipe (RCP)      | 0.7                                     | -               | 140.2        | 34.5         | -            | 0.8          | -               | 9.6%        |
| Transite Pipe (TP)                  | -                                       | -               | 1.1          | -            | -            | -            | -               | 0.1%        |
| Vitrified Clay Pipe (VCD)           | 0.3                                     | -               | -            | -            | -            | -            | -               | <0.1%       |
| Other                               | 0.3                                     | -               | -            | -            | -            | -            | -               | <0.1%       |
| <b>Percent</b>                      | <b>1.0%</b>                             | <b>&lt;0.1%</b> | <b>25.2%</b> | <b>7.3%</b>  | <b>28.9%</b> | <b>37.6%</b> | <b>&lt;0.1%</b> | <b>100%</b> |

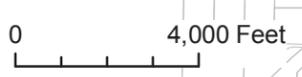
**Table 1B-3  
Gravity Pipe Material and Diameter Summary**

| Diameter<br>(inch) | Material - Length (1,000 feet) |                 |                                     |                |                         |                                  |                          |                                |                    |                           |                 | Percent         |
|--------------------|--------------------------------|-----------------|-------------------------------------|----------------|-------------------------|----------------------------------|--------------------------|--------------------------------|--------------------|---------------------------|-----------------|-----------------|
|                    | Asbestos Cement (AC)           | Cast Iron (CAS) | Concrete Pipe (non-reinforced) (CP) | Clay Tile (CT) | Ductile Iron Pipe (DIP) | High-Density Polyethylene (HDPE) | Polyvinyl Chloride (PVC) | Reinforced Concrete Pipe (RCP) | Transite Pipe (TP) | Vitrified Clay Pipe (VCD) | Other           |                 |
| 4                  | -                              | -               | -                                   | -              | -                       | -                                | 1.1                      | -                              | -                  | -                         | -               | <b>0.1%</b>     |
| 6                  | -                              | -               | -                                   | -              | 0.2                     | -                                | 56.0                     | 1.4                            | -                  | -                         | 0.3             | <b>3.1%</b>     |
| 8                  | -                              | 0.2             | 3.9                                 | 6.0            | 0.3                     | 5.6                              | 1,435.7                  | 70.6                           | -                  | 0.3                       | -               | <b>82.7%</b>    |
| 10                 | 0.7                            | -               | 0.3                                 | 2.2            | 0.8                     | -                                | 53.7                     | 9.1                            | -                  | -                         | -               | <b>3.6%</b>     |
| 12                 | -                              | -               | -                                   | 1.9            | 0.4                     | 1.3                              | 33.3                     | 12.2                           | -                  | -                         | -               | <b>2.7%</b>     |
| 15                 | -                              | -               | -                                   | -              | -                       | -                                | 21.8                     | 14.3                           | -                  | -                         | -               | <b>2.0%</b>     |
| 16                 | -                              | -               | -                                   | 2.8            | -                       | -                                | -                        | -                              | 1.1                | -                         | -               | <b>0.2%</b>     |
| 18                 | -                              | -               | -                                   | -              | 0.2                     | -                                | 21.6                     | 2.7                            | -                  | -                         | -               | <b>1.3%</b>     |
| 20                 | -                              | -               | -                                   | 1.6            | -                       | -                                | -                        | -                              | -                  | -                         | -               | <b>0.1%</b>     |
| 21                 | -                              | -               | -                                   | -              | -                       | -                                | 8.4                      | 10.9                           | -                  | -                         | -               | <b>1.0%</b>     |
| 24                 | -                              | -               | -                                   | -              | -                       | -                                | 3.0                      | 9.0                            | -                  | -                         | -               | <b>0.7%</b>     |
| 27                 | -                              | -               | -                                   | -              | -                       | -                                | -                        | 12.0                           | -                  | -                         | -               | <b>0.7%</b>     |
| 30                 | -                              | -               | -                                   | -              | -                       | -                                | -                        | 5.6                            | -                  | -                         | -               | <b>0.3%</b>     |
| 36                 | -                              | -               | -                                   | -              | -                       | -                                | 0.8                      | 19.3                           | -                  | -                         | -               | <b>1.1%</b>     |
| 42                 | -                              | -               | -                                   | -              | -                       | -                                | -                        | 8.8                            | -                  | -                         | -               | <b>0.5%</b>     |
| 48                 | -                              | -               | -                                   | -              | -                       | -                                | <0.1                     | -                              | -                  | -                         | -               | <b>&lt;0.1%</b> |
| 72 <sup>1</sup>    | -                              | -               | -                                   | -              | -                       | -                                | 0.1                      | -                              | -                  | -                         | -               | <b>&lt;0.1%</b> |
| <b>Percent</b>     | <b>&lt;0.1%</b>                | <b>&lt;0.1%</b> | <b>0.2%</b>                         | <b>0.8%</b>    | <b>0.1%</b>             | <b>0.4%</b>                      | <b>88.8%</b>             | <b>9.6%</b>                    | <b>0.1%</b>        | <b>&lt;0.1%</b>           | <b>&lt;0.1%</b> | <b>100%</b>     |

<sup>1</sup> Serves as in-pipe storage just upstream of Shevlin Lift Station.



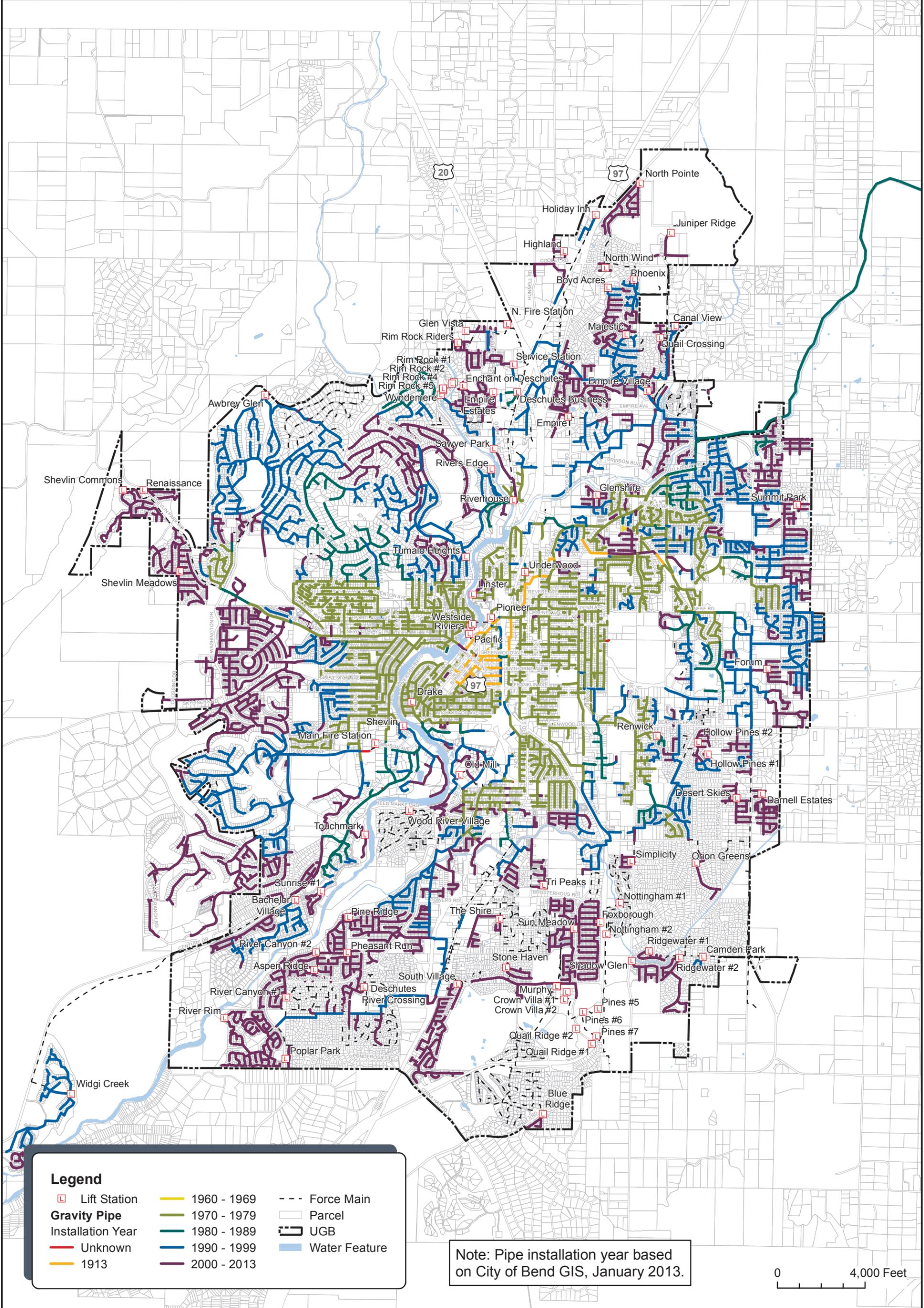
Note: Pipe diameter based on City of Bend GIS, January 2013.

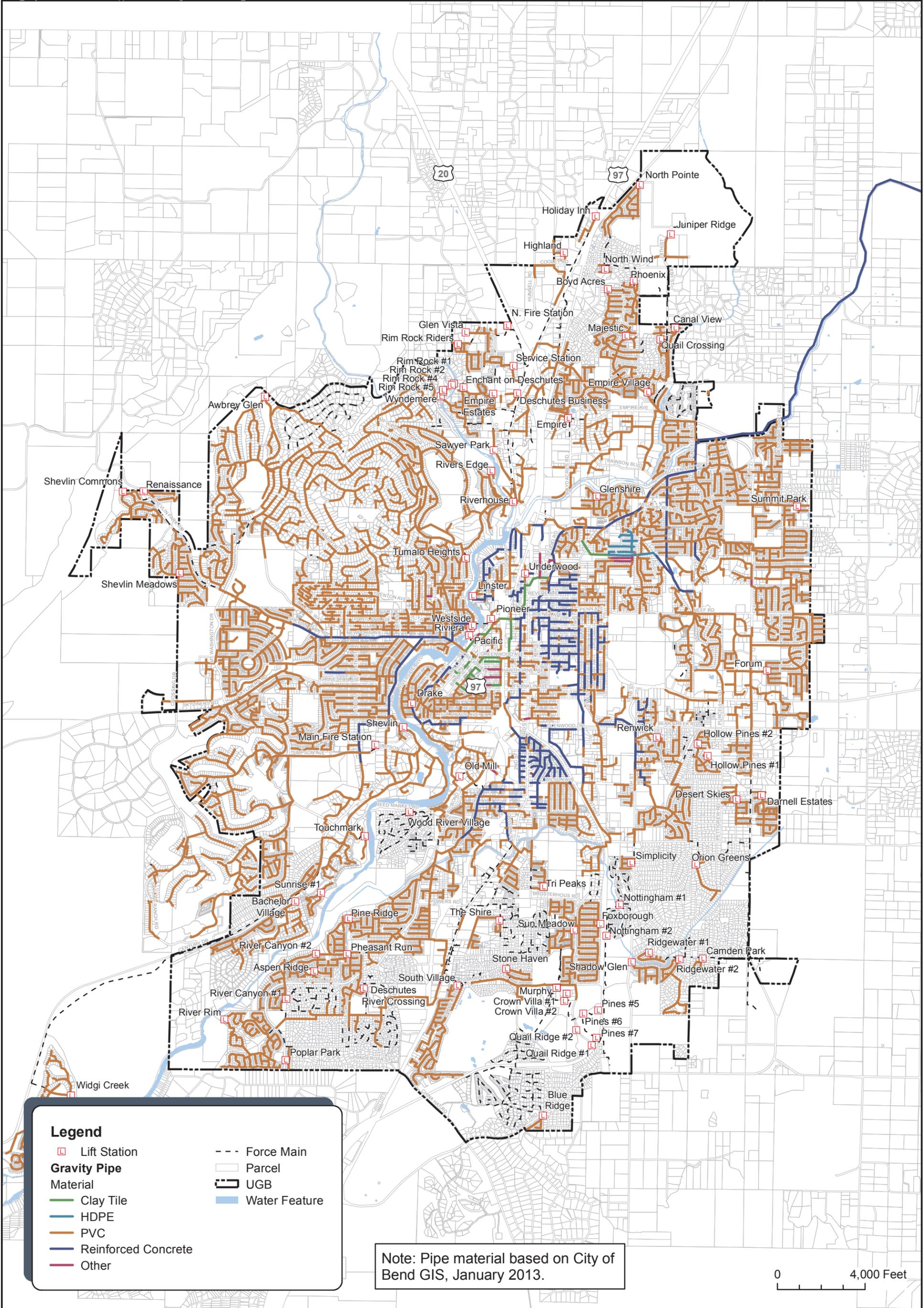


**City of Bend  
Collection System Master Plan**

**Figure 1B-1  
Existing System:  
Gravity Pipe  
Diameter**







**Legend**

|                              |               |
|------------------------------|---------------|
| Lift Station                 | Force Main    |
| <b>Gravity Pipe Material</b> | Parcel        |
| Clay Tile                    | UGB           |
| HDPE                         | Water Feature |
| PVC                          |               |
| Reinforced Concrete          |               |
| Other                        |               |

Note: Pipe material based on City of Bend GIS, January 2013.

0 4,000 Feet



Most of the gravity collection system has been constructed since the late 1970s, when the City received federal funding to construct a centralized wastewater treatment plant, and is generally in good condition. The Public Works Department maintains a GIS database of the collection system that summarizes the size, material, and age of the system components. The sewer GIS data is summarized in Section 2 of the CSMP.

The O&M Department inspects the gravity collection system (diameters  $\leq$  15 inches) through CCTV and, through June 2013, approximately half of the gravity collection system had been inspected and rated. The inspections include a standardized rating index utilizing the National Association of Sewer Service Companies (NAASCO), Pipeline Assessment & Certification Program (PACP) inspection guidelines. The rating index assigns values to defects in pipe segments which are compiled into a composite rating for each pipeline. The O&M Department has used the rating to assign condition according to the categories shown in Table 1B-4. The gravity collection system condition assessment using these condition categories is presented in Figure 1B-4, and is summarized in tables 1B-5 by age, 1B-6 by size, and 1B-7 by material.

**Table 1B-4  
Gravity Pipe Condition Assessment by Category**

| Condition Rating | Condition Assessment                        | Length (mile) |
|------------------|---------------------------------------------|---------------|
| 0 and 1          | Failure Unlikely in Foreseeable Future      | 150.0         |
| 2                | Pipe Unlikely to Fail For 20 Years          | 6.8           |
| 3                | Pipe May Fail in 10-20 Years                | 5.1           |
| 4                | Pipe Will Probably Fail in 5-10 Years       | 2.3           |
| 5                | Pipe Has Failed or Will Fail Within 5 Years | 1.1           |
| Not Rated        | Not Rated To Date                           | 187.1         |

**Table 1B-5  
Gravity Pipe Condition Assessment by Age**

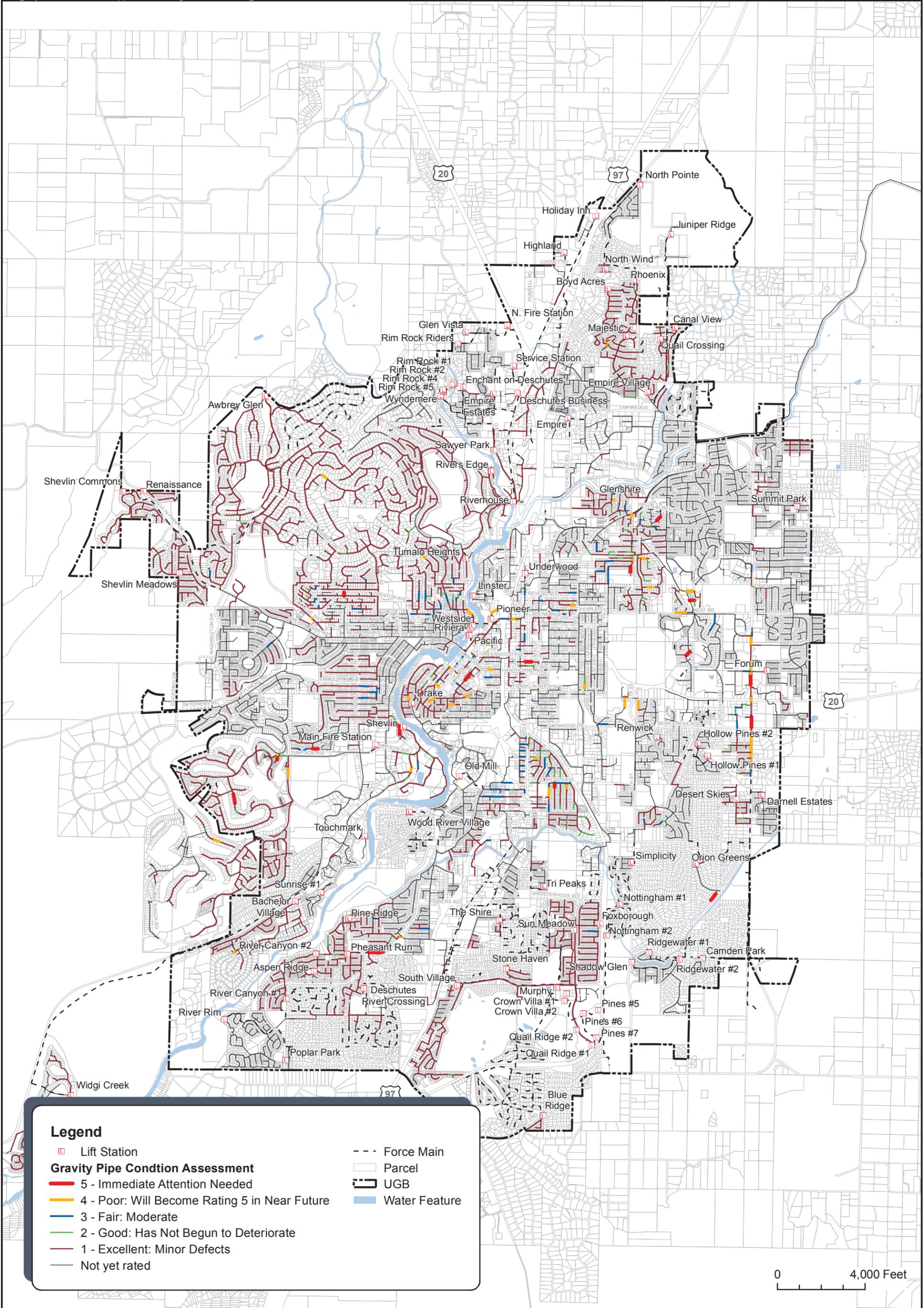
| Rating       | Installation Year - Percentage |              |              |              |              |             | Total        |
|--------------|--------------------------------|--------------|--------------|--------------|--------------|-------------|--------------|
|              | Before 1970                    | 1970 to 1979 | 1980 to 1989 | 1990 to 1999 | 2000 to 2013 | Unknown     |              |
| 0            | 0.53                           | 8.23         | 1.83         | 12.46        | 17.53        | 0.62        | <b>41.20</b> |
| 1            | 0.02                           | 0.60         | 0.12         | 0.44         | 0.17         | 0.03        | <b>1.38</b>  |
| 2            | 0.04                           | 0.82         | 0.11         | 0.40         | 0.48         | 0.07        | <b>1.92</b>  |
| 3            | 0.07                           | 1.01         | 0.05         | 0.13         | 0.15         | 0.03        | <b>1.44</b>  |
| 4            | 0.03                           | 0.31         | 0.03         | 0.25         | 0.04         | 0.00        | <b>0.66</b>  |
| 5            | 0.02                           | 0.12         | 0.00         | 0.11         | 0.06         | 0.00        | <b>0.31</b>  |
| Not Rated    | 0.25                           | 13.88        | 4.94         | 14.74        | 19.23        | 0.05        | <b>53.10</b> |
| <b>Total</b> | <b>0.96</b>                    | <b>24.97</b> | <b>7.08</b>  | <b>28.53</b> | <b>37.66</b> | <b>0.80</b> | <b>100</b>   |

**Table 1B-6  
Gravity Pipe Condition Assessment by Size**

| Rating       | Diameter (inch) - Percentage |              |             |             |             |             |             | Total        |
|--------------|------------------------------|--------------|-------------|-------------|-------------|-------------|-------------|--------------|
|              | 3 to 6                       | 8            | 10 to 12    | 14 to 18    | 20 to 24    | 26 to 30    | 32 to 72    |              |
| 0            | 0.95                         | 37.24        | 2.12        | 0.71        | 0.13        | 0.01        | 0.04        | <b>41.20</b> |
| 1            | 0.02                         | 1.30         | 0.03        | 0.04        | 0.00        | 0.00        | 0.00        | <b>1.38</b>  |
| 2            | 0.10                         | 1.69         | 0.10        | 0.01        | 0.02        | 0.00        | 0.00        | <b>1.92</b>  |
| 3            | 0.08                         | 1.18         | 0.11        | 0.07        | 0.00        | 0.00        | 0.00        | <b>1.44</b>  |
| 4            | 0.04                         | 0.47         | 0.04        | 0.11        | 0.00        | 0.00        | 0.00        | <b>0.66</b>  |
| 5            | 0.01                         | 0.27         | 0.04        | 0.00        | 0.00        | 0.00        | 0.00        | <b>0.31</b>  |
| Not Rated    | 2.01                         | 40.40        | 4.00        | 2.56        | 1.67        | 0.94        | 1.52        | <b>53.10</b> |
| <b>Total</b> | <b>3.21</b>                  | <b>82.55</b> | <b>6.44</b> | <b>3.50</b> | <b>1.82</b> | <b>0.95</b> | <b>1.56</b> | <b>100</b>   |

**Table 1B-7  
Gravity Pipe Condition Assessment by Material**

| Rating       | Material - Percentage |                           |                                    |                                 |                    |             | Total        |
|--------------|-----------------------|---------------------------|------------------------------------|---------------------------------|--------------------|-------------|--------------|
|              | Polyvinyl Chloride    | High Density Polyethylene | Concrete (AC, RCP, Non-Reinforced) | Cast Iron and Ductile Iron Pipe | Clay (CT, VCD, TP) | Unknown     |              |
| 0            | 39.02                 | 0.28                      | 1.41                               | 0.02                            | 0.47               | 0.00        | <b>41.20</b> |
| 1            | 1.15                  | 0.00                      | 0.20                               | 0.01                            | 0.02               | 0.00        | <b>1.38</b>  |
| 2            | 1.51                  | 0.06                      | 0.30                               | 0.01                            | 0.03               | 0.00        | <b>1.91</b>  |
| 3            | 1.02                  | 0.01                      | 0.33                               | 0.00                            | 0.08               | 0.00        | <b>1.44</b>  |
| 4            | 0.53                  | 0.00                      | 0.10                               | 0.00                            | 0.02               | 0.01        | <b>0.66</b>  |
| 5            | 0.27                  | 0.00                      | 0.02                               | 0.00                            | 0.02               | 0.00        | <b>0.31</b>  |
| Not Rated    | 45.42                 | 0.03                      | 7.37                               | 0.06                            | 0.22               | 0.00        | <b>53.10</b> |
| <b>Total</b> | <b>88.93</b>          | <b>0.37</b>               | <b>9.73</b>                        | <b>0.10</b>                     | <b>0.86</b>        | <b>0.01</b> | <b>100</b>   |



**Legend**

- Lift Station
- 5 - Immediate Attention Needed
- 4 - Poor: Will Become Rating 5 in Near Future
- 3 - Fair: Moderate
- 2 - Good: Has Not Begun to Deteriorate
- 1 - Excellent: Minor Defects
- Not yet rated
- Force Main
- Parcel
- UGB
- Water Feature

0 4,000 Feet



**City of Bend  
Collection System Master Plan**

**Figure 1B-4  
Gravity Pipe Condition  
Deficiency Assessment**



### ***Condition Rating of Lift Stations***

The City’s primary wastewater collection system currently includes 86 regional lift stations. There are many residential lift stations that are not part of the primary collection system. City-owned regional lift stations can be further broken down into two categories, Regional Modeled and Regional Not-Modeled. Regional Modeled lift stations typically collect sewage from a large region, and are included in the hydraulic model built and calibrated for the CSMP. Regional Not-Modeled lift stations are regional in nature, but are not included in the hydraulic model because they do not have any gravity pipe in their contributory basin. Table 1B-8 summarizes the lift stations by owner and category. Historically, lift stations have been installed for a number of reasons, including adverse grade, the need to cross a river or other restrictive corridors, or simply as an alternative to more costly gravity piping. Figure 1B-5 shows the lift station locations throughout the system.

**Table 1B-8  
Lift Stations within the Primary Collection System**

| <b>Owner</b> | <b>Category</b>        | <b>Number</b> |
|--------------|------------------------|---------------|
| City         | Regional - Modeled     | 68            |
|              | Regional – Not-Modeled | 18            |

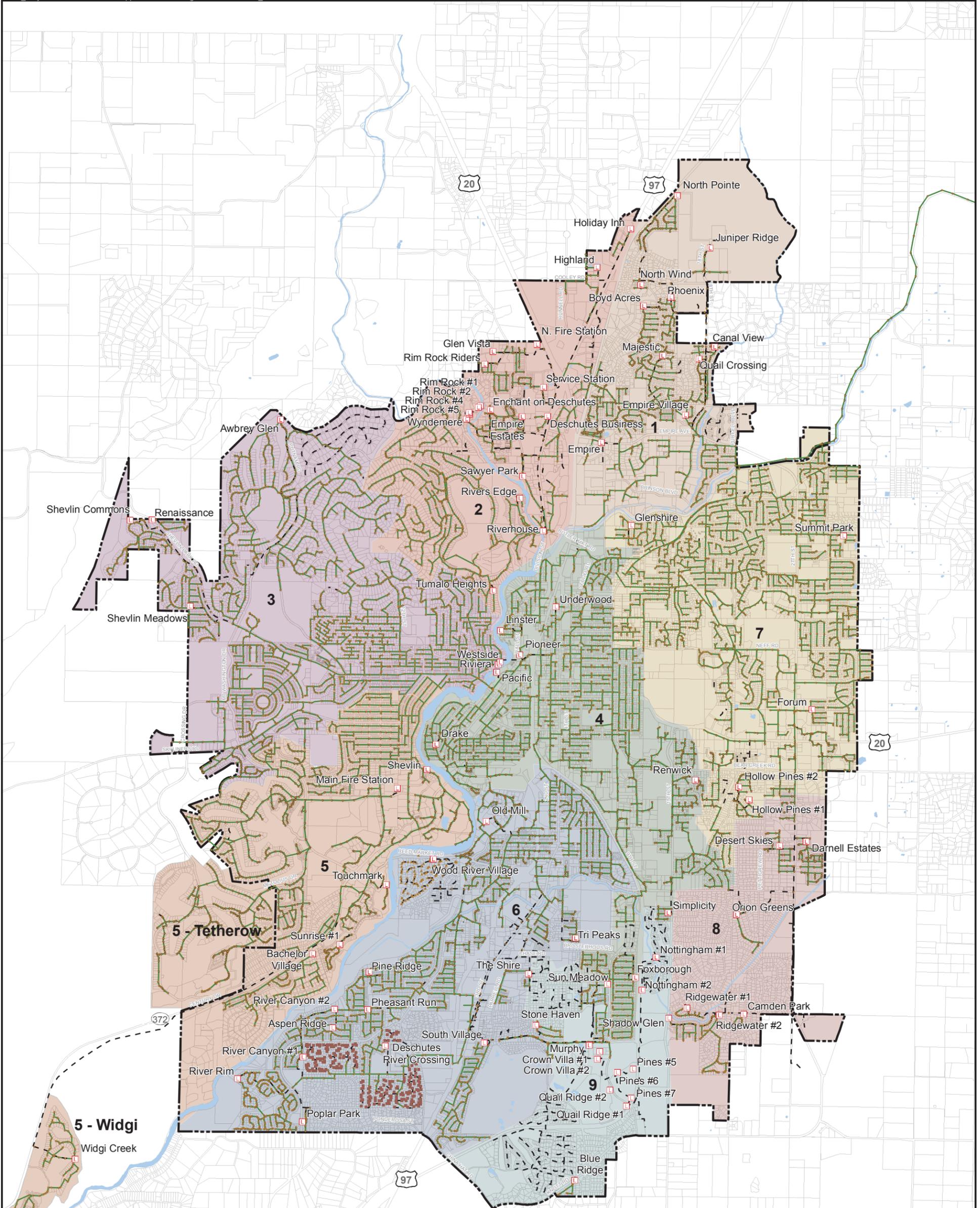
Table 1B-9 includes a summary of the City’s existing lift stations. Some lift stations have the pumps submerged in the wet well where the sewage is stored; others isolate the pumps from the wastewater using a dry well configuration connected by piping. The number of pumps in the lift station and total station horsepower are also listed in Table 1B-9. Some of the lift stations have a variable frequency drive (VFD), which controls the frequency of the power to the pumps, allowing the pumps to operate at different speeds while pumping varied amounts of flow. Three benefits of VFD control are energy savings, controlled performance and phase conversion. VFDs are sometimes utilized to maintain a constant wet well level by matching pump output to the flow entering the facility. This mode of operation can have the added benefit of reducing onsite and downstream odors by reducing the time that wastewater is detained at the wet well. Phase conversion is the use of a VFD to create three-phase power from a single-phase power source. Backup power for the lift stations (as shown in Table 1B-9), is used in the event of a power outage. Some of the lift stations have an onsite generator present. Others have the ability to connect to a portable generator during prolonged power outages.

**Table 1B-9  
Summary of Bend's Existing Lift Stations**

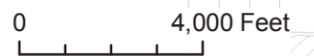
| <b>Basin</b> | <b>Lift Station Name</b> | <b>Type</b>           | <b>Number of Pumps</b> | <b>Total Horsepower</b> | <b>VFD</b> | <b>Standby Power</b> |
|--------------|--------------------------|-----------------------|------------------------|-------------------------|------------|----------------------|
| 1            | Boyd Acres               | Submersible           | 2                      | 12                      | -          | Plug                 |
| 1            | Canal View               | Submersible           | 2                      | 10                      | -          | Plug                 |
| 1            | Empire                   | Submersible           | 2                      | 10                      | -          | Plug                 |
| 1            | Empire Village           | Submersible           | 2                      | 6                       | VFD        | Plug                 |
| 1            | Juniper Ridge            | Submersible           | 2                      | 46                      | VFD        | Standby              |
| 1            | Majestic                 | Submersible           | 2                      | 10                      | VFD        | Plug                 |
| 1            | North Pointe             | Submersible           | 2                      | 80                      | -          | Standby              |
| 1            | North Wind               | Submersible           | 2                      | 40                      | -          | Plug                 |
| 1            | Phoenix                  | Submersible           | 2                      | 30                      | -          | Plug                 |
| 1            | Quail Crossing           | Submersible           | 2                      | 10                      | -          | Plug                 |
| 2            | Deschutes Business       | Submersible           | 2                      | 10                      | -          | Plug                 |
| 2            | Empire Estates           | Submersible           | 2                      | 40                      | -          | Plug                 |
| 2            | Enchant on Deschutes     | Submersible           | 2                      | 60                      | -          | Plug                 |
| 2            | Glen Vista               | Submersible           | 2                      | 46                      | -          | Plug                 |
| 2            | Highland                 | Submersible           | 2                      | 50                      | -          | Plug                 |
| 2            | Holiday Inn              | Submersible           | 2                      | 46                      | VFD        | Plug                 |
| 2            | N. Fire Station          | Submersible           | 3                      | 6                       | -          | Standby              |
| 2            | Rim Rock #1              | Submersible           | 2                      | 2                       | -          | Plug                 |
| 2            | Rim Rock #2              | Submersible           | 2                      | 2                       | -          | Plug                 |
| 2            | Rim Rock #4              | Submersible           | 2                      | 2                       | -          | Plug                 |
| 2            | Rim Rock #5              | Submersible           | 2                      | 2                       | -          | Plug                 |
| 2            | Rim Rock Riders          | Submersible           | 2                      | 40                      | -          | Plug                 |
| 2            | Riverhouse               | Wet Well/<br>Dry Well | 2                      | 15                      | -          | Standby              |
| 2            | Rivers Edge              | Submersible           | 2                      | 15                      | -          | Plug                 |
| 2            | Sawyer Park              | Submersible           | 4                      | 57                      | VFD        | Standby              |
| 2            | Service Station          | Submersible           | 2                      | 9                       | -          | Plug                 |
| 2            | Wyndemere                | Submersible           | 3                      | 45                      | VFD        | Standby              |
| 3            | Awbrey Glen              | Wet Well/<br>Dry Well | 5                      | 300                     | -          | Plug                 |
| 3            | Renaissance              | Submersible           | 2                      | 62                      | -          | Plug                 |
| 3            | Riviera                  | Submersible           | 2                      | 10                      | -          | Standby              |
| 3            | Shevlin Commons          | Submersible           | 2                      | 40                      | -          | Plug                 |
| 3            | Shevlin Meadows          | Submersible           | 2                      | 20                      | VFD        | Plug                 |
| 3            | Tumalo Heights           | Submersible           | 2                      | 15                      | -          | Plug                 |
| 4            | Drake                    | Wet Well/<br>Dry Well | 1                      | 28                      | -          | Standby              |
| 4            | Foxborough               | Submersible           | 2                      | 30                      | -          | Plug                 |
| 4            | Linster                  | Submersible           | 2                      | 15                      | -          | Plug                 |

| <b>Basin</b> | <b>Lift Station Name</b> | <b>Type</b>                       | <b>Number of Pumps</b> | <b>Total Horsepower</b> | <b>VFD</b> | <b>Standby Power</b> |
|--------------|--------------------------|-----------------------------------|------------------------|-------------------------|------------|----------------------|
| 4            | Pacific                  | Submersible                       | 2                      | 4                       | -          | Plug                 |
| 4            | Pioneer                  | Submersible                       | 2                      | 4                       | -          | Plug                 |
| 4            | Renwick                  | Wet Well/<br>Dry Well             | 2                      | 6                       | -          | Plug                 |
| 4            | Simplicity               | Submersible                       | 2                      | 15                      | -          | Plug                 |
| 4            | Sun Meadow               | Submersible                       | 2                      | 100                     | -          | Plug                 |
| 4            | Underwood                | Wet Well/<br>Dry Well             | 2                      | 6                       | -          | Plug                 |
| 4            | West Side                | Wet Well/<br>Dry Well             | 4                      | 170                     | VFD        | Standby              |
| 5            | Bachelor Village         | Submersible                       | 2                      | 20                      | -          |                      |
| 5            | Main Fire Station        | Submersible                       | 2                      | 4                       | -          | Standby              |
| 5            | Shevlin                  | Wet Well/<br>Dry Well             | 2                      | 15                      | -          | Plug                 |
| 5            | Sunrise #1               | Submersible                       | 2                      | 15                      | -          | Plug                 |
| 5            | Touchmark                | Submersible                       | 2                      | 40                      | -          | Standby              |
| 5            | Widgi Creek              | Submersible                       | 2                      | 80                      | -          | Plug                 |
| 6            | Aspen Ridge              | Submersible                       | 2                      | 50                      | -          | Plug                 |
| 6            | Des. River Crossing      | Submersible                       | 2                      | 10                      | -          | Plug                 |
| 6            | Old Mill                 | Submersible                       | 2                      | 30                      | -          | Standby              |
| 6            | Pheasant Run             | Submersible                       | 2                      | 10                      | VFD        | Plug                 |
| 6            | Pine Ridge               | Submersible                       | 2                      | 10                      | -          | Plug                 |
| 6            | Poplar Park              | Submersible                       | 2                      | 10                      | -          | Plug                 |
| 6            | River Canyon #1          | Submersible                       | 2                      | 15                      | -          | Plug                 |
| 6            | River Canyon #2          | Submersible                       | 2                      | 20                      | -          | Plug                 |
| 6            | River Rim                | Submersible                       | 2                      | 20                      | -          | Plug                 |
| 6            | South Village            | Submersible                       | 2                      | 40                      | -          | Plug                 |
| 6            | Stone Haven              | Submersible                       | 2                      | 10                      | -          | Plug                 |
| 6            | The Shire                | Submersible                       | 2                      | 40                      | -          | Plug                 |
| 6            | Tri Peaks                | Submersible                       | 2                      | 10                      | -          | Plug                 |
| 6            | Wood River Village       | Vacuum<br>Station and<br>Dry Well | 2                      | 60                      | -          | Standby              |
| 7            | Forum                    | Submersible                       | 2                      | 2                       | -          | Plug                 |
| 7            | Glenshire                | Submersible                       | 2                      | 10                      | -          | Plug                 |
| 7            | Hollow Pines             | Submersible                       | 2                      | 13                      | -          | Plug                 |
| 7            | Hollow Pines #2          | Submersible                       | 2                      | 10                      | -          | Plug                 |
| 7            | Summit Park              | Submersible                       | 2                      | 10                      | -          | Plug                 |
| 8            | Camden                   | Submersible                       | 2                      | 15                      | -          | Plug                 |
| 8            | Darnell Estates          | Submersible                       | 2                      | 10                      | -          | Plug                 |
| 8            | Desert Skies             | Submersible                       | 2                      | 10                      | -          | Plug                 |
| 8            | Orion Greens             | Submersible                       | 2                      | 20                      | VFD        | Standby              |

| <b>Basin</b> | <b>Lift Station Name</b> | <b>Type</b> | <b>Number of Pumps</b> | <b>Total Horsepower</b> | <b>VFD</b> | <b>Standby Power</b> |
|--------------|--------------------------|-------------|------------------------|-------------------------|------------|----------------------|
| 8            | Ridgewater               | Submersible | 2                      | 13                      | -          | Plug                 |
| 8            | Ridgewater #2            | Submersible | 2                      | 20                      | -          | Plug                 |
| 9            | Blue Ridge               | Submersible | 2                      | 10                      | -          | Plug                 |
| 9            | Crown Villa #1           | Submersible | 2                      | 2                       | -          | Plug                 |
| 9            | Crown Villa #2           | Submersible | 2                      | 2                       | -          | Plug                 |
| 9            | Murphy Interim           | Submersible | 2                      | 60                      | -          | Standby              |
| 9            | Nottingham #1            | Submersible | 2                      | 2                       | -          | Plug                 |
| 9            | Nottingham #2            | Submersible | 2                      | 20                      | -          | Plug                 |
| 9            | Pines #5                 | Submersible | 2                      | 4                       | -          | Plug                 |
| 9            | Pines #6                 | Submersible | 2                      | 4                       | -          | Plug                 |
| 9            | Pines #7                 | Submersible | 2                      | 34                      | -          | Plug                 |
| 9            | Quail Ridge #1           | Submersible | 2                      | 2                       | -          | Plug                 |
| 9            | Quail Ridge #2           | Submersible | 2                      | 2                       | -          | Plug                 |
| 9            | Shadow Glen              | Submersible | 2                      | 13                      | VFD        | Standby              |

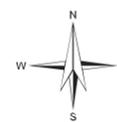


| Legend                   |              |                    |               |
|--------------------------|--------------|--------------------|---------------|
| Lift Station             | Gravity Pipe | <b>Sewer Basin</b> | 5             |
| Residential Lift Station | Force Main   | 1                  | 6             |
| Vacuum Pit               |              | 2                  | 7             |
| Manhole                  |              | 3                  | 8             |
|                          |              | 4                  | 9             |
|                          |              |                    | Parcel        |
|                          |              |                    | UGB           |
|                          |              |                    | Water Feature |



**City of Bend  
Collection System Master Plan**

**Figure 1B-5  
Existing System:  
Service Area and Basins**



Lift station capacity is summarized in Table 1B-10. The upper limit of the listed capacity is based on the sum of individual pump capacity for all pumps in the lift station. The firm capacity (the capacity with the largest pump out of service) is also listed. The actual capacity will be less than the sum of the individual pump capacities, and will depend on the discharge head the station is pumping against. The capacity of the force main associated with each lift station is also summarized in Table 1B-10. This value is the calculated flow through the force main: Dry weather capacity is calculated at a velocity of 6 ft/sec and wet weather capacity at 10 ft/sec. Force main capacity was included to determine if velocity constraints are the limiting factor in lift station capacity.

**Table 1B-10  
Lift Station Capacity**

| <b>Basin</b> | <b>Lift Station Name</b> | <b>Station Pumping Capacity<sup>1</sup><br/>(gpm)</b> | <b>Station Firm Pumping Capacity<sup>2</sup><br/>(gpm)</b> | <b>Discharge Diameter<sup>3</sup><br/>(inch)</b> | <b>Dry Weather Discharge Line Capacity at 6 ft/sec<sup>4</sup><br/>(gpm)</b> | <b>Wet Weather Discharge Line Capacity at 10 ft/sec<sup>5</sup><br/>(gpm)</b> |
|--------------|--------------------------|-------------------------------------------------------|------------------------------------------------------------|--------------------------------------------------|------------------------------------------------------------------------------|-------------------------------------------------------------------------------|
| 1            | Boyd Acres               | 292                                                   | 146                                                        | 3                                                | 132                                                                          | 220                                                                           |
| 1            | Canal View               | 380                                                   | 190                                                        | 4                                                | 235                                                                          | 392                                                                           |
| 1            | Empire                   | 260                                                   | 130                                                        | 4                                                | 235                                                                          | 392                                                                           |
| 1            | Empire Village           | 416                                                   | 208                                                        | 4                                                | 235                                                                          | 392                                                                           |
| 1            | Juniper Ridge            | 888                                                   | 444                                                        | 6                                                | 529                                                                          | 881                                                                           |
| 1            | Majestic                 | 520                                                   | 260                                                        | 6                                                | 529                                                                          | 881                                                                           |
| 1            | North Pointe             | 530                                                   | 265                                                        | 6                                                | 529                                                                          | 881                                                                           |
| 1            | North Wind               | 550                                                   | 275                                                        | 6                                                | 529                                                                          | 881                                                                           |
| 1            | Phoenix                  | 600                                                   | 300                                                        | 6                                                | 529                                                                          | 881                                                                           |
| 1            | Quail Crossing           | 530                                                   | 265                                                        | 6                                                | 529                                                                          | 881                                                                           |
| 2            | Deschutes Business       | 200                                                   | 100                                                        | 4                                                | 235                                                                          | 392                                                                           |
| 2            | Empire Estates           | 240                                                   | 120                                                        | 3                                                | 132                                                                          | 220                                                                           |
| 2            | Enchant on Deschutes     | 300                                                   | 150                                                        | 4                                                | 235                                                                          | 392                                                                           |
| 2            | Glen Vista               | 474                                                   | 237                                                        | 6                                                | 529                                                                          | 881                                                                           |
| 2            | Highland                 | 500                                                   | 250                                                        | 4                                                | 235                                                                          | 392                                                                           |
| 2            | Holiday Inn              | 320                                                   | 160                                                        | 4                                                | 235                                                                          | 392                                                                           |
| 2            | N. Fire Station          | 120                                                   | 80                                                         | 3                                                | 132                                                                          | 220                                                                           |
| 2            | Rim Rock #1              | 80                                                    | 40                                                         | 2                                                | 59                                                                           | 98                                                                            |
| 2            | Rim Rock #2              | 80                                                    | 40                                                         | 2                                                | 59                                                                           | 98                                                                            |
| 2            | Rim Rock #4              | 80                                                    | 40                                                         | 2                                                | 59                                                                           | 98                                                                            |
| 2            | Rim Rock #5              | 80                                                    | 40                                                         | 2                                                | 59                                                                           | 98                                                                            |
| 2            | Rim Rock Riders          | 300                                                   | 150                                                        | 4                                                | 235                                                                          | 392                                                                           |
| 2            | Riverhouse               | 660                                                   | 330                                                        | 6                                                | 529                                                                          | 881                                                                           |
| 2            | River's Edge             | 250                                                   | 125                                                        | 3                                                | 132                                                                          | 220                                                                           |
| 2            | Sawyer Park              | 1,749                                                 | 1,184                                                      | 8                                                | 940                                                                          | 1,567                                                                         |
| 2            | Service Station          | 320                                                   | 120                                                        | 4                                                | 235                                                                          | 392                                                                           |
| 2            | Wyndemere                | 813                                                   | 542                                                        | 6                                                | 529                                                                          | 881                                                                           |
| 3            | Awbrey Glen              | 3,200                                                 | 2,400                                                      | 8                                                | 940                                                                          | 1,567                                                                         |
| 3            | Renaissance              | 244                                                   | 122                                                        | 4                                                | 235                                                                          | 392                                                                           |
| 3            | Riviera                  | 284                                                   | 142                                                        | 4                                                | 235                                                                          | 392                                                                           |
| 3            | Shevlin Commons          | 236                                                   | 118                                                        | 4                                                | 235                                                                          | 392                                                                           |
| 3            | Shevlin Meadows          | 306                                                   | 153                                                        | 4                                                | 235                                                                          | 392                                                                           |
| 3            | Tumalo Heights           | 240                                                   | 120                                                        | 4                                                | 235                                                                          | 392                                                                           |

| Basin | Lift Station Name   | Station Pumping Capacity <sup>1</sup> (gpm) | Station Firm Pumping Capacity <sup>2</sup> (gpm) | Discharge Diameter <sup>3</sup> (inch) | Dry Weather Discharge Line Capacity at 6 ft/sec <sup>4</sup> (gpm) | Wet Weather Discharge Line Capacity at 10 ft/sec <sup>5</sup> (gpm) |
|-------|---------------------|---------------------------------------------|--------------------------------------------------|----------------------------------------|--------------------------------------------------------------------|---------------------------------------------------------------------|
| 4     | Drake               | 1,750                                       | 1,100                                            | 6                                      | 529                                                                | 881                                                                 |
| 4     | Foxborough          | 638                                         | 319                                              | 6                                      | 529                                                                | 881                                                                 |
| 4     | Linster             | 336                                         | 168                                              | 4                                      | 235                                                                | 392                                                                 |
| 4     | Pacific             | 60                                          | 30                                               | 2                                      | 59                                                                 | 98                                                                  |
| 4     | Pioneer             | 70                                          | 35                                               | 6                                      | 529                                                                | 881                                                                 |
| 4     | Renwick             | 80                                          | 40                                               | 4                                      | 235                                                                | 392                                                                 |
| 4     | Simplicity          | 400                                         | 200                                              | 4                                      | 235                                                                | 392                                                                 |
| 4     | Sun Meadow          | 748                                         | 374                                              | 6                                      | 529                                                                | 881                                                                 |
| 4     | Underwood           | 300                                         | 150                                              | 4                                      | 235                                                                | 392                                                                 |
| 4     | West Side           | 10,142                                      | 7,411                                            | 16                                     | 3,760                                                              | 6,267                                                               |
| 5     | Bachelor Village    | 250                                         | 125                                              | 4                                      | 235                                                                | 392                                                                 |
| 5     | Main Fire Station   | 80                                          | 40                                               | 2                                      | 59                                                                 | 98                                                                  |
| 5     | Shevlin             | 560                                         | 280                                              | 6                                      | 529                                                                | 881                                                                 |
| 5     | Sunrise #1          | 500                                         | 250                                              | 4                                      | 235                                                                | 392                                                                 |
| 5     | Touchmark           | 800                                         | 400                                              | 6                                      | 529                                                                | 881                                                                 |
| 5     | Widgi Creek         | 900                                         | 450                                              | 6                                      | 529                                                                | 881                                                                 |
| 6     | Aspen Ridge         | 356                                         | 178                                              | 4                                      | 235                                                                | 392                                                                 |
| 6     | Des. River Crossing | 390                                         | 195                                              | 4                                      | 235                                                                | 392                                                                 |
| 6     | Old Mill            | 654                                         | 327                                              | 6                                      | 529                                                                | 881                                                                 |
| 6     | Pheasant Run        | 250                                         | 125                                              | 4                                      | 235                                                                | 392                                                                 |
| 6     | Pine Ridge          | 320                                         | 160                                              | 4                                      | 235                                                                | 392                                                                 |
| 6     | Poplar Park         | 250                                         | 125                                              | 4                                      | 235                                                                | 392                                                                 |
| 6     | River Canyon #1     | 644                                         | 322                                              | 4                                      | 235                                                                | 392                                                                 |
| 6     | River Canyon #2     | 790                                         | 395                                              | 4                                      | 235                                                                | 392                                                                 |
| 6     | River Rim           | 300                                         | 150                                              | 4                                      | 235                                                                | 392                                                                 |
| 6     | South Village       | 530                                         | 265                                              | 6                                      | 529                                                                | 881                                                                 |
| 6     | Stone Haven         | 320                                         | 160                                              | 6                                      | 529                                                                | 881                                                                 |
| 6     | The Shire           | 400                                         | 200                                              | 4                                      | 235                                                                | 392                                                                 |
| 6     | Tri Peaks           | 214                                         | 107                                              | 3                                      | 132                                                                | 220                                                                 |
| 6     | Wood River Village  | 480                                         | 240                                              | 6                                      | 529                                                                | 881                                                                 |
| 7     | Forum               | 240                                         | 120                                              | 3                                      | 132                                                                | 220                                                                 |
| 7     | Glenshire           | 344                                         | 172                                              | 4                                      | 235                                                                | 392                                                                 |
| 7     | Hollow Pines        | 280                                         | 140                                              | 4                                      | 235                                                                | 392                                                                 |
| 7     | Hollow Pines #2     | 190                                         | 95                                               | 4                                      | 235                                                                | 392                                                                 |
| 7     | Summit Park         | 250                                         | 125                                              | 4                                      | 235                                                                | 392                                                                 |
| 8     | Camden              | 250                                         | 125                                              | 4                                      | 235                                                                | 392                                                                 |
| 8     | Darnell Estates     | 620                                         | 310                                              | 4                                      | 235                                                                | 392                                                                 |

| Basin | Lift Station Name | Station Pumping Capacity <sup>1</sup><br>(gpm) | Station Firm Pumping Capacity <sup>2</sup><br>(gpm) | Discharge Diameter <sup>3</sup><br>(inch) | Dry Weather Discharge Line Capacity at 6 ft/sec <sup>4</sup><br>(gpm) | Wet Weather Discharge Line Capacity at 10 ft/sec <sup>5</sup><br>(gpm) |
|-------|-------------------|------------------------------------------------|-----------------------------------------------------|-------------------------------------------|-----------------------------------------------------------------------|------------------------------------------------------------------------|
| 8     | Desert Skies      | 370                                            | 185                                                 | 4                                         | 235                                                                   | 392                                                                    |
| 8     | Orion Greens      | 340                                            | 170                                                 | 4                                         | 235                                                                   | 392                                                                    |
| 8     | Ridgewater        | 250                                            | 125                                                 | 4                                         | 235                                                                   | 392                                                                    |
| 8     | Ridgewater #2     | 250                                            | 125                                                 | 4                                         | 235                                                                   | 392                                                                    |
| 9     | Blue Ridge        | 132                                            | 66                                                  | 3                                         | 132                                                                   | 220                                                                    |
| 9     | Crown Villa #1    | 160                                            | 80                                                  | 6                                         | 529                                                                   | 881                                                                    |
| 9     | Crown Villa #2    | 160                                            | 80                                                  | 6                                         | 529                                                                   | 881                                                                    |
| 9     | Murphy Interim    | 800                                            | 400                                                 | 6                                         | 529                                                                   | 881                                                                    |
| 9     | Nottingham #1     | 150                                            | 75                                                  | 4                                         | 235                                                                   | 392                                                                    |
| 9     | Nottingham #2     | 240                                            | 120                                                 | 4                                         | 235                                                                   | 392                                                                    |
| 9     | Pines #5          | 20                                             | 10                                                  | 3                                         | 132                                                                   | 220                                                                    |
| 9     | Pines #6          | 20                                             | 10                                                  | 3                                         | 132                                                                   | 220                                                                    |
| 9     | Pines #7          | 20                                             | 10                                                  | 6                                         | 529                                                                   | 881                                                                    |
| 9     | Quail Ridge #1    | 90                                             | 10                                                  | 4                                         | 235                                                                   | 392                                                                    |
| 9     | Quail Ridge #2    | 90                                             | 10                                                  | 4                                         | 235                                                                   | 392                                                                    |
| 9     | Shadow Glen       | 264                                            | 132                                                 | 6                                         | 529                                                                   | 881                                                                    |

<sup>1</sup> Station Pumping Capacity - The lift station capacity is based on the sum of the individual design point flows for all pumps in the lift station. The actual total capacity will be less than this upper limit.

<sup>2</sup> Station Firm Pumping Capacity - Equal to the total design point flow with largest pump out of service. The firm capacity is based on the sum of the individual design point flows for pumps in the lift station. The actual firm capacity will be less than this.

<sup>3</sup> Discharge Diameter - The diameter of the lift station force main.

<sup>4</sup> Discharge Line Capacity - Flow rate in lift station force main based on 6 ft/sec velocity. Does not indicate true capacity of combined lift station and force main.

<sup>5</sup> Discharge Line Capacity - Flow rate in lift station force main based on 10 ft/sec velocity. Does not indicate true capacity of combined lift station and force main.

The O&M Department rated each of the City-owned lift stations in the collection system. The ratings were based on a review of the components summarized in Table 1B-11.

**Table 1B-11  
Lift Station Condition Assessment Summary Components**

| Category          | Component                 | Category          | Component                     |
|-------------------|---------------------------|-------------------|-------------------------------|
| Pump              | General Overall Condition | Pump House        | General Overall Condition     |
|                   | Pump ragging problems     | Alarms and Sensor | General Overall Condition     |
|                   | Impeller Damage Wear      |                   | Recurring Alarm Failures      |
| Motor             | General Overall Condition | Electrical        | Recurring Sensor Failures     |
|                   | Motor Connections         |                   | General Overall Condition     |
| Wet Well          | General Overall Condition | Site              | Generator or Portable Pigtail |
|                   | Hatches/Safety Grate      |                   | HVAC                          |
|                   | Corrosion                 |                   | Lighting                      |
|                   | Fats/Oils/Grease Buildup  |                   | Control Panel                 |
|                   | Solids Buildup            |                   | SCADA                         |
|                   | Expansion Tank            |                   | General Overall Condition     |
| Piping and Valves | General Overall Condition | Site              | Access/Security               |
|                   | Piping                    |                   | Drainage                      |
|                   | Valves                    |                   | Overflow Impact               |

Individual ratings of the components were used to determine the composite rating for each lift station. O&M staff then reviewed and confirmed the final ratings. The general comments are provided below. The final ratings are summarized in tables 1B-12 through 1B-15 and shown in Figure 1B-6.

The tables are organized in the following categories:

- Table 1B-12: Requires significant improvements immediately (included in the short-term, 1- to-5-year CIP)
- Table 1B-13: Requires significant improvements within 5 years (included in the short-term, 1- to -5-year CIP)
- Table 1B-14: Requires significant improvements within 10 years (included in the long-term, 6- to 10-year CIP)
- Table 1B-15: In good condition requiring no major improvements within 10 years (included in the long-term, 11- to 20-year CIP)

#### General City of Bend O&M Staff Comments:

- There are numerous basins where pumps overpower other pumps, resulting in long run times, excessive electrical consumption, and risk of sanitary sewer overflow due to constrained lift station pump output.
- The two lift station service vehicles each have over 100,000 miles, indicating decreased reliability and an associated increase in risk of sanitary sewer overflow.
- The average age of most lift stations is similar (installed during time of rapid growth in the early 2000s). This may result in operational and reliability problems, as these stations all reach the end of useful life at the same time.
- Many lift stations were built with poor quality and unreliable components (pumps and controls).
- Many lift station pumps operate at low efficiency points, consuming excess electricity.
- The large number of lift stations and limited staff restrict the capacity of the operations group to provide proactive maintenance.
- The existing SCADA system is data acquisition only. There is currently no Supervisory Control (remote control/operation).
- The large number of lift stations and limited staff restrict the capacity of the operations group to monitor lift station performance and place significant responsibility on the SCADA system to reliably track lift station function.
- Wood River Village Vacuum System has historically operated with minimal problems, but higher liability exists due to difficulty of isolating and locating vacuum leaks, which significantly increases the risk of sanitary sewer overflows and backups.
- Romaine Village Common Pressure Area has reasonably reliable systems, but it is overwhelming to check lift stations more than once per month due to number of individual pumping units (248, total). This area has a great need for reliable SCADA due to potential risk for sanitary sewer overflow. Home sumps create harsh wastewater environments, leading to hydrogen sulfide generation with associated odors and corrosion throughout the system.

Mechanical and electrical systems require improvements approximately every 20 years; therefore, all the City's lift stations include condition-based upgrades within the 20-year CIP timeframe.

**Table 1B-12  
Lift Station Condition Assessment Summary - Requires Significant Improvements Immediately**

| Lift Station       | Replacement Type         | O&M Comment                                                                                                                                                                                                                                                                     |
|--------------------|--------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Crown Villa #1     | Lift Station Overhaul    | Station need to be completely overhauled. New pumps, discharge piping and electrical panel are needed.                                                                                                                                                                          |
| Crown Villa #2     | Lift Station Overhaul    | Station need to be completely overhauled. New pumps, discharge piping and electrical panel are needed. Station also needs a control panel upgrade.                                                                                                                              |
| Deschutes Business | Lift Station Replacement | Old station. Original, obsolete pumps and obscurely sized discharge piping make this station extremely difficult to maintain. Wet well, discharge piping and valve pit are deteriorating due to corrosion.                                                                      |
| Nottingham #1      | Lift Station Replacement | Aging, poorly designed station. Wet well is deteriorating and discharge piping is very fragile. Pumps into Nottingham #2.                                                                                                                                                       |
| Nottingham #2      | Lift Station Replacement | Aging lift station. Corrosion is rapidly deteriorating pumps, piping and rail system. Pumps are obsolete. Entire subdivision pumps to this lift station, failure could be catastrophic.                                                                                         |
| Pacific            | Lift Station Replacement | Old and deteriorating station. Extremely unsafe to access pumps and piping. Current pumping components are deficient and outdated. Located within close proximity of the Deschutes River.                                                                                       |
| Pioneer            | Lift Station Replacement | Old and deteriorating station. Extremely unsafe to access pumps and piping. Current pumping components are deficient and outdated.                                                                                                                                              |
| Quail Ridge #1     | Lift Station Overhaul    | Station needs to be completely overhauled. New pumps, discharge piping and electrical panel are needed.                                                                                                                                                                         |
| Quail Ridge #2     | Pump replacement/upgrade | Station needs to be completely overhauled. New pumps, discharge piping and electrical panel are needed.                                                                                                                                                                         |
| Shevlin            | Lift Station Replacement | Currently pumping at or near capacity depending on Deschutes Brewery Flows. Older station. High levels of hydrogen sulfide are creating a corrosive environment. Pumps, aging vacuum system and electrical components are deteriorating rapidly and require constant attention. |

**Table 1B-13  
Lift Station Condition Assessment Summary - Requires Significant Improvements within 5 Years**

| Lift Station   | Replacement Type                | O&M Comment                                                                                                                                                                                                                     |
|----------------|---------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Awbrey Glen    | Lift Station Overhaul           | Needs a backup generator dedicated to the station. During storm events, this is often a very difficult station to get to (snow/ice) and we have very little time to get station running before it surcharges and causes an SSO. |
| Camden Park    | Lift Station Overhaul           | Old station. Needs new pumps, rail system and electrical panel                                                                                                                                                                  |
| Canal View     | Sink Hole Needs to be Addressed | Needs further assessment. There appears to be a sinkhole adjacent to the wet well, and control panel is sinking into the ground                                                                                                 |
| Drake          | Lift Station Replacement        | Older, obsolete design with vacuum priming system and small wet wells make this station hard to maintain.                                                                                                                       |
| Empire         | Pump replacement/upgrade        | Pumps need to be replaced and potentially airlocking issues need to be corrected.                                                                                                                                               |
| Empire Village | Pump replacement/upgrade        | Needs bigger pumps and VFDs                                                                                                                                                                                                     |
| Poplar Park    | Pump replacement/upgrade        | Expected to require pump replacement in near future                                                                                                                                                                             |
| Renwick        | Lift Station Replacement        | Older, obsolete design with vacuum priming system and small wet well makes station hard to maintain.                                                                                                                            |
| Rimrock #1     | Lift Station Replacement        | Very poorly designed. Grossly undersized for current flows. Small wet wells create difficulties in maintaining pumps and control floats. Proximity to river makes these sites a significant liability.                          |
| Rimrock #2     | Lift Station Replacement        | Very poorly designed. Grossly undersized for current flows. Small wet wells create difficulties in maintaining pumps and control floats. Proximity to river makes these sites a significant liability.                          |
| Rimrock #4     | Lift Station Replacement        | Very poorly designed. Grossly undersized for current flows. Small wet wells create difficulties in maintaining pumps and control floats. Proximity to river makes these sites a significant liability.                          |
| Rimrock #5     | Lift Station Replacement        | Very poorly designed. Grossly undersized for current flows. Small wet wells create difficulties in maintaining pumps and control floats. Proximity to river makes these sites a significant liability.                          |
| Riverhouse     | Lift Station Replacement        | Older, obsolete design and small wet well make this station hard to maintain.                                                                                                                                                   |
| The Pines #5   | Lift Station Upgrade            | Pumps and electrical in good condition. Station plumbing is insufficient.                                                                                                                                                       |
| The Pines #6   | Lift Station Upgrade            | Pumps and electrical in good condition. Station plumbing is insufficient.                                                                                                                                                       |
| The Pines #7   | Lift Station Upgrade            | Pumps and electrical in good condition. Station plumbing is insufficient.                                                                                                                                                       |
| Underwood      | Lift Station Replacement        | Replace Cornell older, obsolete design with vacuum priming system and small wet well makes station hard to maintain.                                                                                                            |

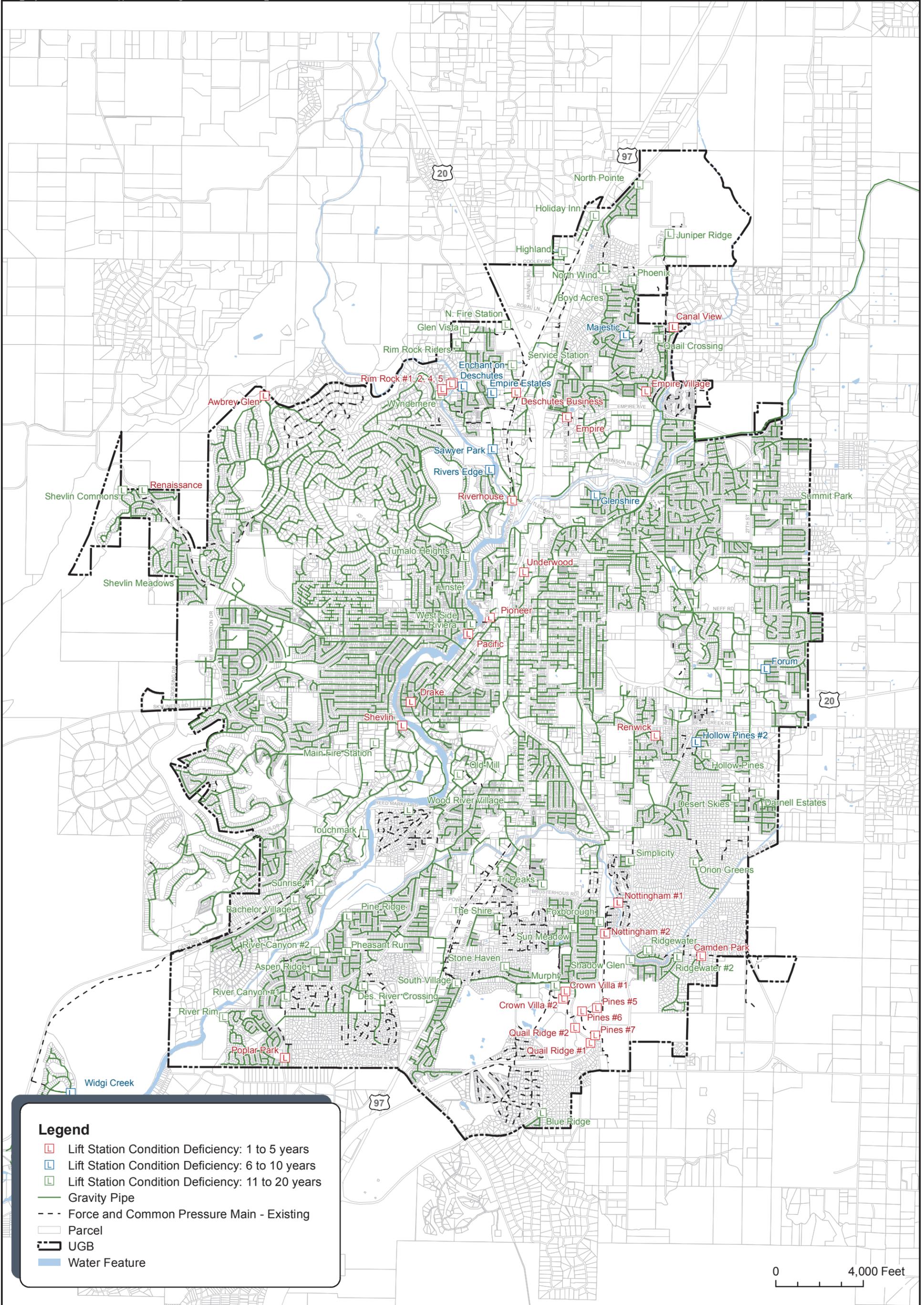
**Table 1B-14  
Lift Station Condition Assessment Summary - Requires Significant Improvements within 10 Years**

| Lift Station         | Replacement Type             | O&M Comment                                                                                                                                                                                                                  |
|----------------------|------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Empire Estates       | Pump replacement/<br>upgrade | Expected to require pump replacement in near future                                                                                                                                                                          |
| Enchant on Deschutes | Pump replacement/<br>upgrade | Expected to require pump replacement in near future                                                                                                                                                                          |
| Forum                | Pump replacement/<br>upgrade | City to replace pumps in near future                                                                                                                                                                                         |
| Glenshire            | Pump replacement/<br>upgrade | Could use pump and VFD upgrade                                                                                                                                                                                               |
| Hollow Pines #2      | Pump replacement/<br>upgrade | City to replace pumps and VFDs in near future                                                                                                                                                                                |
| Majestic             | -                            | Rail system is in poor condition/operations                                                                                                                                                                                  |
| Rivers Edge          | -                            | City to replace pumps in near future                                                                                                                                                                                         |
| Sawyer Park          | -                            | -                                                                                                                                                                                                                            |
| Widgi Creek          | Lift Station Overhaul        | Older pumps require upgrading. Rail system and electrical components need to be replaced. (Note: Existing agreement with Widgi Creek obligates them to upgrade if they expand. However, station needs overhaul, regardless.) |

**Table 1B-15  
Lift Station Condition Assessment Summary - In Good Condition, Requiring No Major Improvements within 10 Years**

| Lift Station             | Replacement Type             | O&M Comment                                         |
|--------------------------|------------------------------|-----------------------------------------------------|
| Airport                  | -                            | -                                                   |
| Aspen Ridge              | -                            | -                                                   |
| Bachelor Village         | -                            | -                                                   |
| Blue Ridge               | -                            | -                                                   |
| Boyd Acres               | Pump replacement/<br>upgrade | -                                                   |
| Darnell Estates          | -                            | -                                                   |
| Deschutes River Crossing | -                            | -                                                   |
| Desert Skies             | -                            | -                                                   |
| Foxborough               | -                            | -                                                   |
| Glen Vista               | -                            | -                                                   |
| Highland                 | Pump replacement/<br>upgrade | -                                                   |
| Holiday Inn              | -                            | -                                                   |
| Hollow Pines #1          | -                            | -                                                   |
| Juniper Ridge            | -                            | -                                                   |
| Linster                  | -                            | -                                                   |
| Main Fire Station        | -                            | -                                                   |
| Murphy                   | -                            | -                                                   |
| North Pointe             | Pump replacement/<br>upgrade | Expected to require pump replacement in near future |

| Lift Station      | Replacement Type             | O&M Comment                                                                        |
|-------------------|------------------------------|------------------------------------------------------------------------------------|
| N. Fire Station   |                              |                                                                                    |
| Northwind         | Pump replacement/<br>upgrade | Expected to require pump replacement in near future                                |
| Old Mill          | Lift Station Overhaul        | Electrical components need upgraded (undersized for existing pumps)                |
| Orion Greens      | -                            | -                                                                                  |
| Pheasant Run      | -                            | -                                                                                  |
| Phoenix           | -                            | -                                                                                  |
| Pine Ridge        | Pump replacement/<br>upgrade | Expected to require pump replacement as budget allows or when existing pumps fail. |
| Quail Crossing    | -                            | -                                                                                  |
| Renaissance       | Pump<br>replacement/upgrade  | Expected to require pump replacement in near future                                |
| Ridgewater #1     | -                            | -                                                                                  |
| Ridgewater #2     | -                            | -                                                                                  |
| Rim Rock Riders   | Pump<br>replacement/upgrade  | Expected to require pump replacement in near future                                |
| River Canyon #1   | -                            | -                                                                                  |
| River Canyon #2   | -                            | -                                                                                  |
| River Rim         | -                            | -                                                                                  |
| Riviera           | -                            | -                                                                                  |
| Service           | Pump replacement/<br>upgrade | Expected to require pump replacement in near future                                |
| Shadow Glen       | -                            | -                                                                                  |
| Shevlin Commons   | Pump replacement/<br>upgrade | Expected to require pump replacement as existing pumps fail.                       |
| Shevlin Meadows   | -                            | -                                                                                  |
| The Shire         | Pump replacement/<br>upgrade | -                                                                                  |
| Simplicity        | Pump replacement/<br>upgrade | -                                                                                  |
| South Village     | Pump replacement/<br>upgrade | -                                                                                  |
| Stone Haven       | -                            | -                                                                                  |
| Summit Park       | -                            | -                                                                                  |
| Sun Meadow        | Pump replacement/<br>upgrade | -                                                                                  |
| Sunrise #1        | Lift Station upgrade         | New rail system required.                                                          |
| Touchmark         | Pump replacement/<br>upgrade | -                                                                                  |
| Tri Peaks         | -                            | -                                                                                  |
| Tumalo Heights    | Pump replacement/<br>upgrade | -                                                                                  |
| Westside          | -                            | -                                                                                  |
| Woodriver Village | -                            | Good working system, though unique to the rest of collection system                |
| Wyndemere         | -                            | -                                                                                  |



**Legend**

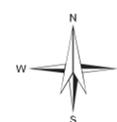
- Lift Station Condition Deficiency: 1 to 5 years
- Lift Station Condition Deficiency: 6 to 10 years
- Lift Station Condition Deficiency: 11 to 20 years
- Gravity Pipe
- - - Force and Common Pressure Main - Existing
- ▭ Parcel
- ▭ UGB
- ▭ Water Feature

0 4,000 Feet



**City of Bend  
Collection System Master Plan**

**Figure 1B-6  
Lift Station Condition  
Deficiency Assessment**



### ***Condition Rating of Vacuum Sewer, Force Mains, and Common Pressure Mains***

The City does not have a program to inspect force mains for condition information or routinely flush or clean force main pipe. All force mains in the system are single-pipe as opposed to dual-pipe systems, and must stay online to convey sewage. For this reason, it is difficult for the City to inspect force mains. However, as noted on page 10, the Public Works Department maintains a GIS database of the force main and pressure collection system, which includes size, material and original installation date. Poor pump operational efficiency may be a sign of a downstream force main or pressure main condition issue.

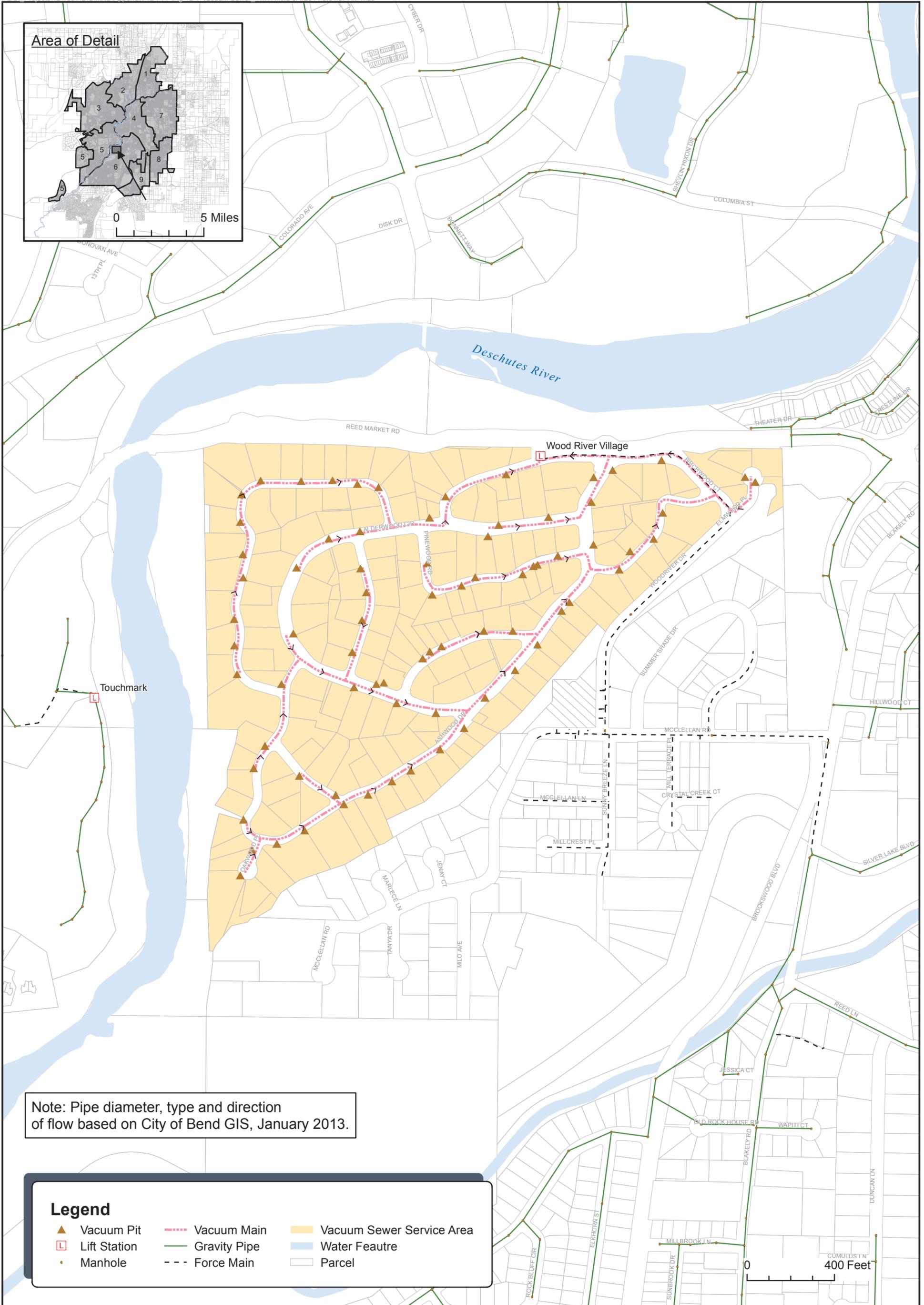
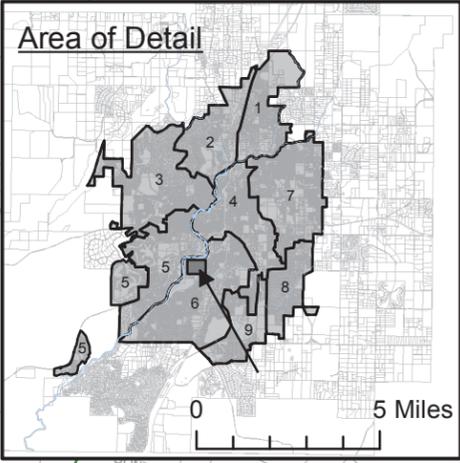
#### ***Vacuum Sewers***

A vacuum sewer collection system serving 169 residential lots in the Wood River Village subdivision was installed in 2002 in the Wood River Village area, located just south of Reed Market Road along the east bank of the Deschutes River. The vacuum sewer service area is nearly at capacity, with available parcels for no more than 20 homes. The service area is zoned Single Family Residential and Public Parks.

The vacuum sewer system is comprised of an array of vacuum pits (each pit serving one to three residences), a vacuum sewer and a vacuum station. Traditional gravity pipes carry wastewater from each residence to the vacuum pit. The vacuum pit valve opens after an accumulation of sewage, and the vacuum pulls the sewage into the vacuum main; the vacuum pit valve then closes. The vacuum sewer is slightly sloped toward the vacuum station. At intervals, the vacuum sewer flows uphill by the differential pressure of the vacuum. Inside the vacuum main, effluent travels between 15 and 18 feet per second (ft/sec). The vacuum main collects and directs sewage toward the vacuum station, which creates the vacuum and pumps the sewage in a traditional force main further downstream into the collection system. Based on information provided by the City, Table 1B-16 summarizes the primary collection system's vacuum mains. Figure 1B-7 presents the area served by the vacuum sewer system.

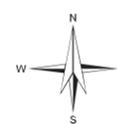
**Table 1B-16  
Primary Collection System's Vacuum Sewer Mains**

| <b>Diameter<br/>(inch)</b> | <b>Total Length<br/>(feet)</b> | <b>Percentage of<br/>Total Length</b> |
|----------------------------|--------------------------------|---------------------------------------|
| 4                          | 8,967                          | 75.8%                                 |
| 6                          | 2,865                          | 24.2%                                 |
| <b>Total</b>               | <b>11,832</b>                  | <b>100%</b>                           |



**Note: Pipe diameter, type and direction of flow based on City of Bend GIS, January 2013.**

|  |  |  |
|--|--|--|
|  |  |  |
|  |  |  |
|  |  |  |



***Force Mains and Common Pressure Mains***

Similar to the method adopted to summarize gravity pipes, force main and common pressure main have been summarized by two attributes: Table 1B-17 presents installation year and diameter, Table 1B-18 installation year and material, and Table 1B-19 material and diameter, and Figure 1B-8 shows existing system force mains by diameter. The force main and common pressure mains total approximately 69 miles. The collection system has many lift stations not served by a dedicated force main. Rather, some force mains are connected to a common pressure main with multiple force mains tied-in to it. This type of connection can cause operational problems at lift stations. For instance, with one lift station pumping, a second lift station cannot effectively pump against the pack pressure created by the first lift station.

**Table 1B-17  
Force Mains and Common Pressure Mains - Installation Year and Diameter Summary**

| <b>Diameter<br/>(inch)</b> | <b>Installation Year - Length (1,000 feet)</b> |                     |                     |                     |                | <b>Percent</b> |
|----------------------------|------------------------------------------------|---------------------|---------------------|---------------------|----------------|----------------|
|                            | <b>1970 to 1979</b>                            | <b>1980 to 1989</b> | <b>1990 to 1999</b> | <b>2000 to 2013</b> | <b>Unknown</b> |                |
| 2                          | 0.9                                            | -                   | 1.2                 | 2.8                 | -              | <b>1.3%</b>    |
| 2.5                        | 21.7                                           | -                   | 10.7                | -                   | -              | <b>8.9%</b>    |
| 3                          | 8.7                                            | 0.8                 | 18.0                | 72.0                | 1.3            | <b>27.6%</b>   |
| 4                          | 15.3                                           | 4.6                 | 32.5                | 43.2                | 2.5            | <b>26.9%</b>   |
| 6                          | 11.9                                           | 12.1                | 45.4                | 39.3                | 0.2            | <b>29.9%</b>   |
| 8                          | 0.5                                            | -                   | 9.3                 | 4.2                 | -              | <b>3.8%</b>    |
| 10                         | -                                              | -                   | -                   | 3.4                 | -              | <b>1.0%</b>    |
| 16                         | 2.1                                            | -                   | -                   | -                   | -              | <b>0.6%</b>    |
| <b>Percent</b>             | <b>16.8%</b>                                   | <b>4.8%</b>         | <b>32.1%</b>        | <b>45.2%</b>        | <b>1.1%</b>    | <b>100%</b>    |

**Table 1B-18  
Force Mains and Common Pressure Mains - Installation Year and Material Summary**

| Material                 | Installation Year - Length (1,000 feet) |              |              |              |             | Percent      |
|--------------------------|-----------------------------------------|--------------|--------------|--------------|-------------|--------------|
|                          | 1970 to 1979                            | 1980 to 1989 | 1990 to 1999 | 2000 to 2013 | Unknown     |              |
| Unknown                  | -                                       | -            | 0.2          | -            | -           | <b>0.1%</b>  |
| Ductile Iron (DI)        | 2.1                                     | -            | 4.8          | 1.6          | -           | <b>2.3%</b>  |
| Polyvinyl Chloride (PVC) | 59.0                                    | 17.5         | 111.9        | 163.2        | 3.9         | <b>97.6%</b> |
| <b>Percent</b>           | <b>16.8%</b>                            | <b>4.8%</b>  | <b>32.1%</b> | <b>45.2%</b> | <b>1.1%</b> | <b>100%</b>  |

**Table 1B-19  
Force Mains and Common Pressure Mains - Material and Diameter Summary**

| Diameter (inch) | Material - Length (1,000 feet) |                   |                          | Percent      |
|-----------------|--------------------------------|-------------------|--------------------------|--------------|
|                 | Unknown                        | Ductile Iron (DI) | Polyvinyl Chloride (PVC) |              |
| 2               | -                              | -                 | 4.8                      | <b>1.3%</b>  |
| 2.5             | -                              | -                 | 32.3                     | <b>8.9%</b>  |
| 3               | -                              | -                 | 100.7                    | <b>27.6%</b> |
| 4               | -                              | 0.01              | 98.1                     | <b>26.9%</b> |
| 6               | 0.2                            | -                 | 108.7                    | <b>29.9%</b> |
| 8               | -                              | 6.4               | 7.6                      | <b>3.8%</b>  |
| 10              | -                              | -                 | 3.4                      | <b>0.9%</b>  |
| 16              | -                              | 2.1               | -                        | <b>0.6%</b>  |
| <b>Percent</b>  | <b>0.1%</b>                    | <b>2.3%</b>       | <b>97.6%</b>             | <b>100%</b>  |

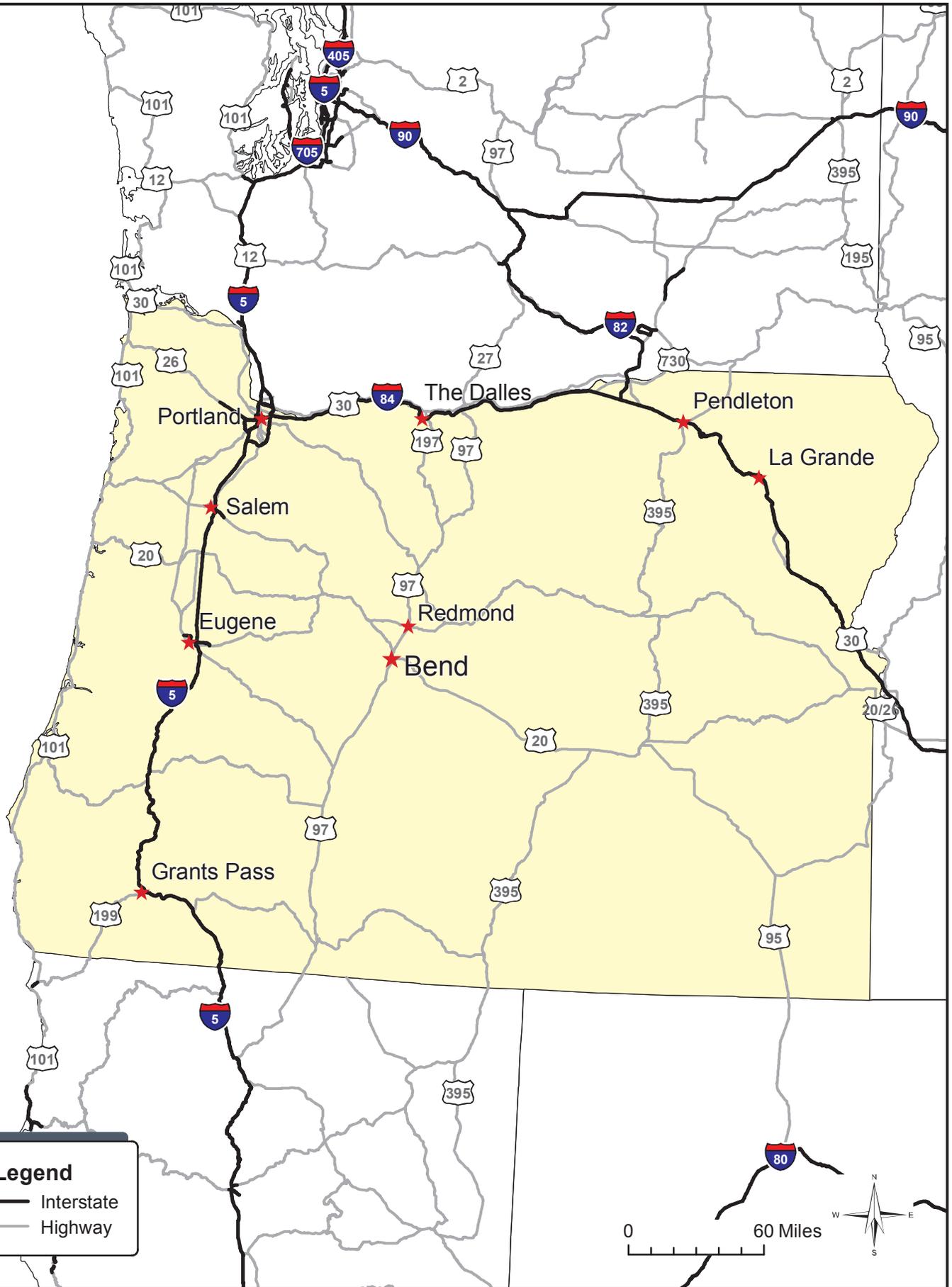


## **OAR 660-11-0010(1)(d) General Location of Service Area**

The City of Bend (City) is located in central Oregon, on the eastern edge of the Cascade Range. The City is located in Deschutes County, along the Deschutes River and to the east of the Three Sisters Mountains and Mount Bachelor. Elevation within the City varies considerably due to the river channel, Awbrey Butte and Pilot Butte, but the City's general elevation is 3,620 feet above mean sea level. The City covers an area of approximately 33.3 square miles.

The City owns and operates a collection system to manage and collect wastewater in the community. The primary collection system is comprised of City-owned lift stations, gravity pipelines, force main, and common pressure main sewer systems, exclusive of services; it contains approximately 349 miles of gravity pipeline and 69 miles of force main and common pressure sewer pipeline, and includes 86 regional lift stations, many of which convey flow through long force mains.

Figure 1B-9 presents a regional map of Oregon showing the location of the City, and Figure 1B-5 (page 17) shows the primary collection system and location of the WRF.



**Legend**

-  Interstate
-  Highway

0 60 Miles




**City of Bend  
Collection System  
Master Plan**

**Figure 1B-9  
Existing System:  
Regional Map**



## **OAR 660-11-0010(1)(e) Provider(s) Identification**

There are no other sewer service providers within the City's UGB, nor are there special districts or private utilities with which the City coordinates to provide wastewater collection and treatment. The City's sewer system includes a collection system, a number of pumping stations and an interceptor through which wastewater is sent to the City's wastewater reclamation facility (WRF).

## **OAR 660-11-0010(1)(b) Public Facility Project Descriptions, OAR 660-11-0010(1)(c) Rough Cost Estimates, and OAR 660-11-0010(1)(f) Project Need-Time Estimate**

This section includes tables describing the proposed projects associated with the City's primary collection system, and Figure 1B-10, which shows all capital improvement program (CIP) project locations discussed here. Each project includes a unique identifier and a description of the improvement, including location reference, rough cost estimate (in 2013 dollars), City funding specifics, where applicable, and timeframe for project implementation.

### ***Short-Term Projects***

In response to existing hydraulic deficiencies, condition deficiencies and other operational issues identified by City Operations & Maintenance (O&M) staff, there are several major projects that the City should undertake in the short term (1 to 5 years). See Table 1B-20 for a more comprehensive description and project cost estimates in 2013 dollars. The actual project costs will likely vary from the estimates presented.

The project estimates will change over time due to fluctuations in actual labor and material costs, competitive market conditions, site conditions, final project scope, implementation schedule, continuity of personnel, and other unforeseeable factors. Because of these factors, project feasibility, benefit-to-cost ratios, risks and funding must be carefully reviewed prior to making specific financial decisions or establishing project specific budgets.

1. Southeast Interceptor (SEI) Phase 1
2. Colorado Lift Station
3. North Area Improvements
4. Plant Interceptor Rehabilitation
5. Valhalla Sewer Relocation and Odor Control
6. Condition-Related Lift Station Improvements

SEI Phase 1 – The Southeast Interceptor (SEI) is the primary capital improvement that provides capacity for flow to be diverted away from capacity-deficient infrastructures in the existing southeast and central portions of the collection system. It enables many City-owned lift stations to be decommissioned, and allows currently unsewered properties within the UGB to be served. Phase 1 of the SEI extends east from Brosterhous Road, along Murphy

Road, northeast through Kings Forest, and north on 27<sup>th</sup> Street to Mary Rose Place. Phase 1 connects to an interim gravity service adjacent to the existing gravity pipe at Mary Rose Place; at this point, a parallel gravity pipe is proposed to increase the capacity of the existing sewer. The SEI is sized consistently with the previously developed design project. Service connections to the SEI Phase 1 are limited by downstream capacity at the connection to the existing system until the completion of Phase 2.

Colorado Lift Station – The proposed Colorado Lift Station will divert flow from the Westside Lift Station service area via a new lift station at McKay Park. A new force main from the Colorado Lift Station will cross the Deschutes River and follow Colorado Avenue, connecting to an existing gravity pipe immediately east of Highway 97(Bend Parkway). The Colorado Lift Station will enable the Shevlin Lift Station to be decommissioned, and redirect flow from to a large contributing area in the southwest portion of the UGB.

A new gravity pipe will divert flow from existing piping at Columbia Street and Commerce Avenue to the Colorado Lift Station. This gravity pipe will divert sufficient flow from the southwestern portion of the system to eliminate the need for significant capacity upgrades at the Westside Lift Station within the 20-year planning horizon.

The Colorado Lift Station provides operational flexibility and infrastructure augmentation by adding a second river crossing from the west to the east side of the Deschutes River. The Colorado Lift Station and associated piping will defer minor capacity-related improvements at the Westside Lift Station, support development within the existing UGB on the west side of the City, and address existing capacity, access, and odor issues at the Shevlin Lift Station.

North Area Improvements – The existing North Area Force Main is a combined low-pressure force-main system collecting sewage from more than ten City-owned lift stations and numerous private lift stations.

Due to the array of combined pumping scenarios possible in this system, each pump experiences a wide range of operating head conditions. In addition, many lift stations operate inefficiently, are hydraulically deficient under some operational scenarios, and are over-designed in other scenarios.

The downstream gravity pipe (starting at CMH003157) experiences overflows caused by intermittent high peak pumping rates. Gravity pipe upgrades and a reroute of force mains will help address surcharging and overflows in manhole CMH003157 and nearby manholes during existing peak dry-weather conditions.

The project includes a gravity pipe replacement from manhole CMH003157 to CMH003150, resulting in a new, larger and deeper gravity pipe that removes a siphon under communication utilities located along Highway 97.

The Sawyer Park Lift Station force main will be rerouted from the Sawyer Park Lift Station along O.B. Riley Road, 3<sup>rd</sup> Street, and Butler Market Road, with final connection at CMH002251 near Butler Market Road and 4th Street.

The Riverhouse Lift Station will be downsized and its force main discharge routed to the Sawyer Lift Station gravity pipe. The Wyndemere Lift Station force main will be disconnected from the existing low-pressure sewer network and re-routed directly to gravity pipe on Sherman Road at CMH000002.

These projects are estimated to provide capacity for the next 5 to 10 years, depending on population growth prior to the construction of the Northeast Interceptor. If growth exceeds current projections, additional short-term localized improvements, rather than an accelerated schedule for implementing the Northeast Interceptor, should be considered.

Plant Interceptor Rehabilitation – Portions of the existing plant interceptor will be replaced and upsized to address both condition- and capacity-related deficiencies occurring in discrete segments of the line.

Valhalla Sewer Relocation and Odor Control – This project provides mitigation of significant odor emissions in the Valhalla neighborhood on the west side of the collection system, and includes depressurization and vapor phase treatment, Mount Washington Drive conveyance improvements, and liquid phase chemical injection at Awbrey Glen Lift Station.

Condition-Related Lift Station Improvements – The City’s O&M Department rated the condition of City-owned area and regional lift stations in the collection system, and determined that 23 lift stations required improvements to address existing condition deficiencies.

**Table 1B-20  
Summary of Short-Term (1- to 5-Year) Improvements**

| <b>Project ID<sup>1</sup></b> | <b>Timeframe</b> | <b>Project Name</b>                   | <b>Project Category<sup>2</sup></b> | <b>Type of Improvement</b> | <b>Description<sup>3</sup></b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | <b>Required Preceding (P) and Concurrent (C) Projects<sup>4</sup></b> | <b>Recommended Size</b> | <b>Unit, Length, HP or gpm</b> | <b>Growth Allocation<sup>5</sup></b> | <b>Project Estimate<sup>6</sup></b> |
|-------------------------------|------------------|---------------------------------------|-------------------------------------|----------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------|-------------------------|--------------------------------|--------------------------------------|-------------------------------------|
| 1A                            | Year 1 to 3      | SEI Phase 1 Connection Downstream     | Hydraulic Capacity                  | Gravity Pipe               | New 12-inch pipe connecting the downstream end of SEI Phase 1 to the existing 15-inch trunk along 27th Street, at manhole CMH002295.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | P: -<br>C: 1B, 2, 3                                                   | 12-inch                 | 400 LF                         | 69%                                  | \$133,000                           |
| 1B                            | Year 1 to 3      | SEI Phase 1                           | Hydraulic Capacity                  | Gravity Pipe               | The Phase 1 portion of the SEI consists of three segments of new gravity pipe. The first segment is an 18-inch diameter pipe extending cross-country from the intersection of Murphy Road and Brosterhous Road to 15th St. The second segment is a 24-inch diameter pipe along 15th Street to Chloe Lane, then east along Chloe Lane to Ferguson Road, then east along Ferguson Road to King Solomon Lane, then north along King Solomon Lane to King David Avenue. The last segment is a 30-inch pipe along King Solomon Lane to Orion Drive, then north along Orion Drive to Camelot Place, then along Camelot Place to Reed Market Road, then east along Reed Market Road to 27th Street, then north along 27th Street to Mary Rose Place where it will connect to Project 1A. | P: -<br>C: 1A, 2, 3                                                   | 18- to 30-inch          | 21,700 LF                      | 64%                                  | \$19,548,000                        |
| 2                             | Year 1 to 3      | Parallel Line on Medical Center Drive | Hydraulic Capacity                  | Gravity Pipe               | Parallel 12-inch pipe to an existing 15-inch pipe along 27th Street from approximately 300 feet north of Mary Rose Place to Medical Center Drive, then along Medical Center Drive to Neff Road, then west along Neff Road approximately 600 feet.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | P: -<br>C: 1A, 1B, 3                                                  | 12-inch                 | 2,700 LF                       | 72%                                  | \$1,112,000                         |
| 3                             | Year 1 to 3      | SEI Phase 1 Connection Upstream       | Hydraulic Capacity                  | Gravity Pipe               | New 8-inch pipe along 27th Street at the intersection of Chilliwack Way from existing 8-inch gravity pipe to new 30-inch gravity pipe (SEI Phase 1).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | P: -<br>C: 1A, 1B, 2                                                  | 8-inch                  | 100 LF                         | 73%                                  | \$38,000                            |
| 4A                            | Year 1 to 3      | Colorado Lift Station                 | Hydraulic Capacity                  | New Lift Station           | New lift station facility with a total capacity of 2,800 gpm.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | P: -<br>C: 4B, 4C, 4D                                                 | -                       | 131 HP                         | 46%                                  | \$4,208,000                         |

| Project ID <sup>1</sup> | Timeframe   | Project Name                        | Project Category <sup>2</sup> | Type of Improvement       | Description <sup>3</sup>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Required Preceding (P) and Concurrent (C) Projects <sup>4</sup> | Recommended Size | Unit, Length, HP or gpm | Growth Allocation <sup>5</sup> | Project Estimate <sup>6</sup> |
|-------------------------|-------------|-------------------------------------|-------------------------------|---------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------|------------------|-------------------------|--------------------------------|-------------------------------|
| 4B                      | Year 1 to 3 | Colorado Lift Station Force Main    | Hydraulic Capacity            | Force Main                | New parallel 12-inch force mains going cross-country 140 feet southeast from new Colorado Lift Station (located 300 feet southeast of Commerce Avenue and Allen Road intersection) to Shevlin Hixon Drive, then along Shevlin Hixon Drive to Colorado Avenue, then along Colorado Avenue to Arizona Avenue, then along Arizona Avenue to Colorado Avenue, then along Colorado Avenue to Scott Street, then along Scott Street to Highway 97 on-off ramp to new 18-inch gravity pipe at Scott Street and Highway 97 on-off ramp intersection. Force main includes river crossing along Colorado Avenue. Discharge to new gravity sewer east of Highway 97.                      | P: -<br>C: 4A, 4C, 4D                                           | Parallel 12-inch | 5,600 LF                | 46%                            | \$4,262,000                   |
| 4C                      | Year 1 to 3 | Colorado Lift Station Gravity Sewer | Hydraulic Capacity            | Gravity Pipe              | First segment is a new 18-inch pipe paralleling the existing 8-inch gravity pipe along Commerce Avenue from Columbia Street to Allen Road, then along Allen Road to Shevlin Hixon Drive, then along Shevlin Hixon Drive and cross-country to new Colorado Lift Station (located 300 feet southeast of Commerce Avenue and Allen Road intersection). The second segment is a new 18-inch gravity pipe that connects the new dual 12-inch force mains (Project 4B) to the existing gravity 24-inch gravity pipe 100 feet northeast of the Scott Street and Highway 97 on-off ramp intersection. This section of gravity pipe connects to gravity sewer CGM008617 at new manhole. | P: -<br>C: 4A, 4B, 4D                                           | 18-inch          | 1,600 LF                | 50%                            | \$1,330,000                   |
| 4D                      | Year 1 to 3 | Shevlin Lift Station Decommission   | Hydraulic Capacity            | Lift Station Decommission | The decommissioning of Shevlin Lift Station process includes the removal of the existing lift station facility and all associated appurtenances with the exception of the force main, which will be abandoned in place.                                                                                                                                                                                                                                                                                                                                                                                                                                                        | P: -<br>C: 4A, 4B, 4C                                           | -                | 1 EA                    | 47%                            | \$28,000                      |

| Project ID <sup>1</sup> | Timeframe   | Project Name                                                             | Project Category <sup>2</sup> | Type of Improvement       | Description <sup>3</sup>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Required Preceding (P) and Concurrent (C) Projects <sup>4</sup> | Recommended Size | Unit, Length, HP or gpm | Growth Allocation <sup>5</sup> | Project Estimate <sup>6</sup> |
|-------------------------|-------------|--------------------------------------------------------------------------|-------------------------------|---------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------|------------------|-------------------------|--------------------------------|-------------------------------|
| 5A                      | Year 1 to 3 | North Area Force Main: New Sawyer Park Force Main                        | Hydraulic Capacity            | Force Main                | New 10-inch force main from Sawyer Park Lift Station along O B Riley Road to Highway 20, then along Highway 20 to Butler Market Road, then along Butler Market Road connecting to the existing gravity sewer at manhole CMH002251. Riverhouse Lift Station Force Main will be diverted to gravity pipe upstream of Sawyer Park in Highway 20. Wyndemere Lift Station force main will discharge to the gravity pipe at Mervin Sampels Road and Highway 97 and 3rd Street (It will no longer flow through the combined force main going north from this location) and flow to the east. The remaining lift stations north of Wyndemere will continue to utilize the common force main in 3rd Street. The segment of the 3 <sup>rd</sup> Street common force main south of Mervin Sampels Road will be isolated to serve as local sewer low pressure main for businesses on Highway 97 south of Mervin Samples discharging to the Sawyer Park Lift Station contributory gravity sewer. | P: -<br>C: 5B                                                   | 10-inch          | 4,400 LF                | 27%                            | \$1,481,000                   |
| 5B                      | Year 1 to 3 | North Area Force Main: Gravity Pipe Replacement along Nels Anderson Road | Hydraulic Capacity            | Gravity Pipe              | New 12-inch gravity pipe to replace existing 8-inch pipe along Highway 97, then east cross-country to Nels Anderson Road, then along Nels Anderson Road to Fred Meyers Road intersection connecting to existing 15-inch gravity pipe. Project will remove siphon under communication utility.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | P: -<br>C: 5A                                                   | 12-inch          | 2,000 LF                | 30%                            | \$1,037,000                   |
| 6A                      | Year 1 to 3 | Tri Peaks Northern Gravity Diversion                                     | Hydraulic Capacity            | Gravity Pipe              | The piping and lift station constructed as part of this project is developer funded. New 8-inch gravity pipe from Tri Peaks Lift Station to interim Stone Creek Lift Station. The interim Stone Creek Lift Station will convey sewage into a new gravity pipeline connecting to the existing Herald Street 8-inch gravity pipe.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | P: -<br>C: 6B, 6C                                               | 8-inch           | 4,000 LF                | NA <sup>7</sup>                | Developer Funded              |
| 6B                      | Year 1 to 3 | Anderson Ranch/Stone Creek Developer Interim Lift Station                | Hydraulic Capacity            | New Lift Station          | Funding of an Interim Stone Creek Lift Station by developers.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | P: -<br>C: 6A, 6C                                               | -                | -                       | NA <sup>7</sup>                | Developer Funded              |
| 6C                      | Year 1 to 3 | Tri Peaks Lift Station Decommission                                      | Hydraulic Capacity            | Lift Station Decommission | The decommissioning of Tri Peaks Lift Station includes the removal of the existing lift station facility and all associated appurtenances with the exception of the force main, which will be abandoned in place. Project funded by developers.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | P: -<br>C: 6A, 6B                                               | -                | 1 EA                    | NA <sup>7</sup>                | Developer Funded              |

| Project ID <sup>1</sup> | Timeframe   | Project Name                                                  | Project Category <sup>2</sup> | Type of Improvement             | Description <sup>3</sup>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Required Preceding (P) and Concurrent (C) Projects <sup>4</sup> | Recommended Size | Unit, Length, HP or gpm | Growth Allocation <sup>5</sup> | Project Estimate <sup>6</sup> |
|-------------------------|-------------|---------------------------------------------------------------|-------------------------------|---------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------|------------------|-------------------------|--------------------------------|-------------------------------|
| 7A-7E                   | Year 1 to 3 | Plant Interceptor Rehabilitation                              | Improve Condition             | Trenchless Sewer Rehabilitation | Based on a 2013 assessment of the Plant Interceptor condition, specific sections of pipe (classified as Grade 5 – imminent failure) were identified for rehabilitation using Cured-In-Place-Pipe (CIPP). Project Estimate not developed utilizing the unit costs from Section 5 of the master plan. Rather, it was provided by City’s Plant Interceptor Condition Consultant who was not involved in the CSMP.                                                                                                                                                                                                   | -                                                               | 30- to 42-inch   | 5,300 LF                | 0%                             | \$5,400,000                   |
| 8                       | Year 1 to 5 | Large Gravity Pipe Condition Assessment Program - Year 1 to 5 | Miscellaneous Project         | -                               | Establish a program to inspect the condition of existing gravity trunk collection system with diameters greater than 15-inch (approximately 4% of the collection system), grade the trunk system components, evaluate rehabilitation options and recommend the most effective solution. This type of inspection requires different equipment than is currently owned by the O&M Department and the budget is for the City to hire a consultant to assist with this project. This project does not include condition assessment of the Plant Interceptor or Inverted Siphon. Funding level is \$200,000 per year. | -                                                               | -                | -                       | 0%                             | \$1,000,000                   |
| 10                      | Year 1      | Plant Interceptor (Yeoman) Condition Assessment               | Miscellaneous Project         | -                               | Condition Assessment of the Plant Interceptor and Siphon. This inspection requires different equipment than is currently owned by the O&M Department and the budget is for the City to hire a consultant to assist with this project. This project does not include condition assessment of the interceptors or gravity collection system away from the Plant Interceptor. City Project ID SW10AA.                                                                                                                                                                                                               | -                                                               | -                | -                       | 0%                             | \$184,000                     |
| 12                      | Year 1      | Valhalla Sewer Relocation and Odor Control Project            | Improve Condition             | -                               | Project as identified by design consultant includes:<br>- Vapor phase treatment to capture/remove odor from the sewer headspace.<br>- Relocation of Awbrey Glen Lift Station force main discharge to a new 15-inch sewer in Mount Washington Drive.<br>- Liquid phase chemical treatment at Awbrey Glen Lift Station to remove and prevent the creation of odor producing compounds from the raw sewage.                                                                                                                                                                                                         | -                                                               | -                | -                       | 0%                             | \$1,616,000                   |

| Project ID <sup>1</sup> | Timeframe   | Project Name                                  | Project Category <sup>2</sup> | Type of Improvement  | Description <sup>3</sup>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Required Preceding (P) and Concurrent (C) Projects <sup>4</sup> | Recommended Size | Unit, Length, HP or gpm | Growth Allocation <sup>5</sup> | Project Estimate <sup>6</sup> |
|-------------------------|-------------|-----------------------------------------------|-------------------------------|----------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------|------------------|-------------------------|--------------------------------|-------------------------------|
| 33                      | Year 1      | Crown Villa #1 Lift Station Condition Upgrade | Improve Condition             | Lift Station Upgrade | Lift Station requires immediate improvement prior to decommissioning in years 4 to 5. Rehabilitation and, where required, replacement of deteriorating lift station components where O&M Department condition assessment indicated poor condition: pumps, discharge piping and electrical panel.                                                                                                                                                                                                                                                                               | -                                                               | -                | 1 EA                    | 0%                             | \$100,000                     |
| 34                      | Year 1      | Crown Villa #2 Lift Station Condition Upgrade | Improve Condition             | Lift Station Upgrade | Lift Station requires immediate improvement prior to decommissioning in years 4 to 5. Rehabilitation and, where required, replacement of deteriorating lift station components where O&M Department condition assessment indicated poor condition: pumps, discharge piping and electrical panel and control panel.                                                                                                                                                                                                                                                             | -                                                               | -                | 1 EA                    | 0%                             | \$100,000                     |
| 44                      | Year 1      | Quail Ridge #2 Lift Station Condition Upgrade | Improve Condition             | Lift Station Upgrade | Lift Station requires immediate improvement prior to decommissioning in years 4 to 5. Rehabilitation and, where required, replacement of deteriorating lift station components where O&M Department condition assessment indicated poor condition: pumps, discharge piping and electrical panel.                                                                                                                                                                                                                                                                               | -                                                               | -                | 1 EA                    | 0%                             | \$150,000                     |
| 9                       | Year 2 to 3 | Flow Monitoring Program                       | Miscellaneous Project         | -                    | Installation, calibration, and maintenance of permanent and temporary flow monitoring equipment.<br>The permanent meters will be located in the following manholes:<br><ul style="list-style-type: none"> <li>- CMH000206</li> <li>- CMH000317</li> <li>- CMH004010</li> <li>- CMH008141</li> <li>- CMH008738</li> </ul> The temporary meters will installed as required for specific projects.<br>Flow triggered projects include 22A, 22B, 22C, 22D, 60A, 60C and 61A. The Flow Monitoring Program is further described in Appendix 7A of the Collection System Master Plan. | -                                                               | -                | -                       | 0%                             | \$287,000                     |

| Project ID <sup>1</sup> | Timeframe   | Project Name                                       | Project Category <sup>2</sup> | Type of Improvement | Description <sup>3</sup>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Required Preceding (P) and Concurrent (C) Projects <sup>4</sup> | Recommended Size | Unit, Length, HP or gpm | Growth Allocation <sup>5</sup> | Project Estimate <sup>6</sup> |
|-------------------------|-------------|----------------------------------------------------|-------------------------------|---------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------|------------------|-------------------------|--------------------------------|-------------------------------|
| 11                      | Year 3 to 5 | On-Call Hydraulic Modeling Services                | Miscellaneous Project         | -                   | Engineering services contract, tailored to meet the City's future need of updating the sewer model, adjusting calibration, or answering specific system operational questions. Funding level is \$100,000 per year. City Project ID SW111CA.                                                                                                                                                                                                                                                                                                                                                                          | -                                                               | -                | -                       | 0%                             | \$300,000                     |
| 57                      | Year 4      | Plant Interceptor Sewer Storage - Land Acquisition | Miscellaneous Project         | -                   | This project is for land acquisition that would be used in the future for offline underground storage of wet weather sewage flow. This project does not include design or construction of the storage facility. The future storage will connect to the Plant Interceptor to remove flow from the interceptor and pump the stored sewage back to the interceptor after the storm event has passed. The wet weather flow would cause deficiencies downstream of the storage facility if not captured. The future below ground storage tank will be approximately 1.0 million gallons.                                   | -                                                               | -                | -                       | 0%                             | \$143,000                     |
| 58                      | Year 4      | Amethyst Street Sewer Storage - Land Acquisition   | Miscellaneous Project         | -                   | This project is for land acquisition that would be used in the future for offline underground storage of wet weather sewage flow. This project does not include design or construction of the storage facility. The future storage will connect to the gravity pipe in Amethyst Street (manhole CMH001642) to remove flow from the interceptor and pump the stored sewage back to the interceptor after the storm event has passed. The wet weather flow would cause deficiencies downstream of the storage facility if not captured. The future below ground storage tank will be approximately 0.1 million gallons. | -                                                               | -                | -                       | 0%                             | \$68,000                      |
| 59                      | Year 4      | Central Sewer Storage - Land Acquisition           | Miscellaneous Project         | -                   | This project is for land acquisition that would be used in the future for offline underground storage of wet weather sewage flow. This project does not include design or construction of the storage facility. The future storage will connect to the gravity pipe in Studio Road (manhole CMH000543) to remove flow from the interceptor and pump the stored sewage back to the interceptor after the storm event has passed. The wet weather flow would cause deficiencies downstream of the storage facility if not captured. The future below ground storage tank will be approximately 0.25 million gallons.    | -                                                               | -                | -                       | 0%                             | \$489,000                     |

| Project ID <sup>1</sup> | Timeframe   | Project Name                                           | Project Category <sup>2</sup> | Type of Improvement               | Description <sup>3</sup>                                                                                                                                                                                                                                                                                                                                                                         | Required Preceding (P) and Concurrent (C) Projects <sup>4</sup> | Recommended Size | Unit, Length, HP or gpm | Growth Allocation <sup>5</sup> | Project Estimate <sup>6</sup> |
|-------------------------|-------------|--------------------------------------------------------|-------------------------------|-----------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------|------------------|-------------------------|--------------------------------|-------------------------------|
| 54                      | Year 5      | Odor Control Master Plan                               | Miscellaneous Project         | -                                 | Collection System Odor Master Plan will include study, documentation and evaluation of the collection system odors issues as well as recommend improvements and prepare a capital improvement plan.                                                                                                                                                                                              | -                                                               | -                | -                       | 0%                             | \$1,000,000                   |
| 21                      | Year 1 to 5 | Riverhouse Lift Station Hydraulic Improvement/Downsize | Hydraulic Capacity            | Lift Station Upgrade and Downsize | Downsize of mechanical pumping and/or electrical components to decrease hydraulic capacity to closer to required capacity. Rehabilitation and, where required, replacement of deteriorating lift station components where O&M Department condition assessment indicated poor condition: wet well, pumps, motors and electrical equipment. Some portion of this project will be privately funded. | -                                                               | -                | 10 gpm                  | 10%                            | \$345,000                     |
| 27                      | Year 1 to 5 | Pioneer Lift Station Condition Upgrade                 | Improve Condition             | Lift Station Upgrade              | Rehabilitation and, where required, replacement of deteriorating lift station components where O&M Department condition assessment indicated poor condition: pumps, access to lift station<br>City O&M Staff to determine specific timing of improvement.                                                                                                                                        | -                                                               | -                | 1 EA                    | 29%                            | \$345,000                     |
| 31                      | Year 1 to 5 | Awbrey Glen Lift Station Condition Upgrade             | Improve Condition             | Lift Station Upgrade              | Lift Station needs a backup generator because it is difficult and time consuming for O&M Department to access the lift station which increases length of time that facility will not pump during power outage and risk of sewer overflow.<br>City O&M Staff to determine specific timing of improvement.                                                                                         | -                                                               | -                | 1 EA                    | 0%                             | \$139,000                     |
| 32                      | Year 1 to 5 | Camden Park Lift Station Condition Upgrade             | Improve Condition             | Lift Station Upgrade              | Rehabilitation and, where required, replacement of deteriorating lift station components where O&M Department condition assessment indicated poor condition: pumps, rail system and electrical panel.<br>City O&M Staff to determine specific timing of improvement.                                                                                                                             | -                                                               | -                | 1 EA                    | 0%                             | \$150,000                     |
| 35                      | Year 1 to 5 | Deschutes Business Lift Station Condition Upgrade      | Improve Condition             | Lift Station Upgrade              | Replacement of lift station and components where O&M Department condition assessment indicated poor condition: pumps, discharge piping, corroded wet well, corroded discharge piping and corroded valve pit.<br>City O&M Staff to determine specific timing of improvement.                                                                                                                      | -                                                               | -                | 1 EA                    | 0%                             | \$345,000                     |

| Project ID <sup>1</sup> | Timeframe   | Project Name                                  | Project Category <sup>2</sup> | Type of Improvement  | Description <sup>3</sup>                                                                                                                                                                                                                                                                                                                                                                                                              | Required Preceding (P) and Concurrent (C) Projects <sup>4</sup> | Recommended Size | Unit, Length, HP or gpm | Growth Allocation <sup>5</sup> | Project Estimate <sup>6</sup> |
|-------------------------|-------------|-----------------------------------------------|-------------------------------|----------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------|------------------|-------------------------|--------------------------------|-------------------------------|
| 36                      | Year 1 to 5 | Drake Lift Station Condition Upgrade          | Improve Condition             | Lift Station Upgrade | Replacement of existing facility with a new lift station to address condition issues and site constraints. Project includes pumps, piping, electrical and control equipment, standby generator for back-up power, odor control equipment, wet or dry well, liquid level monitoring, pressure monitoring, flow monitoring, bypass pumping port and telemetry equipment.<br>City O&M Staff to determine specific timing of improvement. | -                                                               | -                | 1 EA                    | 0%                             | \$1,853,000                   |
| 37                      | Year 1 to 5 | Empire Lift Station Condition Upgrade         | Improve Condition             | Lift Station Upgrade | Rehabilitation and, where required, replacement of deteriorating lift station components where O&M Department condition assessment indicated poor condition: pumps and variable frequency drives.<br>City O&M Staff to determine specific timing of improvement.                                                                                                                                                                      | -                                                               | -                | 1 EA                    | 0%                             | \$100,000                     |
| 38                      | Year 1 to 5 | Empire Village Lift Station Condition Upgrade | Improve Condition             | Lift Station Upgrade | Rehabilitation and, where required, replacement of deteriorating lift station components where O&M Department condition assessment indicated poor condition: pumps and investigation into air locking.<br>City O&M Staff to determine specific timing of improvement.                                                                                                                                                                 | -                                                               | -                | 1 EA                    | 0%                             | \$100,000                     |
| 39                      | Year 1 to 5 | Nottingham #1 Lift Station Condition Upgrade  | Improve Condition             | Lift Station Upgrade | Rehabilitation and, where required, replacement of deteriorating lift station components where O&M Department condition assessment indicated poor condition: corroded pumps, piping and rail system.<br>City O&M Staff to determine specific timing of improvement.                                                                                                                                                                   | -                                                               | -                | 1 EA                    | 0%                             | \$150,000                     |
| 40                      | Year 1 to 5 | Nottingham #2 Lift Station Condition Upgrade  | Improve Condition             | Lift Station Upgrade | Rehabilitation and, where required, replacement of deteriorating lift station components where O&M Department condition assessment indicated poor condition: wet well and discharge piping.<br>City O&M Staff to determine specific timing of improvement.                                                                                                                                                                            | -                                                               | -                | 1 EA                    | 0%                             | \$150,000                     |
| 41                      | Year 1 to 5 | Pacific Lift Station Condition Upgrade        | Improve Condition             | Lift Station Upgrade | Rehabilitation and, where required, replacement of deteriorating lift station components where O&M Department condition assessment indicated poor condition: access to lift station pumps and piping.<br>City O&M Staff to determine specific timing of improvement.                                                                                                                                                                  | -                                                               | -                | 1 EA                    | 0%                             | \$345,000                     |

| Project ID <sup>1</sup> | Timeframe   | Project Name                                  | Project Category <sup>2</sup> | Type of Improvement  | Description <sup>3</sup>                                                                                                                                                                                                                                                                                     | Required Preceding (P) and Concurrent (C) Projects <sup>4</sup> | Recommended Size | Unit, Length, HP or gpm | Growth Allocation <sup>5</sup> | Project Estimate <sup>6</sup> |
|-------------------------|-------------|-----------------------------------------------|-------------------------------|----------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------|------------------|-------------------------|--------------------------------|-------------------------------|
| 42                      | Year 1 to 5 | Poplar Park Lift Station Condition Upgrade    | Improve Condition             | Lift Station Upgrade | Rehabilitation and, where required, replacement of deteriorating lift station components where O&M Department condition assessment indicated poor condition: pumps and motors. City O&M Staff to determine specific timing of improvement.                                                                   | -                                                               | -                | 1 EA                    | 0%                             | \$100,000                     |
| 43                      | Year 1 to 5 | Quail Ridge #1 Lift Station Condition Upgrade | Improve Condition             | Lift Station Upgrade | Rehabilitation and, where required, replacement of deteriorating lift station components where O&M Department condition assessment indicated poor condition: pumps, discharge piping and electrical panel. City O&M Staff to determine specific timing of improvement.                                       | -                                                               | -                | 1 EA                    | 0%                             | \$150,000                     |
| 45                      | Year 1 to 5 | Renwick Lift Station Condition Upgrade        | Improve Condition             | Lift Station Upgrade | Rehabilitation and, where required, replacement of deteriorating lift station components where O&M Department condition assessment indicated poor condition: vacuum priming system and small wet well. City O&M Staff to determine specific timing of improvement.                                           | -                                                               | -                | 1 EA                    | 0%                             | \$345,000                     |
| 46                      | Year 1 to 5 | Rimrock #1 Lift Station Condition Upgrade     | Improve Condition             | Lift Station Upgrade | Rehabilitation and, where required, replacement of deteriorating lift station components where O&M Department condition assessment indicated poor condition: small wet well. Proximity to river makes this lift station a significant liability. City O&M Staff to determine specific timing of improvement. | -                                                               | -                | 1 EA                    | 0%                             | \$100,000                     |
| 47                      | Year 1 to 5 | Rimrock #2 Lift Station Condition Upgrade     | Improve Condition             | Lift Station Upgrade | Rehabilitation and, where required, replacement of deteriorating lift station components where O&M Department condition assessment indicated poor condition: small wet well. Proximity to river makes this lift station a significant liability. City O&M Staff to determine specific timing of improvement. | -                                                               | -                | 1 EA                    | 0%                             | \$100,000                     |
| 48                      | Year 1 to 5 | Rimrock #4 Lift Station Condition Upgrade     | Improve Condition             | Lift Station Upgrade | Rehabilitation and, where required, replacement of deteriorating lift station components where O&M Department condition assessment indicated poor condition: small wet well. Proximity to river makes this lift station a significant liability. City O&M Staff to determine specific timing of improvement. | -                                                               | -                | 1 EA                    | 0%                             | \$100,000                     |

| Project ID <sup>1</sup> | Timeframe   | Project Name                                                       | Project Category <sup>2</sup> | Type of Improvement       | Description <sup>3</sup>                                                                                                                                                                                                                                                                                     | Required Preceding (P) and Concurrent (C) Projects <sup>4</sup> | Recommended Size | Unit, Length, HP or gpm | Growth Allocation <sup>5</sup> | Project Estimate <sup>6</sup> |
|-------------------------|-------------|--------------------------------------------------------------------|-------------------------------|---------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------|------------------|-------------------------|--------------------------------|-------------------------------|
| 49                      | Year 1 to 5 | Rimrock #5 Lift Station Condition Upgrade                          | Improve Condition             | Lift Station Upgrade      | Rehabilitation and, where required, replacement of deteriorating lift station components where O&M Department condition assessment indicated poor condition: small wet well. Proximity to river makes this lift station a significant liability. City O&M Staff to determine specific timing of improvement. | -                                                               | -                | 1 EA                    | 0%                             | \$100,000                     |
| 50                      | Year 1 to 5 | The Pines #5 Lift Station Condition Upgrade                        | Improve Condition             | Lift Station Upgrade      | Rehabilitation and, where required, replacement of deteriorating lift station components where O&M Department condition assessment indicated poor condition: station piping and plumbing. City O&M Staff to determine specific timing of improvement.                                                        | -                                                               | -                | 1 EA                    | 0%                             | \$100,000                     |
| 51                      | Year 1 to 5 | The Pines #6 Lift Station Condition Upgrade                        | Improve Condition             | Lift Station Upgrade      | Rehabilitation and, where required, replacement of deteriorating lift station components where O&M Department condition assessment indicated poor condition: station piping and plumbing. City O&M Staff to determine specific timing of improvement.                                                        | -                                                               | -                | 1 EA                    | 0%                             | \$100,000                     |
| 52                      | Year 1 to 5 | The Pines #7 Lift Station Condition Upgrade                        | Improve Condition             | Lift Station Upgrade      | Rehabilitation and, where required, replacement of deteriorating lift station components where O&M Department condition assessment indicated poor condition: station piping and plumbing. City O&M Staff to determine specific timing of improvement.                                                        | -                                                               | -                | 1 EA                    | 0%                             | \$100,000                     |
| 53                      | Year 1 to 5 | Underwood Lift Station Condition Upgrade                           | Improve Condition             | Lift Station Upgrade      | Rehabilitation and, where required, replacement of deteriorating lift station components where O&M Department condition assessment indicated poor condition: vacuum priming system and small wet well. City O&M Staff to determine specific timing of improvement.                                           | -                                                               | -                | 1 EA                    | 0%                             | \$345,000                     |
| 13A                     | Year 4 to 5 | Crown Villa #1 Lift Station Decommission - Gravity Sewer Diversion | Hydraulic Capacity            | Gravity Pipe              | New 8-inch gravity pipe from Crown Villa #1 Lift Station cross-country east to Brosterhous Road, connecting to existing 8-inch gravity pipe south of Brosterhous Road and Murphy Road intersection.                                                                                                          | P: 1A, 1B, 2<br>C: 13B                                          | 8-inch           | 500 LF                  | 100%                           | \$103,000                     |
| 13B                     | Year 4 to 5 | Crown Villa #1 Lift Station Decommission                           | Hydraulic Capacity            | Lift Station Decommission | The decommissioning of Crown Villa #1 Lift Station includes the removal of the existing lift station facility and all associated appurtenances with the exception of the force main, which will be abandoned in place.                                                                                       | P: 1A, 1B, 2<br>C: 13A                                          | -                | 1 EA                    | 100%                           | \$28,000                      |

| Project ID <sup>1</sup> | Timeframe   | Project Name                                                       | Project Category <sup>2</sup> | Type of Improvement       | Description <sup>3</sup>                                                                                                                                                                                                 | Required Preceding (P) and Concurrent (C) Projects <sup>4</sup> | Recommended Size | Unit, Length, HP or gpm | Growth Allocation <sup>5</sup> | Project Estimate <sup>6</sup> |
|-------------------------|-------------|--------------------------------------------------------------------|-------------------------------|---------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------|------------------|-------------------------|--------------------------------|-------------------------------|
| 14A                     | Year 4 to 5 | Crown Villa #2 Lift Station Decommission - Gravity Sewer Diversion | Hydraulic Capacity            | Gravity Pipe              | New 8-inch gravity pipe along a private road between Crown Villa #2 Lift Station and 530 feet east to Brosterhous Rd, connecting to existing 8-inch gravity pipe south of Brosterhous Road and Murphy Road intersection. | P: 1A, 1B, 2, C: 14B                                            | 8-inch           | 600 LF                  | 100%                           | \$122,000                     |
| 14B                     | Year 4 to 5 | Crown Villa #2 Lift Station Decommission                           | Hydraulic Capacity            | Lift Station Decommission | The decommissioning of Crown Villa #2 Lift Station includes the removal of the existing lift station facility and all associated appurtenances with the exception of the force main, which will be abandoned in place.   | P: 1A, 1B, 2, C: 14A                                            | -                | 1 EA                    | 100%                           | \$28,000                      |
| 15                      | Year 4 to 5 | Murphy Lift Station Decommission                                   | Hydraulic Capacity            | Lift Station Decommission | The decommissioning of Murphy Lift Station includes the removal of the existing lift station facility and all associated appurtenances with the exception of the force main, which will be abandoned in place.           | P: 1A, 1B, 2 C: -                                               | -                | 1 EA                    | 59%                            | \$28,000                      |
| 16A                     | Year 4 to 5 | Quail Ridge #2 Decommission - Gravity Sewer Diversion              | Hydraulic Capacity            | Gravity Pipe              | New 8-inch sewer pipe from Quail Ridge #2 Lift Station to Brosterhous Road (cross-country), connecting to existing gravity pipe northwest of Brosterhous Road and Windsor Drive intersection.                            | P: 1A, 1B, 2 C: 16B                                             | 8-inch           | 100 LF                  | 0%                             | \$14,000                      |
| 16B                     | Year 4 to 5 | Quail Ridge #2 Decommission                                        | Hydraulic Capacity            | Lift Station Decommission | The decommissioning of Quail Ridge #2 Lift Station includes the removal of the existing lift station facility and all associated appurtenances with the exception of the force main, which will be abandoned in place.   | P: 1A, 1B, 2 C: 16A                                             | -                | 1 EA                    | 0%                             | \$28,000                      |
| 17A                     | Year 4 to 5 | Ridgewater #1 Lift Station Decommission - Gravity Sewer Diversion  | Hydraulic Capacity            | Gravity Pipe              | New 8-inch gravity pipe from Ridgewater #1 Lift Station to the intersection of Ridgewater Loop and Ferguson Road, connecting to the new 24-inch SEI Phase 1.                                                             | P: 1A, 1B, 2 C: 17B                                             | 8-inch           | 100 LF                  | 45%                            | \$13,000                      |
| 17B                     | Year 4 to 5 | Ridgewater #1 Lift Station Decommission                            | Hydraulic Capacity            | Lift Station Decommission | The decommissioning of Ridgewater #1 Lift Station includes the removal of the existing lift station facility and all associated appurtenances with the exception of the force main, which will be abandoned in place.    | P: 1A, 1B, 2 C: 17A                                             | -                | 1 EA                    | 45%                            | \$28,000                      |
| 18A                     | Year 4 to 5 | Shadow Glen Lift Station Decommission - Gravity Sewer Diversion    | Hydraulic Capacity            | Gravity Pipe              | New 8-inch gravity pipe from Shadow Glen Lift Station west, cross-country to 15th Street connecting to the new 24-inch SEI Phase 1 northeast of Golden Gate Place and 15th Street intersection.                          | P: 1A, 1B, 2 C: 18B                                             | 8-inch           | 100 LF                  | 90%                            | \$32,000                      |
| 18B                     | Year 4 to 5 | Shadow Glen Lift Station Decommission                              | Hydraulic Capacity            | Lift Station Decommission | The decommissioning of Shadow Glen Lift Station includes the removal of the existing lift station facility and all associated appurtenances with the exception of the force main, which will be abandoned in place.      | P: 1A, 1B, 2 C: 18A                                             | -                | 1 EA                    | 90%                            | \$28,000                      |

| Project ID <sup>1</sup> | Timeframe   | Project Name                                                                      | Project Category <sup>2</sup> | Type of Improvement       | Description <sup>3</sup>                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Required Preceding (P) and Concurrent (C) Projects <sup>4</sup> | Recommended Size | Unit, Length, HP or gpm | Growth Allocation <sup>5</sup> | Project Estimate <sup>6</sup> |
|-------------------------|-------------|-----------------------------------------------------------------------------------|-------------------------------|---------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------|------------------|-------------------------|--------------------------------|-------------------------------|
| 20                      | Year 4 to 5 | Sun Meadow Lift Station Decommission                                              | Hydraulic Capacity            | Lift Station Decommission | The decommissioning of Sun Meadow Lift Station includes the removal of the existing lift station facility and all associated appurtenances with the exception of the force main, which will be abandoned in place.                                                                                                                                                                                                                                                              | P: 1A, 1B, 2<br>C: -                                            | -                | 1 EA                    | 9%                             | \$28,000                      |
| 22A                     | Year 4 to 5 | West of Highway 97: Parallel Sewer on Amethyst Street/Mahogany Street-Segment 1   | Hydraulic Capacity            | Gravity Pipe              | Parallel 8-inch pipe from Brookwood Boulevard and River Rim Drive intersection cross-country northeast to Amethyst Street, then east along Amethyst Street, connecting to the existing 10-inch pipe east of the Amethyst Street and Zircon Drive intersection.<br>Project is initiated by dry weather peak flow trigger of 270 gpm at manhole CMH002318. See Project ID 9 for more information on Flow Monitoring Program.                                                      | P: -<br>C: 22B                                                  | 8-inch           | 800 LF                  | 31%                            | \$175,000                     |
| 22B                     | Year 4 to 5 | West of Highway 97: Parallel Sewer on Amethyst Street/Mahogany Street - Segment 2 | Hydraulic Capacity            | Gravity Pipe              | Parallel 10-inch pipe along Amethyst Street east of Zircon Drive to Garnet Street, then along Garnet Street to Mahogany Street, then along Mahogany Street to Chuckanut Drive, connecting to the existing 12-inch pipe at Mahogany Street and Chuckanut Drive intersection.                                                                                                                                                                                                     | P: -<br>C: 22A                                                  | 10-inch          | 2100 LF                 | 34%                            | \$504,000                     |
| 22C                     | Year 4 to 5 | West of Highway 97: Parallel Sewer Mahogany Street to Highway 97- Segment 1       | Hydraulic Capacity            | Gravity Pipe              | Parallel 12-inch pipe along Granite Drive from Mahogany Street to Kings Lane, then along Kings Lane to Driftwood Lane, then along Driftwood Lane to Crystal Lane, then along Crystal Lane and cross-country, connecting to the existing 12-inch pipe northeast of the Crystal Lane and Driftwood Lane intersection.<br>Project is initiated by dry weather peak flow trigger of 320 gpm at manhole CMH002318. See Project ID 9 for more information on Flow Monitoring Program. | P: -<br>C: 22D                                                  | 12-inch          | 1,200 LF                | 26%                            | \$311,000                     |
| 22D                     | Year 4 to 5 | West of Highway 97: Parallel Sewer Mahogany Street to Highway 97- Segment 2       | Hydraulic Capacity            | Gravity Pipe              | Parallel 18-inch pipe from the Crystal Lane and Driftwood Lane intersection east, cross-country to west of Highway 97, connecting to the existing 12-inch pipe northwest of the Highway 97 and 3rd Street intersection.                                                                                                                                                                                                                                                         | P: -<br>C: 22C                                                  | 18-inch          | 1600 LF                 | 33%                            | \$688,000                     |
| 22E                     | Year 4 to 5 | Parallel Sewer on 3rd Street                                                      | Hydraulic Capacity            | Gravity Pipe              | Parallel 18-inch pipe along 3rd Street between Highway 97 and Pinebrook Boulevard, connecting to the existing 18-inch pipe at 3rd Street and Pinebrook Boulevard.                                                                                                                                                                                                                                                                                                               | -                                                               | 18-inch          | 1500 LF                 | 45%                            | \$534,000                     |

| Project ID <sup>1</sup> | Timeframe   | Project Name                                   | Project Category <sup>2</sup> | Type of Improvement  | Description <sup>3</sup>                                                                                                                                                                                                                                                                                                                                      | Required Preceding (P) and Concurrent (C) Projects <sup>4</sup> | Recommended Size | Unit, Length, HP or gpm | Growth Allocation <sup>5</sup> | Project Estimate <sup>6</sup> |
|-------------------------|-------------|------------------------------------------------|-------------------------------|----------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------|------------------|-------------------------|--------------------------------|-------------------------------|
| 23                      | Year 4 to 5 | Parallel Sewer on Olney Avenue                 | Hydraulic Capacity            | Gravity Pipe         | Parallel 8-inch pipe along Olney Avenue between Wall Street and 1st Street, connecting to the existing 16-inch pipe at 1st Street and Olney Avenue intersection.                                                                                                                                                                                              | -                                                               | 8-inch           | 1,000 LF                | 16%                            | \$581,000                     |
| 24                      | Year 4 to 5 | Plant Interceptor Upgrade                      | Hydraulic Capacity            | Gravity Pipe         | New 36-inch pipe to replace existing 30-inch east of Deschutes Market Road and south of Yeoman Road intersection.                                                                                                                                                                                                                                             | -                                                               | 36-inch          | 900 LF                  | 47%                            | \$542,000                     |
| 25                      | Year 4 to 5 | Boyd Acres Lift Station Hydraulic Upgrade      | Hydraulic Capacity            | Lift Station Upgrade | Upgrade of mechanical pumping and/or electrical components to accommodate increased hydraulic capacity requirements.                                                                                                                                                                                                                                          | -                                                               | -                | 190 gpm                 | 32%                            | \$345,000                     |
| 26                      | Year 4 to 5 | Canal View Lift Station Hydraulic Upgrade      | Hydraulic Capacity            | Lift Station Upgrade | Upgrade of mechanical pumping and/or electrical components to accommodate increased hydraulic capacity requirements.                                                                                                                                                                                                                                          | -                                                               | -                | 110 gpm                 | 29%                            | \$150,000                     |
| 28                      | Year 4 to 5 | River Canyon #2 Lift Station Hydraulic Upgrade | Hydraulic Capacity            | Lift Station Upgrade | Upgrade of mechanical pumping and/or electrical components to accommodate increased hydraulic capacity requirements.                                                                                                                                                                                                                                          | -                                                               | -                | 180 gpm                 | 0%                             | \$345,000                     |
| 29                      | Year 4 to 5 | River Rim Lift Station Hydraulic Replacement   | Hydraulic Capacity            | Lift Station Upgrade | Replacement of existing facility with a new lift station to accommodate upgrades in capacity. Project includes new pumps, piping, electrical and control equipment, standby generator for back-up power, odor control equipment, wet or dry well, liquid level monitoring, pressure monitoring, flow monitoring, bypass pumping port and telemetry equipment. | -                                                               | -                | 550 gpm                 | 40%                            | \$1,558,000                   |

| Project ID <sup>1</sup> | Timeframe   | Project Name                   | Project Category <sup>2</sup>     | Type of Improvement | Description <sup>3</sup>                                                                                                                                                                                                                                                                                                                                                     | Required Preceding (P) and Concurrent (C) Projects <sup>4</sup> | Recommended Size | Unit, Length, HP or gpm | Growth Allocation <sup>5</sup> | Project Estimate <sup>6</sup> |
|-------------------------|-------------|--------------------------------|-----------------------------------|---------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------|------------------|-------------------------|--------------------------------|-------------------------------|
| B                       | Year 1 to 5 | Local Area Improvements        | Fund Local Area Improvements      | -                   | Budget to develop a plan for implementing local area sewer improvements in the system. These areas include currently unsewered customers (septic) and areas that have poorly performing systems. Funding level is \$1,000,000 per year. Specific details, including pipe alignments, pipe sizes, service areas, and timetable for construction have not yet been determined. | -                                                               | -                | -                       | 0%                             | \$5,000,000                   |
| D                       | Year 4 to 5 | Ongoing Repair and Replacement | Fund Ongoing Repair & Replacement | -                   | Fund for implementing long-term ongoing repair and replacement budget to address condition-related projects in the future. Specific details, including alignment, pipe sizes have not yet been determined.                                                                                                                                                                   | -                                                               | -                | -                       | 0%                             | \$9,680,000                   |

<sup>1</sup> Project ID: The majority of proposed projects are comprised of multiple components. Project IDs are differentiated for gravity piping, force mains and lift stations. In the optimization process, modeled components were segmented at connection points, or where hydraulically distinctive (e.g., a change in slope or diameter). The Southeast Interceptor is the exception, as this major project has been modeled and optimized "as designed" with a project ID associated with each manhole-to-manhole segment.

<sup>2</sup> Project Category: Individual projects fall under the following main categories: Hydraulic Capacity, Improve Condition, Fund Ongoing Repair and Replacement, Fund Local Area Improvements and Miscellaneous Projects.

<sup>3</sup> Description: Where applicable, an identified flow value is measured at a particular manhole associated with the requirement for a specific improvement to be in place and operational. Long-term flow monitoring locations have been identified throughout the system, some of which will be used to "trigger" the design and construction of specific improvements. Flow trigger locations focus on projects that are scheduled to occur beyond the 1- to 5- year timeframe.

<sup>4</sup> Required Preceding and Concurrent Projects: The dependence between projects identifies where one project relies on another to function correctly. Generally, projects listed under Dependence are required prior to or concurrently with the project in question. For example, the Southeast Interceptor Phase 1 gravity connection at Mary Rose Place is required in order for the overall project to work correctly.

<sup>5</sup> Growth Allocation: The portion of the project is required due to growth (and the consequent increased flow within the existing UGB versus existing deficiencies based on existing flow within the UGB). The growth allocation factors into the rate and SDC calculations. For example, projects required due to higher growth will be funded with greater percentage of SDC resources. This is defined as:  $1 - (\text{Peak Dry Existing Flow} / \text{Peak Dry 20-Year Flow})$ .

<sup>6</sup> Cost: Project Estimates are based on the type and size of projects identified in the CSMP as required to convey 20-year flow within the existing UGB. Project Estimates were prepared in accordance with the guidelines of American Association of Cost Engineers (AACE) International Class 5 Estimate, with a typical accuracy of -30% to +50%. Project Estimates are based on 2013 dollars and include design (unless noted otherwise) and construction and site-specific information as described in Section 5 of the CSMP.

<sup>7</sup> The project is developer driven and funded, so no cost will be paid by the City.

General note: The proposed locations of all public sewer facilities in Section 7 of the CSMP and in this table are based on conceptual data available at the time the CSMP was prepared. The actual location, routing, type or size of any public sewer facility may vary from what is shown, because of actual physical conditions, the timing of development, the availability or cost of rights of way or easements, final engineering design consideration or other similar reasons. To the extent any planned future sewer improvement is shown on private property, the location is only approximate and does not constrain or limit development on that property.

If property is developed before the planned sewer improvement is constructed, the design of the sewer improvement shall avoid conflicts with the development where possible.

The location of any public sewer facilities outside the UGB is intended only to provide or facilitate service within the UGB. No new connection that allows for service outside the UGB shall be constructed except for new connections to areas that the City already provides service as described in the CSMP.

## *Long-Term Projects*

There are a number of recommended long-term (years 6 through 20) improvement projects required to support anticipated increases in collection system flow within the existing UGB provide service to unsewered areas, and to plan for ongoing system repair and replacement. See Table 1B-21 and Table 1B-22 for a more comprehensive description and project cost estimates in 2013 dollars. The actual project costs will likely vary from the estimates presented. The project estimates will change over time due to fluctuations in actual labor and material costs, competitive market conditions, site conditions, final project scope, implementation schedule, continuity of personnel, and other unforeseeable factors. Because of these factors, project feasibility, benefit-to-cost ratios, risks and funding must be carefully reviewed prior to making specific financial decisions or establishing project specific budgets.

The primary long-term projects include:

1. Southeast Interceptor, Phase 2
2. Northeast Interceptor
3. Decommissioning of Lift Stations
4. Long-Term Repair and Replacement Program
5. Local Area Improvements
6. Ongoing Sewer Flow Monitoring, Modeling, and Planning Projects

SEI, Phase 2 – The Phase 2 portion of the SEI includes the upstream (southern) portion from 3<sup>rd</sup> Street to Parrell Road and the downstream (northern) portion from Mary Rose Place to the existing plant interceptor on Deschutes Market Road. The recommended diameter of the SEI in these segments is consistent with the design size shown in SEI construction plans developed for the City prior to preparation of the CSMP.

Northeast Interceptor (NEI) – The NEI is recommended to provide conveyance capacity at the far north end of the UGB and service development in the Juniper Ridge area. The NEI will ultimately divert flow from upstream of the Fred Meyers Road gravity pipe and plant interceptor, where hydraulic deficiencies would otherwise occur in the future. The NEI also enables seven lift stations to be decommissioned, reducing the long-term life-cycle costs of operating and maintaining the system.

Decommissioning of Lift Stations – As the SEI and NEI are constructed, new gravity pipes can divert flow from existing pumped basins, allowing many lift stations in those areas to be decommissioned.

Long-Term Repair and Replacement Program – The City planned for long-term stewardship of the collection system by dedicating funds to a systematic long-term collection system replacement program. This program consists of budgeting for the replacement of the collection system based on the useful life of components with in-kind replacement or rehabilitation methods where applicable.

Local Area Improvements – City funds allocated for this improvement category provide sewer service to developed, unsewered areas of the community, and improve poorly performing areas of the existing collection system.

Ongoing Sewer Flow Monitoring, Modeling and Planning Projects – These projects allow the City to continue improving information and data collection, modeling, and planning related to ongoing management of the collection system. Dedicated funding has been identified for flow monitoring, ongoing hydraulic modeling and master planning. These ongoing improvement projects will support plan updates and prioritization of collection system improvements beyond the 5-year horizon.

**Table 1B-21  
Summary of Long-Term (6- to 10-Year) Improvements**

| Project ID <sup>1</sup> | Timeframe    | Project Name                                                      | Project Category <sup>2</sup> | Type of Improvement       | Description <sup>3</sup>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Required Preceding (P) and Concurrent (C) Projects <sup>4</sup> | Recommended Size | Unit, Length, HP or gpm | Growth Allocation <sup>5</sup> | Project Estimate <sup>6</sup> |
|-------------------------|--------------|-------------------------------------------------------------------|-------------------------------|---------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------|------------------|-------------------------|--------------------------------|-------------------------------|
| 19A                     | Year 6 to 10 | South Village Lift Station Decommission - Gravity Sewer Diversion | Hydraulic Capacity            | Gravity Pipe              | New 8-inch gravity pipe from South Village Lift Station to Murphy Road, connecting to new 18-inch SEI northwest of Murphy Road and Parrell Road intersection.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | P: 1B, 60A, 60C<br>C: 19B                                       | 8-inch           | 300 LF                  | 52%                            | \$64,000                      |
| 19B                     | Year 6 to 10 | South Village Lift Station Decommission                           | Hydraulic Capacity            | Lift Station Decommission | The decommissioning of South Village Lift Station includes the removal of the existing lift station facility and all associated appurtenances with the exception of the force main, which will be abandoned in place.                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | P: 1B, 60A, 60C<br>C: 19A                                       | -                | 1 EA                    | 52%                            | \$28,000                      |
| 60A                     | Year 6 to 10 | SEI Phase 2 - North                                               | Hydraulic Capacity            | Gravity Pipe              | New 30-inch pipe along 27th Street between Mary Rose Place and Butler Market Road, then along Butler Market Road to Deschutes Market Road, then along Deschutes Market Road, connecting to existing 36-inch pipe north of Deschutes Market Road and Monticello Drive intersection. Project is initiated by dry weather peak flow trigger of 920 gpm at manhole CMH002318. See Project ID 9 for more information on Flow Monitoring Program.                                                                                                                                                                                                                                               | P: 1B<br>C: 60B                                                 | 30-inch          | 11,700 LF               | 69%                            | \$8,287,000                   |
| 60B                     | Year 6 to 10 | SEI - Connections to Existing System                              | Hydraulic Capacity            | Gravity Pipe              | Project consists of 4 Segments connecting to the SEI Phase 2: first segment is a new 8-inch gravity pipe along 27th Street at intersection of Courtney Drive and 27th Street, connecting to the new 30-inch SEI pipeline. The second segment is a new 8-inch gravity pipe going southeast, cross-country from Rosemary Drive to 27th Street, connecting to the new 30-inch SEI pipeline north of the intersection. The third segment is a new 8-inch gravity pipe along Rosemary Drive connection to the new 30-inch SEI. The fourth segment is a new 8-inch gravity pipe along Jill Court at the intersection of Jill Court and 27th Street, connecting to the new 30-inch SEI pipeline. | P: 1B,<br>C: 60A                                                | 8-inch           | 400 LF                  | 17%                            | \$92,000                      |

| Project ID <sup>1</sup> | Timeframe    | Project Name                                                           | Project Category <sup>2</sup> | Type of Improvement       | Description <sup>3</sup>                                                                                                                                                                                                                                                                                                                                                                                         | Required Preceding (P) and Concurrent (C) Projects <sup>4</sup> | Recommended Size | Unit, Length, HP or gpm | Growth Allocation <sup>5</sup> | Project Estimate <sup>6</sup> |
|-------------------------|--------------|------------------------------------------------------------------------|-------------------------------|---------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------|------------------|-------------------------|--------------------------------|-------------------------------|
| 60C                     | Year 6 to 10 | SEI Phase 2 - South                                                    | Hydraulic Capacity            | Gravity Pipe              | New 18-inch pipe along Badger Road between Highway 97 and 3rd Street, then along 3rd Street to Murphy Road, then along Murphy Road to Parrell Road, connecting to the existing 18-inch pipe at Murphy Road and Parrell Road intersection. Project is initiated by dry weather peak flow trigger of 870 gpm at manhole CMH003221. See Project ID 9 for more information on Flow Monitoring Program.               | P: 1B<br>C: 60A                                                 | 18-inch          | 2,900 LF                | 50%                            | \$2,039,000                   |
| 61A                     | Year 6 to 10 | New Sewer Line along Brosterhous Road                                  | Hydraulic Capacity            | Gravity Pipe              | New 8-inch gravity pipe from Interim Stone Creek Lift Station, going east cross-country approximately 400 feet, then cross-country going south to Brosterhous Road, then along Brosterhous Road to Jacklight Lane, connecting to existing 10-inch pipe. Project is initiated by dry weather peak flow trigger of 190 gpm at manhole CMH009219. See Project ID 9 for more information on Flow Monitoring Program. | P: 1B, 60A<br>C: 61B                                            | 8-inch           | 2,400 LF                | 94%                            | \$883,000                     |
| 61B                     | Year 6 to 10 | Anderson Ranch/Stone Creek Developer Interim Lift Station Decommission | Hydraulic Capacity            | Lift Station Decommission | The decommissioning of Interim Stone Creek Lift Station includes the removal of the existing lift station facility and all associated appurtenances with the exception of the force main, which will be abandoned in place.                                                                                                                                                                                      | P: 1B, 60A<br>C: 61A                                            | -                | 1 EA                    | 0%                             | \$28,000                      |
| 62A                     | Year 6 to 10 | Camden Park Lift Station Decommission - Gravity Sewer Diversion        | Hydraulic Capacity            | Gravity Pipe              | New 8-inch gravity pipe from Camden Park Lift Station along Ferguson Road, connecting to new 8-inch gravity pipe (Project 67A) east of Ferguson Road and Sage Creek Drive intersection.                                                                                                                                                                                                                          | P: 1B, 60A,<br>C: 67B                                           | 8-inch           | 1,100 LF                | 15%                            | \$1,122,000                   |
| 62B                     | Year 6 to 10 | Camden Lift Station Decommission                                       | Hydraulic Capacity            | Lift Station Decommission | The decommissioning of Camden Park Lift Station includes the removal of the existing lift station facility and all associated appurtenances with the exception of the force main, which will be abandoned in place.                                                                                                                                                                                              | P: 1B, 60A,<br>67A<br>C: 67A                                    | -                | 1 EA                    | 15%                            | \$28,000                      |
| 63A                     | Year 6 to 10 | Desert Skies Lift Station Decommission - Gravity Sewer Diversion       | Hydraulic Capacity            | Gravity Pipe              | New 8-inch gravity pipe from Desert Skies Lift Station along Daily Estates Drive to Clairaway Avenue, then along Clairaway Avenue to 27th Street, connecting to the new 30-inch SEI pipeline.                                                                                                                                                                                                                    | P: 1B, 60A,<br>C: 63B                                           | 8-inch           | 900 LF                  | 88%                            | \$784,000                     |

| Project ID <sup>1</sup> | Timeframe    | Project Name                                                      | Project Category <sup>2</sup> | Type of Improvement       | Description <sup>3</sup>                                                                                                                                                                                                                                                                                                                                                                                        | Required Preceding (P) and Concurrent (C) Projects <sup>4</sup> | Recommended Size | Unit, Length, HP or gpm | Growth Allocation <sup>5</sup> | Project Estimate <sup>6</sup> |
|-------------------------|--------------|-------------------------------------------------------------------|-------------------------------|---------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------|------------------|-------------------------|--------------------------------|-------------------------------|
| 63B                     | Year 6 to 10 | Desert Skies Lift Station Decommission                            | Hydraulic Capacity            | Lift Station Decommission | The decommissioning of Desert Skies Lift Station process includes the removal of the existing lift station facility and all associated appurtenances with the exception of the force main, which will be abandoned in place.                                                                                                                                                                                    | P: 1B, 60A, C: 63A                                              | -                | 1 EA                    | 88%                            | \$28,000                      |
| 64A                     | Year 6 to 10 | Forum Lift Station Decommission - Gravity Sewer Diversion         | Hydraulic Capacity            | Gravity Pipe              | New 8-inch gravity pipe from Forum Lift Station along Forum Drive connecting to new 30-inch SEI pipeline at Forum Drive and 27th Street intersection.                                                                                                                                                                                                                                                           | P: 1B, 60A, C: 64B                                              | 8-inch           | 800 LF                  | 56%                            | \$287,000                     |
| 64B                     | Year 6 to 10 | Forum Lift Station Decommission                                   | Hydraulic Capacity            | Lift Station Decommission | The decommissioning of Forum Lift Station includes the removal of the existing lift station facility and all associated appurtenances with the exception of the force main, which will be abandoned in place.                                                                                                                                                                                                   | P: 1B, 60A, C: 64A                                              | -                | 1 EA                    | 56%                            | \$28,000                      |
| 65A                     | Year 6 to 10 | Nottingham #1 Lift Station Decommission - Gravity Sewer Diversion | Hydraulic Capacity            | Gravity Pipe              | New 8-inch gravity pipe from upstream of Nottingham #1 Lift Station south, cross-country for approximately 100 feet, then cross-country east to Robin Hood Lane, then along Robin Hood Lane northeast approximately 150 feet, then cross-country northeast 15th Street, then along 15th Street to Desert Woods Drive, then along Desert Woods Drive to Orion Drive, connecting to the new 30-inch SEI pipeline. | P: 1B, 60A, C: 65B                                              | 8-inch           | 4,800 LF                | 15%                            | \$1,081,000                   |
| 65B                     | Year 6 to 10 | Nottingham #1 Lift Station Decommission                           | Hydraulic Capacity            | Lift Station Decommission | The decommissioning of Nottingham #1 Lift Station includes the removal of the existing lift station facility and all associated appurtenances with the exception of the force main, which will be abandoned in place.                                                                                                                                                                                           | P: 1B, 60A, C: 65A                                              | -                | 1 EA                    | 15%                            | \$28,000                      |
| 66A                     | Year 6 to 10 | Nottingham #2 Lift Station Decommission - Gravity Sewer Diversion | Hydraulic Capacity            | Gravity Pipe              | New 8-inch gravity pipe from Nottingham #2 Lift Station east, cross-country to Sherwood Forest Drive, then along Sherwood Forest Drive southeast approximately 400 feet, then cross-country southeast to 15th Street, connecting to new 24-inch SEI pipeline.                                                                                                                                                   | P: 1B, 60A, C: 66B                                              | 12-inch          | 1,600 LF                | 15%                            | \$413,000                     |
| 66B                     | Year 6 to 10 | Nottingham #2 Lift Station Decommission                           | Hydraulic Capacity            | Lift Station Decommission | The decommissioning of Nottingham #2 Lift Station includes the removal of the existing lift station facility and all associated appurtenances with the exception of the force main, which will be abandoned in place.                                                                                                                                                                                           | P: 1B, 60A, C: 66A                                              | -                | 1 EA                    | 15%                            | \$28,000                      |

| Project ID <sup>1</sup> | Timeframe    | Project Name                                                      | Project Category <sup>2</sup> | Type of Improvement       | Description <sup>3</sup>                                                                                                                                                                                                                                                                                                                                      | Required Preceding (P) and Concurrent (C) Projects <sup>4</sup> | Recommended Size | Unit, Length, HP or gpm | Growth Allocation <sup>5</sup> | Project Estimate <sup>6</sup> |
|-------------------------|--------------|-------------------------------------------------------------------|-------------------------------|---------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------|------------------|-------------------------|--------------------------------|-------------------------------|
| 67A                     | Year 6 to 10 | Ridgewater #2 Lift Station Decommission - Gravity Sewer Diversion | Hydraulic Capacity            | Gravity Pipe              | New 8-inch gravity pipe along Ferguson Road between Ladera Road and King Solomon Lane, connecting to new 24-inch SEI pipeline.                                                                                                                                                                                                                                | P: 1B, 60A, C: 67B                                              | 8-inch           | 1,000 LF                | 85%                            | \$860,000                     |
| 67B                     | Year 6 to 10 | Ridgewater #2 Lift Station Decommission                           | Hydraulic Capacity            | Lift Station Decommission | The decommissioning of Ridgewater #2 Lift Station includes the removal of the existing lift station facility and all associated appurtenances with the exception of the force main, which will be abandoned in place.                                                                                                                                         | P: 1B, 60A, C: 67A                                              | -                | 1 EA                    | 85%                            | \$28,000                      |
| 68                      | Year 6 to 10 | River Rim Parallel Force Main                                     | Hydraulic Capacity            | Force Main                | Parallel 4-inch force main along Water Front Court from River Rim Lift Station to Charleswood Lane, then along Charleswood Lane to Creek Stone Loop, then along Creek Stone Loop to River Rim Drive, then along River Rim Drive to Brookwood Boulevard, connecting to existing 8-inch gravity pipe.                                                           | -                                                               | 4-inch           | 3,400 LF                | 40%                            | \$718,000                     |
| 69                      | Year 6 to 10 | Plant Interceptor Upsize                                          | Hydraulic Capacity            | Gravity Pipe              | New 42-inch pipe to replace existing 36-inch pipe going northeast, cross-country from approximately 600 feet northeast of Hamhook Road and Pioneer Road intersection.                                                                                                                                                                                         | -                                                               | 42-inch          | 800 LF                  | 47%                            | \$488,000                     |
| 70                      | Year 6 to 10 | Aspen Ridge Lift Station Hydraulic Replacement                    | Hydraulic Capacity            | Lift Station Replacement  | Replacement of existing facility with a new lift station to accommodate upgrades in capacity. Project includes new pumps, piping, electrical and control equipment, standby generator for back-up power, odor control equipment, wet or dry well, liquid level monitoring, pressure monitoring, flow monitoring, bypass pumping port and telemetry equipment. | -                                                               | -                | 170 gpm                 | 53%                            | \$1,042,000                   |
| 71                      | Year 6 to 10 | Old Mill Lift Station Hydraulic Upgrade                           | Hydraulic Capacity            | Lift Station Upgrade      | Upgrade of mechanical pumping and/or electrical components to accommodate increased hydraulic capacity requirements.                                                                                                                                                                                                                                          | -                                                               | -                | 340 gpm                 | 38%                            | \$345,000                     |
| 72                      | Year 6 to 10 | Quail Crossing Lift Station Hydraulic Replacement                 | Hydraulic Capacity            | Lift Station Replacement  | Replacement of existing facility with a new lift station to accommodate upgrades in capacity. Project includes new pumps, piping, electrical and control equipment, standby generator for back-up power, odor control equipment, wet or dry well, liquid level monitoring, pressure monitoring, flow monitoring, bypass pumping port and telemetry equipment. | -                                                               | -                | 110 gpm                 | 77%                            | \$559,000                     |
| 73                      | Year 6 to 10 | Sawyer Park Lift Station Hydraulic Upgrade                        | Hydraulic Capacity            | Lift Station Upgrade      | Upgrade of mechanical pumping and/or electrical components to accommodate increased hydraulic capacity requirements.                                                                                                                                                                                                                                          | -                                                               | -                | 800 gpm                 | 42%                            | \$345,000                     |

| Project ID <sup>1</sup> | Timeframe    | Project Name                                        | Project Category <sup>2</sup> | Type of Improvement             | Description <sup>3</sup>                                                                                                                                                                                                                                                                   | Required Preceding (P) and Concurrent (C) Projects <sup>4</sup> | Recommended Size | Unit, Length, HP or gpm | Growth Allocation <sup>5</sup> | Project Estimate <sup>6</sup> |
|-------------------------|--------------|-----------------------------------------------------|-------------------------------|---------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------|------------------|-------------------------|--------------------------------|-------------------------------|
| 74                      | Year 6 to 10 | Repair/Replace Poor Condition Gravity Pipes         | Improve Condition             | Trenchless Sewer Rehabilitation | Repair or replace gravity collection system that has been identified as condition deficient by the O&M Staff through their CCTV program. City O&M Staff to identify specific schedule for addressing deficient piping.<br>Grade 4 Assessment - 2.3 miles<br>Grade 4 Assessment - 1.1 miles | -                                                               | -                | -                       | 0%                             | \$3,889,000                   |
| 76                      | Year 6 to 10 | Empire Estates Lift Station Condition Upgrade       | Improve Condition             | Lift Station Upgrade            | Rehabilitation and, where required, replacement of deteriorating lift station components where O&M Department condition assessment indicated poor condition: pumps and motors.                                                                                                             | -                                                               | -                | 1 EA                    | 0%                             | \$345,000                     |
| 77                      | Year 6 to 10 | Enchant on Deschutes Lift Station Condition Upgrade | Improve Condition             | Lift Station Upgrade            | Rehabilitation and, where required, replacement of deteriorating lift station components where O&M Department condition assessment indicated poor condition: pumps and motors.                                                                                                             | -                                                               | -                | 1 EA                    | 0%                             | \$345,000                     |
| 78                      | Year 6 to 10 | Glenshire Lift Station Condition Upgrade            | Improve Condition             | Lift Station Upgrade            | Rehabilitation and, where required, replacement of deteriorating lift station components where O&M Department condition assessment indicated poor condition: pumps and VFD.                                                                                                                | -                                                               | -                | 1 EA                    | 0%                             | \$345,000                     |
| 79                      | Year 6 to 10 | Hollow Pines #2 Lift Station Condition Upgrade      | Improve Condition             | Lift Station Upgrade            | Rehabilitation and, where required, replacement of deteriorating lift station components where O&M Department condition assessment indicated poor condition: pumps and VFDs.                                                                                                               | -                                                               | -                | 1 EA                    | 0%                             | \$345,000                     |
| 80                      | Year 6 to 10 | Majestic Lift Station Condition Upgrade             | Improve Condition             | Lift Station Upgrade            | Rehabilitation and, where required, replacement of deteriorating lift station components where O&M Department condition assessment indicated poor condition: rail system.                                                                                                                  | -                                                               | -                | 1 EA                    | 0%                             | \$345,000                     |
| 81                      | Year 6 to 10 | Rivers Edge Lift Station Condition Upgrade          | Improve Condition             | Lift Station Upgrade            | Rehabilitation and, where required, replacement of deteriorating lift station components where O&M Department condition assessment indicated poor condition: pumps and motors.                                                                                                             | -                                                               | -                | 1 EA                    | 0%                             | \$345,000                     |
| 82                      | Year 6 to 10 | Widgi Creek Lift Station Condition Upgrade          | Improve Condition             | Lift Station Upgrade            | Rehabilitation and, where required, replacement of deteriorating lift station components where O&M Department condition assessment indicated poor condition: pumps, rail system and electrical components.                                                                                 | -                                                               | -                | 1 EA                    | 0%                             | \$345,000                     |

| Project ID <sup>1</sup> | Timeframe    | Project Name                                   | Project Category <sup>2</sup> | Type of Improvement | Description <sup>3</sup>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Required Preceding (P) and Concurrent (C) Projects <sup>4</sup> | Recommended Size | Unit, Length, HP or gpm | Growth Allocation <sup>5</sup> | Project Estimate <sup>6</sup> |
|-------------------------|--------------|------------------------------------------------|-------------------------------|---------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------|------------------|-------------------------|--------------------------------|-------------------------------|
| G                       | Year 6 to 10 | Local Area Improvements                        | Fund Local Area Improvements  | -                   | Budget to develop a plan for implementing local area sewer improvements in the system. These areas include currently unsewered customers (septic) and areas that have poorly performing systems. Funding level is \$1,000,000 per year. Specific details, including pipe alignments, pipe sizes, service areas, timetable of construction have not yet been determined.                                                                                                                                                                                                        | -                                                               | -                | -                       | 0%                             | \$5,000,000                   |
| 83                      | Year 6 to 10 | Plant Interceptor Condition Assessment Program | Miscellaneous Project         | -                   | Condition Assessment of the Plant Interceptor and Siphon. This inspection requires different equipment than is currently owned by the O&M Department and the budget is for the City to hire a consultant to assist with this project. The Plant Interceptor is approximately 20,200 feet of 30-, 36- and 42-inch gravity pipe. The Siphon is approximately 4,900 feet of 21-inch and 36-inch parallel pipe. This project does not include assessment of any piping other than the Plant Interceptor. This project will serve as an update to the assessment conducted in 2013. | -                                                               | -                | -                       | 0%                             | \$600,000                     |
| 84                      | Year 6 to 10 | On-Call Hydraulic Modeling Services            | Miscellaneous Project         | -                   | Engineering services contract tailored to meet the City's future need of updating the sewer model, adjusting calibration, or answering specific system operational questions. Funding level is \$100,000 per year. City Project ID SW111CA.                                                                                                                                                                                                                                                                                                                                    | -                                                               | -                | -                       | 0%                             | \$500,000                     |
| 85                      | Year 6 to 10 | Collection System Master Plan Update           | Miscellaneous Project         | -                   | Engineering services contract to update the current Master Plan, document changes in the system, update the system analysis and CIP. The update will ensure the City is utilizing up-to-date and accurate information regarding the condition of the collection system, flow projections and applicable regulations.                                                                                                                                                                                                                                                           | -                                                               | -                | -                       | 0%                             | \$1,000,000                   |

| Project ID <sup>1</sup> | Timeframe    | Project Name                                                   | Project Category <sup>2</sup> | Type of Improvement | Description <sup>3</sup>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Required Preceding (P) and Concurrent (C) Projects <sup>4</sup> | Recommended Size | Unit, Length, HP or gpm | Growth Allocation <sup>5</sup> | Project Estimate <sup>6</sup> |
|-------------------------|--------------|----------------------------------------------------------------|-------------------------------|---------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------|------------------|-------------------------|--------------------------------|-------------------------------|
| 86                      | Year 6 to 10 | Large Gravity Pipe Condition Assessment Program - Year 6 to 10 | Miscellaneous Project         | -                   | Establish a program to inspect the condition of existing gravity trunk collection system with diameters greater than 15 inches (approximately 4% of the collection system), grade the trunk system components, evaluate rehabilitation options and recommend the most effective solution. This type of inspection requires different equipment than is currently owned by the O&M Department and the budget is for the City to hire a consultant to assist with this project. This project does not include condition assessment of the Plant Interceptor or Inverted Siphon. Funding level is \$200,000 per year. | -                                                               | -                | -                       | 0%                             | \$1,000,000                   |

<sup>1</sup> Project ID: The majority of proposed projects are comprised of multiple components. Project IDs are differentiated for gravity piping, force mains and lift stations. In the optimization process, modeled components were segmented at connection points, or where hydraulically distinctive (e.g., a change in slope or diameter). The Southeast Interceptor is the exception, as this major project has been modeled and optimized "as designed" with a project ID associated with each manhole-to-manhole segment.

<sup>2</sup> Project Category: Individual projects fall under the following main categories: Hydraulic Capacity, Improve Condition, Fund Ongoing Repair and Replacement, Fund Local Area Improvements and Miscellaneous Projects.

<sup>3</sup> Description: Where applicable, an identified flow value is measured at a particular manhole associated with the requirement for a specific improvement to be in place and operational. Long-term flow monitoring locations have been identified throughout the system, some of which will be used to "trigger" the design and construction of specific improvements. Flow trigger locations focus on projects that are scheduled to occur beyond the 1- to 5- year timeframe.

<sup>4</sup> Required Preceding and Concurrent Projects: The dependence between projects identifies where one project relies on another to function correctly. Generally, projects listed under Dependence are required prior to or concurrently with the project in question. For example, the Southeast Interceptor Phase 1 gravity connection at Mary Rose Place is required in order for the overall project to work correctly.

<sup>5</sup> Growth Allocation: The portion of the project is required due to growth (and the consequent increased flow within the existing UGB versus existing deficiencies based on existing flow within the UGB). The growth allocation factors into the rate and SDC calculations. For example, projects required due to higher growth will be funded with greater percentage of SDC resources. This is defined as:  $1 - (\text{Peak Dry Existing Flow} / \text{Peak Dry 20-Year Flow})$ .

<sup>6</sup> Cost: Project Estimates are based on the type and size of projects identified in the CSMP as required to convey 20-year flow within the existing UGB. Project Estimates were prepared in accordance with the guidelines of American Association of Cost Engineers (AACE) International Class 5 Estimate, with a typical accuracy of -30% to +50%. Project Estimates are based on 2013 dollars and include design (unless noted otherwise) and construction and site-specific information as described in Section 5 of the CSMP.

General note: The proposed locations of all public sewer facilities in this table and in Section 7 of the CSMP are based on conceptual data available at the time the CSMP was prepared. The actual location, routing, type or size of any public sewer facility may vary from what is shown, because of actual physical conditions, the timing of development, the availability or cost of rights of way or easements, final engineering design consideration or other similar reasons.

To the extent any planned future sewer improvement is shown on private property, the location is only approximate and does not constrain or limit development on that property. If property is developed before the planned sewer improvement is constructed, the design of the sewer improvement shall avoid conflicts with the development where possible.

The location of any public sewer facilities outside the UGB is intended only to provide or facilitate service within the UGB. No new connection that allows for service outside the UGB shall be constructed except for new connections to areas where the City already provides service, as described in the CSMP.

**Table 1B-22  
Summary of Long-Term (11- to 20-Year) Improvements**

| Project ID <sup>1</sup> | Timeframe     | Project Name                                                        | Project Category <sup>2</sup> | Type of Improvement       | Description <sup>3</sup>                                                                                                                                                                                                      | Required Preceding (P) and Concurrent (C) Projects <sup>4</sup> | Recommended Size | Unit, Length, HP or gpm | Growth Allocation <sup>5</sup> | Project Estimate <sup>6</sup> |
|-------------------------|---------------|---------------------------------------------------------------------|-------------------------------|---------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------|------------------|-------------------------|--------------------------------|-------------------------------|
| 88A                     | Year 11 to 20 | Blue Ridge Lift Station Decommission - Gravity Sewer Diversion      | Hydraulic Capacity            | Gravity Pipe              | New 8-inch gravity pipe along Knott Road between Blue Ridge Lane and Country Club Drive, then along Country Club Drive to south of Murphy Road, connecting to proposed 18-inch SEI pipeline south of the intersection.        | P: 1B, 60A<br>C: 88B                                            | 8-inch           | 6,800 LF                | 10%                            | \$1,713,000                   |
| 88B                     | Year 11 to 20 | Blue Ridge Lift Station Decommission                                | Hydraulic Capacity            | Lift Station Decommission | The decommissioning of Blue Ridge Lift Station includes the removal of the existing lift station facility and all associated appurtenances with the exception of the force main, which will be abandoned in place.            | P: 1B, 60A<br>C: 88A                                            | -                | 1 EA                    | 10%                            | \$28,000                      |
| 89A                     | Year 11 to 20 | Darnell Estates Lift Station Decommission - Gravity Sewer Diversion | Hydraulic Capacity            | Gravity Pipe              | New 8-inch gravity pipe along Darla Place between Darby Court and Darnel Avenue, then along Darnel Avenue to 27th Street, connecting to new 30-inch SEI pipeline.                                                             | P: 1B, 60A<br>C: 89B                                            | 8-inch           | 700 LF                  | 49%                            | \$227,000                     |
| 89B                     | Year 11 to 20 | Darnell Estates Lift Station Decommission                           | Hydraulic Capacity            | Lift Station Decommission | The decommissioning of Darnel Estates Lift Station includes the removal of the existing lift station facility and all associated appurtenances with the exception of the force main, which will be abandoned in place.        | P: 1B, 60A<br>C: 89A                                            | -                | 1 EA                    | 49%                            | \$28,000                      |
| 90A                     | Year 11 to 20 | Quail Ridge #1 Decommission - Gravity Sewer Diversion               | Hydraulic Capacity            | Gravity Pipe              | New 8-inch gravity pipe going northeast approximately 100 feet cross-country from Quail Ridge #1 Lift Station to Brosterhous Road connecting to existing 8-inch pipe northeast of Brosterhous and Windsor Drive intersection. | P: 1B, 60A<br>C: 90B                                            | 8-inch           | 100 LF                  | 0%                             | \$23,000                      |
| 90B                     | Year 11 to 20 | Quail Ridge #1 Decommission                                         | Hydraulic Capacity            | Lift Station Decommission | The decommissioning of Quail Ridge #1 Lift Station includes the removal of the existing lift station facility and all associated appurtenances with the exception of the force main, which will be abandoned in place.        | P: 1B, 60A<br>C: 90A                                            | -                | 1 EA                    | 0%                             | \$28,000                      |
| 91A                     | Year 11 to 20 | Simplicity Lift Station Decommission - Gravity Sewer Diversion      | Hydraulic Capacity            | Gravity Pipe              | New 8-inch gravity pipe along Hollis Lane between east of Lincoln Lane and 15th Street, then along 15th Street to Desert Woods Drive, connecting to new 8-inch pipe at the intersection.                                      | P: 1B, 60A,<br>65A<br>C: 91B                                    | 8-inch           | 1,600 LF                | 80%                            | \$355,000                     |
| 91B                     | Year 11 to 20 | Simplicity Lift Station Decommission                                | Hydraulic Capacity            | Lift Station Decommission | The decommissioning of Simplicity Lift Station includes the removal of the existing lift station facility and all associated appurtenances with the exception of the force main, which will be abandoned in place.            | P: 1B, 60A,<br>65A<br>C: 91A                                    | -                | 1 EA                    | 80%                            | \$28,000                      |

| Project ID <sup>1</sup> | Timeframe     | Project Name                                                     | Project Category <sup>2</sup> | Type of Improvement       | Description <sup>3</sup>                                                                                                                                                                                             | Required Preceding (P) and Concurrent (C) Projects <sup>4</sup> | Recommended Size | Unit, Length, HP or gpm | Growth Allocation <sup>5</sup> | Project Estimate <sup>6</sup> |
|-------------------------|---------------|------------------------------------------------------------------|-------------------------------|---------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------|------------------|-------------------------|--------------------------------|-------------------------------|
| 92A                     | Year 11 to 20 | Stone Haven Lift Station Decommission - Gravity Sewer Diversion  | Hydraulic Capacity            | Gravity Pipe              | New 8-inch gravity pipe along Aberdeen Drive between approximately 200 feet south of Silver Sage and Broadmoor Way, then along Broadmoor Way to Murphy Road, connecting to new 18-inch SEI.                          | P: 1B, 60A<br>C: 92B                                            | 10-inch          | 700 LF                  | 76%                            | \$241,000                     |
| 92B                     | Year 11 to 20 | Stone Haven Lift Station Decommission                            | Hydraulic Capacity            | Lift Station Decommission | The decommissioning of Stone Haven Lift Station includes the removal of the existing lift station facility and all associated appurtenances with the exception of the force main, which will be abandoned in place.  | P: 1B, 60A<br>C: 92A                                            | -                | 1 EA                    | 76%                            | \$28,000                      |
| 93A                     | Year 11 to 20 | Summit Park Lift Station Decommission - Gravity Sewer Diversion  | Hydraulic Capacity            | Gravity Pipe              | New 8-inch gravity pipe along Wells Acres Road between Promise Place and 27th Street, connecting to new 30-inch SEI pipeline.                                                                                        | P: 1B, 60A<br>C: 93B                                            | 8-inch           | 2,100 LF                | 33%                            | \$514,000                     |
| 93B                     | Year 11 to 20 | Summit Park Lift Station Decommission                            | Hydraulic Capacity            | Lift Station Decommission | The decommissioning of Summit Park Lift Station includes the removal of the existing lift station facility and all associated appurtenances with the exception of the force main, which will be abandoned in place.  | P: 1B, 60A<br>C: 93A                                            | -                | 1 EA                    | 33%                            | \$28,000                      |
| 94A                     | Year 11 to 20 | The Pines #5 Lift Station Decommission - Gravity Sewer Diversion | Hydraulic Capacity            | Gravity Pipe              | New 8-inch gravity pipe going southwest cross-country from Pines #5 Lift Station to Brosterhous Road, connecting to existing 8-inch pipe northwest of Brosterhous Road and Windsor Drive intersection.               | P: 1B, 60A<br>C: 94B                                            | 8-inch           | 700 LF                  | 15%                            | \$146,000                     |
| 94B                     | Year 11 to 20 | The Pines #5 Lift Station Decommission                           | Hydraulic Capacity            | Lift Station Decommission | The decommissioning of The Pines #5 Lift Station includes the removal of the existing lift station facility and all associated appurtenances with the exception of the force main, which will be abandoned in place. | P: 1B, 60A<br>C: 94A                                            | -                | 1 EA                    | 15%                            | \$28,000                      |
| 95A                     | Year 11 to 20 | The Pines #6 Lift Station Decommission - Gravity Sewer Diversion | Hydraulic Capacity            | Gravity Pipe              | New 8-inch gravity pipe going southwest cross-country from Pines #6 Lift Station to Brosterhous Road, connecting to existing 8-inch pipe south of Murphy Road and Brosterhous Road intersection.                     | P: 1B, 60A<br>C: 95B                                            | 8-inch           | 1,500 LF                | 15%                            | \$323,000                     |
| 95B                     | Year 11 to 20 | The Pines #6 Lift Station Decommission                           | Hydraulic Capacity            | Lift Station Decommission | The decommissioning of Pines #6 Lift Station includes the removal of the existing lift station facility and all associated appurtenances with the exception of the force main, which will be abandoned in place.     | P: 1B, 60A<br>C: 95A                                            | -                | 1 EA                    | 15%                            | \$28,000                      |

| Project ID <sup>1</sup> | Timeframe     | Project Name                                                     | Project Category <sup>2</sup> | Type of Improvement       | Description <sup>3</sup>                                                                                                                                                                                                                                                       | Required Preceding (P) and Concurrent (C) Projects <sup>4</sup> | Recommended Size   | Unit, Length, HP or gpm | Growth Allocation <sup>5</sup> | Project Estimate <sup>6</sup> |
|-------------------------|---------------|------------------------------------------------------------------|-------------------------------|---------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------|--------------------|-------------------------|--------------------------------|-------------------------------|
| 96A                     | Year 11 to 20 | The Pines #7 Lift Station Decommission - Gravity Sewer Diversion | Hydraulic Capacity            | Gravity Pipe              | New 8-inch gravity pipe going southwest, cross-country from Pines #7 Lift Station to Brosterhous Road, connecting to existing 8-inch pipe northwest of Brosterhous Road and Windsor Drive intersection.                                                                        | P: 1B, 60A<br>C: 96B                                            | 8-inch             | 400 LF                  | 15%                            | \$71,000                      |
| 96B                     | Year 11 to 20 | The Pines #7 Lift Station Decommission                           | Hydraulic Capacity            | Lift Station Decommission | The decommissioning of Pines #7 Lift Station includes the removal of the existing lift station facility and all associated appurtenances with the exception of the force main, which will be abandoned in place.                                                               | P: 1B, 60A<br>C: 96A                                            | -                  | 1 EA                    | 15%                            | \$28,000                      |
| 97A                     | Year 11 to 20 | The Shire Lift Station Decommission - Gravity Sewer Diversion    | Hydraulic Capacity            | Gravity Pipe              | New 8-inch gravity pipe along Benham Road between south of Knightsbridge Place and Silver Sage Street, then along Silver Sage Street to Aberdeen Drive, then along Aberdeen Drive, connecting to new 10-inch pipe south of Silver Sage Street and Aberdeen Drive intersection. | P: 1B, 60A,<br>92A<br>C: 97B                                    | 8-inch             | 2,600 LF                | 85%                            | \$1,761,000                   |
| 97B                     | Year 11 to 20 | The Shire Lift Station Decommission                              | Hydraulic Capacity            | Lift Station Decommission | The decommissioning of The Shire Lift Station includes the removal of the existing lift station facility and all associated appurtenances with the exception of the force main, which will be abandoned in place.                                                              | P: 1B, 60A,<br>97A<br>C: 92A                                    | -                  | 1 EA                    | 85%                            | \$28,000                      |
| 98                      | Year 11 to 20 | Addison Avenue and Butler Market Gravity Improvement             | Hydraulic Capacity            | Gravity Pipe              | New 12-inch pipe along Addison Avenue between 4th Street and Butler Market Road, then new 18-inch pipe along Butler Market Road to 8th Street, connecting to existing 24-inch pipe.                                                                                            | -                                                               | 12-inch to 18-inch | 3,200 LF                | 45%                            | \$1,512,000                   |

| Project ID <sup>1</sup> | Timeframe     | Project Name                                                   | Project Category <sup>2</sup> | Type of Improvement       | Description <sup>3</sup>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Required Preceding (P) and Concurrent (C) Projects <sup>4</sup> | Recommended Size | Unit, Length, HP or gpm | Growth Allocation <sup>5</sup> | Project Estimate <sup>6</sup> |
|-------------------------|---------------|----------------------------------------------------------------|-------------------------------|---------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------|------------------|-------------------------|--------------------------------|-------------------------------|
| 99                      | Year 11 to 20 | NEI                                                            | Hydraulic Capacity            | Gravity Pipe              | This project starts as a new 8-inch gravity pipe along Hunters Circle between Cooley Road and Joseph Way, then continues as a 10-inch pipe along Hunters Circle between Joseph Way and approximately 300 feet northeast of Wellington Street, then continues as a 12-inch pipe cross-country, going northeast approximately 2,000 feet, then cross-country going southeast approximately 4,500 feet, then changing diameter to 18 inches, continuing cross-country east for approximately 6,500 feet, then parallels the Plant interceptor for approximately 900 feet, changing diameter to 24 inches for approximately 4,000 feet, with the last segment 36 inches up to the siphon. Project is initiated by dry weather peak flow trigger of 810 gpm at manhole CMH004010. See Project ID 9 for more information on Flow Monitoring Program. | -                                                               | 8- to 36-inch    | 23,400 LF               | 66%                            | \$15,086,000                  |
| 100A                    | Year 11 to 20 | Boyd Acres Lift Station Decommission - Gravity Sewer Diversion | Hydraulic Capacity            | Gravity Pipe              | New 8-inch gravity pipe along Stacy Lane, cross-country from Nicolette Drive northwest to Vogt Road and Hunters Circle intersection, then cross-country northeast to Stacy Lane, then along Stacy Lane, connecting to new 8-inch pipe south of Cooley Road.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | P: 99, 105A<br>C: 100B                                          | 8-inch           | 1,100 LF                | 0%                             | \$737,000                     |
| 100B                    | Year 11 to 20 | Boyd Acres Lift Station Decommission                           | Hydraulic Capacity            | Lift Station Decommission | The decommissioning of Boyd Acres Lift Station includes the removal of the existing lift station facility and all associated appurtenances with the exception of the force main, which will be abandoned in place.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | P: 99, 105A<br>C: 100A                                          | -                | 1 EA                    | 0%                             | \$28,000                      |
| 101A                    | Year 11 to 20 | Highland Lift Station Decommission - Gravity Sewer Diversion   | Hydraulic Capacity            | Gravity Pipe              | New 8-inch gravity pipe going south, cross-country from Highland Lift Station to Cooley Road, then along Cooley Road to Hunters Circle, connecting to new 8-inch NEI pipeline.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | P: 99<br>C: 101B                                                | 8-inch           | 3,600 LF                | 58%                            | \$1,398,000                   |
| 101B                    | Year 11 to 20 | Highland Lift Station Decommission                             | Hydraulic Capacity            | Lift Station Decommission | The decommissioning of Highland Lift Station includes the removal of the existing lift station facility and all associated appurtenances with the exception of the force main, which will be abandoned in place.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | P: 99<br>C: 101A                                                | -                | 1 EA                    | 58%                            | \$28,000                      |

| Project ID <sup>1</sup> | Timeframe     | Project Name                                                      | Project Category <sup>2</sup> | Type of Improvement       | Description <sup>3</sup>                                                                                                                                                                                                                  | Required Preceding (P) and Concurrent (C) Projects <sup>4</sup> | Recommended Size | Unit, Length, HP or gpm | Growth Allocation <sup>5</sup> | Project Estimate <sup>6</sup> |
|-------------------------|---------------|-------------------------------------------------------------------|-------------------------------|---------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------|------------------|-------------------------|--------------------------------|-------------------------------|
| 102A                    | Year 11 to 20 | Holiday Inn Lift Station Decommission - Gravity Sewer Diversion   | Hydraulic Capacity            | Gravity Pipe              | New 8-inch gravity pipe along Highway 97 from Holiday Inn Lift Station for approximately 200-feet, then cross-country going east to Hunters Circle, connecting to new 10-inch NEI pipeline at Hunters Circle and Joseph Way intersection. | P: 99<br>C: 102B                                                | 8-inch           | 800 LF                  | 66%                            | \$523,000                     |
| 102B                    | Year 11 to 20 | Holiday Inn Lift Station Decommission                             | Hydraulic Capacity            | Lift Station Decommission | The decommissioning of Holiday Inn Lift Station includes the removal of the existing lift station facility and all associated appurtenances with the exception of the force main, which will be abandoned in place.                       | P: 99<br>C: 102A                                                | -                | 1 EA                    | 66%                            | \$28,000                      |
| 103A                    | Year 11 to 20 | Juniper Ridge Lift Station Decommission - Gravity Sewer Diversion | Hydraulic Capacity            | Gravity Pipe              | New 10-inch gravity pipe going east approximately 2,400 feet cross-country from Juniper Ridge Lift Station, connecting to 18-inch NEI pipeline.                                                                                           | P: 99<br>C: 103B                                                | 10-inch          | 2,500 LF                | 74%                            | \$1,433,000                   |
| 103B                    | Year 11 to 20 | Juniper Ridge Lift Station Decommission                           | Hydraulic Capacity            | Lift Station Decommission | The decommissioning of Juniper Ridge Lift Station includes the removal of the existing lift station facility and all associated appurtenances with the exception of the force main, which will be abandoned in place.                     | P: 99<br>C: 103A                                                | -                | 1 EA                    | 74%                            | \$28,000                      |
| 104A                    | Year 11 to 20 | North Pointe Lift Station Decommission - Gravity Sewer Diversion  | Hydraulic Capacity            | Gravity Pipe              | New 8-inch gravity pipe along Hunters Circle from upstream of North Pointe Lift Station to the new 10-inch NEI pipeline.                                                                                                                  | P: 99<br>C: 104B                                                | 8-inch           | 100 LF                  | 71%                            | \$19,000                      |
| 104B                    | Year 11 to 20 | North Pointe Lift Station Decommission                            | Hydraulic Capacity            | Lift Station Decommission | The decommissioning of North Pointe Lift Station includes the removal of the existing lift station facility and all associated appurtenances with the exception of the force main, which will be abandoned in place.                      | P: 99<br>C: 104A                                                | -                | 1 EA                    | 71%                            | \$28,000                      |
| 105A                    | Year 11 to 20 | North Wind Lift Station Decommission - Gravity Sewer Diversion    | Hydraulic Capacity            | Gravity Pipe              | New 8-inch gravity pipe along Stacy Lane between Overton Place and Cooley Road, then along Cooley Road to Hunters Circle, connecting to new 8-inch NEI pipeline.                                                                          | P: 99<br>C: 105B                                                | 8-inch           | 700 LF                  | 56%                            | \$639,000                     |
| 105B                    | Year 11 to 20 | North Wind Lift Station Decommission                              | Hydraulic Capacity            | Lift Station Decommission | The decommissioning of North Wind Lift Station includes the removal of the existing lift station facility and all associated appurtenances with the exception of the force main, which will be abandoned in place.                        | P: 99<br>C: 105A                                                | -                | 1 EA                    | 56%                            | \$28,000                      |
| 106A                    | Year 11 to 20 | Phoenix Lift Station Decommission - Gravity Sewer Diversion       | Hydraulic Capacity            | Gravity Pipe              | New 8-inch gravity pipe along Ranch Village Drive from Phoenix Lift Station to Cooley Road, then east along Cooley Road, connecting to existing 8-inch pipe west of Cooley Road and 18th Street intersection.                             | P: 99, 103A<br>C: 106B                                          | 8-inch           | 1,800 LF                | 15%                            | \$599,000                     |

| Project ID <sup>1</sup> | Timeframe     | Project Name                                        | Project Category <sup>2</sup> | Type of Improvement       | Description <sup>3</sup>                                                                                                                                                                                                                                                                                                                                      | Required Preceding (P) and Concurrent (C) Projects <sup>4</sup> | Recommended Size | Unit, Length, HP or gpm | Growth Allocation <sup>5</sup> | Project Estimate <sup>6</sup> |
|-------------------------|---------------|-----------------------------------------------------|-------------------------------|---------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------|------------------|-------------------------|--------------------------------|-------------------------------|
| 106B                    | Year 11 to 20 | Phoenix Lift Station Decommission                   | Hydraulic Capacity            | Lift Station Decommission | The decommissioning of Phoenix Lift Station includes the removal of the existing lift station facility and all associated appurtenances with the exception of the force main, which will be abandoned in place.                                                                                                                                               | P: 99, 103A<br>C: 106A                                          | -                | 1 EA                    | 15%                            | \$28,000                      |
| 107                     | Year 11 to 20 | Parallel Sewer along Butler Market                  | Hydraulic Capacity            | Gravity Pipe              | Parallel 8-inch gravity pipe along Butler Market Road between Rungay Lane and Brinson Boulevard, connecting to existing 8-inch pipe southwest of Butler Market Road and Tiffany Lane.                                                                                                                                                                         | -                                                               | 8-inch           | 200 LF                  | 54%                            | \$47,000                      |
| 108                     | Year 11 to 20 | Parallel Sewer along Purcell Boulevard              | Hydraulic Capacity            | Gravity Pipe              | Parallel 8-inch gravity pipe along Highway 20 between Dean Swift Road to Purcell Boulevard, then along Purcell Boulevard to Paula Drive, connecting to existing 8-inch pipe at the intersection.                                                                                                                                                              | -                                                               | 8-inch           | 2,200 LF                | 46%                            | \$555,000                     |
| 109A                    | Year 11 to 20 | Parallel Sewer along 4th Street                     | Hydraulic Capacity            | Gravity Pipe              | Parallel 8-inch gravity pipe along 4th Street between Emerson Avenue and Franklin Avenue, connecting to existing 8-inch pipe at Franklin Avenue and 4th Street.                                                                                                                                                                                               | -                                                               | 8-inch           | 400 LF                  | 80%                            | \$95,000                      |
| 109B                    | Year 11 to 20 | Parallel Sewer along Alley South of Franklin Avenue | Hydraulic Capacity            | Gravity Pipe              | Parallel 8-inch gravity pipe between 3rd Street and 4th Street, then along an alley north of Emerson Avenue, connecting to existing 27-inch pipe south of Franklin Avenue and 2nd Avenue intersection at manhole CMH008162.                                                                                                                                   | -                                                               | 8-inch           | 700 LF                  | 69%                            | \$177,000                     |
| 110                     | Year 11 to 20 | Pheasant Run Lift Station Hydraulic Replacement     | Hydraulic Capacity            | Lift Station Replacement  | Replacement of existing facility with a new lift station to accommodate upgrades in capacity. Project includes new pumps, piping, electrical and control equipment, standby generator for back-up power, odor control equipment, wet or dry well, liquid level monitoring, pressure monitoring, flow monitoring, bypass pumping port and telemetry equipment. | -                                                               | -                | 190 gpm                 | 16%                            | \$553,000                     |
| 111                     | Year 11 to 20 | Shevlin Commons Lift Station Hydraulic Replacement  | Hydraulic Capacity            | Lift Station Replacement  | Replacement of existing facility with a new lift station to accommodate upgrades in capacity. Project includes new pumps, piping, electrical and control equipment, standby generator for back-up power, odor control equipment, wet or dry well, liquid level monitoring, pressure monitoring, flow monitoring, bypass pumping port and telemetry equipment. | -                                                               | -                | 110 gpm                 | 75%                            | \$726,000                     |

| Project ID <sup>1</sup> | Timeframe     | Project Name                                            | Project Category <sup>2</sup> | Type of Improvement  | Description <sup>3</sup>                                                                                                                                     | Required Preceding (P) and Concurrent (C) Projects <sup>4</sup> | Recommended Size | Unit, Length, HP or gpm | Growth Allocation <sup>5</sup> | Project Estimate <sup>6</sup> |
|-------------------------|---------------|---------------------------------------------------------|-------------------------------|----------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------|------------------|-------------------------|--------------------------------|-------------------------------|
| 112                     | Year 11 to 20 | Shevlin Meadows Lift Station Hydraulic Upgrade          | Hydraulic Capacity            | Lift Station Upgrade | Upgrade of mechanical pumping and/or electrical components to accommodate increased hydraulic capacity requirements.                                         | -                                                               | -                | 170 gpm                 | 40%                            | \$345,000                     |
| 113                     | Year 11 to 20 | Bachelor Village Lift Station Condition Upgrade         | Improve Condition             | Lift Station Upgrade | Rehabilitation and, where required, replacement of deteriorating lift station components where O&M Department condition assessment indicated poor condition. | -                                                               | -                | 1 EA                    | 0%                             | \$345,000                     |
| 114                     | Year 11 to 20 | Deschutes River Crossing Lift Station Condition Upgrade | Improve Condition             | Lift Station Upgrade | Rehabilitation and, where required, replacement of deteriorating lift station components where O&M Department condition assessment indicated poor condition. | -                                                               | -                | 1 EA                    | 0%                             | \$345,000                     |
| 115                     | Year 11 to 20 | Foxborough Lift Station Condition Upgrade               | Improve Condition             | Lift Station Upgrade | Rehabilitation and, where required, replacement of deteriorating lift station components where O&M Department condition assessment indicated poor condition. | -                                                               | -                | 1 EA                    | 0%                             | \$345,000                     |
| 116                     | Year 11 to 20 | Glen Vista Lift Station Condition Upgrade               | Improve Condition             | Lift Station Upgrade | Rehabilitation and, where required, replacement of deteriorating lift station components where O&M Department condition assessment indicated poor condition. | -                                                               | -                | 1 EA                    | 0%                             | \$345,000                     |
| 117                     | Year 11 to 20 | Hollow Pines #1 Lift Station Condition Upgrade          | Improve Condition             | Lift Station Upgrade | Rehabilitation and, where required, replacement of deteriorating lift station components where O&M Department condition assessment indicated poor condition. | -                                                               | -                | 1 EA                    | 0%                             | \$345,000                     |
| 118                     | Year 11 to 20 | Linster Lift Station Condition Upgrade                  | Improve Condition             | Lift Station Upgrade | Rehabilitation and, where required, replacement of deteriorating lift station components where O&M Department condition assessment indicated poor condition. | -                                                               | -                | 1 EA                    | 0%                             | \$345,000                     |
| 119                     | Year 11 to 20 | Main Fire Station Lift Station Condition Upgrade        | Improve Condition             | Lift Station Upgrade | Rehabilitation and, where required, replacement of deteriorating lift station components where O&M Department condition assessment indicated poor condition. | -                                                               | -                | 1 EA                    | 0%                             | \$100,000                     |
| 120                     | Year 11 to 20 | N. Fire Station Lift Station Condition Upgrade          | Improve Condition             | Lift Station Upgrade | Rehabilitation and, where required, replacement of deteriorating lift station components where O&M Department condition assessment indicated poor condition. | -                                                               | -                | 1 EA                    | 0%                             | \$100,000                     |
| 121                     | Year 11 to 20 | Orion Greens Lift Station Condition Upgrade             | Improve Condition             | Lift Station Upgrade | Rehabilitation and, where required, replacement of deteriorating lift station components where O&M Department condition assessment indicated poor condition. | -                                                               | -                | 1 EA                    | 0%                             | \$345,000                     |

| Project ID <sup>1</sup> | Timeframe     | Project Name                                   | Project Category <sup>2</sup> | Type of Improvement  | Description <sup>3</sup>                                                                                                                                                       | Required Preceding (P) and Concurrent (C) Projects <sup>4</sup> | Recommended Size | Unit, Length, HP or gpm | Growth Allocation <sup>5</sup> | Project Estimate <sup>6</sup> |
|-------------------------|---------------|------------------------------------------------|-------------------------------|----------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------|------------------|-------------------------|--------------------------------|-------------------------------|
| 122                     | Year 11 to 20 | Pine Ridge Lift Station Condition Upgrade      | Improve Condition             | Lift Station Upgrade | Rehabilitation and, where required, replacement of deteriorating lift station components where O&M Department condition assessment indicated poor condition: pumps and motors. | -                                                               | -                | 1 EA                    | 0%                             | \$345,000                     |
| 123                     | Year 11 to 20 | Renaissance Lift Station Condition Upgrade     | Improve Condition             | Lift Station Upgrade | Rehabilitation and, where required, replacement of deteriorating lift station components where O&M Department condition assessment indicated poor condition: pumps and motors. | -                                                               | -                | 1 EA                    | 0%                             | \$345,000                     |
| 124                     | Year 11 to 20 | Rim Rock Riders Lift Station Condition Upgrade | Improve Condition             | Lift Station Upgrade | Rehabilitation and, where required, replacement of deteriorating lift station components where O&M Department condition assessment indicated poor condition: pumps and motors. | -                                                               | -                | 1 EA                    | 0%                             | \$345,000                     |
| 125                     | Year 11 to 20 | River Canyon #1 Lift Station Condition Upgrade | Improve Condition             | Lift Station Upgrade | Rehabilitation and, where required, replacement of deteriorating lift station components where O&M Department condition assessment indicated poor condition.                   | -                                                               | -                | 1 EA                    | 0%                             | \$345,000                     |
| 126                     | Year 11 to 20 | Riviera Lift Station Condition Upgrade         | Improve Condition             | Lift Station Upgrade | Rehabilitation and, where required, replacement of deteriorating lift station components where O&M Department condition assessment indicated poor condition.                   | -                                                               | -                | 1 EA                    | 0%                             | \$345,000                     |
| 127                     | Year 11 to 20 | Service Station Lift Station Condition Upgrade | Improve Condition             | Lift Station Upgrade | Rehabilitation and, where required, replacement of deteriorating lift station components where O&M Department condition assessment indicated poor condition: pumps and motors. | -                                                               | -                | 1 EA                    | 0%                             | \$345,000                     |
| 128                     | Year 11 to 20 | Sunrise #1 Lift Station Condition Upgrade      | Improve Condition             | Lift Station Upgrade | Rehabilitation and, where required, replacement of deteriorating lift station components where O&M Department condition assessment indicated poor condition: rail system.      | -                                                               | -                | 1 EA                    | 0%                             | \$345,000                     |
| 129                     | Year 11 to 20 | Touchmark Lift Station Condition Upgrade       | Improve Condition             | Lift Station Upgrade | Rehabilitation and, where required, replacement of deteriorating lift station components where O&M Department condition assessment indicated poor condition: pumps and motors. | -                                                               | -                | 1 EA                    | 0%                             | \$345,000                     |
| 130                     | Year 11 to 20 | Tumalo Heights Lift Station Condition Upgrade  | Improve Condition             | Lift Station Upgrade | Rehabilitation and, where required, replacement of deteriorating lift station components where O&M Department condition assessment indicated poor condition: pumps and motors. | -                                                               | -                | 1 EA                    | 0%                             | \$345,000                     |

| Project ID <sup>1</sup> | Timeframe     | Project Name                                                    | Project Category <sup>2</sup> | Type of Improvement  | Description <sup>3</sup>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Required Preceding (P) and Concurrent (C) Projects <sup>4</sup> | Recommended Size | Unit, Length, HP or gpm | Growth Allocation <sup>5</sup> | Project Estimate <sup>6</sup> |
|-------------------------|---------------|-----------------------------------------------------------------|-------------------------------|----------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------|------------------|-------------------------|--------------------------------|-------------------------------|
| 131                     | Year 11 to 20 | Westside Lift Station Condition Upgrade                         | Improve Condition             | Lift Station Upgrade | Rehabilitation and, where required, replacement of deteriorating lift station components where O&M Department condition assessment indicated poor condition. This lift station is the largest in the system and due to site constraints and size, it will be expensive to upgrade.                                                                                                                                                                                                                                                                                                                                 | -                                                               | -                | 1 EA                    | 0%                             | \$1,000,000                   |
| 132                     | Year 11 to 20 | Woodriver Village Lift Station Condition Upgrade                | Improve Condition             | Lift Station Upgrade | Rehabilitation and, where required, replacement of deteriorating lift station components where O&M Department condition assessment indicated poor condition.                                                                                                                                                                                                                                                                                                                                                                                                                                                       | -                                                               | -                | 1 EA                    | 0%                             | \$345,000                     |
| 133                     | Year 11 to 20 | Wyndemere Lift Station Condition Upgrade                        | Improve Condition             | Lift Station Upgrade | Rehabilitation and, where required, replacement of deteriorating lift station components where O&M Department condition assessment indicated poor condition.                                                                                                                                                                                                                                                                                                                                                                                                                                                       | -                                                               | -                | 1 EA                    | 0%                             | \$345,000                     |
| 134                     | Year 11 to 20 | On-Call Hydraulic Modeling Services                             | Miscellaneous Project         | -                    | Engineering services contract, tailored to meet the City's future need of updating the sewer model, adjusting calibration, or answering specific system operational questions. Funding level is \$100,000 per year. City Project ID SW111CA.                                                                                                                                                                                                                                                                                                                                                                       | -                                                               | -                | -                       | 0%                             | \$1,000,000                   |
| 135                     | Year 11 to 20 | Collection System Master Plan Update                            | Miscellaneous Project         | -                    | Engineering services contract to update the current Master Plan, document changes in the system, update the system analysis and CIP. The update will ensure the City is utilizing up-to-date and accurate information regarding the condition of the collection system, flow projections and applicable regulations.                                                                                                                                                                                                                                                                                               | -                                                               | -                | -                       | 0%                             | \$1,000,000                   |
| 136                     | Year 11 to 20 | Large Gravity Pipe Condition Assessment Program - Year 11 to 20 | Miscellaneous Project         | -                    | Establish a program to inspect the condition of existing gravity trunk collection system with diameters greater than 15 inches (approximately 4% of the collection system), grade the trunk system components, evaluate rehabilitation options and recommend the most effective solution. This type of inspection requires different equipment than is currently owned by the O&M Department and the budget is for the City to hire a consultant to assist with this project. This project does not include condition assessment of the Plant Interceptor or Inverted Siphon. Funding level is \$200,000 per year. | -                                                               | -                | -                       | 0%                             | \$2,000,000                   |

| Project ID <sup>1</sup> | Timeframe     | Project Name                   | Project Category <sup>2</sup>     | Type of Improvement | Description <sup>3</sup>                                                                                                                                                                                                                                                                                                                                                     | Required Preceding (P) and Concurrent (C) Projects <sup>4</sup> | Recommended Size | Unit, Length, HP or gpm | Growth Allocation <sup>5</sup> | Project Estimate <sup>6</sup> |
|-------------------------|---------------|--------------------------------|-----------------------------------|---------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------|------------------|-------------------------|--------------------------------|-------------------------------|
| H                       | Year 11 to 20 | Ongoing Repair and Replacement | Fund Ongoing Repair & Replacement | -                   | Fund for implementing long term ongoing repair and replacement budget to address condition-related projects in the future. Specific details, including alignment, pipe sizes have not yet been determined.                                                                                                                                                                   | -                                                               | -                | -                       | 0%                             | \$27,070,000                  |
| I                       | Year 11 to 20 | Local Area Improvements        | Fund Local Area Improvements      | -                   | Budget to develop a plan for implementing local area sewer improvements in the system. These areas include currently unsewered customers (septic) and areas that have poorly performing systems. Funding level is \$1,000,000 per year. Specific details, including pipe alignments, pipe sizes, service areas, and timetable for construction have not yet been determined. | -                                                               | -                | -                       | 0%                             | \$10,000,000                  |

<sup>1</sup> Project ID: The majority of proposed projects are comprised of multiple components. Project IDs are differentiated for gravity piping, force mains and lift stations. In the optimization process, modeled components were segmented at connection points, or where hydraulically distinctive (e.g., a change in slope or diameter). The Southeast Interceptor is the exception, as this major project has been modeled and optimized "as designed" with a project ID associated with each manhole-to-manhole segment.

<sup>2</sup> Project Category: Individual projects fall under the following main categories: Hydraulic Capacity, Improve Condition, Fund Ongoing Repair and Replacement, Fund Local Area Improvements and Miscellaneous Projects.

<sup>3</sup> Description: Where applicable, an identified flow value is measured at a particular manhole associated with the requirement for a specific improvement to be in place and operational. Long-term flow monitoring locations have been identified throughout the system, some of which will be used to "trigger" the design and construction of specific improvements. Flow trigger locations focus on projects that are scheduled to occur beyond the 1- to 5- year timeframe.

<sup>4</sup> Required Preceding and Concurrent Projects: The dependence between projects identifies where one project relies on another to function correctly. Generally, projects listed under Dependence are required prior to or concurrently with the project in question. For example, the Southeast Interceptor Phase 1 gravity connection at Mary Rose Place is required in order for the overall project to work correctly.

<sup>5</sup> Growth Allocation: The portion of the project is required due to growth (and the consequent increased flow within the existing UGB versus existing deficiencies based on existing flow within the UGB). The growth allocation factors into the rate and SDC calculations. For example, projects required due to higher growth will be funded with greater percentage of SDC resources. This is defined as:  $1 - (\text{Peak Dry Existing Flow} / \text{Peak Dry 20-Year Flow})$ .

<sup>6</sup> Cost: Project Estimates are based on the type and size of projects identified in the CSMP as required to convey 20-year flow within the existing UGB. Project Estimates were prepared in accordance with the guidelines of American Association of Cost Engineers (AACE) International Class 5 Estimate, with a typical accuracy of -30% to +50%. Project Estimates are based on 2013 dollars and include design (unless noted otherwise) and construction and site-specific information as described in Section 5 - Project Unit Costs and Cost Analysis.

General note: The proposed locations of all public sewer facilities in Section 7 of the CSMP and in this table are based on conceptual data available at the time the CSMP was prepared. The actual location, routing, type or size of any public sewer facility may vary from what is shown, because of actual physical conditions, the timing of development, the availability or cost of rights of way or easements, final engineering design consideration or other similar reasons.

To the extent any planned future sewer improvement is shown on private property, the location is only approximate and does not constrain or limit development on that property. If property is developed before the planned sewer improvement is constructed, the design of the sewer improvement shall avoid conflicts with the development where possible.

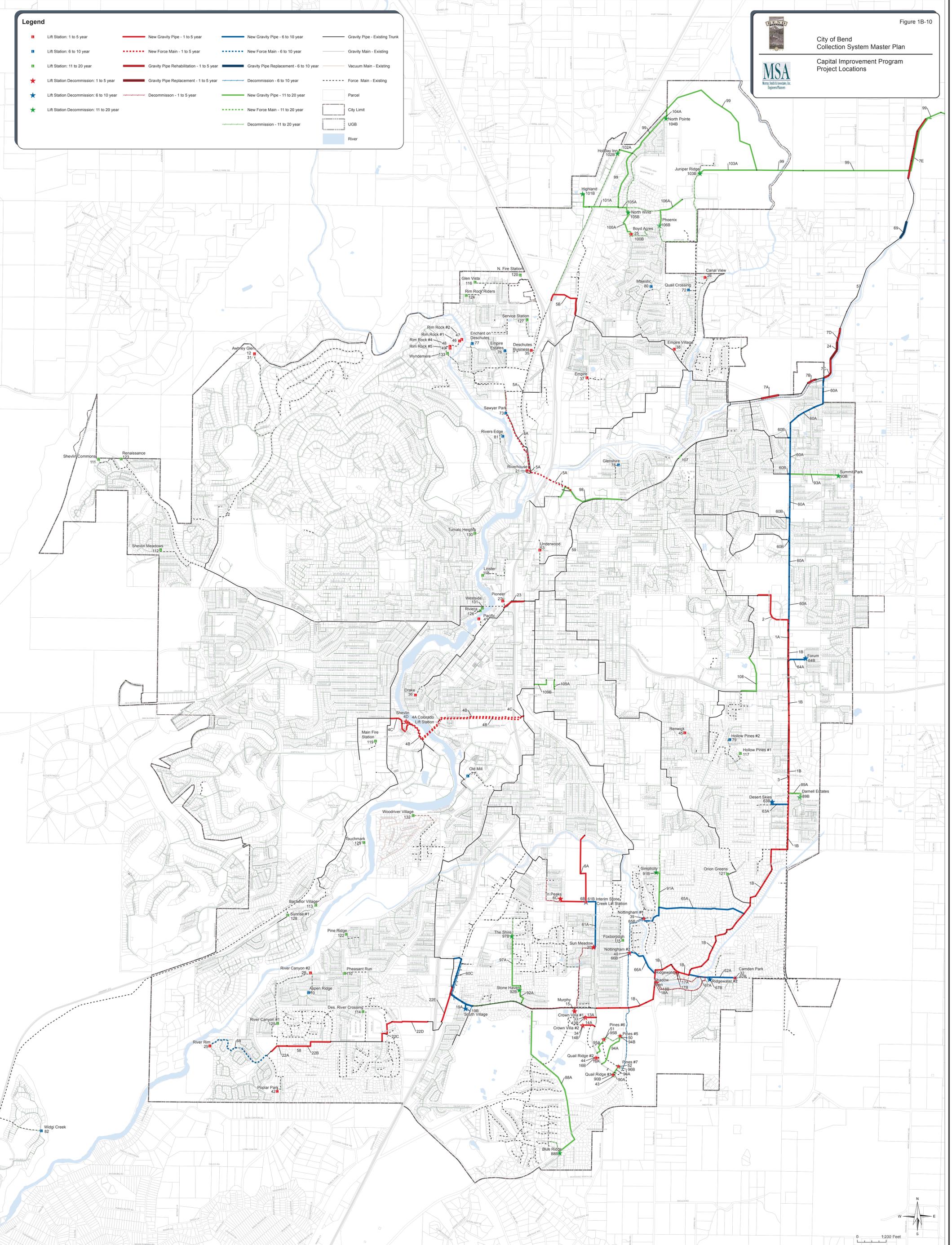
The location of any public sewer facilities outside the UGB is intended only to provide or facilitate service within the UGB. No new connection that allows for service outside the UGB shall be constructed except for new connections to areas where the City already provides service, as described in the CSMP.



City of Bend  
Collection System Master Plan  
Capital Improvement Program  
Project Locations

**Legend**

|                                            |                                             |                                           |                                 |
|--------------------------------------------|---------------------------------------------|-------------------------------------------|---------------------------------|
| ■ Lift Station: 1 to 5 year                | — New Gravity Pipe - 1 to 5 year            | — New Gravity Pipe - 6 to 10 year         | — Gravity Pipe - Existing Trunk |
| ■ Lift Station: 6 to 10 year               | — New Force Main - 1 to 5 year              | — New Force Main - 6 to 10 year           | — Gravity Main - Existing       |
| ■ Lift Station: 11 to 20 year              | — Gravity Pipe Rehabilitation - 1 to 5 year | — Gravity Pipe Replacement - 6 to 10 year | — Vacuum Main - Existing        |
| ★ Lift Station Decommission: 1 to 5 year   | — Gravity Pipe Replacement - 1 to 5 year    | — Decommission - 6 to 10 year             | — Force Main - Existing         |
| ★ Lift Station Decommission: 6 to 10 year  | — Decommission - 1 to 5 year                | — New Gravity Pipe - 11 to 20 year        | □ Parcel                        |
| ★ Lift Station Decommission: 11 to 20 year | — New Force Main - 11 to 20 year            | — Decommission - 11 to 20 year            | □ City Limit                    |
|                                            |                                             |                                           | □ UGB                           |
|                                            |                                             |                                           | □ River                         |



## **OAR 660-11-0010(1)(g) Provider Funding**

The Provider's (City) overall funding strategy includes the wastewater collection system and water reclamation facility (WRF), collectively referred to from here forward as the water reclamation utility (Utility).

The City's goal is to have a self-supported Utility, with total resources (rates and fees) set at a sufficient level to meet annual uses (operations, maintenance, debt service, capital costs and fiscal policy achievement). This self-supported Utility's primary funding source is derived from ongoing monthly charges for service, with additional revenue from miscellaneous fees and charges, interest income, and system development charges (SDCs). The City Council controls and approves the level of user charges as needed to meet financial objectives.

The City's funding strategy reflects the cumulative efforts of City staff, SIAG, engineering consultants and financial consultants. Although the CSMP is focused on the collection system, this funding strategy applies to the Utility as a whole. The City has chosen to account for wastewater cash flows in a single fund (the Water Reclamation Fund) and to charge a single set of rates for wastewater services (as opposed to separate rates for collection and treatment).

The overall funding strategy is detailed in the following financial plan.

### **Financial Plan**

The overall goal of the financial plan is to have the annual Utility total resources (rates and fees) set at a sufficient level to meet annual uses (O&M, debt service, capital costs and fiscal policy achievement). This helps ensure a self-supported Utility.

The primary source of funding for the Utility is derived from ongoing monthly charges for service, additional revenue from miscellaneous fees and charges, interest income, and system development charges (SDCs). The City Council controls and approves the level of user charges as needed to meet financial objectives.

The financial plan ultimately evaluates the sufficiency of Utility revenues in meeting all obligations, including cash uses such as the following:

- O&M.
- Debt service.
- Capital outlays for vehicles and equipment.
- Reserve contributions.
- Coverage requirements associated with long-term debt.

## **Current Financial Structure**

The City accounts for most cash flows related to the Utility in its Water Reclamation Fund. The one exception is that the City accounts for the collection and expenditure of SDCs in its System Development Charges Fund.

## **Fiscal Policies and Other Constraints**

Reserves are among the most important constraints that a financial strategy must meet. Whether because of policy or contract, the City's Utility must maintain multiple reserves.

Operating reserves are a policy-based requirement to maintain at least 90 days of operating expenditures in the ending fund balance of the Water Reclamation Fund.

Debt reserves are a contractually based requirement to maintain at least one year of debt service for all outstanding revenue bond debt.

Capital reserves are not a policy-based requirement at this time. However, SIAG recommended that the City accumulate \$1 million per year (before inflation, in 2013 dollars) for local area improvements and begin setting funds aside for the ongoing repair and replacement of the sewer system.

In addition to required reserves, a minimum debt service coverage ratio is also a constraint in this plan. This ratio is calculated by dividing net revenues (operating revenues less operating expenditures) by annual debt service.

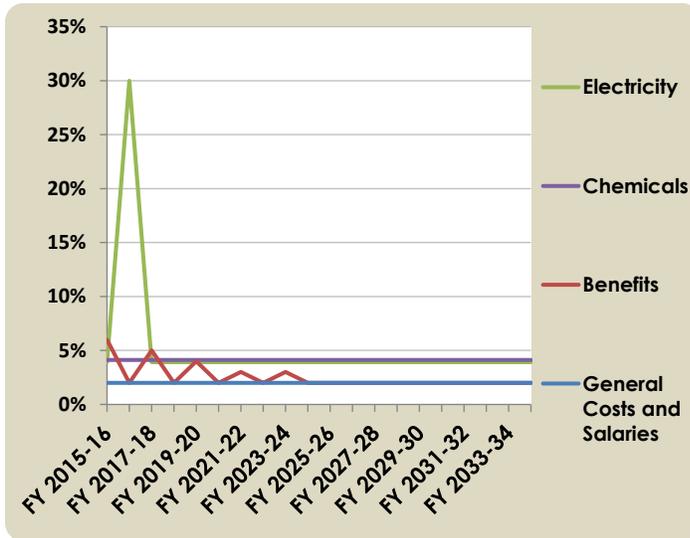
In order to best position itself to issue needed debt, the City has elected to maintain a minimum debt service coverage ratio of 1.75 for revenue bonds and 1.10 for total debt. Maintaining minimum debt service coverage ratios higher than contractually required minimizes the cost of future borrowing.

## **Operating Costs**

The City provided both a detailed operating budget for fiscal year 2014-15 and input on how those expenditures would likely escalate in future years. From that input, specific escalation rates were calculated and used to develop detailed projections of operating expenditures.

Figure 1B-11 summarizes these escalation rates for a period of 20 years beyond the 2013-2014 fiscal year:

**Figure 1B-11  
Cost Escalation Rates**



The large biennial increases in benefit cost escalation reflect expected increases in employer contributions to the Public Employees Retirement System. These employer contribution rates are adjusted every two years. It is expected that these adjustments will attenuate over time. By fiscal year 2024-25, escalation for both salaries and benefits should converge at 2% per year.

The large increase in electricity cost beginning in fiscal year 2016-17 reflects significant improvements at the WRF becoming operational.

### Capital Costs

The capital expenditures detailed in Section 8 of the CSMP are based on the CIP developed as part of the master plan and in conjunction with SIAG. Each improvement project is detailed in the CSMP’s Section 7 and that section’s appendices, including information as to why each improvement is needed and when it should be implemented. An inflation rate provided by City staff was applied to these planned expenditures.

These improvement projects will be financed from the following resources:

- New debt, including both revenue bonds and loans from the Oregon Department of Environmental Quality (DEQ).
- SDCs.
- Sewer rates and fund balance.

## Projected Revenue Requirements

The revenue requirement analysis forecasts the amount of annual revenue that needs to be generated by user rates. The analysis incorporates operating revenues, O&M, debt service payments, rate-funded capital needs, and any other identified revenues or expenses related to operations. The objective of the financial forecast is to evaluate the sufficiency of the current level of rates. The revenue needs also include debt-covenant requirements and specific fiscal policies and financial goals of the City. The analysis determines the amount of revenue needed in a given year to meet that year's expected financial obligations.

Table 1B-23 summarizes the calculation of the rate revenue requirement for the first five years of this financial plan:

**Table 1B-23  
Required Rate Revenues**

| <b>Revenues</b>                             | <b>FY 2014-15</b> | <b>FY 2015-16</b> | <b>FY 2016-17</b> | <b>FY 2017-18</b> | <b>FY 2018-19</b> |
|---------------------------------------------|-------------------|-------------------|-------------------|-------------------|-------------------|
| Rate Revenue Under Existing Rates           | \$18,044,000      | \$18,295,000      | \$18,549,000      | \$18,807,000      | \$19,068,000      |
| Non-Rate Revenues                           | \$703,000         | \$897,000         | \$836,000         | \$693,000         | \$787,000         |
| Total Revenues                              | \$18,747,000      | \$19,192,000      | \$19,385,000      | \$19,500,000      | \$19,855,000      |
| <b>Expenditures</b>                         | <b>FY 2014-15</b> | <b>FY 2015-16</b> | <b>FY 2016-17</b> | <b>FY 2017-18</b> | <b>FY 2018-19</b> |
| Cash Operating Expenses                     | \$11,432,000      | \$13,202,000      | \$12,720,000      | \$12,672,000      | \$13,286,000      |
| Existing Debt Service                       | \$3,339,000       | \$3,333,000       | \$3,327,000       | \$3,031,000       | \$3,000,000       |
| New Debt Service                            | \$2,974,000       | \$5,265,000       | \$6,674,000       | \$7,251,000       | \$8,231,000       |
| Total Expenditures                          | \$17,745,000      | \$21,800,000      | \$22,721,000      | \$22,954,000      | \$24,517,000      |
| Net Surplus (Deficiency)                    | \$1,002,000       | \$(2,608,000)     | \$(3,336,000)     | \$(3,454,000)     | \$(4,662,000)     |
| Deficiency As Proportion of Rate Revenue    | 0.00%             | 14.26%            | 17.98%            | 18.37%            | 24.45%            |
| Annual Rate Adjustment                      | 9.00%             | 3.00%             | 3.00%             | 3.00%             | 3.00%             |
| Cumulative Rate Adjustment                  | 9.00%             | 12.00%            | 16.00%            | 19.00%            | 23.00%            |
| Rate Revenue After Rate Increase            | \$19,127,000      | \$20,508,000      | \$21,438,000      | \$22,409,000      | \$23,425,000      |
| Net Cash Flow After Rate Increase           | \$2,085,000       | \$(395,000)       | \$(447,000)       | \$148,000         | \$(305,000)       |
| Coverage After Rate Increase, Revenue Bonds | 4.30              | 2.59              | 2.04              | 1.96              | 1.92              |
| Coverage After Rate Increase, All Debt      | 1.66              | 1.26              | 1.14              | 1.18              | 1.18              |

*General note: FY = fiscal year (July 1 through June 30).*

The rate strategy developed with City staff and SIAG implements a higher initial rate increase, followed by consistent increases for the remaining years. An initial 9% rate increase was approved by the City Council for implementation October 1, 2014. Inflationary rate increases in the range of 3% to 5% per year are needed thereafter to build the debt capacity that will be needed to fund the Utility.

## **Current and Projected Rates**

The principal objective of the rate design stage is to implement rate structures that collect the appropriate level of revenue as outlined by the revenue requirement.

### ***Current Rates***

Rates for water reclamation can be found in section 5.2 of the City's fee resolution. Currently, residential customers inside the City pay a monthly rate of \$44.37 per dwelling unit, and residential customers outside the City pay a monthly rate of \$45.71 per dwelling unit. Non-residential customers (both inside and outside the City) pay both the monthly rate and an additional fee of \$3.48 for billed flow that exceeds 1,000 cubic feet.

The City Council approved a 9% rate increase, effective on October 1, 2014. All monthly rates (both fixed and volumetric) will increase uniformly by 9%. Residential customers inside the City will pay a monthly rate of \$48.36 per dwelling unit, and residential customers outside the City will pay a monthly rate of \$49.82 per dwelling unit.

Differences between rates inside and outside the City reflect different treatments of the 3% franchise fee. Inside the City, the franchise fee is a separate line item on a customer's bill and is not counted as rate revenue. Outside the City, where a franchise fee cannot be charged, a higher rate is charged to equalize the total cost to the customer.

### ***Projected Rates***

This financial strategy indicates that inflationary rate increases in the range of 3% to 5% per year will be needed for several years to meet the Utility rate revenue requirement. This projection assumes, among other things, that the customer base grows by 1.4% per year.

## **Affordability Analysis**

Affordability measures customers' abilities to pay their monthly utility bills. Often, affordability measures relate more to community-wide affordability. Typically, affordability is based upon the local community's median household income and the percentage of median household income dedicated to utility bills.

The City monitors the affordability of its sewer service by comparing the average residential bill (including franchise fee) with median household income. For a sewer utility, an affordability range can be 1.5% to 2.5% of median household income.

Table 1B-24 summarizes the affordability of residential sewer service for the first five years of this financial strategy:

**Table 1B-24  
Residential Rate Affordability**

| <b>User Fees, Income, &amp; Percentage</b>                    | <b>FY 2014-15</b> | <b>FY 2015-16</b> | <b>FY 2016-17</b> | <b>FY 2017-18</b> | <b>FY 2018-19</b> |
|---------------------------------------------------------------|-------------------|-------------------|-------------------|-------------------|-------------------|
| Annual Residential Bill (Inside City) Including Franchise Fee | \$598             | \$616             | \$635             | \$655             | \$675             |
| Median Household Income (Escalated by Expected Inflation)     | \$54,726          | \$55,821          | \$56,937          | \$58,076          | \$59,237          |
| Bill as Proportion of Median Household Income                 | 1.09%             | 1.10%             | 1.12%             | 1.13%             | 1.14%             |

*General notes: Source: U. S. Census Bureau, <http://quickfacts.census.gov/qfd/states/41/4105800.html> (data from 2008 through 2012).*

*FY = fiscal year (July 1 through June 30).*

The affordability analysis indicates the City’s rates are below the 1.5% affordability threshold for the five-year period. This does not preclude the possibility that the City’s rates may represent more than 1.5% of the household income for some individual households.

### **System Development Charges**

SDCs are one-time fees imposed on new and increased development to recover the cost of system facilities needed to serve that growth. An SDC can include two major components:

- A reimbursement fee that reflects the cost of existing infrastructure with capacity that is available to serve growth.
- An improvement fee that reflects the portion of the cost of future projects that is attributable to providing capacity for growth.

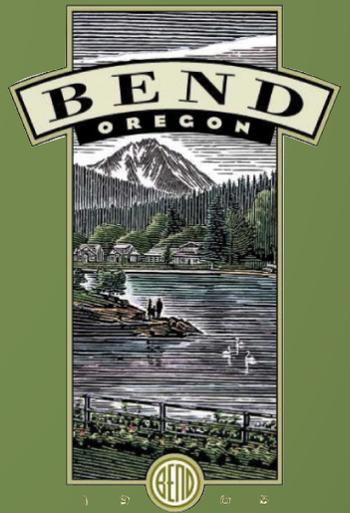
The financial strategy above assumes that the City’s sewer SDC remains at its current level of \$2,986 per equivalent dwelling unit. This plan further assumes that all available SDC revenue will be used to fund projects and thereby reducing the need for debt.

The City has recently initiated an SDC study that will have a separate public process. That process is expected to begin in late 2014 and be complete by June of 2015. It will incorporate all the new information contained in this plan to determine the appropriate SDC and its implementation.

## **Conclusion**

Based on rigorous financial analysis of the entire Utility and contingent upon the validity of key assumptions described herein, it has been concluded that the City can fund the recommendations of the updated CSMP, while meeting existing obligations and policy requirements, by taking the following steps:

- Implement the 9% rate increase that has already been adopted.
- Adopt and implement annual inflationary rate increases in the range of 3% to 5%.
- Draw down the Utility's fund balance over several years to mitigate the need to take on additional debt.
- Expend SDCs for projects whenever possible to mitigate the need to take on additional debt.
- Use debt to fund projects as necessary.



**MSA**  
MURRAY, SMITH & ASSOCIATES, INC.  
ENGINEERS|PLANNERS