Oregon
John A. Kitzhaber, M.D., Governor

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NOTICE OF ADOPTED CHANGE TO A COMPREHENSIVE PLAN OR LAND USE REGULATION

Date: 12/30/2014

Jurisdiction: City of Bend

Local file no.: 14-855

DLCD file no.: 008-14

The Department of Land Conservation and Development (DLCD) received the attached notice of adopted amendment to a comprehensive plan or land use regulation on 12/22/2014. A copy of the adopted amendment is available for review at the DLCD office in Salem and the local government office.

Notice of the proposed amendment was submitted to DLCD 39 days prior to the first evidentiary hearing.

Appeal Procedures

Eligibility to appeal this amendment is governed by ORS 197.612, ORS 197.620, and ORS 197.830. Under ORS 197.830(9), a notice of intent to appeal a land use decision to LUBA must be filed no later than 21 days after the date the decision sought to be reviewed became final. If you have questions about the date the decision became final, please contact the jurisdiction that adopted the amendment.

A notice of intent to appeal must be served upon the local government and others who received written notice of the final decision from the local government. The notice of intent to appeal must be served and filed in the form and manner prescribed by LUBA, (OAR chapter 661, division 10).

If the amendment is not appealed, it will be deemed acknowledged as set forth in ORS 197.625(1)(a). Please call LUBA at 503-373-1265, if you have questions about appeal procedures.

DLCD Contact

If you have questions about this notice, please contact DLCD's Plan Amendment Specialist at 503-934-0017 or plan.amendments@state.or.us

DLCD FORM 2

NOTICE OF ADOPTED CHANGE TO A COMPREHENSIVE PLAN OR LAND USE REGULATION

FOR DLCD USE
File No.: 008-14 {22496}
Received: 12/22/2014

Local governments are required to send notice of an adopted change to a comprehensive plan or land use regulation **no more than 20 days after the adoption**. (*See* OAR 660-018-0040). The rules require that the notice include a completed copy of this form. **This notice form is not for submittal of a completed periodic review task or a plan amendment reviewed in the manner of periodic review.** Use Form 4 for an adopted urban growth boundary including over 50 acres by a city with a population greater than 2,500 within the UGB or an urban growth boundary amendment over 100 acres adopted by a metropolitan service district. Use Form 5 for an adopted urban reserve designation, or amendment to add over 50 acres, by a city with a population greater than 2,500 within the UGB. Use Form 6 with submittal of an adopted periodic review task.

Jurisdiction: City of Bend

Local file no.: **14-855**

Date of adoption: 12/17/2014 Date sent: 12/22/2014

Was Notice of a Proposed Change (Form 1) submitted to DLCD?
Yes: Date (use the date of last revision if a revised Form 1was submitted): 10/03/2014
No

Is the adopted change different from what was described in the Notice of Proposed Change? Yes No
If yes, describe how the adoption differs from the proposal:

Local contact (name and title): Wendy Robinson, SR. Planner

Phone: 541-388-5598 E-mail: wrobinson@bendoregon.gov

Street address: 710 NW Wall Street City: Bend Zip: 97701-

PLEASE COMPLETE ALL OF THE FOLLOWING SECTIONS THAT APPLY

For a change to comprehensive plan text:
Identify the sections of the plan that were added or amended and which statewide planning goals those sections implement, if any:

Chapter 8 , Public Facilities and Services to adopt a Collection System Public Facility Plan - Goal 11

For a change to a comprehensive plan map:
Identify the former and new map designations and the area affected:

Change from to acres. A goal exception was required for this change.

Change from to acres. A goal exception was required for this change.

Change from to acres. A goal exception was required for this change.

Change from to acres. A goal exception was required for this change.

Location of affected property (T, R, Sec., TL and address):

The subject property is entirely within an urban growth boundary

The subject property is partially within an urban growth boundary

If the comprehensive plan map change is a UGB amendment including less than 50 acres and/or by a city with a population less than 2,500 in the urban area, indicate the number of acres of the former rural plan designation, by type, included in the boundary.

Exclusive Farm Use – Acres:	Non-resource – Acres:
Forest – Acres:	Marginal Lands – Acres:
Rural Residential – Acres:	Natural Resource/Coastal/Open Space – Acres:
Rural Commercial or Industrial – Acres:	Other: – Acres:

If the comprehensive plan map change is an urban reserve amendment including less than 50 acres, or establishment or amendment of an urban reserve by a city with a population less than 2,500 in the urban area, indicate the number of acres, by plan designation, included in the boundary.

Exclusive Farm Use – Acres:	Non-resource – Acres:
Forest – Acres:	Marginal Lands – Acres:
Rural Residential – Acres:	Natural Resource/Coastal/Open Space – Acres:
Rural Commercial or Industrial – Acres:	Other: – Acres:

For a change to the text of an ordinance or code:
Identify the sections of the ordinance or code that were added or amended by title and number:

For a change to a zoning map:
Identify the former and new base zone designations and the area affected:

Change from	to	Acres:
Change from	to	Acres:
Change from	to	Acres:
Change from	to	Acres:

Identify additions to or removal from an overlay zone designation and the area affected:

Overlay zone designation:	Acres added:	Acres removed:

Location of affected property (T, R, Sec., TL and address):

List affected state or federal agencies, local governments and special districts:

Identify supplemental information that is included because it may be useful to inform DLCD or members of the public of the effect of the actual change that has been submitted with this Notice of Adopted Change, if any. If the submittal, including supplementary materials, exceeds 100 pages, include a summary of the amendment briefly describing its purpose and requirements.

Adopting Ordinance NS - 2231 and Exhibits A & B

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

EXHIBIT A

Bend Area General Plan

Chapter 8: Public Facilities and Services

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- 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

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;

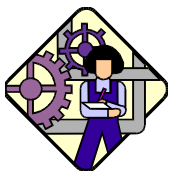
For new development to pay its fair share of the cost of major facilities needed to support development;

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.

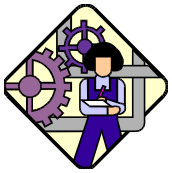
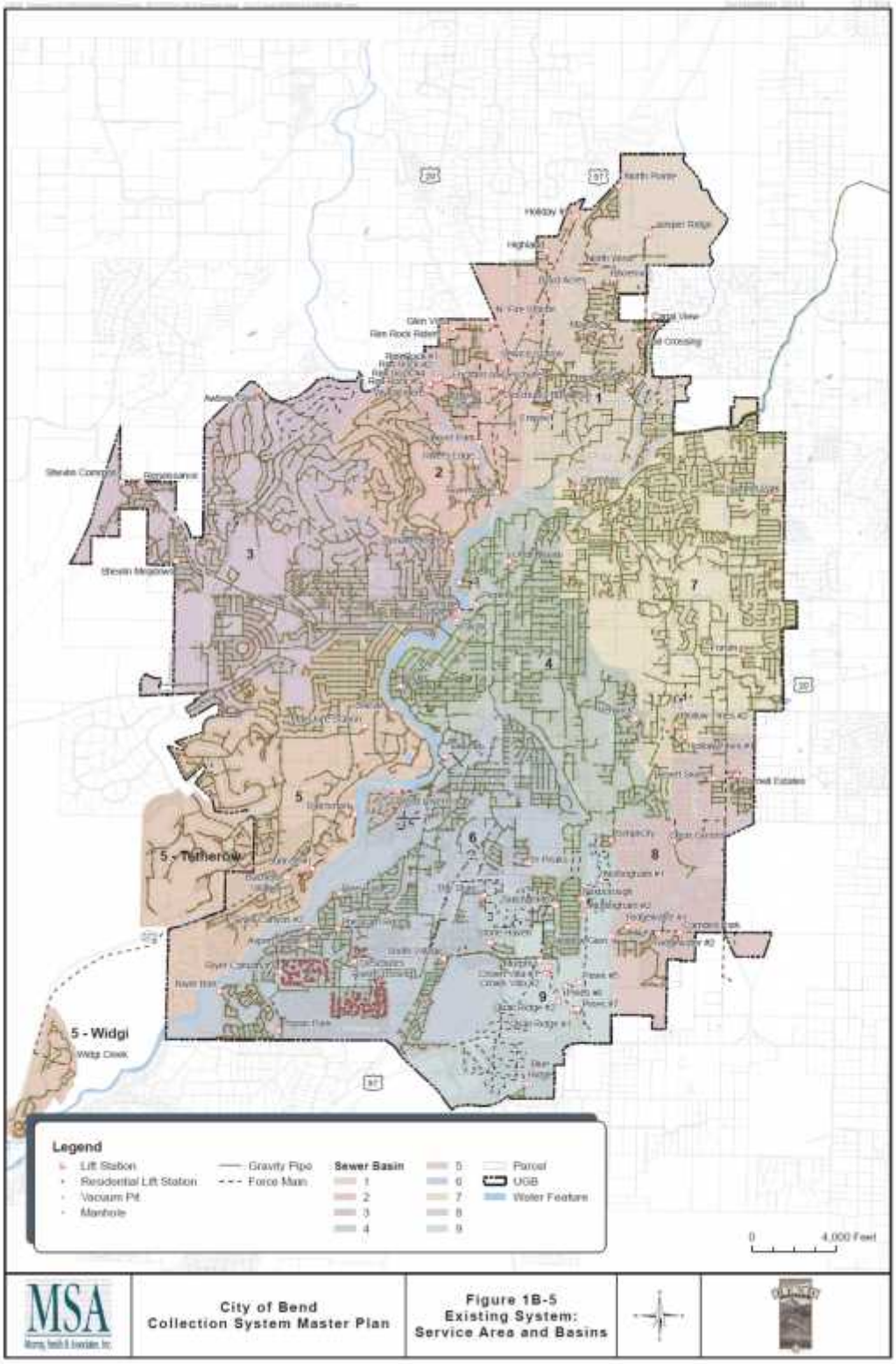


Figure 8-1
Existing System Service Are and Basins



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 wasterwater 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

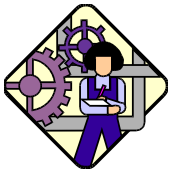
Year Average Daily Flow	Year Average Daily Flow
2007	5.4[1]
2008	7.2[2]
2009	5.6
2010	5.5
2011	5.3
2012	5.4
2013	5.9[1]

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



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

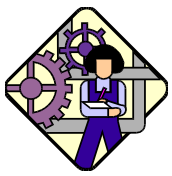
The Capital Improvement Program (CIP) describes proposed improvements that are required in both the short-term (1-5 year) and long-term (6 to 10 years and 11 to 20 years) to provide reliable sewer collection throughout the City's current UGB.

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.

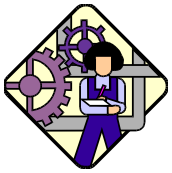
The overall goal of the financial plan is to have the annual water reclamation utility total resources (rates and fees) set at a sufficient level to meet annual uses (operations, maintenance, debt service, capital costs and fiscal policy achievement) to ensure a self-supported utility. The primary source 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.



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:

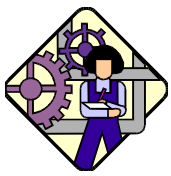
- A reimbursement fee that reflects the cost of existing infrastructure with capacity that is available to serve growth
- An improvement fee that reflects the portion of the cost of future projects that is attributable to providing capacity for growth.

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.

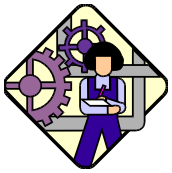


Figure 8-2

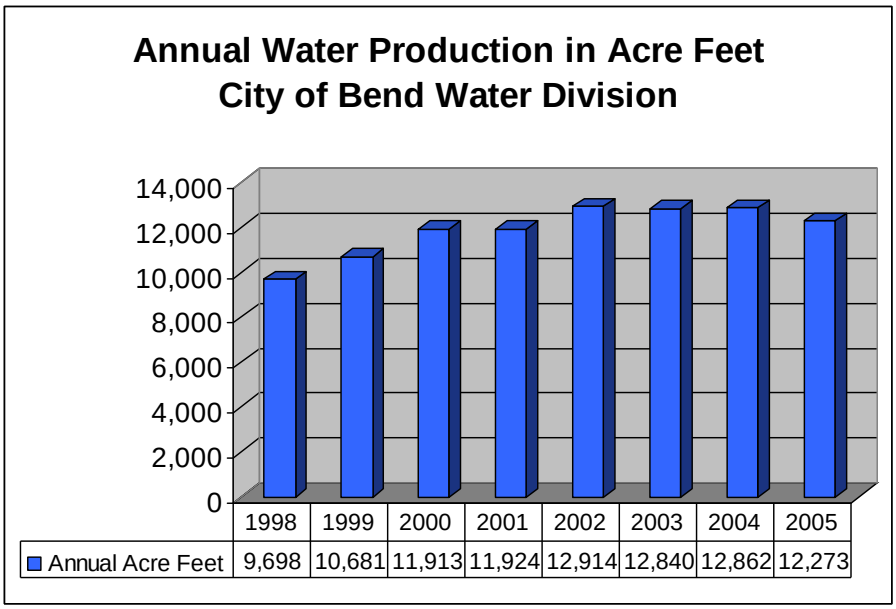


Figure 8-3

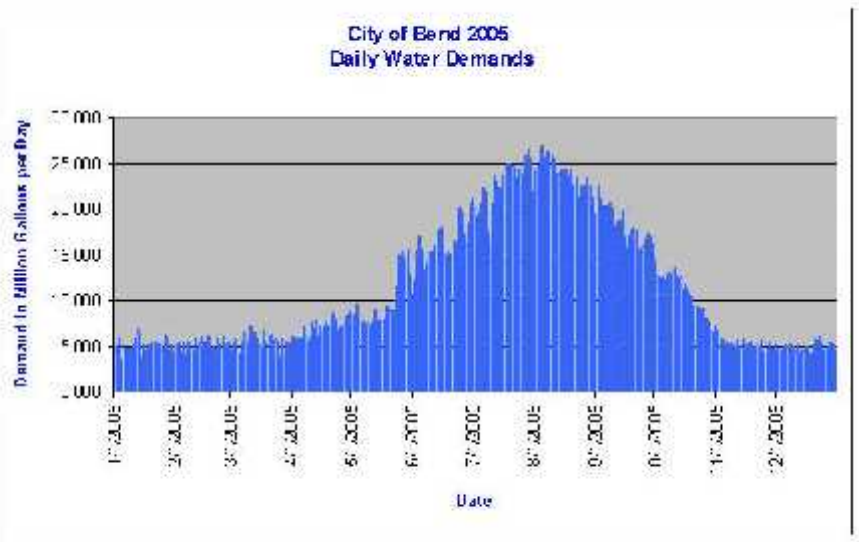
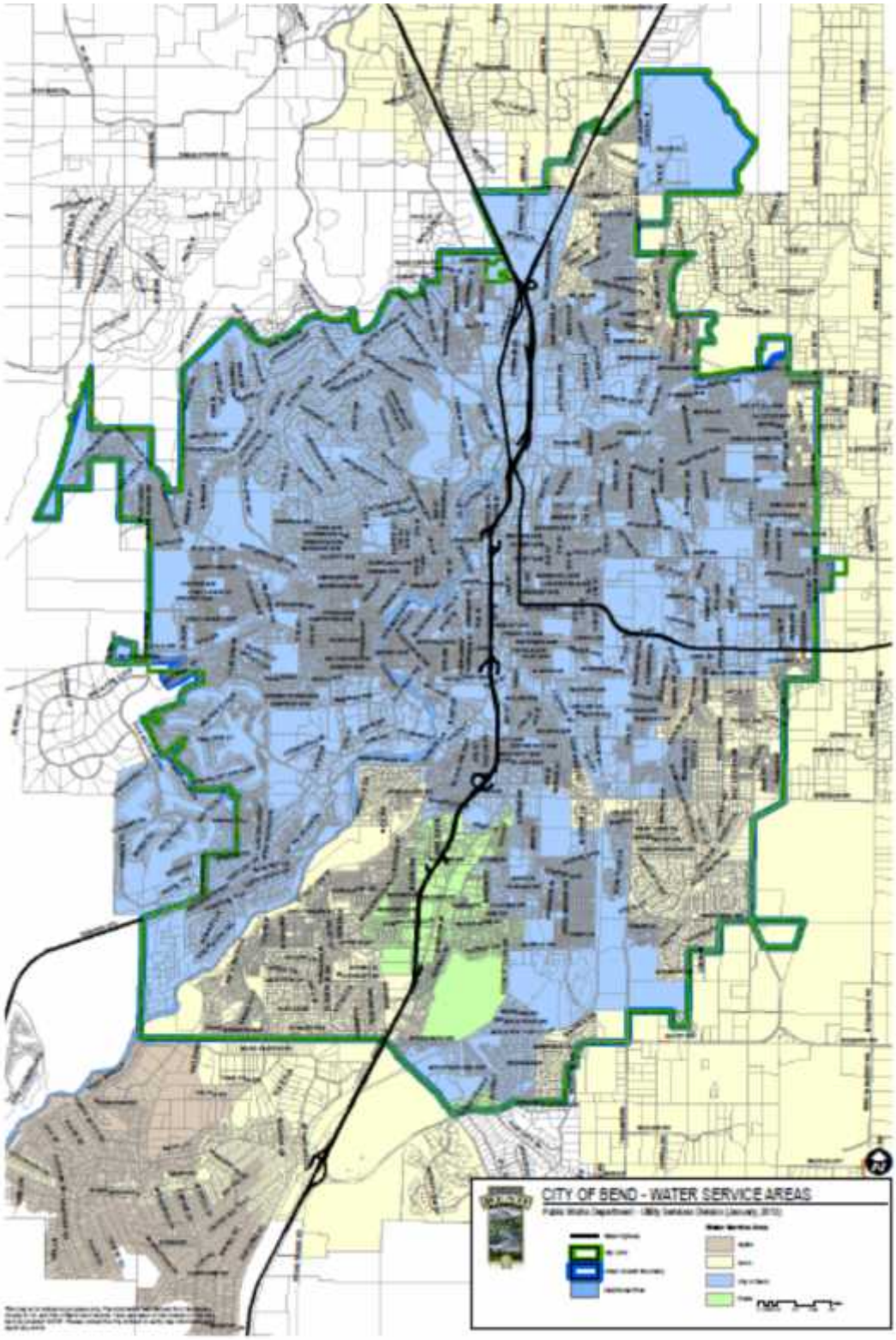


Figure 8-4
Water Utilities in the Bend Urban Growth Boundary



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.

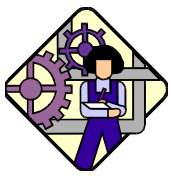
Water System Financing

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

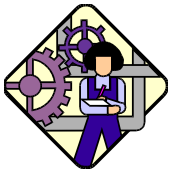
A large part of Bend's drinking water comes from a deep, very high-quality and abundant aquifer beneath the City that is fed by snow melt high in the Cascade Mountains. The City and its residents are committed to protecting this valuable resource along with protecting surface water quality. Protection 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
- llicit 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.



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

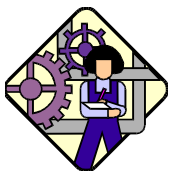
Stormwater Management Budget (Fiscal Year 2013-2014):	
Operation and Maintenance	$1,240,000
Engineering and Project Management	$580,700
Capital Improvement Projects	$2,750,000(1)
Water Quality Management	$378,000
Utility Administration & Public Response	$576,000
Total	**$5,524,700**

Note:
(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 curb-side pickup of municipal solid waste and recyclable materials. Recyclables picked up at curb-side 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 curb-side 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.

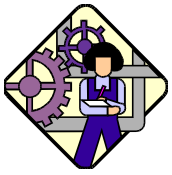
Local (land-line) telecommunication services are provided by Qwest. Many private companies compete to provide long distance and cellular phone services. Cable television service within the urban area is provided by Bendbroadband, which also provides phone and high-speed internet service. Private utility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



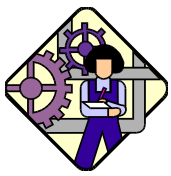
The Bend Metro Parks and Recreation District offices are located between the Old Mill District and the Deschutes River.

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 4th 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.

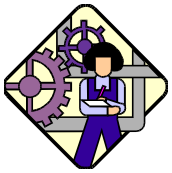
The existing main Public Works building houses Public Works administration and provides crew spaces for the Street and Water Divisions. This 41,000 square foot building will likely undergo significant, phased-in changes in the next seven years in order to bring the building into Code and ADA compliance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



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

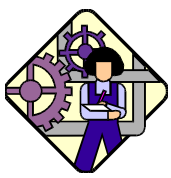
1. All new development within the Urban Growth Boundary should be connected to City sewer.

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.

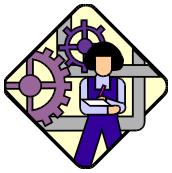
14. Avion Water Company is the provider of water service for its franchise area under Statewide Planning Goal 11 and pursuant to the franchise agreement between the City and Avion adopted under Ordinance NS 1514, as amended.

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.



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.

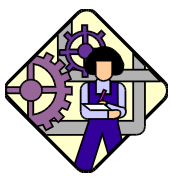
22. The use of stormwater disposal systems shall be coordinated with the Oregon Department of Environmental Quality and Water Resources Department to protect ground water and surface water.

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.

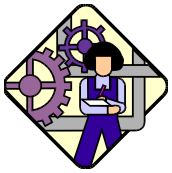
32. The City shall regulate development near water courses to reduce erosion and pollution and to provide open, natural areas.

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.



- 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.

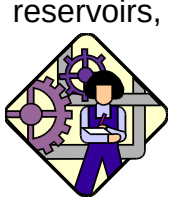
41. The County shall reduce dust and blowing refuse at the landfills in order to ensure as few adverse impacts as possible from these facilities.

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.

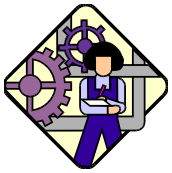
Public Buildings and Facilities

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.



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CITY OF BEND

COLLECTION SYSTEM PUBLIC FACILITY PLAN

CITY PROJECT NO. SW12AA

DECEMBER 2014

CITY OF BEND – COLLECTION SYSTEM PUBLIC FACILITY PLAN
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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 (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	-	-	**0.1%**
6	0.3	0.2	45.4	2.5	5.6	3.6	0.1	**3.1%**
8	8.2	0.2	330.4	78.2	448.0	655.5	0.8	**82.7%**
10	2.2	-	21.3	13.3	20.7	9.3	-	**3.6%**
12	2.1	-	14.6	2.9	22.2	7.3	-	**2.7%**
15	0.1	-	16.4	1.5	10.0	8.4	-	**2.0%**
16	2.5	-	1.4	-	-	-	-	**0.2%**
18	-	-	2.8	-	16.4	5.0	-	**1.3%**
20	1.6	-	-	-	-	-	-	**0.1%**
21	-	-	6.0	7.1	4.6	1.5	-	**1.0%**
24	-	-	9.0	0.5	2.5	0.1	-	**0.7%**
27	0.6	-	10.4	0.9	-	0.2	-	**0.7%**
30	-	-	4.2	1.4	-	0.1	-	**0.3%**
36	-	-	2.6	16.7	-	0.7	-	**1.1%**
42	-	-	-	8.8	-	-	-	**0.5%**
48	-	-	-	-	-	<0.1	-	**<0.1%**
72[1]	-	-	-	-	0.1	-	-	**<0.1%**
Percent	**1.0%**	**<0.1%**	**25.2%**	**7.3%**	**28.9%**	**37.6%**	**<0.1%**	**100%**

[1] *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%**
Percent	**1.0%**	**<0.1%**	**25.2%**	**7.3%**	**28.9%**	**37.6%**	**<0.1%**	**100%**

Table 1B-3
Gravity Pipe Material and Diameter Summary

Diameter (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	-	-	-	-	**0.1%**
6	-	-	-	-	0.2	-	56.0	1.4	-	-	0.3	**3.1%**
8	-	0.2	3.9	6.0	0.3	5.6	1,435.7	70.6	-	0.3	-	**82.7%**
10	0.7	-	0.3	2.2	0.8	-	53.7	9.1	-	-	-	**3.6%**
12	-	-	-	1.9	0.4	1.3	33.3	12.2	-	-	-	**2.7%**
15	-	-	-	-	-	-	21.8	14.3	-	-	-	**2.0%**
16	-	-	-	2.8	-	-	-	-	1.1	-	-	**0.2%**
18	-	-	-	-	0.2	-	21.6	2.7	-	-	-	**1.3%**
20	-	-	-	1.6	-	-	-	-	-	-	-	**0.1%**
21	-	-	-	-	-	-	8.4	10.9	-	-	-	**1.0%**
24	-	-	-	-	-	-	3.0	9.0	-	-	-	**0.7%**
27	-	-	-	-	-	-	-	12.0	-	-	-	**0.7%**
30	-	-	-	-	-	-	-	5.6	-	-	-	**0.3%**
36	-	-	-	-	-	-	0.8	19.3	-	-	-	**1.1%**
42	-	-	-	-	-	-	-	8.8	-	-	-	**0.5%**
48	-	-	-	-	-	-	<0.1	-	-	-	-	**<0.1%**
72[1]	-	-	-	-	-	-	0.1	-	-	-	-	**<0.1%**
Percent	**<0.1%**	**<0.1%**	**0.2%**	**0.8%**	**0.1%**	**0.4%**	**88.8%**	**9.6%**	**0.1%**	**<0.1%**	**<0.1%**	**100%**

[1] *Serves as in-pipe storage just upstream of Shevlin Lift Station.*

North Pointe
Holiday Inn
Juniper Ridge
Highland
North Wind
Phoenix
Boyd Acres
N. Fire Station
Canal View
Glen Vista
Majestic
Rim Rock Riders
Quail Crossing
Rim Rock #1
Service Station
Rim Rock #2
Rim Rock #4
Enchant on Deschutes
Empire Village
Rim Rock #5
Wyndemere
Empire Estates
Deschutes Business
Empire
Awbrey Glen
Sawyer Park
Rivers Edge
Shevlin Commons
Renaissance
Glenshire
Summit Park
Riverhouse
Tumalo Heights
Underwood
Shevlin Meadows
Linster
Pioneer
Westside
Riviera
Pacific
Forum
Drake
Shevlin
Renwick
Main Fire Station
Hollow Pines #2
Hollow Pines #1
Old Mill
Desert Skies
Darnell Estates
Touchmark
Wood River Village
Simplicity
Orion Greens
Tri Peaks
Sunrise #1
Nottingham #1
Bachelor Village
Pine Ridge
The Shire
Foxborough
Sun Meadow
Nottingham #2
Ridgewater #1
Camden Park
River Canyon #2
Pheasant Run
Stone Haven
Ridgewater #2
Aspen Ridge
Shadow Glen
South Village
Deschutes River Crossing
Murphy
Crown Villa #1
Crown Villa #2
Pines #5
River Canyon #1
River Rim
Pines #6
Pines #7
Quail Ridge #2
Poplar Park
Quail Ridge #1
Widgi Creek
Blue Ridge
20
97
97

Legend

- Lift Station
- **Gravity Pipe**
- Diameter
  - 3" to 6"
  - 8"
  - 10" to 12"
  - 14" to 18"
  - 20" to 24"
  - 26" to 30"
  - 32" to 72"
- Force Main
- Parcel
- UGB
- Water Feature

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

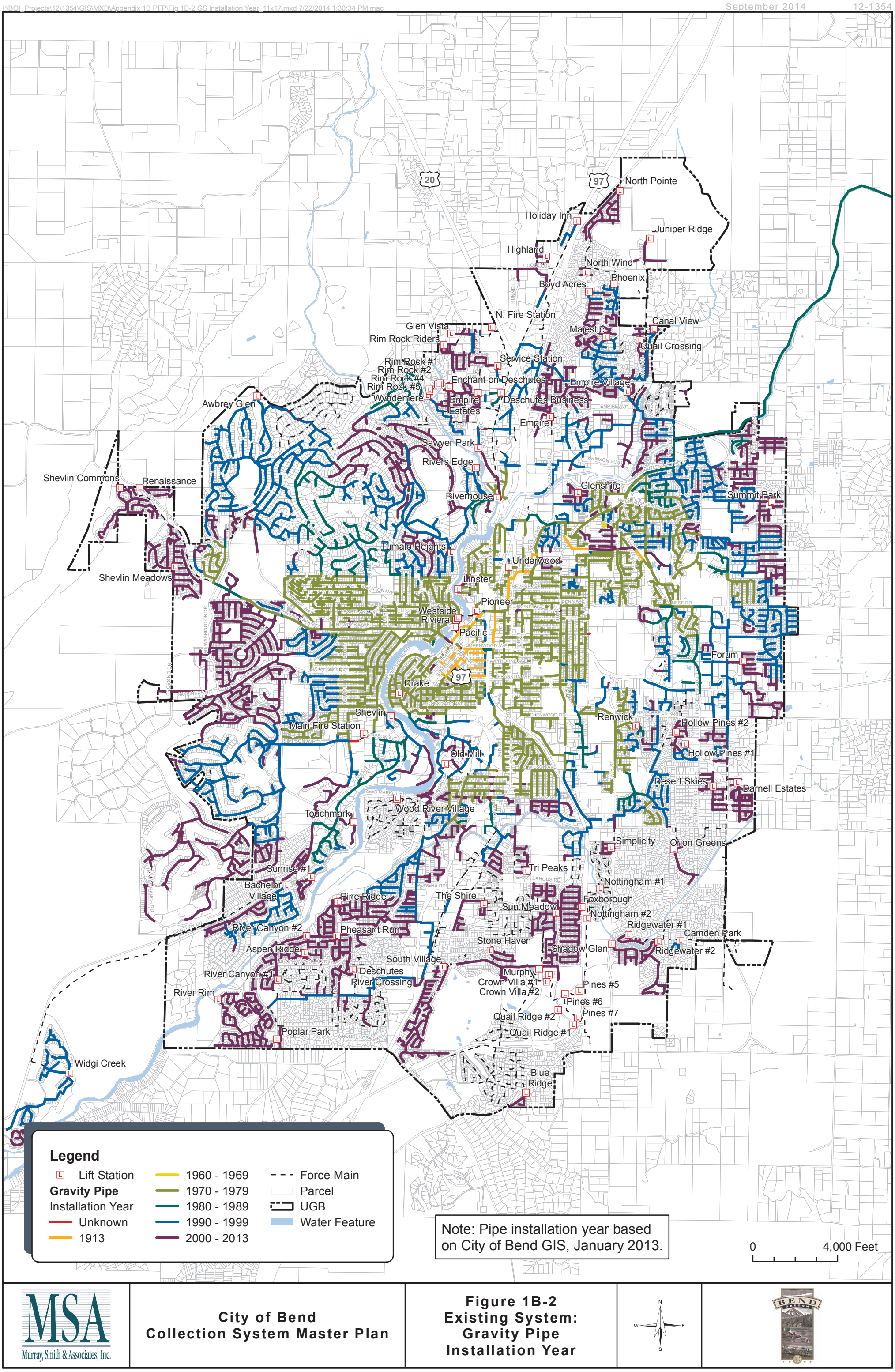
0 4,000 Feet

Murray, Smith & Associates, Inc.

City of Bend
Collection System Master Plan

Figure 1B-1
Existing System:
Gravity Pipe
Diameter

N W E S



MSA
Murray, Smith & Associates, Inc.

City of Bend
Collection System Master Plan

Figure 1B-2
Existing System:
Gravity Pipe
Installation Year

North Pointe
Holiday Inn
Juniper Ridge
Highland
North Wind
Phoenix
Boyd Acres
N. Fire Station
Canal View
Glen Vista
Majestic
Rim Rock Riders
Quail Crossing
Service Station
Rim Rock #1
Rim Rock #2
Rim Rock #4
Rim Rock #5
Enchant on Deschutes
Empire Village
Wyndemere
Empire
Deschutes Business
Estates
Empire
Awbrey Glen
Sawyer Park
Rivers Edge
Shevlin Commons
Renaissance
Riverhouse
Glenshire
Summit Park
Tumalo Heights
Underwood
Linster
Shevlin Meadows
Pioneer
Westside
Riviera
Pacific
Forum
Drake
Shevlin
Renwick
Main Fire Station
Hollow Pines #2
Hollow Pines #1
Old Mill
Desert Skies
Darnell Estates
Touchmark
Wood River Village
Simplicity
Orion Greens
Sunrise #1
Tri Peaks
Bachelor Village
Nottingham #1
Pine Ridge
The Shire
Foxborough
Sun Meadow
Nottingham #2
Ridgewater #1
Camden Park
River Canyon #2
Pheasant Run
Stone Haven
Ridgewater #2
Aspen Ridge
Shadow Glen
South Village
Deschutes River Crossing
Murphy
Crown Villa #1
Crown Villa #2
Pines #5
River Canyon #1
River Rim
Pines #6
Pines #7
Quail Ridge #2
Poplar Park
Quail Ridge #1
Widgi Creek
Blue Ridge

Legend

- Lift Station
- Force Main

Gravity Pipe

Material

- Clay Tile
- HDPE
- PVC
- Reinforced Concrete
- Other

- Parcel
- UGB
- Water Feature

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

0 4,000 Feet

Murray, Smith & Associates, Inc.

City of Bend
Collection System Master Plan

Figure 1B-3
Existing System:
Gravity Pipe Material

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

Table 1B-6
Gravity Pipe Condition Assessment by Size

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

Table 1B-7
Gravity Pipe Condition Assessment by Material

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

North Pointe
Holiday Inn
Juniper Ridge
Highland
North Wind
Phoenix
Boyd Acres
N. Fire Station
Canal View
Glen Vista
Majestic
Rim Rock Riders
Quail Crossing
Service Station
Rim Rock #1
Rim Rock #2
Rim Rock #4
Rim Rock #5
Enchant on-Deschutes
Empire Village
Wyndemere
Empire Estates
Deschutes Business
Empire
Awbrey Glen
Sawyer Park
Rivers Edge
Shevlin Commons
Renaissance
Riverhouse
Glenshire
Summit Park
Tumalo Heights
Underwood
Shevlin Meadows
Linster
Pioneer
Westside Riviera
Pacific
Forum
Drake
Shevlin
Renwick
Main Fire Station
Hollow Pines #2
Hollow Pines #1
Old Mill
Desert Skies
Darnell Estates
Touchmark
Wood River Village
Simplicity
Orion Greens
Sunrise #1
Tri Peaks
Bachelor Village
Pine Ridge
The Shire
Nottingham #1
Foxborough
Sun Meadow
Nottingham #2
Ridgewater #1
Camden Park
River Canyon #2
Pheasant Run
Stone Haven
Ridgewater #2
Aspen Ridge
Shadow Glen
South Village
Deschutes River Crossing
Murphy
Crown Villa #1
Crown Villa #2
Pines #5
River Canyon #1
River Rim
Pines #6
Pines #7
Quail Ridge #2
Poplar Park
Quail Ridge #1
Widgi Creek
Blue Ridge

20
97

Legend

- Lift Station
- Force Main
- Parcel
- UGB
- Water Feature

Gravity Pipe Condtion Assessment

- 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

0 4,000 Feet

Murray, Smith & Associates, Inc.

City of Bend
Collection System Master Plan

Figure 1B-4
Gravity Pipe Condition Deficiency Assessment

N W E S

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

Owner	Category	Number
City	Regional - Modeled	68
	Regional – Not-Modeled	18

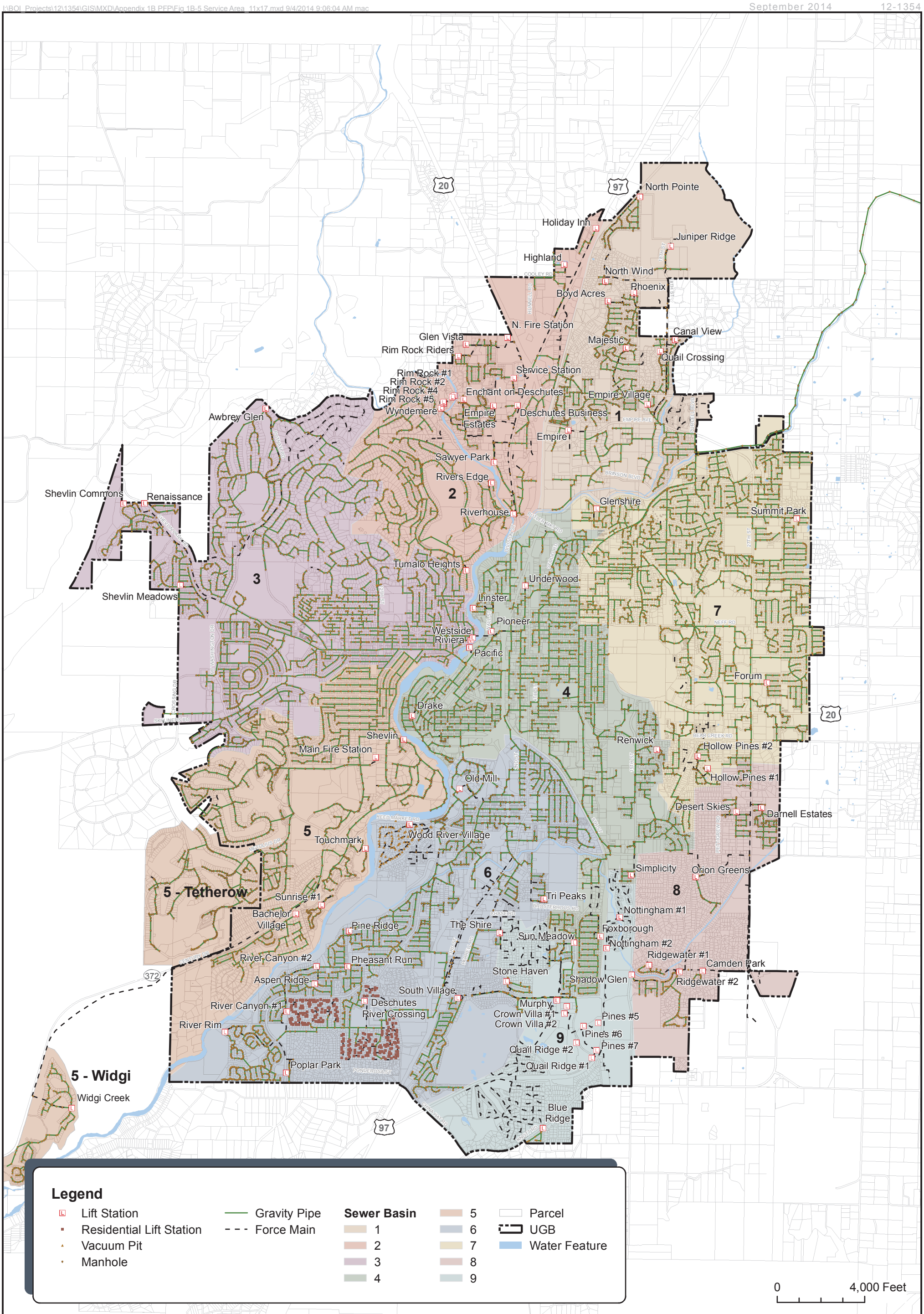
Table 1B-9 includes a summary of the City's existing lift stations. Some lift stations have the pumps submerged in the wet well where the sewage is stored; others isolate the pumps from the wastewater using a dry well configuration connected by piping. The number of pumps in the lift station and total 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

Basin	Lift Station Name	Type	Number of Pumps	Total Horsepower	VFD	Standby Power
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/ 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/ 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/ Dry Well	1	28	-	Standby
4	Foxborough	Submersible	2	30	-	Plug
4	Linster	Submersible	2	15	-	Plug

Basin	Lift Station Name	Type	Number of Pumps	Total Horsepower	VFD	Standby Power
4	Pacific	Submersible	2	4	-	Plug
4	Pioneer	Submersible	2	4	-	Plug
4	Renwick	Wet Well/ Dry Well	2	6	-	Plug
4	Simplicity	Submersible	2	15	-	Plug
4	Sun Meadow	Submersible	2	100	-	Plug
4	Underwood	Wet Well/ Dry Well	2	6	-	Plug
4	West Side	Wet Well/ Dry Well	4	170	VFD	Standby
5	Bachelor Village	Submersible	2	20	-	
5	Main Fire Station	Submersible	2	4	-	Standby
5	Shevlin	Wet Well/ 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 Station and 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

Basin	Lift Station Name	Type	Number of Pumps	Total Horsepower	VFD	Standby Power
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



MSA
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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

Basin	Lift Station Name	Station Pumping Capacity[1] (gpm)	Station Firm Pumping Capacity[2] (gpm)	Discharge Diameter[3] (inch)	Dry Weather Discharge Line Capacity at 6 ft/sec[4] (gpm)	Wet Weather Discharge Line Capacity at 10 ft/sec[5] (gpm)
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[1] (gpm)	Station Firm Pumping Capacity[2] (gpm)	Discharge Diameter[3] (inch)	Dry Weather Discharge Line Capacity at 6 ft/sec[4] (gpm)	Wet Weather Discharge Line Capacity at 10 ft/sec[5] (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[1] (gpm)	Station Firm Pumping Capacity[2] (gpm)	Discharge Diameter[3] (inch)	Dry Weather Discharge Line Capacity at 6 ft/sec[4] (gpm)	Wet Weather Discharge Line Capacity at 10 ft/sec[5] (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

[1] *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.*

[2] *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.*

[3] *Discharge Diameter - The diameter of the lift station force main.*

[4] *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.*

[5] *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		Recurring Sensor Failures
	Motor Connections	Electrical	General Overall Condition
Wet Well	General Overall Condition		Generator or Portable Pigtail
	Hatches/Safety Grate		HVAC
	Corrosion		Lighting
	Fats/Oils/Grease Buildup		Control Panel
	Solids Buildup		SCADA
	Expansion Tank	Site	General Overall Condition
Piping and Valves	General Overall Condition		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/ upgrade	Expected to require pump replacement in near future
Enchant on Deschutes	Pump replacement/ upgrade	Expected to require pump replacement in near future
Forum	Pump replacement/ upgrade	City to replace pumps in near future
Glenshire	Pump replacement/ upgrade	Could use pump and VFD upgrade
Hollow Pines #2	Pump replacement/ 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/ upgrade	-
Darnell Estates	-	-
Deschutes River Crossing	-	-
Desert Skies	-	-
Foxborough	-	-
Glen Vista	-	-
Highland	Pump replacement/ upgrade	-
Holiday Inn	-	-
Hollow Pines #1	-	-
Juniper Ridge	-	-
Linster	-	-
Main Fire Station	-	-
Murphy	-	-
North Pointe	Pump replacement/ upgrade	Expected to require pump replacement in near future

Lift Station	Replacement Type	O&M Comment
N. Fire Station		
Northwind	Pump replacement/ 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/ upgrade	Expected to require pump replacement as budget allows or when existing pumps fail.
Quail Crossing	-	-
Renaissance	Pump replacement/upgrade	Expected to require pump replacement in near future
Ridgewater #1	-	-
Ridgewater #2	-	-
Rim Rock Riders	Pump replacement/upgrade	Expected to require pump replacement in near future
River Canyon #1	-	-
River Canyon #2	-	-
River Rim	-	-
Riviera	-	-
Service	Pump replacement/ upgrade	Expected to require pump replacement in near future
Shadow Glen	-	-
Shevlin Commons	Pump replacement/ upgrade	Expected to require pump replacement as existing pumps fail.
Shevlin Meadows	-	-
The Shire	Pump replacement/ upgrade	-
Simplicity	Pump replacement/ upgrade	-
South Village	Pump replacement/ upgrade	-
Stone Haven	-	-
Summit Park	-	-
Sun Meadow	Pump replacement/ upgrade	-
Sunrise #1	Lift Station upgrade	New rail system required.
Touchmark	Pump replacement/ upgrade	-
Tri Peaks	-	-
Tumalo Heights	Pump replacement/ upgrade	-
Westside	-	-
Woodriver Village	-	Good working system, though unique to the rest of collection system
Wyndemere	-	-

North Pointe
Holiday Inn
Juniper Ridge
Highland
North Wind
Phoenix
Boyd Acres
N. Fire Station
Glen Vista
Canal View
Majestic
Rim Rock Riders
Quail Crossing
Service Station
Enchant on
Deschutes
Rim Rock #1, 2, 4, 5
Empire Estates
Empire Village
Awbrey Glen
Wyndemere
Deschutes Business
Empire
Sawyer Park
Rivers Edge
Renaissance
Shevlin Commons
Riverhouse
Glenshire
Summit Park
Tumalo Heights
Underwood
Shevlin Meadows
Linster
Pioneer
West Side
Riviera
Pacific
Forum
Drake
Shevlin
Renwick
Hollow Pines #2
Main Fire Station
Old Mill
Hollow Pines
Wood River Village
Desert Skies
Darnell Estates
Touchmark
Simplicity
Orion Greens
Sunrise #1
Tri Peaks
Nottingham #1
Bachelor Village
Pine Ridge
The Shire
Foxborough
Nottingham #2
Sun Meadow
Ridgewater
Camden Park
River Canyon #2
Pheasant Run
Stone Haven
Shadow Glen
Ridgewater #2
Aspen Ridge
Murphy
South Village
Crown Villa #1
River Canyon #1
Des. River Crossing
Pines #5
Crown Villa #2
River Rim
Pines #6
Pines #7
Quail Ridge #2
Poplar Park
Quail Ridge #1
Widgi Creek
Blue Ridge

20
97

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

Murray, Smith & Associates, Inc.

City of Bend
Collection System Master Plan

Figure 1B-6
Lift Station Condition Deficiency Assessment

N W E S

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.

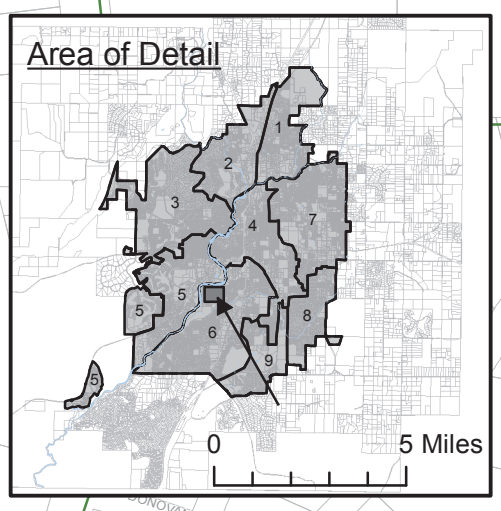
Vacuum Sewers

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

Diameter (inch)	Total Length (feet)	Percentage of Total Length
4	8,967	75.8%
6	2,865	24.2%
Total	**11,832**	**100%**



Deschutes River

Wood River Village

Touchmark

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

Legend

- Vacuum Pit
- Lift Station
- Manhole
- Vacuum Main
- Gravity Pipe
- Force Main
- Vacuum Sewer Service Area
- Water Feautre
- Parcel

0 400 Feet

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City of Bend
Collection System Master Plan

Figure 1B-7
Existing System:
Vacuum Sewer
Service Area

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

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

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	-	-	**0.1%**
Ductile Iron (DI)	2.1	-	4.8	1.6	-	**2.3%**
Polyvinyl Chloride (PVC)	59.0	17.5	111.9	163.2	3.9	**97.6%**
Percent	**16.8%**	**4.8%**	**32.1%**	**45.2%**	**1.1%**	**100%**

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	**1.3%**
2.5	-	-	32.3	**8.9%**
3	-	-	100.7	**27.6%**
4	-	0.01	98.1	**26.9%**
6	0.2	-	108.7	**29.9%**
8	-	6.4	7.6	**3.8%**
10	-	-	3.4	**0.9%**
16	-	2.1	-	**0.6%**
Percent	**0.1%**	**2.3%**	**97.6%**	**100%**

North Pointe
Holiday Inn
Juniper Ridge
Highland
North Wind
Phoenix
Boyd Acres
N. Fire Station
Canal View
Glen Vista
Majestic
Rim Rock Riders
Quail Crossing
Service Station
Rim Rock #1
Rim Rock #2
Rim Rock #4
Rim Rock #5
Enchant on Deschutes
Empire Village
Wyndemere
Empire
Estates
Deschutes Business
Empire
Awbrey Glen
Sawyer Park
Rivers Edge
Shevlin Commons
Renaissance
Glenshire
Riverhouse
Summit Park
Tumalo Heights
Underwood
Shevlin Meadows
Linster
Pioneer
Westside
Riviera
Pacific
Forum
Drake
Shevlin
Renwick
Main Fire Station
Hollow Pines #2
Old Mill
Hollow Pines #1
Desert Skies
Darnell Estates
Touchmark
Wood River Village
Simplicity
Orion Greens
Sunrise #1
Tri Peaks
Bachelor
Village
Nottingham #1
Pine Ridge
The Shire
Foxborough
Sun Meadow
Nottingham #2
Ridgewater #1
River Canyon #2
Pheasant Run
Camden Park
Stone Haven
Aspen Ridge
Shadow Glen
Ridgewater #2
South Village
Deschutes
River Canyon #1
River Crossing
Murphy
Crown Villa #1
Crown Villa #2
Pines #5
Pines #6
Pines #7
River Rim
Quail Ridge #2
Quail Ridge #1
Poplar Park
Widgi Creek
Blue
Ridge

Legend

- Lift Station
- Gravity Pipe

Force Main
Diameter
- 2" to 3"
- 4" to 6"
- 8" to 10"
- Greater than 10"

- Parcel
- UGB
- Water Feature

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

0 4,000 Feet

Murray, Smith & Associates, Inc.

City of Bend
Collection System Master Plan

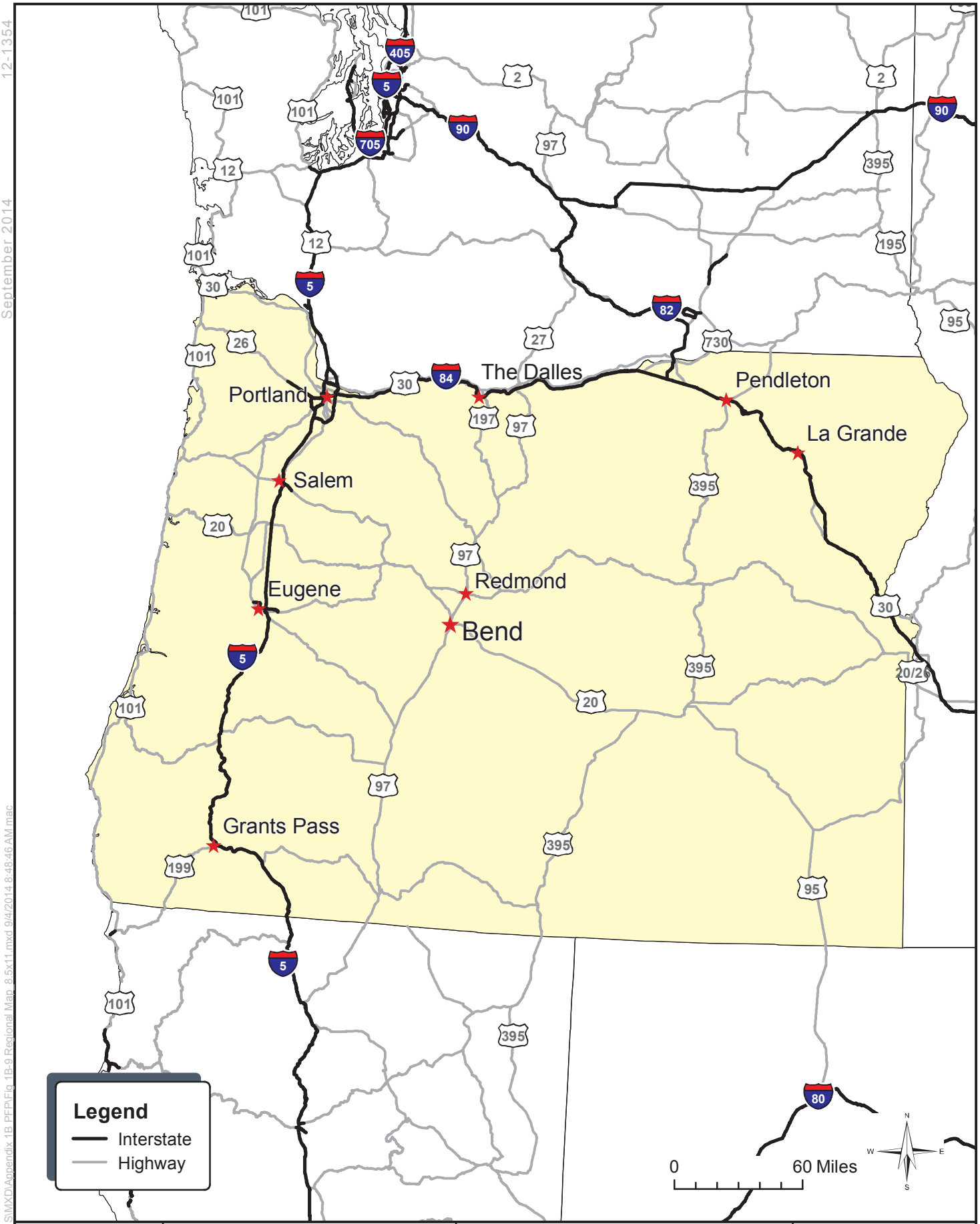
Figure 1B-8
Existing System:
Force Main Diameter

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.



City of Bend Collection System Master Plan

Figure 1B-9 Existing System: Regional Map

Murray, Smith & Associates, Inc.

12-1354

September 2014

I:\BOI_Projects\121354\GIS\MXD\Appendix 1B PFP\Fig 1B-9 Regional Map_8.5x11.mxd 9/4/2014 8:48:46 AM mac

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 27th 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, 3rd 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

Project ID[1]	Timeframe	Project Name	Project Category[2]	Type of Improvement	Description[3]	Required Preceding (P) and Concurrent (C) Projects[4]	Recommended Size	Unit, Length, HP or gpm	Growth Allocation[5]	Project Estimate[6]
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: - 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: - 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: - 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: - 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: - C: 4B, 4C, 4D	-	131 HP	46%	$4,208,000

Project ID[1]	Timeframe	Project Name	Project Category[2]	Type of Improvement	Description[3]	Required Preceding (P) and Concurrent (C) Projects[4]	Recommended Size	Unit, Length, HP or gpm	Growth Allocation[5]	Project Estimate[6]
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: - 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: - 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: - C: 4A, 4B, 4C	-	1 EA	47%	$28,000

Project ID[1]	Timeframe	Project Name	Project Category[2]	Type of Improvement	Description[3]	Required Preceding (P) and Concurrent (C) Projects[4]	Recommended Size	Unit, Length, HP or gpm	Growth Allocation[5]	Project Estimate[6]
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 3rd 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: - 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: - 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: - C: 6B, 6C	8-inch	4,000 LF	NA[7]	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: - C: 6A, 6C	-	-	NA[7]	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: - C: 6A, 6B	-	1 EA	NA[7]	Developer Funded

Project ID[1]	Timeframe	Project Name	Project Category[2]	Type of Improvement	Description[3]	Required Preceding (P) and Concurrent (C) Projects[4]	Recommended Size	Unit, Length, HP or gpm	Growth Allocation[5]	Project Estimate[6]
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: - Vapor phase treatment to capture/remove odor from the sewer headspace. - Relocation of Awbrey Glen Lift Station force main discharge to a new 15-inch sewer in Mount Washington Drive. - 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[1]	Timeframe	Project Name	Project Category[2]	Type of Improvement	Description[3]	Required Preceding (P) and Concurrent (C) Projects[4]	Recommended Size	Unit, Length, HP or gpm	Growth Allocation[5]	Project Estimate[6]
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. The permanent meters will be located in the following manholes: - CMH000206 - CMH000317 - CMH004010 - CMH008141 - CMH008738 The temporary meters will installed as required for specific projects. 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[1]	Timeframe	Project Name	Project Category[2]	Type of Improvement	Description[3]	Required Preceding (P) and Concurrent (C) Projects[4]	Recommended Size	Unit, Length, HP or gpm	Growth Allocation[5]	Project Estimate[6]
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[1]	Timeframe	Project Name	Project Category[2]	Type of Improvement	Description[3]	Required Preceding (P) and Concurrent (C) Projects[4]	Recommended Size	Unit, Length, HP or gpm	Growth Allocation[5]	Project Estimate[6]
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 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. 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. 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. City O&M Staff to determine specific timing of improvement.	-	-	1 EA	0%	$345,000

Project ID[1]	Timeframe	Project Name	Project Category[2]	Type of Improvement	Description[3]	Required Preceding (P) and Concurrent (C) Projects[4]	Recommended Size	Unit, Length, HP or gpm	Growth Allocation[5]	Project Estimate[6]
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. 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. 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. 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. 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. 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. City O&M Staff to determine specific timing of improvement.	-	-	1 EA	0%	$345,000

Project ID[1]	Timeframe	Project Name	Project Category[2]	Type of Improvement	Description[3]	Required Preceding (P) and Concurrent (C) Projects[4]	Recommended Size	Unit, Length, HP or gpm	Growth Allocation[5]	Project Estimate[6]
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[1]	Timeframe	Project Name	Project Category[2]	Type of Improvement	Description[3]	Required Preceding (P) and Concurrent (C) Projects[4]	Recommended Size	Unit, Length, HP or gpm	Growth Allocation[5]	Project Estimate[6]
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 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 C: 13A	-	1 EA	100%	$28,000

Project ID[1]	Timeframe	Project Name	Project Category[2]	Type of Improvement	Description[3]	Required Preceding (P) and Concurrent (C) Projects[4]	Recommended Size	Unit, Length, HP or gpm	Growth Allocation[5]	Project Estimate[6]
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[1]	Timeframe	Project Name	Project Category[2]	Type of Improvement	Description[3]	Required Preceding (P) and Concurrent (C) Projects[4]	Recommended Size	Unit, Length, HP or gpm	Growth Allocation[5]	Project Estimate[6]
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 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 Brookswood 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. 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: - 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: - 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. 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: - 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: - 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[1]	Timeframe	Project Name	Project Category[2]	Type of Improvement	Description[3]	Required Preceding (P) and Concurrent (C) Projects[4]	Recommended Size	Unit, Length, HP or gpm	Growth Allocation[5]	Project Estimate[6]
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[1]	Timeframe	Project Name	Project Category[2]	Type of Improvement	Description[3]	Required Preceding (P) and Concurrent (C) Projects[4]	Recommended Size	Unit, Length, HP or gpm	Growth Allocation[5]	Project Estimate[6]
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

[1] *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.*

[2] *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.*

[3] *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.*

[4] *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.*

[5] *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 – (Peak Dry Existing Flow/Peak Dry 20-Year Flow).*

[6] *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.*

[7] *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.

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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 3rd 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[1]	Timeframe	Project Name	Project Category[2]	Type of Improvement	Description[3]	Required Preceding (P) and Concurrent (C) Projects[4]	Recommended Size	Unit, Length, HP or gpm	Growth Allocation[5]	Project Estimate[6]
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 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 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 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, C: 60A	8-inch	400 LF	17%	$92,000

Project ID[1]	Timeframe	Project Name	Project Category[2]	Type of Improvement	Description[3]	Required Preceding (P) and Concurrent (C) Projects[4]	Recommended Size	Unit, Length, HP or gpm	Growth Allocation[5]	Project Estimate[6]
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 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 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 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, 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, 67A 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, C: 63B	8-inch	900 LF	88%	$784,000

Project ID[1]	Timeframe	Project Name	Project Category[2]	Type of Improvement	Description[3]	Required Preceding (P) and Concurrent (C) Projects[4]	Recommended Size	Unit, Length, HP or gpm	Growth Allocation[5]	Project Estimate[6]
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[1]	Timeframe	Project Name	Project Category[2]	Type of Improvement	Description[3]	Required Preceding (P) and Concurrent (C) Projects[4]	Recommended Size	Unit, Length, HP or gpm	Growth Allocation[5]	Project Estimate[6]
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 Brookswood 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 Hamehook 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[1]	Timeframe	Project Name	Project Category[2]	Type of Improvement	Description[3]	Required Preceding (P) and Concurrent (C) Projects[4]	Recommended Size	Unit, Length, HP or gpm	Growth Allocation[5]	Project Estimate[6]
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. Grade 4 Assessment - 2.3 miles 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[1]	Timeframe	Project Name	Project Category[2]	Type of Improvement	Description[3]	Required Preceding (P) and Concurrent (C) Projects[4]	Recommended Size	Unit, Length, HP or gpm	Growth Allocation[5]	Project Estimate[6]
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[1]	Timeframe	Project Name	Project Category[2]	Type of Improvement	Description[3]	Required Preceding (P) and Concurrent (C) Projects[4]	Recommended Size	Unit, Length, HP or gpm	Growth Allocation[5]	Project Estimate[6]
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

[1] *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.*

[2] *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.*

[3] *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.*

[4] *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.*

[5] *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 – (Peak Dry Existing Flow/Peak Dry 20-Year Flow).*

[6] *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[1]	Timeframe	Project Name	Project Category[2]	Type of Improvement	Description[3]	Required Preceding (P) and Concurrent (C) Projects[4]	Recommended Size	Unit, Length, HP or gpm	Growth Allocation[5]	Project Estimate[6]
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 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 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 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 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 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 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, 65A 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, 65A C: 91A	-	1 EA	80%	$28,000

Project ID[1]	Timeframe	Project Name	Project Category[2]	Type of Improvement	Description[3]	Required Preceding (P) and Concurrent (C) Projects[4]	Recommended Size	Unit, Length, HP or gpm	Growth Allocation[5]	Project Estimate[6]
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 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 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 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 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 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 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 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 C: 95A	-	1 EA	15%	$28,000

Project ID[1]	Timeframe	Project Name	Project Category[2]	Type of Improvement	Description[3]	Required Preceding (P) and Concurrent (C) Projects[4]	Recommended Size	Unit, Length, HP or gpm	Growth Allocation[5]	Project Estimate[6]
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 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 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, 92A 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, 97A 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[1]	Timeframe	Project Name	Project Category[2]	Type of Improvement	Description[3]	Required Preceding (P) and Concurrent (C) Projects[4]	Recommended Size	Unit, Length, HP or gpm	Growth Allocation[5]	Project Estimate[6]
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 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 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 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 C: 101A	-	1 EA	58%	$28,000

Project ID[1]	Timeframe	Project Name	Project Category[2]	Type of Improvement	Description[3]	Required Preceding (P) and Concurrent (C) Projects[4]	Recommended Size	Unit, Length, HP or gpm	Growth Allocation[5]	Project Estimate[6]
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 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 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 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 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 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 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 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 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 C: 106B	8-inch	1,800 LF	15%	$599,000

Project ID[1]	Timeframe	Project Name	Project Category[2]	Type of Improvement	Description[3]	Required Preceding (P) and Concurrent (C) Projects[4]	Recommended Size	Unit, Length, HP or gpm	Growth Allocation[5]	Project Estimate[6]
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 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 Rumgay 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[1]	Timeframe	Project Name	Project Category[2]	Type of Improvement	Description[3]	Required Preceding (P) and Concurrent (C) Projects[4]	Recommended Size	Unit, Length, HP or gpm	Growth Allocation[5]	Project Estimate[6]
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[1]	Timeframe	Project Name	Project Category[2]	Type of Improvement	Description[3]	Required Preceding (P) and Concurrent (C) Projects[4]	Recommended Size	Unit, Length, HP or gpm	Growth Allocation[5]	Project Estimate[6]
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[1]	Timeframe	Project Name	Project Category[2]	Type of Improvement	Description[3]	Required Preceding (P) and Concurrent (C) Projects[4]	Recommended Size	Unit, Length, HP or gpm	Growth Allocation[5]	Project Estimate[6]
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[1]	Timeframe	Project Name	Project Category[2]	Type of Improvement	Description[3]	Required Preceding (P) and Concurrent (C) Projects[4]	Recommended Size	Unit, Length, HP or gpm	Growth Allocation[5]	Project Estimate[6]
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

[1] *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.*

[2] *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.*

[3] *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.*

[4] *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.*

[5] *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 – (Peak Dry Existing Flow/Peak Dry 20-Year Flow).*

[6] *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.

Figure 1B-10

City of Bend
Collection System Master Plan

Capital Improvement Program
Project Locations

Morrow, Smith & Associates, Inc.
Engineers/Planners

Legend

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

Shevlin Commons 111
Renaissance 123
Shevlin Meadows 112
Awbrey Glen 12, 31
Rim Rock #2
Rim Rock #1 47
Rim Rock #4 46, 48
Rim Rock #5 49
Wyndemere 133
N. Fire Station 120
Glen Vista 116
Rim Rock Riders 124
Service Station 127
Enchant on Deschutes 77
Empire Estates 76
Deschutes Business 35
Sawyer Park 73
Rivers Edge 81
Riverhouse 21
Holiday Inn 102B
North Pointe 104A, 104B
Juniper Ridge 103B
Highland 101B
North Wind 105B
Boyd Acres 25, 100B
Phoenix 106B
Canal View 26
Majestic 80
Quail Crossing 72
Empire 37
Empire Village 38
Glenshire 78
Summit Park 93B
Tumalo Heights 130
Underwood 53
Linster 118
Westside 131
Riviera 126
Pioneer 27
Pacific 4
Drake 36
Shevlin 4D
4A Colorado Lift Station
Main Fire Station 119
Old Mill 71
Woodriver Village 132
Touchmark 129
Bachelor Village 113
Sunrise #1 128
Pine Ridge 122
River Canyon #2 28
Pheasant Run 110
Aspen Ridge 70
Des. River Crossing 114
River Canyon #1 125
River Rim 29
Poplar Park 42
Widgi Creek 82
Tri Peaks 6C
61B Interim Stone Creek Lift Station
Sun Meadow 20
The Shire 97B
Stone Haven 92B
Murphy 15
19B South Village
Crown Villa #1 33, 35, 13A, 14A
Crown Villa #2 34, 14B
Quail Ridge #2 44, 16A, 16B
Quail Ridge #1 90B, 43, 90A
Pines #6 51, 95B
Pines #5 50, 94B
Pines #7 52, 96B, 96A
Blue Ridge 88B
Simplicity 91B
Nottingham #1 39, 65B
Foxborough 115
Nottingham #2 40, 66B
Ridgewater #1
Shadow Glen 17A, 18B, 18A
Ridgewater #2 67A, 67B
Camden Park 32, 62A, 62B
Orion Greens 121
Renwick 45
Hollow Pines #2 79
Hollow Pines #1 117
Darnell Estates 89A, 89B
Desert Skies 63B, 63A
Forum 64B, 64A

0 1,200 Feet

N W E S

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.

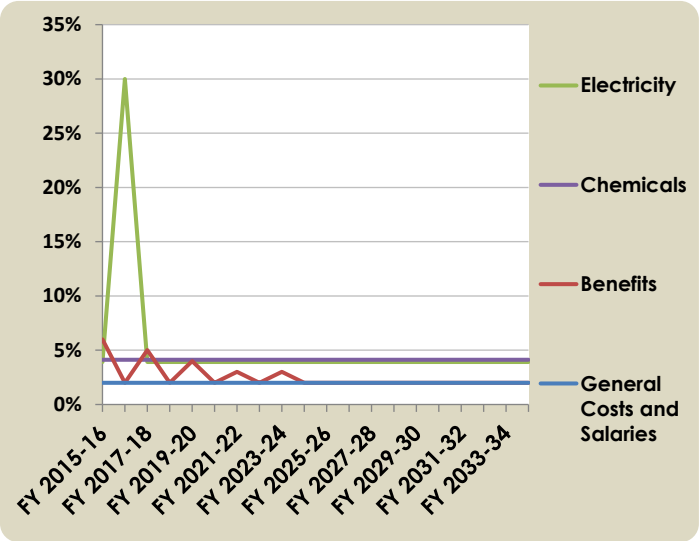
In order to best position itself to issue needed debt, the City has elected to maintain a minimum debt service coverage ratio of 1.75 for revenue bonds and 1.10 for total debt. Maintaining minimum debt service coverage ratios higher than contractually required minimizes the cost of future borrowing.

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

Revenues	FY 2014-15	FY 2015-16	FY 2016-17	FY 2017-18	FY 2018-19
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
Expenditures	**FY 2014-15**	**FY 2015-16**	**FY 2016-17**	**FY 2017-18**	**FY 2018-19**
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

User Fees, Income, & Percentage	FY 2014-15	FY 2015-16	FY 2016-17	FY 2017-18	FY 2018-19
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.

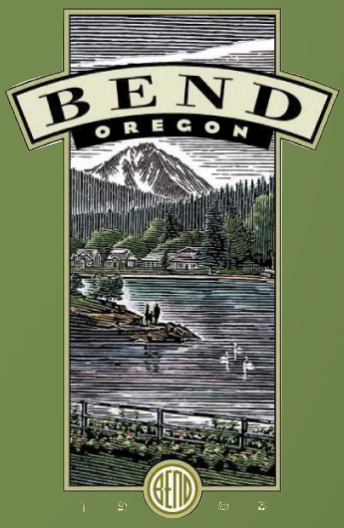
The financial strategy above assumes that the City's sewer SDC remains at its current level of $2,986 per equivalent dwelling unit. This plan further assumes that all available SDC revenue will be used to fund projects and thereby reducing the need for debt.

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.



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