

ORDINANCE NO. 2185

AN ORDINANCE AMENDING THE TEXT OF CHAPTER 8 THE BEND AREA GENERAL PLAN, PUBLIC FACILITIES, AND ADOPTING A GOAL 11 WATER PUBLIC FACILITY PLAN FOR THE CITY OF BEND URBAN GROWTH BOUNDARY.

Findings

A. On July 1, 2011, 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 Water Public Facility Plan.

B. Long Range Planning Staff caused notice to be published in the Bend Bulletin of an August 22, 2011 public hearing on August 2, 2011. Long Range Planning Staff conducted a work session with the Bend Planning Commission on August 8, 2011.

C. On August 22, 2011, the Bend Planning Commission conducted a public hearing on the Water Public Facility Plan, and the related amendments to Chapter 8 of the Bend Area General Plan. This hearing was continued three times, and hearings were held on September 16, October 10, and November 14, 2011. At the final hearing held on November 14, 2011, a majority of the Planning Commission voted to forward the proposed Water PFP and Chapter 8 amendments on to the City Council with a recommendation to approve.

D. The City Council held a public hearing on April 18, 2012 on the Water 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 March 29, 2012. The City Council has considered the evidence in the record, including the evidence and the testimony submitted at the public hearings.

Based on these findings,

THE CITY OF BEND ORDAINS AS FOLLOWS:

Section 1. Chapter 8 of the Bend Area General Plan, Public Facilities, dated November 1998 is repealed and replaced with the September 2011 version attached as Exhibit "A."

Section 2. The Goal 11 Water Public Facility Plan, attached as Exhibit "B" and dated September 2011, is adopted and incorporated by reference in the Bend Area General Plan.

Section 3. The City Council adopts the Findings in Support of the Adoption of the Goal 11 Water Public Facility Plan and the Supplemental Findings as findings supporting adoption of the Goal 11 Water Public Facility Plan and the related amendments to the text of Chapter 8 of the Bend Area General Plan, Public Facilities and Services.

First Reading April 18, 2012.

Second Reading May 2, 2012.

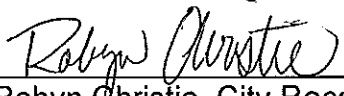
Adopted by roll call vote by the City Council on May 2, 2012.

YES: Tom Greene
Scott Ramsay
Mark Capell
Jodie Barram
Kathie Eckman
Mayor Jeff Eager



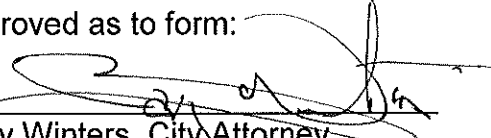
Jeff Eager, Mayor

ATTEST:



Robyn Christie, City Recorder

Approved as to form:



Mary Winters, City Attorney

Bend Area General Plan

Chapter 8: Public Facilities and Services

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MAY 2012

Amended May 2, 2012 – Ordinance NS-2185

BEND AREA GENERAL PLAN

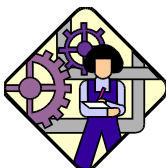
PREAMBLE

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

GOALS

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

- To have public and private utility systems provide adequate levels of service to the public at reasonable cost;
- For the city, county, and special districts to coordinate the provision of adequate urban services in an efficient and timely manner to support urban development;
- For new development to pay its fair share of the cost of major facilities needed to support development;
- To ensure that public services will not negatively impact the environment or the community; and
- To locate and operate public buildings and other public facilities to best serve the needs of the residents.



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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.

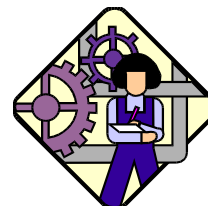
SANITARY SEWER FACILITIES AND SYSTEMS

The City's current public facility plan for sewer collection is the *1996 Utilities System Master Plan*. This plan identifies future improvements to the sewerage collection facilities required to serve long range growth in Bend. The system is designed to serve lands within the Urban Growth Boundary. Between 2007 and 2008, the City engaged in an update to the sewer collection system and the wastewater treatment plant. In 2007, a master plan for the collection system was completed to serve the existing urban growth boundary, the Urban Area Reserve identified in this plan, and potential areas for future expansion of the UGB. This plan was further amended in 2011 to focus on improvements that would be needed to serve the existing urban growth boundary. In 2008, a master plan for the wastewater treatment plant (a.k.a. water reclamation facility) was completed and identified needed improvements to the capacity and the function of the plant over the next 20 years.

Individual Systems

A 2007 Collection System Master Plan (CSMP) concluded there were more than 4,200 parcels within the Urban Growth Boundary (UGB) that were developed but not served by the City of Bend collection and treatment system. These individual systems can potentially create a non-point source of nitrogen based pollutants into the groundwater supply. Ultimately, connection to the city collection system will remove this pollutant stream and improve ground water quality. The concern is exacerbated due to the soil structure in the area. Generally speaking, ground in the urban area is not well suited for drain field disposal systems because the soils are relatively shallow over fractured lava rock.

The Deschutes Basin has a complex geology of fractured lava rock. The state, county, and city are concerned about the potential for ground water and surface water contamination from effluent that works its way into the rock from drill holes and individual drain field systems. The likelihood of contamination increases as the systems get older and more systems are installed. Protection of the water shed becomes increasingly difficult with the failed systems and porous ground structure.

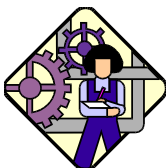


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There are environmental, social and financial costs associated with failing individual sewage disposal systems. The possibility of local and regional public health risks from contaminated water systems represents both environmental and social costs. Replacing or expanding a drain field — if it can physically be done on a subdivision lot — can cost a homeowner thousands of dollars. The extension of the city's sewer system into subdivisions with drain field problems provides the best long term solution to protect the health, safety, and property of residents in the urban area.

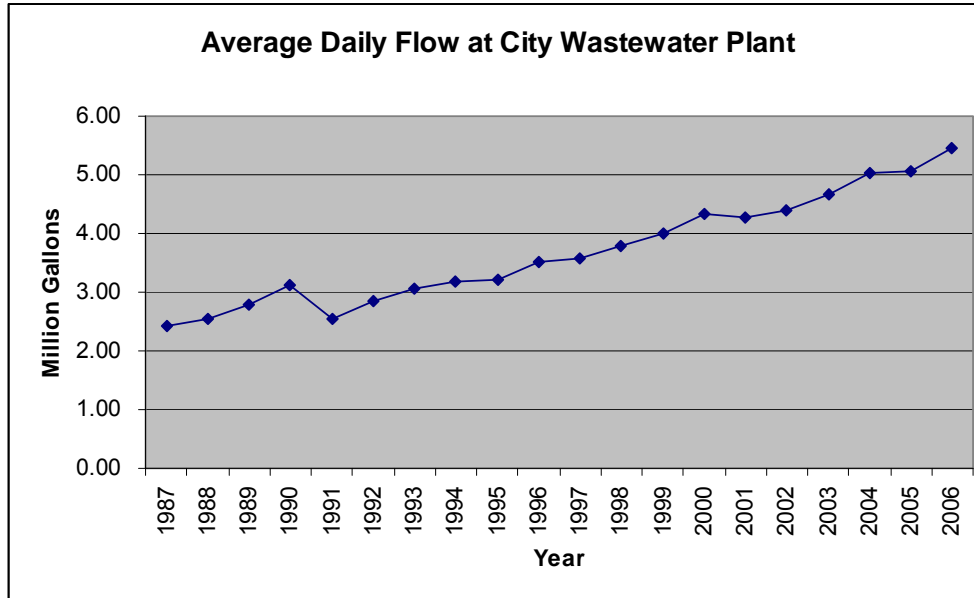
Municipal System

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 and in 2006 the average flow was about 5.6 million gallons a day. Figure 8-1 charts the average daily flows at the wastewater treatment plant.



BEND AREA GENERAL PLAN

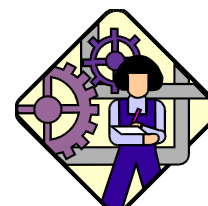
Figure 8-1



In 1986, the disposal of septic tank wastes at the county landfill was curtailed and these wastes started to be disposed of at the city's wastewater treatment plant. Due to the increased volume of septic tank waste from throughout the county, the Bend treatment plant in 1992 was near capacity in its ability to process organic materials. Improvements were initiated to increase capacity. In recent years, a third digester was added; a gravity belt thickener and belt filter press were installed. In 2007 construction began on a new headworks facility as well as capacity enhancements to the existing digesters. Improvements to the biological treatment system and to the secondary clarification are expected through the facilities plan. The headworks facility was completed in 2008.

A master planning process was initiated in January 2007 to focus on necessary improvements to the city's Wastewater Treatment Facility. The master plan for the wastewater reclamation facility (WRF) was completed in 2008 by Carollo Engineering. 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. Other facility improvements will continue to be undertaken to ensure plant sustainability. Eventually a full plant expansion will be required to ensure plant capacity and environmental compliance. This 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 major collection system needs within the urban area include increased capacity to stressed areas, rehabilitate aging pumping stations, install major interceptors in key areas,



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and provide sewerage collection lines to existing developed areas within the urban growth boundary. Additionally, initiatives will be undertaken to improve collection subsystems throughout the nine area plans identified in the WRF master plan. The improvements will address problematic areas by replacing pressure systems with gravity installations, rehabilitating damaged piping, and installing dedicated pump station discharges so as to eliminate back pressure issues with home sumps.

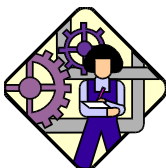
Private Systems

After the annexation of the Juniper Utilities into the City of Bend sewage system, no private systems remain. The only private installations consist of home sumps connected to a pressure sewer system. The individual home pumps are primarily located on Awbrey Butte and Valhalla where sewer needs to be pumped uphill to get into a gravity pipe.

Sewer System Financing

Table 8.1 lists sewer facilities the city plans to construct through 2002 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

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 SDC Project Lists such as interceptor lines and expansion of the wastewater treatment plant. SDC proceeds will be utilized to partially fund the improvements listed in Table 8-1.



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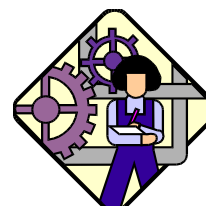
**Table 8-1
City Sewer System Projects (1997 dollars)**

<u>Approximate Year</u>	<u>Description of Project</u>	<u>Rough Cost for all projects</u>
<u>1997-98</u>	<u>Construct centrifuge at treatment plant</u> <u>Install gravity belt thickener at treatment plant</u> <u>Sludge handling / dewatering improvements at treatment plant</u> <u>Construct south canal gravity main interceptor line</u> <u>Design North UGB interceptor line</u>	<u>\$2,615,000</u>
<u>1998-99</u>	<u>Construct 27" Brosterhous interceptor</u> <u>Start 21" Brosterhous interceptor</u> <u>Construct Rimrock Pump Station</u> <u>Construct River's Edge interceptor sewer</u> <u>Start Secondary clarifier #3 at treatment plant</u> <u>Start North UGB interceptor line</u>	<u>\$1,898,000</u>
<u>1999-2000</u>	<u>Continue 21" Brosterhous interceptor</u> <u>Continue North UGB interceptor line</u> <u>Finish Secondary clarifier #3 at treatment plant</u> <u>Start anaerobic digester at treatment plant</u>	<u>\$1,630,000</u>
<u>2000-01</u>	<u>Finish 21" Brosterhous interceptor</u> <u>Continue North UGB interceptor line</u> <u>Finish anaerobic digester at treatment plant</u> <u>Sunrise Village tie-in</u> <u>Start effluent polishing filter at treatment plant</u>	<u>\$2,454,800</u>
<u>2001-02</u>	<u>Continue North UGB interceptor line</u> <u>Finish effluent polishing filter at treatment plant</u>	<u>\$1,650,000</u>

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, and water planning documents from the Avion



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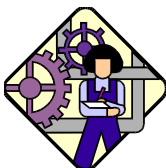
Water Company and Roats Water Company, to develop an updated Goal 11 water public facility plan (PFP) for the existing Bend UGB as of 2008. This 2011 Water PFP is incorporated by reference herein as the Goal 11 public facility plan for water and identifies those capital improvements needed to serve the existing and future development within Bend's UGB as of 2008.

Municipal System

The City of Bend is one of three water suppliers within the UGB. The city's water system in 2006 includes 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.

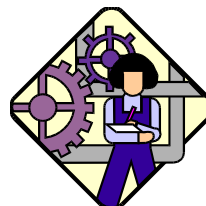
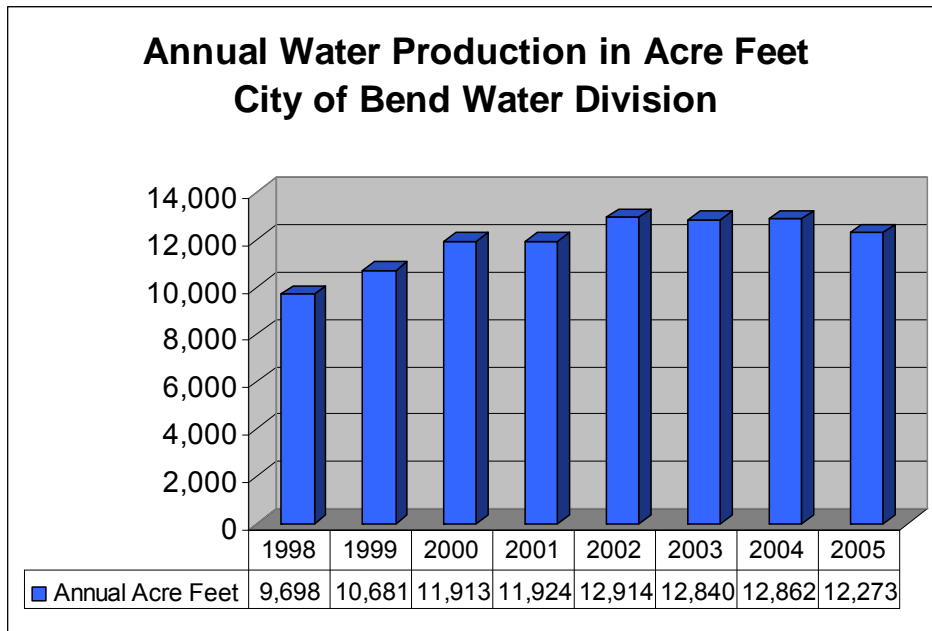
The city water system historically provided metered service for industrial, commercial, and multifamily developments. However, the city was one of the last major water systems in the state to use flat rate (non-metered) billing for residential service connections. As of December 2004, the City has become 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.



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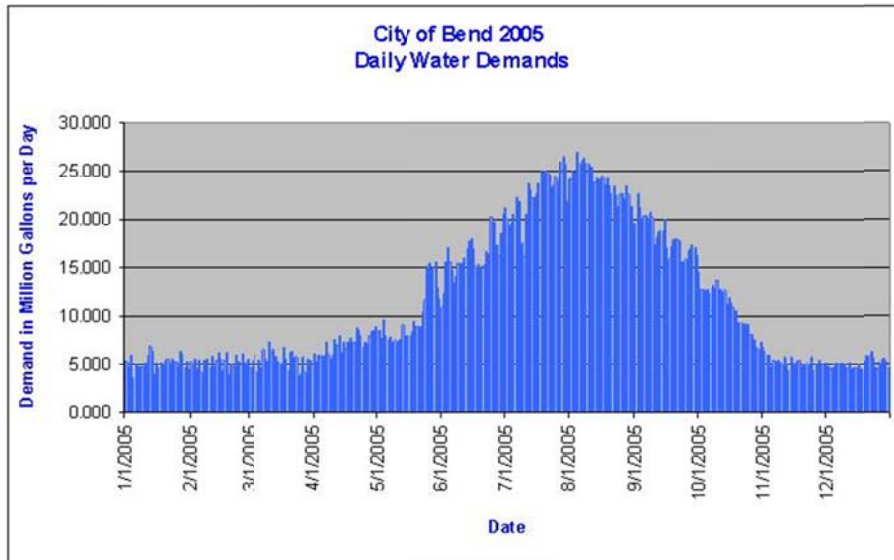
The city's 2007 Water System Master Plan Update identifies water supply, transmission, and storage needs throughout the city's service territory within the UGB. Additional wells, reservoirs, main transmission lines, and smaller distribution lines will be needed to meet the projected urban area growth.

Figure 8-2



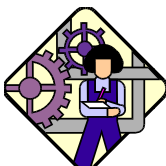
BEND AREA GENERAL PLAN

Figure 8-3



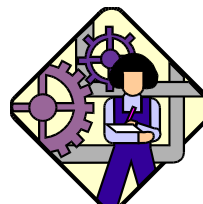
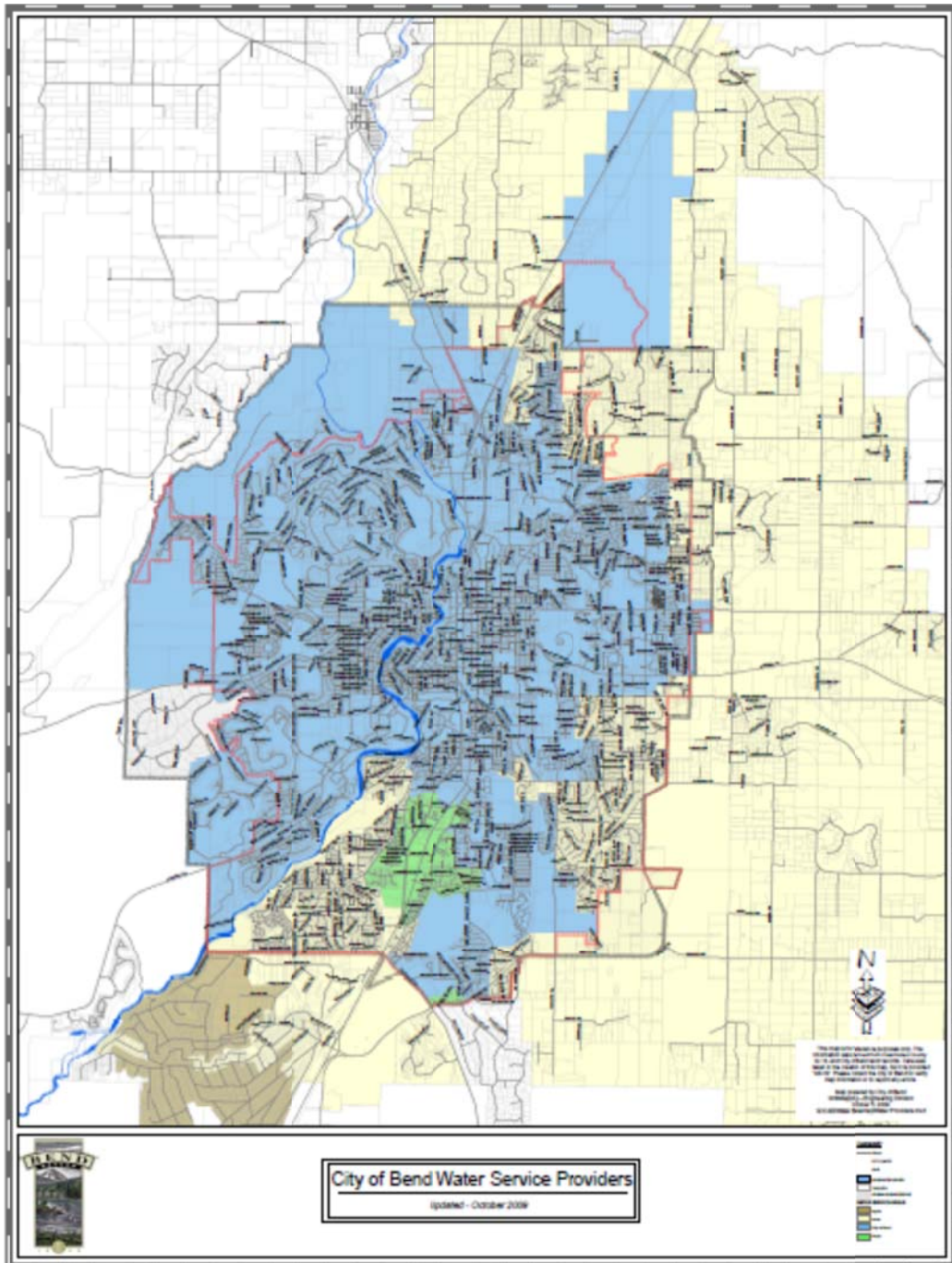
Private Providers

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.



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



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Water System Financing

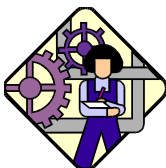
Table 8-2 lists the various water improvement projects the city plans to construct through the year 2028 to support the projected growth and land uses in the Bend urban area. The description, location, timing and estimated cost of listed facilities may change as a result of subsequent design studies, 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.

**Table 8-2
City Water System Improvement Projects (2010 dollars)**

Cost Item	Project Costs, 2010 Dollars
"Surface Water Supply"	
13.5 MGD, membrane treatment, no hydro ¹	\$57,750,000
Additional supply to meet 23 MGD (9.5 MGD) ²	\$12,825,000
New Groundwater Wells (35.7 MGD)	\$45,490,000
New Storage (14.5 MG)	\$24,130,000
New Pipe Improvements for Growth	\$43,637,000
Pipe Improvements for Fire Flow	\$11,458,000
Pump Station Expansion	\$1,957,000
New Valves	\$600,000
TOTAL	\$197,847,000
Sources: Water System Master Plan Update Optimization Study (2011) Optimatics	

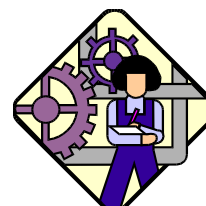
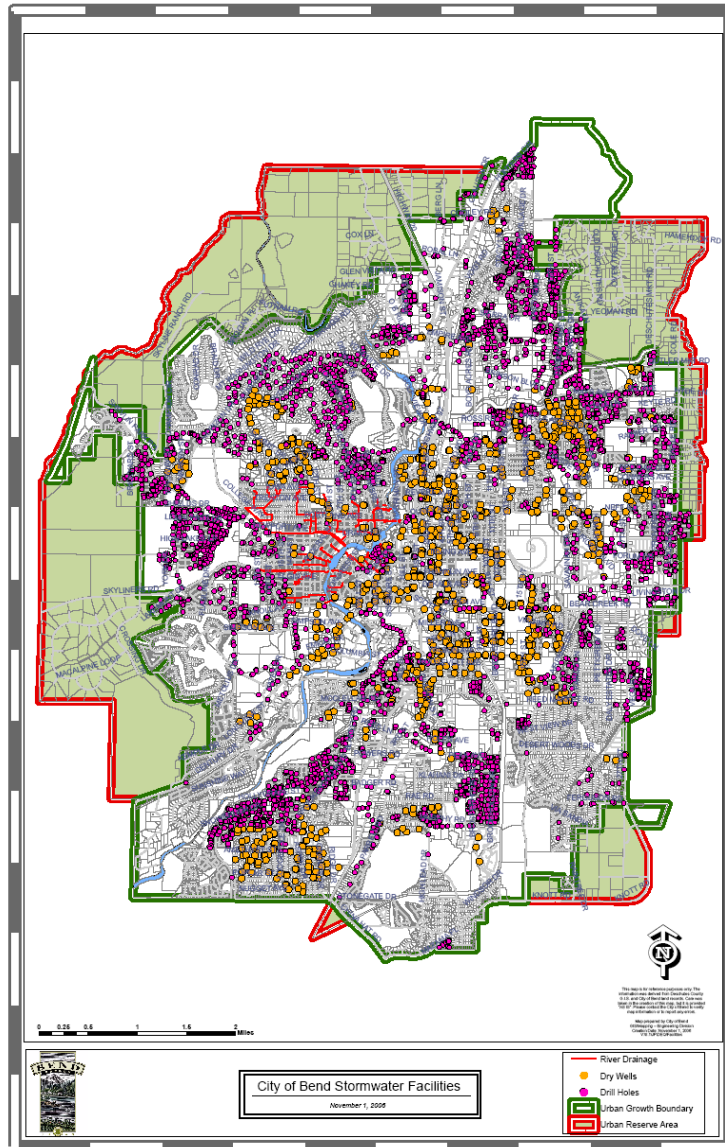


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STORM DRAINAGE FACILITIES AND SYSTEMS

Within the urban area, both public and private drill holes and dry wells are used for disposal of the majority of surface drainage. The city has a limited storm drainage system that serves part of the west side of the river and downtown (See City of Bend Stormwater Facilities, Figure 8-5). This system drains to the Deschutes River.

Figure 8-5



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Some domestic wells are in an area of a shallow water table that may be recharged by surface water such as irrigation canals and the river, or ground water. Disposing of stormwater using dry wells or drill holes in this area presents a potential for ground water contamination.

. The city, county, and state Department of Environmental Quality and Department of Water Resources have developed a program for storm drainage in the urban area that will protect the ground water resource. This program includes dry wells, the use of landscaping and swales to contain runoff, and requirements that surface drainage from developments must be retained on-site. In addition, the Central Oregon Intergovernmental Council (COIC) coordinated the development of the Central Oregon Stormwater manual (COSM). The Central Oregon Stormwater Manual adapts the best available stormwater management guidance from Oregon and Eastern Washington to create a reference for engineers, builders, and local government staff on the design and construction of runoff treatment and flow control facilities¹.

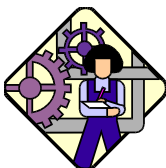
Storm drain facilities must adequately prevent unauthorized flooding of public and private streets, facilities, and properties. Developments should be designed per the recommendations of the Stormwater Master Plan.

Water Quality and Stormwater Management

The City is required to meet the requirements of the federal Clean Water Act and federal Safe Drinking Water Act with respect to stormwater drainage. To do so, the City must successfully meet the requirements of its National Pollutant Discharge Elimination System (NPDES) Phase II Municipal Separate Storm Sewer System (MS4) Stormwater Permit and Total Maximum Daily Load (TMDL) requirements for drainages to surface waters, and its Underground Injection Control Water Pollution Control Facility permit requirements for drainage underground. The City is also committed to providing enhanced protection within its Drinking Water Protection Areas.

The City shall require implementation of stormwater pollution control measures and programs to reduce and control the discharge of pollutants into Bend's drywells, drillholes, storm drain system, the Deschutes River, Tumalo creek, and other natural drainages to the maximum extent practicable or as required per federal and state regulations. Stormwater pollution control measures cover the following main activities:

¹ See Central Oregon Intergovernmental Council (COIC) website at: <http://www.coic.org/cd/stormwater/index.htm>.



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- Public Education and Outreach on Stormwater Impacts
- Public Involvement and Participation
- Illicit Discharge Detection and Elimination
- Construction Site Stormwater Activities
- Post-construction Stormwater Management in New and Redevelopment
- Pollution Prevention for Municipal Operations
- Water Quality Monitoring
- Pollution Prevention in Drinking Water Protection Areas.

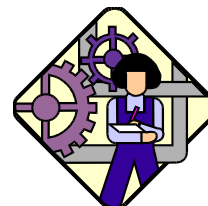
SOLID WASTE DISPOSAL

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.



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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.

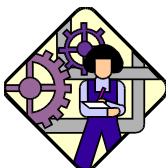
PUBLIC BUILDINGS AND FACILITIES

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.



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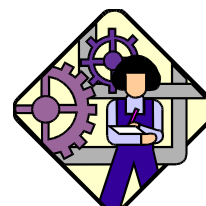
Fire Department Facilities

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



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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

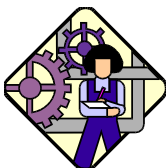
The City's Public Works Facilities are located in three primary areas: The Pilot Butte Campus Site, which is located west of 15th Street between Highway 20 and Bear Creek Road, the Boyd Acres offices, and the Water Reclamation site, which is located northwest of the Bend Airport on McGrath Road. Numerous 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.



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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.

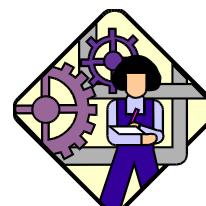
Over the past few years, demand at the Bend Airport has increased significantly. Continued business expansion by the existing tenants, the addition of Epic Aircraft in 2005, and continued growth and demand has wrought a dramatic increase in activity at the Airport. The corresponding demand for new services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

Sanitary Sewer Facilities and Systems

1. The city shall encourage development of serviced land prior to unserved land or require the extension of sewer lines as part of any development within the UGB.
2. The city shall coordinate the provision of sewer service with other providers within the Urban Growth Boundary.
3. All development within the Urban Growth Boundary shall be sewered or provide for sewers through a binding sewer service agreement with the city.
4. No further special districts shall be formed to provide sewer service within the Urban Growth Boundary, nor shall any annexation be allowed to an existing district.



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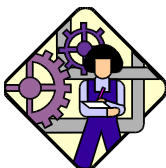
5. The city shall be the primary provider of sewage collection and treatment services for the Bend urban area.
6. To reduce the reliance on individual sewage disposal systems within the Urban Growth Boundary the city will assist established neighborhoods that commit to a sewage collection system by extending pressure or gravity lines to the subdivision.

Water Facilities and Systems

9. The City of Bend is the provider of water service for the City's service area under Statewide Planning Goal 11.
10. 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.
11. 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.
12. Within the urban planning area, public and private water systems shall be consistent with City Standards and Specifications for construction and service capabilities.
13. The City shall continue to coordinate with private providers and irrigation districts in matters of water concerns within the Urban Growth Boundary.
14. The City shall continue to implement a water conservation program that emphasizes education, enforcement, metering, and other methods to use water efficiently.

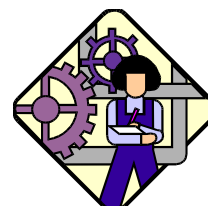
Storm Drainage Facilities and Systems

15. Dry wells or storm drains with appropriate water quality treatment using landscaping, retention ponds or other approved treatment controls shall be used for surface drainage control.
16. The preservation and use of natural drainage ways for storm drainage shall be required in new developments as much as possible.
17. Due to the lack of a defined drainage pattern for most of the urban area, development shall contain storm drainage on-site. In instances where containing storm drainage on-site would be impossible or impact public safety, the City shall enter into a specific agreement with a private party to adequately address the storm drainage.



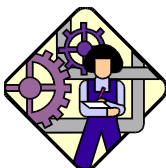
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18. The use of disposal systems shall be coordinated with the Oregon Department of Environmental Quality and Water Resources Department to protect ground water.
19. The City shall work to minimize the discharge of street run-off water directly into the Deschutes River.
20. Developments shall be designed to meet appropriate drainage quantity and quality requirements (e.g., meeting the requirements of the City's National Pollutant Discharge Elimination System MS4 Stormwater Permit, the City's Stormwater Master Plan and Integrated Stormwater Management Plan, and Total Maximum Daily Load requirements). Low impact site designs shall be encouraged.
21. Developments containing underground injection controls shall be designed, constructed, and maintained to meet the requirements of the Underground Injection Control program, including treatment; all underground injection controls shall be properly registered.
22. 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.
23. The City shall implement and enforce requirements for an erosion and sediment control program for public and private construction and post-construction activities.
24. 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.
25. The City shall seek efficiencies and consistency by working with other municipalities within Central Oregon on land use issues to address flood control and stormwater pollution prevention.
26. 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.
27. Development on slopes in excess of 10 percent shall require special consideration to prevent construction-related and post-construction erosion.



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28. The City shall regulate development near water courses to reduce erosion and pollution and to provide open, natural areas.
29. 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.
30. 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.
31. 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.
32. The City shall apply the following stormwater protection activities to all new development and redevelopment proposals during the planning, project review, and permitting processes:
 - Avoid conversion of areas particularly susceptible to erosion and sediment loss (e.g., steep slopes) and/or establish development guidance that identifies these areas and protects them from erosion and sediment loss. It is a general policy to limit grading permits or not allow grading in those areas susceptible to erosion from October through April.
 - Seek to retain river and natural drainage channels in their natural state to prevent undue erosion of banks or beds.
 - Preserve or restore areas that provide water quality benefits and/or are necessary to maintain riparian and aquatic biota.
 - Promote site development that limits impact 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 sites.
 - Require geotechnical site assessments whenever dry wells or other infiltration or injection is proposed.



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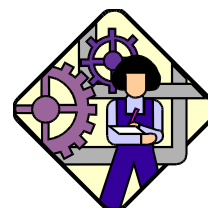
33. The City shall work to reduce transportation-related sources of water pollution, particularly in stormwater pollution. Any means and actions that result in a reduction in vehicle-miles-traveled would benefit congestion and reduce both air and water pollution.
34. The City shall recognize and publicize 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.
35. 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

36. The City and County shall encourage recycling beyond the level required by state law as an alternative to landfill disposal.
37. The County shall reduce dust and blowing refuse at the landfills in order to ensure as few adverse impacts as possible from these facilities.
38. 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.
39. The City shall coordinate with Deschutes County on the creation of a new solid waste management plan.

Public Buildings and Facilities

40. 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.
41. The County Public Works facility shall be planned and zoned with a Public Facilities designation. The uses allowed at the site from among those uses listed in a Public Facility zone shall be limited to public works and transportation facilities and yards and public service uses in existing facilities as such facilities may be expanded and accessory uses thereto. Commercial or manufacturing uses shall not be allowed at this site.



**City of Bend
Goal 11 Water Public Facility Plan
May 2012**



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Purpose

The City of Bend has drafted this water public facility plan to satisfy Statewide Planning Goal 11, Public Facilities and Services, and its implementing rule at OAR 660-011. This plan shows the water public facility systems (as defined under OAR 660-011-0000(7)) for the City, Avion Water Company, and Roats Water Company satisfy Goal 11 and the implementing rule for the respective service areas in the 2008 Bend urban growth boundary (UGB). The water public facility plan (PFP) for the City consists of this document which specifically addresses the requirements of Goal 11 and its administrative rule, and draws on key elements from master plans and engineering documents developed for the City's system and for those of Avion and Roats.

In 2007, Murray, Smith, and Associates (MSA) prepared a water system master plan for the City of Bend. This plan covered the city's service territory in the UGB, and two areas outside of the Bend UGB. These areas included the city's Juniper Ridge property, north and east of Bend, and Tetherow, a Goal 8 destination resort located south and west of Bend. The City adopted this plan and a water master plan for the Bend Airport as the Goal 11 water public facility plan for Bend in 2009¹. This PFP and the adopting ordinance were submitted to the Oregon Department of Land Conservation and Development in June 2009 to be reviewed alongside the city's proposed UGB expansion.

On November 3, 2010, the Oregon Land Conservation and Development Commission (LCDC) issued Order 001795 in which LCDC remanded the water PFP back to the City. LCDC agreed that the City could adopt a water PFP for the current (2008) UGB and if it does so, this plan must consider current and potential future land uses allowed under its acknowledged comprehensive plan². However, LCDC also concluded that a PFP for the current UGB cannot address areas outside of the of the acknowledged urban growth boundary³ in connection with the proposed UGB expansion. With respect to any expansion of the UGB, LCDC found that the city may, if it chooses, analyze water service for alternative areas considered for expansion under Goal 11, Goal 14, locational factor 2, and OAR 660-024-0060(8). This analysis would need to be adopted as part of the city's findings on any UGB expansion. In addition, the city could subsequently choose to either amend the existing water PFP or develop a new PFP that shows how water service would be provided to the areas in an acknowledged UGB expansion consistent with Goal 11 and the Goal 11 rule.

This water PFP, once adopted, will function as the water PFP for the land within the 2008 UGB only, consistent with Goal 11. Public facility systems are defined under OAR 660-011-0005(7) as those facilities of a particular type that combine to provide water, sewer, or transportation services. A "water system" is a system for the provision of piped water for human consumption subject to regulation under ORS 448.119 to 448.285. For the purposes of Division 11, a public facility system for water includes the following components: sources of water; treatment system; storage system; pumping system, and; primary distribution system.

¹ See Ordinance NS-2111 – available online at http://www.ci.bend.or.us/city_hall/meeting_minutes/docs/PFP_ADOPTING_ORDINANCEfinal122908.pdf.

² See LCDC's Partial Acknowledgement/Remand Order 001795 at pages 96-113 for their disposition of the issues raised on appeal regarding the city's public facility plans. The order is available through the city's website: http://www.ci.bend.or.us/depts/community_development/ugb_expansion_information.html.

³ The PFP may address areas outside the City currently served by City water, but not currently unserved areas outside the UGB.

Background

Three different water utilities provide potable water to citizens in the Bend UGB. These utilities are the City, Avion Water Company, and Roats Water Company. No special districts provide potable water within the Bend UGB. The City operates a public drinking water system (Public Water System Identification Number 4100100) that supplies water to its customers from both surface and ground water sources⁴. The City's water system is regulated by the Oregon Drinking Water Program under the Oregon Department of Human Services and the Oregon Water Resources Department. Both Avion and Roats are rate and service regulated private water utilities that are also regulated under the Oregon Public Utility Commission and Oregon Water Resources Department⁵.

City of Bend Water Utility

The City's service area is the largest of the three utilities; it covers approximately 16,000 acres and includes 22,000 water meters and an estimated population of 62,800⁶. Figure 1 shows the City's current UGB and the location of its service area. The City holds 12 groundwater rights that authorize the use of groundwater at a rate of up to 68.2 cfs (44.1 mgd) for municipal purposes: 7 certificates and 5 permits⁷. In addition, the City holds six surface water rights that authorize a total use of up to 36.1 cfs (23.3 mgd) from Bridge Creek and Tumalo Creek for municipal purposes⁸. The City's seven water right certificates for the use of groundwater authorize the use of up to 31.7 cfs. The City's surface water rights are evidenced by four certificates, one permit, and one transfer. Two of the City's groundwater permits, G-16177 and G-16178, require mitigation. This requires purchasing water rights from other water right holders (i.e. irrigation districts) and putting that water back in stream permanently to offset additional groundwater pumping under these two rights.

The City of Bend's existing water system consists of a surface water intake facility, 23 groundwater production wells, 14 finished water storage reservoirs, 5 booster pump stations, transmission and distribution mains, and associated appurtenances such as control valves, pressure reducing valves, isolation valves, meters, and fire hydrants. The system includes eleven primary pressure zones serving water system customers ranging in elevation from approximately 3,450 feet to 4,160 feet above mean sea level (msl). Surface water is collected approximately 13 miles west of the City at the Bridge Creek Intake Facility located near the confluence of Bridge Creek and Tumalo Creek. Flows in Bridge Creek are supplemented by the diversion of natural springs located in the Tumalo Creek drainage basin. Spring flows are collected in a diversion pond and transferred through two parallel transfer pipes to a canal flowing to Bridge Creek. Raw water is then routed from the Bridge Creek Intake Facility approximately 11.5 miles via two parallel steel transmission pipelines measuring 14 inches and 16 inches in diameter to the Outback Site. In addition to the surface water source, the City currently has 9 groundwater production sites that include 23 wells located throughout the

⁴ See Water Management and Conservation Plan (2011), page 2-33.

⁵ See Oregon Public Utility Commission website at <http://www.puc.state.or.us/PUC/water/regcos.pdf>.

⁶ See Executive Summary page ES-2. Water Management and Conservation Plan (2011) for City of Bend. GSI Water Solutions inc. et al.

⁷ Please note cfs = cubic feet/second and mgd = million gallons/day.

⁸ See WMCP (2011) page 2-21 and Exhibit 2-18.

service area and at the Outback site westerly of the City. The total groundwater production capacity is approximately 31 million gallons per day (mgd).

The existing water distribution system includes eleven primary service areas, or pressure zones. A total of 15 storage reservoirs located throughout the water service area, including the 1.5 MG CT Basin at the Outback site, provide a total of approximately 30 million gallons (MG) of storage⁹. The City has two additional reservoirs Outback 1 (1.5 MG) and Outback 2 (2.95 MG) used for CT to meet state and federal requirements. The distribution system includes five booster pump stations designed to deliver water from one pressure zone to a higher zone. Finally, the water system is composed of various pipe materials in sizes up to 36 inches in diameter. The total length of piping in the service area is approximately 290 miles. The majority of the piping in the system is ductile iron, cast iron and steel. The steel pipes are 12 inches to 16 inches in diameter, with the majority of the pipe at 12 inches.

The City has existing interties (a.k.a. interconnections) with both the Avion and Roats water companies¹⁰. The City maintains an emergency intertie with the Avion Water Company. This intertie is located at the intersection of 27th Street and Bear Creek Road. This intertie is meant strictly for emergency purposes, such as fire events or emergency backup. The City has an agreement with the Avion Water Company to allow for future emergency water interties if requested by either water provider. It allows either utility to provide water to the other. Construction of the interconnection occurred in 2003. The City has yet to convey water through this interconnection except for flow testing purposes and will not rely on Avion to supply water to the City's customers on a day-to-day basis.

The City also has an intertie with the Roats Water System to meet the demands of a small portion of the former Juniper Utility Company service area (South Bend service area). The interconnection with the Roats Water System is located at the southern boundary of the City's system. Although this connection originally allowed Roats to serve domestic water in the former Juniper Utility service area, the City no longer purchases water from Roats. The interconnection is now considered for emergencies only.

Avion Water Company

Avion Water Company's service area is the second largest covering over 4,000 acres with an estimated 7,002 service connections and an estimated population of 15,796 persons served in the Bend UGB. Figure 2 shows Avion's service area, including that portion in the Bend UGB. Most of Avion's service territory is beyond the Bend UGB in Crook and Deschutes counties. Avion's water supply is ground water from the Deschutes Basin aquifer. Avion began acquiring water rights in its own name on May 21, 1969. As of today, there are 11 separate rights, including the most recent permit G-12788, which carries a priority date of May 18, 1992. The distribution relies on gravity, flowing from the south of Bend to the north end. Avion can currently pump 14.25 million gallons per day, and has 9.9 million in storage. The supply and storage system includes 11 production wells, 5 of which directly pump to reservoirs. The other 6 wells pump directly into mainlines. Water is stored in two concrete reservoirs with a third under construction; a number of smaller reservoirs serve existing developments outside Bend. The pipe system includes pipes as large as 24 inches in diameter.

⁹ CT stands for chlorine contact time.

¹⁰ See 2011 Draft WMCP (2011), page 2-2.

Roats Water Company

Roats Water Company, the smallest of the three utilities, covers about 1,000 acres and has 2,640 customers in the Bend UGB¹¹. Most of Roats' service territory is within the Bend UGB and surrounded by the City's service area and Avion's service area. In this PFP and in documents prepared for or by Roats, the service area within the UGB is referred to as Homeplace. Roats also provides water to Woodside Ranch, which is outside of the Bend UGB, and not contiguous to its service area in the Bend UGB. Roats relies on groundwater for its utility, and has seven (7) water right permits. Roats stores water in six (6) reservoirs. Water is also stored in ten wells. Of these ten wells, six (6) serve their Homeplace service area. Roats distributes water through a piping system that includes pipe from two (2) inches to 16 inches in diameter. An approximate 132,200 feet of pipe serves the Homeplace service area.

Goal 2 Planning Requirements

The City's decision to develop and adopt a water public facility plan must be consistent with state planning law and with the City's General Plan and Development Code. Statewide Planning Goal 2, Land Use Planning, requires the following for local government planning decisions.

- **Consistency** - The City's plans must be internally consistent and consistent with plans of county, state, and federal agencies, and special districts.
- **Factual Base** - The City's plans must be supported by an adequate factual base. For a legislative land use decision such as this Goal 11 PFP, an adequate factual base must be supported by substantial evidence. Substantial evidence exists to support a finding of fact when the record, viewed as a whole, would permit a reasonable person to make that finding.
- **Coordination** - The City's plan must also be coordinated with the relevant plans of the county, state, federal agencies, and special districts. A plan is "coordinated" when the needs of all levels of governments, semipublic and private agencies and the citizens of Oregon have been considered and accommodated as much as possible (See ORS 197.015(5)).

Coordination with special districts and private utilities was the basis for a number of issues raised in appeals and objections of the city's PFPs before LCDC. ORS 195.065 to 195.085 includes a number of requirements for cities to follow when coordinating with special districts on the provision of public facilities, like water. These requirements include cities entering into urban service provider agreements with special districts. LCDC found that the urban service provider agreement provisions of ORS 195.065 do not apply to either Avion Water Company or to Roats Water Company because they are not special districts under Oregon law.¹² Both companies are rate and service regulated private utilities. In addition, the requirements for

¹¹ See page 7, Roats Water Company Water Management and Conservation Plan (2007).

¹² See Partial Acknowledgement/Remand Order 001795, pages 105-108.

coordinating with urban service providers (e.g. a water district) and executing urban service provider agreements do not apply to irrigation districts organized under ORS 545¹³.

However, ORS 197.015(5), Goal 2, and the Goal 11 rule for public facility planning require that the city coordinate with providers of public facilities, including private utilities within the City's UGB. OAR 660-011(1)(e) and (g) and 011-015 require the City to identify and to designate providers of water service in the water PFP. The water PFP must identify their service areas, and include an inventory and assessment of significant systems and projects to support the land uses within that area as provided in OAR 660-0010(a)-(d) and (f). The plans of the three water service providers are included as appendices to this PFP and include details on the service areas and sufficient descriptions of the systems to comply with Goal 11 and its implementing regulations.

City of Bend (adopted as appendices)

1. Water System Master Plan update, Final Report (2007) prepared by Murray, Smith, and Associates.
2. Water system master Plan Update Optimization Study (2011) prepared by Optimatics.
 - a. See also the following tables from this document that are attached as a separate appendix to this PFP:
 - i. Table 2.11 – Recommended new storage – Final Build-out solution
 - ii. Table 2.12 – Recommended new wells – Final Build-out solution
 - iii. Table 2.13 – Recommended new pumps – Final Build-out solution
 - iv. Table 2.14 – Recommended new valves – Final Build-out solution
 - v. Table 2.18 – Total capital costs – Final Build-out Solution
3. Water Management and Conservation Plan (2011) prepared by GSI Water Solutions, Murray Smith and Associates, and HDR Engineering, Inc.

Avion Water Company (adopted as appendices)

1. Master Plan (2006) Avion Water Company.
2. Water Management and Conservation Plan (2004) Avion Water Company

Roats Water Company (adopted as appendices)

1. Water Management and Conservation Plan (2007) Roats Water Company
2. Modeling by MSA for Roats Water Company (2007)

¹³ See Partial Acknowledgement/Remand Order 001795, pages 111-112, related discussion on coordination with Swalley Irrigation District specifically at pages 143-144.

Goal 11 Requirements for Public Facility Plan

Statewide Planning Goal 11 requires cities to develop a timely, orderly and efficient arrangement of public facilities and services to serve as a framework for urban and rural development¹⁴. The Land Conservation and Development Commission has adopted an administrative rule at OAR 660-011 that identifies what public facilities must be addressed under this rule and the requirements for completing a public facility plan¹⁵. This plan draws from a number of water planning documents to address the requirements for a PFP under Goal 11 and the Goal 11 rule, but only to the extent that these planning documents address land within the 2008 Bend urban growth boundary (UGB). The Council adopts this PFP and its appendices as the water public facility plan for the Bend UGB.

This Goal 11 PFP addresses water service for the area within the Bend UGB as of January 2009. The UGB is shown in Figure 1 in red. This plan does not propose water service to any area outside the 2008 UGB that does not already receive water service.

The Goal 11 administrative rule, OAR 660-011, lists certain elements that must be included in a Goal 11 public facility plan. These elements are listed at OAR 660-011-0010(1)(a) through (1)(g). The rule further requires that the local government preparing the PFP consider and describe how the PFP will guide and support the lands designated in the acknowledged comprehensive plan. For each service area, the following tables direct the reader to the appropriate sections and pages of the plans and reports listed under Section 2 of this report. Each table also considers and highlights how the respective planning documents provide data and information to satisfy the Goal 11 administrative rule requirements for a public facility plan. The purpose of the City's water master planning documents, as with any utility master plan documents, is to identify the infrastructure needs to meet increasing demands due to both population growth and changes in demands from the growing population. The projects identified in water master planning documents represent recommended improvements to the City's water infrastructure. The costs of these projects are presented as Class 5 estimates, meaning the project costs have an estimated level of accuracy of plus 100% to minus 50%. The planning documents identify these projects as certain investments that need to be made based on future demand and more detailed study. The recommended infrastructure improvements are typically tied to population projections by year. This is to best estimate when the population will reach a certain size by a given year so the City knows when certain projects will be needed.

However, because population is not easily measured year to year, a local government can make infrastructure investments that are unwarranted if the improvements are tied only to population projections. In addition, water use behavior can also change which can allow a larger population without increasing water demand. To ensure that the City makes improvements to the water infrastructure when they are needed, the City now relies on an approach that is consistent with the projected population growth, but is more advanced to projecting more specific timing of required investments for its water infrastructure. The City ties the timing of water infrastructure requirements to peak day demands. Peak day demands are easily and readily measured. This approach ensures that any investments made are directly tied to the actual demands and occur when they are actually needed. Tying the infrastructure investments to measured peak day demand allows required estimated investments to be postponed until they are needed.

¹⁴ See OAR 660-015-0000(11) at - <http://www.oregon.gov/LCD/docs/goals/goal11.pdf>.

¹⁵ See OAR 660-011 at - http://arcweb.sos.state.or.us/rules/OARS_600/OAR_660/660_011.html.

Table 3.1 of the Optimization Study (2011) identifies water infrastructure investments needed in the next ten years. This table was developed using the population growth that was used in the UGB process, and based on historical water use patterns. Several factors have impacted, and may continue to impact the timing of when the actual peak day tied to the improvements is reached. The factors that have impacted peak day demands in recent years include, but are not limited to, the economic downturn, operational changes, and cooler weather. Other factors besides growth that can impact the timing of when the peak day is reached (and therefore the City's potential ability to defer investments) are changes in water use behavior. For several years, the City of Bend has seen the per capita demand decreasing, which has helped in making more efficient use of the City's water supply. Since the investments in Table 3.1 are tied to the peak day demand, the City can delay making these investments to some point in the future. For example, it was estimated that in 2012 peak day demand would be approaching 33 MGD and would require over \$2 million in infrastructure investments to meet that peak day. In reality, the City's peak day is approximately 10 MGD less – or 23 MGD - and therefore the investments needed can be postponed until our peak day demands approach 33 MGD. As a result, the projects proposed in Table 3.1 may not be needed as forecasted. To pay for these projects, the City continually updates the five year capital investments that are estimated to be needed. Rate analysis is then developed and updated annually based on the five year capital needs to pay for these projects. As projects are delayed annually, rate analyses to pay for those also change annually to avoid collecting the money until a project is actually needed.

The City Council understands that the improvements identified in Table 3.1 are triggered by changes in maximum daily demand and average daily demand, both of which are expressed in million gallons per day. The City Council further understands that growth in water usage has been less than was estimated in the Optimization Study as a result of the economy, weather trends, and operational changes that have lowered peak day demand. To avoid financing improvements that are not yet needed, the Council is relying on the data in Table 3.1 for developing the following tables based on recommendations from the City Engineer, without tying the need for improvements to a specific year. The Council will follow the practice presented by the Public Works Department to schedule the improvements identified in Table 3.1 when maximum daily demand and average daily demand reach the levels that tie to the required improvement. To the extent that the Optimization Study is adopted as an appendix and contains specific yearly dates, it is the intent of this Master Plan that the following tables control for the timing of Short Term and Long Term Projects. Table 1.1 identifies projects that are already completed or estimated to be needed in the next five years. While the City estimates these projects may be needed in years 1 and 5 of the Water PFP, the City will not include these projects in the CIP until MDD and ADD reach levels that necessitate these improvements. Table 1.2 identifies the projects that are estimated to be required beyond the five year planning horizon for the CIP. These are long term projects, which may be required within years six through twenty.

In addition to Table 3.1, the City Council understands that the Optimization Study includes a series of tables that list improvements that will be needed for final build-out of the City's water utility service area. These improvements are presented in Tables 2.11 through 2.14, and Table 2.18. These tables list improvements for new storage, wells, pumps, valves, and total capital costs. Those improvements that are needed over the planning period area also reflected in Table 3.1, which was used to inform Tables 1.1 and 1.2 of this Water PFP.

The City Council's intent, as expressed above, is to ensure that the public investments for water

infrastructure are made when water consumption has reached levels necessitating these improvements. The Council is relying upon the work presented by Optimatics in the 2011 Optimization Study, and is choosing to work with a longer timeline than the one presented in Table 3.1 of the Optimization Study for financing these projects.

Table 1: Public Facility Plan components for City of Bend Service Area

<p>Goal 11 and OAR 660-011-0005(1) consideration of land uses served by the PFP</p>	<p><u>See</u> Sections 3 through 5 of 2007 Water System Master Plan.</p> <p>These sections include the analysis, based on the city’s buildable lands inventory and population forecast that examines the city’s water system, and acts the foundation for identifying future improvements to the storage and distribution systems. These documents show the city has considered the future existing and future lands uses contemplated under the Bend Area General Plan in developing this component of the water PFP for the Bend UGB.</p>
<p>OAR 660-011-0010, Required Elements</p>	<p>Information or Location of information in Planning Documents Description of required elements</p>
<p>OAR 660-011-0010(1)(a) inventory and General Assessment</p>	<p><u>See</u> Section 2 (Pages 2-1 to 2-11) of 2007 Water System Master Plan;</p> <ul style="list-style-type: none"> • Water supply and water rights • Groundwater production facilities • Pressure zones • Storage • Pumping stations • Miles of pipe by size <p><u>See</u> Figure 1 for a graphic representation of the location of facilities in the Bend service area</p> <p><u>See</u> also Section 2.5, pages 17-20, including Table 2.4 – Demand nodes with pressures below 40 psi under existing peak hour conditions – of Opitmatics (2011) report.</p>
<p>OAR 660-011-0020, inventory requirements</p>	<p><u>See</u> following tables in Section 2</p> <ul style="list-style-type: none"> • Table 2-1 for significant Groundwater Production Facilities • Table 2-3 for Storage Reservoir Summary • Table 2-4 for Existing Booster Pump Station Summary <p>Section 6 includes proposed improvements to the surface water supply, storage, pumping stations, transmission piping, and distribution system. Overall, most of these facilities are in good condition. Section 6 identifies that improvements are needed in supply, storage, and distribution to maintain the condition of the respective facilities. The following sections of this table identify the relevant sections and pages of plans and planning documents in which the reader will find the improvements needed over the planning period.</p>
<p>OAR 660-011-0010 (1)(b)</p>	<p><u>See</u> the following tables from Optimatics (2011) study:</p> <ul style="list-style-type: none"> • Table 2.11 – Recommended new storage – Final Build-out

list of significant public facility projects	<p>solution</p> <ul style="list-style-type: none"> • Table 2.12 – Recommended new wells – Final Build-out solution • Table 2.13 – Recommended new pumps – Final Build-out solution • Table 2.14 – Recommended new values – Final Build-out solution • Table 2.18 – Total capital costs – Final Build-out Solution <p>See also Tables 1.1 and 1.2 of this plan.</p>
OAR 660-011-025, timing of required facilities	See Tables 1.1 and 1.2 of this plan. These tables draw on information presented in Table 3.1 of the Optimatics (2011) study.
OAR 660-011-0030, location of projects	<p>See the following Figures from Chapter 3, Capital Improvements Plan – 10-year, from Optimatics (2011):</p> <ul style="list-style-type: none"> • <u>Figure 3.2 – Recommended phasing of Master Plan Improvements</u> • <u>Figure 3.3 – Phasing of Improvements – Southwest area: Outback, Tetherow, Westwood</u> • <u>Figure 3.4 – Phasing of Improvements – Southeast area: South Bend</u> • <u>Figure 3.5 – Phasing of Improvements – Zone 4b; Rock Bluff</u> • <u>Figure 3.6 – Phasing of Improvements – Level 5 east</u> • <u>Figure 3.7 – Phasing of Improvements – Level 5 west and Level 6</u> • <u>Figure 3.8 – Phasing of Improvements – Awbrey Butte</u>
OAR 660-011-0010 (1)(c) rough cost estimates	<p>See the following tables from Optimatics (2011) Study:</p> <ul style="list-style-type: none"> • Table 2.11 – Recommended new storage – Final Build-out solution • Table 2.12 – Recommended new wells – Final Build-out solution • Table 2.13 – Recommended new pumps – Final Build-out solution • Table 2.14 – Recommended new values – Final Build-out solution • Table 2.18 – Total capital costs – Final Build-out Solution <p>See Tables 1.1 and 1.2 of this plan. The rough cost estimates are presented in these tables are based on 2009 unit costs developed by MSA in October 2009. For the purpose of addressing this rule, the City finds that the cost estimates listed in the forgoing tables are rough cost estimates under OAR 660-011-0010(1)(c).</p>
OAR 660-011-0010 (1)(d) map or written	See Appendix A of 2007 Water System Master Plan, Figure 1, Existing Water System Map. This figure shows the city's service area and

<p>description of projects' general location or service area</p>	<p>existing water system.</p> <p>For the general location of projects, please refer to the following Figures from Optimatics (2011) study:</p> <ul style="list-style-type: none"> • <u>Figure 3.2 – Recommended phasing of Master Plan Improvements</u> • <u>Figure 3.3 – Phasing of Improvements – Southwest area; Outback, Tetherow, Westwood</u> • <u>Figure 3.4 – Phasing of Improvements – Southeast area; South Bend</u> • <u>Figure 3.5 – Phasing of Improvements – Zone 4b; Rock Bluff</u> • <u>Figure 3.6 – Phasing of Improvements – Level 5 east</u> • <u>Figure 3.7 – Phasing of Improvements – Level 5 west and Level 6</u> • <u>Figure 3.8 – Phasing of Improvements – Awbrey Butte</u>
<p>OAR 660-011-0010 (1)(g) discussion of funding mechanisms</p>	<p>Table 2.18 of Optimatics' 2011 study shows that the recommended improvements to the City's water system will cost, a final build out, an estimated \$197,622,000. The 10-year master plan shown in Table 3.1 of this report identifies which of these improvements are needed during this 10-year period, and that these improvements will cost an estimated \$38,790,000.</p> <p>The City's water utility program is funded through system development charges, and utility user fees.</p> <p>Systems Development Charges (SDC's) are fees charged to join or to extend an existing utility system. For the city's water utility, SDC's are projected to be \$4,520 for FY 2011-12, and \$4,565 for FY 2012-2013. Projected revenues from Water SDCs are \$1,561,900 for the biennium.</p> <p>Utility user fees (a.k.a. rates) are used to provide for the on-going operation and maintenance of the Water utility as well as to pay for capital projects and debt service used to finance capital construction. Water Utility user fees are allocated to the respective Water fund. The City's 2011-2013 budget projects \$27,726,000 in revenues from water utility user fees over the 2011-2013 biennium.</p> <p>In addition to utility rates and SDS's, the City's funding mechanisms for water include revenue streams from leasing of property to wireless telecommunications companies and the City's hydrant meter program.</p> <p>The City has also adopted a five-year capital improvement program (CIP) for water for 2011 through 2015. This program includes projects related to: (1) repair and maintenance, and; (2) growth. For repair and maintenance, the CIP budgets an average of \$800,000 per year from 2011 to 2015. For growth related projects, the CIP budgets an average of \$21,305,383 per year from 2011 to 2013. For 2014-15, the City budgeted an average of \$2,088,875 per year.</p>

**Table 1.1. Master Plan Improvements Identified by Optimatics (2011) for City of Bend
Water Utility - Short Term Projects (Years 1-5)**

MDD (mgd)	ADD (mgd)	Pipes	Cost	Wells	Cost	Total Cost
29	12.8	*Juniper Ridge 16-inch connection on 18 th	\$1,292,000			\$1,292,000
31	13.8	**Tetherow Improvements – B (Skyline Ranch 18-in main)	\$1,434,000			\$1,434,000
33	14.7	***Extend larger diameter pipe out of Pilot Butte on Lafayette to 11 th , piping associated with new Awbrey well	\$241,000	Awbrey	\$1,944,000	\$2,185,000

Source: Table 3.1 of the Optimization Study (2011)

Notes:

The five year period referred to in the title of this table is 2008-2012.

* A new lower cost approach for this project was found under further analysis and is currently under design.

The new estimated cost for this project is approximately \$150,000 and expected to be started in 2012.

**This project is complete and was designed and constructed by a local developer in 2011.

***This project is expected to be needed by 2012.

**Table 1.2. Master Plan Improvements Identified by Optimatics (2011) for City of Bend
Water Utility - Long Term Projects (Years 6-20)**

MDD	ADD	Pipes	Cost	Wells	Cost	Total Cost
35	15.6	New parallel pipe near College PS in Level 3 New Level 5 pipe connection on Roanoke Site and discharge piping on new Level 5 Well east of Pilot butte	\$1,169,000	New Level 5A	\$2,721,600	\$3,890,600
37	16.4	Parallel piping from Rock Bluff to Brookwood	\$1,535,000			\$1,535,000
39	17.3	Continue parallel piping from Rock Bluff to Brosterhous; open Zone 4B41 boundary at Reed Market	\$2,940,000	Shilo	\$2,721,600	\$5,661,600
41	18.2	Parallel mains on Brosterhous and Reed Market, replacing piping along Wilson in Zone 4b	\$1,742,000	New Level 6	\$1,360,800	\$3,102,000
43	19.1	Extend larger diameter piping out of Pilot Butte on Lafayette from 11 th to 8 th .	\$402,000	New Level 5a	\$2,721,600	\$3,123,600
45	20.0	Parallel piping in Level 6 – Boyd Acres and Brinson Blvd; piping for Level 6 Well at Butler Market well; New Pilot Butte tank connection	\$1,364,000	New Level 6	\$2,721,600	\$9,892,600*
47	20.9	Replace existing pipe along 8 th from Lafayette to Seward	\$1,000,000	New Level 5 A	\$1,360,800	\$2,360,800

49	21.8	Parallel main on Glassow and new main on Summit in Level 2; Replacement of piping on Norton and Olney in Level 5	\$1,366,000	New Level 6	\$2,721,600	\$4,087,600`
* - The total cost for these improvements includes \$5,807,000 for the Pilot Butte 4 tank.						
Source: Table 3.1 of the Optimization Study (2011)						
Note: The projects in Table 1.2 will be needed sometime between 2013-2028. These represent years 6 through 20 of this PFP.						

Table 2: Public Facility Plan Components for Avion Water Company Service Area

Goal 11 and OAR 660-011-0005(1) consideration of land uses served by the PFP	Chapter 4 of Avion's 2006 master plan includes an analysis of future water requirements based on their service area (<u>See</u> pages 17 through 23). Avion based their consideration of land uses on data on historic growth in their accounts, build-out of their portion of the UGB based on current zoning, and population forecasts.
OAR 660-011-0010, Required Elements	Information or Location of information in Planning Documents
OAR 660-011-0010(1)(a) inventory and General Assessment	<u>See</u> pages 10 to 11 of Avion Water Company master plan: <ul style="list-style-type: none"> • Water supply (<u>See</u> also pages 29-31) • Water storage (<u>See</u> also pages 32-34) • Distribution system (<u>See</u> also pages 36-38)
OAR 660-011-0020, inventory requirements	<u>See</u> Figure 2, mapped location of Avion's distribution system. Please note that this figure does show Avion's service area outside of the Bend UGB. For the purposes of preparing this PFP, the City relies on this figure in showing the location and sizes of distribution lines in the Bend UGB. <p><u>See</u> also:</p> <ul style="list-style-type: none"> • Water supply (<u>See</u> also pages 29-31) • Water storage (<u>See</u> also pages 32-34) • Distribution system (<u>See</u> also pages 36-38) <p>For the purpose of this PFP, the Avion Water Company's plans do not identify any facilities that are in poor conditions. For this plan, the facilities identified under Avion's water planning documents appear to be in good condition. The following sections of this table identify the relevant sections and pages of plans and planning documents in which the reader will find the improvements needed over the planning period.</p>

OAR 660-011-0010 (1)(b) list of significant public facility projects	<u>See</u> Chapter 9 of Avion's 2006 master plan:
OAR 660-011-025, timing of required facilities	<u>See</u> Table 10.1, Short Term Improvements (pages 42-43) <u>See</u> Table 10.2, Long Term Improvements (pages 43-44) For the purpose of this PFP, short term projects are those identified in Table 10.1; long term projects are those projects identified in Table 10.2.
OAR 660-011-0030, location of projects	<u>See</u> Tables 10.1 and 10.2, pages 42 through 44
OAR 660-011-0010 (1)(c) rough cost estimates	<u>See</u> pages 42 – 44 of Avion's 2006 master plan: <u>See</u> Table 10.1 – Short term improvements <u>See</u> Table 10.2 – Long term improvements
OAR 660-011-0010 (1)(d) map or written description of projects' general location or service area	<u>See</u> pages 40-42 of Avion's 2006 master plan.
OAR 660-011-0010 (1)(g) discussion of funding mechanisms	Avion Water Company is an investor-owned public utility and regulated by the Public Utility Commission. <u>See</u> discussion of customer rates for funding at pages 25-26 of 2006 Master Plan.

Table 3: Public Facility Plan Components for Roats Water Company service area

<p>Goal 11 and OAR 660-011-0005(1) consideration of land uses served by the PFP</p>	<p><u>See</u> Section 5 of 2007 WMCP, Water Supply Element. Roats based their consideration of land uses on the City's 2025 population forecast, potential new residential and commercial accounts in their Homeplace service area. Roats has a study conducted in which 1,589 additional service connections could be established in their Homeplace service area.</p>
<p>OAR 660-011-0010, Required Elements</p>	<p>Information or Location of information in Planning Documents</p>
<p>OAR 660-011-0010(1)(a) inventory and General Assessment</p>	<p><u>See</u> pages 8, 12-15 of Roats 2007 WMCP</p>
<p>OAR 660-011-0020, inventory requirements</p>	<p><u>See</u> Figure 3 – Roats service areas in Bend UGB (aka Homeplace). (also Exhibit 2-1 of Roats WMCP (2007)).</p> <p><u>See</u> also Tables 2-7, 2-9, and 2-10</p> <p>For the purposes of this PFP, the Roats water planning documents do not identify any facilities that are in poor condition. For this PFP, the facilities identified in their inventory appear to be in good condition. The following sections of this table identify the relevant sections and pages of plans and planning documents in which the reader will find the improvements needed over the planning period.</p>
<p>OAR 660-011-0010 (1)(b) list of significant public facility projects</p>	<p><u>See</u> page 22 of Roats 2007 WMCP. Roats has not developed a capital improvements program, but has identified a long range supply plan that is an element of its WMCP.</p>
<p>OAR 660-011-025, timing of required facilities</p> <p>OAR 660-011-0030, location of projects</p>	<p>The City of Bend maintains an intertie (or interconnection) with Roats Water Company (<u>See</u> Section 2.6, Interconnections, at page 14 of Roats 2007 WMCP).</p> <p>As indicated above, Roats has not prepared a long-term capital improvements program. A review of the 2007 WMCP suggest that the growth potential is limited in the Roats' Homeplace service area, and that additional facilities will not be required to serve new connections at buildout. This addresses both 025 and 030 of OAR 660-011.</p>
<p>OAR 660-011-0010 (1)(c) rough cost estimates</p>	<p>Roats has not developed any rough cost estimates for its long range supply plan.</p>

<p>OAR 660-011-0010 (1)(d) map or written description of projects' general location or service area</p>	<p><u>See</u> Exhibit 2-1 for the Homeplace System Map, which represents the services area in the Bend UGB. This exhibit describes the current system, including pipe locations and locations of storage.</p>
<p>OAR 660-011-0010 (1)(g) discussion of funding mechanisms</p>	<p>Like Avion, Roats is a rate and service regulated utility under the jurisdiction of the Oregon Public Utility Commission. <u>See</u> page 17 of the Roats WMCP for a discussion of Roats' rate structure for meter sizes. All connections in the Homeplace are metered.</p>

Policy Statements for Water Providers

OAR 660-011-010(1)(e) requires that a public facility plan include policy statement(s) or urban growth management agreement(s) identifying the provider of each public facility system. If there is more than one provider with the authority to provide service within the area covered by the public facility plan, then the rule requires the designation of each provider. This section of the PFP proposes policy statements that identify the City, Avion, and Roats as the providers of water service within the Bend UGB for their respective service areas. The City has entered into franchise agreements with each utility for providing water service in areas of the UGB not already served by the City of Bend.

City of Bend. The City proposes to add the following **new language** to Chapter 8 of the Bend Area General Plan, Public Facilities and Services, as a policy identifying the City of Bend as a provider of water service in the City's UGB.

The City of Bend is the provider of water service for the City's service area in the Bend UGB under Statewide Planning Goal 11.

Avion Water Company. The City proposes to add the following **new language** to Chapter 8 of the Bend Area General Plan, Public Facilities and Services, as a policy identifying the Avion Water Company as a provider of water service in the City's UGB.

Avion Water Company is the provider of water service for Avion's franchise area in the Bend UGB under Statewide Planning Goal 11 and pursuant to the franchise agreement between the City and Avion adopted under Ordinance NS 1514, as amended¹⁶.

Roats Water Company. The City proposes to add the following **new language** to Chapter 8 of the Bend Area General Plan, Public Facilities and Services, as a policy identifying the Roats Water Company as a provider of water service in the City's UGB.

Roats Water Company is a provider of water service for Roats' franchise area in the Bend UGB under Statewide Planning Goal 11 and pursuant to the franchise agreement between the City and Roats adopted as Ordinance NS 1747¹⁷.

¹⁶ See Bend Code 11-20.1, Water Service Franchise-Avion Water Company (Ordinance NS-1514, as amended) available online at: http://www.ci.bend.or.us/online_forms_and_documents/chapter_11_-_franchises.html.

¹⁷ See Bend Code 11-21, Water Service Franchise-Roats Water Company (Ordinance NS-1747), available online at: http://www.ci.bend.or.us/online_forms_and_documents/chapter_11_-_franchises.html.

Urban Growth Management Agreement

The City has entered into a joint management agreement (JMA) with Deschutes County for planning in the Bend UGB. The City and County entered into this agreement on February 24, 1998¹⁸. Section (4)(a)(1) of the JMA states the City is responsible for textual changes in the BAGP or implementing ordinances within the UGB. Section (10)(B) states the City is responsible for the preparation, adoption, and amendment of the public facility plan required by ORS 197.712(2)(e) with the aid and assistance of the County. This same section goes on to say the City shall coordinate the preparation of the public facility plan with the County, special districts, state and federal agencies, and private providers of public facilities as required by ORS 660-011-015(2).

The proposed PFP is a textual change to the BAGP and represents a new element to the BAGP. In addition, the PFP includes proposed changes to the text of Chapter 8 of the BAGP. The PFP was developed in coordination with the other water service providers in the Bend UGB: Avion Water Company and Roats Water Company. Both water companies are private utilities that have service areas within the city and UGB. The City and these companies have entered into franchise agreements for the provision of these services in the UGB. There are no special districts that operate water systems, as that term is defined under Goal 11, within the UGB for the provision of piped water for human consumption subject to regulation under ORS 448. OAR 660-011-0015(4) is not applicable because the city is not receiving state agency funding for the development of this public facility plan. The PFP does rely on water management and conservation plans (WMCPs) prepared for or by the City, Avion, and Roats pursuant to OAR 690, Division 86.

¹⁸ The JMA is available on-line at http://www.ci.bend.or.us/online_forms_and_documents/docs/CityCounty_IGA_Managed_services.pdf.

Figure 1 – Water Service Providers in Bend urban growth boundary

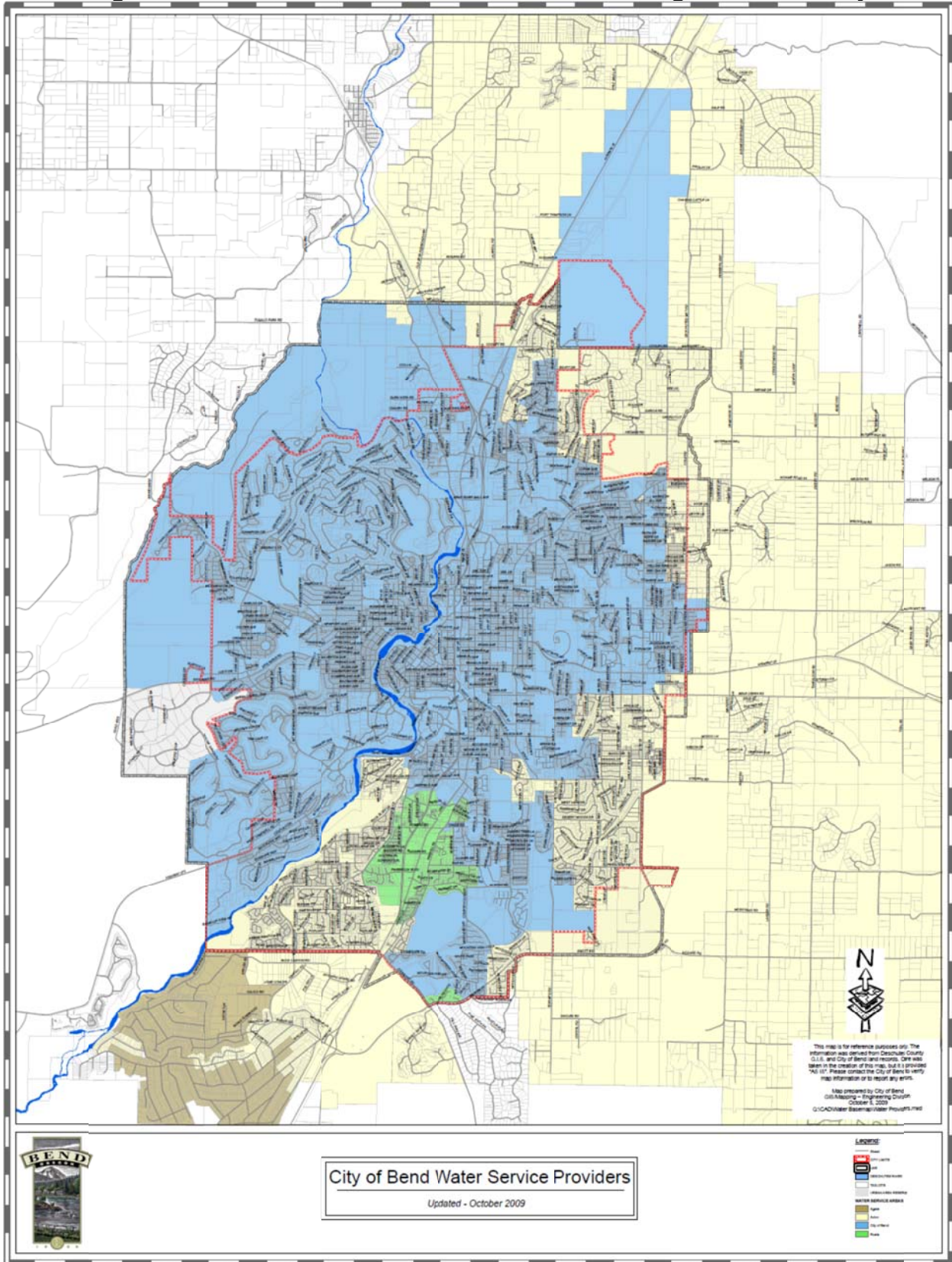
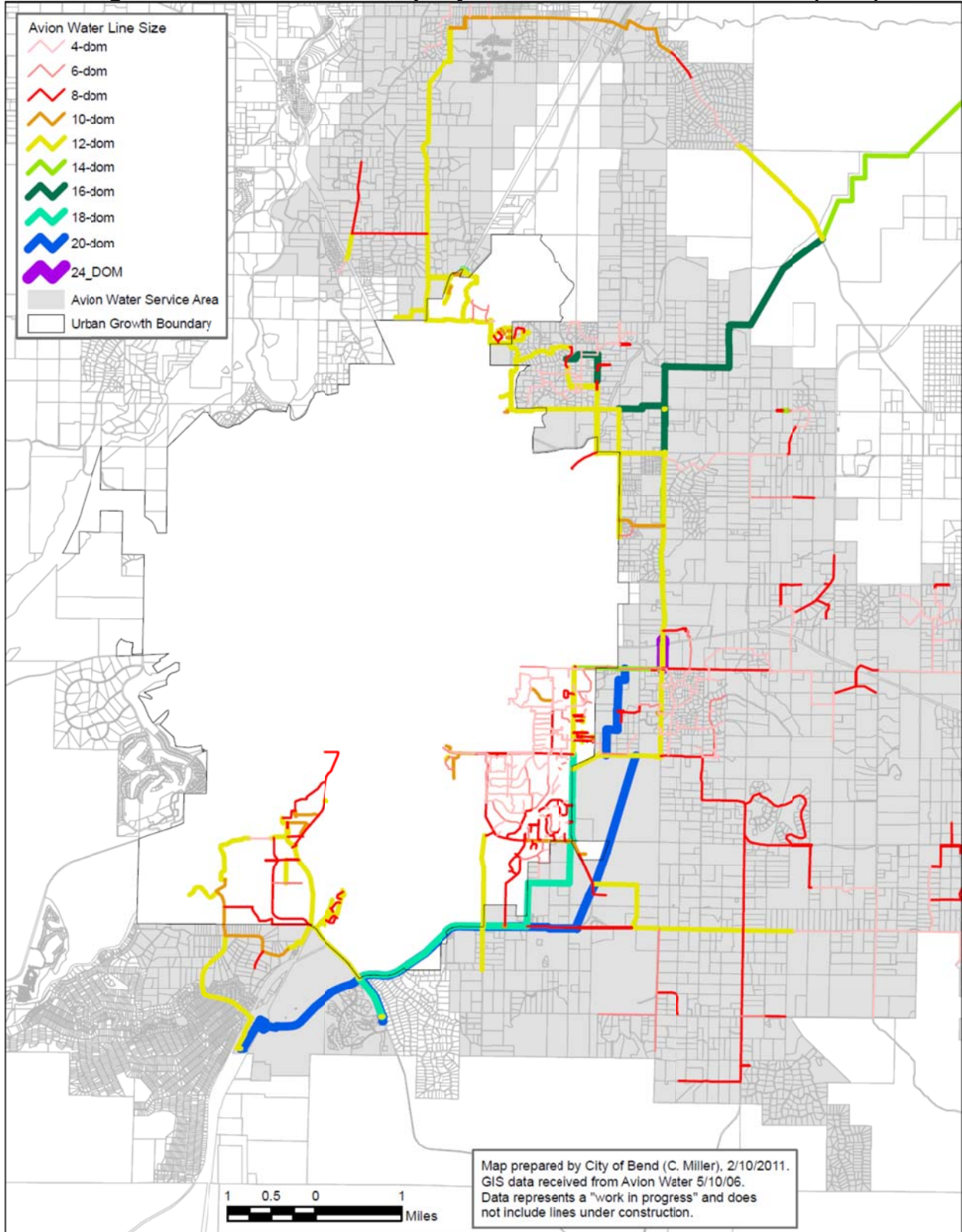


Figure 2 – Avion Water Company Service Area and Line Sizes (2006)



Appendices

A. City of Bend

1. Water System Master Plan update, Final Report (2007) prepared by Murray, Smith, and Associates.
2. Water system master Plan Update Optimization Study (2010) prepared by Optimatics.
The following tables are enclosed as appendices to this public facility plan.
 - a. Table 2.11 – Recommended new storage – Final Build-out solution
 - b. Table 2.12 – Recommended new wells – Final Build-out solution
 - c. Table 2.13 – Recommended new pumps – Final Build-out solution
 - d. Table 2.14 – Recommended new values – Final Build-out solution
 - e. Table 2.18 – Total capital costs – Final Build-out Solution
3. Water Management and Conservation Plan (2011) prepared by GSI Water Solutions, Murray Smith and Associates, and HDR Engineering, Inc.

B. Avion Water Company (adopted as appendices)

1. Master Plan (2006) Avion Water Company.
2. Water Management and Conservation Plan (2004) Avion Water Company

C. Roats Water Company (adopted as appendices)

1. Water Management and Conservation Plan (2007) Roats Water Company
2. Modeling by MSA for Roats Water Company (2007)

D. Agreement between the City of Bend and Deschutes County, Oregon for the Joint Management of the Bend Urban Area (1998).

Appendices (A)(2)(a) through (2)(f), Tables from Water System Master Plan Optimization Study (February, 2011)

Table 2.11 – Recommended new storage – Final Build-out Solution

Location	Storage construction:	New Volume (MG)	Cost
Outback 4 & 5	Above-ground Concrete	6.0	\$7,020,000
College 3	Above-ground Concrete	1.0	\$2,366,000
Tower Rock 2	Above-ground Concrete	2.0	\$3,755,000
Rock Bluff 2	Above-ground Concrete	2.0	\$3,755,000
Pilot Butte 4 (Level 5)	Buried Concrete	3.0	\$5,807,000
Westwood (replace)	Above-ground Concrete	0.5	\$1,427,000
Total Cost		14.5	\$24,130,000

Table 2.12 – Recommended new wells – Final Build-out Solution

Location	Max Day Contribution (MG)	Maximum Flow Rate (gpm)	Pump Capacity (MGD)	Pump Head (ft)	Cost ²
Expanded Outback Wells (#8-11)	5.8	4,000	5.8	~500	\$7,776,000
New Overturf Well	1.4	1,000	1.4	~500	\$1,944,000
Expanded Shilo Well (#2) ¹	1.3	1,400	2.0	~500	\$2,721,600
Expanded Rock Bluff Wells (#4-6)	4.0	6,000	4.0	~400	\$5,443,200
New Awbrey Wells (#1-4)	4.3	3,000	4.3	~500	\$5,832,000
New East Level 5A Wells (#1-5) ³ In vicinity of Shirley Ct	7.1	4,900	7.1	~800	\$9,525,600
New East Level 5B Wells (#1-2) ³ In vicinity of Paula Dr/Purcell Blvd	2.0	1,400	2.0	~800	\$2,721,600
New Level 6 Wells (#1-4) ³ Butler Market Rd/Brinson Blvd	7.1	4,900	7.1	~800	\$9,525,600
Total Well Cost	34.3		35.7		\$45,489,600

1) Assumes Shilo Well 3 online, this is additional capacity

2) Includes cost of standby generator for each new well

3) These locations do not take into account issues related to potential groundwater contamination and 2 year time of travel

Table 2.13 – Recommended new pumps – Final Build-out Solution

Description	Existing Capacity	Maximum flow rate for new pumps	Cost
Tetherow Pump Station Replacing pumps 4, 5 & 6 <i>MD + fire flow = 4,000 gpm</i>	1 x 150 gpm 5 x 700 gpm	3 x 1,250 gpm (replace 3 700s)	\$784,800
Murphy Pump Station Replacing pumps 3, 4 & 5 <i>MD + fire flow = 2,500 gpm</i>	5 x 300 gpm	3 x 1,000 gpm (replace 3 300s)	\$959,400
Total Pump Station Cost			\$1,744,200

Note: Cost based on maximum flow rate using cost rate curve developed by MSA. Cost for pump replacement or additional pumps in an existing station assumed 60% of cost for new pumps.

Table 2.14 – Recommended new valves – Final Build-out Solution

Description	Type	Status	Cost
New valve associated with new piping on Skyliners, Level 3 to Zone 4J/4A	PRV	Active	\$75,000
PRV in new NW Development (reduce pressure for lower elevation areas north of butte)	PRV	Active	\$75,000
New Level 5 to 6 connection at Division and Mt Washington	PRV	Active	\$75,000
Connection from new NW development to Level 6	FCV	Active	\$75,000
Level 3-4A connection near Westwood (helps fill the tank and provides emergency supply)	PRV	Active	\$75,000
Second connection Zone 4B to Level 5 at Bear Creek Rd (assists fire flow)	PRV	Emergency	\$75,000
New valve to assist with fire flow, Level 3 to Zone 4A north of Overturf	PRV	Emergency	\$75,000
Second connection to Zone 7C	PRV	Emergency	\$75,000
Total New Valve Cost			\$600,000

Table 2.18 – Total Capital Costs – Final Build-out Solution

Cost Item	Cost
"Surface Water Supply"	
13.5 MGD, membrane treatment, no hydro ¹	\$57,750,000
Additional supply to meet 23 MGD (9.5 MGD) ²	\$12,825,000
New Groundwater Wells (35.7 MGD)	\$45,490,000
New Storage (14.5 MG)	\$24,130,000
New Pipe Improvements for Growth	\$43,625,000
Pipe Improvements for Fire Flow	\$11,458,000
Pump Station Expansion	\$1,744,000
New Valves	\$800,000
TOTAL	\$197,622,000

- 1) As per HDR Memo *Surface Water / Groundwater Cost Comparison, DRAFT, September 2010*. Costs for all other items are based on 2009 Unit Costs developed by MSA (October 2009). Estimated 2010 dollars for Surface Water Supply and 2009 dollars for remaining cost items are assumed equivalent and called 2009 dollars.
- 2) Assume met from additional wells at Outback, \$1.35 million per MGD