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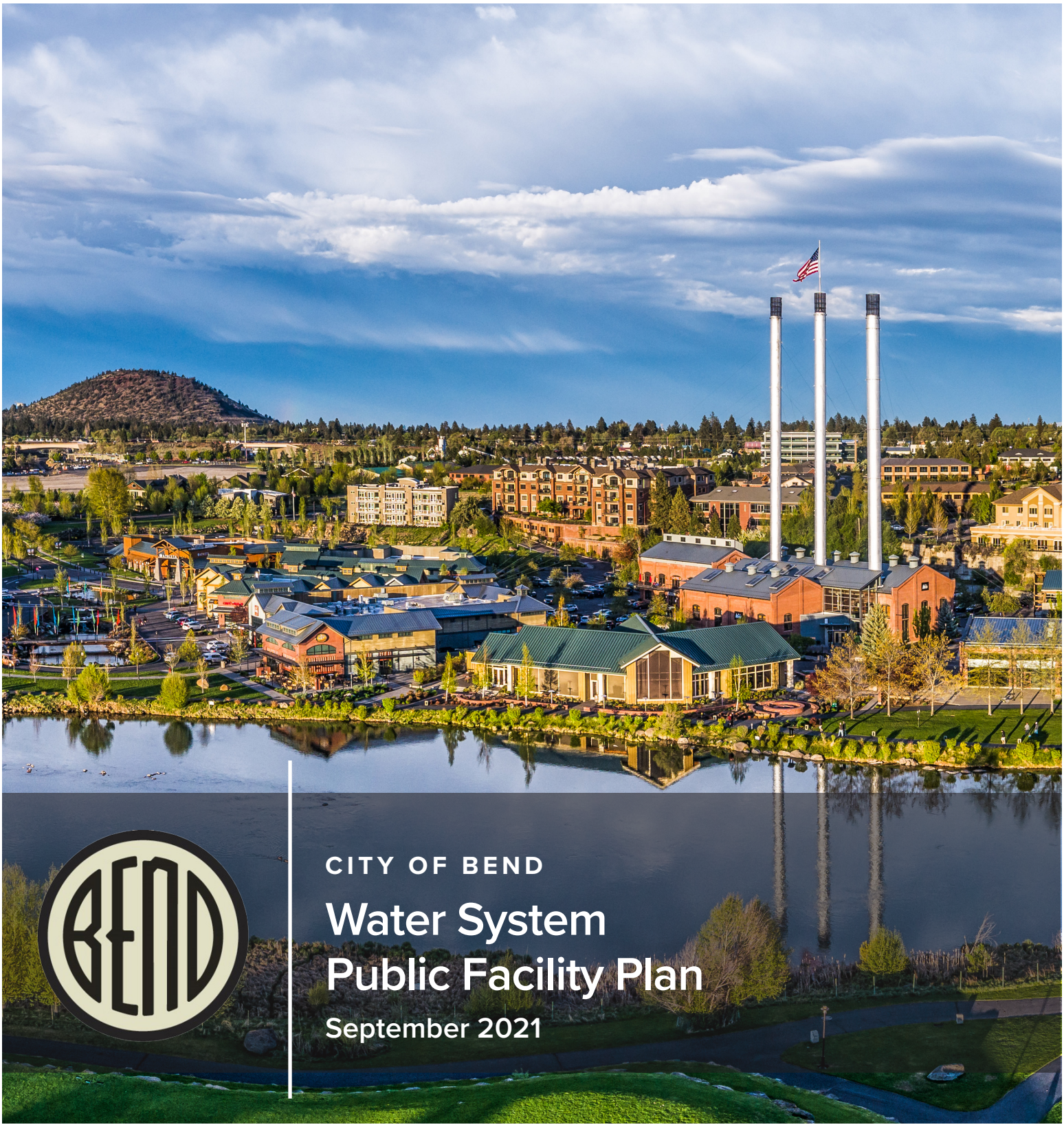

CITY OF BEND

Water System Public Facility Plan

September 2021

Water System Public Facility Plan

City of Bend

September 2021

Renews: 06/30/2023

Murraysmith

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Water System Public Facility Plan

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Water System Public Facility Plan

1. Purpose

This Water System Public Facility Plan (Water PFP) is prepared to comply with Statewide Planning Goal 11, Public Facilities and Services, and its implementing rule at OAR 660-011. The previous Water PFP was completed in 2012 and amended in 2013; this 2021 Water PFP is intended to replace the 2013 Water PFP. The intent of this plan is to comply with Goal 11 and OAR 660-011 for the water public facility systems (as defined under OAR 660-011-0000(7)) for the City of Bend (City), Avion Water Company (Avion), and Roats Water System (Roats), for the planned land uses under the Bend Comprehensive Plan. The Bend City Council adopted the most recent version of the Comprehensive Plan in 2016, along with an urban growth boundary expansion (Ordinance 2271), acknowledged by the Oregon Department of Land Conservation and Development on December 6, 2016. The Comprehensive Plan was amended in 2018 (Ordinance NS-2313, passed September 19, 2018, updated the Plan to improve the sewer system with the adoption of the 2018 Collection System Public Facility Plan, and amendments related to access to parks). The Comprehensive Plan outlines land uses within the Bend urban growth boundary (UGB). These land uses include those within the UGB, both within the City limits and within the unincorporated areas of the UGB that are zoned UA, Urbanizable Area.

The previous Water PFP was adopted by Ordinance No. 2194, in February of 2013 (after remand from the Land Use Board of Appeals), with the City's Water System Master Plan, Water System Master Plan Optimization Study and Water Management and Conservation Plan. Subsequently, the City performed an Urban Growth Boundary Expansion Study (UGB Study, 2016) which helped provide the basis for the 2016 UGB expansion. The expanded UGB includes redevelopment areas within the City limits (also known as Opportunity Areas) and 2,380 acres of expansion lands. This 2021 Water PFP replaces the 2013 Water PFP. This 2021 Water PFP documents capital improvement projects to support growth in the new UGB including expansion areas.

The Water PFP specifically addresses the requirements of Goal 11 and its administrative rule and draws on key elements from the City's Integrated Water System Master Plan (iWSMP) and City, Avion, and Roats Water Management and Conservation Plans (WMCP), and any additional data provided for each respective system. The components required by Goal 11 and each water providers compliance with Goal 11 are outlined in this Water PFP. Additionally, tables are included in this document detailing the pertinent locations for additional information in respect to each component of Goal 11.

The purpose of the plan is to help assure that development within the UGB is guided and supported by the types and levels of urban facilities and services appropriate for the needs and requirements of the urban areas to be served, and that those facilities and services are provided

in a timely, orderly, and efficient arrangement, as required by Goal 11 and its implementing administrative rule at Oregon Administrative Rule (OAR) 660-011.

2. PFP Goal 11 Compliance Components

The Goal 11 administrative rule, OAR 660-011, lists certain elements that must be included in a Goal 11 PFP. 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 land uses designated in the acknowledged comprehensive plan. This Water PFP includes the following Goal 11 compliance components:

a) An inventory and general assessment of the condition of all the significant public facility systems which support the land uses designated in the Bend Comprehensive Plan (2018).

b) A list of the significant public facility projects which are to support the land uses designated in the acknowledged comprehensive plan. Public facility project descriptions or specifications of these projects, as necessary.

c) Rough cost estimates of each public facility project.

d) A map or written description of each public facility project's general location or service area.

e) Policy statement(s) or urban growth management agreement identifying the provider of each public facility system. If there is more than one provider with the authority to provide the system within the area covered by the public facility plan, then the provider of each project shall be designated.

f) An estimate of when each facility project will be needed.

g) A discussion of the City's existing funding mechanisms and the ability of these and possible new mechanisms to fund the development of each public facility project or system.

3. Background

The City's existing Urban Growth Boundary (UGB) is served by three primary water suppliers, the City, Avion Water Company (Avion), and Roats Water System (Roats). Both Avion and Roats are rate and service regulated utilities under the Oregon Public Utility Commission. The City also serves water to the Tetherow destination resort, the Westside Transect area including the Tree Farm rural residential development and Awbrey Meadows, which are located outside the UGB. No special districts provide potable water within the Bend UGB. The current UGB, and service areas of the three utilities are presented in Figure 1. 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 sources. 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 regulated under the Oregon Public Utility Commission and Oregon Water Resources Department. Data included in this Water PFP is primarily from the sources listed below and additional detail on each system is available in these sources.

- City's 2021 iWSMP and WMCP
- Avion 2006 Water Master Plan, 2011 and 2016 WMCP, project list, geographic information system (GIS) data, and data provided by Avion
- Roats 2019 WMCP and data provided by Roats

The City relies on the above-mentioned documents as the Goal 2 factual base to support the Water PFP. These documents are incorporated by reference herein and are also considered part of the public record before the City Council.

4. Inventory of the Existing Systems and Condition

This section addresses the following requirements:

- OAR 660-011-0010(1)(a) Systems Inventory and Condition

An inventory of components and general assessment of the condition of all the significant public facility systems is included. This includes supply, pumping, storage, and distribution infrastructure. The current UGB, City and private utility service areas, and existing City and Avion water systems are shown in Figure 2.

I:\BOI_Projects\19\2484 - Bend IWSMP\GIS\MXD\Water PFP\Figure 1 UGB and Service Areas.mxd 8/17/2021 8:02:26 AM Michele.Neibergs

Legend

- Urban Growth Boundary

Water Service Area

- Avion
- City of Bend
- Roats

Data Sources:
City of Bend
Coordinate System: NAD 1983 StatePlane Oregon South FIPS 3602 Feet Intl
Projection: Lambert Conformal Conic
Datum: North American 1983
Disclaimer: The City of Bend makes no representations, express or implied, as to the accuracy, completeness and timeliness of the information displayed. This map is not suitable for legal, engineering, or surveying purposes. Notification of any errors is appreciated.

0 2,100 4,200 Feet

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N W E S

City of Bend
Water Public Facilities Plan

Figure 1
UGB and
Water Service Areas

September 2021

19-2484

I:\BOI_Projects\19\2484 - Bend IWSMP\GIS\MXD\Water PFP\Figure 2 Existing Water Systems.mxd 8/31/2021 11:58:57 AM Michele.Neibergs

Legend

City of Bend System

- Pump Station
- PRV
- Well
- Tank
- Pipe
- Avion Pipe
- Urban Growth Boundary

Water Service Area

- Avion
- City of Bend
- Roats

TOWER ROCK RESERVOIR
COPPERSTONE WELL
COLLEGE RESERVOIR 2
COLLEGE RESERVOIR 1
AWBREY RESERVOIR
AWBREY PUMP STATION
COLLEGE PUMP STATION
PILOT BUTTE WELLS
PILOT BUTTE RESERVOIR 1 & 2
PILOT BUTTE RESERVOIR #3
BEAR CREEK WELLS
SCOTT STREET PUMP STATION
OVERTURE RESERVOIRS
OUTBACK SITE
RIVER WELLS
WESTWOOD WELL
WESTWOOD RESERVOIR
WESTWOOD PUMP STATION
TETHEROW PUMP STATION
ROCK BLUFF WELLS
ROCK BLUFF RESERVOIR
MURPHY PUMP STATION
SHILO WELL 3

Data Sources:
City of Bend
Coordinate System: NAD 1983 StatePlane Oregon South FIPS 3602 Feet Intl
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0 2,100 4,200 Feet

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City of Bend
Water Public Facilities Plan

Figure 2
City Existing System & Avion Pipe within UGB

4.1 City of Bend

The City has the largest service area in the UGB covering over 16,000 acres. The City system's water supply, transmission and distribution system is responsible for the delivery of treated water to approximately 25,500 service connections to residential, commercial, and industrial customers.

In addition to the territory within the UGB, and for which the City has planned for urban uses, the City provides potable water to the following developments outside of the City limits and the City's UGB:

- Tetherow, a Goal 8 destination resort that abuts Bend on the south and west
- The Westside Transect, including the Tree Farm rural residential development, an area for which Deschutes County adopted an exception to Goal 14
- Awbrey Meadows, an area on the northern side of Awbrey Butte that was located outside of the UGB before it was established

The purpose for documenting these other water commitments is to demonstrate that between the uses planned for within the UGB and these commitments to provide water to these limited number of developments outside of the UGB, the City will still have adequate water supply to serve those land uses planned for within the UGB. Goal 11 prohibits the extension of sewer lines from within a UGB to serve land uses outside a UGB. However, it does not prohibit the extension of water lines from areas within a UGB to serve land uses outside the UGB, provided those same land uses are allowed under the County's Comprehensive Plan and Zoning Code.

4.1.1 City System Inventory

The City has the capability to supply treated water to customers by utilizing groundwater and surface water. The groundwater is supplied by the Deschutes Regional Aquifer and is primarily used to supply peak demands. The City's existing surface water system begins in the Bend Municipal Watershed (BMW) established by agreement with the United States Forest Service (USFS) in 1926. It includes the Prowell Springs Diversion and a surface water intake facility. Surface water is the primary source year-round. Both sources are known to have excellent water quality. The City's existing water system consists of a surface water intake facility, a water filtration facility, 8 groundwater facilities consisting of 20 active wells, 15 finished water storage reservoirs, 6 active booster pump stations, approximately 440 miles of transmission and distribution mains, nearly 10 miles of 30-inch and 36-inch ductile iron raw water pipeline, and associated appurtenances including various valves, hydrants, and meters. The system includes six primary pressure zones with an additional twenty-three subzones.

The City holds numerous surface water and groundwater rights. The City holds 36.1 cubic feet per second (cfs), equivalent to 23.3 million gallons per day (mgd) of surface water rights. There

are seasonal use, priority date, and ordinance and permit limitations on some of these water rights. The City also has 68.2 cfs (44.1 mgd) in groundwater rights.

The WFF was constructed in 2015 and has 4 primary membrane filters each with approximately 2,200 gallons per minute (gpm) capacity for a total capacity of 13,200 gpm and one backwash recovery rack with approximately 1,200 gpm capacity. **Table 1** through **Table 4** provide summaries of existing groundwater facilities, storage reservoirs, booster pump stations, and distribution pipe. The piping summarized includes the distribution network piping that conveys treated water. The 9.5 miles of 30-inch and 36-inch raw water pipe is not included in the distribution pipe table below.

Table 1|City System Existing Groundwater Facilities

Well	Status	Zone Directly Served	Capacity[1] (gpm)
Bear Creek Well 1	Active	4B	1,050
Bear Creek Well 2	Active	4B	1,100
Copperstone Well	Active	3	950
Outback Well 1	Active	3	800
Outback Well 2	Active	3	950
Outback Well 3	Active	3	1,050
Outback Well 4	Active	3	1,150
Outback Well 5	Active	3	1,050
Outback Well 6	Active	3	1,100
Outback Well 7	Active	3	1,300
Pilot Butte Well 1	Active	5	750
Pilot Butte Well 2	Inactive	5	-
Pilot Butte Well 3	Active	5	900
Pilot Butte Well 4	Active	5	1,150
River Well 1	Active	5	1,800
River Well 2	Active	5	1,900
Rock Bluff Well 1	Active	4B	750
Rock Bluff Well 2	Active	4B	800
Rock Bluff Well 3	Active	4B	800
Shilo Well 1	Inactive	3	-
Shilo Well 2	Inactive	3	-
Shilo Well 3	Active	4B	1,200
Westwood Well	Active	4A	700
		Total	**21,250**

Note:
1. Flow rates were determined from available data sources including typical flow rates in SCADA data, GIS recorded data, model results, and pump curves to the nearest 50 gallons.

Table 2|City System Existing Storage Reservoirs

Reservoir	Reservoir Type	Pressure Zone Directly Served	Capacity (MG)	Overflow Height (feet)	Floor Elevation (feet)	Diameter (feet)
Awbrey	Concrete	5	5.00	20.5	3,775	206.3
College 1	Welded Steel	2	0.50	23.3	4,096	60.8
College 2	Welded Steel	2	1.00	31.5	4,088	74.1
Outback CT Basin	Bolted Steel	3 (through Outback 2)	1.50	31.0	3,980	91.5
Outback 1	Bolted Steel	3 (through Outback 2)	2.00	35.1	3,976	98.6
Outback 2	Welded Steel	3	3.00	35.4	3,976	120.8
Outback 3	Welded Steel	3	3.63	29.4	3,982	146
Overturf East	Riveted Steel	4A	1.45	28.0	3,843	94
Overturf West	Riveted Steel	4A	1.45	28.0	3,843	94
Pilot Butte 1	Welded Steel	5	1.50	31.5	3,750	89.3
Pilot Butte 2	Welded Steel	4B	1.00	39.5	3,840	65.2
Pilot Butte 3	Concrete	5	5.00	24.3	3,757	188
Rock Bluff 1	Welded Steel	4B	1.54	39.0	3,840	82
Tower Rock	Welded Steel	1	1.00	31.0	4,213	74
Westwood	Welded Steel	4	0.50	31.5	3,845	53.3
		Total	30.07			

Table 3|City System Existing Booster Pump Stations

Station	Pump	VFD	Motor Horsepower (hp)	Zone From-To	Flow Rate[1] (gpm)	Elevation (feet)
Awbrey	Pump 1	No	200	5 to 1	1,200	3,778
	Pump 2	No	350	5 to 1	1,200	3,778
	Pump 3	No	350	5 to 1	1,200	3,778
College	Pump 1	No	50	3 to 2	1,100	3,723
	Pump 2	No	50	3 to 2	1,100	3,723
Murphy Road	Pump 1	Yes	25	4B to 3D	300	3,746
	Pump 2	Yes	25	4B to 3D	300	3,746
	Pump 3	Yes	25	4B to 3D	300	3,746
	Pump 4	Yes	25	4B to 3D	300	3,746
	Pump 5	Yes	25	4B to 3D	300	3,746
Scott Street	Pump 1	No	50	5 to 4B	1,000	3,649
	Pump 2	No	50	5 to 4B	1,000	3,649
	Pump 3	No	50	5 to 4B	1,000	3,649
Tetherow	Jockey	Yes	7.5	3 to 2A	120	3,877
	Pump 1	Yes	15	3 to 2A	300	3,877
	Pump 2	Yes	60	3 to 2A	700	3,877
	Pump 3	Yes	60	3 to 2A	700	3,877
	Pump 4	Yes	60	3 to 2A	700	3,877
	Pump 5	Yes	60	3 to 2A	700	3,877
	Pump 6	Yes	60	3 to 2A	700	3,877
Westwood	Pump 1	No	20	4A to 3C	275	3,836
	Pump 2	No	40	4A to 3C	550	3,836
	Pump 3	No	75	4A to 3C	900	3,836
	Pump 4	No	40	4A to 3C	550	3,836

Note:
1. Flow rates were determined from available data sources including typical flow rates in SCADA data, GIS recorded data, model results, and pump curves.

Table 4|City System Existing Distribution Pipe (miles)

Installation Timeframe	Material	6 Inch and Less	8 Inch	10 to 14 Inch	16 to 18 Inch	24 to 36 Inch	Total (miles)
Before 1950	CI	2.64	0.90	1.54	0.88	0.00	5.97
	DI	0.66	0.14	0.26	0.26	0.00	1.32
	Other	0.30	0.00	0.35	0.12	0.00	0.77
1950-1959	CI	1.64	0.86	0.14	0.42	0.00	3.06
	DI	0.15	0.17	0.39	1.43	0.00	2.14
	Other	0.39	0.00	0.82	0.82	0.31	2.33
1960-1969	CI	3.46	1.26	1.79	0.00	0.00	6.51
	DI	0.73	0.15	1.09	0.01	0.00	1.97
	Other	0.00	0.00	0.00	0.00	0.00	0.00
1970-1979	CI	5.97	4.40	2.00	0.00	0.00	12.37
	DI	6.63	6.84	5.87	0.00	0.00	19.33
	Other	0.25	0.00	0.00	0.00	0.00	0.25
1980-1989	CI	0.05	0.30	0.00	0.00	0.00	0.35
	DI	2.07	10.47	9.50	1.57	0.00	23.61
	Other	0.21	0.68	0.27	0.11	0.00	1.27
1990-1999	CI	0.12	0.31	0.00	0.00	0.00	0.43
	DI	3.69	58.96	41.46	9.17	2.01	115.29
	Other	0.00	0.21	0.00	0.00	0.00	0.21
2000-2009	CI	0.00	0.13	0.00	0.00	0.00	0.13
	DI	1.18	78.93	18.09	13.07	4.80	116.08
	Other	0.01	0.06	0.00	0.00	0.00	0.07
2010-2019	DI	0.32	22.96	6.88	1.94	1.69	33.79
	Other	0.40	0.00	0.00	0.00	0.14	0.54
Unknown	CI	16.26	9.35	4.45	0.67	0.00	30.73
	DI	13.47	11.42	22.80	7.76	0.65	56.10
	Other	3.21	0.27	0.87	0.23	0.13	4.71
	Total	63.81	208.77	118.57	38.47	9.73[1]	439.35

Note:
1. There is an additional 9.5 miles of 30-inch and 36-inch ductile iron raw water pipeline constructed in 2014 not included in this table.

4.1.2 City System Condition

As part of the 2021 iWSMP the project consultant completed an analysis of the existing system infrastructure to evaluate the facility and pipe condition. Assessment of the well, tank, and booster pump station facilities included a review of background data, City staff input, and an onsite examination. The analysis of the pipe was based on available GIS data including diameter, material, valve frequency, and break and leak history.

Based on the assessment, each facility was ranked, and improvements were identified that are required to maintain current facilities and extend their useful life. Facilities have a mix of elements, each containing a range of conditions from excellent to very poor, however, to assess the overall condition of a facility, a Facility Condition Index was applied with possible overall ratings of Excellent, Good, Fair, Poor, and Very Poor. The index is based on the ratio of overall deferred or backlog maintenance to the estimated cost of replacing the facility.

The City's pipe GIS data (2018) was used to assign each pipe in the system a condition replacement rating based on material, diameter, valve frequency, and break history. A higher rating indicates worse pipe condition. Certain types of materials, such as steel, cast iron, or galvanized iron are older and more prone to leaks and no longer meet the City's material standards. These materials were more heavily weighted, contributing to a higher rating. Ductile Iron pipe was given a 0 rating since it is the City's current standard for pipe material. Additionally, small diameter pipe that no longer meet City standards received higher ratings.

Figure 3 shows the Facility Condition Index rating for each facility and the pipe condition replacement ratings.

4.2 Avion Water Company

Avion Water Company's service area is the second largest in the Bend UGB covering over 6,000 acres. A large portion of Avion's service area is outside the current UGB in Crook and Deschutes counties. Avion serves an estimated 8,600 service connections within the City limits. The most recently available Avion system data is cited here from their 2006 Water Master Plan, 2011 WMCP, and 2016 WMCP Update.

Recently completed projects include an additional production well at the China Hat Reservoir Site and three distribution piping improvements including a 24-inch main near 15th Street and Knott Road, an extension near Empire Road, and a new 16-inch main near Neff Road and Hamby Road to the intersection of Eagle Road and Bradetich Loop.

Avion's water is supplied from ground water in the Deschutes Regional Aquifer. Avion began acquiring water rights in its own name on May 21, 1969. It currently has 34 water rights totaling 73.80 cfs (33,124 gpm). The system has 11 groundwater wells across eight stations with a total capacity of 14,867 gpm. The system has seven reservoirs totaling nearly 12.4 million gallons in storage. The distribution system includes approximately 310 miles of pipe, with 147 miles in the Bend UGB. Most of the pipe is PVC and has diameters ranging from smaller than 6-inch up to 24-inch.

Avion does not have condition information for its system. The system's piping within the UGB and service area are shown in Figure 2. Table 5 through Table 7 provide summaries of existing groundwater facilities, storage reservoirs, and the UGB distribution pipe.

Copperstone Well (2002)
Tower Rock Reservoir (1982)
College Reservoir 2 (1964)
College Reservoir 1 (1983)
College Pump Station (1963)
Awbrey Reservoir (1951)
Awbrey Pump Station (1982)
Well 6 (2005)
Well 2 (1997)
Well 1 (1993)
OB 1 (1993)
OB 3 (2006)
OB 2 (2000)
CT Basin (1991)
Well 7 (2007)
Well 5 (2004)
Well 3 (2001)
Well 4 (2001)
Overturf Reservoir (West) (1926)
Overturf Reservoir (East) (1926)
Westwood Well (1979)
Westwood Reservoir (1978)
Westwood Pump Station (1991)
Tetherow Pump Station (2008)
River Well 2 (1978)
River Well 1 (1972)
Scott Street Pump Station (1987)
Rock Bluff Reservoir (1990)
Well 2 (1992)
Well 1 (2005)
Well 3 (2009)
Murphy Pump Station (2002)
Shilo Well 3 (2010)
Well 1 (1994)
Well 3 (1994)
Well 4 (2009)
PB 2 (1969)
PB 1 (1959)
PB 3 (1998)
Bear Creek Well 2 (2003)
Bear Creek Well 1 (1999)

0 2,000 4,000 Feet

Data Sources:
City of Bend
Coordinate System: NAD 1983 StatePlane Oregon South FIPS 3602 Feet Intl
Projection: Lambert Conformal Conic
Datum: North American 1983
Disclaimer: The City of Bend makes no representations, express or implied, as to the accuracy, completeness and timeliness of the information displayed. This map is not suitable for legal, engineering, or surveying purposes. Notification of any errors is appreciated.

Legend

Facility Condition

Pump Station
- Poor
- Fair
- Good

Well
- Very Poor
- Poor
- Fair
- Good
- Excellent

Reservoir
- Very Poor
- Poor
- Fair
- Good
- Excellent
- PRV

Pipe Condition Rating
- < 3
- 3
- 3.5 - 4.5
- 5 - 6
- 6.5 - 7.5
- Not Rated
- Urban Growth Boundary

Water Service Area
- Avion
- City of Bend
- Roats

*(YEAR) indicates year facility was constructed

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City of Bend
Water Public Facilities Plan

Figure 3
City System Condition

Table 5|Avion System Existing Groundwater Facilities

Location	Capacity (gpm)	Number of Wells
Tekampe (A, B, & C Wells)	2,630	3
Parrell Road	1,290	1
Riverbend (Wells 1 & 2)	1,969	2
China Hat (Wells 1, 2 & 3)	4,902	3
Dyer Site	2,077	1
Deschutes River Woods	1,999	1
Total	**14,867**	**11**

Table 6|Avion System Existing Storage Reservoirs

Reservoir	Capacity (MG)
China Hat Road #1	2.9
China Hat Road #1	4.6
Deschutes River Woods	2.4
Dyer	2.3
Conestoga	0.14
Middle Sundance	0.02
Whispering Pines	0.05
Total	**12.41**

Table 7|Avion System Existing Distribution Pipe in the Bend UGB

Diameter	Length (miles)
Unknown	6.9
Less than 6-inch	42.3
6-inch	12.8
8-inch	49.1
10-inch	0.1
12-inch	25.9
14-inch	0.4
16-inch	0.5
18-inch	4.6
20-inch	4.3
24-inch	0.003
Total	**146.9**

4.3 Roats Water System

Roats Water System, the smallest of the three utilities, covers about 1,500 acres and has 2,456 service connections. Most of Roats' service territory is within the Bend UGB and surrounded by the City's service area and Avion's service area. The Roats system data cited below is taken from their 2019 WMCP. Roats' service area is comprised of two interconnected water systems, Woodside Ranch, and Homeplace. In this Water PFP and in documents prepared for or by Roats, the service area within the UGB is referred to as Homeplace. Roats relies on groundwater for its supply and has five water rights in the Deschutes Regional Aquifer totaling 9.48 cfs (4,255 gpm). The system has 10 wells of which three are in the Homeplace area, four are in Woodside Ranch, one is in the Avion service area and is conveyed to the Roats system through an intertie, and two are in the recently acquired Juniper area. Roats total capacity for the ten wells is 3,917 gpm. Roats stores water in four reservoirs with a total storage capacity of 2.97 million gallons. Roats distributes water through a piping system that includes pipe from 2 to 16 inches in diameter with approximately 132,200 feet of pipe that serves the Homeplace service area.

Roats does not have condition information for its system. The system's service area is shown in Figure 2. Table 8 and Table 9 provide summaries of existing groundwater facilities, storage reservoirs, and the UGB distribution pipe.

Table 8|Roats System Existing Groundwater Facilities

Well Number	Capacity (gpm)
3	113
4	210[1]
5	115
6	115
7	157
8	337
9	325
10	1,800
Hole Ten North	675
Hole Ten South	70
Total	**3,917**

Note:
1. Well 4 has a standby diesel pump with a 2,000 gpm capacity.

Table 9|Roats System Existing Storage Reservoirs

Reservoir Number	Location	Capacity (MG)
1	Brookswood Blvd.	0.32
2	N. Woodside Rd.	0.06
3	S. Woodside Rd.	0.09
4	Deschutes River Woods	2.5
	Total	2.97

5. Public Facility Projects, Costs, and Timeframe

This section addresses the following requirements:

- OAR 660-011-0010(1)(b) Project List and Description
- OAR 660-011-0010(1)(c) Project Cost Estimates
- OAR 660-011-0010(1)(d) Project Locations
- OAR 660-011-0010(1)(f) Project Needed Timeframe

A list of planned projects including the estimated timeframe for when the project is needed or will be completed, and an estimate of the cost is included for each system.

5.1 City of Bend

Employee and housing unit projections across the City's water service area were developed for the UGB expansion and included in the City's Comprehensive Plan (2016). These projections and water demand forecasts developed for the iWSMP were used to estimate future water demand. The projected demands were then used to determine the hydraulic capacity of the system and identify improvements to the City's water infrastructure. Extensive analysis was completed to identify areas of deficiencies. The analysis incorporated condition, capacity, criticality, and operations assessment for all major facilities and the pipe network. Additional detail on the demand projections and analysis are in the 2021 iWSMP.

Improvement projects were identified to address system deficiencies where required to serve projected growth in the City's service area within a 20-year timeframe. Cost estimates were developed for each project and project phasing was done to develop a capital improvement plan that accounts for funding and staffing constraints.

It should be noted that while projections were used to determine future demand and timeframes, the actual timing of any improvements will be based primarily on when the system reaches certain demand thresholds versus specific predetermined timelines. The improvements in Table 10 that are required based on growth in demand will be triggered by increases in maximum day and average day demand. In prior planning documents, projections have been higher than actual demand increases so detailed budgeting, planning, and implementation of the

improvements will be done as needed with consideration to the most recent demand trends and thresholds.

5.1.1 City System Project Cost Assumptions

Unit cost rates used for the capital improvement projects are planning-level estimates and are consistent with the Class 5 Estimate approach used in the iWSMP. Project unit cost estimates were prepared in accordance with the guidelines of the American Association of Cost Engineers (AACE) International, the Association for the Advancement of Cost Engineering. (*AACE International Recommended Practice No. 56R-08 Cost Estimate Classification System - As Applied for the Building and General Construction Industries - TCM Framework: 7.3 - Cost Estimating and Budgeting Rev. March 6, 2019*). Unit project costs developed produce "rough cost estimates" consistent with the definition of Oregon Administrative Rules 660-011-0005(2) and 660-011-035. The true cost and resulting feasibility of a planned project will depend on the actual labor and material costs, competitive market conditions, site conditions, final project scope, implementation schedule, continuity of personnel, and other variable factors. Therefore, the actual unit project costs will vary from the estimates presented here. Because of these factors, project feasibility, benefit-to-cost ratios, risks, and funding must be carefully reviewed prior to making specific financial decisions or establishing project-specific budgets.

All costs identified in this section reference U.S. dollars. The Engineering News Record Construction Cost Index (ENR CCI) basis is 12,341 (Seattle, August 2020).

Component cost rates include materials, installation, and half-road surface restoration in four categories (arterial, collector, local, and dirt). Unit installation and material costs vary by pipe diameter. Component cost markups are included for mobilization, traffic control, erosion control, contractor's overhead and profit, and contingency costs to determine construction costs. Project cost estimates have engineering and administration costs added to the construction costs.

5.1.2 City System Projects

Improvement project descriptions, cost summaries, and timeframes are provided in Table 10. Project locations are in Figure 4. Each project includes a unique identifier and a description of the improvement, including location reference, Class 5 cost estimate (in August 2020 dollars), and timeframe for project implementation. Projects are grouped in three timeframes. The 10-year horizon covers years 2021 through 2030. The 20-year covers years 2031-2040 and the remaining projects are beyond 2040. The projects are spread beyond 20 years due to constraints in funding and staff resource availability to implement the plan. In addition to timeframe, projects are organized by the following categories. Some projects provide improvement across multiple categories. Summaries of the projects by category and timeframe are in Table 11.

- Facility Condition Projects – Improvements to existing reservoirs, wells, and pump stations to maintain and extend their useful life.

- Pipe Replacement Projects– Replacement of existing pipe prioritized by ratings based on material, diameter, valve frequency, and break history.
- Facility Capacity Projects – New reservoirs, wells, and pressure reducing valve (PRV) stations to provide additional system capacity.
- Pipe Capacity Projects – New pipe and the upsize of existing pipe to increase capacity.
- Planning/ Conservation Projects – Projects outside the previous categories that contribute to the overall capacity, condition, and resilience of the system, including things such as planning studies and additional conservation related programs

Table 10|City System Projects

ID	Project Category	Project Name	Timeframe	Cost[1]
CP-1	Pipe Capacity	Ironwood Court Redundant Looping	2021-2030	$239,000
CP-5	Pipe Capacity	Murphy Road Redundant Looping	2021-2030	$0[2]
FFCP-3	Pipe Capacity	New Zone 4I pipe	2021-2030	$287,000
FFP-1	Pipe Capacity	Transect Area New Development	2021-2030	$0[2]
FFP-3	Pipe Capacity	Clay Avenue and 3rd Street Looping Part 1	2021-2030	$47,000
FFP-4	Pipe Capacity	Builders Street Looping	2021-2030	$535,000
FFP-5	Pipe Capacity	Adams Place Upsize	2021-2030	$543,000
FFP-7	Pipe Capacity	12th and Juniper Streets Improvements	2021-2030	$1,829,000
FFP-8	Pipe Capacity	Quincy Avenue Upsize	2021-2030	$341,000
FFP-9	Pipe Capacity	4th Street Looping	2021-2030	$105,000
FFP-10	Pipe Capacity	Awbrey Road and Portland Avenue	2021-2030	$1,788,000
FFP-11	Pipe Capacity	Greenwood Avenue and 3rd Street Intersection New Pipe	2021-2030	$145,000
FFP-12	Pipe Capacity	River's Edge Golf Course Area Upsize	2021-2030	$685,000
FFP-13	Pipe Capacity	Riverhouse Resort Looping	2021-2030	$345,000
FFP-14	Pipe Capacity	Regency Street Upsize	2021-2030	$316,000
FFP-16	Pipe Capacity	Zone 1 Dead-End Fire Flow Improvements	2021-2030	$1,022,000
FFP-17	Pipe Capacity	Highway 20 Looping	2021-2030	$600,000
FFP-19	Pipe Capacity	5th Street and Hawthorne Avenue Looping	2021-2030	$316,000
FFP-20	Pipe Capacity	8th Street and Bear Creek Road Looping and Upsize	2021-2030	$1,463,000
FFP-21	Pipe Capacity	Pilot Butte and Neff Road Upsize	2021-2030	$2,111,000
FFP-22	Pipe Capacity	Cascade View Drive and Trenton Looping	2021-2030	$883,000
FFP-23	Pipe Capacity	Foxwood Upsize	2021-2030	$276,000
FFP-24	Pipe Capacity	Silver Buckle and Broken Arrow Road Upsize	2021-2030	$689,000
FFP-25	Pipe Capacity	Karena Court Upsize	2021-2030	$128,000
FFP-26	Pipe Capacity	Wall Street and Harriman Street and Highway 20 Looping	2021-2030	$737,000

ID	Project Category	Project Name	Timeframe	Cost[1]
FFP-27	Pipe Capacity	Xerxes Avenue and 4th Street Looping	2021-2030	$183,000
FFP-28	Pipe Capacity	Sawyer Reach Lane Upsize	2021-2030	$188,000
FFP-29	Pipe Capacity	Peerless Court Looping	2021-2030	$375,000
FFP-30	Pipe Capacity	Wilson Avenue and 15th Street Industrial Service Looping	2021-2030	$248,000
FFP-33	Pipe Capacity	Bend River Promenade Looping	2021-2030	$233,000
FFP-34	Pipe Capacity	High Desert Lane Looping	2021-2030	$77,000
FFP-35	Pipe Capacity	Addison Avenue Upsize	2021-2030	$1,873,000
FFP-38	Pipe Capacity	5th Street and Glenwood Drive Upsize	2021-2030	$248,000
FFP-40	Pipe Capacity	Glassow Drive Looping	2021-2030	$237,000
FFP-42	Pipe Capacity	Seward Avenue Upsize	2021-2030	$164,000
FFP-43	Pipe Capacity	McClain Drive Upsize	2021-2030	$782,000
O-1	Planning/Conservation	Outback Facility Plan	2021-2030	$500,000
O-2	Planning/Conservation	Conservation Program	2021-2030	$1,538,000
O-4	Planning/Conservation	Hydropower Feasibility Study	2021-2030	$0[2]
O-5	Planning/Conservation	Water System Master Plan Update #1	2021-2030	$1,000,000
O-6	Planning/Conservation	Water Management Conservation Plan Update #1	2021-2030	$200,000
O-10	Planning/Conservation	Traffic Signal Improvements	2021-2030	$25,000
O-11	Planning/Conservation	Outback Land Acquisition	2021-2030	$5,000,000
O-12	Planning/Conservation	Standards & Specs Update	2021-2030	$150,000
P-3	Pipe Capacity	Discovery West Looping	2021-2030	$0[2]
P-13	Pipe Capacity	New Awbrey Transmission	2021-2030	$10,312,000
P-14	Pipe Capacity	Upsize Pilot Butte Reservoir 1 Transmission Pipe	2021-2030	$342,000
P-15	Pipe Capacity	Newport Avenue Replacement	2021-2030	$3,984,000
P-17	Pipe Capacity	Revere Division and Thurston Upsize Part 1	2021-2030	$2,077,000
P-19	Pipe Capacity	6th Street Upsize	2021-2030	$3,625,000
P-23	Pipe Capacity	Awbrey Reservoir Outlet Transmission Upsize	2021-2030	$260,000
P-28	Pipe Capacity	Neff and Purcell Intersection	2021-2030	$19,000
PR-1A	Pipe Replacement	Pipe Replacement Program Years 1 to 10	2021-2030	$33,788,000
PR-P2	Pipe Replacement	Awbrey Butte Distribution Improvements	2021-2030	$2,737,000
PR-P3	Pipe Replacement	Awbrey Butte Distribution Improvements	2021-2030	$3,346,000
PR-P4	Pipe Replacement	Awbrey Butte Distribution Improvements	2021-2030	$1,104,000
PR-P5	Pipe Replacement	Pilot Butte Distribution Improvements	2021-2030	$5,940,000
PR-P6	Pipe Replacement	Pilot Butte Distribution Improvements	2021-2030	$2,314,000
PS-1	Facility Condition	Awbrey Pump Station	2021-2030	$3,459,000
PS-6	Facility Condition and Capacity	Replacement of Murphy Pump Station	2021-2030	$0[2]
T-1	Facility Condition	Outback Reservoir 1	2021-2030	$1,585,000
T-4	Facility Condition and Capacity	Outback CT Basin	2021-2030	$500,000
T-5	Facility Condition	Awbrey Reservoir	2021-2030	$3,547,000

ID	Project Category	Project Name	Timeframe	Cost[1]
T-17	Facility Condition	Rock Bluff Reservoir Interior Coating	2021-2030	$700,000
T-18	Facility Condition	Outback Reservoir 2 Interior Coating	2021-2030	$1,300,000
TR-1	Planning/Conservation	Pretreatment	2021-2030	$16,000,000
V-6	Facility Capacity	New Zone 4A to 4I PRV	2021-2030	$155,000
W-1	Facility Condition	Outback Well 1	2021-2030	$1,223,000
W-2	Facility Condition	Outback Well 2	2021-2030	$1,531,000
W-10	Facility Condition	River Well 1	2021-2030	$2,198,000
W-11	Facility Condition	River Well 2	2021-2030	$2,928,000
CP-2	Pipe Capacity	Rainier Drive Redundant Looping	2031-2040	$176,000
CP-3	Pipe Capacity	High Lakes Elementary Redundant Looping	2031-2040	$210,000
CP-4	Pipe Capacity	Fred Meyer Redundant Looping	2031-2040	$776,000
CP-6	Pipe Capacity	Forest Ridge Avenue and Mt. Washington Drive Crossing	2031-2040	$359,000
CP-7	Pipe Capacity	Bend High School Redundant Looping	2031-2040	$497,000
CP-8	Pipe Capacity	Deschutes Brewery Redundant Looping	2031-2040	$195,000
FFCP-1	Pipe Capacity	Awbrey Meadows pipe	2031-2040	$1,226,000
FFCP-2	Pipe Capacity	New Zone 7C pipe	2031-2040	$137,000
FFP-2	Pipe Capacity	Awbrey Meadows	2031-2040	$5,030,000
FFP-3	Pipe Capacity	Clay Avenue and 3rd Street Looping Part 2	2031-2040	$100,000
FFP-6	Pipe Capacity	Brosterhous Road Fire Service Upsize	2031-2040	$898,000
FFP-15	Pipe Capacity	Franklin Avenue and 1st Street Looping	2031-2040	$299,000
FFP-18	Pipe Capacity	Greenwood Avenue and Hill Street Upsize	2031-2040	$482,000
FFP-31	Pipe Capacity	Quimby Avenue Upsize	2031-2040	$372,000
FFP-32	Pipe Capacity	Nels Anderson Road Upsize	2031-2040	$463,000
FFP-36	Pipe Capacity	Cady Way Upsize	2031-2040	$468,000
FFP-37	Pipe Capacity	Industrial Way Upsize	2031-2040	$159,000
FFP-39	Pipe Capacity	Red Lion Inn Looping	2031-2040	$336,000
FFP-41	Pipe Capacity	Castlewood Drive Upsize	2031-2040	$144,000
O-3	Planning/Conservation	Conservation Program	2031-2040	$1,538,000
O-7	Planning/Conservation	Water Management Conservation Plan Update #2	2031-2040	$200,000
O-8A	Planning/Conservation	Water System Master Plan Update #2	2031-2040	$1,000,000
P-17	Pipe Capacity	Revere Division and Thurston Upsize Part 2	2031-2040	$2,077,000
P-20	Pipe Capacity	8th Street Upsize and Parallel Transmission	2031-2040	$5,985,000
P-27	Pipe Capacity	Upsize 6-inch pipe on Purcell Boulevard	2031-2040	$185,000
PR-1B	Pipe Replacement	Pipe Replacement Program Years 11 to 20	2031-2040	$66,970,000
PS-2	Facility Condition	College Pump Station	2031-2040	$1,276,000
PS-3	Facility Condition	Tetherow Pump Station	2031-2040	$1,967,000
PS-4	Facility Condition and Capacity	Westwood Pump Station	2031-2040	$160,000
T-9	Facility Capacity	New Overturf Zone 4 Reservoir	2031-2040	$11,219,000

ID	Project Category	Project Name	Timeframe	Cost[1]
T-10	Facility Condition and Capacity	Existing Overturf Reservoirs	2031-2040	$1,100,000
T-12	Facility Condition	Pilot Butte Reservoir 1	2031-2040	$1,454,000
T-13	Facility Condition	Pilot Butte Reservoir 2	2031-2040	$1,533,000
T-14	Facility Condition	Pilot Butte Reservoir 3	2031-2040	$904,000
T-15	Facility Condition	Rock Bluff Reservoir 1	2031-2040	$1,429,000
T-16	Facility Condition and Capacity	Westwood Reservoir	2031-2040	$340,000
V-1	Facility Capacity	New Zone 2A to 3C PRV	2031-2040	$155,000
V-4	Facility Capacity	New Zone 4F to 6B PRV	2031-2040	$155,000
V-5	Facility Capacity	New Zone 6 to 7C PRV	2031-2040	$155,000
W-3	Facility Condition	Outback Well 3	2031-2040	$1,633,000
W-4	Facility Condition	Outback Well 4	2031-2040	$954,000
W-5	Facility Condition	Outback Well 5	2031-2040	$912,000
W-13	Facility Condition	Bear Creek Well 1	2031-2040	$2,116,000
W-14	Facility Condition	Bear Creek Well 2	2031-2040	$1,160,000
W-15	Facility Capacity	New Bear Creek Zone 4 Well	2031-2040	$4,049,000
W-16	Facility Condition	Pilot Butte Well 1	2031-2040	$853,000
W-17	Facility Condition	Pilot Butte Well 3	2031-2040	$1,645,000
W-21	Facility Condition	Rock Bluff Well 2	2031-2040	$2,382,000
W-23	Facility Capacity	New Wilson Zone 4 Well 1	2031-2040	$4,358,000
W-24	Facility Capacity	New Wilson Zone 4 Well 2	2031-2040	$4,358,000
W-25	Facility Condition and Capacity	Westwood Well	2031-2040	$180,000
P-1	Pipe Capacity	Outback Site Transmission	Beyond 2040	$815,000
P-2	Pipe Capacity	Outback North Transmission Replacement	Beyond 2040	$3,927,000
P-4	Pipe Capacity	Zone 3 to 4A Mt. Washington Drive and Rivers Edge PRV Pipe Upsize	Beyond 2040	$246,000
P-5	Pipe Capacity	Skyline Ranch Road Parallel	Beyond 2040	$5,923,000
P-6	Pipe Capacity	Niagara Court Upsize	Beyond 2040	$477,000
P-7	Pipe Capacity	Archie Briggs and Falcon Ridge Upsize	Beyond 2040	$94,000
P-8	Pipe Capacity	Mirror Lake Place Looping	Beyond 2040	$79,000
P-9	Pipe Capacity	Skyliners Road and Flagline Drive Upsize	Beyond 2040	$385,000
P-10	Pipe Capacity	New Zone 5 Overturf Reservoir and Well Transmission	Beyond 2040	$1,564,000
P-11	Pipe Capacity	Zone 4F and Zone 4A Distribution Connection	Beyond 2040	$257,000
P-12	Pipe Capacity	15th Street Upsize	Beyond 2040	$192,000
P-16	Pipe Capacity	Roanoke Avenue Looping	Beyond 2040	$340,000
P-18	Pipe Capacity	4th Street Upsize	Beyond 2040	$297,000
P-21	Pipe Capacity	Metolius Drive Upsize	Beyond 2040	$19,000
P-22	Pipe Capacity	Pilot Butte Parallel Transmission on Lafayette Avenue	Beyond 2040	$1,344,000
P-24	Pipe Capacity	New and Upsize Bear Creek Well Transmission	Beyond 2040	$894,000

ID	Project Category	Project Name	Timeframe	Cost[1]
P-25	Pipe Capacity	Bear Creek Road Upsize 15th Street to McCartney Drive	Beyond 2040	$573,000
P-26	Pipe Capacity	Bear Creek Road Connections	Beyond 2040	$786,000
PR-1C	Pipe Replacement	Pipe Replacement Program Years 21 to 30	Beyond 2040	$35,620,000
PS-5	Facility Condition and Capacity	Scott Pump Station	Beyond 2040	$1,465,000
T-2	Facility Condition and Capacity	Replacement Outback Reservoir 2	Beyond 2040	$17,866,000
T-3	Facility Condition	Outback Reservoir 3	Beyond 2040	$2,284,000
T-6	Facility Condition	College Reservoir 1	Beyond 2040	$987,000
T-7	Facility Condition	College Reservoir 2	Beyond 2040	$944,000
T-8	Facility Condition	Tower Rock Reservoir	Beyond 2040	$1,257,000
T-11	Facility Capacity	New Overturf Zone 5 Reservoir	Beyond 2040	$9,009,000
V-2	Facility Capacity	New Zone 4B to 5 PRV	Beyond 2040	$155,000
V-3	Facility Capacity	New Zone 4F to 5D PRV	Beyond 2040	$155,000
W-6	Facility Condition	Outback Well 6	Beyond 2040	$2,660,000
W-7	Facility Condition	Outback Well 7	Beyond 2040	$730,000
W-8	Facility Capacity	New Outback Well	Beyond 2040	$2,711,000
W-9	Facility Condition	Copperstone Well	Beyond 2040	$1,676,000
W-12	Facility Capacity	New Overturf Zone 5 Well	Beyond 2040	$3,386,000
W-18	Facility Condition	Pilot Butte Well 4	Beyond 2040	$774,000
W-19	Facility Condition	Rock Bluff Well 1	Beyond 2040	$812,000
W-20	Facility Condition	Rock Bluff Well 3	Beyond 2040	$830,000
W-22	Facility Condition	Shilo Well	Beyond 2040	$1,926,000
W-26	Facility Capacity	New Purcell Paula Zone 5 Well 1	Beyond 2040	$4,321,000
W-27	Facility Capacity	New Purcell Paula Zone 5 Well 2	Beyond 2040	$4,321,000
O-8B	Planning/Conservation	Water System Master Plan Update #3	Beyond 2040	$1,000,000
O-9	Planning/Conservation	Beyond 2040 Conservation Program	Beyond 2040	$7,998,000

Note:
1. Costs are in 2020 Dollars.
2. Projects with no cost are already funded or will be funded privately.

Table 11|City System Projects Summary

Project Category	Cost[1] by Timeframe (Million $)			Total Cost[1]
	2021-2030	2031-2040	Beyond 2040	
Capacity	$41 M	$47 M	$62 M	$150 M
Condition	$68 M	$87 M	$50 M	$205 M
Planning/Conservation	$24 M	$3 M	$9 M	$36 M
Total	$133 M	$137 M	$121 M	$391 M

Note:
1. Costs are in 2020 Dollars.

I:\BOI_Projects\19\2484 - Bend IWSMP\GIS\MXD\Water PFP\Figure 4 City System Projects.mxd 8/31/2021 11:56:07 AM Michele.Neibergs

Legend

City Projects
- Pump Station Projects
- Well Projects
- Reservoir Projects
- Valve Projects
- Pipe Projects
- Pipe Replacement Projects
- Existing PRV

Existing Water Pipe Diameter
- <= 12"
- >= 14"

Water Service Area
- Avion
- City of Bend
- Roats

TOWER ROCK RESERVOIR
COPPERSTONE WELL
COLLEGE RESERVOIR 2
COLLEGE RESERVOIR 1
AWBREY
COLLEGE PUMP STATION
OUTBACK SITE
OVERTURF
RIVER WELLS
SCOTT STREET PUMP STATION
PILOT BUTTE
PILOT BUTTE RESERVOIR 3
BEAR CREEK WELLS
WESTWOOD WELL
WESTWOOD RESERVOIR
WESTWOOD PUMP STATION
TETHEROW PUMP STATION
ROCK BLUFF
MURPHY PUMP STATION
SHILO WELL 3

Data Sources:
City of Bend
Coordinate System: NAD 1983 StatePlane Oregon South FIPS 3602 Feet Intl
Projection: Lambert Conformal Conic
Datum: North American 1983
Disclaimer: The City of Bend makes no representations, express or implied, as to the accuracy, completeness and timeliness of the information displayed. This map is not suitable for legal, engineering, or surveying purposes. Notification of any errors is appreciated.

0 1,875 3,750 Feet

murraysmith

City of Bend
Water Public Facilities Plan

Figure 4
City Projects

5.2 Avion Water Company

Projects for Avion are shown in **Table 12**.

Table 12|Avion System Projects

Project	Description	Timeframe	Cost[1]
Dyer Well	New production well at Dyer Reservoir Site	Near-Term	$1,250,000[2]
24" Water Line China Hat	Fill in section of 24" pipe completing the run from China Hat Reservoir to NE corner of 15th and Knott (1250')	Near-Term	$250,000[2]
Highway 20 Crossing	Improve crossing of Highway 20 at Hamby Road	Near-Term	$100,000[2]
Dyer Reservoir, Well and Booster Station	A new 2.5 million gallon reservoir w/ a 2000 gpm well and large capacity booster station	Long-Term	$2,300,000
12" Water Line Brookswood	12" water line from Riverbend well site to the PRV station on Brookswood	Long-Term	$200,000
18" line from DRW reservoir to Brookswood	Install 18" Line from DRW reservoir to Brookswood	Long-Term	$170,000

Note:
1. Costs are in 2006 Dollars unless noted otherwise.
2. Costs are in 2020 Dollars.

5.3 Roats Water System

Projects for Roats are shown in **Table 13**.

Table 13|Roats System Projects

Project	Description	Timeframe	Cost
Improvements in prior Juniper Utility Service Territory	Infrastructure improvements in accordance with City of Bend standards and specifications in prior Juniper Utility service territory (purchased from City of Bend).	Near-Term	Costs to be determined by current market costs at time of installations

6. Funding

This section addresses the following requirements:

- OAR 660-011-0010(1)(g) Project Funding

6.1 City of Bend

The City's financial plan to fund ongoing system operations and the escalated costs of the improvements defines a strategy for the water utility to maintain sufficient funds to construct,

operate, and manage the system on a continuing basis based on a 30-year implementation timeframe of the improvements.

The water utility is responsible for funding all its costs. The primary source of funding is derived from ongoing monthly charges for service, with additional revenues coming from system development charges, installation fees, reconnect fees, and other miscellaneous revenue. The City controls the level of user charges and, subject to the City Council, can adjust user charges as needed to meet financial objectives.

The current financial forecast indicates that the utility is currently covering all financial obligations under existing rates, however as the City prepares to fund the needed capital improvement identified, rates will need to increase annually to support the capital funding plan.

The financial plan proposes the following rate increases and debt issuances to satisfy the identified future obligations of the utility.

- 10-year Annual Rate Increases:
  - 3.0 percent in FY 2022 – FY 2023
  - 4.0 percent from FY 2024 – FY 2026
  - 4.5 percent from FY 2027– FY 2030
- 10-year Revenue Bonds:
  - $23.9M in FY 2026
  - $33.9M in FY 2029
  - Annual new debt service payments are forecast to go from $2.0 million with the first issuance to $4.7 million at the second new debt issuance. Including this new debt, total debt service will increase from $5.6 million in FY 2021 to $8.9 million by FY 2030.

Table 14 shows a summary of the projected Undesignated Operating Reserve and residual Capital Reserve ending balances through FY 2030 based on the rate forecasts presented above. The undesignated operating reserve is maintained at a minimum of 3 months of O&M expenses, and the capital reserve balance fluctuates depending on the level of capital projects funded; however, it never falls below the minimum target of $5.0 million.

Table 14|City Ending Reserve Balance Summary ($ in millions)

Ending Reserve Balances	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	FY 2028	FY 2029	FY 2030
Undesignated Operating	$3.2	$3.6	$3.7	$4.2	$4.2	$4.6	$4.7	$4.9	$5.2	$5.2
Capital	$57.3	$53.2	$47.8	$37.1	$14.7	$20.5	$16.1	$15.3	$39.7	$25.5
Total	**$60.5**	**$56.8**	**$51.5**	**$41.3**	**$18.9**	**$25.1**	**$20.8**	**$20.2**	**$44.9**	**$30.7**

The analysis assumes revenue growth and expense inflationary factors. If the forecasting factors change significantly, the existing rate strategy may need to be updated and revised. The City will continue to annually review and update the key underlying assumptions that compose the multi-year financial plan at least annually, to ensure that adequate revenues are collected to meet the City's total financial obligations.

6.2 Avion Water Company

Avion Water Company is an investor-owned public utility that is regulated by the Public Utility Commission (PUC). Avion recovers from its customers all operating costs for providing tariff services to its customers along with the opportunity to earn a rate of return on its net invested capital. The total revenue is determined by agreement between Avion and the PUC and approximately 55-60 percent of the revenue is realized from base rate charges and 40-45 percent from variable use rate charges.

6.3 Roats Water System

Roats is a rate and service regulated utility under the jurisdiction of the Oregon Public Utility Commission. Customers are billed monthly for both a base fee and water usage, which covers operations, maintenance, and improvement costs. Base fees cover the cost of services that occur regardless of how much the service is used (e.g., reading and maintenance of meters, water quality monitoring, infrastructure maintenance, etc.) Base rates are determined by meter size and as of April 2017 are set at $33.45 for 5/8-inch and ¾-inch meters and $48.17 for 1-inch meters. The usage charge is $0.95 per 100 cubic feet. Customers with a separate irrigation line are charged a flat monthly irrigation fee of $41.02.

7. Policy Statements and Agreements

This section addresses the following requirements:

- OAR 660-011-0010(1)(e) Policy Statements

A summary of the policy statements and management agreements are included that identify the City, Avion, and Roats as the providers of water service within the Bend UGB for their respective service areas.

7.1 Policy Statements for Water Providers

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. From the Comprehensive Plan (2018), the policies for Water Facilities and Systems are as stated (see Comprehensive Plan Chapter 8, Public Facilities and Services):

- The City of Bend is the provider of water service for the City's service area under Statewide Planning Goal 11. [8-15]

- 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. [8-16]

- Roats Water System 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. [8-17]

- Within the urban planning area, public and private water systems shall be consistent with City Standards and Specifications for construction and service capabilities. [8-18]

- The City shall continue to coordinate with private providers and irrigation districts in matters of water concerns within the Urban Growth Boundary. [8-19]

- The City shall continue to implement a water conservation program that emphasizes education, enforcement, metering, and other methods to use water efficiently. [8-20]

- The City may allow water service outside the UGB at rural levels consistent with Goal 11. [8-21]

7.2 Joint Management Agreement

On February 24, 1998, the City and Deschutes County entered into a joint management agreement (JMA) for planning in the Bend UGB. The City and County entered a revised JMA on July 7, 2017, that included the areas added to the Bend UGB in 2016 that were subsequently zoned Urbanizable Area (UA). This 2017 JMA replaced the 1998 JMA.

From the JMA, the policies impacting this Water PFP include:

- The City will prepare, adopt, and amend Goal 11 public facility plans, as required by ORS 197.712(2)(e). City will coordinate the preparation and the amendment of public facility plans with the County, special districts, state agencies, federal agencies, and private providers of public facilities as required by OAR 660-011-015(2). [3.3.d]
- The City has the authority but not the obligation to provide extraterritorial water service within the UA in those areas not already within either the existing Avion Water Company or Roats Water Company service areas. The County will not approve the formation of any domestic water supply district that attempts to form as a special district under ORS 264 within the UA without the concurrence of the City, as contemplated by Bend Comprehensive Plan Policy 1-5. [6.1]

- The City may choose to provide extraterritorial water service outside the UGB in compliance with applicable state statutes, planning goals and subject to any applicable County land use decision. [6.2]

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