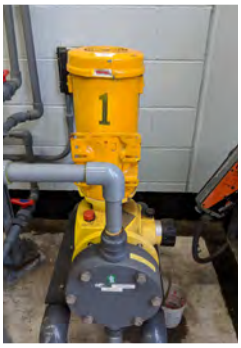
CITY OF ROSEBURG
WATER MANAGEMENT AND CONSERVATION PLAN



PREPARED BY RH2 ENGINEERING, INC.

RH2

THE CITY OF ROSEBURG TIMBER CAPITAL OF THE NATION

MARCH 2020

City of Roseburg Water Management and Conservation Plan

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ES | EXECUTIVE SUMMARY

The City of Roseburg (City) is a community located in the Umpqua River Valley in southern Oregon. The City serves a population of approximately 30,000 in its City Limits, inside its Urban Growth Boundary, and outside of its Urban Growth Boundary.

This Water Management and Conservation Plan (WMCP) includes a summary of the existing system, a description of current water rights, water conservation measures, the City's curtailment plan, and a supply evaluation as outlined in the *Water Management and Conservation Plans – A Guidebook for Oregon Municipal Water Suppliers,* (March 2015), Second Edition by Oregon Water Resources Department (OWRD).

This WMCP was initially prepared in 2019 when the most current data available was from 2018.

NOTICE TO AFFECTED LOCAL GOVERNMENTS

This WMCP was submitted to the following local governments for review:

- Umpqua Basin Water Association
- Roberts Creek Water District

There were no comments from these agencies.

SCHEDULE FOR WMCP UPDATES

- 2025 – WMCP Progress Report
    - Update status of Curtailment Plan
    - Update status of Conservation Measures
- 2030 – WMCP Full Update

RECOMMENDATIONS

This WMCP includes the following recommendations:

- Formally adopt the proposed Water Curtailment Plan.
- Implement additional conservation measures listed in **Table 2-5**.

1 EXISTING SYSTEM

INTRODUCTION

The City of Roseburg (City) is a community located in the Umpqua River Valley in southern Oregon. In 2018, the City provided water to approximately 24,820 people within the City limits. The City also provides water to approximately 5,272 people that are located outside of City limits in the Urban Growth Boundary (UGB) including the Winchester area and customers outside of the UGB in the Charter Oaks and Dixonville areas. Water was provided through approximately 11,339 total accounts. The City withdraws and treats water from the North Umpqua River at the Winchester Water Treatment Plant (WTP). The City is responsible for providing quality water of sufficient quantities to its current and future customers.

SOURCE OF SUPPLY AND WATER RIGHTS

WATER RIGHTS

The City obtains its water supply from the North Umpqua River at Winchester just downstream of the Winchester Dam. The City's three water rights on the river total 31.0 cubic feet per second (cfs) or approximately 20.0 million gallons per day (mgd). The City currently has access to 25.0 cfs (16.2 mgd) due to a limitation of 0.0 cfs on Permit S-44018. The City does not require access to more water at this time and is therefore not requesting greenlight water under Permit S-44018. Chapter 4 presents an assessment of the adequacy and reliability of the City's supply considering water rights limitations. The City's supply is adequate and reliable to meet current demands.

A fourth water right supplements water supply to the Winston-Dillard and Roberts Creek Water Districts through interties.**Table 1-1,** at the end of this Chapter**,** summarizes the City's water rights in the North Umpqua River basin.

ENVIRONMENTAL RESOURCES ISSUES

Areas of the North Umpqua watershed are water quality limited for temperature, pH, dissolved oxygen, iron, lead, mercury, arsenic, copper, aquatic weeds or algae, biological criteria, E. Coli, and sedimentation according to the Oregon Department of Environmental Quality (DEQ) Water Quality Assessment 303(d) listing.

The following threatened and endangered species are listed by the State:

- Chinook Salmon – State listed as Sensitive
- Coho Salmon – State listed as Sensitive
- Green Sturgeon – State listed as Sensitive Critical
- Pacific Lamprey – State listed as Sensitive
- Steelhead – State listed as Sensitive
- Umpqua Chub – State listed as Sensitive Critical

There are no federal listings for the City's sources.

INTERCONNECTIONS

The City has two interconnections to other water systems. The Umpqua Basin Water Association intertie is located to the northwest of the City on Garden Valley Boulevard. The Roberts Creek Water District intertie is located south of the City near the Douglas County Museum within its UGB along the South Umpqua River and next to Interstate 5. The two interconnections are set up so that the City can supply emergency water, however, if necessary, the dual systems could reverse flow back into the City. Umpqua Basin Water Association draws water from the North Umpqua River and Roberts Creek Water District draws from the South Umpqua River.

SERVICE AREA

EXISTING SERVICE AREA AND LAND USE

The current water service area includes the population within the City's UGB and areas outside of its UGB, including Charter Oaks and the previous Dixonville Water Association (DWA) service area. In 2007 the City acquired the DWA facilities. **Figure 1-1** shows a map of the existing system, including the existing water service area.

POPULATION

The population within the City limits was 24,820 in 2018, as estimated from the Portland State University (PSU) College of Urban & Public Affairs Population Research Center (PRC). The total population served, including the current service area within the City's UGB, was 30,092 in 2018.

EXISTING WATER SYSTEM

GENERAL

The City is currently supplied from the Winchester WTP, which is north of the City and draws water from the North Umpqua River. The WTP has a nominal peak capacity of 12 mgd. The treatment plant sits at an elevation of approximately 454 feet on an approximately 3.5-acre site on the south bank of the North Umpqua River. Treated water is pumped from the WTP to the City's distribution system and storage reservoirs through 20-, 24-, and 30-inch diameter transmission mains.

The City's existing hydraulic profile is depicted in **Figure 1-2**. The following sections describe the City's water system facilities.

DISTRIBUTION SYSTEM PUMP STATIONS

The City has 21 pump stations, including five pump stations located in the former DWA service area, which are summarized in **Table 1-2**.

Table 1-2
City of Roseburg Distribution Pump Stations

Pump Station	Year Built	No. of Pumps	Horsepower (HP)	Pump Station Type
Winchester Creek	2006	1	1.5	Hydropneumatic
		2	7.5	Hydropneumatic
Isabell	1944	1	1	Hydropneumatic
Joanne	1965	1	3	Standard
		1	7.5	Standard
Kline	1991 (Rebuilt)	2	15	Standard
Dogwood	1991	1	1	Hydropneumatic
Garden Valley	2017 (Rebuilt)	2	50	Standard
Military	1988	1	3	Standard
		1	3	Standard
Fairhill	2008	2	7.5	VFD
		2	20	VFD
Hawthorne	2002	2	50	Standard
Terrace	1974	1	10	Hydropneumatic
		1	30	Hydropneumatic
Kane	2002	1	1.5	VFD
Golden Eagle	2005	2	3	VFD
Rifle Range	1983	2	1.5	Hydropneumatic
Ventura	1982	2	20	Standard
Frontier (System No. 1)	2007	1	1	VFD
		2	3	VFD
Frontier (System No. 2)	1983	1	1	Hydropneumatic
Dixonville Pump Station No. 2	2009	3	10	VFD
Dixonville Pump Station No. 3	2009	4	5	VFD
Dixonville Pump Station No. 4	2011	3	1.5	VFD
Dixonville Pump Station No. 5	1966	2	7.5	Standard
Dixonville Pump Station No. 6	Unknown	2	7.5	Standard

VFD = Variable Frequency Drive

STORAGE

The City has 13 active reservoirs providing a total storage capacity of approximately 10.7 million gallons (mg). The characteristics of each reservoir are shown in **Table 1-3**.

Table 1-3
Roseburg Storage Reservoirs

Tank	Type	Year Built	Volume (mg)	Overflow Elevation (ft)	Base Elevation (ft)	Diameter (ft)	Height (ft)
Reservoir No. 5	Welded Steel	1949	0.80	710.0	694.3	92	16
Reservoir No. 6	Welded Steel	1949	0.80	710.0	694.3	92	16
Reservoir No. 7	Welded Steel	1980	4.00	710.0	690.0	185	20
Kline Street Reservoir (Garden Valley Tank)	Welded Steel	1976	1.00	710.0	678.5	74	32
Stacie Court Reservoir	Welded Steel	1992	0.30	937.25	917.0	50	21
W. Military Reservoir (West Side Reservoir)	Welded Steel	1956	0.50	683.4	648.4	50	34.5
Frontier Lane Reservoir (Denn-Nora Reservoir)	Welded Steel	1983	0.15	920.5	897.0	34	24
Fairhill Reservoir (Fairgrounds Reservoir)	Welded Steel	1969	0.75	710.3	670.8	57	40
Boyer Reservoir	Welded Steel	1966	0.50	704.0	672.1	52	32
Grange Reservoir	Welded Steel	1966	0.10	817.6	793.8	27	24
Cattle Drive Reservoir	Reinf. Conc.	1977	0.03	966.2	954.9	18x18	12
Terrace Drive Reservoir (High Level Reservoir)	Welded Steel	1998	0.80	1016.1	990.7	74	25.4
Rocky Ridge Reservoir	Bolted Steel	2002	1.00	1015.0	987.0	78	28

WATER DISTRIBUTION SYSTEM PIPING

The City's distribution system is made up of approximately 192 miles of pipe. **Table 1-4** summarizes the City's distribution piping by material and diameter.

Table 1-4
Roseburg Water Distribution System Piping

Material	Total Length of Distribution System Piping (ft)	Minimum Diameter (in)	Maximum Diameter (in)
Asbestos Cement	255,677	4	12
Ductile Iron	259,473	6	30
Galvanized	20,546	1	2
Cast Iron	171,302	4	12
Polyethylene (PE)	7,506	1	2
Polyvinyl Chloride (PVC)	214,969	2	12
Steel	31,876	6	30
Unknown	49,851	-	-
Total Length All Materials	1,011,200 (191.5 miles)		

CURRENT DEMANDS

HISTORICAL WATER PRODUCTION

A city's water supply, or production, is the total amount of water supplied to the system. **Table 1-5** summarizes the total amount of water supplied in millions of gallons (MG) and millions of gallons per day (mgd) to the City's water system from 2009 through 2018.

Table 1-5
Historical Water Production

Year	Annual Production (mg)	ADD (mgd)	MDD (mgd)	Peaking Factor (MDD/ADD)
2009	1,974	5.41	9.94	1.84
2010	1,785	4.89	9.44	1.93
2011	1,574	4.31	7.44	1.73
2012	1,603	4.39	7.80	1.78
2013	1,666	4.56	8.41	1.84
2014	1,656	4.54	8.09	1.78
2015	1,736	4.75	8.49	1.79
2016	1,658	4.54	9.23	2.03
2017	1,662	4.55	9.09	2.00
2018	1,650	4.52	8.39	1.86
Average	1,696	4.65	8.63	1.86

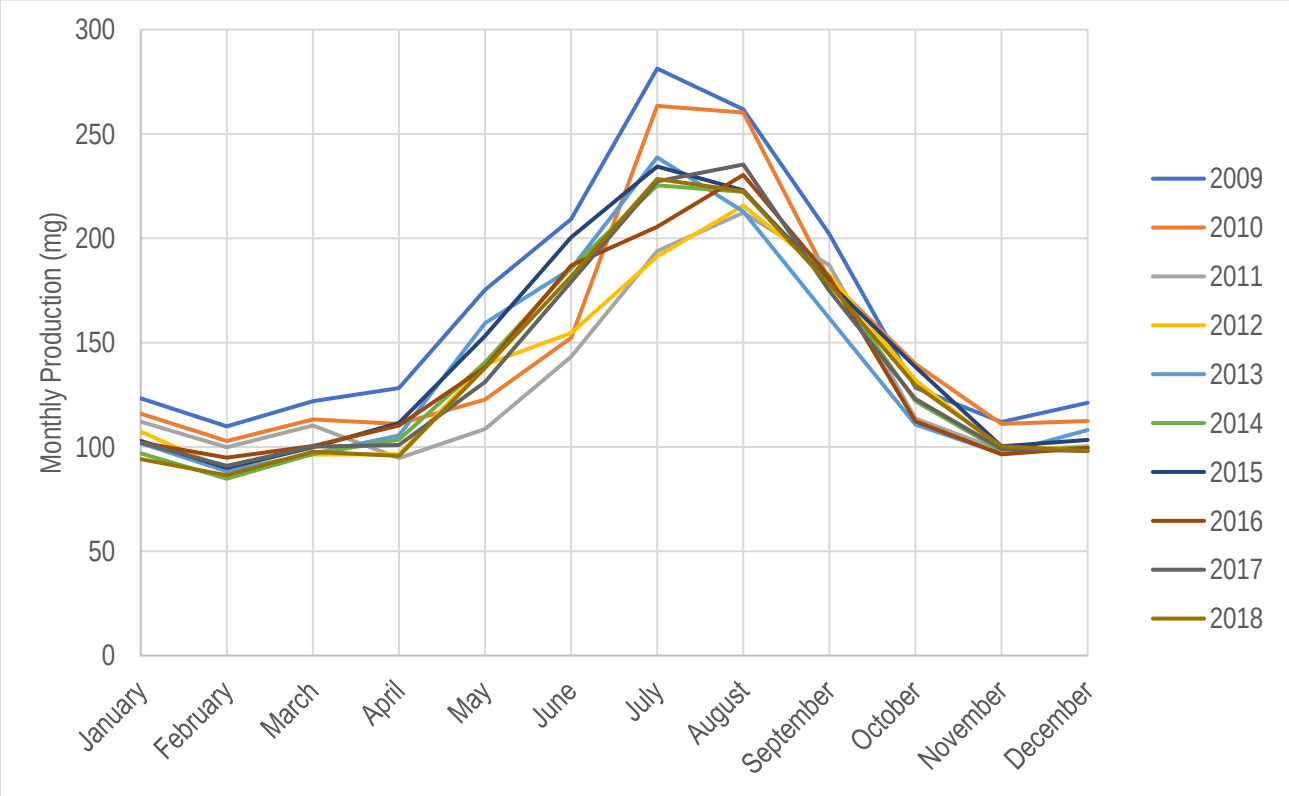
Average Day Demand

Table 1-5 also presents the average day demand (ADD) for the City. ADD is the total amount of water delivered to the system in a year divided by the number of days in the year. The ADD is determined from the historical water use patterns of the system and can be used to project future demands within the system. As seen in **Table 1-5**, ADD from 2009 through 2018 ranges from 4.31 mgd to 5.41 mgd, and the average ADD is 4.65 mgd.

Seasonal Variation and Maximum Day Demand

Like most other water systems in the northwest, the City's water use varies seasonally, typically peaking in the hot summer months due to high irrigation demands. **Chart 1-1** shows the historical amount of water supplied to the City's system for each month from 2009 to 2018. As seen in the **Chart 1-1**, the City's highest water use typically occurs in July and August. Monthly water production increases from around 100 mg per month during winter months to approximately 230 mg per month in the summer. Non-residential customers often peak at different times than residential customers due to non-irrigation needs. However, it is common for communities with mostly residential customers, like the City, to see peak demands driven by the residential irrigation water use.

Chart 1-1
Historical Monthly Water Production



Maximum day demand (MDD) is the maximum amount of water used throughout the system during a 24-hour period of a given year. MDD typically occurs on a hot summer day when lawn watering is occurring throughout much of the system. **Table 1-5** presents the MDD from 2009 to 2018. The highest MDD according to the meter data occurred in 2009 with a peak of 9.94 mgd. Projected MDD is often estimated as a factor of projected ADD, using what is called the MDD/ADD Peaking Factor. The average MDD to ADD Peaking Factor from 2009 to 2018 is 1.86.

HISTORICAL WATER CONSUMPTION

Water consumption is the amount of water used by all customers of the system, as measured by the customer's meters. The City categorizes its customers into ten groups:

1. Residential,
2. Stacie Court Residential,
3. Residential Outside,
4. Dixonville Residential,
5. Commercial,
6. Dixonville Commercial,
7. Commercial Outside,

8. Public,
9. Dixonville Public, and
10. Public Outside

As of February 14, 2020 the City had a total of 11,224 active customer meters. **Charts 1-2**, **1-3**, and **1-4** show the break-down of customers by number of accounts, average water use per account per day, and total annual consumption in each category.

Chart 1-2
2019 Number of Accounts

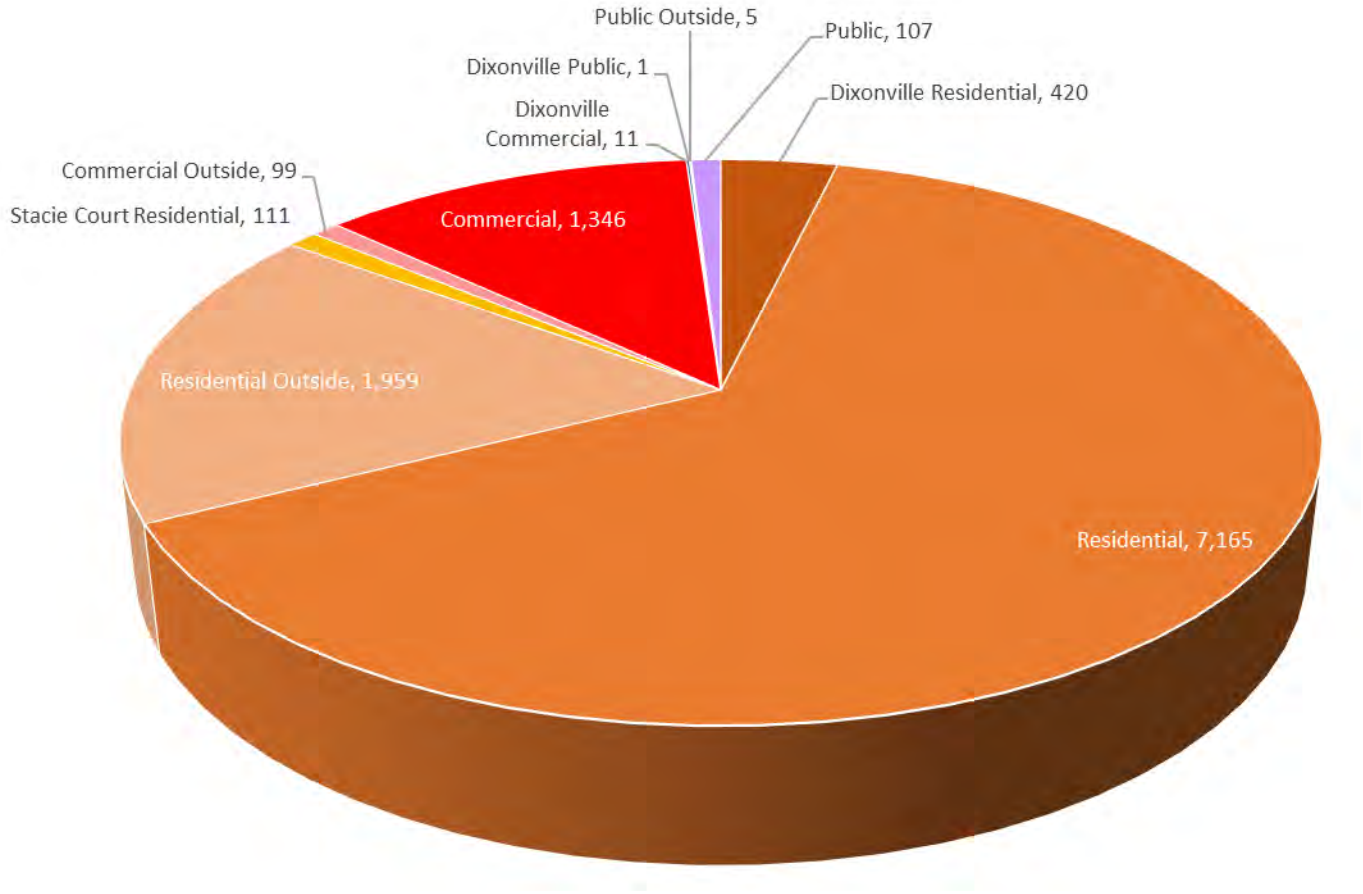


Chart 1-3
2019 Average Water Use Per Account Per Day (gallons per day)

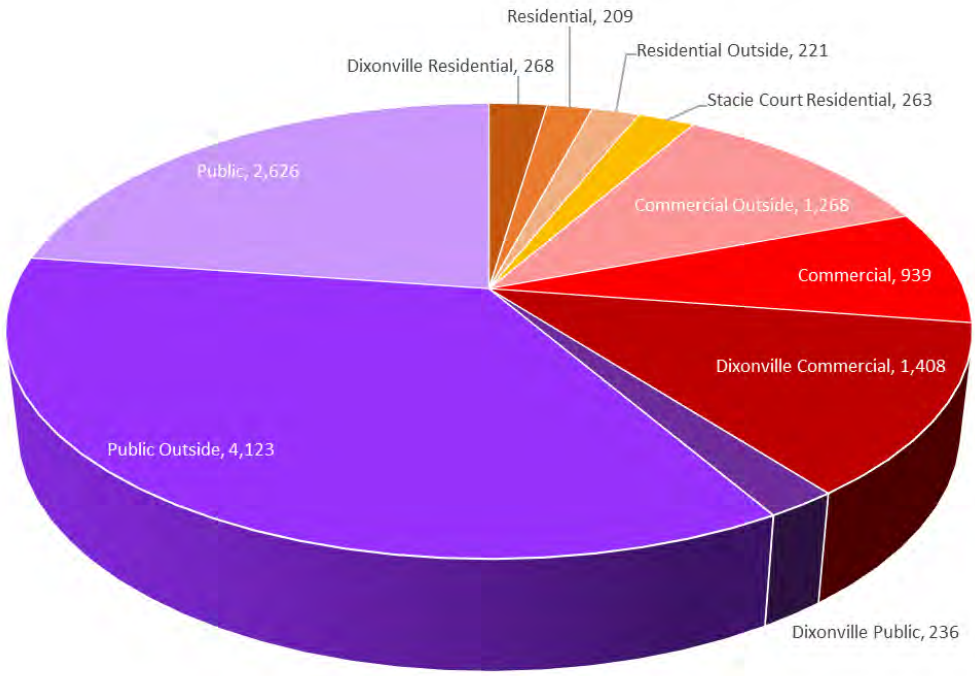
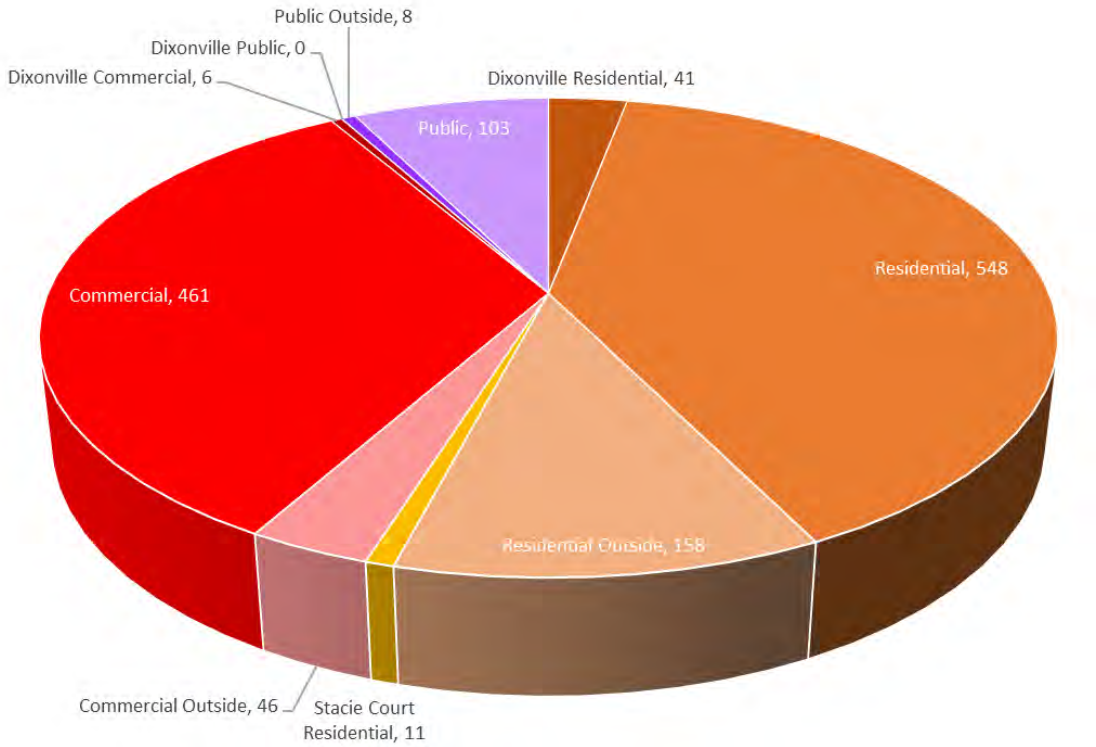


Chart 1-4
2019 Total Annual Consumption (million gallons)



Annual consumption history by customer type is presented in **Table 1-6**. Only four years of data are available because the City switched over to a new billing system in 2016; prior to which, water use was not tracked by customer type. In 2019 approximately 86 percent of all customer meters were residential, 13 percent were commercial, and 1 percent were public meters. Residential customers consumed approximately 55 percent, commercial customers approximately 37 percent, and public customers approximately 8 percent of total City water in 2019.

Table 1-6
Annual Consumption History by Customer Category

Customer Category	Annual Consumption (MG)			
	2016	2017	2018	2019
Dixonville Residential	39	39	42	41
Residential	563	569	572	548
Residential Outside	179	166	163	158
Stacie Court Residential	11	12	11	11
Total Residential	792	786	788	757
Commercial Outside	60	52	48	46
Commercial	475	484	482	461
Dixonville Commercial	5	4	3	6
Total Commercial	539	540	533	513
Dixonville Public	0.2	0.1	0.1	0.1
Public Outside	6	6	6	8
Public	92	105	115	103
Total Public	98	111	122	110
Total All Customers	1,429	1,437	1,442	1,380

Large Water Users

Table 1-7 shows the largest water users of the system in 2018 and their total amount of metered consumption for the year. The total water consumption of these ten water accounts represented approximately 9 percent of the system's total metered consumption in 2018. Their water usage is included in the commercial and public consumption already presented in **Table 1-6**.

Table 1-7
Top 10 Largest Water Users

Name	Address	Total Annual Consumption (gal)
Veterans Admin. #653-C71332	913 NW Garden Valley	36,557,752
Mercy Medical Center	2799 NW Mercy Dr., 2700 NW Stewart Park Dr., 2801 NW Mercy Dr.	32,972,588
Umpqua Dairy	333 SE Sykes Ave.	22,759,396
Nordic Plywood, Inc.	160 Temple Brown Rd.	13,131,140
Sunshine Park (City of Roseburg)	205 Sunshine Rd.	7,179,304
John C. Freemont Middle School	850 W Keady Ct.	4,883,692
Douglas County Fair Board	2100 Frear St.	4,788,696
Holiday Inn Express	375 W Harvard Ave.	4,295,764
Joseph Lane Middle School	2153 NE Vine St.	3,007,708
Roseburg High School	400 W Harvard Ave.	1,828,112
	Largest Water Users Total Consumption	131,404,152
	Water System Total Metered Consumption	1,472,242,772
	Percent of Total Metered Consumption	9%

Bulk Water Sales

The City allows bulk purchases of water to authorized account holders. The City grants permission for these authorized bulk users to hook up to filling stations or to use specified hydrants for work on construction projects. Purchased water is tracked and billed according to use. These customers generally have peak usage in the summer months but can also have peak usage in the off-season. Bulk water sales were only 0.4 percent of the City's total water consumption in 2018. From 2012 to 2018, bulk water usage averaged 9,883 gallons per day (gpd) from hydrants for construction projects and 11,376 gpd from bulk water filling stations.

WATER LOSS

The difference between the amount of water supplied and the amount of authorized water consumption is considered water loss. Many issues contribute to water loss in a typical water system, including water system leaks, inaccurate supply metering, inaccurate customer metering, illegal water system connections or water use, undocumented fire hydrant usage or water main flushing, and malfunctioning telemetry and control equipment resulting in reservoir overflows.

Table 1-8 shows the calculation of water loss as a percentage of total production. From 2009 to 2018 the average water loss was 13.5 percent. Future improvements to the water distribution system by the City should aim to reduce water loss to bring the water loss percentage to 10 percent or below, a standard acceptable level.

Table 1-8
City Water Loss

Year	Total Annual Production (mg)	Total Annual Consumption (mg)	Water Loss (% of Production)
2009	1,974	1,663	15.7%
2010	1,785	1,416	20.7%
2011	1,574	1,368	13.1%
2012	1,603	1,419	11.4%
2013	1,666	1,472	11.6%
2014	1,656	1,457	12.0%
2015	1,736	1,512	12.8%
2016	1,658	1,475	11.1%
2017	1,662	1,419	14.6%
2018	1,650	1,452	12.0%
		Average	13.5%

The City is working to reduce water loss. The City's current Water Master Plan identifies the oldest pipes in the system and includes a budget item within the Capital Improvement Plan to replace old pipes. The City replaces obvious leaks as they occur. The transmission main between the water treatment plant and Reservoir Hill is known to leak. Approximately two miles of the main was replaced in 2012 and 2013. Replacement of additional sections of this main is planned in the next few years with the second phase of construction occurring to the south of the 2013 main replacement. Some minor leaks have occurred downtown in 2-inch pipes and other small diameter pipes. The leaks downtown were addressed and repaired as they occurred. These efforts are also discussed in **Chapter 2 – Water Conservation**.

Table 1-1 City of Roseburg – Water Right Inventory

Application No.	Permit No.	Priority Date	Certificate No.	Transfer No.	Source	Use	Allowed Rate (cfs)	Actual Diversion				Authorized Completion Date	Notes/Environmental concerns
								Maximum Instantaneous Rate Diverted to Date (cfs)	Maximum Annual Quantity Diverted to Date (MG)	Average Monthly Diversion (MG)	Average Daily Diversion (Gallons)		
Municipal Water Rights													
S-24798	S-19329	6-2-1950	45930	N/A	N. Umpqua R.	Municipal	12.0cfs	7.0	1,650	137.5	4,520,000	N/A	
S-31576	S-24914	5-21-1957	84826	N/A	N. Umpqua R.	Municipal	13.0cfs	0	0	0	0	N/A	
S-58356	S-44018	2-22-1979	N/A	N/A	N. Umpqua R.	Municipal	0.0 cfs (out of permitted rate of 6.0cfs)	0	0	0	0	10-1-2050	
						Roseburg Municipal Totals	**25.0cfs**	**7.0**	**1,650**	**137.5**	**4,520,000**		
S-55991	S-41514	5-31-1977	N/A	N/A	N. Umpqua R.	Municipal	3.0 cfs	0	0	0	0	10-1-1998 (COBU rec'd)	Assigned to Roberts Creek Water District; no emergencies requiring supply to Roberts Creek Water District.
Irrigation Water Rights													
S-32723	S-25818	10-24-1958	38427	T-11418	S. Umpqua R.	Irrigation of 31.83 acres (golf course)	0.40cfs	0.22	20.0	1.67	53,800	N/A	Golf Course
S-46205	S-34522	7-9-1969	39733	N/A	S. Umpqua R.	Irrigation of 1.9 acres	0.025 cfs	0.006	0.57	0.05	1,500	N/A	Riverside Park 1
S-29051	S-22852	3-8-1954	40358	N/A	S. Umpqua R.	Irrigation of 0.77acres	0.01cfs	0.006	0.52	0.04	1,400	N/A	Riverside Park 2
S-48034	S-36020	3-11-1971	49667	T-4496 & T-11418	S. Umpqua R.	Irrigation of 6.2ac	0.08cfs	0.06	5.67	0.47	15,100	N/A	Gaddis Park
S-48034	S-36020	3-11-197	54476	T-4496 & T-11418	S. Umpqua R.	Irrigation of 0.8ac	0.01cfs	0.005	0.38	0.03	1,000	N/A	Fir Grove
R-31836	R-2119	9-3-1957	65254	N/A	Newton Creek	Recreation	9.0 AF	N/A, stored water (9.0 AF)	N/A	N/A	N/A	N/A	Newton Creek Pond
S-31837	S-25405	9-3-1957	65255	N/A	Newton Creek and Stewart Park Wildlife Pond	Recreation	0.10cfs	Unknown	Unknown	Unknown	Unknown	N/A	Wildlife Pond
S-54840	S-41139	9-30-1976	67675	N/A	S. Umpqua R.	Irrigation of 0.9acres	0.02cfs	0.016	0.62	0.05	1,650	N/A	Mecilli Park
S-10883	S-7427	7-9-1929	76353	T-11418	S. Umpqua R.	Irrigation of 0.33acres	0.005cfs	0.009	0.84	0.07	2,250	N/A	Duck Pond
S-60117	S-45076	5-9-1980	76681	T-8224 & T-11418	S. Umpqua R.	Irrigation of 11.1acres	0.14cfs	0.05	4.94	0.41	13,300	N/A	Stewart Park Bandshell
S-60117	S-45076	5-9-1980	87562	T-11418	S. Umpqua R.	Irrigation of 25.4ac	0.32cfs					N/A	Stewart Park 2
R-81555	R-12239	8-19-1996	88462	N/A	Runoff overflow from duck pond	Wetland Enhancement (Nov. 1 – July 15)	3.24AF	Runoff not measured	Runoff not measured	Runoff not measured	Runoff not measured	N/A	Runoff overflow from duck pond

Legend

- Intertie
- Water Treatment Plant
- Pump Stations
- Reservoirs/Tanks
- Water Mains

Zoning

- Single-family Res. >10,000 sf
- Single-family Res. >7,500 sf
- Single-family Res. >6,000 sf
- Limited Multi-family Res.
- Multi-family Res.
- Medium-density Multi-family Res.
- High-density Multi-family Res.
- Limited Commercial
- Community Commercial
- Airport District
- Professional Office
- Central Business District
- General Commercial
- Light Industrial
- Medium Industrial
- Heavy Industrial
- Mixed Use
- Public Reserve
- Residential Open Space
- City Limits
- UGB
- Taxlots
- Streets

Dixonville Area

J:\DATA\ROS\1018-191 WMCP\GIS\MAPS\FIG 1-1 ROS EXISTING SYSTEM.MXD BY: HFARRIS PLOT DATE: SEP 20, 2019 COORDINATE SYSTEM: NAD 1983 STATEPLANE OREGON SOUTH FIPS 3602 FEET

RH2 NORTH

1 inch = 4,000 feet

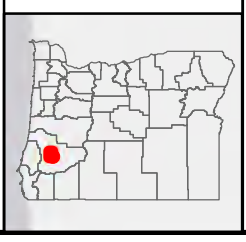
0 1,000 2,000 4,000 Feet

DRAWING IS FULL SCALE WHEN BAR MEASURES 1”

Figure 1-1
Existing System Map

City of Roseburg
Water Management & Conservation Plan

Vicinity Map



NORTH ⟷ SOUTH

1300'
1200'
1100'
1000'
900'
800'
700'
600'
500'
400'

837 Zone
887 Zone
937 Zone
1040 Zone
820 Zone
710 Zone
796 Zone
847 Zone
850 Zone
780 Zone
1198 Zone
885 Zone
1016 Zone
960 Zone
850 Zone
854 Zone
820 Zone
1162 Zone
1022 Zone
704 Zone
845 Zone
1068 Zone
937 Zone
1256 Zone

Supply from Umpqua Basin Master Meter

Stacie Court Reservoir
0.3 MG
Overflow Elev. 937.3'
Base Elev. 917.0'

Rocky Ridge Reservoir
1.0 MG
Overflow Elev. 1015.0'
Base Elev. 987.0'

Terrace PS
Elev. 990'

Terrace Reservoir
(High Level Reservoir)
0.8 MG
Overflow Elev. 1016.1'
Base Elev. 990.7'

Frontier (System No. 1) PS
Elev. 897'

Frontier (System No. 2) PS
Elev. 897'

Cattle Drive Reservoir
0.03 MG
Overflow Elev. 966.2'
Base Elev. 954.9'

Dixonville PS No. 6
Elev. 956'

Winchester Creek PS
Elev. 615'

Isabell PS
Elev. 635'

Joanne PS
Elev. 645'

Kline PS
Elev. 679'

Kline Street Reservoir
(Garden Valley Tank)
1.0 MG
Overflow Elev: 710.0'
Base Elev: 678.5'

Dogwood PS
Elev. 600'

Reservoir No. 5
0.8 MG
Overflow Elev: 710.0'
Base Elev: 694.3'

Reservoir No. 6
0.8 MG
Overflow Elev: 710.0'
Base Elev: 694.3'

Reservoir No. 7
4.0 MG
Overflow Elev: 710.0'
Base Elev: 690.0'

Garden Valley PS
Elev. 594'

Military PS
Elev. 595'

W. Military Reservoir
(West Side Reservoir)
0.5 MG
Overflow Elev: 683.4'
Base Elev: 648.4'

Fairhill PS
Elev. 666'

Fairhill Reservoir
(Fairgrounds Reservoir)
0.75 MG
Overflow Elev. 710.3'
Base Elev. 670.8'

Hawthorne PS
Elev. 680'

Kane PS
Elev. 687'

Golden Eagle PS
Elev. 578'

Rifle Range PS
Elev. 600'

Ventura PS
Elev. 620'

Frontier Lane Reservoir
(Denn-Nora Reservoir)
0.15 MG
Overflow Elev. 920.5'
Base Elev. 897.0'

Boyer Reservoir
0.5 MG
Overflow Elev. 704.0'
Base Elev. 672.1'

Dixonville PS No. 2
Elev. 565'

Solenoid Valve

Dixonville PS No. 3
Elev. 770'

Dixonville PS No. 4
Elev. 565'

Grange Reservoir
0.1 MG
Overflow Elev. 817.6'
Base Elev. 793.8'

Dixonville PS No. 5
Elev. 715'

Winchester Treatment Plant

Legend

455 Zone
820 Zone
837 Zone
887 Zone
937 Zone
1040 Zone
796 Zone
710 Zone
1015 Zone
780 Zone
847 Zone
850 Zone
885 Zone
1016 Zone
1198 Zone
960 Zone
854 Zone
1022 Zone
1162 Zone
704 Zone
845 Zone
1068 Zone
1256 Zone
Valve
PRV

Facilities at Same Site
Reservoir
Booster Pump Station
Master Meter

Figure 1-2
System Hydraulic Profile
City of Roseburg
Water Management and Conservation Plan

Date: February 12, 2019 Filename: ROS-hydraulic-profile.dwg

2 WATER CONSERVATION

INTRODUCTION

Water conservation and promoting the efficient use of water is an important element to water management for all utilities. By working towards efficient end uses and preventing excessive water use, utilities are able to reduce customer demands; therefore, delaying costly capital improvements. Despite continued growth, many utilities in Oregon are maintaining fairly low demand increases, which is largely due to more efficient customer water use.

The City of Roseburg (City) implements several best management practices for water conservation and has identified some additional conservation goals for this Water Management and Conservation Plan (WMCP) as described below.

PROGRESS REPORT

Prior to this WMCP, the City had never developed a Water Management and Conservation Plan; therefore, a progress report is not applicable.

WATER USE MEASUREMENT/REPORTING PROGRAM

The City is in full compliance with Oregon Administrative Rules (OAR) Section 690-085 which governs the City's water use measurement and reporting program. Reports are submitted by December 31st of each year.

CURRENT CONSERVATION MEASURES

The City already employs several best management practices in water use management and efficiency. **Table 2-1** summarizes the City's current conservation measures, which are organized by the Oregon Water Resources Department (OWRD) basic conservation measures required of all suppliers.

Because the City's service population exceeds 7,000, the City is required to implement enhanced conservation measures under the requirements of OAR 690-086-0150(6). These are summarized in **Table 2-1** and discussed further in the sections that follow. No other conservation measures are currently implemented.

Table 2-1
Current Conservation Measures

Conservation Measure	Description	Measure Implemented? (Y/N)
Basic Conservation Measures Required of All Water Suppliers:		
Annual Water Audit	Annual water audit comparing billing information to water supplied	Y
Fully Metered System	Metering of all customers	Y
Meter Testing and Replacement Program	Test and replace water meters when reading meters or if a leak is reported by a customer; regular large meter calibration; all meters replaced every 20 years	Y
Rate Structure	Based on the quantity of water metered	Y
Leak Detection Program	System-wide leak detection and on-going repair and detection of leaks	Y
Public Education Program on Water Conservation	Provide water conservation tips and education to the public	Y
Enhanced Conservation Measures Required of Select Suppliers:		
Program to Reduce Leakage to 10% or Less	Proactive leak management and pipe repair; adopting asset management program to assist with prioritization	Y
Rate Structure that Encourages Conservation	Tiered structure with increasing costs as water usage increases	N
Technical and Financial Assistance		N
Retrofit/Replacement of Inefficient Water Using Fixtures		N
Water Reuse, Recycling, and Non-Potable Opportunities	Non-potable use at several parks and school fields; water reuse at the Fir Grove Park splash pad	Y

BASIC CONSERVATION MEASURES

Annual Water Audit

The City documents production and consumption of water bi-monthly. Data collection includes metered customer billings, flow data from telemetry (also known as supervisory control and data acquisition, SCADA), bulk sales, and hydrant utilization. Calculations are performed and presented in an annual water audit indicating unaccounted-for water, otherwise known as water loss. As indicated in **Chapter 1**, the City's average water loss over the last three years is approximately 13.5

percent. This is higher than the generally accepted goal of 10 percent; therefore, the City continues ongoing efforts to improve meter accuracy, water use accounting (such as bulk sales and hydrant flushing), and aggressive leak detection and repair.

Full Metering of the System

All sources of supply and all water customers in the City's water system are fully metered.

Meter Testing and Maintenance Program

The City currently has an aggressive meter testing and maintenance program. All larger meters (3 inches and larger) are tested and calibrated annually. The City has a program to replace all meters in the system every 20 years.

All water customers in the City's system have record-all reads with disc series meters. The City approaches meter replacement based upon the following factors:

1. Usage – Any discrepancy that is found with consumption being either below or above normal average of any single user.
2. Yearly Maintenance – The City has an aggressive meter testing and maintenance program for all meters 3 inches and larger. The City has Oregon Meter Repair test and calibrate all large meters 3 inches and larger annually in August.
3. Age – The City has a program to replace all meters every 20 years.
4. Investigation – Upon discovery of suspicious meter reads, staff investigates by comparing the current read to historical read data for the same account. If a meter 2 inches and smaller appears to be reading incorrectly, it is replaced. Meters 3 inches and larger that appear to be reading incorrectly are either repaired by Oregon Meter Repair during their next scheduled annual visit, or they are replaced. In most instances, when reads are higher than expected, it has been found that customers have a private side leak or an unexpected usage is occurring.

Rate Structure

All customer use in the City is monitored using metered accounts. **Table 2-2** shows the City's 2019 rate structure. The City has adopted a monthly base charge based on meter size and levels. Beyond this base amount, the City charges $1.92 per 748 gallons to all customers. The City's current rate structure does not include a tiered rate structure.

Table 2-2
2019 Rate Structure

Monthly Water Service Rate	
Monthly rate per unit (748 gallons)	$1.92
Meter Type	**Base Charge**
3/4" Level 1	$15.25
3/4" Level 2	$20.57
3/4" Level 3	$25.88
3/4" Level 4	$31.20
1" Level 1	$38.30

Meter Type	Base Charge
1” Level 2	$43.60
1” Level 3	$48.93
1.5” Level 1	$59.22
1.5” Level 2	$64.55
2” Level 1	$84.28
2” Level 2	$89.60
3” Level 1	$130.42
4” Level 1	$172.79
6” Level 1	$325.74
8” Level 1	$487.49
10” Level 1	$653.75
Stacie Court Surcharge	$20.00

Leak Detection Program

Leak detection and repair are regular parts of maintenance. Maintenance staff regularly check for leaks and respond to customer reports of leaks. Leaks in the City are largely caused by inadequate pipe materials or installation, joint failures, service line failures, and general aging. A summary of the number of leaks and water main breaks that were repaired for the past six years is provided in **Table 2-3**.

Table 2-3
Leak and Main Break Repairs

Year	Number of Repairs
2013	7
2014	19
2015	24
2016	15
2017	12
2018	15

Public Education Program

The City currently provides conservation information to the public in its annual Consumer Confidence Report. In the past, the City has provided brochures at community events. The City is interested in providing more public education and outreach in the form of dispersing brochures at upcoming community events and displaying them at the water bill counter, incorporating water conservation discussions during annual school visits to the Water Treatment Plant, continuing to discuss conservation in the Consumer Confidence Reports, and posting conservation recommendations on the City’s website.

ENHANCED CONSERVATION MEASURES

Program to Reduce Leakage to 10 Percent

As discussed in Chapter 1, the City's average water loss is 13.5 percent. As described in the **Leak Detection Program** section, the City regularly identifies and fixes leaks. The City has an annual budget for replacing aging pipes that are prone to leaks and breaks. Additionally, the City monitors production versus consumption data on a seasonal basis to track leakage estimates.

The City is working to reduce water loss. The City is adopting an asset management program that will estimate and track the condition of the City's pipes to assist in prioritizing work orders to focus on the most critical areas of the system first. The City is planning to use GIS to map current leaks. These leaks would be documented in the City's asset management program to help identify problem areas. The City's current Water Master Plan identifies the oldest pipes in the system and includes a budget item within the Capital Improvement Plan to replace old pipes. The transmission main between the water treatment plant and Reservoir Hill is known to leak. Approximately two miles of the main was replaced in 2012 and 2013. Replacement of additional sections of this main is planned in the next few years with the second phase of construction occurring to the south of the 2013 main replacement. Some minor leaks have occurred downtown in 2-inch pipes and other small diameter pipes. The leaks downtown were addressed and repaired as they occurred. The City also plans to improve tracking of non-metered usage such as fire department flushing, training, etc.

The two-year benchmark for reducing water loss to 10 percent or less by implementing these changes is March 2022. It is assumed that with the above listed efforts, the City will achieve a water loss of 10 percent or less in the next two years.

If these efforts are not effective at reducing water loss to below 10 percent, the City will add an annual budget for leak detection that would include funds for annual surveys from an outside company (such as American Leak Detection), and pipe replacement when leaks are found. The five-year benchmark for completing these additional leakage reduction measures is March 2025.

Technical and Financial Assistance Programs

Technical and financial assistance programs recommended include rebates, cost-share programs, water audits, training in efficient equipment or actions, training for landscapers and contractors, and park and golf course irrigation efficiency assistance. The City has limited staff capacity to develop and manage these types of programs and has performed a cost-benefit analysis to assess their benefit and affordability.

The analysis relies heavily on data used for a similar study in the Rogue Valley; the *Southern Oregon Water Conservation Strategies Plan* (2013, Maddaus) includes a 30-year benefit-cost analysis of 27 applicable conservation measures, considering the costs of implementation and offset costs of water supply. Data regarding individual measures was used to develop the benefit-cost ratios for various financial assistance measures applicable to the City. The City estimated its water production cost to be $2,336 per 1 million gallons. The benefits of estimated water saved from each measure was assessed for a 20-year time period using this production cost. Costs for each measure include the rebate amount, administrative and marketing time, and additional costs to the consumer.

The resulting benefit-cost ratios of selected financial assistance programs are listed in **Table 2-4**. As seen in the table, only Commercial, Institutional, Industrial (CII) high-efficiency urinals and clothes

washers have a benefit-cost ratio above 1. The other measures with a benefit-cost ratio below 1 have higher implementation costs than estimated benefit and therefore they are not recommended.

Table 2-4
Benefit-Cost Ratios for Conservation Measures

Conservation Measure	Benefit-Cost Ratio
High-Efficiency Toilet Rebates	0.61
Hot Water on Demand Rebates	0.26
High-Efficiency Residential Washer Rebate	0.69
CII High-Efficiency Urinal Rebates	2.46
CII Clothes Washer Rebate	6.71

CII = Commercial, Industrial and Institutional

Even though urinals and CII clothes washers show an economic benefit over a 20-year period, City staff believe the other conservation measures included herein are more practical for administrative and management staff to implement over the next five years and therefore the City is not including technical and financial programs at this time.

The City has developed a method to track water use of its largest water users on a regular basis. Previously, the City did not have a clear way to capture the numerous water meters that go with individual customers. With this tool, the City plans to perform regular reviews of billing data to identify any water use trends. This is a first step towards performing water audits.

Retrofit/Replacement of Inefficient Water Using Fixtures

The City plans to purchase approximately $500 per year in conservation giveaway items such as faucet aerators, high-efficiency shower heads, leak detection tablets, and lawn watering gauges. These items will be kept on the main floor of City Hall and will be handed out to customers as requested. The City will use community outreach programs to inform the public where they can pickup the giveaway conservation items. The City also may advertise on customer bills that conservation giveaways are available for pickup at City Hall.

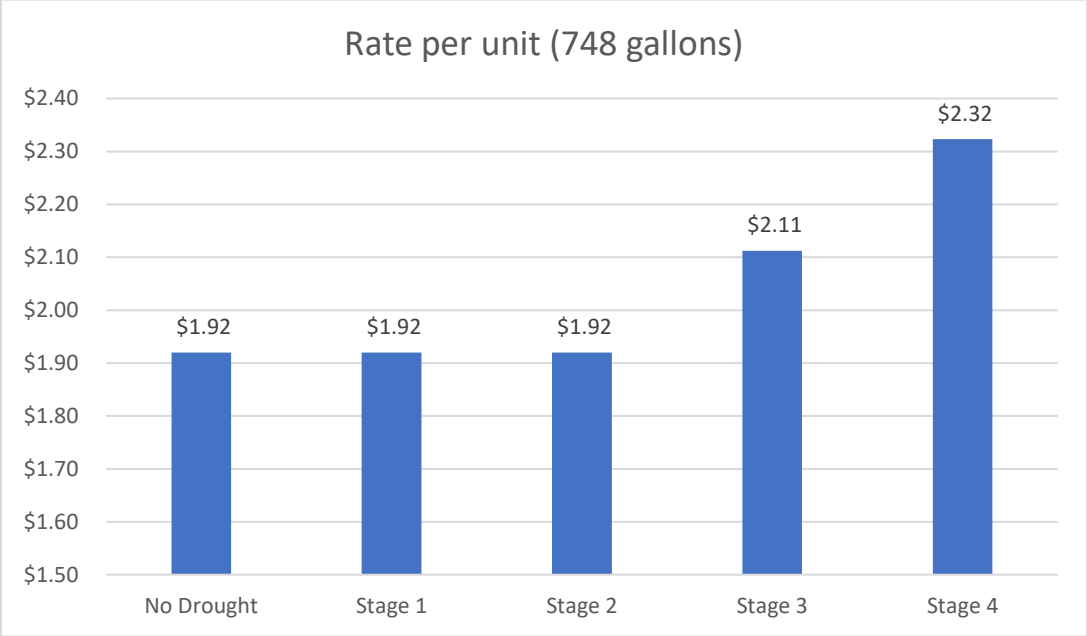
Rate Structure/Billing Practices for Conservation

While the City recognizes that tiered rate structures incentivize conservation, the City does not want to pass on higher water rates to its customers. The City's socio-economic profile is 5.6 percent unemployment (as of April 2019) and largely economically depressed. Therefore, the City does not want to consider a tiered water use charge increase at this time.

Instead, the City plans to implement a drought rate structure to incentivize lower water use during drought conditions when water curtailment is critical. Under the drought rate structure, the volumetric billing rate would incrementally increase in the event of a drought. Implementation of the drought rate structure would be at the discretion of the City according to the City's curtailment plan in **Chapter 3**.

Chart 2-1 presents the proposed rate increase as drought conditions become more severe. These are based on 10 percent increases of the base charge during each stage of severity. In Stages 1 and 2 there would be no increase since there is no actual water shortage in these stages. All base rates will remain the same when the drought rate structure is implemented.

Chart 2-1
Drought Rate Structure (Volumetric Charge for ¾" by ⅝" meter)



Water Reuse, Recycling, and Non-Potable Opportunities

Due to its proximity to the South Umpqua River, several City parks, school fields, and golf courses irrigate directly with river water. Very few parks use the potable water system for irrigation. Taking advantage of these non-potable opportunities reduces the demand on the potable system. Additionally, the City implemented a water reuse system at the Fir Grove Park Playground and Splash Pad.

Developing a recycled water system depends on the availability of wastewater effluent to supply the system and nearby applicable end uses. Recycled water production systems are often costly, as they require an additional level of treatment, storage for providing consistent pressures to end users, and transmission and distribution system piping. To evaluate the feasibility of a recycled water program, the City would need to coordinate with the Roseburg Urban Sanitary Authority (RUSA) that collects and treats the City's wastewater.

The most likely opportunities for recycled water use within the City's service area are irrigation of school grounds, parks, golf courses, and other fields near the treatment plant. These large irrigation users provide the most benefit to offset costs of recycled water infrastructure. However, these irrigation users require consistent supply during the irrigation season, which is also when wastewater effluent flows are at their lowest, and as described below, used elsewhere.

In 2013, RUSA developed a natural treatment system to achieve tertiary treatment of its wastewater effluent. The treatment system is used during the summer, which is a critical period when the South Umpqua River levels are low and susceptible to nutrient and temperature loading from the wastewater effluent. Treated effluent at the Natural Treatment System is put to beneficial use irrigating adjacent fields. Thus, the effluent from the treatment plant is already used during the time period that recycled water users would benefit from it.

Because of the limited availability of wastewater effluent, a recycled water program is not feasible nor appropriate for the City, and no plans to implement a program are recommended at this time. The City will continue to support non-potable water use opportunities as they arise, as well as focus on other conservation measures listed herein.

Other Proposed Measures

The City plans to implement code requirements for high-efficiency appliances in new construction.

CONSERVATION GOALS

City conservation goals are to continue with all current conservation measures and to add the following conservation measures listed in **Table 2-5**.

Table 2-5
Future Conservation Goals

Conservation Measure	Description	Goal Completion Date
Leak Detection and Repair	Continue to identify and repair leaks, adopt an asset management plan, complete replacement of leaking pipe leading to Reservoir Hill, improve tracking of non-revenue water use to achieve a water loss of 10 percent or less. If water loss is not reduced to 10 percent by March 2022 the City will add an annual budget for hiring a leak detection service and target a revised benchmark date of March 2025 to reduce water loss to 10 percent.	March 2022 (March 2025 if goal not met)
Efficient Fixtures Giveaway	Purchase $500 per year in conservation fixture giveaways and make them available to City water customers.	2024
Drought Rate Structure	Introduce a drought rate structure to be implemented temporarily on an emergency basis.	2024

3 WATER CURTAILMENT

INTRODUCTION

Water curtailment planning outlines actions for reducing water demand during emergency or drought conditions while maintaining essential water needs to City of Roseburg (City) customers. The City currently has Municipal Code Ordinance 5.04.300 that gives the City Manager power to temporarily curtail or suspend water service after giving public notice of curtailment or suspension. The City Manager's order remains in effect only until the next City Council meeting, at which time City Council reviews the order and decides the next course of action. Review by City Council is not necessary for curtailment orders by the City Manager requesting only voluntary reduction in water usage.

This section includes a detailed Curtailment Plan that the City plans to implement as part of this Water Management and Conservation Plan (WMCP). Adopting this Curtailment Plan and updating the City Ordinance will be included as an action item for the WMCP.

SUPPLY ASSESSMENT

The City's supply comes from the North Umpqua River and a large networked transmission system to the points of delivery. Water from the river is treated at the City's Winchester Water Treatment Plant (WTP), which has a capacity of 12 million gallons per day (mgd). In 2003, the City's maximum day demand (MDD) reached 10.6 mgd, but MDD has remained below 9.6 mgd in the last 10 years. This equates to approximately 80 percent of the WTP capacity. In the case of a short-term disruption in plant production, the City has 10.7 million gallons (mg) of storage capacity to meet customer demands. Depending on the situation (such as a supply disruption and a large fire at the same time), only a portion of this volume would be available to meet customer demands and curtailment might be triggered.

The City's supply is also limited by its water rights. As summarized in **Chapter 1**, the City's water rights total 25.0 cubic feet per second (cfs) or approximately 16.2 mgd. The City has potential to access 31.0 cfs (20.0 mgd) if greenlight water is granted under Permit S-44018 but the City does not need greenlight water at this time.

The City has stable, consistent supply sources. In the past 20 years the City has only implemented curtailment once, for a one-week period in 2011. In 2011 there was a main break on Laurelwood at a river crossing. It took a full week to locate and repair the break due to high water levels. In 2019 the City had a city-wide power outage that resulted in the WTP being offline for 30 hours. Emergency storage was adequate to meet this short-term supply disruption. The City is aware of several potential causes of water supply shortages as listed below.

- Long-term drought.
- Fire in the North Umpqua River watershed that affects water quality.
- Contamination, such as from a chemical spill, that necessitates shutting down the water source.
- Flooding that forces shut down of one or more facilities.
- Landslides or other natural disasters that damage water pipelines or facilities.

- Power outages, particularly those impacting the Winchester WTP.
- Facility or equipment failure, either from natural or human causes.

WATER CURTAILMENT MEASURES

The curtailment measures consist of four severity stages which can affect the City as a whole or only specified service areas. At each stage, restrictions imposed at the previous level(s) remain in force. The plan provides flexibility and enforcement capability. At any stage, additional restrictions can be imposed if they are deemed necessary. In some extreme cases, some stages can be skipped (e.g., expectation of an extended water capacity reduction, a fire in the watershed, a City-wide power outage). Should the plan have to be implemented, notification to the general public will be primarily through the local news media. Direct contact will be made with large customers and institutions as the need requires. The City plans to implement a warning system in its supervisory control and data acquisition (SCADA) protocol to alert staff if water system demands meet or exceed initiating conditions for curtailment stages. Initiating conditions are described as follows for each curtailment stage. If any administrative authority (e.g. OWRD, Oregon Department of Fish and Wildlife) implements more stringent curtailment measures the authority's curtailment plan will override the measures in Stages 1 through 4 of this plan.

STAGE 1 – AWARENESS OF POTENTIAL WATER SHORTAGE

When Stage 1 occurs, the Water Treatment Plant Superintendent, Water Distribution Superintendent and City Engineer (the Water Utilities Management team) will meet to assess the situation. If the Water Utilities Management team determines that a potential water shortage does exist, the team will consult with the Public Works Director. Under a Stage 1 warning, the Public Works Director has the authority to activate some or all of the voluntary curtailment measures described below.

Initiating Conditions

- Demands are at 85 percent of WTP production for three days.

City Staff Actions

- The City will limit water use for street sweeping and hydrant and water line flushing.
- The City Parks and Recreation Department shall irrigate at maximum efficiency.
- The Fire Department will limit training exercises to those that do not use water.
- The City will make conservation information available at the Public Library, Utility Billing and other City offices, local news media, and neighborhood associations.

Customer Actions

Stage 1 curtailment for citizens will be voluntary. The City will request that customers reduce or eliminate non-essential water use, to follow odd/even outdoor watering schedules based on address, and to limit outdoor watering to the early morning or late evening.

STAGE 2 – WATER SUPPLY SHORTAGE

At Stage 2, the Water Utilities Management team will assess the situation daily and may initiate the following restrictions. Stage 1 measures remain in effect.

Initiating Conditions

- Demands reach 100 percent of WTP production capacity for three days.

City Staff Actions

- Activate a media blast using the City's protocol, or a conservation hotline, or other public notification system with information on the current water supply situation, voluntary curtailment measures, and conservation tips.
- Distribute brochures to major water users. Request voluntary water usage reductions from major water customers.
- Limit City Parks and Recreation Department non-essential water use and irrigate only in off-peak hours for locations that use the potable water system.
- Limit hydrant and water main flushing to emergencies only.

Customer Actions

- Ask customers to voluntarily restrict all irrigation and other non-essential outdoor water use and to limit all outdoor water use to the hours between 8:00 pm and 8:00 am. The following practices are deemed non-essential:
    - Watering or irrigating of lawns, grass, or turf except for:
        - New installations after March 1st of the current calendar year;
        - Athletic fields frequently used for organized play; and
        - Park and recreation areas of a particular significance and value to the community as approved by the City Manager.
    - Use of City-supplied water to wash sidewalks, streets, driveways, walkways, parking lots, or other impervious surfaces except where necessary for public health or safety.
    - Use of City-supplied water to wash vehicles (including boats and watercraft), except at facilities equipped with water recirculation equipment or where necessary for public health or safety (e.g. garbage trucks or food transport) or as required by law.
- Major water users to voluntarily restrict all water usage.
- No water running to waste onto paved surfaces or into gutters.

STAGE 3 – SEVERE WATER SUPPLY SHORTAGE

At Stage 3 the Water Utilities Management team will assess the situation daily. The Public Works Director will notify the City Manager and City Council of the shortage and submit a report of the measures being implemented. At Stage 3, the Public Works Director may declare a Water Emergency (municipal code to be developed). Stage 1 and 2 measures remain in effect.

Initiating Conditions

- Demands exceed the WTP production capacity and maximum storage volumes are below 85 percent of capacity.

City Staff Actions

The Public Works Department will keep the media notified regularly about the status of the shortage and may initiate the following restrictions. The City will implement the drought rate structure as described in **Chapter 2**.

Customer Actions

- Water volume limits may be imposed on all customers.
- Further restriction of landscape irrigation.
- No planting of new landscapes.
- No construction or installation of new pools or hot tubs. Existing pools and hot tubs may not be drained to less than 90 percent of capacity and refilled.
- No water use for fountains, ponds, or other aesthetic purposes unless necessary to support fish.
- No vehicle washing except for vehicles that must be cleaned to maintain public health.
- No use of water from hydrants except for firefighting and flushing deemed necessary to maintain water quality.
- A fine will be instituted for water running to waste onto paved surfaces or into gutters.

STAGE 4 – CRITICAL WATER SHORTAGE

A Stage 4 water shortage is reached when maximum production is not meeting daily demand and reservoir storage falls to 60 percent of capacity. Because a water shortage of this severity threatens the ability of the City to deliver essential water supplies to its customers and provide adequate water storage and pressure for fire suppression, Stage 4 restrictions are mandatory. Stage 1, 2 and 3 measures remain in effect.

The Public Works Director will notify the City Manager and City Council of the shortage and submit a report of measures being implemented. At Stage 4, the Public Works Director may declare a Water Emergency (municipal code to be developed). The Public Works Department will keep the media notified regularly about the status of the shortage and may initiate the following restrictions.

Initiating Conditions

- Demands exceed the WTP production and maximum storage volumes are below 60 percent.

City Staff Actions and Responsibility

- The drought rate structure from Stage 3 will remain in effect in Stage 4.
- The Fire Department shall modify operations as necessary to maintain stored water levels and system water pressure for as long as possible. Public Works shall work closely with the Fire Department to alert them of areas where there may be low pressures and/or supply.
- All medical services will be provided with water as long as possible.
- In the event that a service level or other area of the City is without water, potable water shall be made available at appropriate locations within the City limits. Water shall be trucked to these sites and dispensed free of charge to City water customers.

Customer Actions

- All outdoor non-essential water use shall be prohibited except where necessary for public health or safety, and violators may be cited and water service discontinued for repeat violations.
- All large industrial and institutional accounts shall restrict water use to fire protection and other critical functions only.

The Water Emergency shall be in effect until such time as the Public Works Director notifies the City Manager when, in his/her opinion, the water shortage is over and an emergency situation no longer exists.

RELEVANT MUNICIPAL CODES

The City's existing municipal code (Ordinance 5.04.300) for curtailment is being updated to reflect this new curtailment plan.

4 WATER SUPPLY EVALUATION

INTRODUCTION

This chapter describes the City of Roseburg's (City) planned supply improvements to meet projected water demands. This chapter includes descriptions of the City's future service area, demand projections, and long-term supply strategy.

POPULATION AND SERVICE AREA GROWTH

As stated in **Chapter 1**, the population of the City's current water service area is approximately 29,284. This estimate includes the population within the City limits, some areas within the Urban Growth Boundary (UGB) that are currently served, and customers outside of the UGB, including Winchester, the Charter Oaks area, and the Dixonville area.

FUTURE SERVICE AREA AND POPULATION PROJECTIONS

Growth of the City's water system is comprised of infill within the existing City limits, annexation within the UGB, and further expansion to the UGB. **Figure 4-1** presents the *Comprehensive Plan* Land Use and currently anticipated areas of expansion. Both low and high population projections were estimated to reflect a range of planning assumptions. The assumptions for each of these growth areas are described further in this chapter.

Infill in the UGB

The City plans to serve water to all customers within the City limits and the UGB except: consumers north of the North Umpqua River (Looking Glass Road areas where consumers are provided water by the Umpqua Basin Water Association (UBWA) under an urban service agreement) and Stacie Court customers which receive City purchased water from a master meter supplied by UBWA. According to the Portland State University (PSU) College of Urban & Public Affairs Population Research Center (PRC), the City's UGB should anticipate a 2040 population of 36,126. This represents 20-percent growth over the 2018 population and equates to an average of 0.9-percent growth per year. By 2068 (50-year projections), the UGB population is estimated to be 45,575. The population for the area north of the North Umpqua River was estimated to be approximately 615 today and 1,400 in the future based on planned land use and assuming 2.3 people per household. This population was deducted from the UGB population projections for the purpose of this Water Management and Conservation Plan (WMCP).

For the high projections, the population within the City limits and within the UGB was increased at the same rate as the PRC population forecasts for the full UGB. (This allows the projections to use the same growth rate but reflects the fact that the populations for the UGB and the assumed water service area differ due to the excluded customers north of the North Umpqua River.) For the low projections, the population within the City limits and within the UGB was increased by 0.5 percent per year to reflect a slower growth.

UGB Expansion

The City has three specific areas of UGB expansion: 1) Charter Oaks; 2) Ventura; and 3) Golden Eagle/Terrace. The City provided assumed density for these areas, with the exception of the Golden

Eagle/Terrace area for which a density of 500 households was assumed. Housing density was converted to population assuming 2.3 people per household.

For the high projections, the UGB expansion areas were assumed to begin development in 2040 (with the exception of Charter Oaks, which is already partially developed) and to reach build-out by 2068 (50-year projections). For the low projections, the UGB expansion areas were assumed to begin development in 2040 (with the exception of Charter Oaks) and to reach a population of 500 people per development area by 2068 (50-year projections). No growth was assumed for the Dixonville area in either projections according to assumptions by City staff.

Tables 4-1 and **4-2** present the high and low population estimates for the Water Service Area using the assumptions discussed. It is important to note that these updated populations are significantly lower than previous planning studies for the City's water system, largely due to slower growth projections by the PRC. The City's *Long-Range Water Supply Plan* (2009, Murraysmith) used annual growth rates of 2.5 percent as assumed by the PRC at that time. These reductions in population also result in significantly lower demand projections than previously estimated.

Table 4-1

Water Service Area Population – High

	2018	2020	2030	2040	2050	2060	2068
Within UGB	29,284	29,579	31,607	34,935	8,130	41,515	43,886
UGB Expansion							
Charter Oaks	460	501	707	913	1,119	1,326	1,490
Ventura	0	0	0	10	516	1,021	1,426
Golden Eagle Terrace	0	0	0	10	417	824	1,150
Dixonville	920	920	920	920	920	920	920
Total Water System	30,664	31,025	33,370	37,009	41,411	45,998	49,338

Table 4-2

Water Service Area Population – Low

	2018	2020	2030	2040	2050	2060	2068
Within UGB	29,284	29,579	31,091	32,682	34,353	36,110	37,956
UGB Expansion							
Charter Oaks	460	464	471	479	486	494	502
Ventura	0	0	0	10	185	360	500
Golden Eagle Terrace	0	0	0	10	185	360	500
Dixonville	920	920	920	920	920	920	920
Total Water System	30,664	30,962	32,483	34,100	36,129	38,244	40,378

FUTURE WATER DEMANDS

Demand projections are based on several assumptions, including anticipated growth of the City and estimated water use of existing and future customers. Because these factors vary, three demand scenarios were developed (low, medium, and high) to bracket the potential range of demands the City could experience in the future. Average Day Demand (ADD) and Maximum Day Demand (MDD) projections are provided for the years 2030, 2040, 2050, 2060, and 2068 (which correlates to the PRC 50-year projections for the City's UGB). The following sections summarize the assumptions used for the City's demand projections.

WATER USE ASSUMPTIONS

Table 4-3 summarizes the water use assumptions for the three demand scenarios. In general, the medium demand projections are based on the average population growth and use recent water use trends (slightly lower than the last 10 years). The low demand projections reflect the low population growth and water conservation efforts. The high demand projections reflect the high population growth and use higher water use factors.

Table 4-3

Demand Assumptions

	Demand Scenario		
	Low	Medium	High
Population Growth	Low	Average of Low and High	High
Water Use Per Capita (gpcd)	Reduction of Medium up to 10% by 2040	147	155
MDD:ADD Peaking Factor	Reduction of Medium up to 10% by 2040	1.85	2.00

gpcd = gallons per capita per day

DEMAND FORECASTS

The resulting ADD and MDD for the planning periods used in this WMCP are summarized in **Table 4-4** and shown graphically in **Chart 4-1** and **Chart 4-2**. The table and charts present the low, medium, and high demand scenarios in millions of gallons per day (mgd). As anticipated, the demand projections are significantly lower than previous projections, which predicted an MDD of 34.7 mgd by 2058.

An additional demand that the City anticipates may come from redevelopment of an old mill site, called the Dixonville Industrial Site Development. According to the *Dixonville Industrial Site Feasibility Study* performed in November 2009, this project would add 1 mgd of projected demands to the water system. For planning purposes, it is assumed that this project will be completed as early as 2030.

Table 4-4
Future Water Demand Projections

	2030	2040	2050	2060	2068
AVERAGE DAY DEMAND					
Low - Conservation (mgd)	4.55	4.70	5.12	5.56	5.92
Medium (mgd)	4.84	5.22	5.69	6.18	6.58
High (mgd)	5.15	5.70	6.37	7.07	7.58
High with Dixonville Industrial Site Development (mgd)	6.15	6.70	7.37	8.07	8.58
MAXIMUM DAY DEMAND					
Low - Conservation (mgd)	8.41	8.69	9.47	10.28	10.94
Medium (mgd)	8.95	9.65	10.52	11.42	12.15
High (mgd)	10.30	11.40	12.74	14.14	15.15
High with Dixonville Industrial Site Development (mgd)	12.30	13.40	14.74	16.14	17.15

Chart 4-1
Average Day Demand Projections

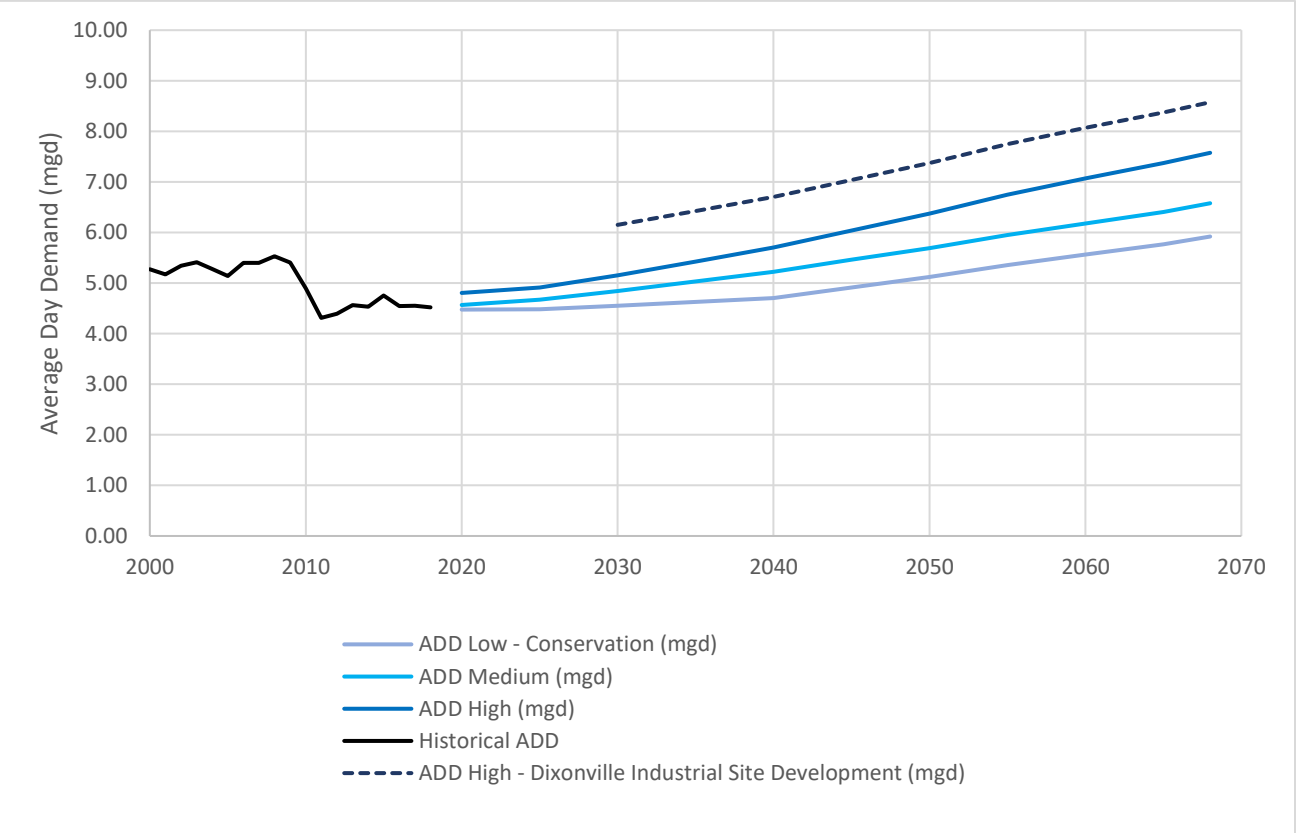
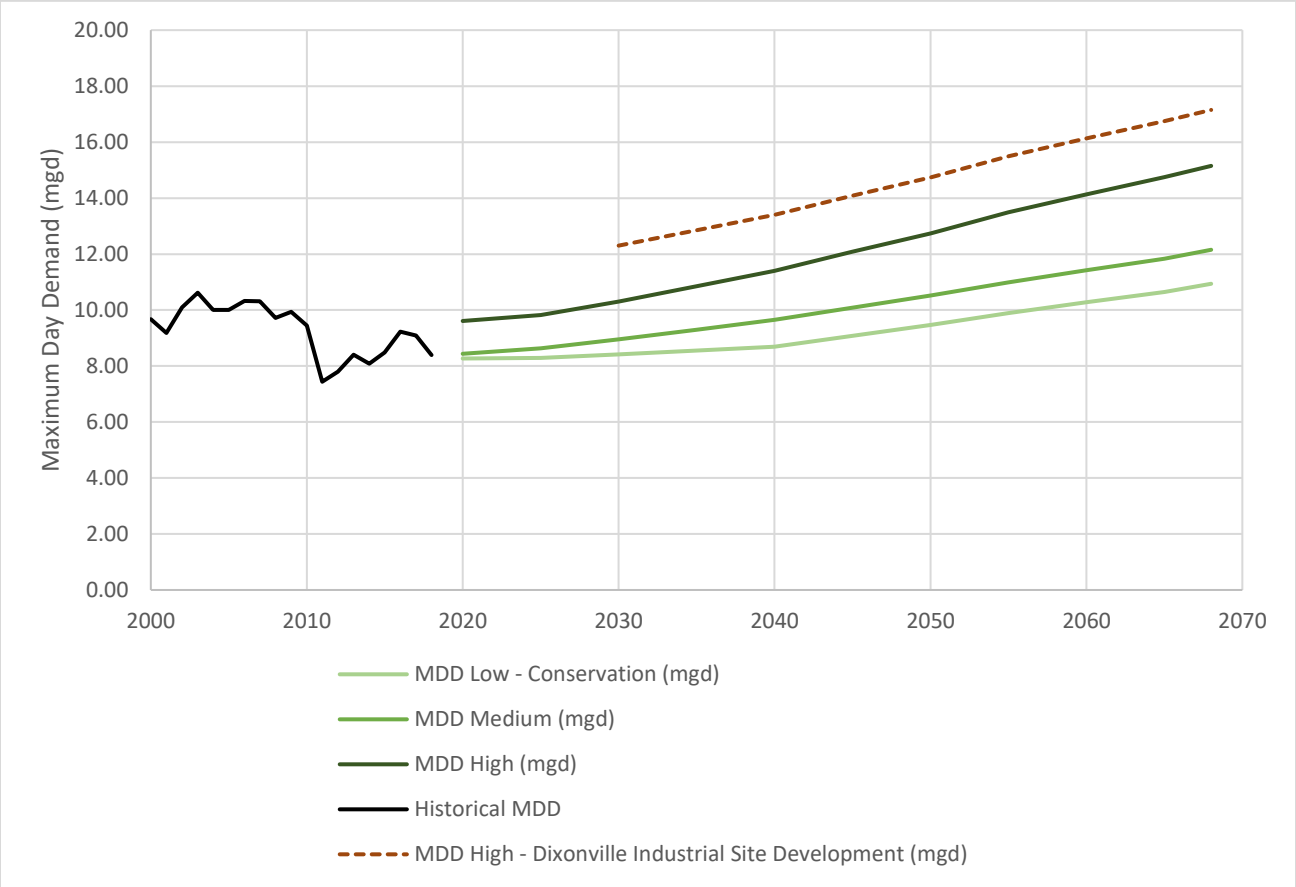


Chart 4-2
Maximum Day Demand Projections



SCHEDULE TO EXERCISE PERMITS AND COMPARISON OF PROJECTED NEED TO AVAILABLE SOURCES

This section evaluates the City's water supplies for meeting existing and future demands of the water service area. Two limitations govern the City's water supplies: water rights and treatment plant capacity. The following sections compare these two supply limitations to the City's current and projected demands and provide recommendations where needed.

WATER RIGHTS EVALUATION

As described in **Chapter 1**, the City holds water rights that include a peak rate of 31.0 cubic feet per second (cfs) (approximately 20 mgd). Approximately 16 mgd of water rights are certificated. As seen in **Chart 4-3** compared to the City's projected low, medium, and high ADD, the City's water rights exceed the annual demand projections beyond the planning horizon. As seen in **Chart 4-4**, which presents the low, medium, and high MDD, if the Dixonville Industrial Site Development project is completed in 2030, then MDD is projected to exceed the certificated water rights (16 mgd) by around 2058 under the high demand scenario. Given the significantly lower demand projections than previously estimated, the City may anticipate applying for an extension of time to perfect Water Right Permit 44018, which is currently extended to 2050. Demand projections are expected to be

updated closer to that time period; therefore, no action is recommended at this time regarding the City's water rights.

WTP CAPACITY EVALUATION

In addition to its water rights, the City is further limited by the Winchester Water Treatment Plant (WTP) capacity of 12 mgd. By approximately 2045 the high MDD projections exceed the current capacity of the WTP as seen in **Chart 4-4**. If the Dixonville Industrial Site Development is completed by 2030, then the WTP capacity would need to be increased by 2030 to accommodate the new demand.

Chart 4-3
Water Rights Capacity Evaluation – ADD

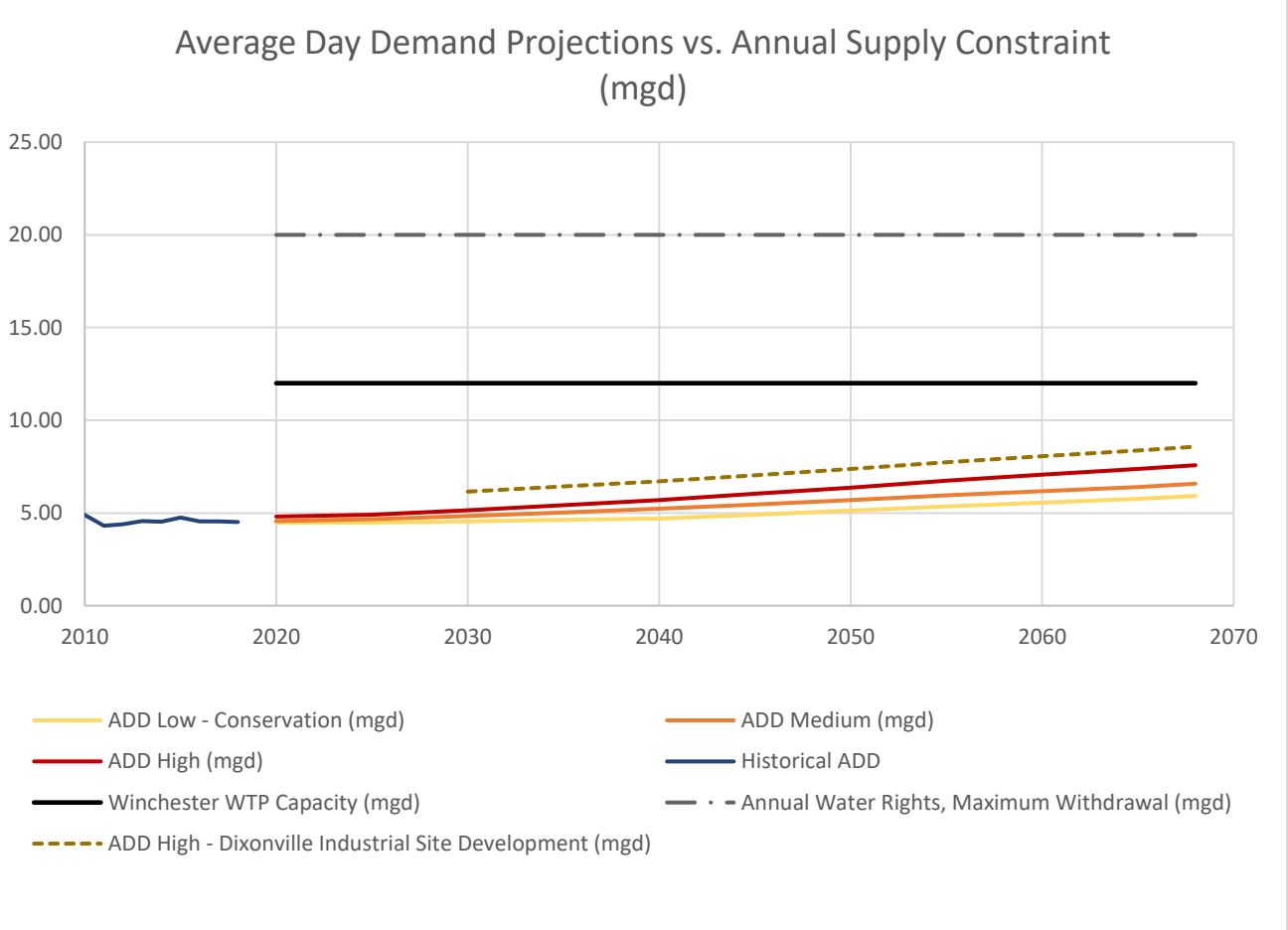
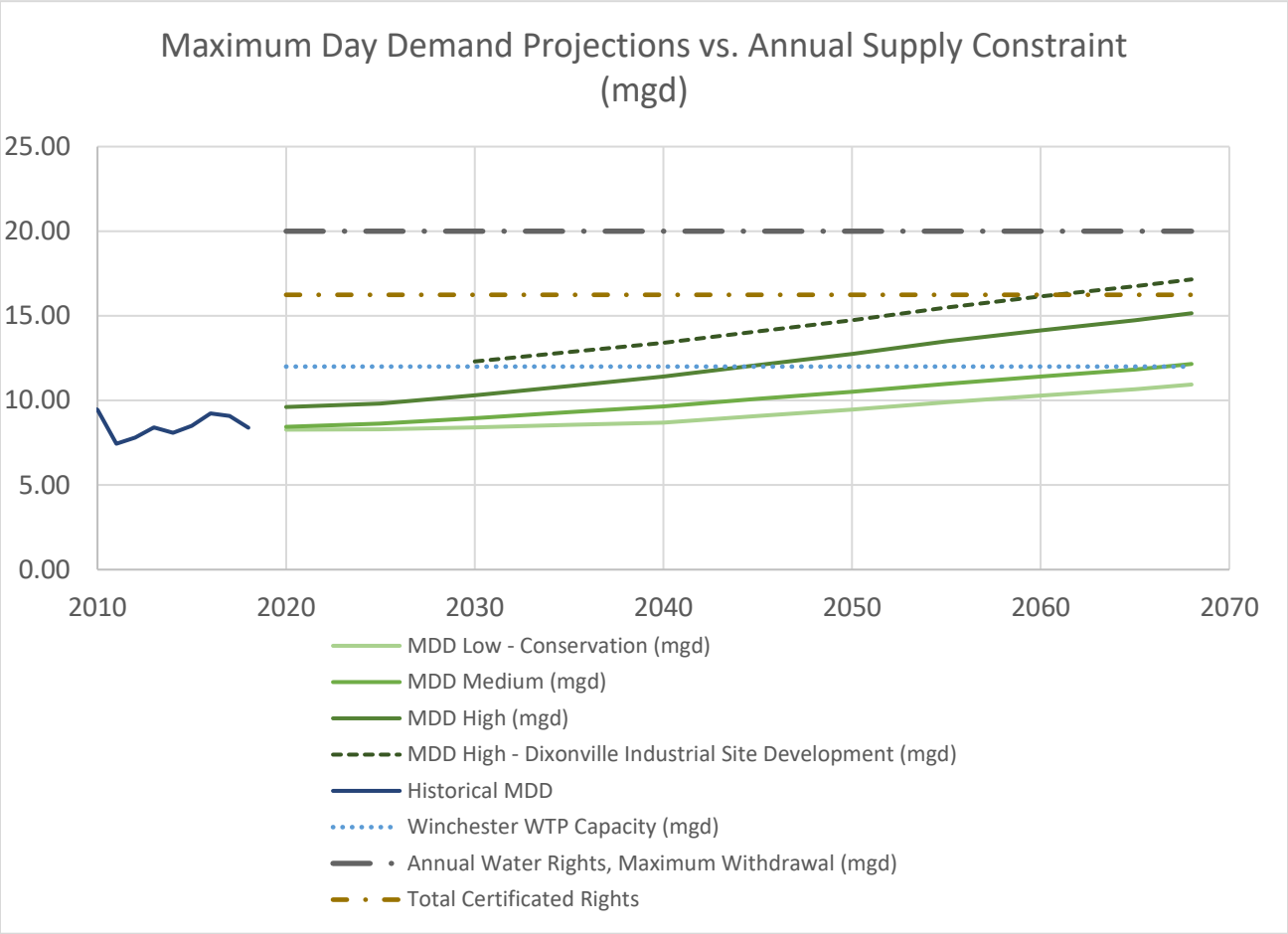


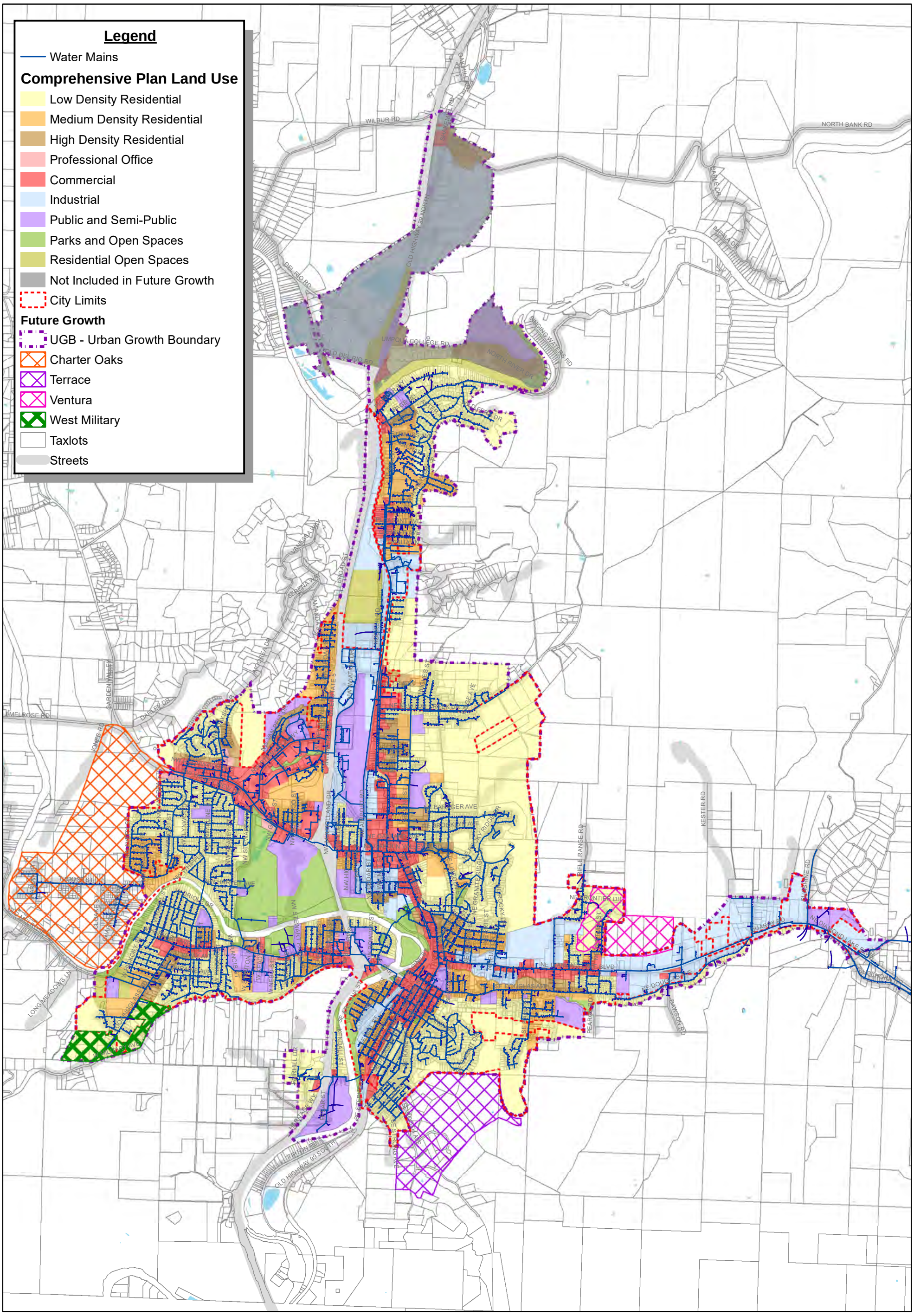
Chart 4-4
Water Rights Capacity Evaluation – MDD



SUPPLY RECOMMENDATIONS

The lower demand projections developed in this WMCP compared to previous planning result in a significant delay in the need to acquire additional water supplies. The City's *Long-Range Water Supply Plan* (2009, Murraysmith) recommended several additional supply improvements, including expanding the Winchester WTP, obtaining additional water rights, and developing a new Galesville reservoir supply to bring the City's total supply capacity to 34.7 mgd. As noted earlier, the *Long-Range Water Supply Plan* recommendations were based on population growth rates of 2.5 percent per year. The current Portland State University PRC population forecasts predict a much smaller growth rate of only 0.9 percent each year.

The current 2018 population forecast and data from the City Planners form the basis for recommendations in this WMCP. The projected demands presented in this WMCP do not necessitate treatment plant expansion nor additional supply in the next 25 years, unless demands increase higher than projected or if the Dixonville Industrial Site Development is developed.



J:\DATA\ROS\1018-191 WMCP\GIS\MAPS\FIG 4-1 ROS FUTURE LAND USE.MXD BY: HFARRIS PLOT DATE: APR 26, 2019 COORDINATE SYSTEM: NAD 1983 STATEPLANE OREGON SOUTH FIPS 3602 FEET

RH2 ENGINEERING 40 YEARS SINCE 1978

NORTH

1 inch = 4,000 feet

0 1,000 2,000 4,000 Feet

DRAWING IS FULL SCALE WHEN BAR MEASURES 1”

Figure 4-1
Future Land Use

City of Roseburg
Water Management & Conservation Plan

Vicinity Map

This map is a graphic representation derived from the City of Roseburg Geographic Information System. It was designed and intended for City of Roseburg staff use only; it is not guaranteed to survey accuracy. This map is based on the best information available on the date shown on this map.