2019 Water Management and Conservation Plan Update

Prepared for:

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Tables

Figures

Glossary

A.G.S.	Above Ground Surface, measured in feet
ANSI	American National Standards Institute. A private, non-profit organization that oversees the development of voluntary consensus standards for products, systems, and services created within the United States. Often combined with ASTM as a dual standard.
Aquifer	A water bearing geological formation; in Oregon, viable aquifers usually consist of sand and/or gravel, basalt rock, and/or marine sediments (shale, sandstone, etc.)
ASTM	American Society for Testing and Materials. An international standards organization that develops and publishes voluntary consensus technical standards for 15 separate sections, including: iron and steel products, construction, and water and environmental technology equipment and processes used in the water supply field. Often combined with ANSI (ANSI/ASTM) to create a dual standard.
Average Day Demand (ADD)	The total amount of metered (delivered to customers) water in one full year divided by 365
Average Summer Demand (ASD)	The estimated average daily demand during 3 full summer months, typically July, August, and September.
Average Winter Demand	The estimated average daily demand during 3 full winter months, typically December, January, and February
AWWA	American Water Works Association: A water industry trade group that develops and publishes standards for equipment and chemicals used in the potable water supply industry.
B.G.S	Below Ground Surface, measured in feet
Cubic Feet (ft^3)	A measure of water volume, often used for water billing purposes. 1 cubic foot of water = 7.48 gallons
C.F.S or CFS	Cubic feet per second, a measurement of rate of fluid flow (1 CFS = 448 GPM)
DEQ	Oregon Department of Environmental Quality. Responsible state agency for wastewater collection, treatment, and discharge as well as for air quality and solid waste disposal
EPA	Environmental Protection Agency, Federal government agency responsible for calculating, establishing, and enforcing national (U.S.) drinking water quality standards

Feet of Head (feet) (ft.hd)	An engineering unit of pressure, usually used to equate a vertical column of water to gauge pressure. 1 foot of water = .433 pounds per square inch (psi) pressure
F.P.S. or FPS	Feet per second, usually used to indicate water velocity in a pipeline. 5 FPS is generally recognized as the recommended maximum pipeline velocity.
GPCD	Gallons Per Capita per Day (AKA: gallons per person per day)
GPD	Gallons Per Day
GPM	Gallons Per Minute, used as a common measurement unit of water flow rate
GR or G	GR=Ground water registrations before 1955 G=Certificate of registration for groundwater sources after 1955 (Oregon)
Groundwater	Naturally occurring water from a water bearing formation (aquifer) at depths > 18' B.G.S.
Groundwater Act (Oregon)	In Oregon, a statute, adopted in 1955, that established water well contractor licensing, water well construction standards and well logs, and groundwater rights and permits.
HI	Hydraulic Institute: An independent organization that provides third-party testing and certification, as well as published standards, for pumping and hydraulic equipment in the United States.
HP, Horsepower	Horsepower-mechanical power necessary to perform work, typically used to calculate the work required to transfer a given volume of water against a given total dynamic head. 1000 GPM @ 100' TDH = 25 theoretical HP (THP). Actual or "Brake" HP (BHP) is usually 20-60% higher than theoretical value; i.e. 25 THP≈30-40 BHP.
Keizer, City of Keizer	City of Keizer; including all water customers supplied and billed by the city as well as city owned wells, pumps, storage, and distribution system.
Maximum Day Demand (MDD)	The maximum actual or projected daily water consumption in a given year. Source capacity and storage requirements are frequently based and sized on this demand.
MCL/MCLG/mcl	Maximum contaminant level-Max. allowed level of a given contaminant set by the EPA MCL goal =desired maximum level of a contaminant

Metered (or Sold) Water	The rate or volume of water delivered (and thus, metered) to customers through service connections and water meters. The difference between the “Production” and “Metered” volume of water is considered as unaccounted for or loss water and is not compensable.
MG/L or mg/L	Milligrams per liter; concentration of a mass of a chemical or contaminant per unit volume of water, roughly equal to 1 part per million (1 lb. per million lbs. = 1 mg/L)
MGD or mgd	Million gallons per day (1 MGD = 694.44 GPM or 1.55 CFS)
MSL	Mean Sea Level-elevation above or below normal sea level (usually expressed in feet)
NA or N/A	Not applicable, none available
ND or N/D	None detected or non-detectable level of an individual contaminant, chemical, element, or compound (mostly used in water quality tests)
NSF	National Sanitation Foundation; an organization that provides third-party testing and certification of water system components and chemicals. NSF standards 60 (components) and 61 (water treatment chemicals) are used in Oregon as the minimum levels of compliance, per OHA.
OHA or Health Authority	Oregon Health Authority, responsible state agency for the regulation of Public Water Systems in Oregon
OWRD	Oregon Water Resources Department, responsible state agency for regulation of well construction and water rights.
Peak Hour Demand	The maximum instantaneous flow rate within a water system anticipated at any one time in a given year, usually expressed in gallons per minute (GPM). Often determines the source and pumping equipment, water storage, and/or distribution system sizing
Per Capita Demand (GPCD)	The rate of water consumed or used by a single person per day, expressed in gallons. Can be applied to average, maximum day, or peak hour demands
PSI (psi) (psig)	Pounds per square inch, a unit measurement of applied pressure. Note that 1 PSI = 2.31 Feet of water head; 100’ of water head = 43.3 psi; 100 psi = 231 feet; Also, See Feet of Head
Production	Used to distinguish the total rate or volume of water delivered from the sources from the total rate or volume sold or delivered to customers. Used for average day, maximum day, and peak hour observations.

Pumping Water Level (PWL)	The stable distance from ground level downward to the lowest water level in a water well during sustained pumping conditions, usually measured in feet B.G.S.
Salem or City of Salem	City of Salem Public Works Department and all treatment, conveyance, and metering facilities owned or operated by the City of Salem.
Static Water Level (SWL)	The distance from ground level downward to the highest free standing water level in a water well that is not presently under pumping conditions, usually measured in feet B.G.S.
TDH or T.D.H.	Total Dynamic Head (in feet)-Sum of the vertical lift (lowest water surface to upper water surface or source to point of delivery) plus delivery pressure, and the sum of all pipe, valve, and minor friction losses.
Unit	Used to determine a total volume of water, often used for billing purposes (Typ. Value: 1 unit = 748 gallons)
USGS (U.S.G.S.)	United States Geological Survey
Well	An artificially created (usually vertical) opening or shaft constructed below ground level for the purpose of locating and extracting water, oil, or gas. A deep water well is usually defined as a well greater than 20’-30’ in total depth.
WRD/OWRD	Oregon State Water Resources Department, State agency responsible for water well construction standards, water well contractor licensing, and water rights appropriations

Chapter 1: Executive Summary

Background Information

The City of Keizer supplies potable water to a population of 38,505 (Year 2018 estimate from Portland State University-Population Research Center) over a 7.14 square mile area. The source of this water is exclusively groundwater from either the Troutdale or Willamette Silts Aquifer. The Troutdale formation is a major water-bearing source in the City and is located between approximate depths of 100 to 250 feet below the surface throughout the area. The City accesses this water through 15 wells, three (3) reservoirs, and two (2) booster pump stations. Past experience evidences an available yield of at least 1,000 GPM per properly developed well. Groundwater quality from the existing wells is good and satisfactory for potable use. This system represents the development of a water system from a collection of private wells which were combined in 1957 to form the Keizer Water District. This district was absorbed by the new City of Keizer in July, 1985.The list of municipal water rights is attached.

The existing system serving the City of Keizer consists of two pressure zones operating between ranges of 60-74 psi. The pressure variation is mostly due to elevation difference and system friction losses throughout the City. Fifteen city wells are available to supply demands through a network of about 130.17 miles of pipelines ranging from 4 to 16 inches in diameter. The primary transmission capacity of the distribution system is provided by waterlines varying from 12 inches to 16 inches in diameter running along River Road North and Cherry Ave. The pipeline material of choice since mid-1960 has been ductile iron. Previously installed steel pipe contributes to 13% of the system's total length.

The total useable storage capacity is 2.80 MG. This storage capacity generally meets the peak hour and maximum day requirements. Auxiliary engines (natural gas, diesel, and propane) provide emergency flows to augment storage when necessary. The attached schematic (Figure 2-1) shows the water sources, storage, and treatment facilities locations and pump stations. The system has a capacity to deliver 3.5 MGD during an average day and 16 MGD during a peak day. The peak day use as used during the 2012 Water Master Plan Update was 9.21 MGD. This number was obtained using pumping records from the telemetry program and verified through well log pumping record sheets. The peak day use from 2013-2019 was 10.5 MGD, also verified in the same manner as previously stated.

Compared with water right permit amounts, average and maximum day production runs about 50% of the maximum allowable flow. Current average annual water usage is 1,250,000,000 gallons. The most limiting component of the delivery system is well and pump size. This is not to be confused with the capacity of the water source. It is anticipated that the aquifer will supply all of the City's future water needs.

The system is operated by a radio modem telemetry system that was put into service in 2006. This system includes a computer program (with backup) that monitors the wells, using radio frequencies and allows system adjustments either manually or automatically from the control center in the Keizer Public Works Shop. In the event of an emergency, data can be read manually at each well site. Two electrical suppliers serve the City of Keizer municipal water system. Two wells are powered by Salem Electric, twelve by Portland General Electric, and one well is operated by an engine. Each well is an

independent component of the fifteen well distribution system and is able to be controlled individually. This allows the City to optimize water delivery under the current water permit.

Purpose and Authority

Oregon Administrative Rule 690-315 and 690-086 directs the need to prepare a Water Management and Conservation Plan (WMCP). The WMCP has also been completed in conjunction with the 2012 update of the City's Water Master Plan. An update has been prepared in February, 2019.

Proposed Update Schedule

In order to meet regulatory requirements, the City of Keizer intends to submit an updated Water Management and Conservation Plan (WMCP) every 10 years (next plan due in Year 2029, after update in 2019). The update shall include goals or benchmarks that were accomplished along with updated water system and consumption information.

Chapter Two: Municipal Supplier Description and Background Water Distribution System

The city's distribution system consists of primarily older wrapped steel pipe (approx. 87,000', 13% of total remains as of late, 2018) and newer ductile iron pipe with a minor amount of cast iron. Most of the original distribution system was installed during the period between 1957- 1970. The city has embarked on a steel water line replacement program and plans to replace all remaining steel pipe within the next 20 years. The city currently utilizes AWWA standard C- 151 Pressure Class 350 ductile iron pipe as the standard pipe of choice. Refer to Table 2-1A for the approximate lengths of various sizes within the system and Table 2-1B for the current number of service meters in the system.

Table 2-1A
Distribution System Comparison 2019 to 2013 (Updated February, 2019)

Nominal Size (Inch)	2013 Total Length	2019	Type(s)
4”	17,258’	20,049’	Ductile Iron and Steel
6”	237,487”	238,301’	Ductile Iron and Steel
8”	289.810’	303,383’	Ductile Iron and Steel
10”	17,037’	17,037’	Ductile Iron and Steel
12”	86,920’	93,480’	Ductile Iron and Steel
14”-16”	15,020’	15,032’	Ductile Iron

2013 Total Length: 663,532’-Miles:125.67 2019-Total Length: 687,282’-Miles:130.17

Table 2-1B
Water Meter Distribution Comparison 2019 to 2013 (February, 2019)

Size	# of Accounts	% of Total	Class
5/8"or 3/4"	(2019) 10,121	(2019) 94.5%	Residential
	(2013) 9,759	(2013) 94.5%	
1"	(2019) 287	(2019) 2.7%	Residential-Commercial/Industrial
	(2013) 288	(2013) 2.8%	
1-1/2"	(2019) 152	(2019) 1.4%	Residential-Commercial/Industrial
	(2013) 153	(2013) 1.5%	
2"	(2019) 110	(2019) 1%	Residential-Commercial/Industrial
	(2013) 95	(2013) .9%	
3"	(2019) 19	Same 0.2%	Commercial/Industrial
	(2013) 20		
4"	(2019) 10	(2019) 0.09%	Commercial/Industrial
	(2013) 7	(2013) 0.06%	
6"	(2019) 4	(2019) 0.01%	Commercial/Industrial
	(2013) 4	(2013) .04%	
Total	(2019) 10,703	100%	Approx. 97%-98% of all meters
	(2013) 10,326		fall into the residential class

Residential unit means a residential dwelling unit and includes single-family unattached homes, condominiums, town homes, duplex, triplex and fourplex units, and individual apartment units in a multi-family building.

Commercial unit means any building or structure that a business entity uses to transact its business.

Industrial Unit means any business unit which engages in the manufacturing, processing, or assembling of any products.

Population

The current City of Keizer water system, based on the 2012 Water Master Plan is designed to include a maximum growth to 48,082 residents in the Year 2032. The average residence is a 1,600 square foot building on a 6,000 square foot lot. The average age of these structures is 26 years. The City does not have any water intensive businesses (i.e. silicone wafer manufacturing or industrial businesses). The City has one major consumer/shopping complex user (Keizer Station). The highest water use in the City is from irrigation at city parks and consumption at schools in the area.

Several independent sources were consulted during preparation of the 2012 Water Master Plan to obtain a realistic and objective estimate of population growth over the next 20 years. These sources include: United States Census Report, Mid-Willamette Council of Governments, Marion County Planning Department, Portland State University Center for Population Research and Census, and the State Office of Economic Analysis. All of these sources project an increase of population within Keizer over the next 20 years. A new projection was obtained using the same sources for the Year 2018 population and projections. This is due to the influx of new residents as well as an expected shift of urban population. Table 2-2 shows past and projected population growth as shown in the 2012 Water Master Plan Update.

Table 2-2
Past and Projected Population Growth

Year	Population	%
1990	21,884 (US Census)	N/A
2000	32,203 (estimate)	N/A
2005	34,735 (estimate)	1.52%
2010	36,478	.98%
2012	36,735	.52%
2018	38,505	.84%
2020	40,280	2.20%
2025	43,350	1.48%
2030	46,655	1.48%
2032	48,082	1.51%
2035	50,278	1.50%
2039	53,364	1.50%

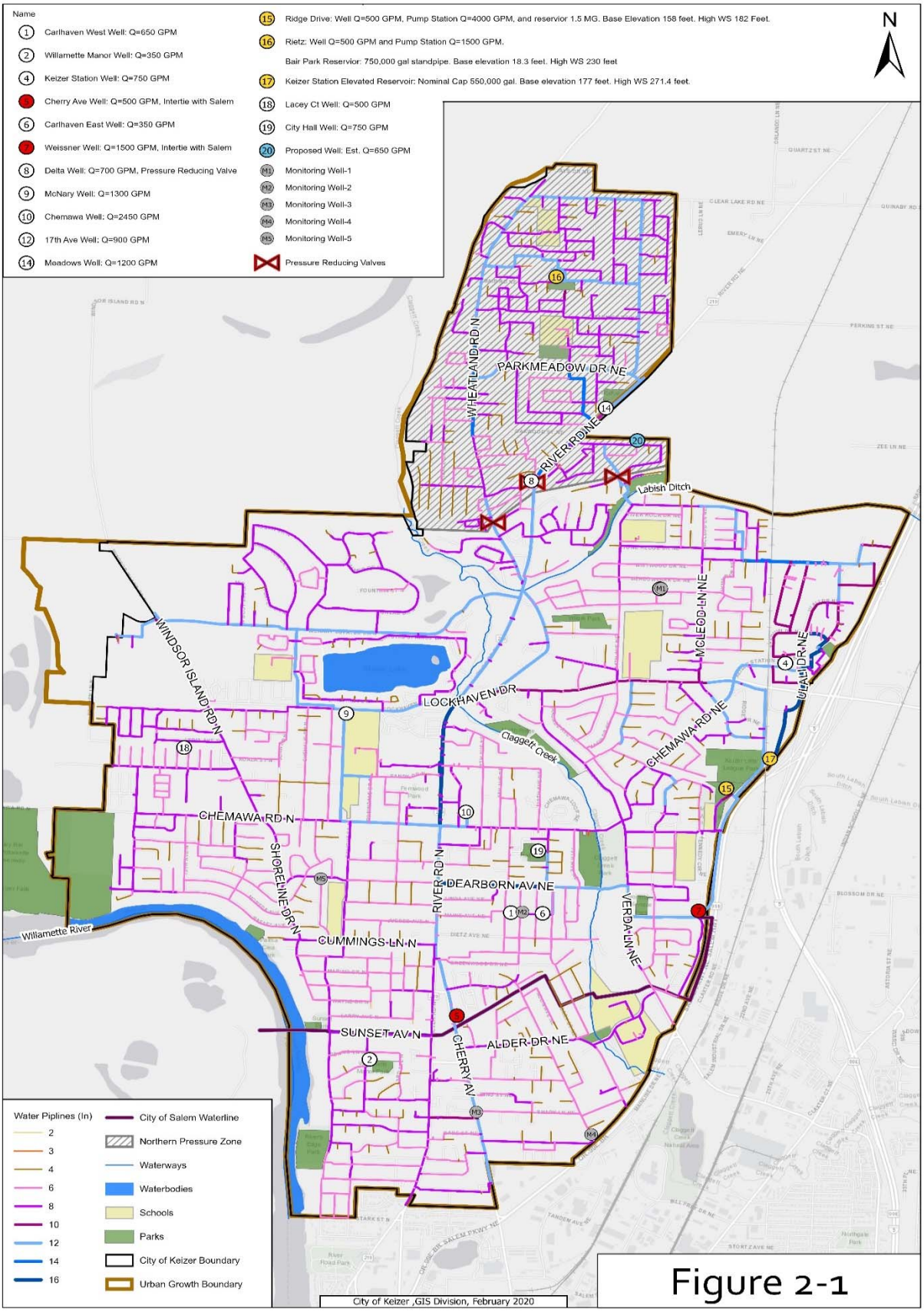

Name
1 Carlhaven West Well: Q=650 GPM
2 Willamette Manor Well: Q=350 GPM
4 Keizer Station Well: Q=750 GPM
Cherry Ave Well: Q=500 GPM, Intertie with Salem
6 Carlhaven East Well: Q=350 GPM
Weissner Well: Q=1500 GPM, Intertie with Salem
8 Delta Well: Q=700 GPM, Pressure Reducing Valve
9 McNary Well: Q=1300 GPM
10 Chemawa Well: Q=2450 GPM
12 17th Ave Well: Q=900 GPM
14 Meadows Well: Q=1200 GPM
15 Ridge Drive: Well Q=500 GPM, Pump Station Q=4000 GPM, and reservior 1.5 MG. Base Elevation 158 feet. High WS 182 Feet.
16 Rietz: Well Q=500 GPM and Pump Station Q=1500 GPM.
Bair Park Reservior: 750,000 gal standpipe. Base elevation 18.3 feet. High WS 230 feet
17 Keizer Station Elevated Reservoir: Nominal Cap 550,000 gal. Base elevation 177 feet. High WS 271.4 feet.
18 Lacey Ct Well: Q=500 GPM
19 City Hall Well: Q=750 GPM
20 Proposed Well: Est. Q=650 GPM
M1 Monitoring Well-1
M2 Monitoring Well-2
M3 Monitoring Well-3
M4 Monitoring Well-4
M5 Monitoring Well-5
Pressure Reducing Valves
N
PARKMEADOW DR NE
WHEATLAND RD N
RIVER RD NE
Labish Ditch
MCLEOD LN NE
WINDSOR ISLAND RD N
LOCKHAVEN DR
Claggett Creek
CHEMAWA RD NE
CHEMAWA RD N
SHORELINE DR N
RIVER RD N
DEARBORN AV NE
VERDA LN NE
Willamette River
CUMMINGS LN N
SUNSET AV N
ALDER DR NE
CHERRY AV
Water Piplines (In)
2
3
4
6
8
10
12
14
16
City of Salem Waterline
Northern Pressure Zone
Waterways
Waterbodies
Schools
Parks
City of Keizer Boundary
Urban Growth Boundary
City of Keizer ,GIS Division, February 2020

Figure 2-1

Future Service and Study Area

The City currently operates within established geographical and political boundaries that comprise the City limits and the Urban Growth Boundary (UGB) and there are currently 4,713 acres of land within the city limits. The City is bounded on the east by the City of Salem and Interstate 5, the UGB to the north and south, and the Willamette River to the west. Most of the land presently available for future development is in the northern section of the City with a smaller percentage available in other regions of the city. Figure 2-1 shows the UGB boundaries for the City of Keizer. Presently the City of Keizer does not have any plans for a centralized water treatment plant, nor does any of the water quality results indicate the requirement for a treatment plant in the future.

Keizer Station

Keizer Station remains the only large commercial development that has been constructed. The Keizer Station development consists of approximately 237 acres of presently developed and undeveloped land in the northeastern region of the City of Keizer. The Keizer Station Plan essentially created five distinct regions, called "areas", each with different types of uses and size. Area A, referred to as the Village Center, consists of 100 acres of retail and mixed-use commercial development. Area B, known as Retail Center, consists of 11 acres of commercial and 1 acre of residential development. Area C, Keizer Station Center, is a 36-acre parcel, intended to be zoned as mixed use. Area C is planned to encompass just under 280,000 square feet of development. Area D, Commerce Center, is zoned as 15 acres of industrial business park. Finally, although not currently included in the formal plan, Area E, known as the Entertainment and Sports Center, is located on 71 acres of land zoned as industrial business park (41 acres) and general industrial use (30 acres).

Irrigation for the flower beds and trees in Keizer Station also is a high use. City of Keizer has a water right that is designated for irrigation for the Keizer Station development (Permit G- 16094). Keizer Station has numerous large users. The consumption for the high use summer months (July-August) is as follows:

Table 2-3
Keizer Station Comparison of High Use
Years 2011 & 2012 vs 2017 & 2018

Account	2011	2012	2017	2018
Irrigation for Keizer Station	6,185,960 gallons	4,556,068 gallons	5,173,168 gallons	5,292,100 gallons
Lowe's	59,092 gallons	53,856 gallons	80,036 gallons	79,288 gallons
Lowe's Irrigation	196,724 gallons	195,228 gallons	307,428 gallons	283,492 gallons
Target	555,764 gallons	552,772 gallons	558,756 gallons	723,316 gallons
Starbucks	N/A	N/A	178,024 gallons	128,656 gallons
Firehouse Subs Complex	N/A	N/A	N/A	273,768 gallons
Keizer Permanente	N/A	N/A	483,208 gallons	207,944 gallons
Panda Express	N/A	N/A	115,192 gallons	115,940 gallons
Salem-Keizer Transit	N/A	N/A	588,676 gallons	718,828 gallons
SK Transit Irrigation	N/A	N/A	159,324 gallons	187,000 gallons
McDonald's	0 gallons	304,436 gallons	278,256 gallons	322,388 gallons
Gustav's Biergarten	N/A	N/A	260,304 gallons	210,188 gallons
Outback Steakhouse	N/A	N/A	329,120 gallons	253,572 gallons
Holiday Inn	N/A	N/A	N/A	195,976 gallons
Hop Jacks	N/A	N/A	N/A	179,520 gallons
Misc. small stores and other restaurants	404,668 gallons	549,032 gallons	950,108 gallons	801,108 gallons
Total	**7,488,228 gallons Average: 86.7 gpm**	**6,305,640 gallons Average: 73 gpm**	**9,462,200 gallons Avg: 110 gpm**	**9,973,084 gallons Avg: 115 gpm**

Future Expansion (Areas B, C, and D)

At the date of this study (February, 2019), Area D of Keizer Station remains underdeveloped. Areas B and C are presently partially developed with available, undeveloped land for future developments (approximately 12 acres total for both areas). The available capacity from the existing 8" and 12" waterlines surrounding the Area B development will provide adequate pressure and delivery volume for virtually any intended use. The 12" waterline route through Area C provides a looped waterline configuration within Keizer Station, as well as a path to optimize the delivery of water from the Ridge Drive Reservoir and Pump Station and the Elevated Storage Tank (EST) to the Keizer water system. Future water service throughout Area D was originally planned in the 2006 Keizer Station Water Master Plan and consists of delivery from either the existing 16" waterline that passes through Area D or the parallel 12" waterline on Ridge Drive.

Summary of Existing Water Sources

The City currently has access to fifteen individual groundwater well sites and five booster pumps at two reservoir sites. The existing City of Keizer wells are spread throughout the city to control the water levels and not draft one well too much. The existing reduction of the Ridge and Reitz wells results in requiring the city to increase flow from the existing wells. This increased flow has the potential to over pump certain wells and potentially make these wells operate outside of their water rights. Another issue of this reduction is it would require that the city back feed water from other wells to the reservoirs which could diminish peak hour capacity and also generate a significant penalty in energy as the water

would have to be pumped twice. This would violate a tenant of proper engineering design. Each well is fully metered by flowmeter at each pump station and flow is read on a daily basis by the public works department. Groundwater sources are currently used exclusively in Keizer. There are no City of Keizer wells in the critical groundwater area or have any required mitigation actions under any of the existing permits. As the City of Keizer utilizes groundwater they presently do not have any water treatment facilities. See Table 2-3 for Well Data and Table 2-5 for Well Pump data. Figure 2-1 indicates the current water system schematic and well locations.

Table 2-4
City of Keizer
Final Water Rights Distribution

Well	Flow (in GPM)
Carlhaven West	949
Willamette Manor	318
Keizer Station	749
Cherry Ave	596
Carlhaven East	639
Wiessner Well	1,604
Delta Well	1,492
McNary Well	1,443
Chemawa Well	2,432
17th Ave Well	896
Meadows Well	1,398
Ridge Drive Well	798
Reitz Well	399
Lacey Ct Well	700
City Hall Well	775
Well #20-Future	650
Total	**15,838**

Water Rights

The City of Keizer currently (2019) has approved and active permits or certificates for up to 16,641 GPM of exclusive groundwater sources with the Oregon Water Resources Department (Table 2-7 through Table 2-8). The city has no required mitigation actions under any of its existing water rights permits.

City of Keizer

Water System Well/Pump Data Sheets

Sheet #1--Well Data---February, 2019

Well/Site#	Description/Address	Site Elev.(MSL)	Well Diam.	Well Depth	Perforated or Screened	Perforation or Screen Interval/Slot Size	Seal Depth	S.W.L/O.B.Date	Well Test Capacity @P.W.L.	Yr.Drilled-Driller	Well ID #L/Well Log #---OHA Facility ID#
1	**Carlhaven West Well**	133ft.	10"	250'	10" tele. S.S. Screen	148'-160'-30 slot; 160'-170' & 190'-220'-100 slot	100'	31'-11"(2010)	750 GPM @ 128' PWL (10-2010)	2010-Westerberg	L-101905--- MARI 63385
	950 Brandon NE					170'-190'-80 slot; 220'-240'-60 slot		32' (2011)	725 GPM @ 105' PWL (7-2012)		OHA Facility ID # EP-T---SRC-TA
2	**Willamette Manor Well**	139ft.	8"	191'	S.S. Screen, 6" PS(all)	120'-140' & 175'-185'- 80 slot	95'	26'(5-30-00)	400 GPM @ 94' (6-09-00)	2000	Goulds Submersible
	3868 5th. Ave.		6" below 113	Blank:113'-120',		140'-145'-50 slot,145'-160'-100 slot					
3	**Burnside (INACTIVE)**					**ABANDONED-2004**					Mari 57995 (abandonment)
	4335 Shoreline N										
4	**Keizer Station Well**	148ft.	12"	270'	8" P.S. S.S. Screen	150'-185'; 200'-234'; 239'-265'--All 60 Slot	150'	28.3'(2005)	750 GPM @ 128' PWL	2005-Boart Longyear	L-79776-----MARI 59353
	2630 Jorie Road NE					Filter packed with 8 x 12 sand			775 GPM @ 151' PWL		OHA Facility ID# EP-Q----SRC-QA
5	**Cherry Ave. Well**	132ft.	12"	210'	12" & 10" S.S.Screen	12"Tele.-120'-140'-60 slot	80'	25'(1982)	410 GPM @ 74' (1999)	1982-Eola Well Drilling	L-32102---- MARI 16771
	4110 Cherry Ave. NE				Tele. & P.S.	10"PS-170'-188'-30 slot,188'-205'-25 slot					OHA Facility ID# EP-E----SRC-EA
6	**Carlhaven East Well**	133ft.	12'	300'	12" tele. S.S. Screen	160'-252' w/ 60 slot & 252'-280' w/ 40 slot	96'	38'-11'(2010)	300 GPM @ 111' (10-2010)	2010-Westerberg	L-101904--- MARI 63186
	1150 Brandon NE					Filter packed with 8/12 & 6/9 CSS sand-163'-280'			360 GPM @ 151' (7-2012)		OHA Facility ID# EP-U----SRC-UA
7	**Wiessner Well**	170ft.	18"	258'	16"-S.S. Screen	145'-185' & 205'-255'--All 100 Slot	30'	49' (3-3-00)	1350 GPM @ 99' * (1993)	1980-West Coast	L-32104 --- MARI 16734
	2005 Wiessner Ave.				"Hi-Cap"				1500 GPM @ 138' PWL (8-2009)		OHA Facility ID# EP-J---- SRC-JA
8	**Delta Well**	181ft.	12"	328'	10" P.S. S.S. Screen	180'-195' w/ 150 slot, 210'-250' w/125 slot	150'	72.9'(2006)	1000 GPM @ 157 PWL	2006-Boart Longyear	L-82750-----MARI 59708
	939 Delta NE					250'-270' w/ 90 slot, 280'-320' w/ 150 slot					OHA Facility ID# EP-R--SRC-RA
9	**McNary Well**	122ft.	16"	205'	16" P.S. S.S. Screen	119.5'-200'--All 150 Slot	96'	23'(1981)	1350 GPM @ 43'* (1993)	1981-Schneider	L-32106------MARI 5384
	610 Lockhaven NE				Double Xtra Strong-Hi Cap	Gravel Pack:0'-205'(1/2"-3/4")		31' (8-2009)	1300 GPM @ 60' PWL (8-2009)		OHA Facility ID# EP-H--SRC-HA
10	**Chemawa Well**	132ft.	16"	255'	16" P.S. S.S. Screen	120'-250'--All 150 Slot	85'	21'(1981)	2500 GPM @ 90' (1981)	1981-West Coast	L-32107------MARI 16779
	641 Chemawa					Gravel Pack:0'-255'(1/2"-)		36' (7-2012)	2100 GPM @ 77' PWL (2011)		OHA Facility ID# EP-D--SRC-DA
11	**Lauderback (INACTIVE)**					**ABANDONED-2017**					
	6180 Lauderback NE										
12	**17th. Ave. Well**	155ft	10"	335'	10" S.S. telescope screen	152'-160'-185'-195'-295'-313' w/ 10 slot,	122'	31'(2012)	900 GPM @ 115' PWL	2012-Westerberg	L-106360--- MARI 64141
	6288 17th. Ave. NE					160'-185'-195'-295' w/70 slot-313'-330' w/ 100 slot					OHA Facility ID# EP-V----SRC-VA
13	**13th. Ave. (INACTIVE)**	150ft.				**ABANDONED-2012**					
	6250 13th. Ave. NE										
14	**Meadows Well**	177ft.	12"	310'	10" PS S.S.Screen (3)	195'-230' & 275'-295' w/80 slot-230'-250' w/ 50 slot	52'	60'(1992)	1200 GPM @ 93' * (1992)	1992-Waldroop/Sippel	L-32109-----MARI 17870
	7177 River Rd. NE										OHA Facility ID# EP-N---SRC-NA
15	**Ridge Drive Well**	158.5ft.	12"	260'	Perforated-3/8"x 2"	Perf- 144'-177'	127'	35'(1999)	830 GPM @ 143' * (1999)	1999-Waldroop	L-10949-----MARI 54341
	5175 Ridge Dr. NE				10" P.S. Screen -125 slot	Screen- 190'-250'					OHA Facility ID# EP-O---SRC-OA
16	**Reitz Well**	180ft.	10"	410'	10" S.S. telescope screen	313'-410'	180'	80'(2006)	700 GPM @ 242' PWL (24 hr.)	2003-Beier/Waldroop	L-55502-----MARI 57704
	1065 Bair Road NE									2012-Westerberg-Reh.	OHA Facility ID# EP-P---SRC-PA
17	**Elevated Reservoir**	Base Elev.: 177'									
	5700 Ulali Dr NE	Dome Elev.: 277'	High Water Surface Elev.: 270.40'								
18	**Lacey Court Well**	130' (approx)	12"	171'	10" S.S. P.S. Screen	128'-158' w/ 100 slot,	100'	27' (1989)	400 GPM @ 160' (Orig. Air Test)	1989-West Coast	MARI 5361
	5289 Lacey Ct NE					122'-158' & 158'-168'-10" Blank Casing		37' (2012)	600 GPM @ 122' PWL (Pump)-2012	2012-Westerberg-Reh.	OHA Facility ID# N/A
19	**City Hall Well**	135ft.	12"	290'	12" tele S.S. screen	170'-175' w/50 slot, 175-200 with 100 slot,	90'	29' 6"(2006)	950 GPM @ 161' PWL	2006-Boart Longyear	L-82935-----MARI 60019
	Rickman Road NE					200'-240' w/35 slot ,265'-280' w/125 slot			833 GPM @ 152' PWL (36 hrs)		OHA Facility ID# EP-S---SRC-SA

LEGEND	
Tele.= Telescope Screen	
S.S.=Stainless steel	
P.S.= Pipe Size Screen	
COS= Design or operating condition of pump	
* = Most Recent Test	

S.W.L.= Static Water Level (in ft.) Reh. = Rehabilitation

P.W.L.= Pumping Water Level (in ft.)

City of Keizer

Water System Well/Pump Data Sheets

Sheet #2--Well Data---February, 2019

Pump/Mtr Make/Type	Pump Model/Stgs./Imp. Dia/COS	HP	Pump Setting	Column/Shaft-Pipe/Wire Size	Utility-Voltage-Starting Method	Aux./Mode	Comments SYSTEM PRESSURE=	55-58psi-Low	65psi-Normal	70-72psi-High
Goulds Submersible Pump	7THC060-4 stg-4.875" Imp. Dia	60	133'	6" blk T&C pipe & #4/4 cu sub cable	PGE-480V-VFD **1**	None	2010: New Well & Pump--Equipped with VFD &	750 GPM	725 GPM	700 GPM
Franklin Elec. mtr.	COS: 650 GPM @ 295' TDH				**CARLHAVEN WEST-SITE NAME**		Pitless Unit (Maass MB-10" x 8")			
7CLC03066C-3 stg.	30	105'	4"pipe & #6 cable	480 (SE)	None **2**	New well and pu	mp 350 GPM	350 GPM	325 GPM	
COS: 350 GPM @ 265' TDH					**WILLAMETTE MANOR**	Well is equip. w/	pitless (Maass 10J4)			
Flowserve Submersible	8EHL-4 stg with 5.95" Imp. Dia.	60	137'	6" blk T&C pipe & #2/4 cu sub cable	PGE-480V-VFD **4**	None	Well equipped with pitless adapter (Maass "MB")	700 GPM	675 GPM	650 GPM
Franklin Elec. Mtr.	COS: 700 GPM@ 270' TDH				**KEIZER STATION**		Site includes stormwater P.S.--3 Pumps: 1-Joc/2 H.S.			
Worthington VTP	10M41-8 stg.-7.33" Imp.SN VTP 57026	50	110'	6"x1 1/4" water-lube column/shaft	Salem Elec.-480V-ALS **5**	N.G. Engine	1993: New pump/engine rebuild in 2011	525 GPM	500 GPM	480 GPM
U.S. Elec VHS mtr.	COS: 500 GPM @ 280' TDH		30' Tail Pipe		**CHERRY**	Auto Start/Run	Site has 5000 gal. Tank, Ford 300CI IL6 & Redi-Torq			
Goulds Submersible	6CHC040-7 stg-4.0625" Imp Dia.	40	168'	4" blk T&C Pipe & #4/4 sub cable	PGE-480V-ALS **6**	None	2010: New Well & Pump--Maass 10J4 Pitless-4"	330 GPM	325 GPM	320 GPM
Franklin Elec. Mtr.	COS: 300 GPM @ 355' TDH				**CARLHAVEN EAST**					
Flowserve VTP	12ENL-7 stg.-8.83" Imp. Dia	125	190'	10"x1 1/2" water-lube column/shaft	PGE-480V-ALS **7**	Diesel Engine	Caterpillar 3306 Engine-SN 66D41399	1450 GPM	1300 GPM	1250 GPM
U.S. Elec. VHS mtr.	COS: 1500 GPM @ 275' TDH			Pump SN 020CGC75415	**WIESSNER**	Auto Start/Run	Gearhead is Johnson Redi-Torq	(45 psi)	(55 psi)	(60 psi)
Goulds Submersible Pump	7THC-4 Stage--4.8125" Imp. Dia.	60	179'	6" blk. pipe & 180'-#1/0/4 cu cable	PGE-480V-VFD **8**	None	2006: New well, 100 HP pump, Maass MB Pitless,	750 GPM	675 GPM	650 GPM
Hitachi 60 HP, 8" dia. Mtr	COS: 700 GPM @ 270' TDH				**DELTA**		2010: Pump Sized Down to 60 HP + Added 21' of pipe	(50 psi)	(60 psi)	(70 psi)
Goulds VTP	14RJLO-3 stg.-9.82" Imp. Dia.	100	102'	10"x1 1/2" water-lube column/shaft	PGE-480V-ALS **9**	L.P.G. Engine	Manual Engine Drive & Johnson CH110 Gear	1450 GPM	1350 GPM	1250 GPM
U.S. Elec. VHS mtr.	COS: 1600 GPM @ 225' TDH			Pump SN 5737363-S	**MCNARY**	Manual	Engine: Ford 534CI-V8			
Goulds VTP	14RJHC-3 stg --9.75" Imp. Dia	150	110'	10"x1 1/2" water-lube column/shaft	PGE **10**	Diesel Engine	Pump is Engine drive only-No elec. motor at site	2500 GPM	2300 GPM	2150 GPM
Caterpillar 3306 Engine	COS: 2250 GPM @ 250' TDH	(BHP)			**CHEMAWA**	Auto Start/Run	Caterpillar 3306 Engine-SN 66D34990			
					LAUDERBACK					
Goulds Submersible Pump	8FDLC-5 stage--5.06" Imp. Dia.	100	142'	6" blk. T&C pipe & #00/4 cu sub cable	PGE-480V-VFD **12**	None	1994: New 3000 gallon pressure tank & bldg. remodel	950 GPM	925 GPM	910 GPM
Franklin Elec. Mtr.	COS: 900 GPM @ 300' TDH			Pump SN M61127	**17TH**		2012: New Well & Pump-Maass MB Pitless Adapter			
Ingersoll/Dresser VTP	12H110-6 stg.--9.33" Imp. Dia.	125	150'	8"x 1 1/2" water-lube column/shaft	PGE-480V-ALS **14**	Diesel Engine	Equipped with Redi-Torq	1300 GPM	1250 GPM	1200 GPM
U.S. Elec. VHS mtr.	COS: 1300 GPM @ 260' TDH			Pump SN 9401C0003	**MEADOWS**	Auto Start/Run	Caterpillar 3306 Engine-SN 85Z11875			
Goulds Submersible Pump	7THC030- 2 stg.--4.875" Imp. Dia.	30	168'	6" blk. T&C pipe & # 6/4 cu sub cable	PGE-480V-ALS (Well) **15**	Diesel Genset	Cat D150P1 150 kw genset-Runs all elec. pumps	600 GPM to Res	600 GPM to Res	600 GPM to Res
Franklin Elec. mtr.	COS: 625 GPM @ 150' TDH	Reservoir: 1.5 MG Dim: 101' D x 24' H			**RIDGE DRIVE**	Auto Start/Run	Well Pumps to Reservoir Only-via Maass MB Pitless	(See Booster Pump Specs for Sta. Output)		
Goulds Submersible Pump	8RJLC-4 stg.-5.1875" Imp. Dia.	50	273'	6" blk. T&C pipe & #2/4 cu sub cable	PGE-480V-VFD **16**	None	Equipped with Maass MB Pitless	500 GPM to Res	500 GPM to Res	500 GPM to Res
Franklin Elec. mtr.	COS: 500 GPM @ 300' TDH	Reservoir: .75 MG Dim: 53' D x 47' H (Bair Park)			**REITZ**		Well Pumps to Reservoir Only-No Back-Up Equip.	(See Booster Pump Specs for Sta. Output)		
					17		Dimensions: 27' Spherical Diameter-37'6" Max. Head Range			
					ELEVATED RESERVOIR		Nominal Capacity: 550,000 U.S. Gallons-Designed for 4-6 Hour Max. Draft			
Goulds Submersible Pump	7TLC-5 stg.--4.75" Imp. Dia.	50	136'	6" blk. T&C pipe & #4/4 cu sub cable	**18**	None		575 GPM	525 GPM	500 GPM
Franklin Elec. mtr.	COS: 525 GPM @ 293' TDH				**LACEY CT**					
Flowserve VTP	10EHM-8 stg.--7.64" Imp. Dia	75	160'	8" x 1 1/2" waterlube column/shaft	PGE-480V-VFD **19**	None	Equipped with VFD	850 GPM	800 GPM	750 GPM
U.S. Elec. VHS mtr.	COS: 725 GPM @ 320' TDH				**CITY HALL**					
							Total Source (Well) Capacity	**13,950 GPM**	**13,115 GPM**	**12,535 GPM**
	Reitz (Bair Park Boosters)							(20.10 MGD)	(18.90 MGD)	(18.06 MGD)
Peerless End-Suction	mdl. C740-750 GPM @ 120'	30	N/A	Vertically Mounted Pumps	PGE-480V-VFD. **-REITZ BP #1 & 2**	None	Combined Reitz (Bair Park) Elec. Boosters	1500 GPM	1200 GPM	1000 GPM
Centrifugal Pumps							(2 Identical booster pumps-No Back-Up Service @ site)			
	Ridge Drive Booster Pumps									
Ingersoll/Dresser VTP	12M90A-2 stg.--9.33" Imp. Dia.	40	5' (canned VTP)	8" x 1 1/4" water-lube column/shaft	PGE-480V-S.S.--**RIDGE BP #1 & 2**	Cat D150P1	**Ridge #1 & 2 Booster Pumps-**Auto Genset Back-Up	2300 GPM	2200 GPM	2000 GPM
U.S. Elec. VHS mtr.	COS: 1000 GPM @ 135' TDH			Pump SN 9805C71395 A & B		Auto Start/Run		(55 psi)	(60 psi)	(65 psi)
Ingersoll/Dresser VTP	15M185-2 stg.--10.85" Imp. Dia.	80HP	5' (canned VTP)	10" x 1 1/2" water-lube column/shaft	PGE-480V-N/A----**RIDGE BP #3**	Diesel Engine	**Ridge #3 Engine Drive-**via Johnson H110 geardrive	2300 GPM	2100 GPM	2000 GPM
Caterpillar 3304 Engine	COS: 2000 GPM @ 140' TDH	(Engine)		Pump SN 9905CGC72481	MOTOR STARTING METHOD KEY	Auto Start/Run	**ELEVATED STORAGE TANK (EST)-Avg. Draft Rate**	**2,000 GPM**	**N/A**	**N/A**
				T&C = Threaded & Coupled Pipe	S.S.=Soft Starter-(Electronic)	(Cat 3304)	**Total System Capacity (w/oWells #15 &16)**	**20,950 GPM**	**17,515 GPM**	**16,435 GPM**
VTP=Vertical Turbine Pump				blk.= Black Steel Pipe	VFD= Variable Freq. Drive		**Auto Start/Run Capacity (with EST Contribution)**	**12,375 GPM**	**9,650 GPM**	**9,080 GPM**
					ALS = Across (the) Line Start		**Projected Peak Hour Demand-Pop.=36K**	**15,000 GPM**	**15,000 GPM**	**15,000 GPM**
							5B	Well Pump Data--Table 2-6		

Table 2-7
Water Rights Table

POD-ID	APPLN. #	PERMIT #	CERT #	PRIORITY	SOURCE	RATE (CFS)	MAXIMUM INSTANTANEOUS RATE DIVERED TO DATE (CFS)	MAXIMUM ANNUAL QUANTITY DIVERED TO DATE (CFS)	AVERAGE MONTHLY DIVERSION (CFS)	AVERAGE DAILY DIVERSION (CFS)	AUTHORIZED COMPLETION DATE	FACILITY	KEIZER I.D.	NOTES
12759	GR-3066	GR-2869	0	12/31/1948	Well 2	0.4456	N/A	N/A	N/A	N/A	N/A	Potts	N/A	Water being transferred to new Well #20
12755	GR-3069	GR-2872	0	12/31/1943	Well 5	1.0026	N/A	N/A	N/A	N/A	N/A	Toni	N/A	Water being transferred to new Well #20
11630	G-6189	G-6838	50519	6/27/1973	Well 1	2.0000	N/A	N/A	N/A	N/A	N/A	13th Ave	N/A	Water being transferred to Well #12
11627	GR-3068	GR-2871	0	12/31/1945	Well 3	0.4456	0.889	179,131	14,480	467.1	N/A	Carlhaven West	Well #1	Flow combined with Permit # G-9971, GR-3160
11626	G-10446	G-9771	86617	7/13/1981	Carlhaven West Well	0.7800	0.889	179,131	14,480	4671.1	October 1, 2015	Carlhaven West	Well #1	Flow combined with Permit # G-2871, GR-3160
12756	GR-3412	GR-3160	0	12/31/1954	A Well	0.3342	0.889	179,131	14,480	467.1	N/A	Carlhaven West	Well #1	Flow combined with Permit # G-9971, GR-2871
11628	G-10446	G-9771	86617	7/13/1981	Willamette Manor Well	0.7100	0.630	289,350	19,923	642.7	October 1, 2015	Willamette Manor	Well #2	Flow combined with Permit # G-139
11628	G-222	G-139	31611	1/30/1956	O.H. Duncan Well	0.5600	0.630	289,350	19,923	642.7	N/A	Willamette Manor	Well #2	Flow combined with Permit # G-9771
---	G-16433	G-16094	NA	4/8/2005	A Well	1.03-MU and 0.35-Irrigation	1.04	382,197	24,843	801.4	October 1, 2010	Keizer Station	Well #4	Flow combined with Permit # G-16164
---	G-16588	G-16164	NA	12/28/2005	A Well	0.642	1.04	382,197	24,843	801.4	October 1, 2011	Keizer Station	Well #4	Flow combined with Permit # G-16094
11629	G-10446	G-9771	86617	7/13/1981	Cherry Ave Well	1.3300	1.16	274,616	16,165	521.5	October 1, 2015	Cherry Ave	Well #5	

Table 2-7
Water Rights Table

POD-ID	APPLN. #	PERMIT #	CERT #	PRIORITY	SOURCE	RATE (CFS)	MAXIMUM INSTANTANEOUS RATE DIVERED TO DATE (CFS)	MAXIMUM ANNUAL QUANTITY DIVERED TO DATE (CFS)	AVERAGE MONTHLY DIVERSION (CFS)	AVERAGE DAILY DIVERSION (FS)	AUTHORIZED COMPLETION DATE	FACILITY	KEIZER I.D.	NOTES
11627	G-10446	G-9771	86617	7/13/1981	Carlhaven East Well	2.4300	0.69	252,757	21,063	679.5	October 1, 2015	Carlhaven East	Well #6	
11624	G-10446	G-9771	86617	7/13/1981	Wiessner Well	3.0200	0.86	105,641	5,106	164.7	October 1, 2015	Wiessner Well	Well #7	
11622	G-10446	G-9771		7/13/1981	Delta Well	3.3300	1.50	476,723	32,538	1,049.6	October 1, 2015	Delta Well	Well #8	Extension is due on Delta Well on T-10591 and then water right will be perfected.
11623	G-10446	G-9771	86617	7/13/1981	McNary Well	3.2200	2.14	212,880	13,864	447.2	October 1, 2015	McNary Well	Well #9	
11625	G-10446	G-9771	86617	7/13/1981	Chemawa Well	4.0900	0.16	6,882	368	30.7	October 1, 2015	Chemawa Well	Well #10	
20925	G-6189	G-6838	50519	6/27/1973	Well 3	2.0000	0.80	283,310	19,469	628.0	N/A	Lauderback	Well #11	Water being transferred to Well #12
20924	G-6189	G-6838	50519	6/27/1973	Well 2	2.0000	1.40	306,120	19,181	618.8	N/A	17th Ave	Well #12	
32045	G-12793	G-11899	0	2/28/1992	A Well	3.1200	2.36	437,142	2,459	79.3	October 1, 1996	Meadows Well	Well #14	
49305	G-14916	G-13784	0	1/29/1999	A Well	2.2300	1.78 (allowed current) 2.23 (total upon approval)	437,142	2,459	342.7	October 1, 2004	Ridge Drive	Well #15	20 year demand requires the full 2.23 CFS
---	G-15729	G-15369	NA	3/27/2002	A Well	2.2300	0.89 (allowed current) 2.23 (total upon approval)	171,667	10,624	483.2	October 1, 2007	Reitz Well	Well #16	20 year demand requires the full 2.23 CFS
---	GR-3065	G-2868	0	12/31/1943	A Well	1.5596						Lacey Ct	Well #18	
---	GR-24	GR-20	0	1/23/1947	City Hall Well	1.7267	1.16	517,393	56,082	1,089.1	N/A	City Hall	Well #19	

TABLE 2-8
CITY OF KEIZER
2019 WATER RIGHT DISTRIBUTION

POD-ID	FACILITY	TRANSFER	CERT #	PERMIT	APPLN.	L/S	PRIORITY	TWP	RGE	SEC	Q/Q	USE	RATE	U	FLOW (GPM)	P/A/S	SOURCE	TRIBUTARY TO
32045	Meadows Well	---	0	G-11899	G-12793	L	2/28/1992	6S	3W	26	SENE	MU	3.1200	CFS	1,398	P	A Well	Claggett Creek
---	City Hall	T-10592	0	GR-20	GR-24	L	1/23/1947	7S	3W	2	NWNW	MU	775.0000	GPM	775	P	City Hall Well	Willamette River
---	Lacey Ct	T-11724	0	GR-2868	GR-3065	L	12/31/1943	6S	3W	34	SWSW	MU	700.0000	GPM	700	P	A Well	Willamette River
11625	Chemawa Well	---	0	GR-2869	GR-3066	L	12/31/1948	7S	3W	2	NENW	MU	200.0000	GPM	200	P	A Well	Willamette River
11625	Chemawa Well	---	0	GR-2871	GR-3068	L	12/31/1945	7S	3W	2	NWSE	MU	200.0000	GPM	200	P	A Well	Claggett Creek
11625	Chemawa Well	---	0	GR-2870	GR-3067	L	12/31/1945	7S	3W	2	NESW	MU	200.0000	GPM	200	P	A Well	Claggett Creek
12755	Future Well #20	Pending	0	GR-2872	GR-3069	L	12/31/1943	6S	3W	26	NESE	MU	450.0000	GPM	450	P	Well 5	Claggett Creek
---	Future Well #20	Pending	0	GR-2869	GR-3066	L	12/31/1948	6S	3W	26	NESE	MU	200.0000	GPM	200	P	A Well	Claggett Creek
12756	Carlhaven West	---	0	GR-3160	GR-3412	L	12/31/1954	7S	3W	2	SWSW	MU	150.0000	GPM	150	P	A Well	Claggett Creek
11624	Wiessner Well	---	31611	G-139	G-222	L	1/30/1956	7S	3W	1	SWNW	MU	0.5600	CFS	251	P	A Well	Willamette River
20924	17th Ave	Pending	50519	G-6838	G-6189	L	6/27/1973	6S	3W	35	NENE	MU	2.0000	CFS	896	A	Well 2	Claggett Creek
11622	Delta Well	T-10591	86617	G-9771	G-10446	L	7/13/1981	6S	3W	26	NESW	MU	3.3300	CFS	1,492	P	Delta Well	Willamette River
11623	McNary Well	T-10591	86617	G-9771	G-10446	L	7/13/1981	6S	3W	34	NESE	MU	3.2200	CFS	1,443	P	McNary Well	Willamette River
11624	Wiessner Well	T-10591	86617	G-9771	G-10446	L	7/13/1981	7S	3W	1	SWNW	MU	3.0200	CFS	1,353	P	Wiessner Well	Willamette River
11625	Chemawa Well	T-10591	86617	G-9771	G-10446	L	7/13/1981	7S	3W	2	NENW	MU	4.0900	CFS	1,832	P	Chemawa Well	Willamette River
11626	Carlhaven West	T-10591	86617	G-9771	G-10446	L	7/13/1981	7S	3W	2	NESW	MU	0.7800	CFS	699	P	Carlhaven West Well	Willamette River
11627	Carlhaven East	T-10591	86617	G-9771	G-10446	L	7/13/1981	7S	3W	2	NWSE	MU	2.4300	CFS	739	P	Carlhaven East Well	Willamette River
11628	Willamette Manor	T-10591	86617	G-9771	G-10446	L	7/13/1981	7S	3W	10	NENE	MU	0.7100	CFS	318	P	Willamette Manor Well	Willamette River
11629	Cherry Ave	T-10591	86617	G-9771	G-10446	L	7/13/1981	7S	3W	11	NENW	MU	1.3300	CFS	596	P	Cherry Ave Well	Willamette River
49305	Ridge Drive	---	0	G-13784	G-14916	L	1/29/1999	6S	3W	36	SESW	MU	1.78	CFS	798	P	A Well	Claggett Creek
---	Reitz Well	---	NA	G-15369	G-15729	L	3/27/2002	6S	3W	23	SWSE	MU	0.89	CFS	399	P	A Well	Clearlake
---	Keizer Station*	---	NA	G-16094	G-16433	L	4/8/2005	6S	3W	36	SENW	MU	1.0300	CFS	461	P	A Well	Labish Creek
---	Keizer Station	---	NA	G-16164	G-16588	L	12/28/2005	6S	3W	36	SENW	MU	0.642	CFS	288	P	A Well	Labish Creek

Total: 16,641 GPM

*-Allows for irrigation of 28.5 acres in Keizer Station

Effect of Ridge and Reitz Drawdown Conditions

Presently the drawdown conditions of Ridge (G-13784) and Reitz (G-15369) does not appear to be an issue. Both wells are handling the drawdown and recovering with no overuse to the aquifer. If the City of Keizer had to reduce flow or eliminate flow from both the Reitz and Ridge well sites it would not have an effect on the cities' ability to deliver enough water during hot, summer months as the remaining fourteen sources could fulfill water requirements. Both wells drawdown conditions do not seem to have a direct correlation with the Endangered Species Act and if drawdown below the allowed level does occur it does not appear that any endangered species or any varieties of fish will be affected. The 2012 Water Master Plan does not expect any issues or drawdown conditions that will prevent use of either well in the next 20 years due to historical use and water level results.

These two wells directly feed the only two reservoirs in the City of Keizer that are used for water storage for high water use and fire flow. Full water use from both of these wells are needed to provide water into the Bair Park Reservoir (located at the Reitz site) and the Ridge Drive Reservoir (located at the Ridge site). Presently both the Ridge (Permit G-13784) and Reitz (Permit G-15369) have reduced authorized diversion rates. This reduced flow does not allow the City of Keizer to operate these two wells at their full capacity to refill the reservoirs in the case of a fire or high water usage event quickly and efficiently. Ridge has a permitted for a total flow of 2.23 CFS, but is on a limited authorized diversion rate of 1.78 CFS presently. Reitz has a permitted flow for a total of 2.23 CFS, but is on a limited authorized diversion rate of 0.89 CFS presently. Both the 10 and 20 year population projections will require the full authorized flow to be utilized to meet the summer month demand. Along with the required flows for the summer months, the City of Keizer has an intertie agreement with the City of Salem to provide water when the City of Salem is unable to meet their demands due to water quality or production issues in the Salem Geren Island Facility. Most recently in the summer of 2018, the City of Keizer provided water for over 30 days to the City of Salem during an elevated Cyanotoxin event. In the next 5 years future developments at Detroit Lake and a proposed fish project that is expected to interrupt the City of Salem water delivery system, will once again require Keizer to assist Salem in the summer months to provide water to their residents.

Table 2-9
2015-2018 Water System Statistics

Parameter	2015	2016	2017	2018	Average of 2015-2018
Population	36,985	37,505	38,345	38,595	37,858
Average Daily Demand (Production Sources)	3,688,208	3,556,312	3,681,957	3,694,487	3,655,241
Average Daily Demand (Metered Sold Water)	3,262,577	3,442,259	3,232,989	3,303,432	3,310,314
Average Yearly Unaccounted Water (Percent)	11.5%	3.2%	12.2%	10.6%	9.38%
Maximum Month	July	August	August	July	N/A
Average Day during Maximum Month (GPD)	6,695,854	6,150,273	6,516,889	6,792,298	6,538,828
Average Summer Day (July-September) (Peak Seasonal Use)	6,134,998	5,595,268	5,926,103	6,249,280	5,976,412
Average Summer Day/Average Day	1.66	1.57	1.61	1.69	1.63
Peak Hour on Max Day	12,945 GPM 776,700 GPH	13,127 GPM 787,620 GPH	18,229 GPM 1,093,749 GPH	16,840 GPM 1,010,416 GPH	15,285 GPM 917,121 GPH
Peak Day Use	5.4 MGD	6.4 MGD	10.5 MGD	9.7 MGD	8.0 MGPD
Minimum Month	February	February	February	February	February
Average Winter Day (December-February)	2,391,572	2,471,999	2,566,945	2,518,117	2,487,158
Average Winter Day/Average Day	0.65	0.70	0.70	0.68	0.68
Average Per Capita Day	99.72	94.82	96.02	95.72	96.57
Per Capita Usage: Average Day During Summer Months	165.80	149.18	154.55	161.92	157.86

Meter Replacement Program

The City of Keizer presently checks around 250 meters a year. Most of the meter checks are initiated by a complaint or meter audit that shows the meter is not functioning as required. If the meter fails testing it is automatically replaced. During routine meter reading or maintenance if a meter is discovered to be over 20 years old it is also automatically replaced. In the event of a consumer complaint the city will perform a standard flow test on the consumer's meter.

Table 2-10
Meter Replacement Program Figures

Year	Meters Replaced
2015	85
2016	108
2017	119
2018	144

Water Rate Structure

In January, 2019, the City of Keizer had a water rate increase of 4% above the previous water consumption rate. To follow are the meter costs after the rate increase:

Table 2-11
City of Keizer Meter Cost and Rate Structure

Meter Size	Water Meter Cost per Bi-Monthly Billing
5/8”-3/4”	$11.72
1”	$23.81
1- 1/2”	$46.04
2”	$72.74
3”	$141.45
4”	$224.19
6”	$446.78
8”	$765.12

Along with a bi-monthly water meter cost, the City of Keizer also charges a water consumption cost for residential and multi-family users of $1.52 per unit and $1.46 per unit for commercial and industrial users. A unit of water used in the City of Keizer includes 748 gallons.

Summary of Recent Water Use

The data contained within Table 2-11 reflects the raw production from the sources and is indicative of the total output of water into the system. The data within Table 2-12 reflect the total production data as well as metered (sold) water consumption. This data permits determination of current unaccounted for (lost) water. As reflected in Table 2-11, the five-year average of water loss is 9.67%. An average of water loss is used as in large systems as pumping and sales figures are not recorded on the same date and an average must be used to allow for these timing differences. All of the displayed values are acceptable for a water system of this size and is within the generally accepted range of 2%-10%.

The City of Keizer reads approximately 50% of the City’s service meters monthly, (bi-monthly billing cycles), which accounts for the variance of monthly readings between metered consumption and source production. Typically, these variances average out over the course of a full year. The City of Keizer annually reviews the water pumped verses the water sold to verify the unaccounted for water has not increased, therefore, showing the city is repairing leaks and pipelines that may be need to be replaced. Due to the City's ongoing leak detection program, unaccounted water is low.

Unaccounted for water includes the unmetered water that is lost when the city performs waterline flushing for 6 weeks in the spring. This is approximately 160-170 hours of mainline flushing through 4-6 hydrants at a time using both 3” ports. After flushing all of the City’s mainlines, an additional two weeks is spent flushing all the cul-de-sacs. Water is also lost during new waterline construction and development flushing that occurs several times a year for 15-60 minutes from waterlines sized 6”-12” using the steamer port of hydrants.

The city also has unmetered water loss during hydrant flow testing through both of the hydrant's 3" ports. On top of the unmetered water that is lost during waterline flushing and city performed hydrant flow testing, unaccounted for water also includes any Fire Department training exercises that is also unmetered.

Table 2-12
Total Production: 2014-2018

Month/Year	Total Well Production (in Gallons)	
January, 2014	72,755,716	Estimated Population: 36,985 Average Day: 3,536,927 Average Day per Capita: 95.63 Average Summer Day: 5,700,410 Average Summer Day per Capita: 154.13
February, 2014	65,279,456	
March, 2014	72,367,504	
April, 2014	90,640,396	
May, 2014	95,657,232	
June, 2014	145,456,828	
July, 2014	191,772,240	
August, 2014	187,208,692	
September, 2014	138,173,552	
October, 2014	87,491,316	
November, 2014	70,753,320	
December, 2014	73,422,184	
2014 TOTAL	**1,290,978,436**	
January, 2015	73,892,676	Estimated Population: 36,985 Average Day: 3,688,208 Average Day per Capita: 99.72 Average Summer Day: 6,134,998 Average Summer Day per Capita: 165.8
February, 2015	66,794,156	
March, 2015	77,373,868	
April, 2015	91,785,584	
May, 2015	111,000,208	
June, 2015	172,142,476	
July, 2015	207,571,496	
August, 2015	184,705,884	
September, 2015	122,039,940	
October, 2015	90,196,084	
November, 2015	74,138,768	
December, 2015	74,554,656	
2015 TOTAL	**1,346,195,796**	

Month/Year	Total Well Production (in Gallons)	
January, 2016	74,497,808	Estimated Population: 37,505 Average Day: 3,556,312 Average Day per Capita: 94.82 Average Summer Day: 5,595,268 Average Summer Day per Capita: 149.18
February, 2016	70,888,708	
March, 2016	73,733,352	
April, 2016	93,061,672	
May, 2016	110,380,116	
June, 2016	149,911,916	
July, 2016	174,194,240	
August, 2016	190,658,468	
September, 2016	127,871,348	
October, 2016	83,277,240	
November, 2016	73,385,532	
December, 2016	77,093,368	
2016 TOTAL	**1,298,053,768**	
January, 2017	80,166,152	Estimated Population: 38,345 Average Day: 3,681,957 Average Day per Capita: 96.02 Average Summer Day: 5,926,103 Average Summer Day per Capita: 154.55
February, 2017	69,414,400	
March, 2017	77,305,800	
April, 2017	93,130,488	
May, 2017	105,969,160	
June, 2017	143,103,620	
July, 2017	200,074,292	
August, 2017	202,023,580	
September, 2017	130,314,316	
October, 2017	86,257,864	
November, 2017	74,710,240	
December, 2017	81,444,484	
2017 TOTAL	**1,343,914,396**	
January, 2018	76,868,220	Estimated Population: 38,505 Average Day: 3,694,487 Average Day per Capita:95.9 Average Summer Day: 6,249,280 Average Summer Day per Capita: 162.30
February, 2018	68,317,832	
March, 2018	75,423,832	
April, 2018	88,728,508	
May, 2018	151,992,104	
June, 2018	167,514,600	
July, 2018	210,561,252	
August, 2018	196,857,892	
September, 2018	131,822,284	
October, 2018	97,320,036	
November, 2018	75,389,424	
December, 2018	76,691,692	
2018 TOTAL	**1,348,487,676**	

Table 2-13
Water Requirement/Monthly Water Production and Metered Sales (in Gallons) 2014-2018

Month/Year	Total Well Production (in Gallons)	Total Metered Sales	Unaccounted Water (Percent)
January, 2014	72,755,716		
February, 2014	65,279,456		
March, 2014	72,367,504		
April, 2014	90,640,396		
May, 2014	95,657,232		
June, 2014	145,456,828		
July, 2014	191,772,240		
August, 2014	187,208,692		
September, 2014	138,173,552		
October, 2014	87,491,316		
November, 2014	70,753,320		
December, 2014	73,422,184		
2014 TOTAL	**1,290,978,436**	**1,153,754,096**	**10.4%**
January, 2015	73,892,676		
February, 2015	66,794,156		
March, 2015	77,373,868		
April, 2015	91,785,584		
May, 2015	111,000,208		
June, 2015	172,142,476		
July, 2015	207,571,496		
August, 2015	184,705,884		
September, 2015	122,039,940		
October, 2015	90,196,084		
November, 2015	74,138,768		
December, 2015	74,554,656		
2015 TOTAL	**1,346,195,796**	**1,190,840,684**	**11.5%**
January, 2016	74,497,808		
February, 2016	70,888,708		
March, 2016	73,733,352		
April, 2016	93,061,672		
May, 2016	110,380,116		
June, 2016	149,911,916		
July, 2016	174,194,240		
August, 2016	190,658,468		
September, 2016	127,871,348		
October, 2016	83,277,240		
November, 2016	73,385,532		
December, 2016	77,093,368		
2016 TOTAL	**1,298,053,768**	**1,256,424,576**	**3.2%**

Month/Year	Total Well Production (in Gallons)	Total Metered Sales	Unaccounted Water (Percent)
January, 2017	80,166,152		
February, 2017	69,414,400		
March, 2017	77,305,800		
April, 2017	93,130,488		
May, 2017	105,969,160		
June, 2017	143,103,620		
July, 2017	200,074,292		
August, 2017	202,023,580		
September, 2017	130,314,316		
October, 2017	86,257,864		
November, 2017	74,710,240		
December, 2017	81,444,484		
2017 TOTAL	**1,343,914,396**	**1,180,041,060**	**12.2%**
January, 2018	76,868,220		
February, 2018	68,317,832		
March, 2018	75,423,832		
April, 2018	88,728,508		
May, 2018	151,992,104		
June, 2018	167,514,600		
July, 2018	210,561,252		
August, 2018	196,857,892		
September, 2018	131,822,284		
October, 2018	97,320,036		
November, 2018	75,389,424		
December, 2018	76,691,692		
2018 TOTAL	**1,348,487,676**	**1,205,752,812**	**10.6%**
2014-2018 5 Year Average	**1,325,526,014**	**1,197,362,646**	**9.67%**
January, 2019	75,666,184		
February, 2019	69,190,000		
March, 2019	76,388,752		
April, 2019	97,637,188		
May, 2019	125,935,524		
June, 2019	163,055,024		
July, 2019	188,065,152		
August, 2019	182,126,780		
September, 2019	117,463,676		
2019 - 9 MONTH TOTAL	**1,095,528,280**		

Storage Facilities

The city operates two ground-level reservoirs, located at the Ridge Drive and Bair Park sites. In addition, one (1) elevated water storage reservoir exists in the eastern most region of the water system and is primarily designed for emergency water supply and fire protection within Keizer Station.

Table 2-14
Existing Storage Facilities

Water Storage Reservoir Location and Year Constructed	Nominal Diameter and Height Type	Rated Water Storage (in Gallons)	Material of Construction	Reservoir Floor Elevation (Ft-MSL)	Maximum Water Surface Elevation (Ft-MSL)	Maximum Water Depth (Ft)
Ridge Drive, 1999 (Site #15) (5175 Ridge Dr NE)	101' Dia x 24' Height Ground Level	1,500,000	Steel (glass lined, bolted)	158.5'	182.33'	23'
Bair Park, 2005 (Site #16) (1066 Bair Park NE)	53' Dia x 47' Height Ground Level	750,000	Steel (glass lined, bolted)	183'	230'	46'
Elevated Storage Tank (EST) Keizer Station, 2007 (Site #17) (5700 Ulali Dr NE)	27' Dia x 37'- 6" Working Head Range Elevated	550,000	Welded steel	177' (base)	270'	37'-6"

Either ground level reservoir can be filled by either the dedicated on-site well (500-600 GPM) or back-fed (up to 1000 GPM) from the distribution system. Typically, day to day use requires refill of the reservoir through use of the on-site wells only. The elevated reservoir, primarily referred to as the Elevated Storage Tank or EST, is back-fed and refilled using system pressure, primarily from the Ridge Drive facility.

Although not significant in volume, the water system also includes hydropneumatic storage vessels at several sites:

Table 2-15A
Hydropneumatic Pressure Tanks

Site Name and Number	Pressure Vessel Size	Air Volume Control
Willamette Manor (#2)	2000 gallon	Yes
Cherry Ave (#5)	5000 gallon	Yes
17th Ave (#12)	3000 gallon	Yes

Total Hydropneumatic storage: 10,000 gallons

Table 2-15B
Pressure Tanks

Lacey Ct (#18)*	2600 gallon	Yes

*Lacey Court is used as a pressure vessel for on-site filtration

The pressure tanks provide a minor amount of surge protection and pressure buffering within the distribution system and are important for the day to day operation.

City of Salem/Keizer Intertie

Two (2) intertie connections to the City of Salem (Figure 2-1), although not in active use, remain physically connected and operable on a manual basis. An emergency water inter-use agreement, executed in 1987 and amended in 2012, provides for the emergency exchange of water for either city. This emergency exchange agreement has been recently used four times; in 1996 and 1998, the City of Salem purchased water from Keizer for several days during the severe flood events that occurred during these years which caused a shutdown of Salem's Geren Island water treatment facility and in 2011, the City of Salem purchased water for several days in response to a severe draft of water during high summer usage. In 2018, the City of Salem experienced high Cyanotoxin levels and required additional water to meet their summer demands. To meet these demands the City of Salem/Keizer intertie was activated and Salem purchased water from Keizer. The City of Salem has constructed an intertie booster pump station at the Cherry Avenue well/pump station site capable of transferring up to 5 million gallons per day (3500 GPM) from Keizer to Salem. In the case of emergency, the City of Keizer is also able to receive water from the City of Salem through a 42” pipeline connection at Cherry Ave and/or a 12” waterline connection at Wiessner. A second intertie pump station is planned for the Wiessner site, however, the actual schedule for implementing this location has not been determined.

In 2018, the City of Keizer supplied water to the City of Salem during a high Cyanotoxin event. Pumping records indicate the City of Keizer supplied a total of 24.8 million gallons of water during this event. The breakdown of water supplied was a total of 24.3 million gallons over 137 hours was pumped through the intertie and 500,000 gallons was pumped from fire hydrants into a water truck.

In the next 5 years future developments at Detroit Lake and a proposed fish project that is expected to interrupt the City of Salem water delivery system and will once again may require Keizer to assist Salem in the summer months to provide water to their residents. The city has stated that the effects the work will have on the existing Cyanotoxin blooms is unknown, but initial reports show the work is expected to disturb the blooms. The effect of this disruption of the blooms have on the new City of Salem Cyanotoxin water treatment facility is unknown currently. Presently it is expected that the City of Salem will need to turn to the City of Keizer, along with Suburban East Salem Water District, to supplement the supply water to the City of Salem and provide bottle filling stations during this time and during extremely high Cyanotoxin events during the bloom disruption if the new City of Salem treatment plant was to be unable to handle the higher level of Cyanotoxin or the smaller particle size. As a tie-in to Salem is located near the Ridge Well, this well will be required to function at the maximum flow.

Chapter Three: Conservation Elements

Water Conservation Program

The City of Keizer Water Department is aggressive in its water conservation measures and encourages the community to participate by way of a variety of programs. Other than the things Keizer does below, the City does not have any other measures other than what is required by the State Drinking Water Rules. The following conservation measures have been, or are currently being implemented:

Many opportunities are in place to encourage the public's involvement in conservation. These include school and local education programs on conservation, City and Public Works sponsored open houses coinciding with National Drinking Water Week, presentations on "Using Water Wisely" to local service organizations (Rotary, Chamber of Commerce), and Conservation tips in the annual Drinking Water Report (Consumer Confidence Report) that is distributed to every physical address in the City, including customers who have a sewer only account and those who get their water through their own well. Keizer is now posting yearly conservation tips through facebook, and a conservation page is being developed to go on the City of Keizer web page.

The school education program has been in effect for many years. The City of Keizer considers this program so valuable there is an Education Coordinator on staff. Although the program is given to all of the 5th and 6th graders in Keizer, it is diverse enough to be tailored to a variety of audiences ranging from kindergarten through high school and even adults. The presentation covers the water cycle, properties of water and a special section focusing on the City of Keizer's water system which uses wells and groundwater. The City of Keizer also participates in the Oregon Children's Groundwater Festival where students from all over the state meet to learn about water and conservation.

The City’s customer service program is swift to respond to any customer complaints regarding high consumption, possible leaks, or any other water conservation or irrigation system questions. In addition to this, any unusual consumption reported on meter reads is followed up immediately to assure there is no leak and to verify the function of the meter. The City also offers an incentive to the customer when a leak is found by offering a credit of half the consumption if they get their leak fixed immediately.

- Due to the City's ongoing leak detection program, the amount of unaccounted water is low. The total unaccounted for water includes any Fire Department training exercises and all of the water required for City's flushing of lines.

- 90% of new construction has underground irrigation systems. Contractors are encouraged to use low water use landscaping and efficient irrigation systems as incentives for prospective home buyers.

- In 1984 the Keizer City Council adopted a water district financial management plan prepared by Pacific Economica. The study recommended regular rate increases, however the City Council, in an effort to keep rates down for the citizens of Keizer, has chosen to increase rates only if necessary to service the bonded debt without levying a property tax. In 2002, the City completed and implemented a new rate study and changed the rates from a high/fixed low commodity to a low/fixed high commodity rate structure which encourages conservation.

- A water re-use opportunity exists for businesses such as local carwashes. The City provides incentives for this procedure by not allowing discounts for high volumes of water and by maintaining high sewer rates for wastewater.

- All 4” and 6” meters were replaced over the last two years with low flow meters that can read all flows.

- All loop systems where meters were not registering during low flow events have been replaced with new meters over the last two years that will allow low usage to be registered and accounted for.

The requirements of the water management plan have already been implemented by the City of Keizer. These include:

- Annual water audit for residential and commercial water accounts, which includes leak detection and repair of lines.

- All service connections are metered, including city parks, city shops, city hall, library and any other city owned public works or park land.

- Since 2005 Meter Readers Company has perform the City of Keizer's bimonthly meter reading services.

- A regularly scheduled leak detection program for transmission and distribution systems is in place, although not very in depth. The last five years (2014-2018) averages a loss of 9.67% of the City's water being unaccounted for. Table 3-1 shows the system leaks for the last five years. Because the water loss from 2018 was above 10% the City will set a two year benchmark after approval of the WMCP to do a system wide, leak detection survey of all steel water main lines in the system and conduct testing on all well production meters for accuracy. If and when a leak is detected, it will be fixed immediately, as is normal procedure. The City will also have a five year benchmark which will include continuing of the items of the two year benchmark along with expanding the leak detection survey to include all older cast and ductile water mains.

- The city currently conducts a yearly water audit to compare water produced from the existing City of Keizer wells compared to sales in gallons, water used during hydrant flushing and/or used during fire suppression, and water that is used on city property for irrigation of parks and other city owned land. The water loss is computed by comparing the water pumped divided by the water sold, used through a fire hydrant, and water used for irrigation. This difference is then divided by the water pumped to determine the percent of water that has been lost or unmetered.

- The City of Keizer does not have any requirements under any water supply contracts that require specific or specialized conservation methods.

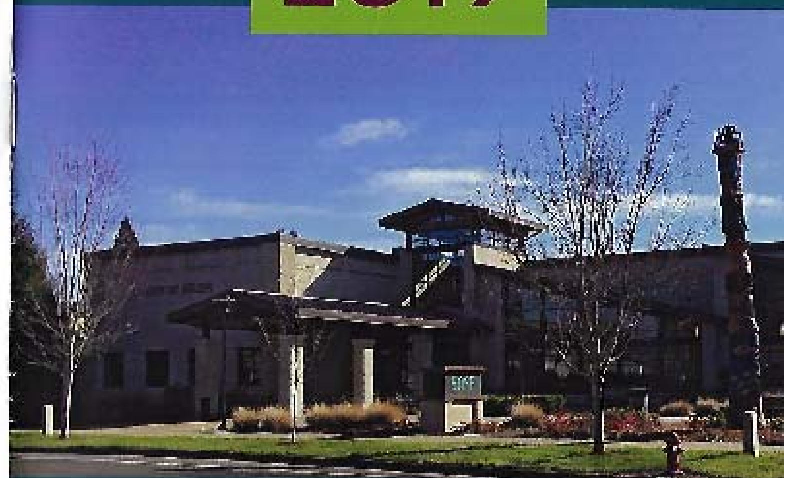
- The City of Keizer includes a section in every yearly Consumer Confidence Report (CCR) about measures residents can do to conserve water. The 2019 Consumer Confidence Report is attached as Figure 3-1.

POSTAL CUSTOMER

City of Keizer

CITY OF KEIZER

2019



ANNUAL DRINKING

Water Quality Report

What's inside:

www.keizer.org

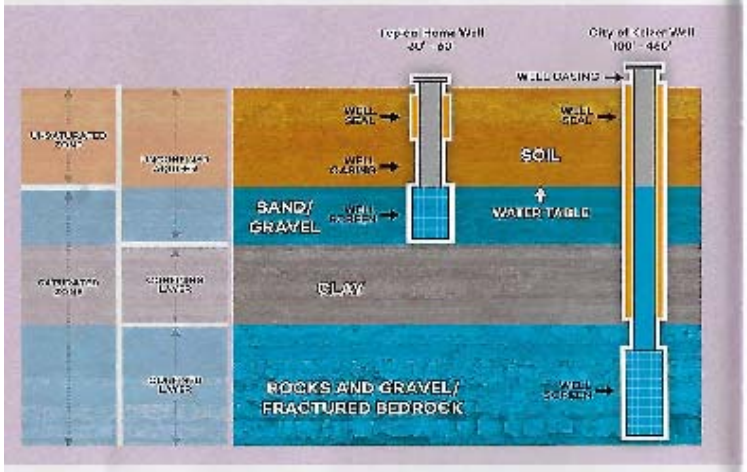
KEIZER Well Facts

Fluoride is added to your water at a rate of .70 parts per million which is the recommended level set by the American Dental Association and the Oregon Health Authority. An ion exchange zeolite system is also added to the water to reduce staining. Hardness of the water is 167 parts per million or approximately 9 grains per gallon.

The water system is controlled by a computerized telemetry system which continually monitors the water pressure and activates or deactivates individual wells to maintain a system water pressure of 60-74 pounds per square inch. Keizer has three water storage facilities totaling 2.75 million gallons of storage.

The source of the City of Keizer's water is the Troutdale Aquifer.

(An aquifer is an underground geologic formation that can store water.) Keizer's aquifer is located between the surface of the earth and 1,000 feet deep. Wells draw from the aquifer and distribute the water to your home through 120 miles of piping. Average water use is 15-3 mgd and average summer use is 65-8 mgd.



The 1996 Amendments to the Safe Drinking Water Act require that all states conduct Source Water Assessments for public water systems within their boundaries. The assessments consist of (1) identification of the Drinking Water Protection Area, i.e., the area at the surface that is directly above that part of the aquifer that supplies groundwater to our well(s), (2) identification of potential sources of pollution within Drinking Water Protection Area, and (3) determining the susceptibility or relative risk to the well water from these sources.

The purpose of this assessment is to provide water systems with the information they need to develop a strategy to protect their drinking water resource if they choose. The respective Drinking Water Programs of the Oregon Health Authority and Environmental Quality have completed the assessment for our system. A copy of the report (Source Water Assessment Report) is on file and available for viewing at Keizer City Hall.

Your water is clean and contaminant free. However, the following language is required in this report by the EPA:

Required Additional Health Information

To ensure that tap water is safe to drink, the Environmental Protection Agency (EPA) prescribes limits on the amount of certain contaminants in water provided by public water systems. Food and Drug Administration (FDA) regulations establish limits for contaminants in bottled water.

Drinking water, including bottled water, may reasonably be expected to contain at least small amounts of some contaminants. The presence of contaminants does not necessarily indicate that water poses a health risk. More information about contaminants and potential health effects can be obtained by calling the EPA's Safe Drinking Water Hotline (1-800-426-4791).

The sources of drinking water (both tap water and bottled water) include rivers, lakes, streams, ponds, reservoirs, springs and wells. As water travels over the surface of the land or through the ground, it dissolves naturally occurring minerals and radioactive material, and can pick up substances resulting from the presence of animals or from human activity.

Contaminants that may be present in source water include:

A. Microbial contaminants, such as viruses and bacteria, which may come from sewage treatment plants, septic systems, agricultural livestock operations and wildlife.

B. Inorganic contaminants, such as salts and metals, which can be naturally occurring or result from urban storm runoff, industrial or domestic wastewater discharges, oil and gas production, mining, or farming.

C. Pesticides and herbicides, which may come from a variety of sources such as agriculture, storm water runoff, and residential uses.

D. Organic chemical contaminants, including synthetic and volatile organics, which are by-products of industrial processes and petroleum production, and can also come from gas stations, urban storm water run-off, and septic systems.

E. Radioactive contaminants, which can be naturally occurring or be the result of oil and gas production and mining activities. In order to ensure that tap water is safe to drink, EPA prescribes regulations which limit the amount of certain contaminants in water provided by public water systems. FDA regulations establish limits for contaminants in bottled water which must provide the same protection for public health.

Some people may be more vulnerable to contaminants in bottled water than is the general population. Immune-compromised persons such as persons with cancer undergoing chemotherapy, persons who have undergone organ transplants, people with HIV/AIDS or other immune system disorders, some elderly, and infants can be particularly at risk from infections. These people should seek advice about drinking water from their health care providers. EPA/CDC guidelines on appropriate means to lessen the risk of infection by Cryptosporidium are available from the Safe Drinking Water Hotline (1-800-426-4791).

Information on Lead

If present, elevated levels of lead can cause serious health problems, especially for pregnant women and young children. Lead in drinking water is primarily from materials and components associated with service lines and home plumbing. The City of Keizer is responsible for providing high quality drinking water, but cannot control the variety of materials used in plumbing components. When your water has been sitting for several hours, you can minimize the potential for lead exposure by flushing your tap for 30 seconds to 2 minutes before using water for drinking or cooking. If you are concerned about lead in your water, you may wish to have your water tested. Information on lead in drinking water, testing methods, and steps you can take to minimize exposure is available from the Safe Drinking Water Hotline, 800-426-4791 or at http://www.epa.gov/safewater/lead.

2019 WATER QUALITY TESTING RESULTS

MICROORGANISMS

Substance	Date Tested	Unit	MCLG	EPA's MCL (Highest Level Allowed)	Detected Level	Source	Violation
*1 Total Coliform	2019	TT	0	5%	0.003%	see below	No

INORGANIC CONTAMINANTS

Substance	Date Tested	Unit	MCLG	MCL	Detected Level	Source	Violation
*2 Nitrate	2019	ppm	10	10	3.02	see below	No
*3 Fluoride	2019	ppm	4	4	0.38	see below	No
*4 Lead (every 3 years)	2017	ppb	0	AL=15	0	see below	No
*5 Copper (every 3 years)	2017	ppm	1.3	AL=1.3	0.096	see below	No
*6 Arsenic	2019	ppb	0	10	4	see below	No

VOLATILE ORGANIC CONTAMINANTS

Substance	Date Tested	Unit	MCLG	MCL	Detected Level	Source	Violation
Well Name: Willamette							
*7 Tetrachloroethylene	2019	ppb	0	5	0.8	see below	No
*8 Trichloroethylene	2019	ppb	0	5	3	see below	No
Well Name: Cherry Ave							
*9 Toluene	2019	ppm	1	1	0.001	see below	No

RADIOACTIVE CONTAMINANTS

Substance	Date Tested	Unit	MCLG	MCL	Detected Level	Source	Violation
Well Name: Delta							
*10 Gross Alpha	2016	pCi/L	0	15 pCi/L	3.4	see below	No
Well Name: City Hall							
*11 Radium 226/228	2016	pCi/L	0	5 pCi/L	1	see below	No

UCMR 4

Wells: All wells in UCMR database

Substance	Date Tested	Unit	MCLG	MRL	Level Range	Source	Violation
*12 Manganese	2018	ppm	N/A	0.0004	0.0014 to .402	see below	No
	2019	ppm	N/A		0.0103 to .456		No

*1 Coliforms are bacteria that are naturally present in the environment and are used as an indicator that other potentially harmful, waterborne pathogens may be present, or that a potential pathway exists through which contamination may enter the drinking water distribution system. In 2019 a total of 523 bacteria samples were collected from the distribution system and 2 tested positive for Total Coliform. The Oregon Health Authority, Drinking Water Section and the EPA require that repeat samples be taken immediately from the original site that tested positive as well as taps adjacent to that site. In addition, required testing is done at all water sources (wells in production) at the time the sample was collected (Triggered Source). All repeat samples along with all Triggered Source samples were negative.

*2 Nitrates are caused by runoff from fertilizer use. Leaching from septic tanks, sewage, Erosion of natural deposits. Of the 15 wells that served Keizer in 2019, 4 had detects ranging from 0.10 to 3.02 ppm. The MCL is 10 ppm.

*3 Fluoride is a water additive which promotes strong teeth; erosion of natural deposits; discharge from fertilizer and aluminum factories. The recommended dose of fluoride set by EPA is .70 ppm. (MCL=4ppm) Keizer uses Sodium Fluoride. Ranges found in Keizer's system were .2 ppm (natural) to 0.96 ppm (added)

*4,*5 Monitoring for levels of lead and copper leached from household plumbing by corrosive water supplies. Systems that exceed "action levels" must install corrosion control treatment systems. No samples tested exceeded the action levels. Lead and Copper are tested for every 3 years. The last test was done in 2017. This data is the most recent monitoring done in compliance with the regulations.

*6 Arsenic is produced from erosion of natural deposits, runoff from orchards, and runoff from glass and electronics production wastes. Arsenic was detected in 6 wells ranging from 1 to 4 ppb (MCL=10 ppb). The last test was done in 2016. This is the most recent monitoring done in compliance with the regulations.

*7, *8 Tetrachloroethylene and Trichloroethylene are a manufactured chemical widely used as a cleaning agent in the dry cleaning industry and as a metal degreaser in the manufacturing industry. Testing for Volatile Organic Compounds (VOC's) are required by the State every 3 years. However, because of detections in 2002, the City has been voluntarily monitoring and reporting VOC's to the State on a monthly basis. All detects have been far below the MCL. The level at which a lab can detect tetrachloroethylene and trichloroethylene is 0.5 ppb. Willamette Well had detects of Trichloroethylene from 1.0 to 3.0 ppb (MCL=5 ppb) and Tetrachloroethylene from 0.6 to 0.8 ppb (MCL=5 ppb). Cherry Ave well had detects of Tetrachloroethylene only at levels of 0.9 to 1.6 ppb.

*9 Toluene is mainly used as a solvent and in the process of making chemicals. It can get into drinking water through discharge from industrial plants. Cherry Ave had one detect in March of 2019 after well work was completed. Monthly testing since then has shown no detects.

*10, *11 Radioactive Contaminants come from erosion of natural deposits of certain minerals that are radioactive and may emit a form of radiation. Consuming water in excess of the MCL over many years may have an increased risk of getting cancer. Gross Alpha was detected in 1 well at a level of 3.4 pCi/L (MCL=15 pCi/L). Radium 226-228 was detected in 1 well at a level of 1 pCi/L (MCL=5 pCi/L). The last test was done in 2016. This data is the most recent monitoring done in compliance with the regulations.

*12 Manganese is a naturally occurring element that can be found ubiquitously in the air, soil, and water. Manganese is an essential nutrient for humans and animals. Adverse health effects can be caused by inadequate intake or over exposure.

*12 UCMR 4 Event: The City of Keizer took 34 samples from each well location. Sampling was done 5-6 months apart taking 17 samples from each well during each sampling event. The compounds that were tested for included 9 pesticides, 3 semi-volatile compounds, 3 alcohols, and 2 metals. There were No Detects on either round of pesticides, semi-volatile or alcohols. Only one metal was detected which was manganese. Manganese was detected on the first round of testing at levels from .0014ppm to .402ppm. The second round results showed manganese levels from 0.0103ppm to .456ppm. The MRL for the UCMR test on manganese is 0.0004.

UCMR-Unregulated Contaminant Monitoring Rule: "Unregulated contaminants are those that don't yet have a drinking water standard set by USEPA. The purpose of monitoring for these contaminants is to help EPA decide whether the contaminants should have a standard."

UCMR Background: The 1996 Safe Drinking Water Act (SDWA) amendments require that once every five years EPA issue a new list of no more than 30 unregulated contaminants to be monitored by public water systems (PWSs). This monitoring provides a basis for future regulatory actions to protect public health.

Maximum Contaminant Level (MCL): The highest level of a contaminant that is allowed in drinking water. MCLs are set as close to the MCLGs as feasible using the best available treatment technology.

Maximum Contaminant Level Goal (MCLG): The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs allow for a margin of safety.

Action Level (AL): The concentration of a contaminant which, if exceeded, triggers a treatment or other requirement that a water system must follow.

Method Reporting Limit (MRL): Also known as the detection limit. The minimum limit at which a contaminant can be detected using a particular lab testing method.

Parts per million (ppm): One part per million is the equivalent of 1/2 of a dissolved aspirin tablet in a full bathtub of water (approx. 50 gallons).

Parts per billion (ppb): One part per billion is the equivalent of 1/2 of a dissolved aspirin in 1,000 bathtubs of water (approx. 50,000 gallons).

Treatment Technique (TT): A required process intended to reduce the level of a contaminant in drinking water.

Picocuries per liter (pCi/L): Unit of measure used to express the results of radioactivity tests in air and water.

FREQUENTLY ASKED QUESTIONS

What is that yellow, black, or blue staining I get in my dishwasher, toilet, sinks, and laundry?

A Keizer gets its' water from deep wells. Well water has natural minerals which can cause staining. The yellow or orange color stain is mostly caused by iron whereas the blue or black stains are caused by manganese. These minerals are common in ground water.

How do I get rid of these stains?

A In the dishwasher, we suggest running a cycle with a citrus base package of drink mix or a tableted form of detergent. Sometimes a second cycle is necessary but this should clear up the problem. In laundry, we suggest you minimize or eliminate the use of bleach. Bleach actually draws out the iron and suspends it in the water, making the staining worse. There are products on the market that are made for hard water stains.

My water has this odor that smells like rotten eggs, or sulfur. What causes the smell and is it safe to drink?

A We have found that the majority of our odor complaints are due to various supply tubes that are located under sinks, behind toilets, and behind refrigerators. This line is typically clear and braided, opaque, or has stainless webbing. These supply pipes are being used in most new homes and remodels today. The minerals in our water seem to react with these types of tubes. When water sits for a period of time unused in these pipes, a sulfuric odor may present itself. After running water a short time, the odor goes away. Replacing the braided type hose with copper or chrome piping usually solves most odor problems. If you have an odor in your hot water supply, you may want to replace the standard magnesium or aluminum anode rod with an aluminum/zinc alloy anode in your hot water heater. It is also recommended that you flush your hot water heater annually. The water is still safe to drink even if there is an odor.

Why is my city services bill so high? (City services bill includes: water, sewer, stormwater, police, and parks)

A Keep in mind that your bill is for a two month period. In addition approximately 50% of your bill is for sewer services. A unit of water is 748 gallons for which you pay only $1.45!

I have a well and I want to hook up to City water but I still want to use my well for irrigation, do I have to abandon my well? What are my options?

A The answer is no, you do not need to abandon your well. When you hook up to City water you must separate the well completely from your home drinking water line. You also must install a Reduced Pressure Backflow Assembly (RPBA) on your new water line going to the house. Make sure to read about thermal expansion when installing any device on a service line (see below). There are installation instructions available at City Hall.

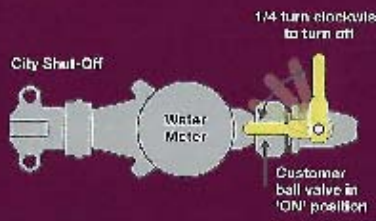
What is thermal expansion?

A Water heaters are installed with a temperature and pressure T&P valve, which is designed to relieve excessive water temperature or pressure. Also aiding in the control of excessive heat and pressure is a condition known as thermal expansion, which allows extremely hot water to backflow into water main lines, mixing with the cold water and dissipating the heat. However, when a backflow prevention assembly is installed on a household water service line, the water cannot go back out into the water system. This leaves the T&P valve as the only release route for the overheated water.

If a water heater thermostat becomes defective, allowing the water temperature to increase to more than 212 degrees F., and the T&P valve fails, your domestic water can become "superheated". Superheated water can cause water heaters to explode or can allow scalding steam to be released from faucets upon use. We recommend that you inspect your T&P valve periodically. Also, a licensed plumber can inspect, repair or replace your T&P valve to ensure your safety. Thermal expansion chambers and pressure-relief toilet ball cock assemblies can provide additional protection.

How do I shut off my water if I need to?

A If you have an updated meter you should have a handle on your side of the meter. A quarter turn of this handle clockwise will shut off your water. (See illustration)



BACKFLOW DEVICES

Q I got this letter in the mail that says something about having my backflow device tested and I have no idea what that is. I just moved into my house and no one told me about this, what is it and why do I have to test it every year?

A The backflow device is to prevent contamination of our drinking water. The state mandates that they are tested once a year as does our city ordinance. Typically they are installed for a sprinkler system. The device protects both the city water system and your domestic line as well.

Q Is there anything I need to know when installing or retrofitting my irrigation system?

A Yes. You must provide some sort of backflow protection on your sprinkler system. The three most common preventors are a double check valve assembly (DCVA), a pressure vacuum breaker assembly (PVBA), and an atmospheric vacuum breaker (AVB). The DCVA and PVBA must be tested by a state certified backflow tester within 30 days of installation and annually thereafter with a copy of the report mailed to the City. The AVB is a non-testable device that must be freeze protected. You need to take out a permit with Marion County to install your sprinkler system. You may pick up a permit along with installation procedures at City Hall in the Community Development Department or at the Marion County office.

CALL BEFORE YOU DIG

If you plan on doing any type of digging at your home this year, please call for utility locates at least 48 hours prior to starting your project. Utility companies will come and mark your property for free, giving you locations of their underground utilities. This can not only save you money and time, but could also save your life. The number for the Oregon Utility Notification Center is 1-800-332-2344 or 811.

811

Know what's **below.** Call before you dig.

WATER CONSERVATION

Water is a valuable resource and we encourage wise use and conservation whenever possible. Below are a few ideas to not only save water, but save you money in the long run.

Broken or defective plumbing and irrigation systems should be repaired or replaced within a reasonable period.

Replace old toilets with high efficiency models. Water displacement will reduce the amount of water per flush.

Potable water should not be used to water outdoor landscapes in a manner that causes runoff onto non-irrigated areas, walkways, roadways, parking lots, or other hard surfaces.

Install water-saving shower heads or flow restrictors. Saves 500 – 800 gallons per month, or 20,000 gallons of water per year. Reducing shower time even one or two minutes can save up to 150 gallons per month.

When brushing teeth, washing hands, or shaving, do not leave water running. Turning the water off during these activities can save 25 – 500 gallons per month.

Run only full loads in the washing machine or dishwasher. Saves up to 1,000 gallons per month.

PUBLIC PARTICIPATION OPPORTUNITY

The City of Keizer Public Works Department invites all interested citizens to join them at:

City Council Meetings
The first and third Monday of each month, 7:00pm at Keizer City Hall, 930 Chemawa Rd. NE, Keizer, OR 97303

The City of Keizer Source Water Assessment
is available for viewing at City Hall located at 930 Chemawa Rd. NE, Keizer, OR 97303

Normal Business Hours
M-F 8am-5pm
(closed holidays)
City Hall, Utility Billing
503-390-3700

After Hours Emergency Number
503-393-1002
Press 1 for Water
Press 2 for Street, Storm, or signal lights

Questions concerning this document?

Contact: Patrick Taylor, Water Division Manager
City of Keizer, P.O. Box 21000
Keizer, OR 97307-1000
503-856-3560
www.keizer.org

GET READY FOR SPRING

DON'T JUST MAINTAIN YOUR LAWN

Care for It!

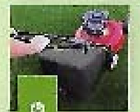
Spring is here! It's that time of year when our landscapes come out of winter dormancy and lawn care takes center stage. Before you fire up the mower or roll out the spreader, consider the following:

Some of the ways we "care" for our lawns aren't actually good for the grass, for the soil, for our pets, for the environment, or even for us. For example, we are told to feed our lawns so we purchase bags or bottles of expensive synthetic fertilizers, apply them heavily to our grass, and then mow and water, mow and water, mow and water. It's time consuming, it's costly, and it's hard work. With repeated applications, fertilizers can actually cause chemical burns in the grass, make the soil more acidic, and runoff to local streams making water unsafe for humans and pets. To offset these problems, we often have to purchase more chemicals– spinning our wheels and spending money needlessly. If you really want to care for your lawn, maybe it's time to change your approach.

To help you get the healthy, green lawn you want without the expense and risks check out these helpful lawn care tips:

Healthy Streams Start at Home.

MOWING



DO

Raise the blades

You should never cut more than a third of the grass height. Leaving your grass a little longer helps it grow thicker and create deeper roots. Taller grass is also better for your soil—it provides more shade, helps retain moisture, and makes it more difficult for weeds to germinate.

Use a mulching mower

Grass clippings contain nitrogen, phosphorus and potassium—the nutrients lawns need to stay healthy. Save time and money—no need to apply expensive synthetic fertilizers.

DON'T

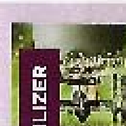
Scalp the lawn

The low golf-course-style cut can stresses grass and requires more maintenance, which means more time, more labor, more fertilizer, and more water. It also creates an ideal place for weed seeds to germinate and flourish.

Bag grass clippings

Collection accessories for mowers are more costly. Bagging grass clippings also takes more time, more labor, and you have to dispose of them.

FERTILIZER



DO

Add compost

Compost is alive with microbes that suppress common lawn fungus and pathogens and it provides all the nutrition necessary for healthy dark green lawn. The addition of compost to your lawn will also build healthy soil that will retain water more efficiently.

DON'T

Apply multi-purpose products

While synthetic products that contain fertilizer and weed killer in one are appealing and seem easy, they aren't as effective or efficient as applying them separately. These "one-size-fits-all" products are often overkill and can actually damage your soil. Excess chemicals can also be carried away by the rain and impact our local streams.

PESTICIDES

DO

Use chemicals sparingly (if needed)

Before applying pesticides, know the pest you're dealing with, select the right product, and spot treat when possible.

Read the label, follow instructions carefully, and always wear protective clothing to prevent skin exposure.

Dispose of any unused products at the Household Hazardous Waste Facility (Salem-Keizer Transfer Station: 3250 Deer Park Dr SE, Salem OR)

Keep children and pets away from treated areas as recommended on the label.

DON'T

Over apply

Less is more when it comes to treating a pest problem. It may be tempting to apply more than the recommended amount, but don't. It's a waste of product, a waste of money and it increases the exposure and risks to you, your family and the environment.

Never allow chemicals to runoff into the streets or storm drains; it can have significant impacts on our local streams and rivers.

This spring, care for your lawn. Make it a safe and healthy space that you and your family can enjoy. The added peace of mind it brings knowing that you're also helping to protect our water resources should help to offset the appearance of a few weeds or small imperfections.

ONE COMMUNITY | ONE WATER | ONE KEIZER

Visit https://www.keizer.org/outreach-and-education for more information.

Table 3-1
System Leaks

Year	System Leaks
2018	11
2017	16
2016	11
2015	15
2014	15

Leaks are mainly due to aging of piping in some areas of the city. The 2012 Water Master Plan Update Capital Improvement Plan has called to replace a total of approximately 87,000' of pipe and ranges from 6" to 12" in size. Table 3-2 lists the pipe replacements that have been completed since the 2012 Master Plan Update Capital Improvement Plan was adopted.

Table 3-2
Pipe Replacement Program Projects Completed To Date

2011	
Type and Length of Pipe	**Location**
621’ - 6” Ductile Iron	Jack St from Wilshire to Stark
531’ - 6” Ductile Iron	Mayfield Place
878’ – 6” Ductile Iron	Willamette Drive from Stark to Appleblossom
548’ – 6” Ductile Iron	Wilshire Drive from Willamette to Jack
1,395’ – 6” Ductile Iron	Garland Ave from Jack to River Road
Total Pipe Replaced in 2011: 3,973’	
2014/2015	
Type and Length of Pipe	**Location**
790’ – 6” Ductile Iron	Marino and Rowan
32’ – 6” Ductile Iron 1,710’ – 8” Ductile Iron	Rivercrest
350’ – 6” Ductile Iron 1,100’ – 8” Ductile Iron	Manbrin and Toni
Total Pipe Replaced in 2014/2015: 3,982’	
2015/2016	
Type and Length of Pipe	**Location**
1,225’ – 6” Ductile Iron	Larry from Rivercrest to Toni
370 – 8” Ductile Iron	Toni to Midblock
645’ – 6” Ductile Iron	Ivy from Harcourt to Thorman
520’ – 6” Ductile Iron	Weeks from Potts to Midblock Weeks
1,221’ – 6” Ductile Iron	Potts and Appleblossom from Weeks to River Road
Total Pipe Replaced in 2015/2016: 3,981’	

2016/2017	
Type and Length of Pipe	**Location**
235’ – 6” Ductile Iron	Thorman from Ivy to Greenwood
773’ – 6” Ductile Iron	Ivy from Thorman to End
325’ – 6” Ductile Iron	Thorman from Ivy to Lawless
934’ – 6” Ductile Iron	Lawless from Clark to Harcourt
530’ – 6” Ductile Iron	Lowell from Lawless to Midblock
270’ – 6” Ductile Iron	Harcourt from Ivy to Greenwood
600’ – 6” Ductile Iron	Lowell from Dearborn to Midblock
Total Pipe Replaced in 2016/2017: 3,667’	
2017/2018	
Type and Length of Pipe	**Location**
2,390’ – 6” Ductile Iron	Greenwood from Harcourt to Cherry
1,370’ – 6” Ductile Iron	Dietz from Clark to River Road
Total Pipe Replaced in 2017/2018: 3,760’	

- In addition to the public education programs mentioned previously, the State mandated Consumer Confidence Report has been distributed in accordance with State guidelines since the Year 1999.

The method of water measurement and reporting is through the State water use reporting program, of which the City is in compliance, OAR 690, Division 85.

Long Range Water Supply Element

The City of Keizer 2012 Water System Master Plan Update evaluated the City of Keizer Water Department's need in the area of water supply, storage and distribution with respect to providing sufficient water for both existing and future development through the year 2032. The current water system is designed to meet UGB build-out and would serve a projected population of 48,082. (UGB maps are included in Figures 5-1 and 5-2.)

Long range water demand in the next 10-20 years depends on whether the Urban Growth Boundary for the City of Keizer is expanded. Any discussions regarding changes in the UGB will include availability of services. There is the possibility that some single family residential units could be replaced by multi-family residences, increasing water usage within the UGB. The City is taking a proactive approach by looking at several future water projects in case the need arises such as interconnecting large trunk lines to maintain constant pressure and flow for more efficient use of the wells.

Future use of the Willamette River as a source could only be possible through the construction of a treatment facility using conventional treatment methods. The costs to develop this supply as an alternative to groundwater are not reasonable at this time due to the City's commitment to wells. The City would pursue purchasing water from the City of Salem before resorting to use of the Willamette River. As the current capacity of the aquifer is expected to be able to provide all of Keizer's future water needs, the City is concentrating on the accessibility of this source.

Customer Incentives

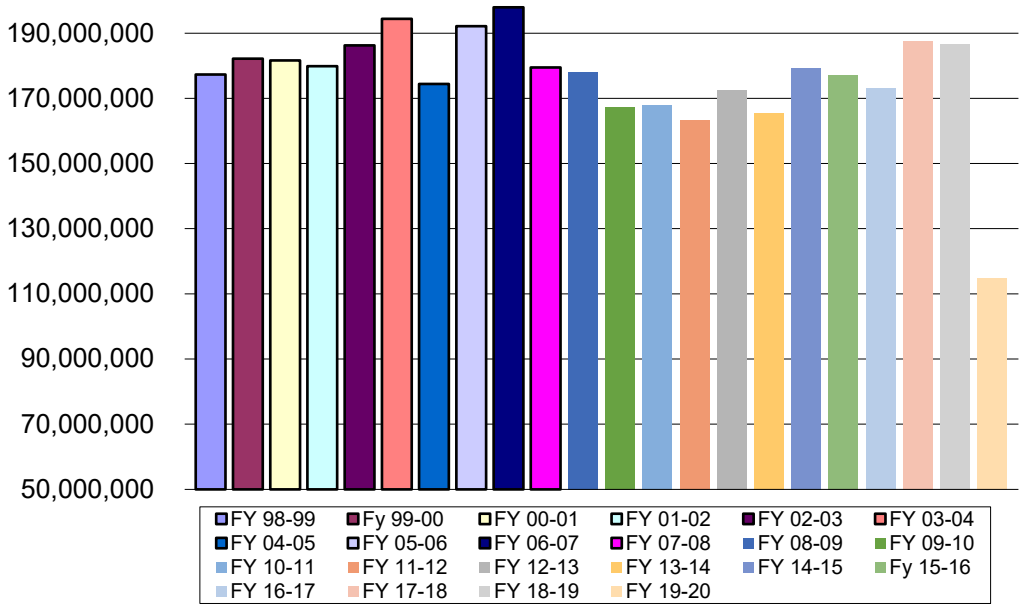
The City of Keizer has previously looked into providing rebates for installation of drip systems, front load washing machine and/or alternate landscaping. The main issue of adding this program is the City of Keizer's rate structure is one of the lowest rates in the State compared to Cities of the same size. To add a program to offer rebates the City would have to raise water rates and pass the rebates onto their water customers. The City of Keizer water rate structure is designed to encourage conservation by having a low fixed, high commodity rate structure.

In previous years the City of Keizer has provided free retrofit kits and low water fixtures that were supplied by Salem Electric and PGE. Recently both of the utilities have stopped the program and no longer supply the kits and fixtures to the City of Keizer. Keizer has looked into purchasing and providing the kits and fixtures themselves, but once again the water users' rates would be raised and customers have stated they don't want higher rates. Another aspect on why retrofit kits are not being supplied any longer is most new residential and commercial buildings are built with low flow toilets, shower heads, and water saving sinks installed.

Another reason the City of Keizer does not offer customer incentives is because the water rate structure encourages residents to reduce their water use. The City of Keizer has a yearly open house and sends out public information flyers and documents encouraging the customers to use low flow shower heads and toilets. Table 3-3 shows water use over the last 20 years. In 2019, the City of Keizer evaluated purchasing of Waterwise Conservation Kits through Niagra Corp in Flower Mound, Texas. The cost we determined to not be economical to pass onto the City of Keizer residents at this time without a water rate increase. The last water rate in January, 2019 had a 4% increase to cover increased cost of electrical services and system improvements, but did not account for the purchase of water conservation kits.

Table 3-3

Annual Water Production in Cubic Feet



Chapter Four: Water Curtailment Plan

Water Curtailment Plan

Emergencies in life are rarely planned or predicted, the same situation exists in public water systems. In order to safeguard public health and insure continued water service, a responsible water purveyor will prepare and maintain a water curtailment plan, with various stages, depending on the severity of emergency, for implementation should the need arise, though the City of Keizer has not had any supply deficiencies in the past 10 years and presently there are no current capacity limitations, including the City's ability to maintain delivery during a long- term water supply shortfall.

The City of Salem's 42-inch diameter pipeline traversing the City of Keizer is no longer being utilized for Keizer water supply, but is still presently connected at one metered location (Cherry Ave Pump Station) with closed valves for emergency use only. A second connection point has been added at the Wiessner Pump Station to the City of Salem's distribution system. This connection allows Keizer to receive water from the City of Salem should an event arise. The connection points are shown on Figure 2-6. Both the City of Keizer and the City of Salem have signed an Emergency Water Agreement stating that, upon request, each City will supply the other surplus water under emergency conditions, when it will not hinder or harm the water delivery of the City supplying the water.

In the event of contamination of the source aquifer, the City of Keizer would enact the Emergency Water Agreement with the City of Salem until the cause of the contamination is identified and dealt with. However, the aquifer is so large that it is unlikely contamination would affect the entire source due to the low transmissivity of the water. The geographic spread of the system's wells covers a large enough area that a well drawing water from a pocket of contamination could be shut off, and water would be provided to the City by the remaining wells in the uncontaminated areas of the aquifer. The sheer volume of water in the source would dilute most contaminations to undetectable amounts.

In the event of a real or potential threat to the water supply, the City has prepared a response to a diminished water supply by prohibiting certain non-essential uses of City supplied water. These include both voluntary and mandatory measures. The Keizer City Council has delegated authority for implantation of this response to the Public Works Director. The Director is authorized to use discretion as to when to implement the Water Curtailment Plan. The state of alert will be determined based on the City water use compared to well production capacity. This decision is based on a number of factors including maintaining a minimum pressure in the system (40 psi) and the projected water needs of the community.

The Keizer City Council adopted the following Water Curtailment Plan June, 1987. An amendment to the Water Curtailment Plan was signed in April, 2013.

The Keizer Plan includes three stages of severity:

Stage One Alert (An alert for a potential water supply shortage). The Stage One Alert is activated when the Public Works Director determines that a potential for a water shortage exists. The Stage One Alert will be made when the City is using water at a rate that equal 80% of the well production capacity. Notification may be provided to customers through notices on utility bills, news releases to the media and/or other methods. Under Stage One, the Director has the authority to activate some or all of the voluntary curtailment measures listed below:

Institute a voluntary restricted watering schedule based on odd/even address numbers for residential and business customers. The voluntary schedule shall apply to all residential and commercial lawn watering and other nonessential water uses with exception as specified by the Director. Customers will be asked to restrict watering to the early morning and evening hours to avoid loss to evaporation.

A. Disseminate informational brochures on conservation methods. These are in the process of being prepared.

B. Activate conservation hotline with information on the current supply situation, voluntary measures, and conservation tips. The City of Keizer has a dedicated voice mail line that can be accessed through the main City Hall phone number, 503-390-3700.

C. Develop a combination of media outreach through newspaper advertisements, public service announcements, and other methods. The city has media relationships with the Statesman Journal newspaper, Keizertimes newspaper, and CCTV, a local television station with whom the City has contracted services.

D. Provide specific notification to major water users asking for voluntary reductions in use and/or deferring nonessential use to off-peak hours. For commercial and industrial users that have developed water shortage contingency plans, provide specific notification at each stage of curtailment and ask that they implement a corresponding action. As the City does not yet have any high water use commercial industries, this will be implemented as those demographics change.

E. The City Parks Department shall operate their irrigation system to achieve maximum efficiency based upon data received from their on-site weather station.

F. City uses of water hydrant and water line flushing shall be limited to essential needs.

Stage Two Alert (Water Supply Shortage). A Stage Two Alert is activated when the Public Works Director determines that a water shortage exists. The Stage Two Alert will be made when the City is using water at a rate that equals 90% of the well production capacity. Customers shall be notified through major media sources of the request to voluntarily curtail all nonessential water use. In the event a problem is local, the City will distribute information to effected customers. Updates on the water situation shall be provided to the media regularly until Stage Two is canceled. Under Stage Two, the Director has the authority to activate some or all the measures listed below until the Director determines that the capacity to deliver adequate supplies of water is restored:

A. All Stage One measures will be implemented as appropriate.

B. Customers will be asked to voluntarily restrict all lawn watering and other nonessential uses of water as specified below:

1. No watering or irrigating of lawns, grass, or turf unless it is:

a. New lawn, grass, or turf that has been seeded or sodded after March 1 of the calendar year.

b. Exempted athletic fields frequently used for organized play. Exceptions for athletic fields must be received in writing from the Director.

c. Golf course tees and greens

d. Park and recreation area of a particular significance and value to the community as approved by the City Manager

2. No use of City supplied water to wash sidewalks, walkways, streets, driveways, parking lots, or other hard surfaced areas except where necessary for public health or safety.

3. No uses of City supplied water for washing vehicles, except for commercial carwashes using a system to recirculate and reuse water.

C. For parks supplied by City water, the Parks Department shall limit nonessential water use and/or irrigate only during off-peak hours as specified by the Director.

D. Hydrant and water main flushing shall be done to insure water quality and for other emergencies only.

E. All fire districts using City water shall be notified of the Stage Two Alert and requested to refrain from any training activities using City water.

Stage Three Alert (Critical Water Supply Shortage). Stage Three is activated when the Public Works Director determines that there is a critical water supply shortage that threatens the ability of the City to deliver essential water supplies to its customers. The Stage Three Alert will be made when the City is using water at a rate that equals 95% of the well production capacity. In the event a problem is local, the City will distribute information directly to affected customers. The Director shall immediately notify the City Manager and the Council of the situation and submit a report at the next available meeting of the Council. All media shall be notified of the situation and updated regularly on the water supply status. Under Stage Three, the Director has the authority to activate the mandatory restrictions and other measures listed below:

A. All Stage One curtailment measures shall be implemented as appropriate according to the Director.

B. Upon declaration of a Stage Three critical water supply shortage by the Director, the following mandatory restrictions on use of City supplied water will be implemented:

1. No watering and irrigating of lawns, grass, or turf shall occur.

2. No use of water shall be allowed to fill swimming pools or other pools with a capacity in excess of 100 gallons.

3. No use of water shall be allowed to wash sidewalks, walkways, streets, driveways, parking lots, or other hard surfaced areas except where approved by the Director as necessary for public health and safety.

4. No use · of water shall be allowed to wash vehicles, including all commercial carwashes.

5. Hydrant and water main flushing shall be done to insure water quality and for other emergencies only.

6. No City supplied water shall be used for fire district training activities.

C. Water waste prohibitions set forth in this Section will be strictly enforced. Violators may be cited pursuant to the Civil Infraction Ordinance (Ordinance No. 86-063) and water service may be interrupted for repeat violations as set forth herein.

1. It is unlawful to use or allow the use of City water in contravention of the prohibitions set forth in Section 5(B) of this Ordinance. Violators may be cited pursuant to the Civil Infraction Ordinance (Ordinance No. 86-063).

2. It is unlawful to allow waste of City water by knowingly or negligently causing, authorizing or permitting such water to escape from its intended beneficial use into any river, creek, natural watercourse, depression, lake, reservoir, storm sewer, street, highway, road, or ditch. For the purpose of this Section, "waste" means the use of water in excess of the reasonable volume necessary to meet the beneficial use. Violators may be cited under the Civil Infraction Ordinance (Ordinance No. 86- 063).

3. In the event that a citation is issued during the period of activated emergency measures for a violation of the Ordinance, and the Director determines that a second violation has occurred after the date of the citation and during the same emergency curtailment period, the Director may terminate water service.

Chapter Five: Future Municipal Source

Requirements for Future Source Requirements

Presently, the city's sources are capable of a combined safe yield of 13,115 GPM at 65 psi operating pressure; and 13,950 GPM at 55 psi operating pressure. Based on data the water system can safely accommodate the current (2018) and future (2032) maximum day demands, therefore, additional source capacity will not be needed for future demands.

Peak Hour or Simultaneous Maximum Day and Fire Flow Demands

Due to the unique nature of the Keizer water system, high water demands, such as peak hour or maximum day with a coincidental large fire, must be accommodated from a combination of sources (wells) along with the above ground water storage and booster pumping. Although these demands are typically much shorter in duration than the maximum day demands, the increase in required capacity is usually significant and often instantaneous in nature. The Keizer water system, until 1998 1999, historically supplied water during all high demand events using source supplies only. In 1999, a new 1.5 million gallon reservoir and pump station was constructed on Ridge Drive to assist in providing water for primarily peak hour demands. In addition, a new well, along with a second (750,000 gallon) water storage reservoir and 1,800 GPM booster pump station was constructed at Bair Park in 2004-05 to help provide peak demands, primarily in the northern zone. In 2008 a 550,000 gallon elevated storage tank was constructed within the Keizer Station development for fire flow demands.

The logic for the continued and expanded use of this concept is based on several reasons:

1. Use of storage/booster pumping allows optimum site selection and the use of pumps with higher flow rates (>2000 GPM) than can be safely realized from individual wells in most areas of Keizer. This type of facility typically has a lower or equal cost per delivered gallon than comparable well/pump facilities.

2. Use of storage/booster pumping assists in preventing over-pumping and stressing of the primary aquifers. This concept also lessens the risk of contaminant draw to a well due to the lower pumping rate and resulting area of influence.

3. The Willamette silts and Troutdale aquifers, as all aquifers, have a finite capacity and high capacity withdrawal increases the likelihood of well to well interference, increased pumping lifts, and higher operating costs. Additionally, sand pumping is less likely when pumping wells at lower capacity.

4. Generally speaking, reliability is higher and maintenance costs are lower with booster pumping than equivalent high capacity wells.

5. Incorporation of emergency stand-by equipment is generally lower in cost and higher in reliability.

6. Above-ground reservoirs provide a small measure of gravity storage, when properly located, which will provide limited water to the system during power or equipment failures for a short time allowing time needed to engage back-up equipment.

Table 5-1
Total System Capacity*

	2019	2020	2025	2032	2039
Total Available System Capacity (w/ EST Contribution)	20,600 GPM	20,600 GPM	22,600 GPM	22,600 GPM	22,600 GPM
Highest Required System Capacity (Peak Hour on Max Day)	18,680 GPM	19,000 GPM	20,100 GPM	21,700 GPM	22,600 GPM
Deficit (-), Surplus (+)	+1,920 GPM	+1,600 GPM	+2,500 GPM	+900 GPM	+0 GPM

*Information obtained from City of Keizer 2019 water usage and projected for years 2020-2039 based on population projections and Keizer Station build out

The capacity needed in Year 2039 to meet the demand projected within the City of Keizer UGB is 22,600 GPM. This amount leaves no reserve in the Year 2039 based on using the 2019 water usage, operating the system with all existing 15 city wells running at full capacity including both Reitz and Ridge wells at full operation, population projections for Year 2039, and the proposed 20 year buildout within the Keizer Station area. Total available system capacity in Years 2019-2039 were calculated using full use of water rights and production capacity from both the Reitz well (Permit G-15369) and the Ridge well (Permit G-13784) with the full water right amount of 2.23 CFS from each source.

Table 5-2
Projected Water Demands: 2019-2039*

	2019	2020	2025	2032	2039
Design Population	38,505	40,280	43,350	48,082	52,814
Average Daily Demand	3,694,487 GPD (2,566 GPM)	4,430,800 GPD (3,077 GPM)	4,768,500 GPD (3,311 GPM)	5,289,020 GPD (3,673 GPM)	5,809,540 GPD (4,034 GPM)
Average Winter Demand	2,518,117 GPD (1,749 GPM)	3,101,560 GPD (2,154 GPM)	3,337,950 GPD (2,318 GPM)	3,702,314 GPD (2,571 GPM)	4,066,678 GPD (2,824 GPM)
Average Summer Demand	6,249,280 GPD (4,340 GPM)	6,646,200 GPD (4,615 GPM)	7,152,750 GPD (4,967 GPM)	7,933,530 GPD (5,509 GPM)	8,714,310 GPD (6,051 GPM)
Maximum (Peak) Daily Demand	9,848,438 GPD (6,840 GPM)	10,070,000 GPD (6,993 GPM)	10,837,500 GPD (7,526 GPM)	12,020,500 GPD (8,348 GPM)	13,203,500 GPD (9,169 GPM)
Peak Hour on Max Day	18,680 GPM	19,000 GPM	20,100 GPM	21,700 GPM	22,600 GPM

*Information obtained from City of Keizer 2019 water usage and projected for years 2020-2039 based on population projections and Keizer Station build out

Emergency Water Supply

The City of Keizer water system is quite unique for a city with a population of over 35,000 in that all water has historically been delivered to customers on-demand directly from wells. Since 1980, the city has successfully relied solely on electrically or engine driven well pumps for all water demands. Generally, a water system of this size depends on some degree of gravity (elevated) water storage to supply uninterrupted water service to all customers, regardless of the status of electrical service. The addition of the 550,000 gallon (.55 million gallon) Elevated Storage Tank (EST) in 2008 at Keizer Station, although primarily designed for fire protection within Keizer Station, nonetheless, offers a direct benefit to the entire Keizer Water system.

This volume of storage, although a minor amount compared to the average day demand, can provide up to 3,000 GPM of instantaneous flow into the water system, giving the standby pumping equipment and generators the needed time to start and engage, thus, preventing a serious loss of water system pressure within the distribution system. To be able to provide this flow both Reitz and Ridge wells need to be operating at full capacity to refill the reservoirs in a timely manner during high water events or when fire flows are required. Although Keizer's water system has provided excellent and uninterrupted water supply since its 1980 inception, the current size, concern over future electrical utilities generation, transmission, and distribution capacity and reliability, and complexity and size of the city's water system necessitates additional consideration of potential emergencies.

There are various reasons the city's water system has been extremely reliable over the years. Among these are:

1. The city is served by two separate electrical utilities (Salem Electric and Portland General Electric) which individually supply electrical service as follows:

Pump Station	Electrical Service Provider
Carlhaven West	PGE
Carlhaven East	PGE
Willamette Manor	Salem Electric
Cherry Ave	Salem Electric
Wiessner	PGE
Delta	PGE
McNary	PGE
Chemawa	Engine Drive only
17th Ave	PGE
Meadows	PGE
Ridge Drive	PGE
City Hall	PGE
Lacey Ct	PGE
Reitz/Bair Park	PGE
Keizer Station	PGE

2. The water system is controlled by a computer based controller with active back-up. Local over-ride control is available at all pump stations in the event of control failure.

3. The city performs an excellent program of maintenance.

4. The water system utilizes reliable and durable mechanical and electrical components.

5. There has been sufficient redundancy and flow distribution between the existing sites

6. Water demands have been mostly residential in nature which are usually predictable and consistent

Table 5-3
Automatic Engine Drive Pumps (@55 psi)

Backup Type	Site #	Facility Name	Type of Equipment	Rated Capacity
Well	5	Cherry Ave	Engine backup to electrical	550 GPM
Well	7	Wiessner	Engine backup to electrical	1,400 GPM
Well	9	McNary	Engine backup to electrical (Will be converted in 2019)	1,300 GPM
Well	10	Chemawa	Engine Drive only	2,500 GPM
Well	14	Meadows	Engine back up to electrical	1,400 GPM
Booster Pump	15	Ridge Drive	Engine Drive only	2,300 GPM
Booster Pump	15	Ridge Drive	Standby generator for electrical pumps	2,200 GPM
Booster Pump	16	Reitz	Standby generator for electrical pumps	1,800 GPM

Total: 13,450 GPM

Future

Backup	Site #	Facility Name	Type of Equipment	Rated Capacity
Booster	TBD	TBD	Engine backup to electrical	2,000 GPM

Total: 15,450 GPM

Total Booster Pump Capacity: 6,300 GPM Total Well Capacity: 7,150 GPM

The present available capacity of automatic backup equipment is over 4,000 GPM more than the current maximum day demand of 6,400 GPM and 2,100 GPM more than the Year 2032 maximum day demand, even without any contribution from the EST. This positive difference of emergency/standby pumping capacity indicates the current system has adequate facilities and redundancy for present conditions. In the 2012 Water System Master Plan Capital Improvement Plan has an addition of a third reservoir/pump station that will provide the needed capacity for future growth.

Water Right Implications

To satisfy the proposed groundwater development schedule, the City will not need to obtain or secure additional water rights beyond those currently in place. The city currently holds valid permits for 37.15 CFS (16,641 GPM) for the current combined sources when they are at their maximum permitted capacity. All of these permits are for year-round use. Additionally, other water permits are planned to be modified or transferred to provide a better distribution between current sources. The current water rights for Reitz (Permit G-15369) and Ridge (Permit G-13784) will need to be at their full

permitted capacity to service the future peak demands in 2028 (10-year projection) as well as full buildout fire flow for Keizer Station. The 2039 (20 year projection) shows that the city will need these two permits at full capacity to meet normal day to day water usage. The City is making a greenlight water request for access to the remaining 0.45cfs of water under Permit G-13784 and 1.34cfs of water under Permit G-15369. The City's implemented conservation measures, interconnection with the City of Salem, and other identified conservation measures will not provide the additional water needed to meet future demands. The City would like to divert each at the maximum rate allowed under each permit of 2.23cfs. The monthly volume to be diverted will be 42 million gallons for Permit G-13784 and 42 million gallons for Permit G-15369. No mitigation actions are required under either permit.

Surface Water Development

According to information obtained from the Water Resources Department and the Willamette Basin Plan (Nov. 1994), surface water for municipal use is available from the Willamette River at Salem/Keizer. At this time, Keizer has no current or pending surface water rights applications, permits, or certificates. The amount of water available via water rights allocation from the Willamette River is far in excess of the projected water demands for Keizer through the study period. The cost associated with treatment, storage, and transmission of this source to the city, however, is felt to be economically excessive. Given the high cost of development and treatment of surface water, public resistance, the possible risk of contaminants due to local agricultural practices and upstream wastewater discharges, and the availability of adequate groundwater; development or use of any surface water source is not recommended at this time.

Future UGB Area Growth

Future UGB Area Growth is in the northern area of the City of Keizer. Over the next 20 years there is no expected development into the northern area (by 2033). Figure 5-1 shows the proposed pipeline, reservoir, booster pump, and well improvements that would be built to accommodate UGB growth. A copy of the 2010 UGB report for future development has been included in the Appendix of this report.

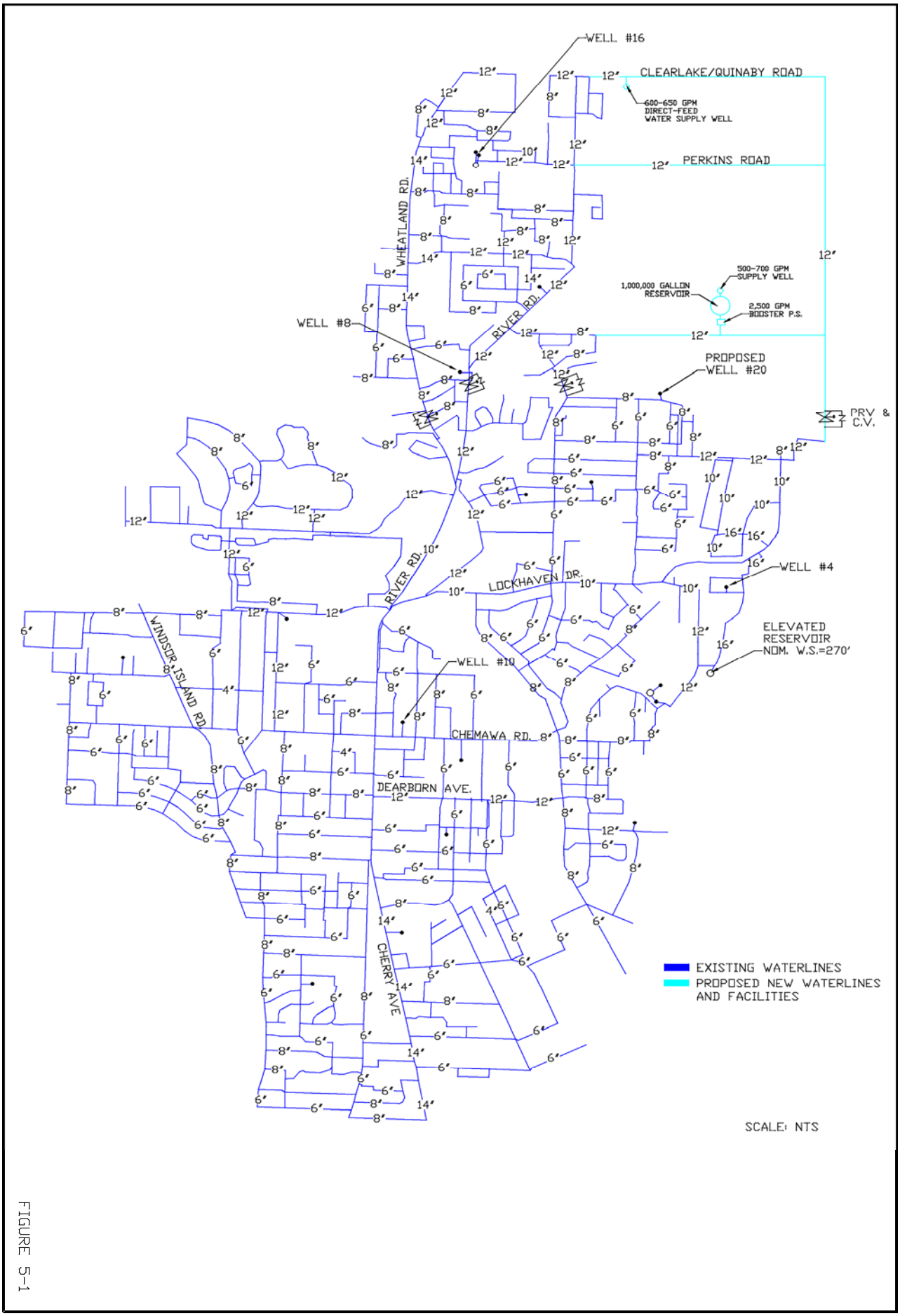

WELL #16
CLEARLAKE/QUINABY ROAD
600-650 GPM
DIRECT-FEED
WATER SUPPLY WELL
PERKINS ROAD
WHEATLAND RD.
500-700 GPM
SUPPLY WELL
1,000,000 GALLON
RESERVOIR
2,500 GPM
BOOSTER P.S.
WELL #8
RIVER RD.
PROPOSED
WELL #20
PRV &
C.V.
LOCKHAVEN DR.
WELL #4
ELEVATED
RESERVOIR
NOM. W.S.=270'
WINDSOR ISLAND RD.
WELL #10
CHEMAWA RD.
DEARBORN AVE.
CHERRY AVE
EXISTING WATERLINES
PROPOSED NEW WATERLINES
AND FACILITIES
SCALE: NTS

FIGURE 5-1