



November 13, 2024

Oregon Water Resources Department
Attn: *Kerri Cope, Tamera Smith*
Water Rights Services Division
725 Summer St. NE Ste A
Salem, Oregon 97301

RE: CITY OF COLUMBIA CITY: WATER MANAGEMENT & CONSERVATION PLAN UPDATE

Dear OWRD Staff,

Please find accompanying this letter a draft copy of the City of Columbia City's (City) updated Water Management and Conservation Plan (WMCP). As a condition of the Final Order approving their WMCP in 2014, an updated WMCP document was required to be submitted by June 2, 2023. A hard copy of this WMCP document was mailed to Columbia County (the only affected local government) for their records and for a 30-day comment period. This comment period ended on November 11, 2024, and no comments were received from Columbia County by either CwM or the City.

Please let us know if there are any issues with processing this submittal or questions regarding the information included therein. Thank you for your assistance.

Sincerely,

CwM H2O, L.L.C.

A handwritten signature in blue ink, appearing to read "RL2", is written over the typed name.

Robert Long, CWRE

Received
NOV 18 2024

OWRD



DRAFT



**City of Columbia City
Water Management and Conservation Plan – 5-Year Update**

Project No. 2417001
November 2024

PREPARED FOR:



The City of Columbia City

In Columbia County on the Columbia River

PO Box 189
1840 2nd St
Columbia City, OR 97018

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CwM-H2O

Complete Water Management



Executive Summary

Municipal Water Supplier Description

The City of Columbia City (City) is located on the west bank of the Columbia River approximately 25 miles north of the Portland Metro area in Columbia County, OR. The City operates a municipal water system that serves a population of approximately 2,000, which includes full-time residents, commercial and governmental offices, and seasonal vacation residents. The City appropriates its water supply from two groundwater wells under groundwater right Permit G-16438 for 1.11 CFS and an Application of Groundwater Registration GR-2515 for 0.22 CFS, as modified by Transfer T-10507. The City's water right portfolio allows for up to 1.33 cfs (597 gpm) of groundwater production. Additionally, the City maintains an Inter-Governmental Agreement (IGA) with the neighboring City of St. Helens for the purchase of up to 1 million cubic feet per month through an intertie between the two cities' water systems.

Water Conservation

The City's Water Management and Conservation Plan (WMCP) presents an assessment of its current water loss and a formal water conservation plan with updated 5-Year Benchmarks required for existing or expanded water supply. The City's 5-year (October 2019 to October 2023) non-revenue water (water loss) averages about 16%. The City's loss has decreased throughout the last 5 years, averaging 21% between October 2018 and March 2021, and 11% between April 2021 and September 2023. It is the City's goal to continue to improve leak detection, reduce leak response time, promote water conservation behaviors, and maintain a typical monthly and annual non-revenue water rate of less than 10%.

Water Curtailment

This WMCP presents a water curtailment strategy based on usage compared to the average daily demand and identifies triggers for action and target goals for each level of water curtailment actions. The City employs a four-phase curtailment plan to address a variety of identified infrastructure and environmental risks to the water system and supply.

Water Supply

The City's water supply relies on two groundwater wells and an intertie from the City of St. Helens. Current population trends, population projections, and development plans for the City show that 4-5% (0.22% annual) growth is expected over the next 20-25 years (PSU Population Research Center Population Forecast for Columbia County, 2024). This projected rate of growth by itself does not require the City to expand on its current water supply capacity to meet future demands. However, the City is interested in improving its water production reliability and source redundancy for supply security. Under current demands and operational conditions, the loss of a single source well or the St. Helens intertie during peak season would result in severe curtailment.

The City is evaluating multiple options to improve system reliability and redundancy, including adding a new source or combination of sources that can reliably produce up to 400 gpm under its current Groundwater Registration (GR-2515) and water right Permit G-16438. Multiple water sources in a variety of locations would provide the City with improved source reliability and sufficient supply to meet emergency needs in a scenario where a water source is lost.

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| WMCP Plan Elements | | | |
|-----------------------------------|---|--------------------|-----------------------------|
| X | Plan organization / data sources | | 1.2 & 1.3, Tab. 1.1 |
| X | Notice to affected local government(s) | 690-086-0125(5) | 1.4 |
| X | Proposed WMCP update schedule | 690-086-0125(6) | 1.5 |
| X | Additional time to implement conservation benchmarks | 690-086-0125(7) | 1.6 |
| Water Supplier Description | | | |
| X | Description of supplier's source(s) | 690-086-0140(1) | 2.1 |
| X | Map/Delineation of current service area | 690-086-0140(2) | 2.2, Fig 2.1 |
| X | Assessment of adequacy and reliability of existing supplies | 690-086-0140(3) | 2.3 |
| X | Records of water use - Terminology | | 2.4, Fig 2.2 |
| X | Present and historic water use | 690-086-0140(4) | 2.5, Fig 2.3 & 2.4, Ex 1 |
| X | Water right inventory table | 690-086-0140(5) | 2.6, Tab 2.1 |
| X | Customers served and water use summary | 690-086-0140(6) | 2.7, Tab 2.2 & 2.3 |
| X | Interconnections with other systems | 690-086-0140(7) | 2.8 |
| X | System schematic | 690-086-0140(8) | 2.9, Fig 2.1, Tab 2.4 - 2.6 |
| X | Quantification of system leakage | 690-086-0140(9) | 2.10, Fig 2.4 |
| Water Conservation Element | | | |
| X | Progress report on implementation of conservation measures | 690-086-0150(1) | 3.1 |
| X | Water use measurement and reporting program | 690-086-0150(2) | 3.2 |
| X | Currently implemented conservation measures | 690-086-0150(3) | 3.3 |
| X | Annual water audit | 690-086-0150(4)(a) | 3.4 & Tab 3.1, Ex 2 |
| X | Full metering of system | 690-086-0150(4)(b) | 3.4.1 & Tab 3.2 |
| X | Meter testing and maintenance program | 690-086-0150(4)(c) | 3.4.2 |
| X | Rate structure | 690-086-0150(4)(d) | 3.4.3 & Tab 3.4 |
| X | Measures for systems with more than 10% loss | 690-086-0150(4)(e) | 3.4.4 |
| X | Public education program | 690-086-0150(4)(f) | 3.4.5 |
| X | Water Right Extension and Environmental Resource Issues | 690-086-0150(5) | 3.5 |
| X | Technical and financial assistance programs | 690-086-0150(5)(a) | |
| X | Retrofit/replacement of inefficient fixtures | 690-086-0150(5)(b) | |
| X | Rate structure & billing practices to encourage conservation | 690-086-0150(5)(c) | |
| X | Reuse, recycling, and non-potable opportunities | 690-086-0150(5)(d) | |
| X | Other proposed conservation measures | 690-086-0150(5)(e) | |
| Water Curtailment Element | | | |
| X | Introduction | | 4.1 |
| X | History of system curtailment episodes | 690-086-0160(1) | 4.1 |
| X | Stages of curtailment | 690-086-0160(2) | 4.3, Tab 4.2a-d |
| X | Triggers for each stage of alert | 690-086-0160(3) | 4.3, Tab 4.2a-d |
| X | Authority and enforcement | 690-086-0160(4) | 4.4, Tab 4.3 |
| Water Supply Element | | | |
| X | Current/future service area and population projections | 690-086-0170(1) | 5.1 & Tab 5.1 |
| X | Schedule to fully exercise each permit (i.e., certification) | 690-086-0170(2) | 5.2 & Tab 5.2 |
| X | Water demand forecast | 690-086-0170(3) | 5.3, Tab 5.3 & 5.4 |
| X | Comparison of projected need to available sources | 690-086-0170(4) | 5.4 & Fig 5.1 |
| X | Analysis of alternative sources / Extended permits | 690-086-0170(5) | 5.5 |
| X | Conservation measure schedule and cost effectiveness | 690-086-0170(5)(a) | 5.5 |
| X | Justification that selected source is most feasible/appropriate | 690-086-0170(5)(b) | |
| X | Mitigation requirements | 690-086-0170(5)(c) | |
| X | Maximum rate and monthly volume by source | 690-086-0170(6) | 5.6 & Tab 5.5 |
| X | Mitigation actions under state and federal laws | 690-086-0170(7) | 5.7 |
| New Water Right Request | | | |
| X | Conservation Measures | 690-086-0170(8)(a) | 5.8 |
| X | Interconnections | 690-086-0170(8)(b) | |
| X | Other Potential Conservation Measures | 690-086-0170(8)(c) | |
| X | Request for Greenlight Water Under Extended Permit | 690-086-0130(7) | |

1 Introduction

CwM-H2O, LLC (CwM) prepared this Water Management and Conservation Plan (WMCP) 5-year Update on behalf of the City of Columbia City (City), Columbia County, Oregon. The City's first WMCP was submitted in December 2013 and approved in January 2014 with the condition of a progress report submitted after 5 years, on or before **January 2, 2019**. The progress report was submitted on October 30, 2018. Additionally, the City was to submit an updated WMCP to OWRD by June 2, 2023. This Plan is intended to satisfy this second condition of the WMCP Final Order (FO).

The City maintains a public water utility servicing the City of Columbia City in Columbia County, OR. It is a water supplier with authority to serve and operate from the Oregon Health Authority (OHA) as system OR41-00203.

Water rates described in this Plan use units of flow rate common to municipal planning. These are defined here for the reader and include:

- Gallons Per Minute (gpm), a rate of water measurement.
- Cubic Feet Per Second (cfs), a rate which is equal to 448.83 gpm, and:
- Million Gallons Per Day (MGD), a rate which is equal to approximately 694.44 gpm.

Historically, the City could not meet peak demands during the summer due to poor water quality from wells described on the now-cancelled Permit G-13937. To maintain adequate levels of service, the City entered an agreement with the City of St. Helens in 1982 for the purchase of up to 1 million cubic feet (7,480,520 gallons) of water each month. Between 2019 and 2023, the City used an average of 484,000 gallons per month through this intertie, or about 9.7% of average monthly production. The City also applied for an additional groundwater permit in 2007 (G-16438), which allows for additional diversion from the City's two wells. Permit G-16438's completion date is October 1, 2027.

The most recent population growth estimates (PSU, 2024) show that the City can expect annual growth of 0.22% over the next 10 to 20 years. Since the 2013 WMCP, the City has annexed 6.77 acres of residential-zoned land. However, the City has provided water service to that area for over a decade, so the annexation did not change the City's total service area. To estimate population growth in the future, this report utilizes population projections from Portland State University (PSU, 2024). The population is projected to grow a total of 5.2% by 2050 relative to the current population.

1.1 Purpose of the Plan

The purpose of this plan is to demonstrate compliance with the requirements of Oregon Administrative Rules (OAR) adopted by the Oregon Water Resources Commission in November 2002 (OAR Chapter 690, Division 86). This WMCP documents the current status of the City's water supply, assesses the current reliability of the water sources, estimates the future water supply needs of this municipal water supply provider, and requests the approval of "green light" water for the development of a redundant and reliable groundwater source under Permit G-16438. These assessments are presented with benchmark activities to demonstrate improvement of water conservation practices critical to a sustainable and reliable water supply for the City's water customers.

Assuming approval of this Plan by OWRD, the City will continue to develop its existing permit to the extent that groundwater conditions and permit conditions allow, with the goal of providing adequate and

reliable supply, as well as supply redundancy, to support the growth projected within the City urban growth boundary (UGB).

1.2 Plan Organization

This Plan is organized in a manner consistent with OAR 690-086-0125.

| Table 1.1 Plan Organization | | |
|---------------------------------------|------------------|---|
| Section | Requirement | Description |
| Section 1: Introduction | OAR 690-086-0125 | |
| Section 2: Water Supplier Description | OAR 690-086-0140 | Describes the water supply system, including key demographic information, water consumption, conveyance and distribution system, treatment, and storage facilities. |
| Section 3: Water Conservation | OAR 690-086-0150 | Identifies conservation measures the City has implemented and proposes new measures with associated benchmarks for each new measure. |
| Section 4: Curtailment | OAR 690-086-0160 | Describes the triggers and actions for curtailing water use in the event of a water supply shortage. |
| Section 5: Water Supply | OAR 690-086-0170 | Assesses the 10- and 20-year water demands and presents a plan for developing the City's remaining water rights. |

1.3 Data Sources

This document presents information collected by the City, the City's Engineer, and Kennedy-Jenks Consultants (KJ) and evaluated by CwM. The information includes data from City staff interviews conducted between January and July 2024 as well as production data recorded and provided by the City through September 2023, publicly available population growth rate estimates, public and private geologic, hydrogeologic, slope-stability information, and information collected during a site visit by CwM on May 30, 2024.

1.4 Affected Local Government

OAR 690-086-0125(5)

The local government entity is Columbia County. A copy of this draft WMCP Update was submitted to Columbia County along with a request for comments related to consistency with the Columbia County's comprehensive land use plan on October 10, 2024. CwM did not receive any comments from the County within the 30-day period after submission. Columbia County Land Use, Planning, and Zoning address:

Columbia County
 Planning
 445 Port Ave
 St. Helens, OR 97051

1.5 Plan Update Schedule

OAR 690-086-0125(6)

This WMCP update was due by June 2, 2023, as a 10-year update of the City's first WMCP report approved in 2014. The City proposes completing a 5-year benchmark update within five years of the approval of this 2024 update, or by **June 2, 2029**.

The schedule for proposed benchmark progress reports is as follows:

- **Annual Water Audit:** Assessing monthly and annual production by source and identifying the source of monthly variability of water loss estimates, with a goal of reducing overall system losses to 10% or below. Progress Report due **June 2, 2029**.
- **Customer Meter Repair and Recalibration:** A summary of the success and reliability of the smart meters installed at approximately 75% customer connections as of 2024, and a description of meter repairs and leak responses, Progress Report due **June 2, 2029**.
- **Leak Detection Program:** A review of annual water loss estimates and the success of efforts to reduce non-revenue water, variability in monthly estimates, and response time to detected leaks. While loss remains above 10%, the City will conduct a leak detection survey once every 5 years. Progress Report due **June 2, 2029**.

1.6 Request for Additional Time for Metering or Benchmarks

OAR 690-086-0125(7)

The City is not requesting additional time to meet the 5-year benchmarks set in the 2014 WMCP. All benchmarks (listed in Section 1.5) have been addressed. Original and updated benchmarks are further discussed in Section 3 – Water Curtailment Element. The proposed benchmarks in Section 1.5 are aimed at the continued improvement of water production and usage records, reducing uncertainty in water loss estimates, and further eliminating non-revenue water.

2 Water Supplier Description

OAR 690-086-0140

The Water Supplier Description Element for a Municipal WMCP outlines the City's water sources, service area, and existing water rights. It also considers the adequacy and reliability of the City's existing water system. This section provides a description of the City's customers, their water use patterns, the water distribution system, the status of interconnections with other water providers, and an estimate of potential system leakage and non-revenue water.

Population growth and water demand projections suggest that the City will not need additional water rights to meet 20-year demands (see Section 5 for detailed future demand information). However, the City does hope to improve water supply reliability and redundancy, especially to support peak-season demands and limit risk of curtailment due to natural disasters, infrastructure failures, or other emergencies. The City also hopes to reduce their reliance on their intertie with neighboring St. Helens by developing a second reliable source. These improvements will occur under the City's current water rights portfolio.

2.1 Water Sources

OAR 690-086-0140(1)

The City sources drinking water from two groundwater wells and from an intertie with the City of St. Helens water system. The City's municipal groundwater wells, wells PW-1 and PW-2 are located within the City limits on a property owned by the City. The City receives water on an as-needed basis from the intertie with the City of St. Helens. Figure 2.1 – Water System Schematic identifies each water supply well location.

- **Wells PW-11 and PW-2** – Permit G-16438 has two points of appropriation that are approximately 100 ft apart: PW-1 (COLU-53313 built in 2006) and PW-2 (COLU-53400 built in 2007). PW-1 and 2 both draw from an unconfined aquifer at a depth of approximately 80-140 ft. This aquifer is considered by OWRD to be in hydraulic continuity with the nearby Columbia River. The aquifer is composed of brown fine-medium sands and coarse, multicolored gravels. The base of the aquifer is marked by a transition to gray sandstone. All groundwater from PW-1 and 2 is treated at the City's water treatment facility located on the same property. Currently, the City operates PW-2 as its primary production well, with PW-1 serving as a backup. When run simultaneously, the two wells cause groundwater interference and reduce each other's capacity significantly. Well PW-2 was reconditioned in July 2011, resulting in a maximum capacity of about 200 gpm. Since then, the City has reported that biological fouling has continued to be a maintenance issues that has decreased the capacity of PW-2.
- **Inter-Governmental Agreement** – The City has an IGA with the City of St. Helens for the purchase of up to 1 million cubic feet of potable water per month. This agreement was formalized in 1982 after the City continued to struggle with performance issues at its existing wells. Rising prices of purchased water have encouraged the City to search for alternatives to this agreement. Despite this, water from St. Helens has made up a significant portion (9.7% of the average monthly demand from 2019-2023 and 25% of the average monthly demand during peak months of Jun-Aug) of the City's supply over the last five years.

2.2 Map of Current Service Area

OAR 690-086-0140(2)

The City's service area lies between St. Helens and McBride Creek along Highway 30 on the west bank of the Columbia River (Figure 2.1 – Columbia City Water System Schematic). The service area is comprised of the City of Columbia City and residents of the City's UGB. The service area is made up of a mix of year-round residences, commercial buildings, and industrial sites. The City estimates its current service population is approximately 2,000 people. Of the people served, approximately 65 are located outside the City UGB.

2.3 Adequacy and Reliability of Existing Supplies

OAR 690-086-0140 (3)

Water supply adequacy describes how the physical (pumping, transmission, etc.) and legal capacity (water rights limitations) relate to the water demands on the system. An adequate supply means that there is more than enough water available at the source and legally obtainable through water rights to meet average and peak demands on the system. Supply reliability describes the consistency to which that supply is present at its full amount and the degree to which the supply is susceptible to risks.

The City cannot meet its annual peak demand with its current water sources (PW-1 and 2). As a customer of the City of St. Helens (St. Helens) via the intertie between the two water systems, the City can provide an adequate and reliable supply. Changes to the City's metering and water tracking methods, distribution system, and to customer metering have reduced losses in the system. These efforts have decreased the system stresses that were once commonplace for the City in the peak-demand months. However, the City still has a need to develop replacement and redundant supply capacity to support peak demands to replace aging and inadequate groundwater wells and in case of an emergency when the St. Helens intertie may not be available.

2.3.1 Adequacy of Existing Supply

2.3.1.1 Water Supply

The amount of water available under the City's current water rights portfolio is adequate to meet peak demands. The City's water right portfolio (Table 2.1) includes up to 1.33 cfs (597 gpm). The City has additional capacity through its intertie with St. Helens. The full use of the water rights associated with each of the City's two wells and the IGA is limited by multiple factors, including:

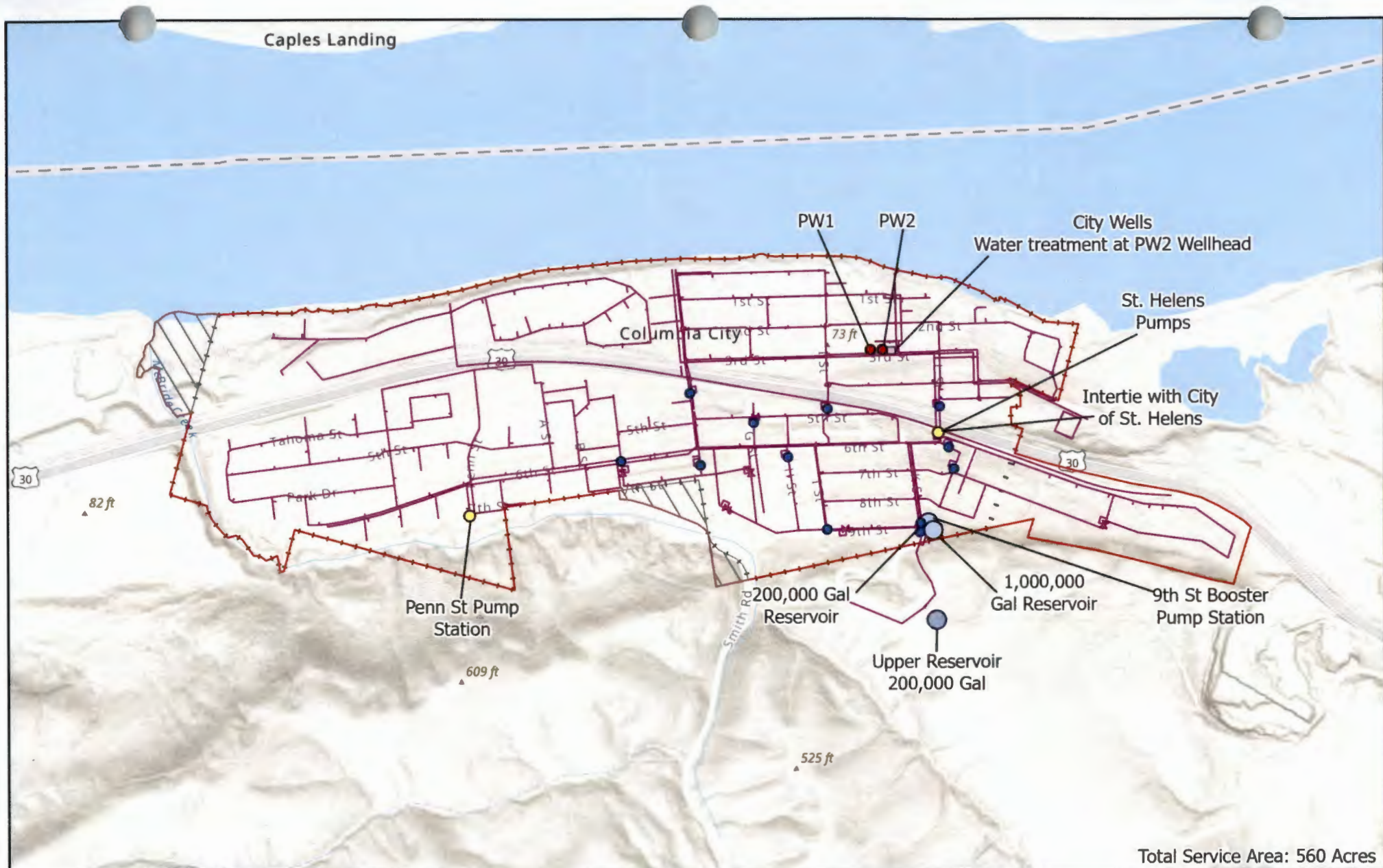
- Pumping capacity of the PW-1 and PW-2 wells,
- Pumping interference between PW-1 and PW-2 wells,
- Underperformance of PW-2 due to biofouling, other complications,
- The desire to maintain optimum water quality delivery to the water distribution system,
- The elevated cost of purchasing water through the IGA with St. Helens.

The City estimates the maximum instantaneous rate for both wells operating simultaneously to be about 140 gpm. The City reports that PW-2 has functioned as the primary groundwater source for approximately the past 15 years. The intertie with St. Helens is a secondary source, and the PW-1 well serves as an emergency backup supply.

The IGA with St. Helens allows for the purchase of up to 1 million cubic feet of water monthly (7.5 million gallons). The City limits the use of this option due to the rising cost of purchased water, though it was regularly used in the 5-year reporting period of this Plan. The City currently uses a small portion of the total IGA allotment. Recent maximum use totaled approximately 64,700 cubic feet or 484,000 gallons per month on average.

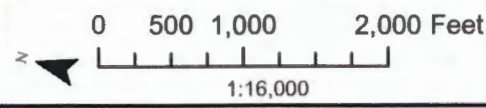
2.3.1.2 Water Storage

The City currently has three water storage tanks: two on Ninth and "K" Streets (0.2 MG steel and 1.0 MG concrete reservoirs) and one on Miloris Way (0.2 MG steel reservoir). The steel reservoirs recently received seismic retrofits. Based on the City's current average day demand (ADD) of 160,811, water storage in the system is currently sufficient for storing 8-9 days worth of water for the City.



Total Service Area: 560 Acres

Figure 2.1
Columbia City Water
Distribution System Schematic



- Pressure Reducing Vaults
- Pumps
- Reservoirs
- Existing Water Lines
- ▭ Columbia City UGB
- - - Columbia City Boundary
- ▨ Areas of UGB Not Served by City Water
- ▭ City Water Treatment Plant

| 1 | DATE | AUTH | DRAFT |
|-----|------|------|-----------|
| | | | |
| No. | Date | By | Revisions |

Proj#: 2317001
Columbia City WMCP
City of Columbia City
PO Box 189
Columbia City, OR, 97018

CwM-H2O
Complete Water Management



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(503) 954-1326

2.3.2 Reliability of Existing Supply

The City reports that underperformance of PW-2, their primary groundwater source has required additional maintenance procedures and remains diminished in its initial capacity. Over the years, the City has lowered the pump and removed biofouling in the well, though these efforts were insufficient to allow it to reach its original design capacity of 400 gpm. The most recent attempt to improve the well's performance in 2011 resulted in an improved maximum capacity of 200 gpm, though the City reports that the capacity has decreased to about 140 gpm in 2024.

The City's other well, PW-1, has a design capacity of 40 gpm, though is estimated to only provide an additional 15 gpm to the City's total capacity when both wells are run simultaneously. PW-1 serves as a backup to PW-2, and is connected to the City's water treatment and distribution systems.

The City's IGA with St. Helens serves as its third source. This intertie reliably provides up to 1,000,000 cubic feet of water per month. The City makes efforts not to use this water due to its expense relative to water produced by its own wells.

The 2019-2023 average consumption rate was 0.161 MGD, equivalent to about 112 gpm. The PW-2 well can currently produce water to match that rate. However, during peak use periods, the City is still reliant on water purchased from St. Helens and water stored in its reservoirs to meet maximum daily demands (MDD).

Ultimately, the City's goal is to obtain a new water source capable of reliably providing 400 gpm such that the City can provide its own redundancy and reduce their dependence on purchased water.

2.3.3 Water Supply Redundancy

The City's system is vulnerable to the loss of one of its sources. Currently, PW-2 serves as the primary production well, with PW-1 serving as its backup. PW-1 has a design capacity of only 40 gpm, which is not sufficient to fully replace PW-2. PW-2 has biofouling problems that limit its productivity. Improvements to PW-2 in 2011 increased its capacity to approximately 200 gpm, though it continues to struggle with biofouling and unreliable river levels that negatively affect its performance. In the summer of 2023, the PW-2's performance had already decreased to 140 gpm. The City would be required to rely more heavily on its IGA with St. Helens if PW-2 fails because PW-1 does not have sufficient capacity to fully replace it.

The City does not have sufficient redundancy built into its water system. The loss of Well PW-2 would represent a loss of 60-70% of the City's total groundwater production capacity, with PW-1 only able to produce approximately a third of the rate of PW-2. In this scenario, the City would be forced to rely heavily on water stored in its reservoirs (short-term) and purchased from St. Helens. This would incur a significant cost. The City hopes to develop an additional point of appropriation capable of producing approximately 400 gpm under their currently held water rights. With this, the City would gain significant redundancy should a well fail during peak use.

| Date (b) | Transfer | Certificate (5)(a) | Well Name Well Log (Source) (5)(c) | Type of Use (5)(d) | Maximum Allowed Instantane ous Rate (CFS) (5)(e) | Maximum Instantaneous Rate Diverted to Date (CFS) (5)(f) | Maximum Annual Use to Date Million Gallons (MG) (5)(f) | 2023 Average Daily Diversion (Gallons) (5)(g) | 2023 Average Monthly Diversion (MG) (5)(g) | 2019-2023 Average Daily Diversion (Gallons) (5)(g) | 2019-2023 Average Monthly Diversion (MG) (5)(g) | Co |
|-------------|----------|-----------------------|--|--------------------------|---|--|---|--|---|---|--|--------------------------|
| 2007 | - | - | Well PW-1 (COLU 53313) Well PW-2 (COLU 53400) | Muni. | 1.11 | 0.45 ¹ | 7.25 ¹ (2014) | 2,447 ¹ | 0.08 ¹ | 4,451 ¹ | 0.33 ¹ | 10 |
| 939 | T-10507 | - | Well PW-1 (COLU 53313) Well PW-2 (COLU 53400) | Muni. | 0.22 | 0.22 | 51.9 | 142,186 | 4.32 | 142,186 | 4.32 | Cor dat or adju |

for each well shared by G-16438 and GR-3873. Volumes reported for G-16438 represent remaining volume or rate after maximum allowable quantities were reached for GR-3873 additional water right (G-13937), which was cancelled in 2014.

2.4 Water Use Records

OAR 690-086-0140(4) and OAR 690-086-0140(5)(a-h)

This section begins by defining the terminology commonly used in discussions of recorded water use, followed by descriptions of system and monthly demands, peaking factor, and per capita demands.

2.4.1 Terminology

Production is the total amount of water diverted from the source. Finished water refers to the quantity of water delivered to the distribution system after treatment. The City measures output from both the PW-1 and PW-2 wells and the intertie with St. Helens, which is production. Production may be divided into two broad categories; water that provides revenue to the utility, and water that does not provide revenue (non-revenue water).

Revenue water consists of all billed, metered water consumption, and any billed unmetered consumption, such as water that is sold in bulk for construction but is not measured. Some non-revenue water is to be expected, including authorized consumption as well as real and apparent water losses. Authorized consumption includes unbilled metered or unmetered consumption such as use for firefighting and hydrant flushing. Unauthorized consumption is considered a water loss. Water loss includes both apparent losses such as metering and water accounting inaccuracies and real losses such as through leaks, reservoir overflows, water theft, and evaporation. The City estimates water loss by subtracting the sum of all metered withdrawals from the City’s records of the total amount of pumped and purchased water. In 2024, the City was not aware of any significant specific points of loss (leaks).

This breakdown is shown in the International Water Association/American Water Works Association (IWA/AWWA) water audit schematic provided in Figure 2.2.

| | | | | |
|---|---------------------------------------|--|---|--------------------------|
| Water Sources | Authorized Consumption | Billed Authorized Consumption | Billed Metered Consumption (exported water - not applicable) | Revenue Water |
| | | | Billed Unmetered Consumption | |
| | | Unbilled Authorized Consumption | Unbilled Metered Consumption | Non-Revenue Water |
| | | | Unbilled Unmetered Consumption | |
| | Water Losses | Apparent Losses | Unauthorized Consumption | |
| | | | Customer Metering Inaccuracies | |
| | | | Systematic Data Handling Errors | |
| | | Real Losses | Leakage on Transmission and/or Distribution Mains | |
| Leakage and Overflows at Utility’s Storage Tanks | | | | |
| | Leakage on Service Connections | | | |

Figure 2.2 - International Water Association/American Water Works Association (IWA/AWWA) Water Audit Schematic.

Generally, demands and consumption in municipal systems are expressed in units of million gallons per day (MGD). They may also be expressed in cubic feet per second (cfs) or gallons per minute (gpm). One

MGD is equivalent to 1.55 cfs or approximately 694 gpm. For annual or monthly values, it is typical to refer to the total quantity of water in million gallons (MG). The following terms are used to describe specific values of system demands:

- **Average Day Demand (ADD):** the total annual demand divided by 365 days. Demand is based on total production, which includes all groundwater pumped from the City's wells.
- **Maximum Day Demand (MDD):** the highest system demand that occurs on any single day during a calendar year. It is also called the one-day MDD or peak day demand. The MDD is based on daily production data from all sources over the past five years.
- **Monthly Demand:** demand during a calendar month. This demand can be expressed as the total volume of water produced in a month, or as a daily demand value by dividing the total monthly volume by the number of days in the month.
- **Maximum Monthly Demand (MMD):** the highest monthly demand during a calendar year or study period.
- **Peak Season:** The City typically defines its peak season as the period from June through August, with May and September constituting the shoulder season.
- **Peaking Factors:** the ratios of one demand value to another. The most common and important peaking factor is the ratio of the MDD to the ADD, which is used in this report.
- **Gallons per Capita per Day (gpcpd):** the system demand divided by the population served. The per capita water use is a benchmark for water use efficiency. This ratio allows the City to compare its water use against other water systems. The City can use this ratio to assess how conservation programs and efforts on leak detection and repair are improving the efficiency of the water system.

2.5 Present and Historic Water Use

OAR 690-086-0140(4)

The City provided the last five years of water use data (2019-2023) for analysis to update their previous WMCP report. In the previous WMCP reporting period (2008-2012), average annual water non-revenue ranged from 10-17% and averaged 13.8%. based on the available data. In general, the 2019-2023 data suggests that the City's conveyance system continues to experience a loss of about 16% of produced water. However, between April 2021 and September 2023, improvements to operations, leak response, and public water conservation education have resulted in significant improvements to water loss, averaging 11% over that time.

A review of water production records between 2019 and 2023 suggests a historic Maximum Day Demand (MDD) of approximately 551,040 gallons on July 10, 2023. The City reported no significant operational issues that would account for the July 10, 2023 water use. The City's water use based on the 2019-2023 Average Day Demand (ADD) of 160,811 gallons was 80.4 gpd per capita. Over the last five years, the City has worked continuously to educate customers about the limitations of their water system and methods to reduce unnecessary water use during the peak season. These efforts, along with leak detection and repair programs and limited population growth, have resulted in only a minor increase in the per capita use compared to the 2008-2012 average (80.3 gpd per capita).

The previous WMCP did not directly report an average Peaking Factor for the 2008-2012 period. However, based on ADD and MDD values calculated for 2009-2012, the peaking factor is estimated at 2.7.

To better understand the current operational demands on the City’s system, this Plan presents Figure 2.3 – 2019-2023 Average Monthly Production by Well shows the monthly volume of water produced by each well during the year. The figure illustrates how each of the City’s sources are used to meet demands and how the peak summer season starts in late May and maintains high rates of water use until late September. Monthly production values are shown in Exhibits 1 and 2. Figure 2.3 demonstrates the City’s increased reliance on the St. Helens intertie during the summer months.

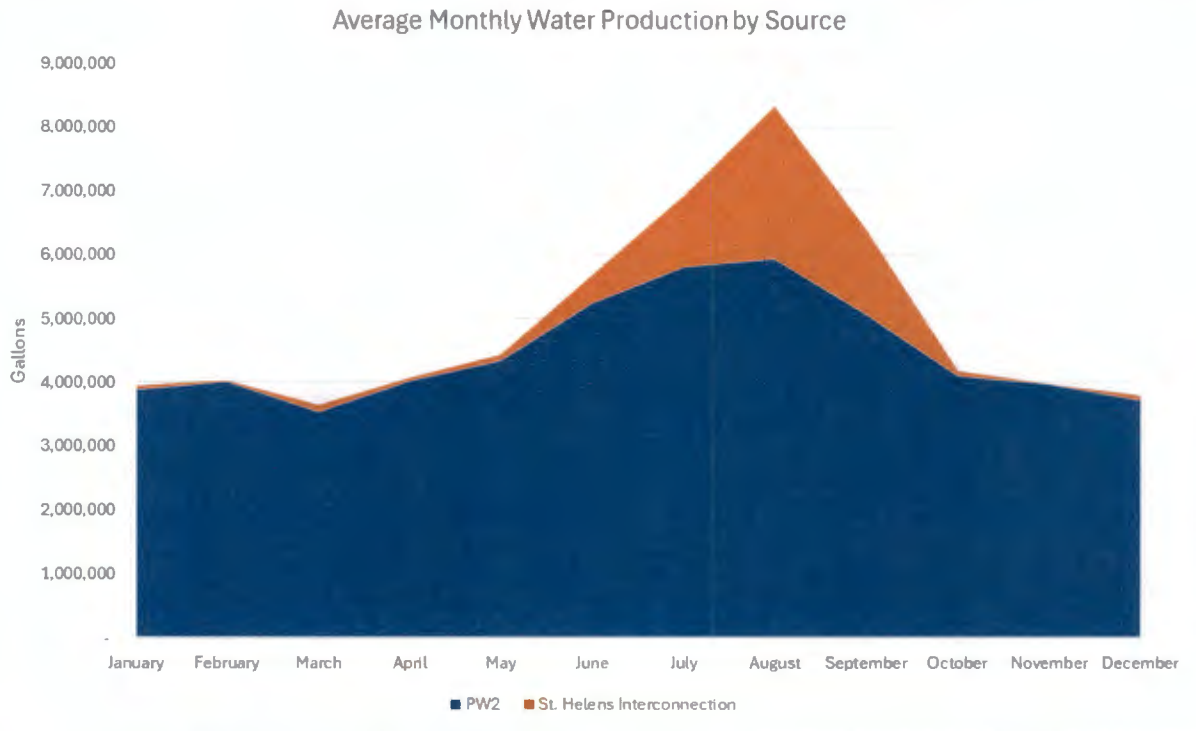


Figure 2.3 – 2019-2023 Average Monthly Production by Source

2.6 Inventory of Water Rights and Sources

OAR 690-086-140(5)

The City’s water rights and sources are presented in Table 2.1 – City Water Rights Inventory, which shows each water right and its associated wells (OAR 690-086-140(5)). Table 2.1 addresses the requirements of OAR 690-086-140 (5)(a-h).

2.6.1 Source Treatment

Both of the groundwater sources used for the City’s service area are currently in compliance with state and federal drinking water quality standards outlined under OAR 333-065.

PW Wells 1 and 2 are both treated with chlorine for disinfection and with sodium hydroxide for pH adjustment by a flow-paced injection system in the PW Well 2 well house. The contact time is sufficient to provide a 4-log viral inactivation. Contact and residence times are provided by the piping treated water from the well to the “K” Street reservoirs.

2.6.2 Environmental Resource Issues of Concern

ORAR 690-086-0140(5)(i)

ORAR 690-086-0140(5)(i) requires an analysis of Threatened and Endangered Species and of Critical Groundwater Areas associated with the water rights held by a water provider. In the City’s case, all water supply is sourced from groundwater or via interconnections with other water systems. Therefore, there are no threatened or endangered species within the City’s source waters. The City’s two production wells are not located in any of the state delineated groundwater limited or groundwater critical areas as defined by ORAR 690-519-000, which classifies groundwater limited and groundwater critical areas for the Columbia River Basin.

2.7 Customer Characteristics and Water Use Patterns

ORAR 690-086-140(6)

The City has historically tracked water users under the following designations: Residential, Commercial/Industrial, and Public/Institutional. The breakdown of water user types by percentage is presented in Table 2.2. A total of 18 customer connections have been added since the 2013 WMCP report. Of these, six were residential units. The total population within the City’s service area is estimated to have increased by about ten people since the previous WMCP report’s estimate of 1,990 people.

The City estimates the daily water use by customer category in Table 2.3.

| Connect type | 2019-2023 Count (Percent of total) | 2008-2012 Count (Percent of total) |
|--------------------------|---------------------------------------|---------------------------------------|
| 1. Residential | 836 (96.1%) | 830 (97.4%) |
| 2. Commercial/Industrial | 20 (2.3%) | 5 (0.6%) |
| 3. Public/Institutional | 14 (1.6%) | 17 (2.0%) |
| Total | 870 | 852 |

| Customer Type | Avg Monthly Use (CF) | Avg Daily Use (CF) | Avg Daily Use (gal) |
|-----------------------|----------------------|--------------------|---------------------|
| Residential | 521,514 | 17,155 | 128,328 |
| Commercial/Industrial | 30,018 | 987 | 7,387 |
| Public/Institutional* | 3,224 | 106 | 793 |

**This category is considered non-revenue water. The category includes all bulk City and Park water uses. (1 Cubic Foot = 7.48 Gallons).*

2.8 System Interconnections

ORAR 690-086-0140(7)

The City is a wholesale customer of St. Helens, Oregon and maintains a connection with the St. Helens water system under an IGA dated May 20, 1982. Under this agreement, the City may purchase up to 1

million cubic feet of water per month (7,480,500 gallons). The City maintains a metered intertie with the City of St. Helens Water System to track the use of purchased water.

2.9 Water System Schematic

OAR 690-086-0140 (8) and (OAR 690-086-0140 (2)

The major water distribution pipelines, wells, and storage systems are shown in Figure 2.1 - Water System Schematic. Currently, The City operates an intertie with the City of St. Helens also shown in Figure 2.1.

2.9.1 Transmission and Distribution

The drinking water transmission and distribution system is shown in Figure 2.1. Pipeline sizes and locations are listed in Table 2.4. The City maintains a system of approximately 72,346 feet of pipeline that range in diameter from 2- to 18-inches. Since the 2013 WMCP, a total of 5,122 ft of pipe has been added to the system. Of this new pipeline, 3,929 ft was 6-inch diameter PVC piping installed to replace existing 3-inch and 4-inch cast iron pipe.

| Table 2.4 – Pipe Sizes and Length | | | | | | |
|-----------------------------------|---------------|---------------|--------------|-----------------|------------|-----------------------|
| Pipe Diameter (inches) | Ductile Iron | PVC | Cast Iron | Galvanized Iron | PEX | Total – All Materials |
| Distribution (feet) | | | | | | |
| 2 | 0 | 1,036 | 0 | 0 | 563 | 1,599 |
| 3 | 0 | 491 | 0 | 0 | 0 | 491 |
| 4 | 1,024 | 6,487 | 0 | 0 | 0 | 14,050 |
| 6 | 1,406 | 22,748 | 1,399 | 0 | 0 | 22,304 |
| 8 | 455 | 13,344 | 0 | 0 | 0 | 16,054 |
| 10 | 771 | 12,387 | 0 | 0 | 0 | 13,158 |
| 12 | 2,898 | 139 | 0 | 0 | 0 | 3,037 |
| 16 | 3,378 | 0 | 0 | 0 | 0 | 3,378 |
| 18 | 150 | 0 | 0 | 0 | 0 | 150 |
| Total Distribution | 10,082 | 56,632 | 1,399 | 0 | 563 | 68,331 |
| Transmission (feet) | | | | | | |
| 6 | 0 | 1,290 | 0 | 0 | 0 | 1,290 |
| 8 | 0 | 2,380 | 0 | 0 | 0 | 2,380 |
| Total Transmission | 0 | 3,670 | 0 | 0 | 0 | 3,670 |
| Total System | 10,082 | 60,302 | 1,399 | 0 | 563 | 72,346 |

The pipeline replacement work was done as part of two major pipeline improvement projects in 2014 and 2019. The 2014 project focused on the abandonment of redundant 4-inch cast iron pipe on 6th street as well as the installation of PEX piping to replace old, galvanized iron pipe. The 2019 project saw the installation of over 4000 feet of 4- and 6-inch PVC pipe to replace old cast iron pipe. Both projects aimed to improve the City’s distribution system and reduce system losses. Additionally, in 2017, a new subdivision development added approximately 345 additional feet of 6 inch PVC pipe to the system.

2.9.2 Water Storage

The City has three above-ground storage reservoirs that have a total volume of 1.4 million gallons (see Table 2.1). The wells pump to the reservoir, then a booster pump directly feeds the water into the distribution system to maintain positive pressure across this pressure zone. As currently designed, the wells must feed the reservoir and associated pump station year-round to maintain positive pressure in this part of the system. Both steel reservoirs have recently been seismically retrofitted. The reservoirs are listed in Table 2.5, Storage Facilities and shown in Figure 2.1

| Facility | Construction Year | Pressure Zone Served | Storage Volume (MG) | Overflow Elevation (feet) |
|-------------------------------|-------------------|----------------------|---------------------|---------------------------|
| K Street Reservoir – Steel | 1979 | Lower and Middle | 0.2 | 310.35 |
| K Street Reservoir – Concrete | 2003 | Lower and Middle | 1.0 | 310.35 |
| Upper Reservoir – Steel | 1984 | Upper | 0.2 | 484.00 |

2.9.3 Pump Stations

The City uses two pump stations as shown on Figure 2.1. The K Street pump is located at the K Street reservoirs and serves to pump water from the K Street reservoirs to the upper reservoir. The L Street pump is located near the intersection of Highway 30 and L Street, and pumps water from the City of St. Helens source to the K Street Reservoirs. Table 2.6 lists the pumps and horsepower for each submersible well pump and motor.

| Pump station | Pump Capacity (gpm) | Pump Type | Pump Size (HP) | Manufacturer |
|---------------------|---------------------|-------------|----------------|--------------|
| PW-2 | 400 | Submersible | 30 | Franklin |
| St. Helens Intertie | 260 | Centrifugal | 7.5* | Aurora |
| L Street | 210 | Unknown | | |
| K Street | 80 | Centrifugal | 10* | Paco |

**Both the St. Helens Intertie and K Street Booster Station are served by two of the listed pumps*

2.10 Quantification of System Leakage

OAR 690-086-0140(9)

The previous WMCP reported annual water loss values ranging from 6% to 20%. Historically, the City has calculated water loss by calculating the total volume of water pumped from its wells and intertie with St. Helens and subtracting the total water it sells to customers and uses for authorized non-billable uses (firefighting, water line flushing, etc.) each month. In 2013, the City received funding through a Safe

Drinking Water Loan that allowed for the completion of significant system upgrades. The funding allowed for the following developments:

- Installation of over 5,000 feet of new PVC piping to replace aging cast and galvanized iron pipe.
- Replacement of nearly 500 manual water meters with modern radio meters.
- A system-wide leak detection survey, completed in 2018.
- Improvements to pressure reducing valves and stations to improve customer pressure.

The City has remained committed to monitoring and recording loss monthly through the comparison of water production and billing data. This information shows that the City’s water loss has not remained constant since 2013. Over the last 5 years, monthly loss estimates ranged from 2% to 30%, leading to an annual average of 16% (Exhibit 3). However, losses between October 2018 and March 2021 averaged 21%, while losses between April 2021 and September 2023 averaged 11%. The reason for the significant decrease in monthly losses is related to improvements in operations, leak response and repair, and public education about water conservation. The average monthly loss over the period of October 2018-September 2023 is shown in Figure 2.4.

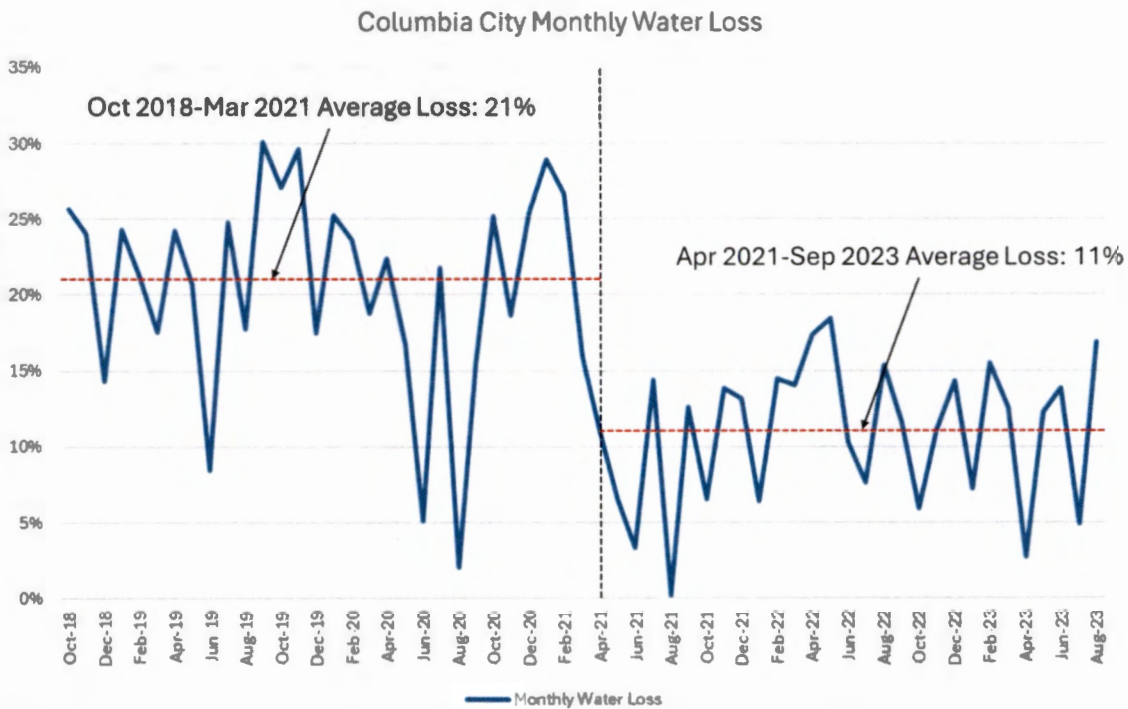


Figure 2.4: Average Monthly Water Loss October 2018-September 2023

3 Water Conservation Element

OAR 690-086-0150

In the last WMCP, the City reported per capita usage of 81 gpcpd, with water losses totaling around 10%. Since then, the City has maintained similar per capita usage, with per capita use of 80 gpcpd between 2019 and 2023. In addition, the City has replaced all but three old manual meters with updated radio-read meters and continues to educate the public about water conservation through tips in monthly newsletters. Approximately 75% of the radio-read meters installed to date are smart meters.

The City's service area sits within an alluvial aquifer system alongside the Columbia River. Many of the homes and businesses in the area have retained indigenous trees and other plants native to their environment in their yards, which require less watering than non-native species. Within the service area there are very few swimming pools and hot tubs and few public open green spaces that might require irrigation (such as schools or sports fields). Overall, water-efficient landscaping and land uses require less water to maintain.

The 2013 WMCP included details about many conservation programs. In this WMCP, the City reports on progress associated with these programs and outlines benchmarks to routinely check on progress in the future. The summary the 5-year benchmarks in this section includes:

- **Annual Water Audits**
 - Monthly monitoring of loss (sold vs. produced or purchased).
- **Meter Testing and Maintenance**
 - Testing of production meters every 5 years
 - Billing customers based on the quantity of water metered at the service connection.
 - Testing of meters >1" every 5 years.
 - Revolving replacement of 5/8" and 3/4" meters based on customer reports.
- **Leak Detection Program**
 - Full system leak detection survey completed in 2018.
 - On-call response and repair for customer-reported leaks.
 - Monthly visual inspection of reservoirs
- **Public Education**
 - Distribute brochures with new construction permits encouraging the use of indigenous plants.
 - Distribution of conservation tips in City newsletter, on City website, and in annual CCR.
 - Biannual distribution of a limited number of conservation kits and brochures to interested customers.
 - Distribution of conservation information during leak detection visits.

3.1 Progress Report on Implementation of Conservation Measures

OAR 690-086-0150(1)

The City has implemented the following conservation measures defined as benchmarks in the 2013 WMCP:

- 1) **Leak Detection Survey and Reporting** – The City performed a system-wide water leak detection survey when water loss peaked at 34% in 2002. Currently, the City initiates leak detection when

monthly water audits detect a rising trend in loss. The City also aims to conduct a system-wide leak detection study every three to five years. This also includes prompt repair of leaks when they are found and regular visual inspections of the reservoirs to ensure water is not lost. The City completed its last system-wide leak detection survey in 2018. The City should continue to conduct leak detection surveys every 5 years while average losses remain above 10%, with the next to be completed by **June 2029**.

- 2) **Meter Testing** – Suspect meters are identified by water billing staff based on unusual usage patterns or customer reports. The City adheres to AWWA standards for testing and repairing meters. Meters that no longer meet these standards are repaired or replaced. Production meters are tested every five years. Approximately 75% of the customer meters are smart meters that automatically flag unusual usage trends, which has aided the City in identifying faulty meters as well as customer-end leaks.
- 3) **Monthly Water Audit** – The City has performed a water audit each month since September 2000. From 2000-2013, the City’s average water loss was approximately 13%. From 2019-2023, the City’s loss increased slightly to 16%, though was only 11% from April 2021-September 2023. The City also makes efforts to track unmetered authorized uses and non-revenue water usage.
- 4) **Revolving Meter Replacement** – The City has a program that aims to replace all 5/8” and 3/4” meters **every 20 years**. As of July 2024, the City has replaced all but three manual meters (1 municipal, 2 residential) with radio-read meters. Of the radio-read meters, approximately 75% are smart meters with automated leak-detection capabilities. As older radio-read meters reach the end of their service life, they will be replaced with smart meters. The City has plans to replace the remaining three manual meters in the near future.
- 5) **Water Conservation Campaign** – The City distributes water conservation tips to customers through a monthly newsletter that is included with the utility bill. Additionally, the City distributes conservation tips on its website, at City events, with new construction permits, and during leak detection visits.

The City has had an integrated Supervisory Control and Data Acquisition (SCADA) since the installation of the 1.0 MG reservoir in 2002, but aging software and hardware has limited its use. Currently, the City is in the process of updating the SCADA system so that it can be used for the collection of digital water use records.

3.2 Water Use Measurement and Reporting Program

OAR 690-086-0150(2)

OAR 690-085-0010 requires governmental entities to submit an annual report on water use to OWRD. The City is a governmental municipal water supplier. The City has reported monthly water production from each of its source wells to the OWRD on an annual basis since the 2007 water year.

The City maintains totalizing flow meters on both of its production wells and at the intertie with St. Helens. The City also maintains 100% metering on all connections and tracks water use at every meter on a regular monthly interval.

Water production records are compared to water sales records monthly. The City has complete daily hand-written water use data. Data from October 2018 to September 2023 were analyzed for this WMCP. Additionally, the City maintains digital records of monthly production and billing. Regular flushing of lines and fire hydrant testing is documented, and water use for these events is estimated for reference when completing the annual water audit. The City also visually inspects reservoirs and reservoir levels for unusual drops in volume over the low-water-use night hours to assess the potential that a leak has occurred undetected.

3.3 Currently Implemented Conservation Measures

OAR 690-086-0150(3)

OAR 690-086-0150(3) requires a description of other conservation measures, if any, implemented within the service area. The following is a list of conservation measures currently put in place by the City:

Metering:

- The City maintains a 100%-meter installation rate with all but 3 customer meters having recently been replaced with automatic radio-read meters. All new connections are required to have radio-read meters installed.
- Meters are mandatory for all new connections.

Leak detection, production water monitoring, and trend assessments:

- The main leak detection tool for the City is monitoring month to month changes in the rate of system-wide loss. Additionally, the City relies on leak alerts from residential smart meters to identify smaller leaks. The following procedures are implemented when monthly losses exceed 10%:
 - Step 1: City staff conduct visual surveys of the distribution system to identify wet spots, slumping, or deterioration of pavement.
 - Step 2: Visual survey of facilities;
 - Step 3: Acoustic survey of fire hydrants, valves, meters, and backflow devices;
 - Step 4: Acoustic survey of distribution system using geophones;
 - Step 5: Leak detecting contractor to perform a correlator survey.

3.4 Annual Water Audit

OAR 690-086-0150(4)(a)

The results of a five-year water audit for 2019-2023 are presented in Table 3.1 – Columbia City Water Audit Summary and in Exhibit 3 – Columbia City 2019-2023 Monthly Water Audit. This analysis compiled the monthly water production recorded from each source to develop total monthly and annual water production estimates (System Input). The water production estimates were then compared to the monthly water volume billed to customers based on monthly meter readings (Authorized Consumption).

5-year Benchmark: The City will continue to complete an Annual Water Audits. The City will submit a progress report outlining the results of the water audits after five years, or by **June 2, 2029**.

| Table 3.1 – 2019 – 2023 Water Audit Summary: Average Monthly Values ¹ | | | | |
|--|---------------------|--------------------------|------------------------------|--------------------------------|
| Source | Produced Water (MG) | Revenue Water (MG) | Authorized Non-Revenue Water | Estimated Water Loss (MG/%) |
| PW-2 | 4.46 | 4.19 MG <i>Billed</i> | ~3200 gallons | ~0.70 MG (16%) ¹ |
| St. Helens Intertie | 0.43 | | | |
| Total | 4.89 | | | |

1. The City's average loss over 2019-2023 was 16%. However, recent improvements resulted in a lower 11% loss between April 2021 and September 2023.

3.4.1 Full Metering of System

OAR 690-086-0150 (4)(b)

As of 2013, the City has metered 100% of the customer accounts. Since 2013, a total of 18 customer connections have been added to the system, all of which are metered. Table 3.2 presents the meter count, size, and total percentage by size of the meters installed.

| Table 3.2. Meters Installed | | |
|------------------------------|------------|-------------|
| Meter Size | Count | Percentage |
| 3/4 or 5/8" Residential | 834 | 95.87% |
| 1.5" Residential | 1 | 0.11% |
| 2" Residential | 1 | 0.11% |
| 3/4 or 5/8" Commercial | 12 | 1.38% |
| 1" Commercial | 1 | 0.11% |
| 1.5" Commercial | 1 | 0.11% |
| 2" Commercial | 5 | 0.57% |
| 3/4 or 5/8" City (no charge) | 9 | 1.03% |
| 1" City (no charge) | 1 | 0.11% |
| 2" City (no charge) | 4 | 0.46% |
| 2" Industrial | 1 | 0.11% |
| Total Meters | 870 | 100% |

5-year benchmark: The City has satisfied the previous 5-year benchmark to have all connections metered. The City has a rule that all new connections must be metered. No additional benchmark is needed.

3.4.2 Meter Testing and Maintenance

OAR 690-086-0150 (4)(c)

All water meters on the City's system are repaired or replaced as needed to maintain them within the accuracy tolerance specified by the meter manufacturer. Meters are tested and calibrated on an as-needed basis. Suspect meters are identified when the meter reading and/or water billing staff recognizes unusual meter reading patterns, or from a call from a customer. The City uses AWWA's accuracy standards when testing and repairing or maintaining meters. If suspect meters are found to measure

outside of this standard, the meter is repaired or replaced. Meters exceeding 1" in size will be tested and calibrated at least every 5 years to ensure that they are operating properly and within design parameters.

5-year benchmark: Test all meters, replace faulty and all meters older than 20 years by **June 2, 2029**.

| Table 3.3: City of Columbia City Five-year Conservation Benchmarks | | |
|--|--|-------------------|
| Benchmark | Completion Date(s) | Frequency |
| Complete leak detection survey and reporting | Last system-wide survey in September 2018 | 5 years |
| Leak repair | As needed | Ongoing |
| Visual inspection of reservoirs | Monthly | Monthly |
| Meter testing program | As-needed (customer reports or anomalous data) | On-call |
| Production meter testing | Flow meter calibrated in 2014 | 5 years |
| Leak detection visits | As needed | On-call |
| Water auditing – monitoring loss (sold vs. pumped) | Monthly | Monthly |
| Revolving meter replacement | Ongoing | Ongoing |
| Distribute conservation tips via Newsletter | Ongoing | Monthly |
| Convert to system-wide automated smart water meters | December 2013 | Ongoing |
| Eliminate over-pressurized areas within water system | October 2014 | Ongoing |
| Complete a system-wide leak detection survey | October 2014, September 2018 | As needed |
| Prevent over-pressurized areas during PRV failures | October 2014 | Ongoing |
| Abandon 1,151 feet of old redundant PVC piping | October 2014 | One-time |
| Abandon 6,135 feet of old redundant cast iron piping | October 2014 | One-time |
| Distribute conservation brochures and kits | September 2014, ongoing | Annually, ongoing |
| Distribute conservation kits during leak detection visits | January 2014, ongoing | Ongoing |
| Provide conservation tips on City website | January 2014, ongoing | Ongoing |
| Include conservation tips in Annual CCR | Annually since June 2014 | Annually |
| Distribute brochure about water efficient landscape plants with permits for new construction | December 2013, ongoing | Ongoing |
| Install automated park & public facility irrigation | May 2014 | Ongoing |
| Testing meters > 1" | July 2018 | 5 years, ongoing |
| Replace existing cast iron and galvanized pipe | Most recent replacements in 2019 | Ongoing |

3.4.3 Water Rate Structure

OAR 690-086-0150(4)(d)

The City assesses a minimum charge, which includes some usage, for the use of its water, along with an inclining block rate consumption charge based on the units of water taken. There are no discounts for high or increased water usage. The City recently completed an update to its rates. The City charges a minimum monthly base rate of \$41.93 for a 3/4" or 5/8" meter located within the City limits, which includes the first 100 cubic feet of usage. The 2024 City rate schedule is shown in Table 3.4.

3.4.4 Required Measures for Water Losses Over 10%

OAR 690-086-0150 (4)(e)

5-year benchmark: The City will continue to conduct regular water audits to track water loss as more infrastructure improvements are completed, install updated telemetry systems, conduct regular infrastructure inspections, and improve leak response times. The City’s goal is to reduce non-revenue water to below 10% through improved leak response and repair within 5 years. The City will submit a progress report on their Leak Detection and Reduction Plan by **June 2, 2029**.

| Table 3.4 - Water Rate Schedule | |
|---------------------------------|----------------------------|
| Inside City Water Rates | |
| Service Meter Size | Monthly Base Rate |
| 5/8 or 3/4 -inch | \$41.93 |
| 1-inch | \$64.50 |
| 1 ½-inch | \$128.63 |
| 2-inch | \$205.87 |
| Consumption (cubic feet) | Per Unit Rate (cubic foot) |
| 101-500 | \$0.0257 |
| 501-1000 | \$0.0408 |
| 1000+ | \$0.0557 |
| Outside City Water Rates | |
| Service Meter Size | Monthly Base Rate |
| 5/8 or 3/4 -inch | \$52.43 |
| Consumption (cubic feet) | Per Unit Rate (cubic foot) |
| 101-400 | \$0.0279 |
| 401-800 | \$0.0428 |
| 800+ | \$0.0590 |

5-year benchmark: The condition is met. No additional benchmark is necessary for rate structure.

3.4.5 Public Education

OAR 690-086-0150 (4)(f)

Public education is an important component of the City's overall water conservation program. The following public education measures are planned:

- **Distribute conservation brochures and kits:** The City plans to continue to distribute water conservation brochures and kits during the Annual Columbia City Celebration. Brochures will include tips on water saving irrigation techniques and landscaping techniques, methods to reduce

consumption indoors and outdoors, and information about the importance of early leak detection. Kits will contain some conservation items such as toilet leak detection tablets, faucet aerators and landscape moisture meters. Brochures and kits will also be issued to new customers, given to customers during leak detection visits, and made available to other interested customers at City Hall year-round.

- **Perform leak detection visits:** The City will continue to provide free leak detection tests to residential customers who suspect a leak. City staff will try to determine the location of the leak if the leak is outdoors.
- **Distribute conservation brochure during leak detection visits:** Customers receive conservation brochures with leak detection information during leak detection visits. Credits for timely leak fixes are available.
- **Distribute conservation tips in the City's Newsletter:** The City will continue to distribute water conservation information on a regular basis through the City's Newsletter, which is distributed to all utility customers with their monthly utility bill.
- **Provide conservation tips on the City's website:** The City displays water conservation information on the City's website, including links to other water conservation sites.
- **Include conservation tips in the annual Consumer Confidence Report (CCR):** The City includes water conservation information in the City's annual CCR.
- **Distribute brochures about water efficient landscape plans with permits for new construction:** The City will begin to distribute an informational brochure about water efficient landscaping design and water efficient plants, trees, and shrubs with the issuance of building permits for new construction. This information is also available to any interested individual on the City's website.

5-year benchmark: The City has met this condition and will continue to provide water conservation education to the public.

3.5 Water Right Extension and Environmental Resource Issues

OAR 690-086-0150 (5)

OAR 690-086-150(5) is required for municipal water suppliers that serve more than 1,000 people who plan to initiate or expand diversions from water rights under an extension of time. Currently, the City plans to extend Permit G-16438s, which has a completion date of October 1, 2027. Any extension would be filed before that date.

4 Water Curtailment Element

4.1 Introduction

In this section, the City's protocols for managing instances of high water demand or limited water supply are outline. Based on the severity of the event, the City maintains four levels of curtailment meant to temporarily lower demand and lessen stresses on the water system. The City has not experiences a water curtailment event since the submission of the previous WMCP but lists historical curtailment events below. Known conditions that would necessitate water use curtailment include:

Groundwater:

- Failure of pump or motor equipment during high-demand periods
- Contamination of source water

- Low water levels in the Columbia River
- Extreme drought conditions that would require OWRD to pull back permits on wells hydraulically connected to the Columbia River
- Loss of water right permits
- Extraordinary drop in well production due to biofouling or incrustation
- Loss of well infrastructure due to landslide, fire, or other natural disaster

Infrastructure failure:

- Extended power failure- The City has a 120kw trailer mounted generator that can fully power well PW-2 and the treatment building. The generator is not dedicated to the well and would spend most of the time powering sewer pump stations. There is no backup power connection at either the St Helens intertie or the upper booster pump station.
- Negative line pressure
- Loss of reserves in storage facilities
- Pipeline break that requires more than 48 hours to repair

The following subsection presents the history of system curtailment, the three stages of curtailment triggers and responses for each alert stage.

4.2 History of System Curtailment Episodes

OAR 690-086-160(1)

The City has a history of curtailment episodes. Notably, many of these events occurred prior to the installation of the City’s 1 MG storage tank in November 2004. This added storage capacity has helped the City avoid frequent curtailment events. Table 4.1 summarizes instances where the City was forced to implement curtailment measures:

| Dates | Description | Contributing Factors | Water Use Restrictions Imposed |
|---|---|--|--|
| July 1998 | Supply shortage and inadequate disinfection | Extended period of hot weather; other contributing factors unknown | Voluntary conservation requested and voluntary odd/even outdoor watering schedule imposed |
| June, July, September, and October 2000 | Supply shortage and inadequate disinfection; wholesale contract limits exceeded in July | Extended period of hot weather coupled with severe system leaks (35% loss) | Voluntary conservation requested and mandatory odd/even outdoor watering schedule imposed. |
| June and July 2002 | Supply shortage and inadequate disinfection | Extended period of hot weather; severe system leaks (35% loss); malfunctioning pumps | Voluntary conservation requested and mandatory odd/even outdoor watering schedule imposed |
| July and August 2006 | Wholesale pumping limits reached | Extended period of hot weather; growing customer base | None |

4.3 Curtailment Stages

OAR 690-086-0160(2) and (3)

The City has four (4) stages of water alert; Levels one through four. Tables 4.2a-d outline the stages of alert, the action that triggers the alert, the goal of implementing the alert, and the measures by which the alert or implementation of actions can be measured to meet the stated goal(s).

| Table 4.2a. Stage One: Water Alert Status | | |
|---|---|--|
| Stage | Triggers | Measures |
| One | Water demand reaches 150% of historic ADD during multiple days in a billing cycle | <p>The City will not enact any specific curtailment measures, but will report elevated water use to customers in monthly billing and encourage voluntary participation in water conserving measures including:</p> <ul style="list-style-type: none"> • Reduced watering • Reduced washing of vehicles • Reduced washing of sidewalks • Limited filling of pools, hot tubs, etc. |
| | | <p>The City will take the following steps:</p> <ul style="list-style-type: none"> • Prioritize leak repair. <p>The City will communicate water use information via:</p> <ul style="list-style-type: none"> • Monthly Water Bill |

| Table 4.2b. Stage Two: Water Shortage Status | | | |
|--|--|--|---|
| Stage | Triggers | Measures | |
| | | Residential | Commercial and Industrial |
| Two | Water demand exceeds 250% of historic ADD for 3 consecutive days | All measures from previous Stages and: | |
| | | <ul style="list-style-type: none"> • Enact a mandatory alternate day lawn and garden watering schedule. • Eliminate any use of water from a fire hydrant except for fighting fires or emergency applications. • Require customers to water only during the evening hours when demand is lower and prohibit watering in the midday heat. • Disallow the washing of any motor bike, motor vehicle, boat, trailer, airplane, or other vehicle except at a commercial fixed washing facility or by bucket and hose equipped with a shut-off nozzle. • Disallow use of non-recycled water for aesthetic purposes • Disallow running water into gutters or drains. | <ul style="list-style-type: none"> • Limit washing of commercial vehicles unless in a facility that recycles water • Moratorium on new connections. • Prohibit the use of water for dust control at construction sites. • Prohibit all non-essential irrigation. • Limit necessary irrigation to an alternate day schedule. • Prohibit the use of water from hydrants for any purpose other than firefighting. • |
| | | <p>The City will take the following steps:</p> <ul style="list-style-type: none"> • Curtail water use in public spaces. • Cease fire hydrant flushing. • Necessary irrigation on an alternate day basis <p>The City will communicate curtailment measures in the following ways:</p> <ul style="list-style-type: none"> • Text alerts through voluntary alert sign up, weekly spotlight newspaper, Facebook, and the City's website. • Public service announcements would be made. • The curtailment measures would be posted in several public places. • Leaflets containing the curtailment measures would be distributed. | |

| Table 4.2c. Stage Three: Serious Water Shortage Status | | |
|--|---|---|
| Stage | Triggers | Measures |
| Three | <p>Water demand exceeds 300% of historic ADD for 3 consecutive days</p> <p>Or</p> <p>Unscheduled loss of production from a water source (well or intertie) for more than 1 days</p> | <p>All measures in previous stages and:</p> <ul style="list-style-type: none"> • Restrict all lawn and garden watering to every 4th day. • Disallow the use of non-recycled water in a fountain or pond for aesthetic or scenic purposes except where necessary to support fish life. • Disallow initial filling or refilling of a swimming pool. • Disallow the washing of any motorbike, motor vehicle, boat, trailer, airplane, or other vehicle, except at a commercial fixed washing facility which recycles its water. • Require that no person or customer cause or allow water to run to waste in any gutter or drain. • Prohibit daylight watering. • Disallow the use of water for dust control at construction sites. • Disallow the use of water from hydrants for any purpose other than firefighting. • Set gallonage limits on individual businesses based on the severity of the current situation as well as current and past consumption habits. • Contact the largest consumers in the City service area and discuss ways to reduce water consumption on an individual basis. |
| | | <p>The City will publicize curtailment measures in the following ways:</p> <ul style="list-style-type: none"> • Mailed to all water customers, along with a lawn and garden watering calendar. • Text alerts through voluntary alert sign up, weekly spotlight newspaper, Facebook, and the City's website. • Public service announcements would be made. • Leaflets containing the curtailment measures would be distributed. |

Table 4.2d. Critical Water Shortage Status

| Stage | Triggers | Measures | |
|-------------|---|--|--|
| | | Residential | Commercial and Industrial |
| Four | <p>Water demand exceeds 325% of historic ADD for 3 consecutive days</p> <p style="text-align: center;">Or</p> <p>Unscheduled loss of production from a water source (well or intertie) for more than 3 days</p> | All measures in previous Stages, and: | |
| | | <ul style="list-style-type: none"> • Set usage volume limits on individual residences. | <ul style="list-style-type: none"> • Limit any commercial or industrial use to 50 percent of the amount used by the customer during the corresponding billing period in the same period of the previous year. If connection to the water system was not in existence during the previous year, an assumed amount will be computed using existing records of similar services. The City of Columbia City reserves the right to set gallonage limits on individual businesses based on the severity of the current situation as well as current and past consumption habits. An appeal against the 50 percent limitation may be made directly to the City Administrator. The City Administrator’s decision will be final. |
| | | Adopt a rule which states that no person or customer shall sprinkle, water, or irrigate any shrubbery, trees, lawns, grass, ground covers, plants, vines, gardens, vegetables, flower, or any other vegetation. | |
| | | <p>Curtailment measures would be publicized in the following ways:</p> <ul style="list-style-type: none"> • Door Hangers at each customer address. • Text alerts through voluntary alert sign up, weekly spotlight newspaper, Facebook, and the City’s website. • Public service announcements would be made. • Leaflets containing the curtailment measures would be distributed. | |

4.4 Authority and Enforcement

OAR 690-086-0160(4)

The City first adopted a water curtailment ordinance in October 2000. This ordinance authorized the City Council by majority, or the City Administrator if the Council was not available, to promulgate a water supply emergency and enact curtailment actions. This authority has been carried through to the latest City ordinance from December 2023, Chapter 3.6.

Table 4.3 presents the actions for each stakeholder party during a water curtailment:

| Table 4.3. Actions of Notified Parties | | |
|--|---|---|
| Staff Person | Curtailment entities | Action |
| Public Works Director | All City customers | Notify |
| Public Works Director | All City staff and directors | Implement Curtailment Plan |
| Public Works Director | Oregon Health Authority | Notify of contamination or negative pressure |
| Public Works Director | Oregon Public Utility | Notify curtailment plan implemented |
| Public Works Director | Oregon Water Resources | |
| Public Works Director | Columbia County Fire & Rescue | Notify of potential impacts to fire suppression |
| Public Works Director | St. Helens School System | Notify of impacts to students/staff |
| Public Works Director | Columbia County Chronicle Newspaper | Notify |
| Public Works Director | The Oregonian | |
| Public Works Director | KOIN, KPTV, KATU, KGW, KOPB (TV) | |
| Public Works Director | KXL, KEX, KOPB, KOAC, KPAM (News radio) | |
| Public Works Director | ODOT, CC Transportation | Notify of restricted use |

5 Municipal Water Supply Element

OAR 690-086-0170

The current total production capacity of the City’s water system is estimated to be 0.448 MGD (311 gpm) based on historic well production and maximum use of the intertie with St. Helens. This capacity is only possible for short periods of time. In terms of annual capacity, the maximum 5-year annual production was 58.70 MG in 2023. Although the average annual usage from 2019 – 2023 was 50.30 MG, demand still has the potential to approach the system’s production capacity in the summer. During the high-demand summer months, short-term demand requires the City to depend upon its intertie with St. Helens. Despite expected growth of ~5% over the next 20 years, the City can increase production within the current water rights portfolio and additional groundwater production infrastructure to account for future demand.

The following sections detail current and future water needs and recommend potential water sources to meet these needs.

5.1 Current and Future Service Areas

OAR 690-086-0170(1)

The City presently serves drinking water to about 1,935 customers within the City limits, covering approximately 560 acres, and about 65 customers outside of the City limits but within the UGB, covering approximately an additional 53 acres. The number of customers outside of the City UGB was previously estimated to be about 40 people. However, due to uncertainty around this value, this WMCP conservatively estimated the outside-UGB population to be 65 people for a total service population of 2,000. The service area is divided in land use by 72.3% residential zoning, 1.3% commercial zoning, 20% industrial zoning, 0.8% primary forest, and 4.8% public lands zoning.

A map showing the City’s service area, as defined by the City limits and UGB, is provided in Figure 2.1. Since the 2013 WMCP, 6.77 acres out of the total 84 additional acres proposed to be annexed have been added to the City UGB. The annexed area is 100% residential zoning.

5.1.1 Population Projections

Forecasting of the City’s service population was completed forecasted population for the Columbia City urban growth boundary (UGB) provided by Portland State University’s Population Research Center (PRC) (PSU, 2024). The resulting service population forecast for the City is presented in Table 5.1. Since 2013, the population of the City’s service area has increased by approximately 10 people, for an estimated 2023 population of approximately 2,000 residents.

| Year | Population¹ |
|-------------|-------------------------------|
| 2024 | 2,000 |
| 2025 | 2,017 |
| 2030 | 2,050 |
| 2035 | 2,067 |
| 2040 | 2,078 |
| 2045 | 2,089 |
| 2050 | 2,103 |

1. *Estimated based on a current estimated service population of 2,000 people for 2023 (including approximately 65 persons outside of the City limits) and the projected population growth from Portland State University’s Oregon Population Forecast Program (OPFP) 2024 report for Region 3: Northwest Oregon.*

5.2 Schedule for Estimated Water Right Development

OAR 690-086-0170 (2)

The PW-1 and PW-2 wells under Permit G-16438 require frequent reconditioning to maintain the capacity of the two wells. Well PW-1 currently serves as emergency backup with PW-2 serving as the primary supply well. The City is exploring options for the development of another well on Permit G-16438 that will complete development of the water right.

Table 5.2 - Estimated Schedule for Water Right Development, presents a schedule of water right development based on the projected increase in the 10- and 20-year water demands for the City.

| Table 5.2. Estimated Schedule for Water Right Development | | | |
|---|--|---|--|
| Water Right | 2023-2025 | 2025-2026 | 2026-2028 |
| Permit G-16438 – PW-1 & PW-2. These wells are limited to about 25% of the water right by aquifer conditions and diminishing well performance. Additionally, the wells are too close together to pump simultaneously. The City has previously considered constructing an additional point of appropriation on this permit to complete full development. Under the current permit status, the permit window closes on October 1, 2027, and a Claim of Beneficial Use survey must be completed by October 1, 2028. | Assess locations for additional well on this permit. | Develop new well location in Columbia River alluvium. | Install well. Increase overall max production by ~300-400 gpm average rate. Claim of Beneficial Use by 2028. |

5.3 Demand Forecast

OAR 690-086-0170 (3)

The future water demand estimates were developed from the following set of 2019-2023 data:

- The Average Day Demand (ADD) was determined from daily production data available from October 2018 through September 2023 and equaled 160,811 gallons.
- The average gallons per capita day demand rate, which is estimated by dividing the 2019-2023 Average Day Demand (ADD) by the 2023 total population (ADD/population = gpcpd), was about 80 gpd,
- The Maximum Day Demand (MDD), which is the highest volume day in the available daily records from October 2018 to September 2023, was 551,040 gallons recorded on July 10, 2023, and;
- The 2019-2023 peaking factor for the system (MDD/ADD = Peaking Factor), which was determined to be at a maximum of 3.34 in 2023.

Table 5.3, Population and Water Demand Projections, presents the estimated 25-year trends (out to 2050) for population, average, and maximum daily demands. The City is continuing efforts to reduce system loss to a target of 10% or lower. This goal should be reached within the next ten years, resulting in a lower per capita usage after 2033. However, for this projection, per capita demand was assumed to remain at its current value. Demand is still expected to grow modestly as a result of an approximately 5% increase in population by 2050.

Based on the City’s current use and the limit of its existing water rights, it seems unlikely that the City will need to pursue additional water rights to support the projected population growth over the next 20 years. It may be necessary to improve the current wells or add another POA to the existing water rights to fully utilize these sources. The City would ultimately like to add an additional well source to its water right capable of reliably producing a maximum rate of at least 400 gpm to increase redundancy and lessen dependence on the St. Helens intertie.

MDD is currently expected to peak at about 0.580 MGD, which exceeds the City’s current independent production capacity by approximately 0.130 MGD. Due to continued performance declines at the PW-2 well, this gap is likely to grow. While the intertie with St. Helens can make up this discrepancy in short-

term peaks, to maintain sufficient capacity and source reliability, the City will need to fully develop its water right on permit G-16438.

Table 5.3 - Population and Daily Water Demand Projections

| Year | Total Service Population ¹ | Average Daily Demand Projection | | Maximum Daily Demand Projection | | Current Daily Production Capacity (MGD) |
|------|---------------------------------------|--|--------------------------|---|--------------------------|---|
| | | Ave. Per Capita Use (gpcpd) ² | Average Day Demand (MGD) | Max Per Capita Use (gpcpd) ² | Maximum Day Demand (MGD) | |
| 2023 | 2,000 | 80 | 0.161 | 276 | 0.551 | 0.448 ³ |
| 2025 | 2,017 | | 0.162 | | 0.540 | |
| 2030 | 2,050 | | 0.164 | | 0.549 | |
| 2035 | 2,067 | | 0.166 | | 0.553 | |
| 2040 | 2,078 | | 0.166 | | 0.556 | |
| 2045 | 2,089 | | 0.167 | | 0.559 | |
| 2050 | 2,103 | | 0.168 | | 0.563 | |

1. Based on data from Oregon Population Research Center 2023 Proposed Population Forecast for Columbia County.
2. Average and maximum daily demands are based on daily records from 2019-2023 and the estimated population for each time period. The MMD presented here is based on the anomalously high value recorded in 2023.
3. Maximum production assumes PW-2 capacity of 140 gpm. This rate may decrease unless the well is regularly rehabilitated. This accounts for the water available through the St. Helens intertie.

5.4 Comparison of Projected Need and Available Sources

OAR 690-086-0170(4)

This section is required to compare the projected 10- and 20-year water demands with the current available water sources. This section presents a capacity analysis of the City’s two production wells, PW-2 (primary) and PW-1 (backup), to compare with the 10- and 20-year demand projections. Historically, peak days have exceeded the City’s system capacity and have required the use of additional water from the City’s intertie with St. Helens. This has occurred more frequently in the past few years compared with data from the previous WMCP.

The City’s projected demands are expected to increase slightly over the next 20+ years due to very modest population growth. Improvements to system efficiency, reduced loss, and increased customer education and outreach efforts could decrease the per capita usage, which may even outpace growth on the 5-10 year scale. However, the current per capita rate was assumed to stay constant for this projection.

To prepare for projected increases in demand over the next 20-25 years, the City intends to continue to improve system efficiency as well as continue to develop its current water rights. The City possesses sufficient water rights to meet its projected MDD if it fully develops permit G-16438 but requires a new source well to increase water right utilization rates. In this scenario, the City could retain its intertie with St. Helens as a redundant source in case of the failure of one of its wells.

The projected peak 5-10-year MDD is 0.553 MGD, or 384 gpm on average. The 20- to 25-year MDD is expected to increase due to continued population growth to about 0.563 MG, or 391 gpm on average. In Section 5.3, the maximum peak day production capacity (including the St. Helens intertie) is listed as 0.448 MGD, which is less than current and projected MDD. However, this capacity assumes that PW-2 well will not continue to experience diminishing performance related to biofouling and unreliable aquifer water levels and that the City will continue to use water from the City of St. Helens.

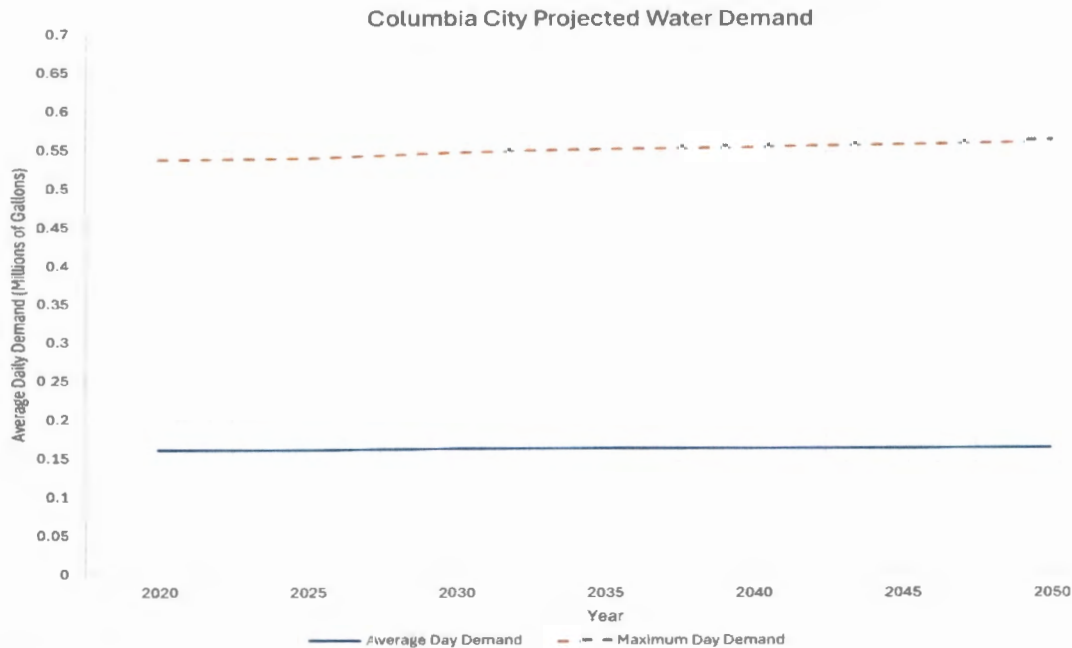


Figure 5.1 – Projected Average and Maximum Day Demands

Historically, the City’s groundwater sources have been limited by poor well performance due to biofouling, drawdown, and, in the case of previous well sources, water quality limitations. The development of an additional source under Permit G-16438 could help limit issues related to drawdown by spreading pumping over multiple points of appropriation. A new well on permit G-16438 would need to be located a significant distance from the City’s current pumping wells, which are limited from pumping simultaneously due to interference.

| Table 5.4 – Available Water Source Peak Demand Capacity | | |
|---|-----------------------|---------------------------------------|
| Well | Allowed Rate | Current Max Pumping Rate ¹ |
| PW-2 | 498 gpm ² | 140 gpm |
| St. Helens Intertie | 170 gpm | 170 gpm |
| Proposed New Source on G-16438 | ~498 gpm ² | ~350-400 gpm |
| Total | 1,068 gpm | 660 gpm |

1. Based on the current pump, motor, and treatment equipment capacity.
2. The proposed new groundwater source would share water rights with PW-2. Combined, the wells would be permitted to operate at 498 gpm.

5.5 Alternative Source Analysis

OAR 690-086-0170(5)

OAR 690-086-0170(5) requires an analysis of alternative sources of water to see if any expansion or initial diversion of water allocated under existing permits is necessary to meet future water demand. Current City owned water sources available under existing water rights do not have the capacity to meet projected MDD with the desired level of redundancy, though total diversions permitted by the water rights themselves are sufficient.

The City's best option for securing reliable and sufficient water supply capable of meeting and exceeding the projected MDD over the next 25 years is to fully develop the remaining water under Permit G-16438 through the construction of a new well or wells capable of producing approximately 400 gpm. Such a source would grant the City sufficient capacity to meet its MDD with additional capacity to spare.

5.5.1 Implementation of Conservation Measures

OAR 690-086-0170(5)(a)

To reduce water demand, the City has and continues to implement a wide variety of water conservation measures, as described in Section 3 Conservation Element. The City estimates that the effective average per capita demand could be lowered if average losses are reduced further. However, the City's per capita demand of approximately 80 gpcpd is already relatively low. Loss reduction and conservation are critical, but alone will not be sufficient to address the gap between projected MDD demands and current production capacity.

5.5.2 Interconnections

OAR 690-086-0170(5)(b)

The City maintains an interconnection with the City of St. Helens, with an agreement for the purchase of up to 1 million CF of water per month. Historically, the City has avoided using this option unless completely necessary due to the relatively high cost of purchased water compared to water from the City's own wells. Recently, however, the City has relied more heavily on this intertie to meet heavy demands during peak months. While the City does not fully utilize the allotted volume, the cost of using purchased water is prohibitive. Ultimately, the City's goal is to develop a new reliable groundwater source, or sources, that can meet the City's demands independent of the St. Helens intertie. Doing so would improve system reliability, redundancy, and reduce customer costs.

5.5.3 Cost Effectiveness

OAR 690-086-170(5)(c)

This rule requires an assessment of whether the projected water needs can be satisfied through other conservation measures that would provide water at a cost that is equal to or less than the cost of other identified sources.

Reducing water loss through leak detection and repair and limiting consumption through modernization and public education are the most cost-effective ways to improve the City's means to support peak demands. The City is continuing these efforts with the goal of reaching an average annual system loss of 10% or lower within 10 years. However, these efforts alone are not sufficient to meet projected peak

demands and system redundancy goals. New sources of water must be developed, and current sources optimized, to ensure sufficient capacity to reliably meet future demands.

5.6 20-Year Rate and Monthly Volume by Permit

OAR 690-086-0170(6)

OAR 690-086-0170(6) requires a quantification of the maximum rate of withdrawal and maximum monthly use if any expansion or initial diversion of water allocated under an existing permit is necessary to meet demands in the 20-year planning horizon.

The City recognizes that there are differences in the maximum instantaneous rates reported to date in Table 2.1 under OAR 690-086-0140 and the reliable supply rates reported in Table 5.5 - 20-Year Withdrawal Rate and Monthly Volume. The difference is that an instantaneous rate can be sustained only for short-term pumping scenarios to meet peak demands and reliable supply capacity is the anticipated pumping rate averaged over the peak season of pumping (approx. July through September).

The 20-year demand projections suggest a modest increase in demand. However, The City does not currently utilize a significant portion of the diversion allowed under G-16438. Thus, the City's intent to improve water production redundancy by optimizing existing sources and evaluating the addition of a new source can all be done within its current water rights portfolio. The values presented in Table 5.5 include the proposed average production capacity under each source. Figure 5.2 shows the possible source breakdown if each source and water right is developed as discussed in Tables 5.4 and 5.5 compared to the last five years.

| Table 5.5. 20-Year Withdrawal Rate and Monthly Volume | | | | | | | |
|---|--------------------|----------|-----------------------|--|-------------------------|--------------------|---------------------------------------|
| Well Name (Source) | Permit / Cert. No. | Transfer | Max Permit Rate (cfs) | Current (2019-2023) | | Projected 20-Year | |
| | | | | Reliable Ave. Max. Month Capacity ¹ (cfs) | Maximum Month (Gallons) | Maximum Rate (cfs) | Max. Monthly Volume ³ (MG) |
| PW-2 | G-16438 | - | 1.33 ² | 0.312 | 6,559,381 | 0.312 | 4.9 |
| St. Helens Intertie | - | - | 0.70 | 0.38 | 3,057,289 | 0.70 | 7.5 |
| <i>Proposed New Well⁴</i> | G-16438 | - | 1.33 ² | - | - | 0.798 | 15.7 |
| Total | - | - | 1.49 | 0.698 | 9,616,670 | 1.49 | 28.1 |

- 1) *Reliable Average Max Month Capacity is based on the Max. Month in gallons for the (2019-2023) record normalized to cfs. Actual maximum pumping rates on record are higher (see Table 2.1) due to shorter than 1-day pumping cycles.*
- 2) *PW-2 and the Proposed New Well would have a combined maximum permitted rate of 1.33 cfs (GR-2514 and Permit: G-16438).*
- 3) *Rate based on water right maximum allowed capacity or estimated physical capacity of well infrastructure.*
- 4) *Assuming the City can find a location for a new well and develop a production groundwater source.*

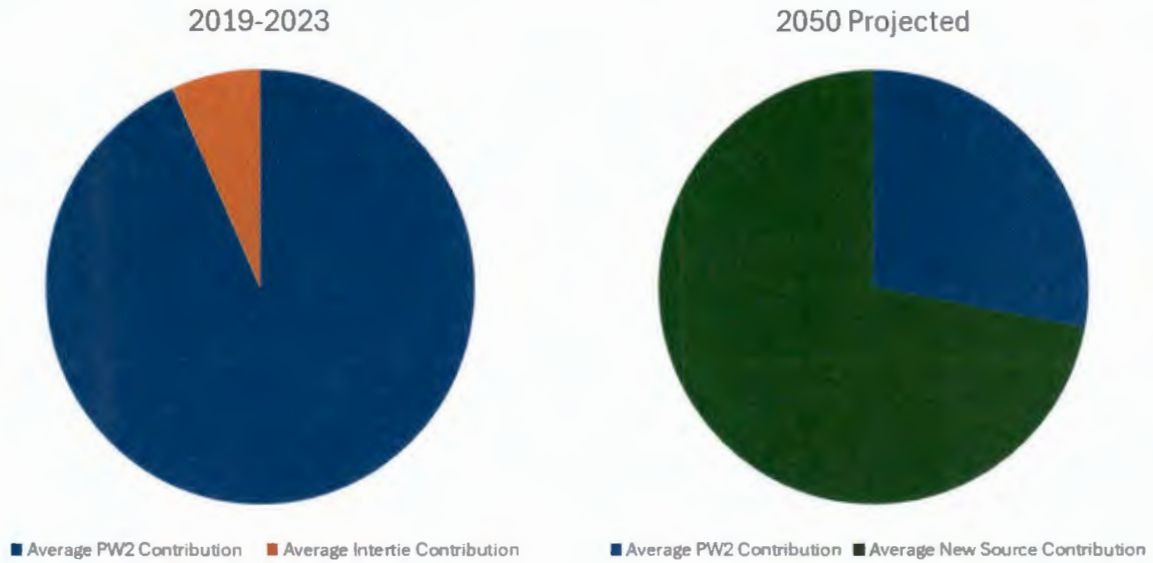


Figure 5.2 – Projected 20-Year Source Breakdown

5.7 Mitigation Actions

OAR 690-086-0170(7)

Under OAR 690-086-0170(7), for expanded or initial diversion of water under an existing permit, the water supplier is to describe mitigation actions it is taking to comply with legal requirements of the Endangered Species Act, Clean Water Act, and other applicable state or federal environmental regulations. The City is not making any initial diversions under their water rights and is currently not required to take any mitigation actions under state or federal law.

5.8 New Water Rights

OAR 690-086-0170 (8) New Water Rights

The City is not requesting new water rights. Therefore, this section does not apply to the current WMCP.