

City of West Kelowna

2024 ANNUAL WATER REPORT



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Contents

1	INTRODUCTION	3
	Acknowledgement	3
	Background	3
2	DRINKING WATER SYSTEM DESCRIPTION	4
	Source Water	4
	Powers Creek Source Water Quality	4
	Lambly Creek and Rose Valley Source Water Quality	6
	Treatment System	7
	Distribution System	8
3	WATER QUALITY SAMPLING PROGRAM AND RESULTS	10
	Water Quality Regulations and Treated Water Goals	10
	Guidelines for Canadian Drinking Water Quality	11
	BC Drinking Water Protection Regulation	12
	Manganese Event	13
	Turbidity	15
4	EVOLVING GUIDELINES	17
	Manganese Treatment Improvements	17
5	WATER SYSTEM RISKS	18
	Mitigation measures	18
6	WATER USE AND WATER CONSERVATION	19
	2024 Water Use	19
	Projected Future Water Use	20
	Water Conservation	20
7	SOURCE WATER PROTECTION	22
8	EMERGENCY RESPONSE & CONTINGENCY PLAN SUMMARY	23
9	WATER SYSTEM MANAGEMENT	24
	System Maintenance and Management	24
10	APPENDICES	27
	Appendix A - Water Treatment Plant Test Results Summary	28
	Appendix B - Distribution Water Quality	28
	Appendix C - Turbidity Results for Water Service Areas	29
	Appendix D - Disinfection Byproducts Testing Results	30
	Appendix E - Water Sampling Locations	31
	Appendix F – Water Quality Definitions	32

List of Tables

Table 3.1: Microbiological Parameters according to the Guidelines for Canadian Drinking Water Quality	11
Table 3.2: Water Quality Standards for Potable Water	12
Table 3.3: Frequency of Monitoring Samples for Water Supply Systems	12
Table 3.4: Bacteriological results for 2024 in both distribution systems tested via external analytical lab CARO Analytical Services	12
Table 3.5: Bacteriological results for 2024 in both distribution systems tested via internal lab at the RVWTP utilizing the IDEXX methodology.	12
Table 3.6: RVWSA Manganese Results throughout distribution	14
Table 3.7: 2024 Exceedances for Turbidity in the RVWSA	15
Table 6.1: Projected Future Water Use	20
Table 9.1: Number of public works staff that hold EOCP certifications	24
Table 9.2: Water Main Break Locations in 2024	25
Table A-1: Rose Valley Water Treatment Plant Testing Data 2024	27
Table A-2: Powers Creek Water Treatment Plant Testing Data 2024	27
Table B-1: Overall grab sampling WQ collected throughout both distribution systems in 2024.	28
Table C-1: Turbidity in the RVWSA distribution network 2024.	29
Table C-2: Turbidity in the PCWSA distribution network 2024.	29
Table D-1: PCWSA THM Byproduct Results	30
Table D-2: PCWSA HAA5 Byproduct Results	30
Table D-3: Rose Valley WSA THM Byproduct Results	30
Table D-4: Rose Valley WSA HAA5 Byproduct Results	30

List of Figures (Photographs Excluded)

Figure 2: Powers Creek Watershed (PCWSA)	5
Figure 3: Lambly Creek and Rose Valley Reservoir Watershed (RVWSA)	6
Figure 4: Water Treatment Plant Diagram	8
Figure 6: Map of Water Systems in City of West Kelowna	9
Figures 11/12: Treated Water 2024 Daily Flow/Water Usage Breakdown	19

1 INTRODUCTION

Acknowledgement

The City of West Kelowna acknowledges our presence on the traditional territory of the syilx Okanagan People.

Background

The annual report is an important part of providing City of West Kelowna residents with information regarding the operations, quality, risks and mitigations associated with the drinking water supply system. It also provides users with details about ongoing progress, challenges, education and communications, and plans for sustainable delivery of the water supply system.

Water systems are governed by the *British Columbia Drinking Water Protection Act*, which sets out requirements for drinking water operators and suppliers to ensure the provision of safe drinking water to their customers. The City of West Kelowna has such a plan to continue to provide residents with safe drinking water and guide future improvements to the water system.

Drinking water can be a complex issue and some of the information provided in this report is technical in nature. Please contact the City of West Kelowna's Engineering Services department should you have any questions.

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2 DRINKING WATER SYSTEM DESCRIPTION



Figure 1: Tadpole Lake – a reservoir in the Powers Creek Watershed

Source Water

The City of West Kelowna primarily makes use of source water from the Powers Creek and Lambly Creek Watersheds. Flow from both the Powers Creek and Lambly Creek Watersheds are controlled through a series of reservoirs and dams to ensure a consistent and steady supply year-round. The Powers Creek Watershed ultimately converges into Powers Creek which supplies the Powers Creek Water Treatment Plant, and the Lambly Creek Watershed converges to Lambly (Bear) Creek and some of its waters are diverted to the Rose Valley Reservoir and then the Rose Valley Water Treatment Plant.

Powers Creek Source Water Quality

The Powers Creek watershed encompasses ~136 km² with an elevation range from 340 m at Okanagan Lake to 1,860 m at the summit of Whiterocks Mountain. The Powers Creek Community Watershed source area is ~131 km² and includes the portion of the watershed upstream of the old Westbank System intake. The Alocin Creek Community Watershed source area is ~ 5 km² and is situated within the Nicola River watershed (for the purpose of this report it is considered part of the Powers Creek Community watershed).



Figure 2: Powers Creek Watershed (PCWSA)

Lambly Creek and Rose Valley Source Water Quality

Lambly Creek and Rose Valley are designated Community Watersheds and provide drinking water to the Rose Valley Water Service Area. The Lambly Creek watershed area, upstream of the intake, is ~232 km² and is located on the western shore of Okanagan Lake. Elevations range from 342 m at the mouth of the creek at Okanagan Lake to over 1,900 m at the summit of Terrace Mountain.

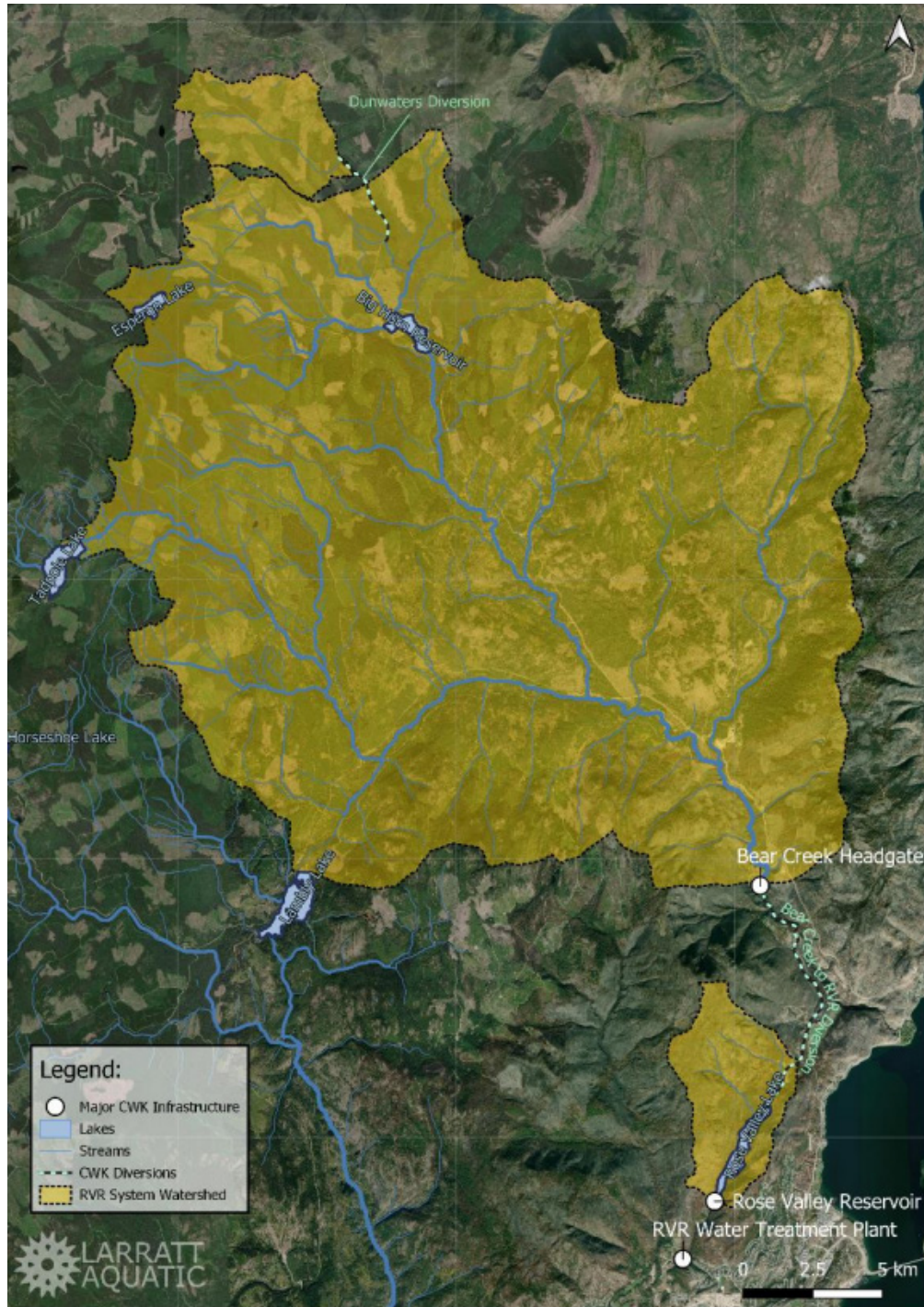


Figure 3: Lambly Creek and Rose Valley Reservoir Watershed

Treatment System

To supply water to domestic customers, the City has developed a plan to meet provincial *Drinking Water Treatment Objectives (Microbiological) for Surface Water Supplies in British Columbia* that is supported by Interior Health.

Source water for the City of West Kelowna is treated at two water treatment plants (WTP): Powers Creek WTP, commissioned in 2007, serves approximately 15,800 customers through approximately 5,200 connections in the Powers Creek Water Service Area; Rose Valley WTP provides water to the Rose Valley Water Service Area, which combined the legacy Lakeview, Sunnyside/Pritchard, and West Kelowna Estates Systems, and serves approximately 19,600 customers through 8,550 connections.

As outlined in the West Kelowna Water Utility Master Plan, which is receiving an update for 2025/2026, the City started operating the new Rose Valley Water Treatment Plant (RVWTP), to treat water from the Rose Valley Reservoir source, in November 2023. RVWTP supplies water to the former Lakeview, West Kelowna Estates and Sunnyside/Pritchard Systems, collectively renamed the Rose Valley Water Service Area. The City received a grant of \$41,002,000 from the Governments of Canada and British Columbia through the Clean Water and Wastewater Fund to construct the facility, which is currently in the commissioning phase.

Drinking water treatment objectives for surface water supplies are outlined by *B.C.'s Drinking Water Officers' Guide*. This guide, last updated in 2024, outlines the following objectives:

- Two treatment processes for surface water.
- Less than or equal to (\leq) one nephelometric turbidity unit (NTU) of turbidity.
- No detectable E. Coli, fecal coliform and total coliform.

Both the Powers Creek and Rose Valley WTPs use DAF (Dissolved Air Filtration), granular media filtration, and disinfection with both UV radiation and chlorine or hypochlorite dosing. A multi-barrier treatment strategy, filtration, UV and chlorine disinfection, was adopted to achieve the 4-log reduction or inactivation of viruses. Together these measures work to achieve the treatment objectives outlined above.

The City of West Kelowna publishes monthly water quality data from both WTPs which exhibit the fulfillment of these objectives. These reports are available under the *Water Quality and Reporting* webpage at westkelownacity.ca/waterquality.

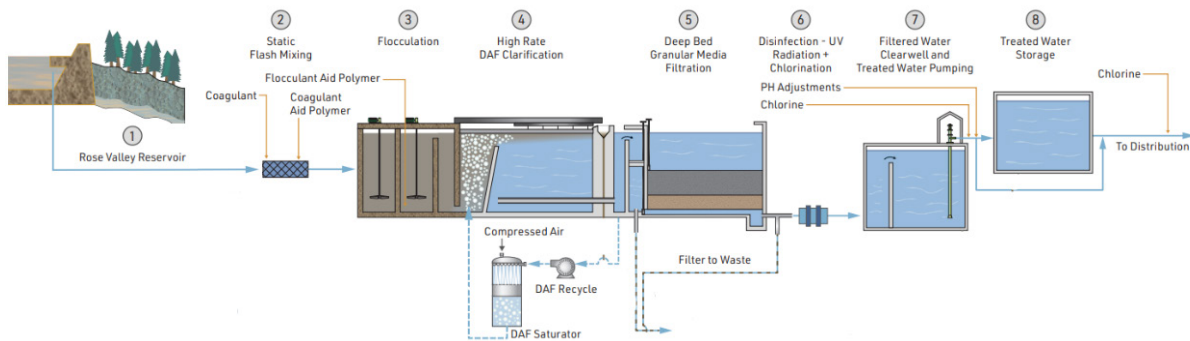


Figure 4: Water Treatment Plant Diagram

Distribution System

The City of West Kelowna distributes an average of 26 Megaliters (MLs) of water per day, and up to 63.85 ML/day during peak demand, via more than 300km of watermains and other components including 16 reservoirs, 78 PRVs, and 18 pump/booster stations before diverging into a large network of smaller water lines used to service each customer. A wide array of components and a variety of pipe materials are in use within the distribution network, each of which has an expected service life (ESL). The ESL for the various components of the water distribution network inform planning and budgetary considerations for necessary upgrades and replacements.

Capital projects completed or in progress in 2024, which support the maintenance of these components, are listed below:

- Completion of the Menu Rd Reservoir/Control Valve/Pump Station
- Mission Hill Reservoir Perimeter Fencing
- Advancement of SCADA Backbone, Radio Communications and PLC Update Project
- Completion of Generator Installation Project at McPhail Reservoir/Booster System
- Decommissioning of the Evergreen Reservoir in PCWSA
- Continuation of Electrical and Instrumentation Critical Spare Component Replacement/Inventory Project
- Commencement of Water Utility Master Plan Update
- Advancement of Cross Connection Control Survey Project
- Commenced NFPA Fire Flow Testing Project



Figure 5: Crews working on the Menu Road Upgrades

3 WATER QUALITY SAMPLING PROGRAM AND RESULTS

Water Quality Regulations and Treated Water Goals

Water suppliers are responsible for delivering safe drinking water as outlined in the *Health Canada Guidelines for Canadian Drinking Water Quality*, and *Schedule A of the Drinking Water Protection Regulation of B.C.* These guidelines provide parameters which outline acceptable limits for a wide range of possible water contaminants. The City publishes monthly and annual water testing and quality data on the *Water Quality and Reporting* webpage at westkelownacity.ca/waterquality. A summary of these results for the Rose Valley and Powers Creek Water Treatment Plants are included in *Appendix B*.

These treatment objectives provide a minimum performance target to produce microbiologically safe drinking water. Depending on specifics to the source water, the actual amount of treatment required will depend on the risks identified; and greater levels of treatment may be required.

Water treatment is only one part of the multi-barrier approach to providing safe drinking water. Protecting and maintaining the source water and the distribution system are important complementary steps to dealing with microbiological or other risks.



Figure 7: Rose Valley Water Treatment Plant

Guidelines for Canadian Drinking Water Quality The *Guidelines for Canadian Drinking Water Quality* lists adhering to its microbiological parameters (Included in Table 3 below) as the highest priority for safe drinking water as microorganisms such as disease-causing bacteria, protozoa, and viruses pose the most significant risk to people’s health. Test results from the Powers Creek and Rose Valley Water Treatment Plants for 2024 fall within all microbiological parameter guidelines for E. coli and total coliforms.

Microbiological Parameters		
Parameter	Guideline	Health Consideration
Escherichia coli (E. coli)	None detectable per 100mL	Indicator of fecal contamination. Pathogens in human and animal feces pose the greatest immediate danger to public health.
Total coliforms	None detectable per 100mL	Not used as indicator of health effects; tool to determine how well the water treatment system is operating.
Turbidity	1.0 NTU (Nephelometric Turbidity Units)	The presence of particles (turbidity) can harbour microorganisms, protecting them from disinfection, and can entrap heavy metals and biocides; elevated or fluctuating turbidity in filtered water can indicate a problem with the water treatment process and a potential increased risk of pathogens in treated water.

Table 3.1: Microbiological Parameters according to the Guidelines for Canadian Drinking Water Quality



Figure 8: Inside the Rose Valley Water Treatment Plant

BC Drinking Water Protection Regulation

Alongside meeting the *Guidelines for Canadian Drinking Water Quality*, water suppliers must also adhere to *Schedules A and B of B.C.’s Drinking Water Protection Regulation* shown below in Tables 3.2 and 3.3.

The City of West Kelowna surpasses Schedule B’s sampling requirements in each of the water service area populations of the Powers Creek Water Service Area (15,800) and the Rose Valley Water Service Area (19,600). All sample results met the standards set out in *Schedule A* of the *Drinking Water Protection Regulation*. Those samples satisfy the E. coli requirements as per *Schedule A*.

Parameter	Standard
Escherichia coli	No detectable Escherichia per 100mL
Total coliform bacteria (b) more than 1 sample in a 30 day period	At least 90% of samples have no detectable coliform bacteria per 100mL and no sample has more than 10 total coliform bacteria per 100mL

Table 3.2: Water Quality Standards for Potable Water

Population Served by the Prescribed Water Supply System:	Number of Samples Per Month
Less than 5000	4
5000 to 90 000	1 per 1 000 of population
More than 90 000	90 plus 1 per 10 000 of population in excess of 90 000

Table 3.3: Frequency of Monitoring Samples for Prescribed Water Supply Systems

CARO Lab	Total Coliforms			E.coli		
	# of Tests	Average	# of exceedances	# of Tests	Average	# of exceedances
RVWSA	503	<1	0	503	<1	0
PCWSA	236	<1	0	236	<1	0

Table 3.4: Bacteriological results for 2024 in both distribution systems tested via external analytical lab CARO Analytical Services.

In-House Lab	Total Coliforms			E.coli		
	# of Tests	Average	# of exceedances	# of Tests	Average	# of exceedances
RVWSA	101	<1	0	101	<1	0
PCWSA	53	<1	0	53	<1	0

Table 3.5: Bacteriological results for 2024 in both distribution systems tested via internal lab at the RVWTP utilizing the IDEXX methodology.

The Guidelines further state that chemical substances are generally only a concern if they are present above guideline levels, and exposure to them occurs over a period of years. In 2024, there were short-term exceedances reported publicly and noted for manganese and disinfection by-products.

Manganese Event

Background

Over the summer months, increased manganese and iron content occurred within the Rose Valley Reservoir source water. The manganese also precipitated in the watermains, post treatment, and levels at some points in the distribution system (see Table 3.6) exceeded the maximum acceptable concentration (MAC) for drinking water as per Health Canada guidelines, and City staff took mitigative action and reported out publicly.

Workers at Rose Valley Water Treatment Plant implemented temporary pre-treatment measures to effectively reduce the manganese content. Upon seeing the success of their efforts, work began on a permanent installation to replace the temporary one; this new addition will serve to provide ongoing treatment to address future instances of elevated manganese coming from the Rose Valley Reservoir source water. This process is outlined in further detail in *Section 4: Evolving Guidelines*. A modernized aeration system was also identified as a need and will be installed to aid in oxidation of the source water.



Figure 9: Rose Valley Reservoir

What Happened

Elevated manganese in Rose Valley Reservoir source water is a known issue that has occurred in the past, and the 2023 McDougall Creek Wildfire contributed further to conditions, which gave rise to the 2024 event. A lack of dissolved oxygen in the reservoir is caused by high temperatures and decomposition of algae and other organic matter. The McDougall Creek Wildfire is suspected to have played a role because the aftermath of fires in watersheds can result in elevated nutrients in adjacent water, leading to increased organic matter and subsequent algae growth and decomposition.

Typically, if manganese is present in source water, it will oxidize with dissolved oxygen in the water. This creates particulate matter, which can then be removed through treatment plant filtration processes. However, if dissolved oxygen in the water is diminished, this oxidation cannot occur. As a result, the manganese passes through the treatment plant and into the treated water system, which presents itself as colour and odour in the water. This occurred in July and September 2024.

Rosevalley Water Service Area									
Location	13-May-24	09-Jul-24	24-Jul-24	31-Jul-24	08-Aug-24	07-Oct-24	28-Oct-24	27-Nov-24	Average
Rv Trails SS	0.0048		0.1080	0.0755	0.0059	0.0003	0.0058	0.0074	0.0297
Thacker SS	0.0033		0.0443	0.0612	0.0045	0.0005	0.0056	0.0059	0.0179
Bridgeview SS			0.0833	0.0302	0.0044	0.0002	0.0052		0.0247
Shannon Way SS	0.0017		0.0599	0.0360	0.0061	0.0002	0.0046	0.0055	0.0163
Tallus Res			0.0634	0.0660	0.0395	0.0027	0.0019		0.0347
Lakeview Cove PS			0.0492	0.1080	0.0056	0.0007	0.0051		0.0337
Stevens Rd/Utility Yard		0.0573	0.0912	0.0682	0.0044	0.0005	0.0056		0.0379
Menu PS	0.0057	0.0543	0.0603	0.0666	0.0030	0.0004	0.0054	0.0061	0.0252
Pritchard SS	0.0023		0.1270	0.1020	0.0090	0.0007	0.0041	0.0087	0.0363
Sunnside SS				0.0951	0.0080	0.0008	0.0082		0.0280
Boucherie PS - Inlet			0.0735						0.0735
Boucherie PS - Outlet			0.0626						0.0626
Voignier PRV	0.0120				0.0064	0.0006	0.0011	0.0046	0.0049
Upper Boucherie PS			0.0648	0.0515	0.0243	0.0010	0.0025		0.0288
Blackwood PS	0.0039	0.1070	0.1680	0.1650	0.0073	0.0003	0.0046	0.0055	0.0577
McPhail PS			0.0845	0.1040	0.0177	0.0003	0.0045		0.0422
Horizon SS	0.0059		0.0857	0.1320	0.0050	0.0002	0.0040	0.0047	0.0339
Pettman PS			0.1300	0.1610	0.0118	0.0003	0.0040		0.0614

Table 3.6: Manganese results throughout the distribution system for the RVWSA.

Notification

During this period of elevated manganese, the City of West Kelowna followed Health Canada’s recommendation on manganese in drinking water and issued a notification to the public not to mix baby formula with coloured water as a precaution. Health Canada’s [Guidelines for Canadian Drinking Water Quality](#) state, “Formula reconstituted with tap water can be an important source of exposure to

manganese for bottle-fed infants. In areas where the level of manganese in drinking water is above the guideline, it is recommended that an alternate source of water be used to reconstitute infant formula.” Further information on drinking water with elevated manganese levels can also be found on the appropriate HealthFile ([HealthLinkBC File #49g Manganese in Drinking Water](#)) found on HealthLinkBC.

Turbidity

Health Canada states, “Turbidity is a measure of the relative clarity or cloudiness of water. The turbidity of filtered water is usually measured in nephelometric turbidity units (NTU), using a device called a turbidimeter.”

If turbidity occurs due to suspended particles in water, the suspension can prevent protozoa, bacteria and other microorganisms from being disinfected.

Note, the water leaving the treatment plants did not exceed the MAC of an average of 1.0 NTU outlined by Health Canada’s guidelines. However, post-treatment, turbidity can occur within the distribution network due to hydrant use, flushing activities, watermain breaks, changes in flow or other events. Isolated, temporary color exceedances that occurred within the Rose Valley Water Service Area distribution system, in July, were attributed to the precipitation of manganese. See Table 3.7 for additional 2024 turbidity reporting:

2024 Rose Valley Turbidity Exceedances	
Testing Location	Month of and Cause for Exceedance
Thacker SS	March and July; March exceedances due to high volume demand occurring at agricultural property, short spike in turbidity occurring for a small-time window. Turbidity decreased below guidelines by the time the sample station was revisited later that day.
Lakeview Cove PS	May, July, and August; May exceedance due to pump run starting up, turbidity value was not representative of water in the main.
Blackwood PS	July
McPhail PS	July
Lower Horizon SS	July
Pettman PS	July
Menu PS	August
Pritchard SS	July, September, and November; Sep. and Nov. exceedances due to flushing activities in the Sunnyside Zone 2, zone was on a precautionary water quality advisory.
Viognier PRV	January exceedance due to running bypass in the PRV station causing a spike in turbidity, value was not representative of the water in the main at the time.
Lower Boucherie PS	July
Sunnyside SS	July
Green Bay SS	July

Table 3.7: 2024 Exceedances for Turbidity in the Rose Valley Water Service Area

Turbidity Caused by Disinfection Byproducts

Trihalomethanes (THMs) and Haloacetic Acids (HAAs) are disinfection byproducts (DBPs) that form when chlorine reacts with naturally occurring organic matter. Health Canada has set a maximum acceptable concentration (MAC) for THMs and HAAs as 0.10mg/L and 0.08mg/L respectively. The MAC is based on long-term exposure and is designed to minimize the potential health risks. The MAC compliance is based on the locational running average where the average concentration of THMs and HAAs is calculated at each sampling location based on the four quarterly samples taken over the last 12 months. This method helps account for seasonal fluctuations and provides more representative chronic exposure risks, rather than a single snapshot. Note that additional DBPs were analyzed in the Rose Valley Water Service Area in October as a follow up to the manganese event during July and August. Testing results for DBPs can be found in Appendix C.

Viognier Exceedances

The 2024 THM concentration at the Viognier Pressure Reducing Valve (PRV) exceeded the MAC based on the locational running annual average for this site. The elevated levels highlighted in Appendix C are primarily attributed to prolonged water age in the distribution zone, compounded by re-chlorination practices necessary to maintain adequate free chlorine residuals at this downstream location. Additionally, limitations associated with the original sampling point impacted the reliability and representativeness of the water quality data. The sample line was difficult to flush effectively, resulting in reduced turnover and potential stagnation. Due to these operational constraints, the sampling location was decommissioned and replaced with a new, dedicated sampling station installed on Vineyard View Drive on December 10, 2024. This change aims to improve sample quality and ensure more accurate monitoring of distribution system conditions.

4 EVOLVING GUIDELINES

Providing safe, reliable drinking water year-round is a complex task which requires operations, maintenance and monitoring conducted by highly qualified professionals (See Table 9.1 on Page 24 for a list of qualified operators).

These professionals operate a sustainable water system that is continually adapted to new technologies, climate change, aging infrastructure, and updated requirements or scientific findings. The City of West Kelowna works to adapt the water system to maintain quality in line with current and evolving standards.

Manganese Pre-treatment Improvements

Background

In 2024, the City introduced pre-treatment improvements to reduce elevated manganese leaving Rose Valley Reservoir. Larratt Aquatic prepared a memo for the City on July 30, 2024, which posits that the McDougall Creek Wildfire in 2023 will contribute to increased water temperature, nutrients, and metals, including manganese, flowing into the Rose Valley Reservoir for many years to come. This last manifested in July 2024 when water leaving the treated water reservoir measured manganese above the MAC.

Intervention

Pre-treatment adjustments were implemented in July and August 2024 to address the elevated levels of dissolved manganese (Mn) coming from the Rose Valley Reservoir source water. The corrective actions optimized oxidation processes to convert soluble manganese into its insoluble, particulate form, enabling effective removal through filtration systems at the Rose Valley Water Treatment Plant (RVWTP).

To achieve this, sodium hypochlorite (NaOCl) was dosed upstream of the RVWTP's filtration process as an interim oxidant. This temporary solution successfully facilitated the oxidation of dissolved Mn, thereby preventing breakthrough into the finished water. Following implementation, performance evaluations were conducted in collaboration with a third-party engineering consultant to assess the efficacy of alternative oxidants for long-term application.

Both sodium permanganate (NaMnO₄) and potassium permanganate (KMnO₄) demonstrated superior oxidation performance and provided additional aesthetic benefits, including reductions in taste and odour compounds. Based on these findings, a capital improvement plan has been initiated to retrofit existing dam infrastructure into a dedicated pre-oxidation facility. Commissioning of the upgraded system is anticipated for summer 2025. A modern aeration system will also be installed in the reservoir by the dam.

5 WATER SYSTEM RISKS

Mitigation Measures

Several measures are in place to safeguard the water system and ensure safe and reliable access. A few notable examples include:

- A cross-connection control program in our bylaw which restricts any person from creating a connection which may introduce contaminants to the system. This includes the requirement that backflow valves are in place at all private connections.
- Corrosion control measures in the form of using cathodic protected infrastructure.
- Implementation of watering restrictions to reduce water demand during peak consumption.



Figure 10: Bighorn Lake in the Lambly Creek Watershed

6 WATER USE AND WATER CONSERVATION

2024 Water Use

Water use needs for the City of West Kelowna vary widely between the seasons due to the irrigation and agricultural needs in the summer months. A peak flow of 63.85ML/d was measured on July 18, 2024.

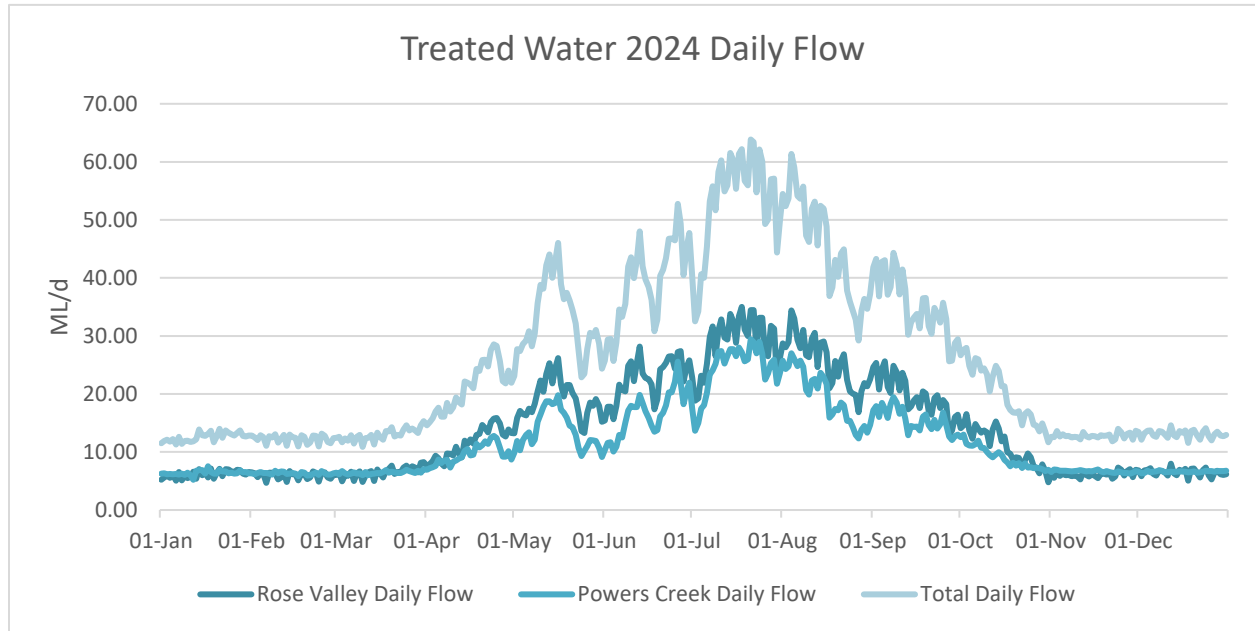
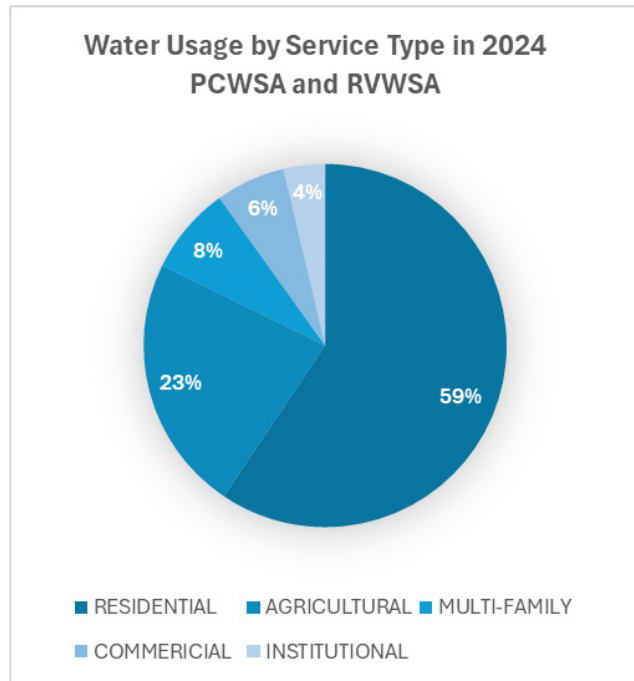


Figure 11: Treated Water 2024 Daily Flow



As seen in Figure 11, the Rose Valley Water Service Area (WSA) consistently delivers higher flows than Powers Creek WSA year-round with few exceptions, owing to the larger population served by the Rose Valley WSA versus the Powers Creek WSA (19,600 vs 15,800). The breakdown of water usage by type for 2024 can be seen in Figure 12. Note that this is an average for the entire year based on consumption data as opposed to number of water meters and as such these percentages will fluctuate depending on time of year.

Figure 12: 2024 Water Usage Breakdown

Projected Future Water Use

West Kelowna’s Official Community Plan which was adopted in summer of 2023 provides population projections starting in 2021 forward to 2040. This increased population will naturally increase the demands of our water system, as will climate change.

A rough estimate of our population-based water need is provided in Table 6 below using the same projections.

As most of the increased water demand is in the summer months, due to domestic irrigation and agriculture as noted above, these numbers only provide a conservative estimate as a breakdown of population type is not considered for the purpose of this calculation, nor is climate change considered.

Year	2021	2030	2040	2050
Population	36,085.00	41,961.00	48,223.00	54,147.00
Percent Growth	100%	116%	134%	150%
Median	21.33	24.81	33.15	49.75
Mean	25.95	30.18	40.33	60.51
Peak Daily Flow	63.85	74.25	99.22	148.89

Table 6.1: Projected Future Water Use

Rose Valley WTP has the capacity to deliver 70ML per day and is designed to increase capacity to 115ML per day to meet demands in the future for the Rose Valley Water Service Area, but conservation will still be important. Powers Creek WTP is designed with a hydraulic capacity of 55ML per day. The plant may need to be expanded as early as 2030. Staff flagged the possible need for expansion during the heat dome of 2021, when peak water demands hovered near the plant’s maximum capacities; this is to be given further consideration during the Water Utility Master Plan Update, which is currently underway.

Water Conservation

West Kelowna employs multiple methods to conserve water, including the following ongoing strategies:

Consumption-Based Metering and Billing

The City is continuing with its multi-year program to replace aging water meters, many of which are now over 15 years old. Modern, reliable meters encourage conservation because the more water a customer uses, the more they pay. Conversely, customers are rewarded with lower quarterly bills if they conserve and use water more efficiently. Residential water rates are structured in a three-tier system that increases with cumulative consumption, providing an added incentive for customers to reduce usage.

In 2024, the metering program was fully staffed with four technicians who replaced 1,483 meters.

A further 186 new meters were installed throughout the City. The new meters provide user-friendly software called EyeOnWater, in which customers can create an account and see their water usage daily and set alerts if continuous water flow is detected over a 24-hour period indicating a potential leak.

Marketing and Public Information

The City has a suite of effective communication tools, which are immediately available and readily usable, to encourage conservation and provide education:

- E-notifications sent directly to the inboxes of more than three dozen local and regional media and more than 5,000 subscribers; sign up at westkelownacity.ca/subscribe.
- Digital and print publications on popular online sites such as Castanet and in the WestK News weekly local newspaper.
- Calls to action on the City’s homepage at westkelownacity.ca and watering regulations webpage at westkelownacity.ca/wateringregulations.
- Two digital reader boards are available for placement on arterial roads and highways.
- Recurring organic and paid, boosted reach and ads on Facebook, ads on Instagram, and tweets on X throughout the irrigation season.
- Reminders posted on quarterly bills, coordinated with Utility Billing staff.

Public notices also include the use of water regulations as needed to reduce usage. These measures begin at Stage 1, which is always in effect, unless another stage is enacted, and increase through Stages 2, 3, and 4, which reduce outdoor watering consumption by 30, 60, and 100 per cent respectively. These different stages are put into effect depending on rainfall and reservoir levels. Learn more about the specifications for each stage at westkelownacity.ca/wateringregulations.

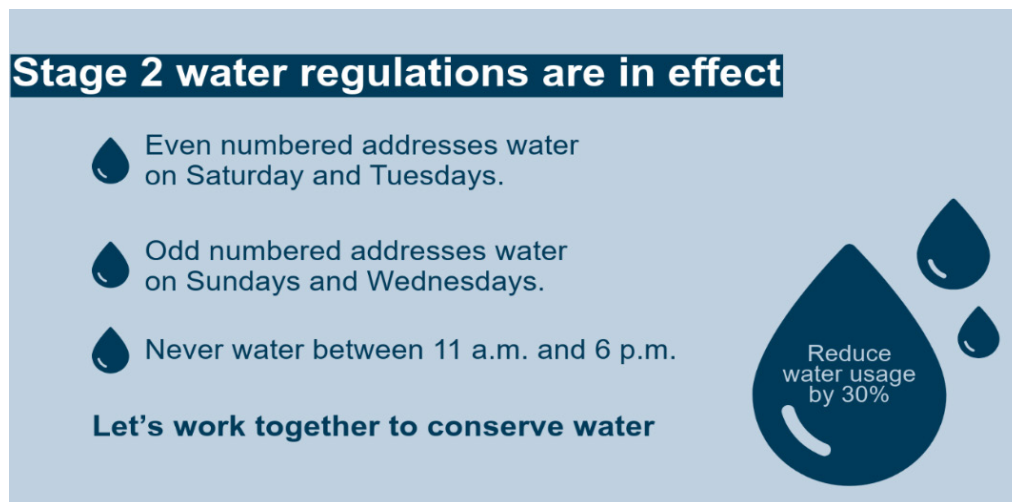


Figure 13: Example of social media image conveying City of West Kelowna Stage 2 Water Regulations

Water Loss Management and Leak Reduction

Since 2014, the City has coordinated a leakage detection program, which uses equipment, co-funded by the Okanagan Basin Water Board, to assist staff in finding leaks and making repairs. The Water Utility Master Plan found that up to 29 per cent of water supply was potentially being lost through leaks within the distribution system, with the detection program's goal of reducing losses to 10 per cent.

Low Water Capacity in the Summer

As is the case with any water system relying on surface flow from precipitation and snowmelt, the hot and dry summer months pose the risk of having reduced volume, which can pose challenges in meeting customer demands. This is compounded by the fact that water needs are higher in the summer for irrigation and agricultural needs.

7 SOURCE WATER PROTECTION

The City of West Kelowna has had an official Source Water Protection Plan in place since 2016 when Urban Systems Inc. performed an in-depth analysis of both the Powers Creek and Lambly Creek watershed areas. This analysis was coupled with a protection plan tailored for each watershed which guides the City in making decisions to protect our drinking water at its source.

This comprehensive plan details many aspects of source water protection including:

- Forestry: Eliminating forest service road runoff into reservoir through ditches and curbing.
- Access: Restricting access to sensitive areas to prevent human-introduced contamination.
- Monitoring: Continue raw water quality monitoring to identify problems and be able to address them swiftly.
- Wildfire Preparedness: Plan harvesting to reduce fuel loads to create defensible zones.
- This plan goes on to outline monitoring practices, recommendations to improve protection and sustainability, and a range of potential risks and planned responses in those events.

Many of the reservoirs used to supply West Kelowna's water are available to visit for camping or boating and are accessible through forest service roads. Being mindful of the impact we can have on these reservoirs is important, and acting with water stewardship in mind whenever these sites are visited helps to protect our water. Using only electric motors in boats, leaving no litter behind, and being careful not to alter the landscape of the area are some simple ways to ensure the safety and reliability of our water supply.

8 EMERGENCY RESPONSE & CONTINGENCY PLAN SUMMARY

The City of West Kelowna’s Emergency Response Manual for Water Systems is used for instances of emergency relating to the drinking water system. The stated goal of this plan is to reduce the risk and overall effects of these emergencies. It outlines steps which water operations staff must undertake in a variety of emergency scenarios including potable water contamination, watermain failure, loss of source water, power failures, or natural disasters such as wildfires or earthquakes. This document is updated on an annual basis.

The responses to the emergencies presented in this document are broken down into short, concise actions which clearly indicate to whom the responsibility falls to carry out these actions. A list is also included of all relevant staff and organizations which need to be informed as well as their phone numbers. This is to ensure that the correct people are notified ASAP if an emergency involving the water system does occur. Drinking water supply and drinking water safety are of paramount importance as it has direct impact on health and also on firefighting efforts. As such, a multidisciplinary response is often needed involving not just the City, but also the regional district, communications organizations, and health authorities.



Figure 14: Crews fixing a water main break in West Kelowna

9 WATER SYSTEM MANAGEMENT

The City of West Kelowna has a highly qualified team of operators who oversee a robust maintenance program for our pump stations, lake intakes, reservoirs and distribution system.

Public Works Staff Certifications				
Level of Certification	Water Distribution	Water Treatment Distribution	Powers Creek WTP and Rose Valley WTP	PCWTP/RWTP Distribution Tickets
Operator in Training	0	0	0	0
Level 1	6	2	3	2
Level 2	7	1	3	4
Level 3	4	0	5	2
Level 4	0	1	2	1
Total	17	4	13	9

Table 9.1: Number of public works staff that hold EOCP certifications



Figure 15: Crews performing maintenance work



Figure 16: Pump Station Interior

System Maintenance and Management

Distribution

- Watermains are flushed using a unidirectional procedure. The following zones were flushed in 2024:
 - RV Zones 3, 4 and 5
 - WKE Zones 1 and 2
 - SS Zones 1 and 2
- Fire Hydrants are completely disassembled and inspected on an as-needed basis
- Painting and weed whacking are completed around the hydrants as needed

Reservoirs

- Weekly security checks of tanks and compounds are completed
- Monthly reservoir water quality testing is conducted
- Human-made reservoirs are cleaned every three to five years

Pump Station

- Pumps and chlorination system are checked weekly. There are seven locations throughout both water systems that have re-chlorination occurring
- Check valves and control valves are inspected daily
- Back-up generator run testing is done monthly
- Generator load testing and maintenance are completed annually

Watermain Flushing

Watermain flushing is a process of forcing water through water mains at high speed to scour and clear pipes of sediment that may have accumulated from our source water. This is often done using a fire hydrant to allow water to flow out of the pipe system and into storm infrastructure. A precautionary water quality advisory is put in place during flushing in the event sediment can flow through into residential taps. More information on the city’s flushing program can be found at westkelownacity.ca/flushing.

Watermain Breaks

In the event of a watermain break the city has staff available 24/7 to respond to resolve the issue. These breaks can cause a reduction or loss of water pressure, and typically a boil water notice is put in place as a precaution. In 2024, six watermain break repairs were completed in the Powers Creek Water Service Area (WSA) and five were completed in the Rose Valley WSA as outlined in Table 9.2.

2024 Water Main Breaks	
Date	Location of Break
21-Jan-24	Apollo Rd
02-Feb-24	Apollo Rd
12-Feb-24	Hebert Rd
18-Mar-24	Mclver Rd
24-Apr-24	Gregory Rd
03-Jul-24	Saturn Rd
16-Jul-24	Perley Rd
12-Aug-24	Gossett Rd
30-Aug-24	Margaret Rd
31-Oct-24	Scott Cres
13-Dec-24	Concord Rd

Table 9.2: Water Main Break

Cross Connection

All agricultural, industrial, commercial, and institutional water customers are required to install and maintain a backflow prevention device, to reduce the possibility of a back-siphoning or back-pressure event. These types of devices are mandatory because they protect the City’s drinking water supply by preventing backflow contamination. The City of West Kelowna provides potable water to all customers including agricultural, industrial, commercial, institutional and residential. All water is treated and is connected to our network and therefore backflow preventers are an important tool for reducing the risk of contamination to the public drinking water system. More information on our cross-connection program can be found at westkelownacity.ca/cross-connection-program.

Frequently Asked Questions about Water Quality

Does West Kelowna add fluoride to the water?

- No, the City of West Kelowna does not add fluoride to the water.

What is the pH of West Kelowna's Water?

- The pH of West Kelowna's water usually ranges from 7.5 - 8.5.

How can I reduce possible exposure to lead from household plumbing?

- To the best of our knowledge, the City of West Kelowna does not have lead pipes for watermains and service connections.
- Items on private property that may contain lead include:
 - Lead solder used to join copper pipes (prior to 1986).
 - Brass fittings on faucets.
- A few simple things one can do to reduce exposure to lead in drinking water include:
 - Run the tap until it is cold before drinking or cooking with water from that tap.
 - Replace brass fittings.
 - Inspect the aerators on screens at the tap monthly and remove any debris.
 - Install a water filter on the tap that is certified to the NSF International standard for removal of lead.

What causes colour in water?

- Sediment and organic matter from the source water can cause discolouration.
- It can also happen within the distribution system if a fire hydrant is flushed, a watermain break occurs or a plumbing issue arises at your home such as with your filter, softener or hot water tank.

10 APPENDICES

Appendix A

Water Treatment Plant Test Results Summary

Rose Valley WTP 2024				
2024	Raw Water Turbidity	Treated Water Turbidity	Treated Water pH	Total Bacteriological Samples
January	0.35	0.03	7.68	60
February	0.45	0.06	7.64	48
March	0.80	0.03	7.68	48
April	0.96	0.02	7.62	60
May	0.88	0.03	7.64	48
June	1.03	0.08	7.57	48
July	0.57	0.40	7.59	96
August	1.12	0.05	7.74	48
September	1.35	0.04	7.62	48
October	0.44	0.02	7.72	72
November	0.22	0.02	7.86	48
December	0.14	0.02	7.71	60
2024 Average	0.69	0.07	7.67	684.00

Table A-1: Rose Valley Water Treatment Plant Testing Data 2024

Powers Creek WTP 2024				
2024	Raw Water Turbidity	Treated Water Turbidity	Treated Water pH	Total Bacteriological Samples
January	1.04	0.03	7.72	24
February	1.26	0.03	7.72	16
March	2.11	0.03	7.46	21
April	2.15	0.04	7.71	27
May	1.90	0.03	7.71	17
June	1.09	0.03	7.71	12
July	1.21	0.02	7.70	23
August	0.86	0.03	7.70	23
September	0.77	0.03	7.70	17
October	0.95	0.03	7.71	19
November	0.48	0.03	7.73	14
December	1.38	0.03	7.72	8
2024 Average	1.27	0.03	7.69	221.00

Table A-2: Powers Creek Water Treatment Plant Testing Data 2024

Appendix B

Distribution Water Quality Summary

Water Quality (WQ) field data results reflect the noted location within the distribution system at the time of grab sample collection. There are nine locations through-out both distribution systems that have online analyzers with real time data available:

- Blackwood PS
- Menu PS
- Upper Boucherie PS
- Lower Boucherie PS
- Lakeview Cove PS
- Glenrosa Res
- Lateral One PS
- Smith Creek Res & PS
- Dixie PS

		Turbidity (NTU)	Water Temp (°C)	pH	FCR (mg/L)	
System	# of Tests	Average	Average	Average	# of Tests	Average
RVWSA	1884	0.27	12.7	7.49	2017	0.53
PCWSA	1004	0.16	10.7	7.61	1001	0.52

Table B-1: Overall grab sampling WQ collected throughout both distribution systems in 2024.

Appendix C

Turbidity Results for Rose Valley & Powers Creek Water Service Areas

2024 Rose Valley Water Service Area - Grab Sample Turbidity (NTU)				
Sampling Location	# of Tests	Average	Range	# of Exceedances
RV Trails	142	0.19	0.06-0.98	0
Thacker	145	0.31	0.07-3.47	5
Bridgeview	142	0.23	0.05-0.94	0
Shannon Way	59	0.22	0.05-0.88	0
Tallus Res	119	0.26	0.07-0.84	0
Lakeview Cove	124	0.24	0.04-1.63	5
Blackwood	146	0.29	0.05-2.55	8
McPhail	146	0.29	0.06-2.22	4
Lower Horizon	133	0.26	0.05-1.62	5
Pettman	136	0.32	0.06-2.3	8
Menu	118	0.21	0.04-1.16	1
Pritchard	142	0.31	0.08-1.98	8
Viognier	57	0.36	0.08-1.32	1
Lower Boucherie	131	0.35	0.04-3.62	3
Upper Boucherie	121	0.24	0.06-0.76	0
Sunnyside	15	0.23	0.11-1.05	1
Green Bay	8	0.3	0.13-1.05	1
Total	1884	0.27	0.04-3.62	50

Table C-1: Turbidity in the RVWSA distribution network 2024.

2024 Power's Creek Water Service Area - Grab Sample Turbidity (NTU)				
Sampling Location	# of Tests	Average	Range	# of Exceedances
Lateral One	134	0.13	0.04-0.48	0
Old Okanagan	55	0.15	0.07-0.39	0
Webber	54	0.14	0.05-0.46	0
Mclver	54	0.13	0.04-0.3	0
End-Of-Line	56	0.13	0.04-0.38	0
Bulk Water Stn	130	0.17	0.00-0.68	0
SC Res	131	0.21	0.07-0.77	0
SCPS	132	0.19	0.05-0.59	0
Dixie	131	0.16	0.08-0.39	0
Glenrosa	127	0.18	0.05-0.97	0
Total	1004	0.159	0.00-0.97	0

Table C-2: Turbidity in the PCWSA distribution network 2024. No exceedances noted in the PCWSA.

Appendix D Disinfection Byproducts Testing Results

Powers Creek Water Service Area - THM Results (mg/L) MAC=0.10mg/L			
Date	Lateral One PS	End-of-Line WQS	Mclver SS
14-Feb-24	0.0311	0.0423	0.0482
13-May-24	0.0211	0.0272	0.0281
12-Aug-24	0.0368	0.0475	0.0404
27-Nov-24	0.0218	0.0486	0.0552
Average	0.0277	0.0414	0.043

Table D-1: PCWSA THM Byproduct Results

Powers Creek Water Service Area - HAA5 Results (mg/L) MAC=0.08mg/L			
Date	Lateral One PS	End-of-Line WQS	Mclver SS
14-Feb-24	0.0311	0.0423	0.0482
13-May-24	0.0211	0.0272	0.0281
12-Aug-24	0.0205	0.0242	0.0212
27-Nov-24	0.0264	0.0382	0.0476
Average	0.0248	0.0330	0.0363

Table D-2: PCWSA HAA5 Byproduct Results

Rose Valley Distribution System - THM Results (mg/L) MAC=0.10mg/L								
Date	RV Trails SS	Thacker SS	Shannon Way SS	Menu PS	Pritchard SS	Viognier PRV	Horizon SS	Blackwood PS
14-Feb-24	0.058	0.071	0.081	0.069	0.088	0.099	0.080	0.056
13-May-24	0.028	0.034	0.043	0.032	0.038	0.069	0.037	0.038
08-Aug-24	0.133	0.130	0.141	0.129	0.143	0.155	0.175	0.140
28-Oct-24	0.061	0.078	0.082	0.076	0.086	0.175	0.078	0.075
27-Nov-24	0.043	0.056	0.061	0.068	0.075	0.097	0.064	0.074
Average	0.065	0.074	0.082	0.075	0.086	0.119	0.087	0.076

Table D-3: Rose Valley WSA THM Byproduct Results

Rose Valley Distribution System - HAA5 Results (mg/L) MAC=0.08mg/L								
Date	RV Trails SS	Thacker SS	Shannon Way SS	Menu PS	Pritchard SS	Viognier PRV	Horizon SS	Blackwood PS
14-Feb-24	0.037	0.042	0.043	0.042	0.051	0.042	0.042	0.041
13-May-24	0.022	0.021	0.024	0.023	0.030	0.024	0.027	0.025
08-Aug-24	0.129	0.129	0.137	0.125	0.116	0.114	0.128	0.127
28-Oct-24	0.043	0.049	0.059	0.045	0.030	0.075	0.049	0.058
27-Nov-24	0.042	0.044	0.055	0.046	0.035	0.047	0.056	0.055
Average	0.055	0.057	0.064	0.056	0.052	0.060	0.060	0.061

Table D-4: Rose Valley WSA HAA5 Byproduct Results

Appendix F Water Quality Definitions

Refer to the Guideline for Canada Drinking Water Quality for additional information.

Alkalinity: Refers to the capability of water to resist changing pH when an acid is added. Water is said to be low in alkalinity when it is not able to neutralize acids well.

Aesthetic Objective (AO): Aesthetic effects (e.g., taste, odour) are taken into account when they play a role in determining whether consumers will consider the water drinkable.

Boil Water Notification (BWN): A notification issued by the public utility (i.e., CWK) as a preventative measure. Boil water advisories are issued when the microbiological quality of drinking water is suspected or confirmed to be compromised, meaning disease-causing microorganisms, such as bacteria, viruses or parasites, could be in the drinking water.

Escherichia coli (E. coli): Used as an indicator of the microbiological safety of drinking water.

Chemical or Physical parameters: Affect multiple aspects of water quality including human health, aesthetic considerations and operational considerations. Health Canada provides guidelines for chemical and physical parameters.

Disinfection By-Products (DBP): A chemical compound formed by the reaction of a water disinfectant (e.g. chlorine) with a precursor (e.g. natural organic matter) in a water supply.

Drinking Water Advisory: Drinking water advisories are public health protection messages issued by public health or regulatory authorities to inform consumers about actions they should take to protect themselves from real or potential health risks related to their drinking water supply. Advisories are generally precautionary, meaning they are typically issued before drinking water quality problems happen, and can take four forms in order of lowest to highest severity: Water Quality Advisory, Boil Water Notice, Do Not Consume Order and Do Not Use Order.

Drinking Water Officer (DWO): A person employed by Interior Health who has significant authority to require individuals (i.e., the CWK) to undertake action to remove a threat to drinking water quality. Such authority is granted per the Drinking Water Protection Regulation (B.C. Reg. 200/2003) and the Drinking Water Protection Act.

Water System Emergency Response and Contingency Plan (ERCP): CWK has prepared a Water System Emergency Response Plan for its drinking water system, as required under Section 13 of the Drinking Water Protection Regulation (B.C. Reg. 200/2003). The Water System ERCP summarizes possible emergencies and the person's role in responding to them.

Free Chlorine Residuals (FCR): Free chlorine is defined as the concentration of residual chlorine in water present as dissolved gas (Cl_2), hypochlorous acid (HOCl), and/or hypochlorite ion (OCl^-). A test kit which measures free chlorine will indicate the combined concentrations of HOCl , OCl^- , and Cl_2 .

Haloacetic Acids (HAA): A type of chlorination disinfection by-product (CDBP) formed when the chlorine used to disinfect drinking water reacts with naturally occurring organic matter (NOM) in water. Haloacetic acids are a relatively new disinfection by-product.

Hardness: Naturally occurring (sedimentary rock erosion and seepage, runoff from soils); levels generally higher in groundwater. Although hardness may have significant aesthetic effects, a guideline has not been established because public acceptance of hardness may vary considerably according to the local conditions; major contributors to hardness -- calcium and magnesium -- are not of direct public health concern.

Maximum Allowable Concentrations (MAC): Water in nature contains impurities, some of which may pose a health risk when ingested. To address this risk, Health Canada works with the provincial and territorial governments to develop guidelines that set out the maximum acceptable concentrations of these substances in drinking water. These drinking water guidelines are designed to protect the health of the most vulnerable members of society, such as children and the elderly and those with weakened immunity. The guidelines set out the basic parameters that every water system should strive to achieve in order to provide the cleanest, safest and most reliable drinking water possible.

Microbiological contaminants: Contaminants such as bacteria, protozoa and viruses naturally occurring in water, soil and vegetation or entering raw water sources from human and animal feces, that pose health risks to end users of public water supply and distribution systems.

pH: A measure of hydrogen ion concentration; a measure of the acidity or alkalinity of a solution. Aqueous solutions at 25 degrees Celcius with a pH less than seven are acidic, while those with a pH greater than seven are basic or alkaline. A pH of seven is neutral.

Sodium Hypochlorite solution: A liquid chlorine product used for disinfection of drinking water. Molecular formula is Na₂OCl.

Total Chlorine Residual (TCR): Remaining chlorine concentration after chlorine demand of water.

Total coliforms: Total coliforms should be monitored in the distribution system because they are used to indicate changes in water quality.

Trihalomethanes (THMs): A type of chlorination disinfection by-product (CDBP) that is formed when the chlorine used to disinfect drinking water reacts with organic and non-organic matter.

Turbidity: Naturally occurring organic (decomposed plant and animal debris, microorganisms) and inorganic (clays, silts, metal precipitates) particles that reduce water quality by harbouring microorganisms and protecting them from disinfection, and entrapping heavy metals and biocides. The units of turbidity are called Nephelometric Turbidity Units (NTU), which refers to the instrument used to measure turbidity (a calibrated nephelometer).

LSI: The Langelier Index is one of several tools used by water operators for stabilizing water to control both internal corrosion and the deposition of scale. Water supply operators can optimize their water supply systems and identify leakage potentials with the Langelier Index.