



2025 ANNUAL DRINKING WATER REPORT
Columbia Ridge Waterworks
Small Water System



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Introduction

Columbia Ridge is located approximately 10 km south of Fairmont Hot Springs Resort, British Columbia.

Bluestem Utilities ULC. owns and operates the utility infrastructure associated with Columbia Ridge Waterworks. Specifically, the water treatment plant, water distribution network and fire hydrants. The distribution network serves approximately 160 residential connections with 35 fire hydrants.

Columbia Ridge Waterworks water treatment plant is classified as Small Water System facility by the EOCP (Environmental Operators Certification Program). Bluestem Utilities has one chief operator and one part-time operator for water treatment and distribution system and fire hydrants maintenance. This ensures that at least one operator is on site or available to provide twenty-four-hour emergency on-call coverage.

Providing clean, potable, and aesthetically pleasing drinking water for its customers is at the forefront of our responsibilities. This is accomplished by maintaining regular monitoring, sampling, and maintenance schedule.

Upgrade

A new backup generator has been installed to supply water during power outages. A SCADA (Supervisory Control and Data Acquisition) is in the process of being installed.

SCADA is an industrial control system that uses software and hardware to monitor and control processes in real-time. It collects data from sensors and equipment, displays it on a central interface, and allows operators to issue commands for remote control and respond to any alarms.

System Overview

Water Source

Columbia Ridge Waterworks has two water sources. The primary source is Beardsley Spring (Figure 1) which is used year-round and gravity fed. The second source is Columbia Lake (Figure 2) which is used during high demand and fed by a pump system, usually from May until October. During the summer season the two sources are blended.



Figure 1 Beardsley Spring



Figure 2 Columbia Lake

Treatment

The water source from Beardsley Spring is gravity fed year-round, and the Columbia Lake source is pumped to the reservoir during the summer months.

The Bluestem Utilities operator administers a dosage of 12% Sodium Hypochlorite via a pump when the reservoir is being filled. The level of chlorine leaving the treatment plant is usually around 1.00 mg/L. This creates a very efficient disinfection process by inactivating many microorganisms.



Sodium Hypochlorite

Reservoir

There are two reservoirs with a total capacity of 910 cubic meters (figure 3). Each reservoir is equipped with a mixer. The reservoirs fill up via a level sensor. When the level decreases from 2.80 meters (maximum level) to 2.70 meters the Beardsley Creek source will start to fill up the reservoir. When the reservoir decreases to 2.50 meters due to consumption demand, the Lake Columbia pump turns on filling the reservoir at the same time as the spring until it reaches 2.70 meters then Beardsley Spring fills to 2.80 meters.



Figure 3 Reservoir

Distribution system

The distribution system (figure 4) works under pressure. There are three pumps (figure 5). One pump operates continuously to maintain a pressure of 73 psi. If water demand increases, and the pressure decreases, the second pump will run to maintain the pressure. The third pump is used for supplemental fire flow.



Figure 4 Distribution



Figure 5 Pumps System

As the water leaves the reservoir, there is continuous online monitoring system of turbidity (figure 6), chlorine residual (figure 7) and the volume of water leaving including the rate of flow (figure 8).



Figure 6 Turbidity Meter



Figure 7 Chlorine Analyzer



Figure 8 Flow Meter

Water Distribution

In 2025 we have treated and distributed approximately 70 612 cubic meters of water (70,612,000L). Chart 1 below illustrates the amount of water that was treated daily from January to December 2025. Note that Columbia Ridge area is a seasonal destination with few full-time residents. Higher flows can be expected through the summer months (June – Oct) due to higher occupancy rates. Summer irrigation also factors into a higher demand during these months.

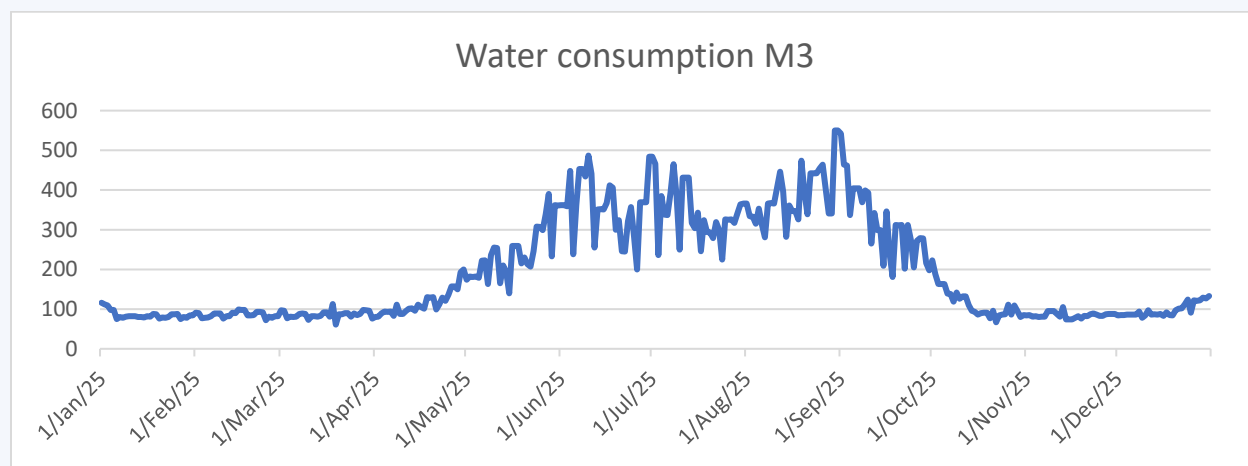


Chart 1: water consumption 2025.

Monitoring the Small Water System

Five times per week, Bluestem Utilities operators perform a set of daily rounds consisting of operational checks of the Beardsley Spring, Columbia Lake station, the water system and the distribution of water throughout the area including fire hydrants.

Chlorine residual and turbidity checks are also completed on the same frequency by an operator with portable instruments. By completing these checks, this ensures an adequate chlorine residual and turbidity level throughout the entire system.

Chlorine residual concentrations usually range from 0.30 to 2.0 mg/L in many Canadian drinking water distribution systems. Bluestem Utilities operators try to maintain the residual around 0.85 mg/L to 1.00 mg/L in the reservoir to ensure proper disinfection while minimizing the taste of chlorine for the customer.

During the summer months the turbidity tends to increase due to supplies of water coming from the lake. Turbidity is one of the most important measurements of water quality. Turbidity is a measurement of the clarity of the water and gives an indication of the number of particles in the water that can't be seen by the naked eye. A rise in turbidity can help alert an operator of changes in raw water quality. Higher turbidity (more particles) can harbor microorganisms, shielding them from disinfection. The turbidity levels should never exceed 1.0 NTU. As noted below, the highest turbidity level recorded in 2025 at the Columbia Ridge reservoir was 0.64 NTU.

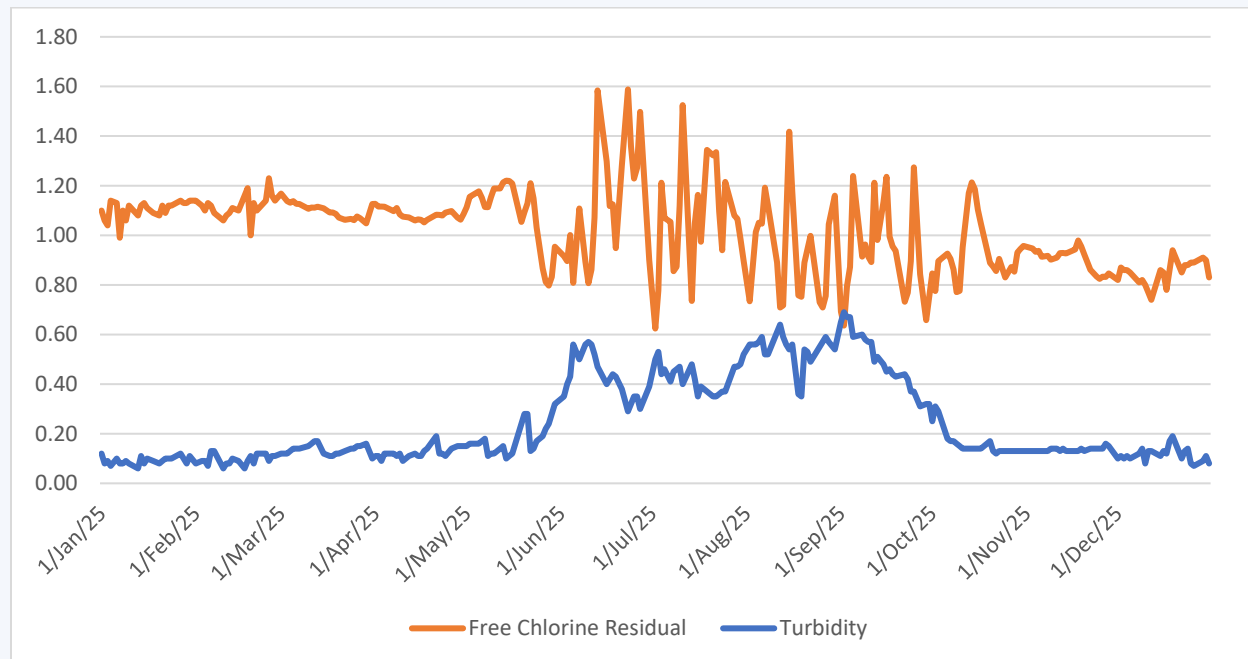


Chart 2: Chlorine & Turbidity 2024

Water Quality

Full Potability Analysis of Beardsley Spring and Columbia Lake

A full water potability test was completed on August 14, 2025, for Beardsley Spring and Columbia Lake. This testing is completed prior to any treatment; therefore, it provides a very accurate representation of the water quality coming from these water sources.

		COLUMBIA RIDGE BEARDLY SPRING INTAKE	COLUMBIA RIDGE COLUMBIA LAKE INTAKE
		14-Aug-2025 12:30	14-Aug-2025 12:30
		CG2511487-001	CG2511487-002
Unit		Result	Result
Physical Tests			
Absorbance, UV (254nm)	AU/cm	<0.0050	0.0260
Alkalinity, bicarbonate (as CaCO ₃)	mg/L	228	126
Alkalinity, carbonate (as CaCO ₃)	mg/L	12.8	9.8
Alkalinity, hydroxide (as CaCO ₃)	mg/L	<1.0	<1.0
Alkalinity, total (as CaCO ₃)	mg/L	241	136
Colour, true	CU	<5.0	<5.0
Conductivity	µS/cm	399	298
Hardness (as CaCO ₃), from total Ca/Mg	mg/L	237	157
Langelier index (4°C)	-	0.753	0.350
pH	pH units	8.39	8.39
Solids, total dissolved [TDS]	mg/L	207	184
Solids, total suspended [TSS]	mg/L	14.7 DLIS	12.1 DLIS
Temperature, sample	°C	20.2	20.1
Turbidity	NTU	11.8	19.9
Transmittance, UV (254nm)	% T/cm	100	94.2
Anions and Nutrients			
Ammonia, total (as N)	mg/L	<0.0050	<0.0050
Chloride	mg/L	0.34	6.15
Fluoride	mg/L	0.060	0.071
Nitrite (as N)	mg/L	<0.0010	<0.0010
Nitrogen, total organic	mg/L	<0.056	0.286
Phosphorus, total	mg/L	<0.0020	0.0066
Sulfate (as SO ₄)	mg/L	11.4	31.8
Nitrate (as N)	mg/L	0.144	<0.0050
Kjeldahl nitrogen, total [TKN]	mg/L	<0.050	0.286
Nitrogen, total	mg/L	0.144	0.286

Cyanides			
Cyanide, strong acid dissociable (Total)	mg/L	<0.0020	<0.0020
Organic / Inorganic Carbon			
Carbon, total organic [TOC]	mg/L	<0.50	2.27
Microbiological Tests			
Coliforms, total	MPN/100 mL	8	1410
Heterotrophic plate count [HPC]	MPN/100 mL	90	21900
Coliforms, Escherichia coli [E. coli]	MPN/100mL	<1	<1
Aggressivity	-	Aggressive	Aggressive
Bacteria, iron related, population estimate	CFU/mL	9000	9000
Total Metals			
Aluminum, total	mg/L	<0.0030	0.0061
Antimony, total	mg/L	<0.00010	<0.00010
Arsenic, total	mg/L	0.00018	0.00123
Barium, total	mg/L	0.185	0.0756
Boron, total	mg/L	0.012	<0.010
Cadmium, total	mg/L	<0.0000050	<0.0000050
Calcium, total	mg/L	42.5	29.3
Chromium, total	mg/L	<0.00050	<0.00050
Copper, total	mg/L	0.00235	<0.00050
Iron, total	mg/L	<0.010	0.173
Lead, total	mg/L	0.000310	0.000060
Magnesium, total	mg/L	31.8	20.3
Manganese, total	mg/L	0.00026	0.0190
Mercury, total	mg/L	<0.0000050	<0.0000050
Molybdenum, total	mg/L	0.00155	0.000558
Potassium, total	mg/L	0.813	0.841
Selenium, total	mg/L	0.000201	0.000057
Sodium, total	mg/L	4.73	6.43
Strontium, total	mg/L	0.111	0.194
Uranium, total	mg/L	0.00203	0.000858
Zinc, total	mg/L	0.0062	<0.0030

Microbiological Test

Bacteriological sampling is done biweekly at two locations. Location one is the reservoir, location two is Spirits Reach. These samples are sent to Interior Health Authority to test E. Coli bacteria and total coliforms.

On June 18, 2025, during the installation of the genset, a Boil Notice Advisory (BNA) was issued due to water interruption in the distribution system. As required by Interior Health Authority (IHA), water samples need to be collected two days in a row. The first sample on June 18, 2025, came back negatively. The second sample on June 19, 2025, came back positively, therefore meaning these samples had to be redone to satisfy the IHA. The notice was removed on June 24, 2025.

On December 16, 2025, during the upgrade of the water system a Boil Notice Advisory (BNA) was issued due to water interruption in the distribution system. As required by Interior Health Authority (IHA), water samples need to be collected two days in a row. The water samples came back negatively; therefore, the BNA was removed on December 19, 2025.

Columbia Ridge Waterworks Bacteria Test Result

Date	Reservoir E. coli	Reservoir Total Total Coliform	# 6 Spirits Reach E. coli	# 6 Spirits Reach Total Coliform	Acceptable
Jan 08 2025	<1	<1	<1	<1	yes
Jan 22 2025	<1	<1			yes
Feb 05 2025	<1	<1			yes
Feb 19 2025	<1	<1			Yes
March 05 2025	<1	<1			yes
March 17 2025	<1	<1			Yes
April 02 2025	<1	<1			yes
April 16 2025	<1	<1	<1	<1	yes
April 30 2025	<1	<1	<1	<1	yes
May 14 2025	<1	<1	<1	<1	yes
May 27 2025	<1	<1	<1	<1	yes
June 11 2025	<1	<1	<1	<1	Yes
June 25 2025	<1	<1	<1	<1	Yes
July 09, 2025	<1	<1	<1	<1	Yes
July 23, 2025	<1	<1	<1	<1	Yes
Aug 06, 2025	<1	<1	<1	<1	yes
Aug 20, 2025	<1	<1	<1	<1	yes
Sept 03, 2025	<1	<1	<1	<1	yes
Sept 17, 2025	<1	<1	<1	<1	yes
Oct 01, 2025	<1	<1	<1	<1	yes
Oct 15, 2025	<1	<1	<1	<1	yes
Oct 29, 2025	<1	<1	<1	<1	Yes
Nov 12, 2025	<1	<1	<1	<1	yes
Nov 25, 2025	<1	<1	<1	<1	yes
Dec 16, 2025			< 1	< 1	yes
Dec 17, 2025			< 1	< 1	yes

THM, HAA tests

Trihalomethane (THM) and Halo Acetic Acids (HAA) are a byproduct of the water treatment process. They are formed when natural organic material, such as the decaying vegetation commonly found in lakes and reservoirs, reacts with chlorine used to treat the water. This reaction produces disinfection byproducts, the most common of which are THMs and HAAs. THM and HAA tests are performed tertiary in 2025. These samples are sent to ALS Laboratory in Calgary. The chemical sample results were acceptable and there were no chemical exceedances under the Canadian & BC Guidelines for Drinking Water Quality.

Columbia Ridge Waterworks	unit	16-Apr-25	16-Jul-25	15-Oct-25
		Result	Result	Result
Volatile Organic Compounds [THMs]				
Bromodichloromethane	µg/L	1.5	3.2	1.5
Bromoform	µg/L	<1.0	<1.0	<1.0
Chloroform	µg/L	2.7	29.3	5.8
Dibromochloromethane	µg/L	<1.0	<1.0	<1.0
Trihalomethanes [THMs], total	µg/L	4.2	32.5	7.3
Volatile Organic Compounds [THMs] Surrogates				
Bromo fluorobenzene, 4-	%	89.4	98.6	98.0
Di fluorobenzene, 1,4-	%	98.3	98.0	97.8
Halo acetic Acids				
Bromo chloroacetic acid	µg/L	<1.00	1.14	<1.00
Di bromoacetic acid	µg/L	<1.00	<1.00	<1.00
Dichloroacetic acid	µg/L	1.30	11.4	1.59
Monobromoacetic acid	µg/L	<1.00	<1.00	<1.00
Monochloroacetic acid	µg/L	<1.00	1.28	<1.00
Trichloroacetic acid	µg/L	1.22	10.9	1.44
Halo acetic acids, total [HAA5]	µg/L	<5.00	23.6	<5.00

System Maintenance

Bluestem Utilities operator has performed general maintenance of the water system including.

- Collect water samples and send them to independent laboratory for analysis.
- Maintenance and calibration of equipment at the water treatment plant.
- Inspection and exercising (close/open) of main water valves.
- Check pressures, flows and exercise isolation valves on fire hydrants.
- Flush the distribution system.