



2023 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.

Corix Multi-Utility Services Inc. owns and operates the utility infrastructure associated with Columbia Ridge Waterworks water treatment and water distribution network. The distribution network serves approximately 160 residential connections.

Columbia Ridge's water treatment system is classified as Small Water System facility by the EOCP (Environmental Operators Certification Program). Corix has one chief operator and three part-time operators for water treatment and distribution system working onsite. 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 to its customers is at the forefront of our responsibilities. This is accomplished by maintaining a regular monitoring, sampling, and maintenance schedule.

## System Overview

### Water Source

Columbia Ridge has two water sources. The primary source is Beardsley Spring which is used year-round. The second one is Columbia Lake which is used during the summer months, from May until October. During the summer season the two sources are blended.



*Beardsley Spring*



*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.

There is continuous online monitoring of turbidity and chlorine in the system. Corix 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. Each reservoir is equipped with a mixer. The reservoirs fill up via a level sensor. When the level decreases from 2.80 meter (maximum level) to 2.70 meter the Beardsley Creek source will start to fill up the reservoir. If the reservoir decreases to 2.40 meter due to consumption demand, the Columbia Lake pump turns on filling the reservoir at the same time as the spring.

**Distribution system**

The distribution system works on pressure. There are three pumps. One pump operates continuously to maintain a pressure of 73psi. 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.



*Pumps*



*Distribution*

A full potability report was completed on May 10, 2022. This testing is completed prior to any treatment; therefore, it provides a very accurate representation of the water quality coming from Columbia Lake and Beardsley Spring.

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**Columbia L Intake (22E1444-01) | Matrix: Water | Sampled: 2022-05-10 12:00 Calculated Parameters**

Hardness, Total (as CaCO <sub>3</sub> )	<b>169</b>	None Required	0.500 mg/L	N/A
<b>General Parameters</b>				
Alkalinity, Total (as CaCO <sub>3</sub> )	<b>151</b>	N/A	1.0 mg/L	2022-05-13
Alkalinity, Phenolphthalein (as CaCO <sub>3</sub> )	< 1.0	N/A	1.0 mg/L	2022-05-13
Alkalinity, Bicarbonate (as CaCO <sub>3</sub> )	<b>151</b>	N/A	1.0 mg/L	2022-05-13
Alkalinity, Carbonate (as CaCO <sub>3</sub> )	< 1.0	N/A	1.0 mg/L	2022-05-13
Alkalinity, Hydroxide (as CaCO <sub>3</sub> )	< 1.0	N/A	1.0 mg/L	2022-05-13
Carbon, Total Organic	<b>1.91</b>	N/A	0.50 mg/L	2022-05-12
Colour, True	< 5.0	AO ≤ 15	5.0 CU	2022-05-12
pH	<b>7.73</b>	7.0-10.5	0.10 pH units	2022-05-13 HT2
Turbidity	<b>0.57</b>	OG < 1	0.10 NTU	2022-05-12
UV Transmittance @ 254nm	<b>95.5</b>	N/A	0.10 % T	2022-05-12
<b>Microbiological Parameters</b>				
Coliforms, Total (Q-Tray)	< 1	MAC = 0	1 MPN/100 mL	2022-05-11
E. coli (Q-Tray)	< 1	MAC = 0	1 MPN/100 mL	2022-05-11
<b>Total Metals</b>				
Aluminum, total	<b>0.0078</b>	OG < 0.1	0.0250 mg/L	2022-05-14
Antimony, total	< 0.00020	MAC = 0.006	0.00100 mg/L	2022-05-14
Arsenic, total	<b>0.00051</b>	MAC = 0.01	0.00250 mg/L	2022-05-14
Barium, total	<b>0.0719</b>	MAC = 2	0.0250 mg/L	2022-05-14
Beryllium, total	< 0.00010	N/A	0.00050 mg/L	2022-05-14
Bismuth, total	< 0.00010	N/A	0.00050 mg/L	2022-05-14
Boron, total	< 0.0500	MAC = 5	0.250 mg/L	2022-05-14
Cadmium, total	< 0.000010	MAC = 0.005	0.000050 mg/L	2022-05-14
Calcium, total	<b>35.2</b>	None Required	1.00 mg/L	2022-05-14
Chromium, total	< 0.00050	MAC = 0.05	0.00250 mg/L	2022-05-14
Cobalt, total	< 0.00010	N/A	0.00050 mg/L	2022-05-14
Copper, total	< 0.00040	MAC = 2	0.00200 mg/L	2022-05-14
Iron, total	< 0.010	AO ≤ 0.3	0.050 mg/L	2022-05-14
Lead, total	< 0.00020	MAC = 0.005	0.00100 mg/L	2022-05-14
Lithium, total	<b>0.00295</b>	N/A	0.00050 mg/L	2022-05-14
Magnesium, total	<b>19.6</b>	None Required	0.050 mg/L	2022-05-14
Manganese, total	<b>0.00532</b>	MAC = 0.12	0.00100 mg/L	2022-05-14
Molybdenum, total	<b>0.00064</b>	N/A	0.00050 mg/L	2022-05-14
Nickel, total	< 0.00040	N/A	0.00200 mg/L	2022-05-14
Phosphorus, total	< 0.050	N/A	0.250 mg/L	2022-05-14
Potassium, total	<b>0.77</b>	N/A	0.50 mg/L	2022-05-14
Selenium, total	< 0.00050	MAC = 0.05	0.00250 mg/L	2022-05-14
Silicon, total	<b>1.8</b>	N/A	5.0 mg/L	2022-05-14
Silver, total	< 0.000050	None Required	0.000250 mg/L	2022-05-14
Sodium, total	<b>5.97</b>	AO ≤ 200	0.50 mg/L	2022-05-14

**Columbia L Intake (22E1444-01) | Matrix: Water | Sampled: 2022-05-10 12:00, Continued**
**Total Metals, Continued**

Strontium, total	<b>0.209</b>	MAC = 7	0.0050 mg/L	2022-05-14
Sulfur, total	<b>11.1</b>	N/A	15.0 mg/L	2022-05-14
Tellurium, total	< 0.00050	N/A	0.00250 mg/L	2022-05-14
Thallium, total	< 0.000020	N/A	0.000100 mg/L	2022-05-14
Thorium, total	< 0.00010	N/A	0.00010 mg/L	2022-05-14
Tin, total	< 0.00004	N/A	0.00020 mg/L	2022-05-14
Titanium, total	< 0.0050	N/A	0.0050 mg/L	2022-05-14
Tungsten, total	< 0.0002	N/A	0.0010 mg/L	2022-05-14
Uranium, total	<b>0.000878</b>	MAC = 0.02	0.000100 mg/L	2022-05-14
Vanadium, total	< 0.0050	N/A	0.0250 mg/L	2022-05-14
Zinc, total	< 0.0040	AO ≤ 5	0.0200 mg/L	2022-05-14
Zirconium, total	< 0.00010	N/A	0.00050 mg/L	2022-05-14

**Beardsley Springs (22E1444-02) | Matrix: Water | Sampled: 2022-05-10 14:00**
**Calculated Parameters**

Hardness, Total (as CaCO <sub>3</sub> )	<b>231</b>	None Required	0.500 mg/L	N/A
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**General Parameters**

Alkalinity, Total (as CaCO <sub>3</sub> )	<b>235</b>	N/A	1.0 mg/L	2022-05-13
Alkalinity, Phenolphthalein (as CaCO <sub>3</sub> )	< 1.0	N/A	1.0 mg/L	2022-05-13
Alkalinity, Bicarbonate (as CaCO <sub>3</sub> )	<b>235</b>	N/A	1.0 mg/L	2022-05-13
Alkalinity, Carbonate (as CaCO <sub>3</sub> )	< 1.0	N/A	1.0 mg/L	2022-05-13
Alkalinity, Hydroxide (as CaCO <sub>3</sub> )	< 1.0	N/A	1.0 mg/L	2022-05-13
Carbon, Total Organic	< 0.50	N/A	0.50 mg/L	2022-05-12
Colour, True	< 5.0	AO ≤ 15	5.0 CU	2022-05-12
pH	<b>7.68</b>	7.0-10.5	0.10 pH units	2022-05-13 HT2
Turbidity	<b>0.14</b>	OG < 1	0.10 NTU	2022-05-12
UV Transmittance @ 254nm	<b>98.6</b>	N/A	0.10 % T	2022-05-12

**Microbiological Parameters**

Coliforms, Total (Q-Tray)	< 1	MAC = 0	1 MPN/100 mL	2022-05-11
E. coli (Q-Tray)	< 1	MAC = 0	1 MPN/100 mL	2022-05-11

**Total Metals**

Aluminum, total	< 0.0050	OG < 0.1	0.0250 mg/L	2022-05-14
Antimony, total	< 0.00020	MAC = 0.006	0.00100 mg/L	2022-05-14
Arsenic, total	< 0.00050	MAC = 0.01	0.00250 mg/L	2022-05-14
Barium, total	<b>0.166</b>	MAC = 2	0.0250 mg/L	2022-05-14
Beryllium, total	< 0.00010	N/A	0.00050 mg/L	2022-05-14
Bismuth, total	< 0.00010	N/A	0.00050 mg/L	2022-05-14
Boron, total	< 0.0500	MAC = 5	0.250 mg/L	2022-05-14
Cadmium, total	< 0.000010	MAC = 0.005	0.000050 mg/L	2022-05-14
Calcium, total	<b>41.9</b>	None Required	1.00 mg/L	2022-05-14

Beardsley Springs (22E1444-02) | Matrix: Water | Sampled: 2022-05-10 14:00, Continued

*Total Metals, Continued*

Chromium, total	< 0.00050	MAC = 0.05	0.00250 mg/L	2022-05-14
Cobalt, total	< 0.00010	N/A	0.00050 mg/L	2022-05-14
Copper, total	< 0.00040	MAC = 2	0.00200 mg/L	2022-05-14
Iron, total	<b>0.039</b>	AO ≤ 0.3	0.050 mg/L	2022-05-14
Lead, total	< 0.00020	MAC = 0.005	0.00100 mg/L	2022-05-14
Lithium, total	<b>0.00251</b>	N/A	0.00050 mg/L	2022-05-14
Magnesium, total	<b>30.7</b>	None Required	0.050 mg/L	2022-05-14
Manganese, total	<b>0.00066</b>	MAC = 0.12	0.00100 mg/L	2022-05-14
Molybdenum, total	<b>0.00154</b>	N/A	0.00050 mg/L	2022-05-14
Nickel, total	< 0.00040	N/A	0.00200 mg/L	2022-05-14
Phosphorus, total	< 0.050	N/A	0.250 mg/L	2022-05-14
Potassium, total	<b>0.76</b>	N/A	0.50 mg/L	2022-05-14
Selenium, total	< 0.00050	MAC = 0.05	0.00250 mg/L	2022-05-14
Silicon, total	<b>4.7</b>	N/A	5.0 mg/L	2022-05-14
Silver, total	< 0.000050	None Required	0.000250 mg/L	2022-05-14
Sodium, total	<b>4.45</b>	AO ≤ 200	0.50 mg/L	2022-05-14
Strontium, total	<b>0.105</b>	MAC = 7	0.0050 mg/L	2022-05-14
Sulfur, total	<b>3.9</b>	N/A	15.0 mg/L	2022-05-14
Tellurium, total	< 0.00050	N/A	0.00250 mg/L	2022-05-14
Thallium, total	< 0.000020	N/A	0.000100 mg/L	2022-05-14
Thorium, total	< 0.00010	N/A	0.00010 mg/L	2022-05-14
Tin, total	< 0.00004	N/A	0.00020 mg/L	2022-05-14
Titanium, total	< 0.0050	N/A	0.0050 mg/L	2022-05-14
Tungsten, total	< 0.0002	N/A	0.0010 mg/L	2022-05-14
Uranium, total	<b>0.00195</b>	MAC = 0.02	0.000100 mg/L	2022-05-14
Vanadium, total	< 0.0050	N/A	0.0250 mg/L	2022-05-14
Zinc, total	< 0.0040	AO ≤ 5	0.0200 mg/L	2022-05-14
Zirconium, total	< 0.00010	N/A	0.00050 mg/L	2022-05-14



**Water Distribution**

In October 2022, Corix bought Columbia Ridge Waterworks. Since then, Corix has been monitoring water usage through the community. We have treated and distributed approximately 9,671 cubic meters of water (9,671,000 L). Chart 1 below illustrates the amount of water that was treated daily from October to December 2022. Note that Columbia Ridge 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.

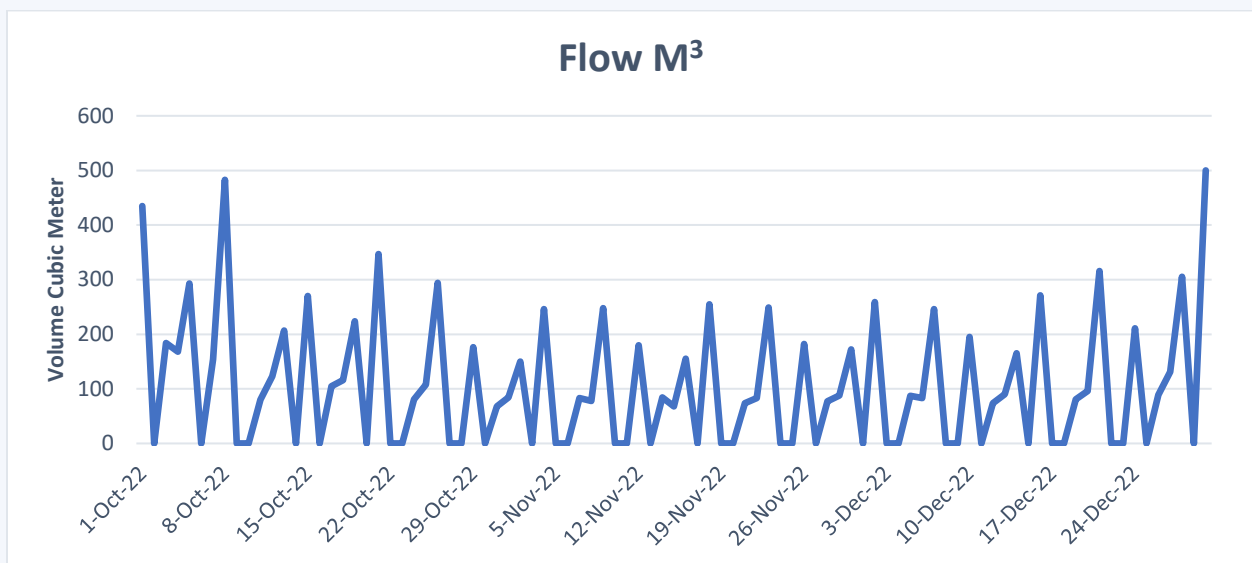
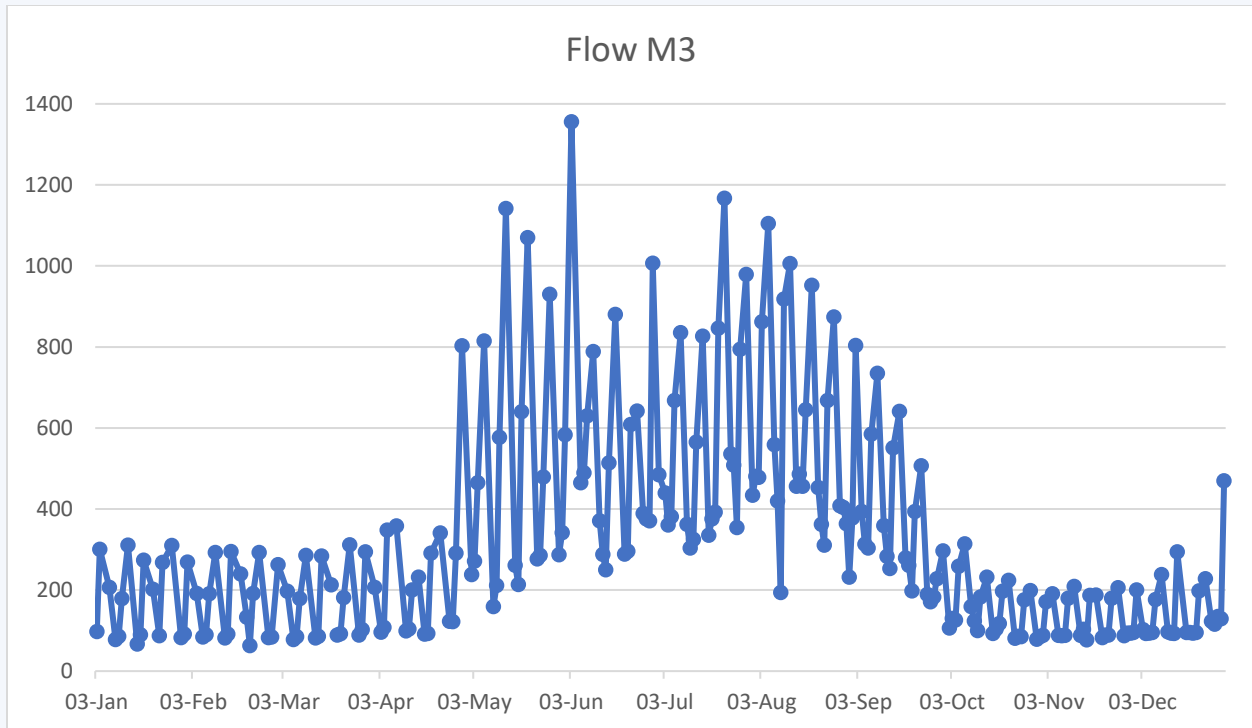


Chart 1: water used 2022.

**Water Distribution cont.**

In 2023 we have treated and distributed approximately 74 535 cubic meters of water (74,535,000L). Chart 2 below illustrates the amount of water that was treated daily from January to December 2023. Note that Columbia Ridge 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 2: water used 2023.*

**Water Quality Control**

Five times per week, Corix operators perform a set of daily rounds consisting of operational checks of the Beardsley Spring and Columbia Lake station. 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. Corix operators try to maintain the residual around 1.00 mg/L in the reservoir to ensure proper disinfection while minimizing the taste of chlorine for the customer.

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 on 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 the Columbia Ridge reservoir was 0.89 NTU.

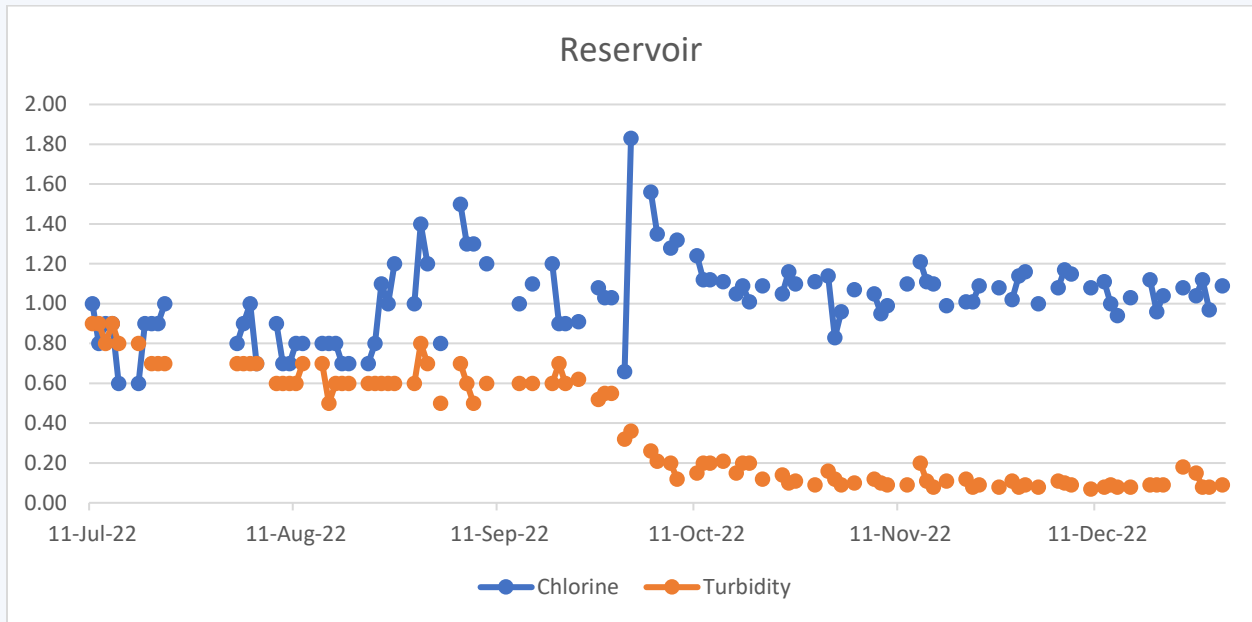


Chart 3: Chlorine & Turbidity 2022.

Year 2022	Reservoir	
	Chlorine (mg/L)	Turbidity (NTU)
Min.	0.60	0.07
Max.	1.83	0.90
Average	1.02	0.37

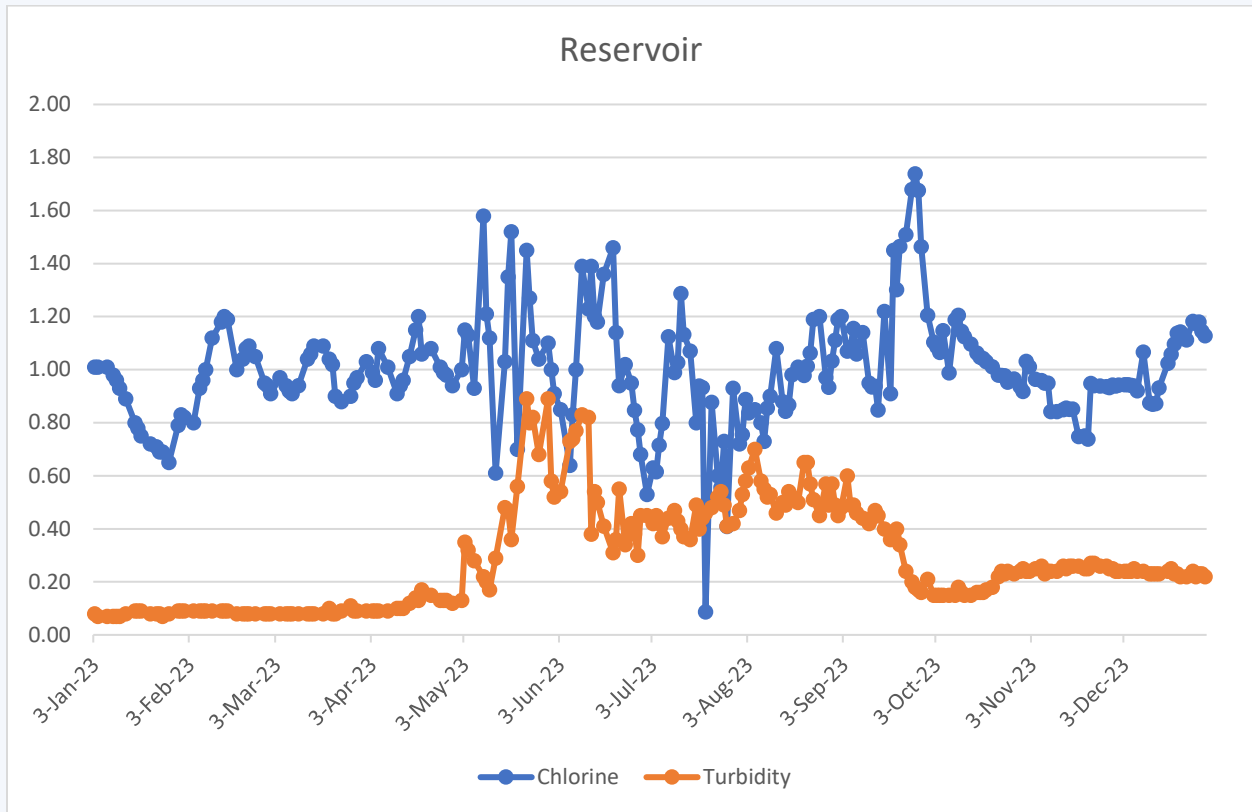


Chart 4: Chlorine & Turbidity 2023.

Year 2023	Reservoir	
	Chlorine (mg/L)	Turbidity (NTU)
Min.	0.09	0.07
Max.	1.74	0.89
Average	1.00	0.29

Bacteriological sampling is done semi-monthly at two locations. These samples are sent to Interior Health to test for E. Coli bacteria and total coliforms. Corix received zero reports of any positive test results for the year 2022 and 2023.

## **System Maintenance**

Corix has performed general maintenance of the water system including.

- Inspection and exercising (close/open) of the main valves,
- Check pressures and flows on fire hydrants,
- Flush the distribution system, and
- Located service valve (curb stop) on owners' properties.