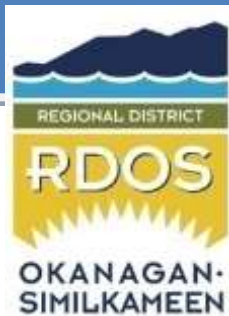


2024

ANNUAL WATER QUALITY MONITORING REPORT OLALLA WATER SYSTEM



Olalla Well Pump Station



**2024 ANNUAL WATER QUALITY MONITORING REPORT
OLALLA WATER SYSTEM
OLALLA, B.C.**

Copy prepared for:
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Table of Contents

1. Introduction	3
2. System Description	3
3. System Classification and Operator Certifications	3
3.1. System Classification	3
3.2. Operator Certification	4
4. Annual Water Usage	4
4.1. Consumption Records	4
4.2. Water Conservation	6
5. Aquifer Monitoring	7
6. Source Water Quality Monitoring	7
6.1. Source Water Bi-Weekly Monitoring	8
6.2. Source Water Potable Water Testing	8
6.2.1. Source Water General Potability Parameters	9
6.2.2. Guideline Notes for General Potability Parameters	10
6.2.3. Source Water Total Metals	11
6.2.4. Guideline Notes for Total Metals Potability	12
7. Distribution System Water Quality	13
7.1. Distribution System Bacteriological Results	13
7.2. Distribution Water Quality Field Parameters	15
7.3. Water Quality Complaints	15
8. Water System Notifications	16
8.1. Water Quality Advisory (WQA)	16
8.2. Boil Water Notice (BWN)	16
8.3. Do Not Consume (DNC)	16
8.4. Do Not Use (DNU)	16
9. Program Updates and Status	17
9.1. Cross Connection Control Program	17
9.2. Capital Works / System Additions	17
9.3. Emergency Response Plan	17
9.4. Future System Upgrades	17
9.5. Supervisory Control and Data Acquisition (SCADA System)	17
9.6. System Maintenance/Upgrades	18
9.7. Water Quality Monitoring Program	18
10. Summary	18

TABLES

Table 1: RDOS Operator Certifications 2024	4
Table 2: Annual Water Consumption 2024	4
Table 3: Olalla Well Bi-Weekly Testing 2024 Summary	8
Table 4: Olalla Well General Potability Parameters 2024	9
Table 5: Olalla Well Total Metals Potability 2024	11
Table 6: Distribution Water Bacteriological Testing 2023 Summary	14
Table 7: Distribution Field Measured Parameters 2023 Summary	15

FIGURES

Figure 1: Annual Water Consumption 2005 to 2024	5
Figure 2: Monthly Water Consumption 2022 to 2024	6
Figure 3: Olalla Aquifer Level	7

1. Introduction

As the owner and operator of the Olalla water system, the Regional District Okanagan-Similkameen is responsible for the following Annual Report summarizing the results from the 2024 *Water Quality Monitoring Program*. The report is a conditional requirement of the *Permit to Operate* issued by the Interior Health Authority (IHA) and the *BC Drinking Water Protection Act and Regulation*.

2. System Description

The Olalla water system is located approximately 40 km to the southwest of Penticton and approximately 8 km north of Keremeos within Electoral Area G. This system supplies domestic water to the community of Olalla, which has approximately 250 service connections and supports fire protection. The system consists of a single deep source groundwater well, an elevated storage reservoir, and distribution system. There is no treatment of the groundwater supplying the system.

3. System Classification and Operator Certifications

3.1. System Classification

The *Environmental Operators Certification Program (EOCP)* is responsible for the classification of potable water systems in BC.

The Olalla system remained classified as a *Small Water System (SWS)* in 2024.

3.2. Operator Certification

The *Environmental Operators Certification Program (EOCP)* is responsible in British Columbia for the certification of all water system operators. RDOS water system operators hold certification(s) in the disciplines of Water Distribution and/or Water Treatment, or are classed as an Operator-In-Training. Four levels (I-IV) of certification are achievable within each discipline. These operators attend courses, seminars and complete online training as required to maintain and augment their levels of certification. All RDOS operators are certified through the EOCP as indicated in Table 1 below.

OPERATOR EOCP CERTIFICATION No.	OPERATOR IN TRAINING	WATER DISTRIBUTION CERTIFICATION LEVELS				WATER TREATMENT CERTIFICATION LEVELS			
		IV	III	II	I	IV	III	II	I
1126		X						X	
4194				X					
4840				X				X	
4839			X						X
6926			X						X
8266					X				X
8761			X						X
9322			X						X
9342				X					
1000977				X					X
1002324	X								
1002351	X								

Table 1: RDOS Operator Certifications 2024.

4. Annual Water Usage

The annual pumping volumes extracted from the Olalla well from 2005 to 2024 is presented below. In 2024, a total of 142,931 m³ of water was pumped from the Olalla well, up from 136,433 m³ in 2023.

4.1. Consumption Records

	Cubic Meters (m ³)	US Gallons	
Annual Total Usage	142,931	37,762,370	Date
Minimum Daily Flow	67	17,701	January 2, 2024
Maximum Daily Flow	1,247	329,457	July 14, 2024

Table 2: Annual Water Consumption 2024

Both annual and monthly water consumption has been trended as shown in the following two graphs.

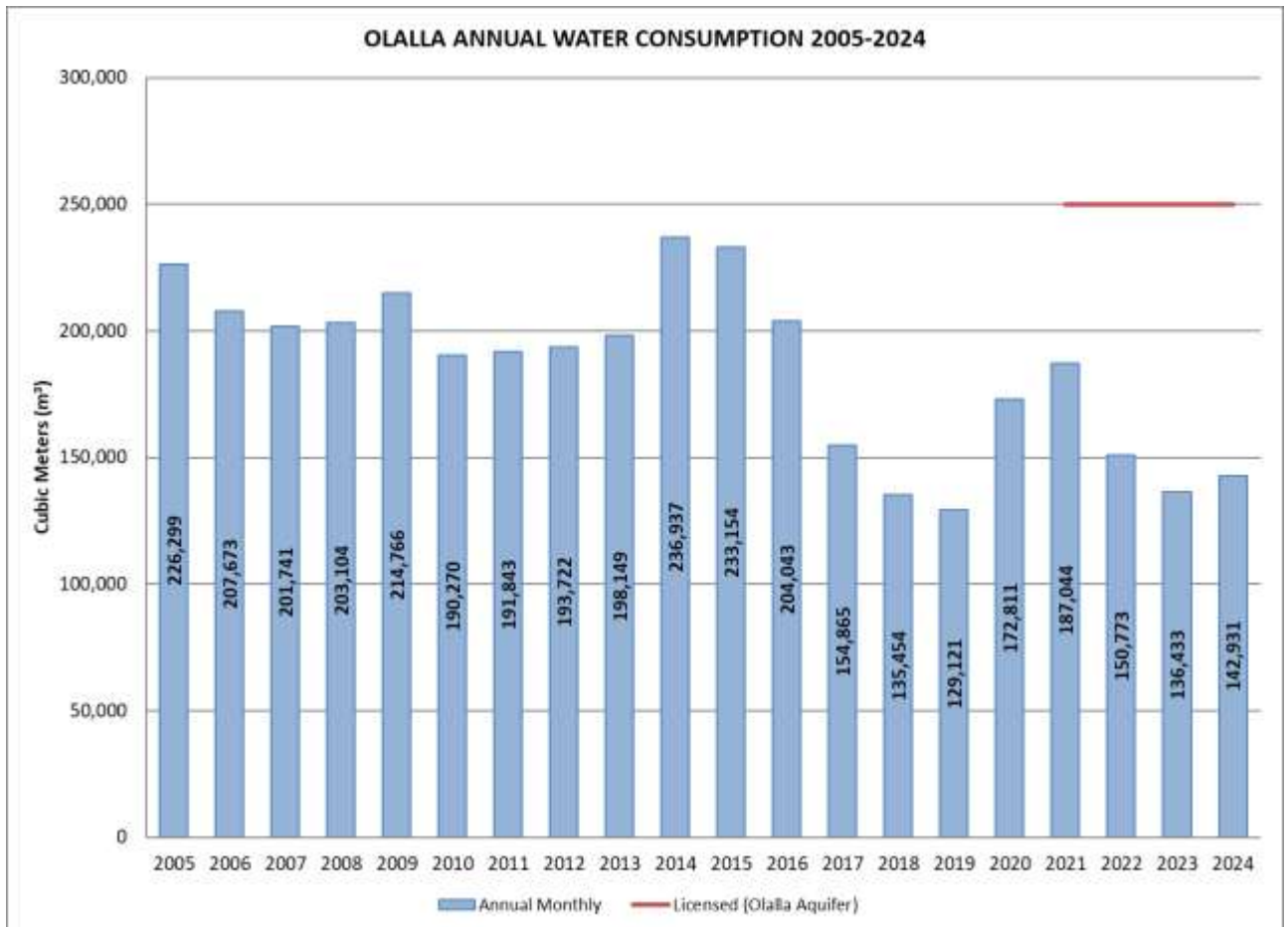


Figure 1: Annual Water Consumption 2005 to 2024

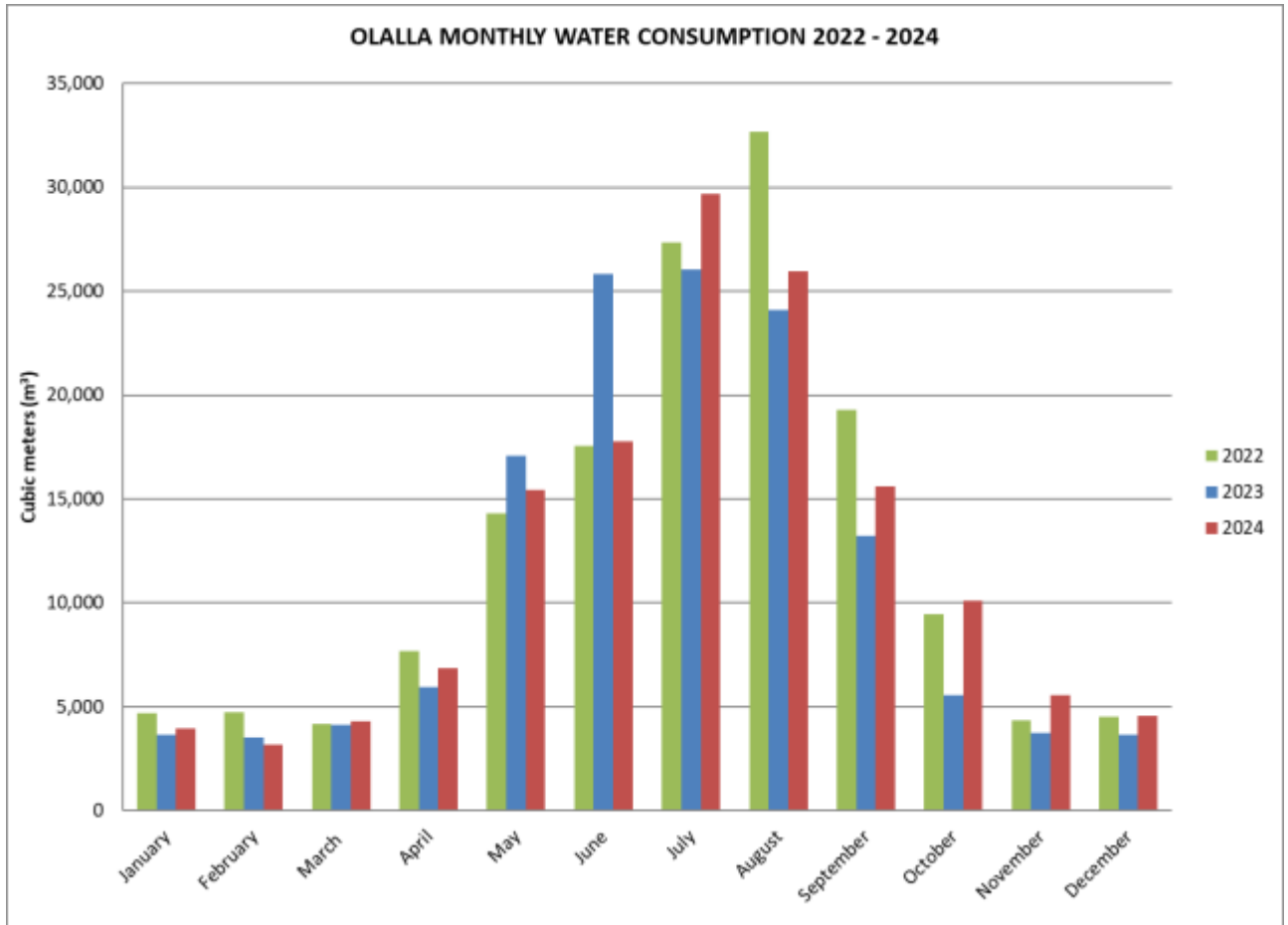


Figure 2: Monthly Water Consumption 2022 to 2024

4.2. Water Conservation

The Olalla water system started under Stage “Normal” water restrictions in 2024. Stage 1 water restrictions were implemented on April 23, 2024. Due to a prolonged heat wave and minimal precipitation across the region, on July 21st the RDOS implemented Stage 2 restrictions for all of its systems. Stage 2 restrictions target a 20 percent reduction in water use. On October 16th the RDOS returned all systems to Stage “Normal”.

5. Aquifer Monitoring

The RDOS monitors the aquifer level using the Olalla well. Below is the well level measurement trend for the Olalla well from 2018 to 2024. The trend is based on a data point taken once-a-day at midnight from the Olalla well level sensor, therefore, both static and dynamic levels are included in the plot. A decreasing trend in the well level has been observed over the past number of years.

Note: the measurements below are assumed to be feet of water above the top of the well pump.

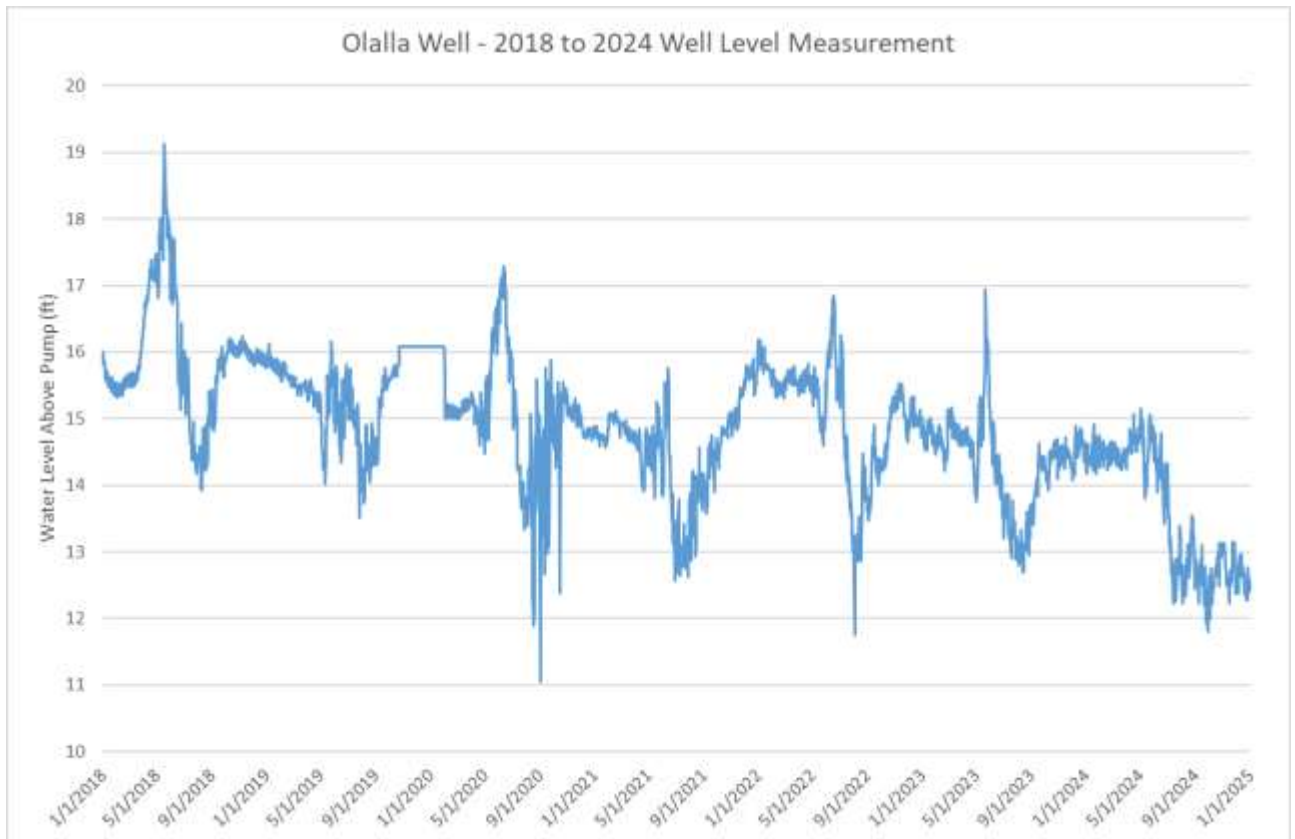


Figure 3: Olalla Aquifer Level

6. Source Water Quality Monitoring

All untreated source water quality parameters are compared to the *British Columbia Drinking Water Protection Act and Regulation (DWPA)* and the *Guidelines for Canadian Drinking Water Quality (GCDWQ)* unless otherwise noted, which could be indicated as an Operational Guideline (OG). The *DWPA* and *GCDWQ* define these parameters and set Aesthetic Objectives (AO) and Maximum Acceptable Concentrations (MAC).

All accredited laboratory tests in 2024 were performed by Caro Analytical Services in Kelowna, B.C.

6.1. Source Water Bi-Weekly Monitoring

Bi-weekly monitoring of the Olalla well includes bacteriological grab samples and field measured parameters using field kits. Samples from the well were analyzed for Total Coliforms and *Escherichia coli* (*E. coli*). The table below summarizes the bacteriological laboratory results and the field measured parameters from the Olalla groundwater well.

Analyte	Unit	Average	Min	Max	Number of Results	Number of Results with Exceedances
Field Results						
Conductivity	µS/cm	463	434	586	32	0
pH		7.63	6.83	8.06	32	0
Total dissolved solids	mg/L	330	307	417	32	0
Temperature	°C	9.3	8	12.4	32	0
Turbidity	NTU	0.16	0.07	0.94	30	0
Lab Results						
Background bacteria	CFU/100 mL	1	1	2	30	0
Total coliforms (counts)	CFU/100 mL	<1	<1	<1	32	0
E. coli (counts)	CFU/100 mL	<1	<1	<1	32	0

Table 3: Olalla Well Bi-Weekly Testing 2024 Summary

6.2. Source Water Potable Water Testing

Annually, the RDOS submits a sample of the untreated well water to an accredited lab for comprehensive potable water testing. The test results are compared to the *Guidelines for Canadian Drinking Water Quality* to determine if the water remains potable. The GCDWQ establishes Maximum Allowable Concentration (MAC), Interim Maximum Acceptable Concentrations (IMAC) and Aesthetic Objectives (AO) for tested parameters where applicable.

This comprehensive test includes physical parameters (e.g. color, turbidity, temperature, ultraviolet transmittance), chemical parameters (e.g. hardness, total metals and nutrients). Changes in these parameters may result in the need for water notifications for customers (i.e. Boil Water Notice or Water Quality Advisory) or the requirement for treatment processes to be implemented. The following tables display the results for the respective comprehensive potable water tests.

In 2024, all tested source water parameters met the applicable guidelines with no notable increasing or decreasing trends.

All 2024 accredited laboratory tests in 2024 were performed by Caro Analytical Services (Kelowna, B.C.).

6.2.1. Source Water General Potability Parameters

General potability parameters for the past 3 years.

Sampling Location Date Sampled				Well 26-Sep-22	Well 26-Sep-23	Well 23-Sep-24
Analyte	Unit	Guideline				
		GCDWQ MAC	GCDW Q AO			
Lab Results						
General						
Alkalinity (total, as CaCO3)	mg/L	NG	NG	188	173	146
Total organic carbon	mg/L	NG	NG	1.21	1.09	0.99
Chloride	mg/L	NG	250	10.3	11.8	10.5
Colour	CU	NG	15	<5.0	<5.0	<5.0
Conductivity	µS/cm	NG	NG	399	422	448
Total cyanide	mg/L	0.2 ^{1.1}	NG	<0.0020	<0.0020	0.0032
Fluoride	mg/L	1.5	NG	<0.10	<0.10	<0.10
Hardness (as CaCO3), from total Ca/Mg	mg/L	NG	NG	187	214	208
Langelier Index		NG	NG	0.5	0.2	0.4
pH		NG	7.0 - 10.5 ^{2.1}	8.01	7.72	8.02
Total dissolved solids (computed)	mg/L	NG	500	262	269	249
Sulphate	mg/L	NG	500 ^{2.2}	57.1	59.5	60.4
Sulphide (total, as S)	mg/L	NG	0.047 _{2.3}	<0.020	<0.020	<0.020
Turbidity	NTU	N ^{1.2}	NG	<0.10	0.12	<0.10
UV transmittance at 254 nm - filtered	%	NG	NG	98.9	98.6	96.2
Nutrients						
Ammonia (total, as N)	mg/L	NG	NG	0.053	<0.050	<0.050
Nitrate (as N)	mg/L	10	NG	0.359	0.388	0.259
Nitrite (as N)	mg/L	1	NG	<0.010	<0.010	<0.010
Potassium (total)	mg/L	NG	NG	2.24	2.44	2.26

See Guideline Notes in Section 6.2.2

Table 4: Olalla Well General Potability Parameters 2022 to 2024

6.2.2. Guideline Notes for General Potability Parameters

1. Notes for Guidelines for Canadian Drinking Water Quality - Maximum Acceptable Concentrations (GCDWQ MAC)

Note 1.1 for Total cyanide:

The MAC for free cyanide is 0.2 mg/L. A maximum of 0.2 mg/L was used, in this report, to identify exceedances for total cyanide as means for determining the potential for exceeding the free cyanide guideline.

Note 1.2 for Turbidity:

"Waterworks systems that use a surface water source or a groundwater source under the direct influence of surface water should filter the source water to meet health-based turbidity limits, as defined for specific treatment **technologies**. Where possible, filtration systems should be designed and operated to reduce turbidity levels as low as possible, with a treated water turbidity target of less than 0.1 NTU at all times. Where this is not achievable, the treated water turbidity levels from individual filters should meet the requirements described in **GCDWQ**.

For systems that use groundwater that is not under the direct influence of surface water, which are considered less vulnerable to faecal contamination, turbidity should generally be below 1.0 NTU.

For effective operation of the distribution system, it is good practice to ensure that water entering the distribution system has turbidity levels below 1.0 NTU."

2. Notes for Guidelines for Canadian Drinking Water Quality - Aesthetic Objectives (GCDWQ AO)

Note 2.1 for pH:

The operational guideline for pH is a range of 7.0 to 10.5 in finished drinking water.

Note 2.2 for Sulphate:

There may be a laxative effect in some individuals when sulphate levels exceed 500 mg/L. Health authorities should be notified of drinking water sources containing above 500 mg/L.

Note 2.3 for Sulphide (total, as S):

The aesthetic objective for sulphide (as H₂S) is 0.05 mg/L. This is equivalent to 0.047 mg/L sulphide (as S).

6.2.3. Source Water Total Metals

Total metals potability parameters for the past 3 years.

Sampling Location Date Sampled				Well 26-Sep-22	Well 26-Sep-23	Well 23-Sep-24
Analyte	Unit	Guideline				
		GCDWQ MAC	GCDWQ AO			
Lab Results						
Total Metals						
Aluminum (total)	mg/L	2.9 ^{1.1}	0.100 ^{2.1}	<0.0050	<0.0050	<0.0050
Antimony (total)	mg/L	0.006	NG	<0.00020	<0.00020	<0.00020
Arsenic (total)	mg/L	0.010 ^{1.2}	NG	0.00093	0.00098	0.00095
Barium (total)	mg/L	2.0 ^{1.3}	NG	0.0706	0.0776	0.0813
Boron (total)	mg/L	5	NG	<0.0500	<0.0500	<0.0500
Cadmium (total)	mg/L	0.007 ^{1.4}	NG	<0.000010	<0.000010	<0.000010
Calcium (total)	mg/L	NG	NG	55.8	64.3	62.7
Chromium (total)	mg/L	0.05	NG	0.00091	0.00059	0.00056
Cobalt (total)	mg/L	NG	NG	<0.00010	<0.00010	<0.00010
Copper (total)	mg/L	2 ^{1.5}	1	0.00194	0.00288	0.00191
Iron (total)	mg/L	NG	0.1	<0.010	<0.010	<0.010
Lead (total)	mg/L	0.005 ^{1.6}	NG	<0.00020	<0.00020	<0.00020
Magnesium (total)	mg/L	NG	NG	11.6	12.8	12.5
Manganese (total)	mg/L	0.12 ^{1.7}	0.02 ^{2.2}	<0.00020	<0.00020	<0.00020
Mercury (total)	mg/L	0.001	NG	<0.000010	<0.000010	<0.000010
Molybdenum (total)	mg/L	NG	NG	0.00415	0.00419	0.00397
Nickel (total)	mg/L	NG	NG	<0.00040	<0.00040	<0.00040
Selenium (total)	mg/L	0.05	NG	0.00109	0.00131	0.00123
Sodium (total)	mg/L	NG	200	9.08	10.4	10.7
Strontium (total)	mg/L	7.0 ^{1.8}	NG	0.284		
Uranium (total)	mg/L	0.02	NG	0.000704	0.000899	0.000905
Zinc (total)	mg/L	NG	5.0	<0.0040	<0.0040	<0.0040

See Guideline Notes in Section 6.2.4

Table 5: Olalla Well Total Metals Potability 2022 to 2024

6.2.4. Guideline Notes for Total Metals Potability

1. Notes for Guidelines for Canadian Drinking Water Quality - Maximum Acceptable Concentrations (GCDWQ MAC)

Note 1.1 for Aluminum (total): The maximum acceptable concentration (MAC) for total aluminum in drinking water is 2.9 mg/L (2 900 µg/L) based on a locational running annual average of a minimum of quarterly samples taken in the distribution system. (Update March 5, 2021)

Note 1.2 for Arsenic (total): Every effort should be made to maintain arsenic levels in drinking water as low as reasonably achievable.

Note 1.3 for Barium (total): Update January 24, 2020. The MAC was revised from 1.0 mg/L to 2.0 mg/L.

Note 1.4 for Cadmium (total): A maximum acceptable concentration (MAC) of 0.007 mg/L (7 µg/L) is established for total cadmium in drinking water, based on a sample of water taken at the tap. (Update July 14, 2020)

Note 1.5 for Copper (total): A maximum acceptable concentration (MAC) of 2 mg/L is established for total copper in drinking water, based on a sample of water taken at the tap. Guidelines for Canadian Drinking Water Quality - Guideline Technical Document on Copper, June 2019.

Note 1.6 for Lead (total): The maximum acceptable concentration (MAC) for total lead in drinking water is 0.005 mg/L (5 µg/L), based on a sample of water taken at the tap and using the appropriate protocol for the type of building being sampled. Every effort should be made to maintain lead levels in drinking water as low as reasonably achievable (or ALARA). (GCDWQ: Guideline Technical Document; March, 2019)

Note 1.7 for Manganese (total): Guidelines for Canadian Drinking Water Quality - Guideline Technical Document on manganese, May 2019.

Note 1.8 for Strontium (total): Guidelines for Canadian Drinking Water Quality - Guideline Technical Document on strontium, May 2019.

2. Notes for Guidelines for Canadian Drinking Water Quality - Aesthetic Objectives (GCDWQ AO)

Note 2.1 for Aluminum (total): The operational guidance (OG) value for total aluminum in drinking water is 0.100 mg/L (100 µg/L) to optimize water treatment and distribution system operations. This value is based on a locational running annual average. The sampling frequency required to calculate the locational running annual average will vary based on the type of treatment facility and the sampling location. (Update March 5, 2021)

Note 2.2 for Manganese (total): Guidelines for Canadian Drinking Water Quality - Guideline Technical Document on manganese, May 2019.

7. Distribution System Water Quality

All treated distribution water quality parameters are compared to the applicable criteria set out in the *British Columbia Drinking Water Protection Act and Regulation (DWPA)*, the *Guidelines for Canadian Drinking Water Quality (GCDWQ)*, applicable Interior Health Authority programs and Operational Guidelines (OG). The *DWPA* and *GCDWQ* define these parameters and set Aesthetic Objectives (AO) and Maximum Acceptable Concentrations (MAC).

All accredited laboratory tests in 2024 were performed by Caro Analytical Services (Kelowna, B.C.)

7.1. Distribution System Bacteriological Results

The Olalla distribution system has two dedicated sample stations that are alternated between bi-weekly. Samples from the distribution system were analyzed for Total Coliforms and *Escherichia coli* (*E.coli*). Schedule A of the *BC Drinking Water Protection Regulation* provides bacteriological testing criteria as given below.

Schedule A
Water Quality Standards for Potable Water
(sections 2 and 9)

Parameter:	Standard:
Fecal coliform bacteria	No detectable fecal coliform bacteria per 100 ml
<i>Escherichia coli</i>	No detectable <i>Escherichia coli</i> per 100 ml
Total coliform bacteria	
(a) 1 sample in a 30 day period	No detectable total coliform bacteria per 100 ml
(b) more than 1 sample in a 30 day period	At least 90% of samples have no detectable total coliform bacteria per 100 ml and no sample has more than 10 total coliform bacteria per 100 ml

In September 2024, multiple distribution samples reported results for Total Coliforms and background bacteria. Four (4) of those samples reported results for background bacteria in excess of 100 CFU/100mL. Due to these results, temporary chlorination of the system was put in place on September 16th for a short period of time, and the system was flushed on September 17th.

In October, additional distribution samples reported results for Total Coliforms and background bacteria. Temporary chlorination was again put in place on October 11th in response to the lab results, and the system was briefly flushed the same day. The entire water system was unidirectional flushed on October 24th. System chlorination was stopped on October 31st.

In November, both distribution sample sites reported high background bacteria counts and chlorination was reinstated on November 15th. Additional unidirectional flushing is planned for early 2025 before any decision to remove chlorination will be considered.

All samples taken during periods when the system was chlorinated reported no detectable E. coli, Total Coliforms, and background bacteria.

The following is a summary of the bacteriological laboratory results from the distribution system.

Analyte	Sampling Location	Unit	Average	Min	Max	Number of Results	Number of Results with Exceedances
Lab Results: Microbiological							
Background bacteria	12th St	CFU/100 mL	12	<1	180	26	0
	N. Main St	CFU/100 mL	44	1	1000	28	0
	Reservoir Station	CFU/100 mL	<1	<1	<1	9	0
Total coliforms (counts)	12th St	CFU/100 mL	1	1	2	26	3
	N. Main St	CFU/100 mL	1	1	6	29	4
	Reservoir Station	CFU/100 mL	<1	<1	<1	9	0
E. coli (counts)	12th St	CFU/100 mL	<1	<1	<1	26	0
	N. Main St	CFU/100 mL	<1	<1	<1	29	0
	Reservoir Station	CFU/100 mL	<1	<1	<1	9	0

Table 6: Distribution Water Bacteriological Testing 2024 Summary

7.2. Distribution System Water Quality Field Parameters Testing

The following is a summary of the field parameters that are measured routinely in the distribution system.

Analyte	Sampling Location	Unit	Avg	Min	Max	Number of Results
Field Results						
Chlorine (free)	12th St	mg/L	0.39	0.02	0.66	10
	N. Main St	mg/L	0.42	0.04	0.83	11
	Reservoir Sample Station	mg/L	0.4	0.05	0.73	8
Conductivity	12th St	µS/cm	458	422	507	24
	N. Main St	µS/cm	473	433	643	26
	Reservoir Sample Station	µS/cm	447	426	468	8
pH	12th St		7.71	6.85	8.14	24
	N. Main St		7.58	6.83	7.97	26
	Reservoir Sample Station		7.82	7.4	8.04	8
Total dissolved solids	12th St	mg/L	325	300	358	24
	N. Main St	mg/L	325	131	405	26
	Reservoir Sample Station	mg/L	317	304	331	8
Temperature	12th St	°C	10.2	4.1	17.8	23
	N. Main St	°C	10	4.9	14.6	26
	Reservoir Sample Station	°C	7.9	6.5	11.4	8
Turbidity	12th St	NTU	0.2	0.05	0.46	23
	N. Main St	NTU	0.15	0.07	0.45	26
	Reservoir Sample Station	NTU	0.16	0.07	0.36	8

Table 7: Distribution Field Measured Parameters 2024 Summary

7.3. Water Quality Complaints

September 2024 – During the temporary chlorination of the water system, a resident complained of a musty or muddy taste of the water. An operator went to the site and checked the water parameters, which were within normal ranges. The free chlorine was 0.87 ppm, and total chlorine was 0.97 ppm on site. The chlorine was suspected to have caused the change in taste of the water which triggered the complaint.

8. Water System Notifications

The Interior Health Authority's team of drinking water officers are responsible for providing oversight to ensure compliance and drinking water safety through the issuing of *Permits to Operate* to drinking water systems. The Interior Health Authority has four (4) types of water notifications to inform users of negative impacts to water quality.

8.1. Water Quality Advisory (WQA)

There is some level of risk associated with consuming the drinking water but a Boil Water Notice is not needed. The risk is elevated for people with weakened immune systems, the elderly and infants and young children.

No WQAs issued in 2024.

8.2. Boil Water Notice (BWN)

There are organisms in the water that can make you sick. To safely consume (swallow) the water, you must bring it to a rolling boil for at least 60 seconds, or use a safe alternate source of water.

No BWNs issued in 2024.

8.3. Do Not Consume (DNC)

There are harmful chemicals or other bad things in the water that can make you sick. You cannot make the water safe by boiling. The water can make you sick if you consume (swallow) it. You cannot use the water for drinking, brushing teeth, washing/preparing/cooking food or pet's drinking water. You can bath, shower and water plants and gardens with the water.

No DNCs issued in 2024.

8.4. Do Not Use (DNU)

There are known microbial, chemical or radiological contaminants in the water and that any contact with the water with the skin, lungs or eyes can be dangerous. Do not turn on your tap for any reason and do not use your water. You CANNOT make the water safe by boiling it.

No DNUs issued in 2024.

9. Program Updates and Status

9.1. Cross Connection Control Program

A cross connection is any actual or potential connection between the drinking water (potable) system and a non-potable substance (contaminant). Backflow is when the flow of water in a pipe reverses from the normal direction. When a cross connection and backflow occur simultaneously often the result is a contaminant entering the drinking water system.

Cross connection in plumbing systems require backflow preventers corresponding to the degree of hazard as indicated by the CSA B64.10, *Manual for the Selection and Installation of Backflow Preventers*, as referenced in the BC Plumbing Code, or as determined by a CCC hazard assessment survey.

The RDOS adopted a Regional CCC Bylaw, No.2851, in 2020 to address cross connection and backflow prevention applicable to all agricultural, industrial, commercial and institutional properties. These property uses are required to have a suitable backflow protection device installed. In 2023 the RDOS started implementation of its Regional Cross Connection Control program with MTS Inc. (Vernon, B.C.) contracted as the program administrator.

In 2024 the RDOS continued work with MTS Inc. as the program administrator to address cross connection control for agricultural and commercial properties within the nine (9) RDOS owned and operated water systems. This included follow-up on existing backflow prevention devices that had previously been entered into the CCC database along with surveying of applicable properties and facilities for entry into the database.

9.2. Capital Works / System Additions

No items of note in 2024.

9.3. Emergency Response Plan

The *Emergency Response Plan* is scheduled to be updated in 2025.

9.4. Future System Upgrades

In response to a reservoir inspection conducted in October 2023, it is anticipated that the Olalla storage reservoir will be lined in the fall of 2025.

9.5. Supervisory Control and Data Acquisition (SCADA System)

No items of note in 2024.

9.6. System Maintenance/Upgrades

Two new sample stations were installed in December 2024 to allow for more sample points to investigate the source of the background and Total Coliforms counts that were reported.

9.7. Water Quality Monitoring Program

The Water Quality Monitoring Program is scheduled to be updated in 2025.

10. Summary

All tested source water parameters from the Olalla groundwater well met the applicable criteria in 2024. All tested distribution water parameters, with the exception of elevated background bacteria and Total Coliform counts, met the applicable criteria in 2024. Temporary chlorination of the system was implemented a number of times in the later part of 2024 response to the background bacteria and Total Coliform counts. Enhanced bacteriological monitoring will continue in 2025 in an effort to determine the source of the background and Total Coliform detections. The operation of the Olalla water system by a team of RDOS *EOCP* certified Operators resulted in the continuous supply of the highest quality water possible to the community of Olalla. The RDOS continues to work on reviewing and upgrading the various programs that support facilitating the highest quality of water possible.