

REGIONAL DISTRICT OF NANAIMO

Water Service Area Annual Report 2022



Westerne Heights Water Service Area

June 2023



REGIONAL DISTRICT OF NANAIMO

Water Services Department

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Appendix A - Map of Westerne Heights Water Service Area

Appendix B - Water Quality Testing Results

Appendix C - Emergency Response & Contingency Plan

1.0 Introduction

The following annual report describes the Westerne Heights Water Service Area and summarizes the water quality and production data from 2022. This report also includes a summary of inquiries and complaints, completed and proposed maintenance activities, Operator Certification, the Emergency Response & Contingency Plan, and the Cross Connection Control Program. This report is to be submitted to Island Health by the spring of 2023.

2.0 Westerne Heights Water Service Area

The Westerne Heights Water Utility is located 2.2 kilometers south of the intersection of Highway 4 and Chatsworth Road in Whiskey Creek. The utility was established in 1995 to service properties along Westerne Heights Road. Ownership of the water utility was transferred to the RDN in September 2016. The water system is comprised of one groundwater well, two underground cisterns, a pumphouse, and a short network of watermains. There are 17 residential connections in this water system. The water source is chlorinated and pumped into the system on demand via two pressure tanks. A backup generator is present on-site in the event of a power outage. A map of the Westerne Heights Water Service Area is provided in Appendix A for reference.

2.1 Groundwater Wells

One groundwater production well is present at the reservoir site at 1262 Westerne Heights Road, west of Coombs, B.C.

Well / Name	Well Depth	Wellhead Protection In Place	Treated/Untreated with Chlorine
#1	26.2 m	Yes	Treated

2.2 Reservoirs

Two below-ground cisterns are present at 1262 Westerne Heights Road, and have a combined water storage capacity of 13 m³ (2,800 imperial gallons). Water supply is pumped into the system via a dual pressure tank arrangement.

2.3 Distribution System

The water distribution system is comprised of 0.21 km of 75mm diameter PVC watermains. Three below-ground flushouts are present at the end of each watermain. There are no fire hydrants located within the system.

Note: 'PVC' is poly-vinylchloride (plastic)



**Westerne Heights
Well #1**

3.0 Water Sampling and Testing Program

Water sampling and testing is carried out weekly in the distribution system. Notably, the chlorine residual levels are tested weekly to ensure the absence of bacterial regrowth in the water mains. The following table includes a summary of all testing.

Timing	Location	Tests
Weekly	RDN (in-house) Laboratory	Total coliforms, E.Coli, Temperature, pH, Conductivity, Chlorine residual, Salinity, TDS
Weekly	BC Centre for Disease Control	Total coliforms, E.Coli
Annual Source Water Testing (every Fall)	Bureau Veritas	Complete potability testing of raw well water, including T-Ammonia
Annual System Water Testing (every Spring)	Bureau Veritas	Complete potability testing of distribution system, including T-Ammonia

4.0 Water Quality - Source Water and Distribution System

Up-to-date water quality reports and lab data are posted monthly on the RDN website at www.rdn.bc.ca/westurne-heights. Tables of water quality testing results for both the source water and distribution system are provided at the end of this report under Appendix B.



**Westurne Heights
Pumphouse and Buried Cisterns**

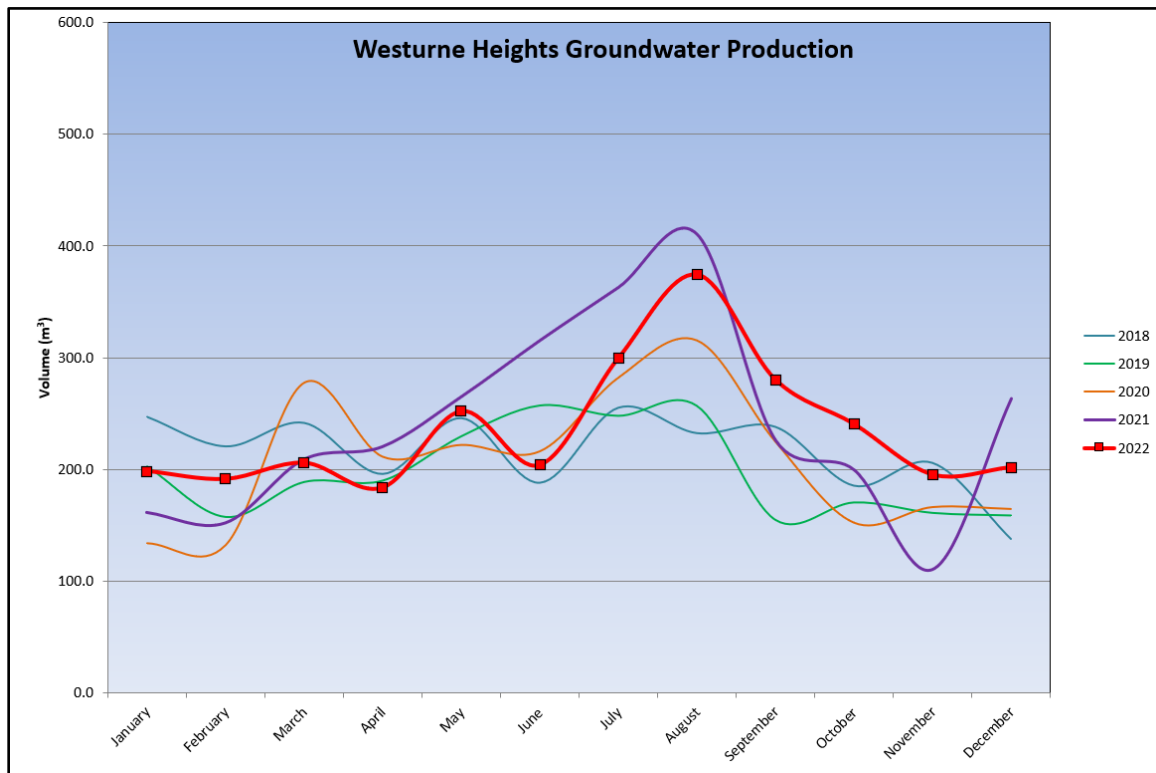
5.0 Water Quality Inquiries and Complaints

A few inquiries and complaints were received from the Westerne Heights water service area in 2022 and were typically related to temporary power outages in the area. The on-call water services staff respond to water system emergencies and alarms within minutes of receiving each call. A summary of the water system incidents in 2022 is given in the table below.

Activity in 2022	Date(s)	History/Notes
Boil Water Advisories	None	None
High Turbidity Events	None	None
Equipment Malfunction	None	None
Water Main Breaks	None	None
Pump Failures	None	None

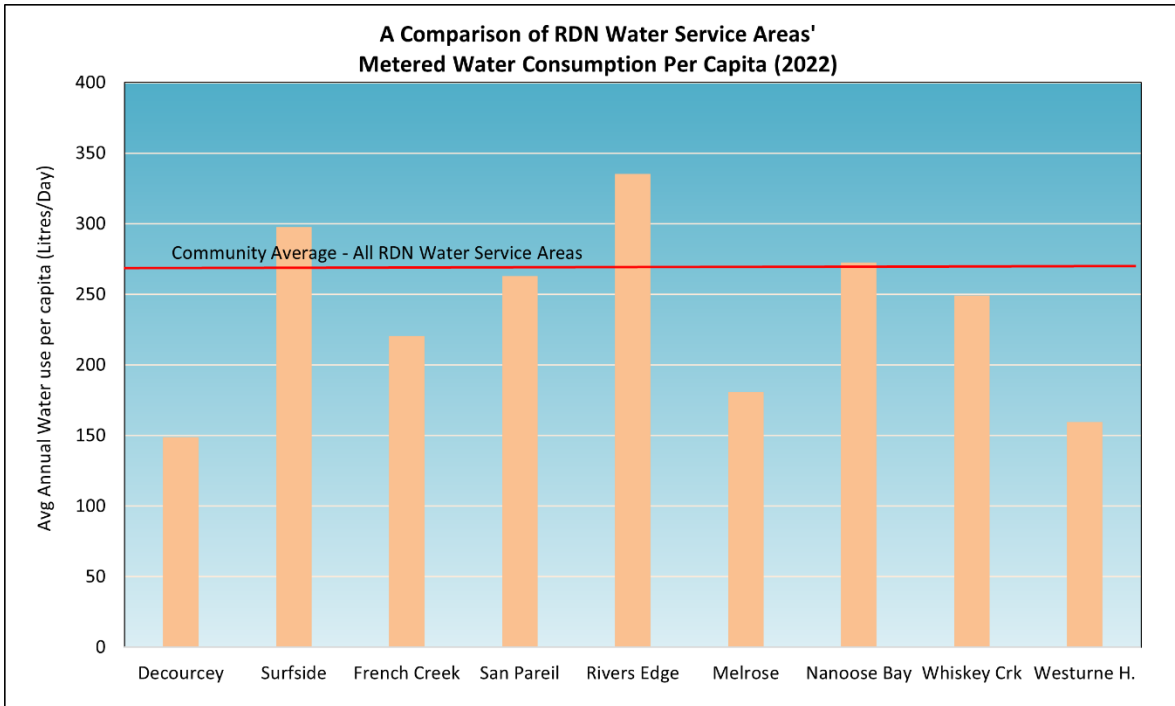
6.0 Groundwater Production and Consumption

The monthly groundwater production in the Westerne Heights Water Service Area over the past 5 years is shown in the graph below. Groundwater production in 2022 was above average in the summer and fall months due to high seasonal temperatures.



Consumption

In the Fall/Winter of 2022, the average usage per home in the Westerne Heights Water Service Area was 0.33 cubic metres per day (72.6 imperial gallons). In the summer, the average water usage was 0.49 cubic metres per day (107.8 imperial gallons). Based on these figures, the annual consumption per capita is estimated to be 159 L/day (based on 2.4 people per household). This consumption is *41% lower* than the average of all the other RDN water systems of 269 L/day/capita for 2022.



7.0 Maintenance Program

Weekly pump station inspections are carried out to reduce or eliminate the risk of contamination and system failure, and to ensure the consistent application of chlorine for treatment purposes. Watermains are flushed once a year in the spring. The water storage cisterns are drained and cleaned as required. Twenty-four hour on-call coverage is in place to respond to water system emergencies and alarms.



Pressure tanks in the Westerne Heights pump house

8.0 Operator Certification

The Regional District Water & Utility Services staff are comprised of one Manager, one Project Engineer, one Engineering Technologist, one Engineering Technician, one Chief Operator, and seven certified operators. The operators receive ongoing training and certification in:

- | | | |
|----------------------------|---|----------------------------|
| ✓ Water Treatment | ✓ Chlorine Handling | ✓ Confined Space Awareness |
| ✓ Water Distribution | ✓ WHMIS (Workplace Hazardous Material Information System) | ✓ Fall Protection |
| ✓ Wastewater Collection | ✓ TDG (Transportation of Dangerous Goods) | ✓ First Aid |
| ✓ Cross Connection Control | | ✓ Silica Awareness |
| ✓ Asbestos Awareness | | |

9.0 Water Service Area Projects

9.1 2022 Completed Studies & Projects

- Corresponded with residents regarding water conservation;
- Utilized leak detection equipment and tracking;
- Set new water rates structure based on rewarding conservation;
- Followed Cross Connection Control program to reduce backflow prevention risks;
- Enforced outdoor sprinkling regulations;
- Advised residents regarding water leak repairs;
- Continued the 2021-2030 Water Conservation Plan;
- Completed regular watermain flushing and hydrant maintenance;
- Maintained a high level of water quality;
- Continued quality control through regular testing and monitoring of water system;
- Implement Phase 2 Water Systems SCADA Master Plan; and
- Continued valve maintenance program.

9.2 2023 Proposed Projects & Upgrades

- Complete irrigation checks for high-water users;
- Begin billing for metered consumption based on revised water rates;
- Continue watermain flushing program;
- Continue leak detection equipment utilization program;
- Investigate new watermain flushing and metering procedures to promote conservation;
- Continue valve maintenance program;
- Continue the 2021-2030 DWWP Water Conservation Plan; and
- Continue to offer numerous water-saving incentives via rebates.



Westurne Heights well site and fence

- Continue to offer numerous water-saving incentives via rebates.

10.0 Emergency Response & Contingency Plan

The Regional District Emergency Response & Contingency Plan (ERCP) contains procedures and contact information to efficiently respond to water system emergencies such as contamination of water supply, loss of supply, pump failure, and drought management. The ERCP was reviewed and updated in 2022, and copies are available on our website, at each RDN office, in each pumphouse, and in each Water Services vehicle. A copy of the ERCP is also attached to this report in Appendix C.

11.0 Supply Security

The RDN continues to effectively manage water supply in its service areas in response to ongoing demand and the effects of climate change. Most RDN water service areas are not expected to expand, so growth in demand is not expected. Initiatives that provide resiliency for the groundwater sources that serve residents remain a high priority. Reservoir capacity and redundancy are reviewed with regards to water storage during periods of drought, and water from backup sources is available to be delivered in the case of an emergency. Groundwater quality is regularly tested in all RDN water service areas. The aquifers within the regional district are monitored through the RDN's Drinking Water and Watershed Protection (DWWP) program. The most sustainable way to protect water supply is through demand management (conservation), which is promoted through outreach and stewardship initiatives provided by the RDN's Team WaterSmart , as well as the RDN Water Service Area's Water Conservation Plan 2020-2030. Rebates for well water testing, water smart landscaping, and rainwater harvesting further assist RDN residents to reduce water usage in high demand seasons. A new tiered system for water rates taking effect in 2023 will help promote conservation by rewarding low water users with reduced rates and encouraging high water users to seek ways to use less. Additional planning and preparation initiatives will be introduced in the future to support water supply security.

12.0 Cross Connection Control

The RDN's Cross Connection Control Program was put in place to protect the public health by reducing the risk of contaminants flowing back into the public water supply. The RDN Manager of Water Services is the designated Cross Connection Control Manager.

The RDN's Cross Connection Control Program addresses cross connection threats through operating policies and procedures, as well as assisting customers with backflow preventer selection, installation, testing, maintenance and reporting. The program receives its authority from RDN Cross Connection Control Regulation Bylaw No. 1788, and the British Columbia Building Code, Part 7, which requires that potable water be protected from contamination. Additionally, a webpage has been established at <https://rdn.bc.ca/cross-connection-control-program> to educate RDN water service customers about cross connection hazards, and lists the relevant links to current standards and resources.

Two of the RDN's water system operators received certification as backflow assembly testers through the British Columbia Water & Waste Association (BCWWA).

13.0 Cyber Security

The RDN uses a multi-level approach to cyber-security. Corporate network security is employed via a universal threat management gateway that implements various methods of data security, which includes daily definition updates to block known cyber threats. In addition, all RDN PC's are protected with anti-virus software. RDN water systems are connected to the corporate network via IP-Sec VPN's for remote management by information technology and equipment operators. Future infrastructure upgrades will see our water systems located on segregated networks to limit the vulnerability from cybersecurity threats.

14.0 Closing

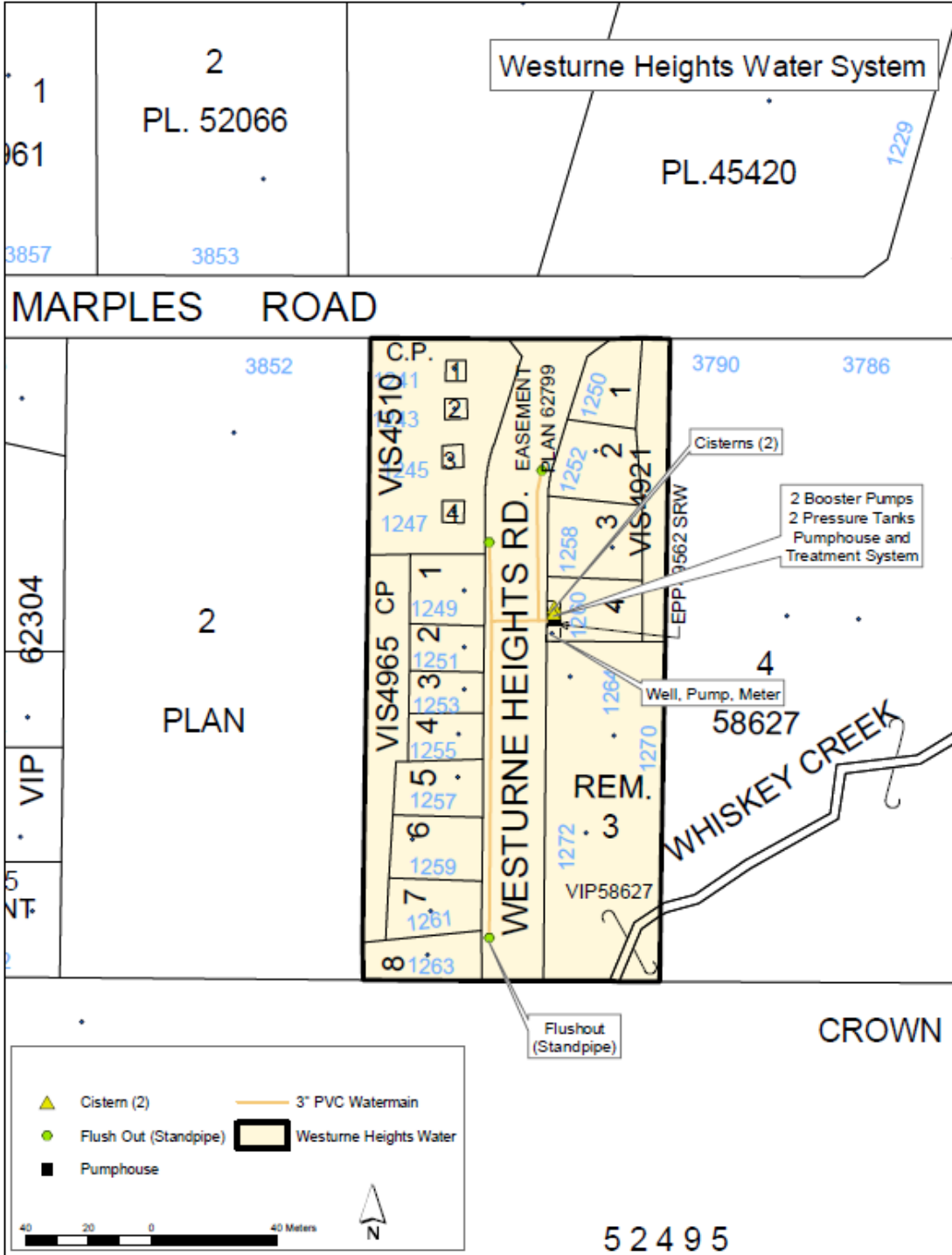
An annual report for the year 2023 will be prepared and submitted to Island Health in the Spring of 2024. Annual reports are also available on our website at: www.rdn.bc.ca/westurne-heights.

APPENDIX A

MAP OF WESTURNE HEIGHTS

WATER SERVICE AREA

WESTERNE HEIGHTS WATER SERVICE AREA



APPENDIX B

WATER QUALITY TESTING RESULTS

WESTERNE HEIGHTS WATER SERVICE AREA



Facility Location:

1262 Westerne Heights Road, Qualicum Beach

Facility Information: Facility Type: 15-300 connections DWC

Facility Sampling History:

<u>Date Collected</u>	<u>Total Coliform</u>	<u>Total E. Coli</u>	<u>Site Name</u>
01/05/2022	QRWRT	QRWRT	Well Head Sample Port - 1260 Westerne Heights Rd.
01/26/2022	LT1	LT1	Well Head Sample Port - 1260 Westerne Heights Rd.
02/08/2022	LT1	LT1	Well Head Sample Port - 1260 Westerne Heights Rd.
02/23/2022	LT1	LT1	Well Head Sample Port - 1260 Westerne Heights Rd.
03/08/2022	LT1	LT1	Well Head Sample Port - 1260 Westerne Heights Rd.
03/23/2022	LT1	LT1	Well Head Sample Port - 1260 Westerne Heights Rd.
04/13/2022	LT1	LT1	Well Head Sample Port - 1260 Westerne Heights Rd.
04/25/2022	LT1	LT1	Well Head Sample Port - 1260 Westerne Heights Rd.
05/10/2022	LT1	LT1	Well Head Sample Port - 1260 Westerne Heights Rd.
05/25/2022	LT1	LT1	Well Head Sample Port - 1260 Westerne Heights Rd.
06/20/2022	LT1	LT1	Well Head Sample Port - 1260 Westerne Heights Rd.
07/13/2022	LT1	LT1	Well Head Sample Port - 1260 Westerne Heights Rd.
07/26/2022	LT1	LT1	Well Head Sample Port - 1260 Westerne Heights Rd.
08/09/2022	LT1	LT1	Well Head Sample Port - 1260 Westerne Heights Rd.
08/24/2022	LT1	LT1	Well Head Sample Port - 1260 Westerne Heights Rd.
09/14/2022	LT1	LT1	Well Head Sample Port - 1260 Westerne Heights Rd.
09/27/2022	LT1	LT1	Well Head Sample Port - 1260 Westerne Heights Rd.
10/12/2022	LT1	LT1	Well Head Sample Port - 1260 Westerne Heights Rd.
10/26/2022	LT1	LT1	Well Head Sample Port - 1260 Westerne Heights Rd.
11/07/2022	LT1	LT1	Well Head Sample Port - 1260 Westerne Heights Rd.
11/21/2022	LT1	LT1	Well Head Sample Port - 1260 Westerne Heights Rd.
12/21/2022	REJCT DELAY3	REJCT DELAY3	Well Head Sample Port - 1260 Westerne Heights Rd.
01/18/2022	LT1	LT1	Westerne Sample Port - 1252 Westerne Heights Rd.
02/16/2022	LT1	LT1	Westerne Sample Port - 1252 Westerne Heights Rd.
03/16/2022	LT1	LT1	Westerne Sample Port - 1252 Westerne Heights Rd.
04/20/2022	LT1	LT1	Westerne Sample Port - 1252 Westerne Heights Rd.
06/08/2022	LT1	LT1	Westerne Sample Port - 1252 Westerne Heights Rd.

06/15/2022	LT1	LT1	Westurne Sample Port - 1252 Westurne Heights Rd.
07/19/2022	LT1	LT1	Westurne Sample Port - 1252 Westurne Heights Rd.
08/16/2022	LT1	LT1	Westurne Sample Port - 1252 Westurne Heights Rd.
09/21/2022	LT1	LT1	Westurne Sample Port - 1252 Westurne Heights Rd.
10/17/2022	LT1	LT1	Westurne Sample Port - 1252 Westurne Heights Rd.
11/14/2022	LT1	LT1	Westurne Sample Port - 1252 Westurne Heights Rd.
12/14/2022	LT1	LT1	Westurne Sample Port - 1252 Westurne Heights Rd.
01/18/2022	LT1	LT1	WESTURNE Sample Port - 1263 Westurne Heights Rd.
02/02/2022	LT1	LT1	WESTURNE Sample Port - 1263 Westurne Heights Rd.
03/02/2022	LT1	LT1	WESTURNE Sample Port - 1263 Westurne Heights Rd.
04/05/2022	LT1	LT1	WESTURNE Sample Port - 1263 Westurne Heights Rd.
05/04/2022	LT1	LT1	WESTURNE Sample Port - 1263 Westurne Heights Rd.
06/29/2022	LT1	LT1	WESTURNE Sample Port - 1263 Westurne Heights Rd.
07/06/2022	LT1	LT1	WESTURNE Sample Port - 1263 Westurne Heights Rd.
08/02/2022	LT1	LT1	WESTURNE Sample Port - 1263 Westurne Heights Rd.
09/07/2022	LT1	LT1	WESTURNE Sample Port - 1263 Westurne Heights Rd.
10/05/2022	LT1	LT1	WESTURNE Sample Port - 1263 Westurne Heights Rd.
11/02/2022	LT1	LT1	WESTURNE Sample Port - 1263 Westurne Heights Rd.
12/05/2022	LT1	LT1	WESTURNE Sample Port - 1263 Westurne Heights Rd.
12/14/2022	LT1	LT1	WESTURNE Sample Port - 1263 Westurne Heights Rd.

Interpreting Sample Reports

In VIHA, the results of drinking water sampling are reported using the following coding system:

LT1 Less than 1 (no detectable bacteria) - Meaning: No bacteria present

L1 Less than 1 (no detectable bacteria) - Meaning: No bacteria present



Regional District of Nanaimo - Water Services Department

Westurne Heights Water Analysis - 2022 Monthly Report

Date	Sample Location (Address)	BC Centre for Disease Control		RDN In-House Laboratory and Spectrophotometer									
		E. coli *	Total Coliform *	E.coli *	Total Coliform *	Temp. (°C)	pH	Free Chlorine Residual (mg/L)	Total Dissolved Solids (mg/L)	Salinity (%)	Conductivity (µS/cm)	Total Iron (mg/L)	Manganese (mg/L)
05-Dec-22	1263 Westurne	0	0	0	0	8	7.18	0.51	47.9	0.05	101.8	Fe and Mn are no longer tested in-house. See Annual Tap Water Results at https://www.rdn.bc.ca/we-sturne-heights	
14-Dec-22	1252 Westurne	0	0	0	0	5	7.01	0.50	46.4	0.05	98.4		
14-Dec-22	1263 Westurne	0	0	0	0	5	7.01	0.59	46.4	0.05	98.4		
21-Dec-22	1260 Westurne	0	0	0	0		7.17	0.32	46.9	0.05	99.3		
CDN Drinking Water Guidelines		<1	<1	<1	<1	n/a	7.0-10.5	n/a	500	n/a	n/a	0.3	0.02 AO 0.12 MAC

Legend:

* Coliforms are measured in colony forming units (CFU) per 100 millilitres of water (CFU/100mL)

Orange font indicates non-compliance with the Aesthetic Objective (AO) in the Canadian Drinking Water Guidelines (CDWG)

Red font indicates non-compliance with the Maximum Acceptable Concentration (MAC) in the CDWG

Comments:

Iron and Manganese are no longer being tested in-house.

A full potability scan is completed once per year at an external lab that includes metals and minerals.



Regional District of Nanaimo - Water Services Department

Westurne Heights Water Analysis - 2022 Monthly Report

Date	Sample Location (Address)	BC Centre for Disease Control		RDN In-House Laboratory and Spectrophotometer									
		E. coli *	Total Coliform *	E.coli *	Total Coliform *	Temp. (°C)	pH	Free Chlorine Residual (mg/L)	Total Dissolved Solids (mg/L)	Salinity (%)	Conductivity (µS/cm)	Total Iron (mg/L)	Manganese (mg/L)
3-Nov-22	1263 Westurne Hts	0	0	0	0	11	7.38	0.45	47.0	0.05	99.8	Fe and Mn are no longer tested in-house. See Annual Tap Water Results at https://www.rdn.bc.ca/we-sturne-heights	
7-Nov-22	1260 Westurne Hts	0	0	0	0	12	7.21	0.52	47.1	0.05	100.0		
14-Nov-22	1252 Westurne Hts	0	0	0	0	11	7.13	0.47	46.7	0.05	99.0		
22-Nov-22	1260 Westurne Hts	0	0	0	0	9	7.11	0.51	47.0	0.05	99.7		
CDN Drinking Water Guidelines		<1	<1	<1	<1	n/a	7.0-10.5	n/a	500	n/a	n/a	0.3	0.02 AO 0.12 MAC

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Regional District of Nanaimo - Water Services Department

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Date	Sample Location (Address)	BC Centre for Disease Control		RDN In-House Laboratory and Spectrophotometer									
		E. coli *	Total Coliform *	E.coli *	Total Coliform *	Temp. (°C)	pH	Free Chlorine Residual (mg/L)	Total Dissolved Solids (mg/L)	Salinity (%)	Conductivity (µS/cm)	Total Iron (mg/L)	Manganese (mg/L)
5-Oct-22	1263 Westurne	0	0	0	0	16	7.08	0.51	46.1	0.05	97.8	Fe and Mn are no longer tested in-house. See Annual Tap Water Results at https://www.rdn.bc.ca/we-sturne-heights	
12-Oct-22	1260 Westurne	0	0	0	0	10	7.24	0.62	46.9	0.05	99.6		
17-Oct-22	1252 Westurne	0	0	0	0	13	7.14	0.44	46.5	0.05	98.8		
26-Oct-22	1260 Westurne	0	0	0	0	9	6.86	0.50	46.6	0.05	98.8		
CDN Drinking Water Guidelines		<1	<1	<1	<1	n/a	7.0-10.5	n/a	500	n/a	n/a	0.3	0.02 AO 0.12 MAC

Legend:

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Green font indicates a value flagged for operational consideration

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Comments:

Notes below about pH (2015) from https://www.canada.ca/en/health-canada/services/environmental-workplace-health/reports-publications/water-quality/guidelines-canadian-drinking-water-quality-summary-table.html#_ftn1

Type	Parameter (published, reaffirmed)	MAC (mg/L)	Other value (mg/L)	Common sources of parameter in water	Health considerations	Comments
Treatment-related	pH (2015)	None	7.0-10.5	Not applicable	Not applicable	The control of pH is important to maximize treatment effectiveness, control corrosion and reduce leaching from distribution system and plumbing components.



Regional District of Nanaimo - Water Services Department

Westurne Heights Water Analysis - 2022 Monthly Report

Date	Sample Location (Address)	BC Centre for Disease Control		RDN In-House Laboratory and Spectrophotometer									
		E. coli *	Total Coliform *	E.coli *	Total Coliform *	Temp. (°C)	pH	Free Chlorine Residual (mg/L)	Total Dissolved Solids (mg/L)	Salinity (%)	Conductivity (µS/cm)	Total Iron (mg/L)	Manganese (mg/L)
7-Sep-22	1263 Westurne	0	0	0	0	16	7.02	0.50	45.2	0.04	96.0	Fe and Mn are no longer tested in-house. See Annual Tap Water Results at https://www.rdn.bc.ca/we-sturne-heights	
14-Sep-22	1260 Westurne	0	0	0	0	11	7.20	0.36	46.2	0.05	98.0		
21-Sep-22	1252 Westurne	0	0	0	0	14	8.00	0.55	44.8	0.04	95.2		
27-Sep-22	1260 Westurne	0	0	0	0		7.09	0.56	46.2	0.05	98.1		
CDN Drinking Water Guidelines		<1	<1	<1	<1	n/a	7.0-10.5	n/a	500	n/a	n/a	0.3	0.02 AO 0.12 MAC

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2-Aug-22	1263 Westurne Hts	0	0	0	0	n/a	7.48	0.53	43.9	0.04	93.4	Fe and Mn are no longer tested in-house. See Annual Tap Water Results at https://www.rdn.bc.ca/we-sturne-heights	
8-Aug-22	1260 Westurne Hts	0	0	0	0	9	7.09	0.42	43.1	0.04	93.0		
16-Aug-22	1252 Westurne Hts	0	0	0	0	12	7.21	0.48	45.2	0.04	95.8		
24-Aug-22	1260 Westurne Hts	0	0	0	0	9	7.32	0.50	42.2	0.04	95.8		
CDN Drinking Water Guidelines		<1	<1	<1	<1	n/a	7.0-10.5	n/a	500	n/a	n/a	0.3	0.02 AO 0.12 MAC

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6-Jul-22	1263 Westurne Hts	0	0	0	0	14	7.64	0.63	44.5	0.04	94.4	Fe and Mn are no longer tested in-house. See Annual Tap Water Results at https://www.rdn.bc.ca/we-sturne-heights	
13-Jul-22	1260 Westurne Hts	0	0	0	0	12	7.44	0.58	44.9	0.04	95.3		
19-Jul-22	1252 Westurne Hts	0	0	0	0	14	7.03	0.63	44.6	0.04	94.6		
26-Jul-22	1260 Westurne Hts	0	0	0	0	12	7.29	0.56	44.9	0.04	95.3		
CDN Drinking Water Guidelines		<1	<1	<1	<1	n/a	7.0-10.5	n/a	500	n/a	n/a	0.3	0.02 AO 0.12 MAC

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Westurne Heights Water Analysis - 2022 Monthly Report

Date	Sample Location (Address)	BC Centre for Disease Control		RDN In-House Laboratory and Spectrophotometer									
		E. coli *	Total Coliform *	E.coli *	Total Coliform *	Temp. (°C)	pH	Free Chlorine Residual (mg/L)	Total Dissolved Solids (mg/L)	Salinity (%)	Conductivity (µS/cm)	Total Iron (mg/L)	Manganese (mg/L)
1-Jun-22	1260 Westurne			0	0	9	7.10	0.38	43.6	0.04	92.6	Fe and Mn are no longer tested in-house. See Annual Tap Water Results at https://www.rdn.bc.ca/we-sturne-heights	
8-Jun-22	1252 Westurne	0	0	0	0	14	7.14	0.41	43.9	0.04	93.5		
15-Jun-22	1252 Westurne	0	0	0	0	9	7.08	0.52	42.7	0.04	90.6		
20-Jun-22	1260 Westurne	0	0	0	0	11	7.43	0.45	43.6	0.04	91.6		
29-Jun-22	1263 Westurne	0	0	0	0	14	7.45	0.36	44.3	0.04	93.9		
CDN Drinking Water Guidelines		<1	<1	<1	<1	n/a	7.0-10.5	n/a	500	n/a	n/a	0.3	0.02 AO 0.12 MAC

Legend:

* Coliforms are measured in colony forming units (CFU) per 100 millilitres of water (CFU/100mL)

Orange font indicates non-compliance with the Aesthetic Objective (AO) in the Canadian Drinking Water Guidelines (CDWG)

Red font indicates non-compliance with the Maximum Acceptable Concentration (MAC) in the CDWG

Comments:

Iron and Manganese are no longer being tested in-house.

A full potability scan is completed once per year at an external lab that includes metals and minerals.



Regional District of Nanaimo - Water Services Department

Westurne Heights Water Analysis - 2022 Monthly Report

Date	Sample Location (Address)	BC Centre for Disease Control		RDN In-House Laboratory and Spectrophotometer									
		E. coli *	Total Coliform *	E.coli *	Total Coliform *	Temp. (°C)	pH	Free Chlorine Residual (mg/L)	Total Dissolved Solids (mg/L)	Salinity (%)	Conductivity (µS/cm)	Total Iron (mg/L)	Manganese (mg/L)
4-May-22	1263 Westurne	0	0	0	0	9	7.28	0.39	43.0	0.04	91.1	Fe and Mn are no longer tested in-house. See Annual Tap Water Results at https://www.rdn.bc.ca/we-sturne-heights	
10-May-22	1260 Westurne	0	0	0	0	9	7.15	0.39	43.2	0.04	91.5		
16-May-22	1252 Westurne	0	0	0	0	9	7.08	0.52	42.7	0.04	90.6		
25-May-22	1260 Westurne	0	0	0	0	9	7.00	0.38	42.6	0.04	90.4		
CDN Drinking Water Guidelines		<1	<1	<1	<1	n/a	7.0-10.5	n/a	500	n/a	n/a	0.3	0.02 AO 0.12 MAC

Legend:

* Coliforms are measured in colony forming units (CFU) per 100 millilitres of water (CFU/100mL)

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Regional District of Nanaimo - Water Services Department

Westurne Heights Water Analysis - 2022 Monthly Report

Date	Sample Location (Address)	BC Centre for Disease Control		RDN In-House Laboratory and Spectrophotometer									
		E. coli *	Total Coliform *	E.coli *	Total Coliform *	Temp. (°C)	pH	Free Chlorine Residual (mg/L)	Total Dissolved Solids (mg/L)	Salinity (%)	Conductivity (µS/cm)	Total Iron (mg/L)	Manganese (mg/L)
5-Apr-22	1263 Westurne Hts	0	0	0	0	8	7.08	0.47	43.6	0.04	92.8	Fe and Mn are no longer tested in-house. See Annual Tap Water Results at https://www.rdn.bc.ca/we-sturne-heights	
13-Apr-22	1260 Westurne Hts	0	0	0	0	8	7.23	0.46	42.9	0.04	82.9		
20-Apr-22	1252 Westurne Hts	0	0	0	0	8	7.14	0.48	42.7	0.04	90.7		
25-Apr-22	1260 Westurne Hts	0	0	0	0	9	7.20	0.40	42.7	0.04	90.6		
CDN Drinking Water Guidelines		<1	<1	<1	<1	n/a	7.0-10.5	n/a	500	n/a	n/a	0.3	0.02 AO 0.12 MAC

Legend:

* Coliforms are measured in colony forming units (CFU) per 100 millilitres of water (CFU/100mL)

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Regional District of Nanaimo - Water Services Department

Westurne Heights Water Analysis - 2022 Monthly Report

Date	Sample Location (Address)	BC Centre for Disease Control		RDN In-House Laboratory and Spectrophotometer									
		E. coli *	Total Coliform *	E.coli *	Total Coliform *	Temp. (°C)	pH	Free Chlorine Residual (mg/L)	Total Dissolved Solids (mg/L)	Salinity (%)	Conductivity (µS/cm)	Total Iron (mg/L)	Manganese (mg/L)
2-Mar-22	1263 Westurne Hts	0	0	0	0	5	7.16	0.64	43.4	0.04	92.1	Fe and Mn are no longer tested in-house. See Annual Tap Water Results at https://www.rdn.bc.ca/we-sturne-heights	
8-Mar-22	1260 Westurne Hts	0	0	0	0	8	7.32	0.59	43.5	0.04	92.3		
16-Mar-22	1252 Westurne	0	0	0	0	7	7.01	0.59	42.9	0.04	91.9		
23-Mar-22	1260 Westurne Hts	0	0	0	0	8	7.54	0.67	43.7	0.04	92.8		
29-Mar-22	1260 Westurne Hts			0	0	9	7.50	0.59	44.3	0.04	93.9		
CDN Drinking Water Guidelines		<1	<1	<1	<1	n/a	7.0-10.5	n/a	500	n/a	n/a	0.3	0.02 AO 0.12 MAC

Legend:

* Coliforms are measured in colony forming units (CFU) per 100 millilitres of water (CFU/100mL)

Orange font indicates non-compliance with the Aesthetic Objective (AO) in the Canadian Drinking Water Guidelines (CDWG)

Red font indicates non-compliance with the Maximum Acceptable Concentration (MAC) in the CDWG

Comments:

Iron and Manganese are no longer being tested in-house.

A full potability scan is completed once per year at an external lab that includes metals and minerals.



Regional District of Nanaimo - Water Services Department

Westurne Heights Water Analysis - 2022 Monthly Report

Date	Sample Location (Address)	BC Centre for Disease Control		RDN In-House Laboratory and Spectrophotometer									
		E. coli *	Total Coliform *	E.coli *	Total Coliform *	Temp. (°C)	pH	Free Chlorine Residual (mg/L)	Total Dissolved Solids (mg/L)	Salinity (%)	Conductivity (µS/cm)	Total Iron (mg/L)	Manganese (mg/L)
2-Feb-22	1263 Westurne	0	0	0	0	4	7.11	0.61	42.7	0.04	90.6	Fe and Mn are no longer tested in-house. See Annual Tap Water Results at https://www.rdn.bc.ca/we-sturne-heights	
8-Feb-22	1260 Westurne Hts	0	0	0	0	9	7.36	0.54	43.3	0.04	91.9		
15-Feb-22	1252 Westurne Hts	0	0	0	0	n/a	6.98	0.49	42.8	0.04	89.9		
23-Feb-22	1260 Westurne Hts	0	0	0	0	8	7.35	0.67	43.3	0.04	92.0		
CDN Drinking Water Guidelines		<1	<1	<1	<1	n/a	7.0-10.5	n/a	500	n/a	n/a	0.3	0.02 AO 0.12 MAC

Legend:

* Coliforms are measured in colony forming units (CFU) per 100 millilitres of water (CFU/100mL)

Green font indicates a value flagged for operational consideration

Orange font indicates non-compliance with the Aesthetic Objective (AO) in the Canadian Drinking Water Guidelines (CDWG)

Red font indicates non-compliance with the Maximum Acceptable Concentration (MAC) in the CDWG

Comments:

Notes below about pH (2015) from https://www.canada.ca/en/health-canada/services/environmental-workplace-health/reports-publications/water-quality/guidelines-canadian-drinking-water-quality-summary-table.html#_ftn1

Type	Parameter (published, reaffirmed)	MAC (mg/L)	Other value (mg/L)	Common sources of parameter in water	Health considerations	Comments
Treatment-related	pH (2015)	None	7.0-10.5	Not applicable	Not applicable	The control of pH is important to maximize treatment effectiveness, control corrosion and reduce leaching from distribution system and plumbing components.



Regional District of Nanaimo - Water Services Department

Westerne Heights Water Analysis - 2022 Monthly Report

Date	Sample Location (Address)	BC Centre for Disease Control		RDN In-House Laboratory and Spectrophotometer									
		E. coli *	Total Coliform *	E.coli *	Total Coliform *	Temp. (°C)	pH	Free Chlorine Residual (mg/L)	Total Dissolved Solids (mg/L)	Salinity (%)	Conductivity (µS/cm)	Total Iron (mg/L)	Manganese (mg/L)
5-Jan-22	1260 Westerne Heights	0	0	0	0	8	7.16	0.51	42.7	0.04	90.6	Fe and Mn are no longer tested in-house. See Annual Tap Water Results at https://www.rdn.bc.ca/westerne-heights	
12-Jan-22	1260 Westerne Heights			0	0	6	7.31	0.63	43.2	0.04	91.6		
18-Jan-22	1252 Westerne Heights	0	0	0	0	5	6.79	0.40	43.3	0.04	91.9		
18-Jan-22	1263 Westerne Heights	0	0	0	0	5		0.57					
26-Jan-22	1260 Westerne Heights	0	0	0	0	9	7.24	0.52	43.3	0.04	91.9		
CDN Drinking Water Guidelines		<1	<1	<1	<1	n/a	7.0-10.5	n/a	500	n/a	n/a	0.3	0.02 AO 0.12 MAC

Legend:

* Coliforms are measured in colony forming units (CFU) per 100 millilitres of water (CFU/100mL)

Green font indicates a value flagged for operational consideration

Orange font indicates non-compliance with the Aesthetic Objective (AO) in the Canadian Drinking Water Guidelines (CDWG)

Red font indicates non-compliance with the Maximum Acceptable Concentration (MAC) in the CDWG

Comments:

Notes below about pH (2015) from https://www.canada.ca/en/health-canada/services/environmental-workplace-health/reports-publications/water-quality/guidelines-canadian-drinking-water-quality-summary-table.html#_ftn1

Type	Parameter (published, reaffirmed)	MAC (mg/L)	Other value (mg/L)	Common sources of parameter in water	Health considerations	Comments
Treatment-related	pH (2015)	None	7.0-10.5	Not applicable	Not applicable	The control of pH is important to maximize treatment effectiveness, control corrosion and reduce leaching from distribution system and plumbing components.

Westerne Heights #1 Raw Well Water Analysis 1260 Westerne Heights Road

CDWG=Canadian Drinking Water Guidelines
OG= Operational Guidance Value

MAC=Maximum Acceptable Concentration
AO= Aesthetic Objective

Green font indicates a value flagged for operational considerations.

Orange font indicates non-compliance with the Aesthetic Objective in the Canadian Drinking Water Guidelines (CDWG)

Red font indicates non-compliance with the Maximum Acceptable Concentration (MAC) in the CDWG

	Units	CDWG		Sept 8 2014	October 12 2016	Sept 18 2017	October 25 2018	October 3 2019	October 21 2020	October 21 2021	October 13 2022
Miscellaneous Inorganics											
Fluoride	mg/L	1.5	MAC	<0.05	0.026	0.031	0.026	<0.05	<0.05	<0.05	<0.05
Alkalinity (total as CaCO)	mg/L			46	44.5	47.5	45.1	47	40	50	41
Anions											
Dissolved Sulphate	mg/L	500	AO	1.6	1.7	1.8	2.3	1.4	2.9	2.3	2.1
Dissolved Chloride	mg/L	250	AO	1.4	1.8	2.3	1.6	1.5	1.6	1.2	<1
Nitrite	mg/L	1	MAC	<0.05	<0.0050	<0.0050	<0.0050	<0.005	<0.0005	<0.0005	<0.005
Miscellaneous											
Apparent Colour	Colour Unit			<5	5	5	5	5	5	<5	<5
Nutrients											
Total Ammonia	mg/L			<0.02	0.1	<0.020	0.02	0.07	0.027	0.017	0.018
Physical Properties											
Conductivity	µS/cm			90.7	97.6	98.5	95.4	95	91	90	93
pH	pH	7.0:10.5	OG	7.2	7.79	7.79	7.78	7.61	7.04	6.76	7.2
TDS	mg/L	500	AO	76	78	82	60	50	74	82	58
Turbidity	NTU			<0.5	0.55	0.15	0.34	0.25	0.44	0.28	0.37
Microbiological Parameters											
E.coli	MPN/100mL	<1	MAC	<1.0	<1.0	<1.0	<1.0	<1.0	0	0	0
Total Coliforms	MPN/100mL	<1	MAC	<1.0	4.2	<1.0	<1.0	<1.0	0	0	0
Calculated Parameters											
Total Hardness (CaCO)	mg/L			42	41.5	42.6	43.3	41.4	41.2	39.5	40.6
Nitrate	mg/L	10	MAC	0.10	0.118	0.115	0.117	0.12	0.117	0.138	0.134
Elements											
Total Mercury	mg/L	0.001	MAC	<0.00001	<0.00001	<0.00001	0.0000083	<0.000002	<0.0000019	<0.0000019	<0.0000019
Total Metals											
Total Aluminum	mg/L	0.1	OG	<0.025	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003
Total Antimony	mg/L	0.006	MAC	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Total Arsenic	mg/L	0.01	MAC	0.00041	<0.0001	<0.0001	0.00011	<0.001	<0.0001	<0.0001	0.0001
Total Barium	mg/L	1	MAC	0.00315	0.0015	0.0014	0.0014	0.0015	0.0015	0.0015	0.0014
Total Beryllium	mg/L			<0.00025	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Total Bismuth	mg/L			<0.0005	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Total Boron	mg/L	5	MAC	<0.010	<0.050	<0.050	<0.050	<0.05	<0.05	<0.05	<0.05
Total Cadmium	mg/L	0.005	MAC	0.00015	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Total Chromium	mg/L	0.05	MAC	<0.0025	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Total Cobalt	mg/L			<0.0005	<0.0005	<0.0002	<0.0002	<0.002	<0.0002	<0.0002	<0.0002
Total Copper	mg/L	1	AO	0.0085	0.0028	0.00469	0.00418	0.00249	0.00168	0.00359	0.00105
Total Iron	mg/L	0.3	AO	0.058	0.123	0.0845	0.142	0.121	0.152	0.172	0.135
Total Lead	mg/L	0.01	MAC	0.0035	<0.0002	<0.0002	0.00032	0.00076	0.00063	0.00032	<0.0002
Total Manganese	mg/L	0.02 0.12	AO MAC	<0.0050	0.0075	0.0028	0.003	0.0031	0.0033	0.0034	0.0028
Total Molybdenum	mg/L			0.00028	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Total Nickel	mg/L			0.0101	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Total Selenium	mg/L	0.05	MAC	<0.0005	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Total Silicon	mg/L			7.5	6.63	7.55	7.17	7.09	7.46	7.48	7.86
Total Silver	mg/L			<0.00025	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002
Total Strontium	mg/L			0.028	0.0286	0.0281	0.0281	0.0273	0.0262	0.0245	0.0242
Total Thallium	mg/L			<0.00005	<0.00005	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Total Tin	mg/L			0.0006	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Total Titanium	mg/L			<0.0025	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Total Uranium	mg/L	0.02	MAC	<0.00005	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Total Vanadium	mg/L			0.0023	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Total Zinc	mg/L	5	AO	0.121	<0.005	0.0058	<0.005	<0.005	<0.005	0.0051	<0.005
Total Zirconium	mg/L				<0.0005	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Total Calcium	mg/L			11.7	11.1	11.7	12	11.3	11.2	10.9	11.2
Total Magnesium	mg/L			3.16	3.34	3.25	3.27	3.2	3.21	2.94	3.09
Total Potassium	mg/L			<0.5	0.189	0.192	0.179	0.172	0.18	0.167	0.165
Total Sodium	mg/L	200	AO	2.7	3.18	3.57	2.8	2.52	265	2.29	2.39
Total Sulphur	mg/L				<3.0	<3.0	<3.0	<3	<3	<3	<3

Notes below about pH (2015) from https://www.canada.ca/content/dam/hc-sc/migration/hc-sc/ewh-semt/alt_formats/pdf/pubs/water-eau/sum_guide-res_recom/summary-table-EN-2020-02-11.pdf

Type	Parameter (published, reaffirmed)	MAC (mg/L)	Other value (mg/L)	Common sources of parameter in water	Health considerations	Comments
Treatment-related	pH (2015)	None	7.0-10.5	Not applicable	Not applicable	The control of pH is important to maximize treatment effectiveness, control corrosion and reduce leaching from distribution system and plumbing components.

CDWG=Canadian Drinking Water Guidelines

MAC=Maximum Acceptable Concentration

OG= Operational Guidance Value

AO= Asthetic Objective.

Orange font indicates non-compliance with the Aesthetic Objective in the Canadian Drinking Water Guidelines (CDWG)

Red font indicates non-compliance with the Maximum Acceptable Concentration (MAC) in the CDWG

	Units	CDWG		May 8 2017	May 7 2018	May 13 2019	May 25 2020	May 6 2021	May 19 2022
Miscellaneous Inorganics									
Fluoride	mg/L	1.5	MAC	0.03	0.031	0.026	<0.05	<0.05	<0.05
Alkalinity (total as CaCO ₃)	mg/L			42.7	39.9	45.1	42	44	40
Anions									
Dissolved Sulphate	mg/L	500	AO	1.91	2.7	3.2	1.9	1.7	2.2
Dissolved Chloride	mg/L	250	AO	2.6	2.8	3.3	2.7	2.9	3.4
Nitrite	mg/L	1	MAC	<0.0050	<0.0050	<0.005	<0.005	<0.005	<0.005
Miscellaneous									
Apparent Colour	Colour Unit			10	5	<2	10	10	<5
Nutrients									
Total Ammonia	mg/L			0.095	0.35	<0.015	<0.015	<0.015	<0.015
Physical Properties									
Conductivity	µS/cm			93.3	93	95.2	93	94	90
pH	pH	7.0:10.5	AO	7.8	7.74	7.41	7.65	7.57	7.31
TDS	mg/L	500	AO	62	56	68	58	68	56
Turbidity	NTU			0.13	0.18	0.2	0.23	0.64	0.29
Microbiological Parameters									
E.coli	MPN/100mL	<1	MAC	<1.0	<1.0	0	0	0	0
Total Coliforms	MPN/100mL	<1	MAC	<1.0	<1.0	0	0	0	0
Calculated Parameters									
Total Hardness (CaCO ₃)	mg/L			45.1	38.9	40.5	39.5	39.9	37.4
Nitrate	mg/L	10	MAC	0.113	0.116	0.105	0.1	0.101	0.119
Elements									
Total Mercury	mg/L	0.001	MAC	<0.00001	<0.000002	0.0000029	<0.0000019	<0.0000019	<0.0000019
Total Metals									
Total Aluminum	mg/L	0.1	OG	<0.003	<0.003	<0.003	<0.003	0.0059	<0.003
Total Antimony	mg/L	0.006	MAC	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Total Arsenic	mg/L	0.01	MAC	<0.0001	<0.0001	<0.0001	0.00011	0.00021	<0.0001
Total Barium	mg/L	1	MAC	0.0015	0.0012	0.0013	0.0013	0.0015	0.0015
Total Beryllium	mg/L			<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Total Bismuth	mg/L			<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Total Boron	mg/L	5	MAC	<0.050	<0.050	<0.05	<0.05	<0.05	<0.05
Total Cadmium	mg/L	0.005	MAC	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Total Chromium	mg/L	0.05	MAC	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Total Cobalt	mg/L			<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Total Copper	mg/L	1	AO	0.00863	0.00424	0.00348	0.00459	0.00685	0.00411
Total Iron	mg/L	0.3	AO	0.0867	0.0879	0.0993	0.184	0.584	0.109
Total Lead	mg/L	0.01	MAC	0.00134	<0.0002	<0.0002	<0.0002	0.00024	<0.0002
Total Manganese	mg/L	0.02 0.12	AO MAC	0.0035	0.0028	0.0031	0.0038	0.0049	0.0029
Total Molybdenum	mg/L			<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Total Nickel	mg/L			<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Total Selenium	mg/L	0.05	MAC	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Total Silicon	mg/L			9.03	7.62	7.19	7.45	7.69	8.04
Total Silver	mg/L			<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002
Total Strontium	mg/L			0.0267	0.0262	0.0246	0.0261	0.0268	0.0241
Total Thallium	mg/L			<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Total Tin	mg/L			<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Total Titanium	mg/L			<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Total Uranium	mg/L	0.02	MAC	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Total Vanadium	mg/L			<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Total Zinc	mg/L	5	AO	0.0185	0.0152	0.011	0.0169	0.0134	0.0117
Total Zirconium	mg/L			<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Total Calcium	mg/L			12.4	10.9	11.3	10.9	10.8	10.2
Total Magnesium	mg/L			3.42	2.87	2.99	2.99	3.15	2.86
Total Potassium	mg/L			0.22	0.171	0.181	0.182	0.198	0.176
Total Sodium	mg/L	200	AO	3.91	3.49	3.99	3.4	3.84	3.51
Total Sulphur	mg/L			<3.0	<3.0	<3	<3	<3	<3