

REGIONAL DISTRICT OF NANAIMO

Water Service Area Annual Report 2021



Westerne Heights Water Service Area

June 2022

REGIONAL DISTRICT OF NANAIMO

Water & Utility 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 2021. 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 2022.

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

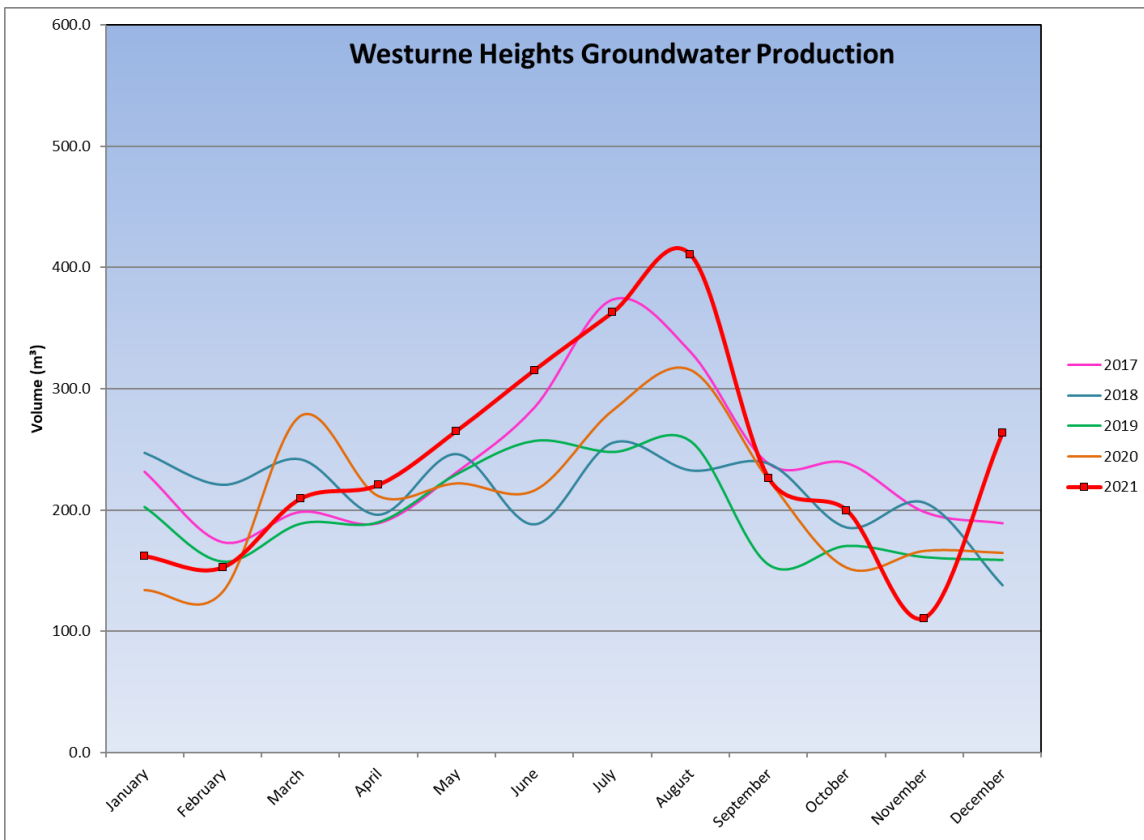
5.0 Water Quality Inquiries and Complaints

A few inquiries and complaints were received from the Westerne Heights water service area in 2021 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 2021 is given in the table below.

Activity in 2021	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

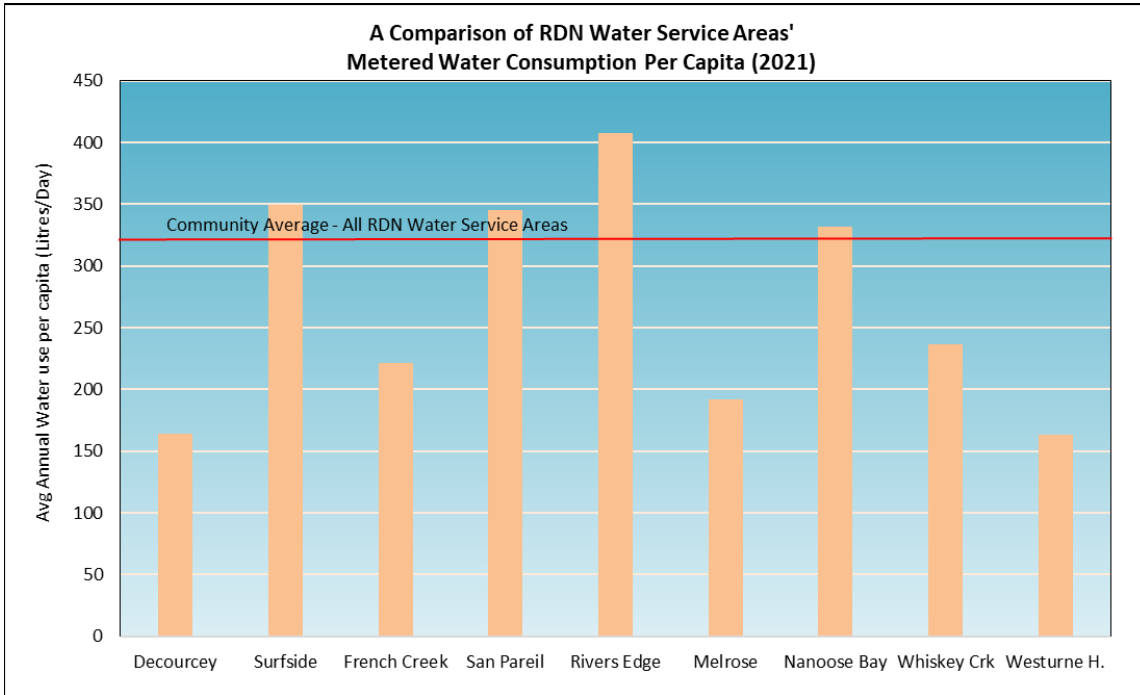
6.0 Groundwater Production and Consumption

The monthly groundwater production in the Westerne Heights Water Service Area has been monitored since 2017. Groundwater production in 2021 was above average in the summer months due to high seasonal temperatures.



Consumption

In the Fall/Winter of 2021, the average usage per home in the Westerne Heights Water Service Area was 0.31 cubic metres per day (68.2 imperial gallons). In the summer, the average water usage was 0.56 cubic metres per day (123.2 imperial gallons). Based on these figures, the annual consumption per capita is estimated to be 164 L/day (based on 2.4 people per household). This consumption is *49% lower* than the average of all the other RDN water systems of 321 L/day/capita for 2021.



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) | ✓ Traffic Control |
| ✓ Wastewater Collection | ✓ TDG (Transportation of Dangerous Goods) | ✓ Fall Protection |
| ✓ Cross Connection Control | | ✓ First Aid |
| ✓ Asbestos Awareness | | ✓ Silica Awareness |

9.0 Water Service Area Projects

9.1 2021 Completed Studies & Projects

- Cleaned water storage cisterns;
- Corresponded with residents regarding water conservation;
- Enforced outdoor sprinkling regulations;
- Advised residents regarding water leak repairs;
- Implemented 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;
- Implemented the Water Systems SCADA Master Plan; and
- Began valve maintenance program.

9.2 2021 Proposed Projects & Upgrades

- Complete irrigation checks for high-water users;
- Continue watermain flushing program and hydrant maintenance;
- Implement Phase 2 Water Systems SCADA Master Plan;
- Utilize leak detection equipment and tracking;
- Continue valve maintenance program;
- Continue the 2021-2030 DWWP Water Conservation Plan; and
- Continue to offer numerous water-saving incentives via rebates.



Westerne Heights well site and fence

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 2021, 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 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).

12.0 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.

13.0 Closing

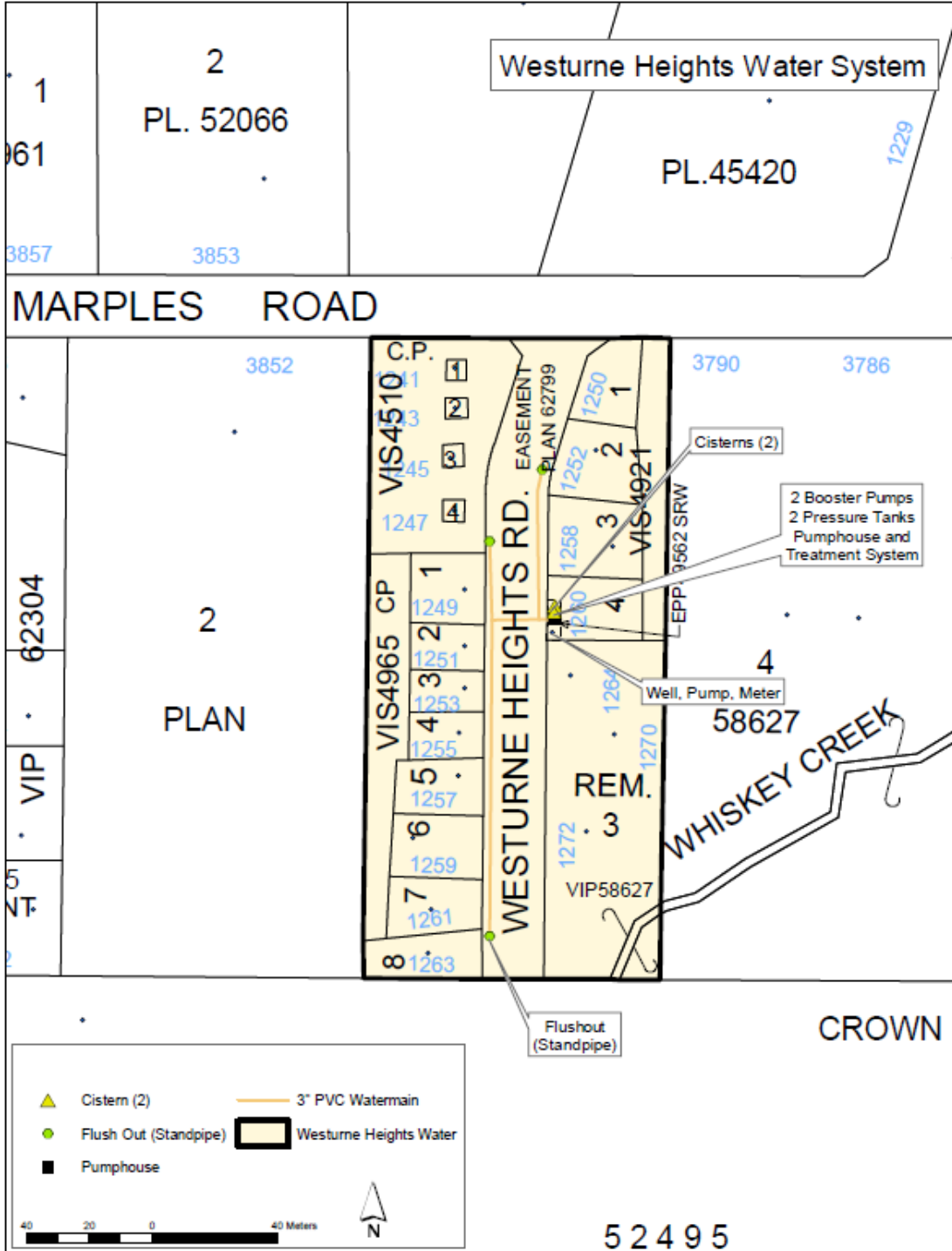
An annual report for the year 2022 will be prepared and submitted to Island Health in the Spring of 2023. Annual reports are also available on our website at: www.rdn.bc.ca/westerne-heights.

APPENDIX A

MAP OF WESTURNE HEIGHTS

WATER SERVICE AREA

WESTERNE HEIGHTS WATER SERVICE AREA



APPENDIX B

WATER QUALITY TESTING RESULTS

WESTURNE HEIGHTS WATER SERVICE AREA


Facility Location:

1262 Westurne Heights Road, Qualicum Beach

Facility Information: Facility Type: 15-300 connections DWC

Facility Sampling History:

Date Collected	Drinking Water System	Total E. Coli	Total Coliform	Site Name
01/25/2021	WESTURNE HEIGHTS WATER SERVICE AREA	LT1	LT1	Well Head Sample Port - 1260 Westurne Heights Rd.
02/17/2021	WESTURNE HEIGHTS WATER SERVICE AREA	LT1	LT1	Well Head Sample Port - 1260 Westurne Heights Rd.
03/15/2021	WESTURNE HEIGHTS WATER SERVICE AREA	LT1	LT1	Well Head Sample Port - 1260 Westurne Heights Rd.
04/19/2021	WESTURNE HEIGHTS WATER SERVICE AREA	LT1	LT1	Well Head Sample Port - 1260 Westurne Heights Rd.
05/17/2021	WESTURNE HEIGHTS WATER SERVICE AREA	LT1	LT1	Well Head Sample Port - 1260 Westurne Heights Rd.
06/14/2021	WESTURNE HEIGHTS WATER SERVICE AREA	LT1	LT1	Well Head Sample Port - 1260 Westurne Heights Rd.
07/19/2021	WESTURNE HEIGHTS WATER SERVICE AREA	LT1	LT1	Well Head Sample Port - 1260 Westurne Heights Rd.
07/27/2021	WESTURNE HEIGHTS WATER SERVICE AREA	LT1	LT1	Well Head Sample Port - 1260 Westurne Heights Rd.
08/09/2021	WESTURNE HEIGHTS WATER SERVICE AREA	LT1	LT1	Well Head Sample Port - 1260 Westurne Heights Rd.
08/16/2021	WESTURNE HEIGHTS WATER SERVICE AREA	LT1	LT1	Well Head Sample Port - 1260 Westurne Heights Rd.
09/13/2021	WESTURNE HEIGHTS WATER SERVICE AREA	LT1	LT1	Well Head Sample Port - 1260 Westurne Heights Rd.
09/28/2021	WESTURNE HEIGHTS WATER SERVICE AREA	LT1	LT1	Well Head Sample Port - 1260 Westurne Heights Rd.
10/18/2021	WESTURNE HEIGHTS WATER SERVICE AREA	LT1	LT1	Well Head Sample Port - 1260 Westurne Heights Rd.
10/25/2021	WESTURNE HEIGHTS WATER SERVICE AREA	LT1	LT1	Well Head Sample Port - 1260 Westurne Heights Rd.
11/16/2021	WESTURNE HEIGHTS WATER SERVICE AREA	LT1	LT1	Well Head Sample Port - 1260 Westurne Heights Rd.
12/07/2021	WESTURNE HEIGHTS WATER SERVICE AREA	LT1	LT1	Well Head Sample Port - 1260 Westurne Heights Rd.

Date Collected	Drinking Water System	Total E. Coli	Total Coliform	Site Name
12/14/2021	WESTURNE HEIGHTS WATER SERVICE AREA	LT1	LT1	Well Head Sample Port - 1260 Westurne Heights Rd.
01/11/2021	WESTURNE HEIGHTS WATER SERVICE AREA	LT1	LT1	Westurne Sample Port - 1252 Westurne Heights Rd.
02/08/2021	WESTURNE HEIGHTS WATER SERVICE AREA	LT1	LT1	Westurne Sample Port - 1252 Westurne Heights Rd.
02/22/2021	WESTURNE HEIGHTS WATER SERVICE AREA	LT1	LT1	Westurne Sample Port - 1252 Westurne Heights Rd.
03/10/2021	WESTURNE HEIGHTS WATER SERVICE AREA	LT1	LT1	Westurne Sample Port - 1252 Westurne Heights Rd.
04/12/2021	WESTURNE HEIGHTS WATER SERVICE AREA	LT1	LT1	Westurne Sample Port - 1252 Westurne Heights Rd.
04/26/2021	WESTURNE HEIGHTS WATER SERVICE AREA	LT1	LT1	Westurne Sample Port - 1252 Westurne Heights Rd.
05/10/2021	WESTURNE HEIGHTS WATER SERVICE AREA	LT1	LT1	Westurne Sample Port - 1252 Westurne Heights Rd.
05/25/2021	WESTURNE HEIGHTS WATER SERVICE AREA	LT1	LT1	Westurne Sample Port - 1252 Westurne Heights Rd.
06/07/2021	WESTURNE HEIGHTS WATER SERVICE AREA	LT1	LT1	Westurne Sample Port - 1252 Westurne Heights Rd.
07/12/2021	WESTURNE HEIGHTS WATER SERVICE AREA	LT1	LT1	Westurne Sample Port - 1252 Westurne Heights Rd.
08/09/2021	WESTURNE HEIGHTS WATER SERVICE AREA	LT1	LT1	Westurne Sample Port - 1252 Westurne Heights Rd.
09/20/2021	WESTURNE HEIGHTS WATER SERVICE AREA	LT1	LT1	Westurne Sample Port - 1252 Westurne Heights Rd.
10/13/2021	WESTURNE HEIGHTS WATER SERVICE AREA	LT1	LT1	Westurne Sample Port - 1252 Westurne Heights Rd.
11/22/2021	WESTURNE HEIGHTS WATER SERVICE AREA	LT1	LT1	Westurne Sample Port - 1252 Westurne Heights Rd.
12/14/2021	WESTURNE HEIGHTS WATER SERVICE AREA	LT1	LT1	Westurne Sample Port - 1252 Westurne Heights Rd.
01/06/2021	WESTURNE HEIGHTS WATER SERVICE AREA	LT1	LT1	WESTURNE Sample Port - 1263 Westurne Heights Rd.
01/18/2021	WESTURNE HEIGHTS WATER SERVICE AREA	LT1	LT1	WESTURNE Sample Port - 1263 Westurne Heights Rd.
02/03/2021	WESTURNE HEIGHTS WATER SERVICE AREA	LT1	LT1	WESTURNE Sample Port - 1263 Westurne Heights Rd.
03/03/2021	WESTURNE HEIGHTS WATER SERVICE AREA	LT1	LT1	WESTURNE Sample Port - 1263 Westurne Heights Rd.
03/28/2021	WESTURNE HEIGHTS WATER SERVICE AREA	QRWRT	QRWRT	WESTURNE Sample Port - 1263 Westurne Heights Rd.
04/06/2021	WESTURNE HEIGHTS WATER SERVICE AREA	LT1	LT1	WESTURNE Sample Port - 1263 Westurne Heights Rd.

Date Collected	Drinking Water System	Total E. Coli	Total Coliform	Site Name
05/03/2021	WESTURNE HEIGHTS WATER SERVICE AREA	LT1	LT1	WESTURNE Sample Port - 1263 Westurne Heights Rd.
06/01/2021	WESTURNE HEIGHTS WATER SERVICE AREA	LT1	LT1	WESTURNE Sample Port - 1263 Westurne Heights Rd.
06/21/2021	WESTURNE HEIGHTS WATER SERVICE AREA	LT1	LT1	WESTURNE Sample Port - 1263 Westurne Heights Rd.
07/06/2021	WESTURNE HEIGHTS WATER SERVICE AREA	LT1	LT1	WESTURNE Sample Port - 1263 Westurne Heights Rd.
08/03/2021	WESTURNE HEIGHTS WATER SERVICE AREA	LT1	LT1	WESTURNE Sample Port - 1263 Westurne Heights Rd.
09/07/2021	WESTURNE HEIGHTS WATER SERVICE AREA	LT1	LT1	WESTURNE Sample Port - 1263 Westurne Heights Rd.
10/04/2021	WESTURNE HEIGHTS WATER SERVICE AREA	LT1	LT1	WESTURNE Sample Port - 1263 Westurne Heights Rd.
11/01/2021	WESTURNE HEIGHTS WATER SERVICE AREA	LT1	LT1	WESTURNE Sample Port - 1263 Westurne Heights Rd.
12/07/2021	WESTURNE HEIGHTS WATER SERVICE AREA	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 - 2021 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)
07-Dec-21	1263 Westurne			0	0	7	7.09	0.49	60.9	0.06	127.7	Fe and Mn are no longer tested in-house. See Annual Tap Water Results at https://www.rdn.bc.ca/westurne-heights	
07-Dec-21	1260 Westurne			0	0	8	7.18	0.52	43.3	0.04	91.8		
14-Dec-21	1252 Westurne			0	0	8	7.19	0.48	42.8	0.04	91.0		
14-Dec-21	1260 Westurne			0	0	8	7.18	0.48	44.1	0.04	91.2		
20-Dec-21	1260 Westurne			0	0	5	7.30	0.60	42.8	0.04	90.9		
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 considerations

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.

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

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01-Nov-21	1263 Westurne	0	0	0	0	9	7.51	0.44	44.6	0.04	94.8	Fe and Mn are no longer tested in-house. See Annual Tap Water Results at https://www.rdn.bc.ca/westurne-heights	
08-Nov-21	1260 Westurne	0	0	0	0	9	7.63	0.42	44.7	0.04	95.0		
15-Nov-21	1252 Westurne			0	0	9	7.33	0.42	44.4	0.04	94.2		
22-Nov-21	1252 Westurne			0	0	7	7.48	0.45	43.6	0.04	92.6		
29-Nov-21	1260 Westurne			0	0	9	6.93	0.40	44.3	0.04	101.6		
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

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		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-Oct-21	1263 Westurne	0	0	0	0	12	7.47	0.62	46.2	0.05	98.0	Fe and Mn are no longer tested in-house. See Annual Tap Water Results at https://www.rdn.bc.ca/westurne-heights	
13-Oct-21	1252 Westurne	0	0	0	0	12	7.54	0.39	48.0	0.05	101.7		
18-Oct-21	1260 Westurne	0	0	0	0	9	7.39	0.44	45.6	0.04	96.8		
25-Oct-21	1260 Westurne	0	0	0	0	9	7.35	0.49	45.8	0.04	96.7		
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

Legend:

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07-Sep-21	1263 Westurne	0	0	0	0	15	7.59	0.68	49.1	0.05	104.4	Fe and Mn are no longer tested in-house. See Annual Tap Water Results at https://www.rdn.bc.ca/westurne-heights	
13-Sep-21	1260 Westurne	0	0	0	0	9	7.55	0.53	48.1	0.05	102.2		
20-Sep-21	1252 Westurne	0	0	0	0	13	7.49	0.70	46.7	0.05	99.0		
27-Sep-21	1260 Westurne	0	0	0	0	14	7.55	0.51	47.3	0.05	100.3		
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:

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03-Aug-21	1263 Westerne	0	0	0	0		7.31	0.69	45.3	0.04	96.0	Fe and Mn are no longer tested in-house. See Annual Tap Water Results at https://www.rdn.bc.ca/westerne-heights	
11-Aug-21	1252 Westerne	0	0	0	0	17	7.30	0.62	46.1	0.04	96.7		
11-Aug-21	1260 Westerne	0	0	0	0	10	7.31	0.58	45.6	0.04	97.8		
16-Aug-21	1260 Westerne	0	0	0	0	10	7.35	0.54	45.3	0.04	96.1		
23-Aug-21	1260 Westerne			0	0	10	7.45	0.63	46.1	0.05	97.8		
30-Aug-21	1263 Westerne			0	0	17	7.55	0.62	47.6	0.05	101.2		
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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Comments:

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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 - 2021 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)
06-Jul-21	1263 Westerne	0	0	0	0	18	7.25	0.51	45.6	0.04	96.7	Fe and Mn are no longer tested in-house. See Annual Tap Water Results at https://www.rdn.bc.ca/we-sturne-heights	
12-Jul-21	1252 Westerne	0	0	0	0	15	7.30	0.47	45.7	0.04	95.8		
19-Jul-21	1260 Westerne	0	0	0	0	19	7.30	0.66	45.3	0.04	97.1		
27-Jul-21	1260 Westerne	0	0	0	0	19	7.43	0.63	47.6	0.05	100.8		
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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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 - 2021 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)
01-Jun-21	1263 Westurne	0	0	0	0	11	7.36	0.66	44.2	0.04	92.8	Fe and Mn are no longer tested in-house. See Annual Tap Water Results at https://www.rdn.bc.ca/westurne-heights	
07-Jun-21	1252 Westurne	0	0	0	0	12	7.43	0.64	44.4	0.04	94.3		
14-Jun-21	1260 Westurne	0	0	0	0	9	7.39	0.61	44.0	0.04	93.1		
21-Jun-21	1263 Westurne	0	0	0	0	15	7.38	0.54	44.7	0.04	94.7		
29-Jun-21	1260 Westurne	0	0	0	0	18	7.40	0.64	43.9	0.04	92.8		
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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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 - 2021 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)
03-May-21	1263 Westurne	0	0	0	0	10	7.20	0.58	43.1	0.04	91.3	Fe and Mn are no longer tested in-house. See Annual Tap Water Results at https://www.rdn.bc.ca/westurne-heights	
10-May-21	1252 Westurne	0	0	0	0	9	7.26	0.55	43.8	0.04	92.8		
17-May-21	1260 Westurne	0	0	0	0	9	7.14	0.53	43.4	0.04	92.0		
25-May-21	1252 Westurne	0	0	0	0	12	7.15	0.58	44.9	0.04	93.7		
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

Legend:

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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 - 2021 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)
06-Apr-21	1263 Westurne	0	0	0	0	8	7.34	0.51	42.4	0.04	90.1	Fe and Mn are no longer tested in-house. See Annual Tap Water Results at https://www.rdn.bc.ca/westurne-heights	
12-Apr-21	1252 Westurne	0	0	0	0	8	7.22	0.42	43.0	0.04	91.2		
19-Apr-21	1260 Westurne	0	0	0	0	9	7.26	0.49	42.9	0.04	91.0		
26-Apr-21	1252 Westurne	0	0	0	0	9	7.31	0.59	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:

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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 - 2021 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)
03-Mar-21	1263 Westurne	0	0	0	0	6	7.28	0.66	42.8	0.04	91.0	Fe and Mn are no longer tested in-house. See Annual Tap Water Results at https://www.rdn.bc.ca/westurne-heights	
08-Mar-21	1252 Westurne	0	0	0	0	6	7.10	0.52	42.7	0.04	90.1		
15-Mar-21	1260 Westurne	0	0	0	0	8	7.34	0.42	42.4	0.04	90.2		
22-Mar-21	1252 Westurne			0	0	7	7.39	0.54	49.9	0.04	89.1		
28-Mar-21	1263 Westurne	0	0	0	0	7	7.34	0.54	42.4	0.04	90.1		
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

Legend:

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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 - 2021 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)
03-Feb-21	1263 Westurne	0	0	0	0	7	6.58	0.65	42.7	0.04	90.7	Fe and Mn are no longer tested in-house. See Annual Tap Water Results at https://www.rdn.bc.ca/westurne-heights	
08-Feb-21	1252 Westurne	0	0	0	0	7	7.09	0.53	42.5	0.04	90.2		
17-Feb-21	1260 Westurne	0	0	0	0	8	7.40	0.43	42.4	0.04	90.0		
22-Feb-21	1252 Westurne	0	0	0	0	7	7.43	0.52	42.5	0.04	90.1		
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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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 - 2021 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)
06-Jan-21	1263 Westurne	0	0	0	0	7	6.99	0.48	43.0	0.04	91.5	Fe and Mn are no longer tested in-house. See Annual Tap Water Results at https://www.rdn.bc.ca/westurne-heights	
11-Jan-21	1252 Westurne	0	0	0	0	7	6.86	0.45	42.9	0.04	90.9		
18-Jan-21	1263 Westurne	0	0	0	0	6	7.01	0.57	43.1	0.04	91.5		
27-Jan-21	1260 Westurne	0	0	0	0	8	7.42	0.44	43.0	0.04	91.3		
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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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

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	Units	CDWG		Sept 8 2014	October 12 2016	Sept 18 2017	October 25 2018	October 3 2019	October 21 2020	October 21 2021
Miscellaneous Inorganics										
Fluoride	mg/L	1.5	MAC	<0.05	0.026	0.031	0.026	<0.05	<0.05	<0.05
Alkalinity (total as CaCO ₃)	mg/L			46	44.5	47.5	45.1	47	40	50
Anions										
Dissolved Sulphate	mg/L	500	AO	1.6	1.7	1.8	2.3	1.4	2.9	2.3
Dissolved Chloride	mg/L	250	AO	1.4	1.8	2.3	1.6	1.5	1.6	1.2
Nitrite	mg/L	1	MAC	<0.05	<0.0050	<0.0050	<0.0050	<0.005	<0.0005	<0.0005
Miscellaneous										
Apparent Colour	Colour Unit			<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
Physical Properties										
Conductivity	µS/cm			90.7	97.6	98.5	95.4	95	91	90
pH	pH	7.0-10.5	OG	7.2	7.79	7.79	7.78	7.61	7.04	6.76
TDS	mg/L	500	AO	76	78	82	60	50	74	82
Turbidity	NTU			<0.5	0.55	0.15	0.34	0.25	0.44	0.28
Microbiological Parameters										
E.coli	MPN/100mL	<1	MAC	<1.0	<1.0	<1.0	<1.0	<1.0	0	0
Total Coliforms	MPN/100mL	<1	MAC	<1.0	4.2	<1.0	<1.0	<1.0	0	0
Calculated Parameters										
Total Hardness (CaCO ₃)	mg/L			42	41.5	42.6	43.3	41.4	41.2	39.5
Nitrate	mg/L	10	MAC	0.10	0.118	0.115	0.117	0.12	0.117	0.138
Elements										
Total Mercury	mg/L	0.001	MAC	<0.00001	<0.00001	<0.00001	0.0000083	<0.000002	<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
Total Antimony	mg/L	0.006	MAC	<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
Total Barium	mg/L	1	MAC	0.00315	0.0015	0.0014	0.0014	0.0015	0.0015	0.0015
Total Beryllium	mg/L			<0.00025	<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
Total Boron	mg/L	5	MAC	<0.010	<0.050	<0.050	<0.050	<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
Total Chromium	mg/L	0.05	MAC	<0.0025	<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
Total Copper	mg/L	1	AO	0.0085	0.0028	0.00469	0.00418	0.00249	0.00168	0.00359
Total Iron	mg/L	0.3	AO	0.058	0.123	0.0845	0.142	0.121	0.152	0.172
Total Lead	mg/L	0.01	MAC	0.0035	<0.0002	<0.0002	0.00032	0.00076	0.00063	0.00032
Total Manganese	mg/L	0.02 0.12	AO MAC	<0.0050	0.0075	0.0028	0.003	0.0031	0.0033	0.0034
Total Molybdenum	mg/L			0.00028	<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
Total Selenium	mg/L	0.05	MAC	<0.0005	<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
Total Silver	mg/L			<0.00025	<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
Total Thallium	mg/L			<0.00005	<0.00005	<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
Total Titanium	mg/L			<0.0025	<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
Total Vanadium	mg/L			0.0023	<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
Total Zirconium	mg/L				<0.0005	<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
Total Magnesium	mg/L			3.16	3.34	3.25	3.27	3.2	3.21	2.94
Total Potassium	mg/L			<0.5	0.189	0.192	0.179	0.172	0.18	0.167
Total Sodium	mg/L	200	AO	2.7	3.18	3.57	2.8	2.52	265	2.29
Total Sulphur	mg/L				<3.0	<3.0	<3.0	<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	
Miscellaneous Inorganics									
Fluoride	mg/L	1.5	MAC	0.03	0.031	0.026	<0.05	<0.05	
Alkalinity (total as CaCO)	mg/L			42.7	39.9	45.1	42	44	
Anions									
Dissolved Sulphate	mg/L	500	AO	1.91	2.7	3.2	1.9	1.7	
Dissolved Chloride	mg/L	250	AO	2.6	2.8	3.3	2.7	2.9	
Nitrite	mg/L	1	MAC	<0.0050	<0.0050	<0.005	<0.005	<0.005	
Miscellaneous									
Apparent Colour	Colour Unit			10	5	<2	10	10	
Nutrients									
Total Ammonia	mg/L			0.095	0.35	<0.015	<0.015	<0.015	
Physical Properties									
Conductivity	µS/cm			93.3	93	95.2	93	94	
pH	pH	7.0:10.5	AO	7.8	7.74	7.41	7.65	7.57	
TDS	mg/L	500	AO	62	56	68	58	68	
Turbidity	NTU			0.13	0.18	0.2	0.23	0.64	
Microbiological Parameters									
E.coli	MPN/100mL	<1	MAC	<1.0	<1.0	0	0	0	
Total Coliforms	MPN/100mL	<1	MAC	<1.0	<1.0	0	0	0	
Calculated Parameters									
Total Hardness (CaCO)	mg/L			45.1	38.9	40.5	39.5	39.9	
Nitrate	mg/L	10	MAC	0.113	0.116	0.105	0.1	0.101	
Elements									
Total Mercury	mg/L	0.001	MAC	<0.00001	<0.000002	0.0000029	<0.0000019	<0.0000019	
Total Metals									
Total Aluminum	mg/L	0.1	OG	<0.003	<0.003	<0.003	<0.003	0.0059	
Total Antimony	mg/L	0.006	MAC	<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	
Total Barium	mg/L	1	MAC	0.0015	0.0012	0.0013	0.0013	0.0015	
Total Beryllium	mg/L			<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	
Total Bismuth	mg/L			<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	
Total Cadmium	mg/L	0.005	MAC	<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	
Total Cobalt	mg/L			<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	
Total Iron	mg/L	0.3	AO	0.0867	0.0879	0.0993	0.184	0.584	
Total Lead	mg/L	0.01	MAC	0.00134	<0.0002	<0.0002	<0.0002	0.00024	
Total Manganese	mg/L	0.02 0.12	AO MAC	0.0035	0.0028	0.0031	0.0038	0.0049	
Total Molybdenum	mg/L			<0.001	<0.001	<0.001	<0.001	<0.001	
Total Nickel	mg/L			<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	
Total Silicon	mg/L			9.03	7.62	7.19	7.45	7.69	
Total Silver	mg/L			<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	
Total Strontium	mg/L			0.0267	0.0262	0.0246	0.0261	0.0268	
Total Thallium	mg/L			<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	
Total Tin	mg/L			<0.005	<0.005	<0.005	<0.005	<0.005	
Total Titanium	mg/L			<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	
Total Vanadium	mg/L			<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	
Total Zirconium	mg/L			<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	
Total Calcium	mg/L			12.4	10.9	11.3	10.9	10.8	
Total Magnesium	mg/L			3.42	2.87	2.99	2.99	3.15	
Total Potassium	mg/L			0.22	0.171	0.181	0.182	0.198	
Total Sodium	mg/L	200	AO	3.91	3.49	3.99	3.4	3.84	
Total Sulphur	mg/L			<3.0	<3.0	<3	<3	<3	