

REGIONAL DISTRICT OF NANAIMO

Water Service Area Annual Report 2020



Westerne Heights Water Service Area

June 2021

REGIONAL DISTRICT OF NANAIMO

Water & Utility Services Department

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Appendix A - Map of Westurne Heights Water Service Area

Appendix B - Water Quality Testing Results

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1.0 Introduction

The following annual report describes the Westerne Heights Water Service Area and summarizes the water quality and production data from 2020. This report also includes a summary of inquiries and complaints, completed and proposed maintenance activities, Operator Certification, the Emergency Response Plan, and the Cross Connection Control Program. This report is to be submitted to Island Health by the spring of 2021.

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

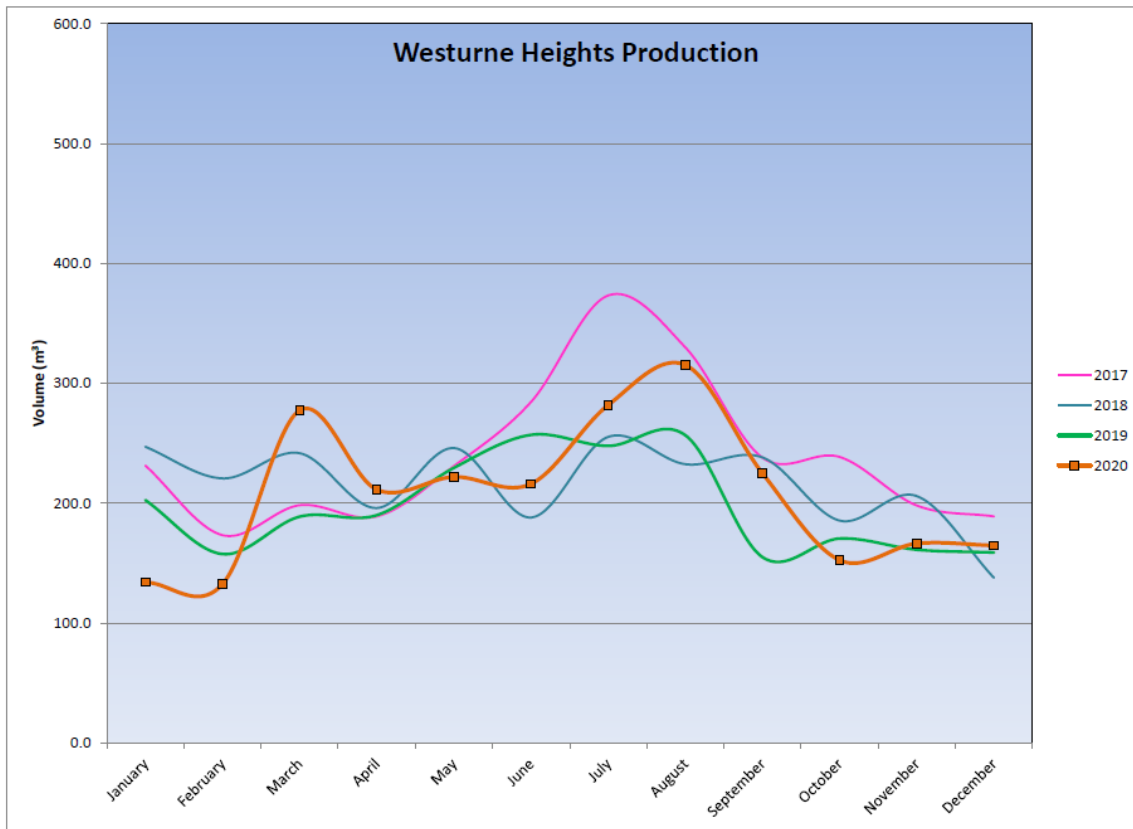
5.0 Water Quality Inquiries and Complaints

A few inquiries and complaints were received from the Westerne Heights water service area in 2020 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 2020 is given in the table below.

Activity in 2020	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	Fall/Winter 2020	Temp power outages

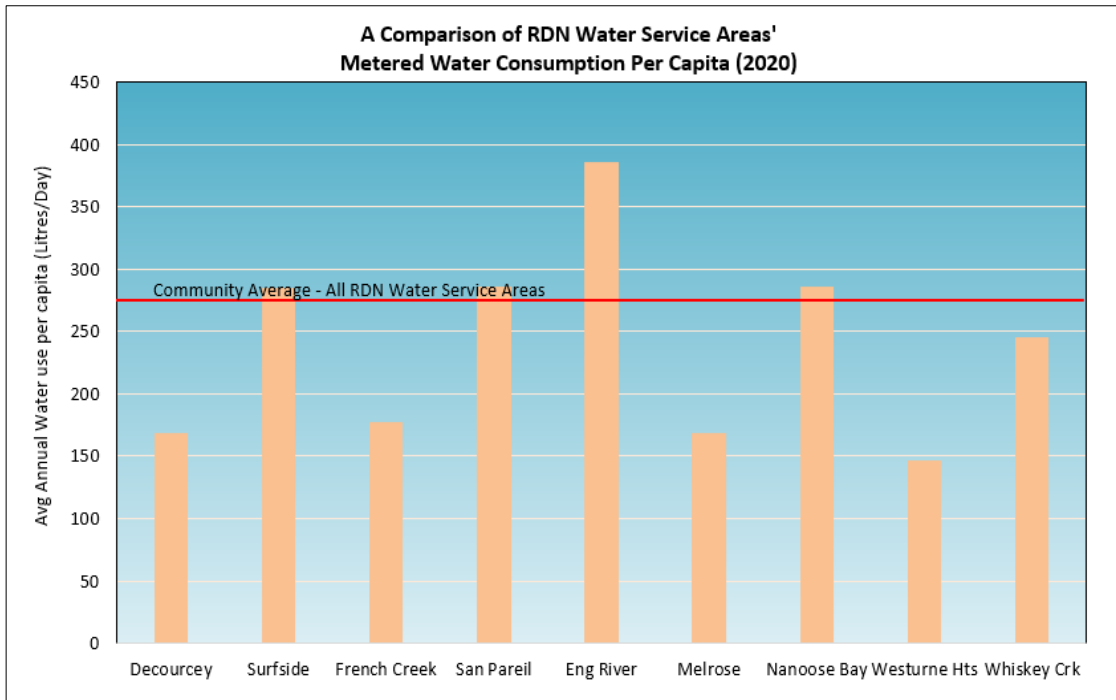
6.0 Groundwater Production and Consumption

The monthly groundwater production in the Westerne Heights Water Service Area has been monitored since 2017. Groundwater production in 2020 was average in the summer months and below average in the fall and winter.



Consumption

In the Fall/Winter of 2020, the average usage per home in the Westerne Heights Water Service Area was 0.31 cubic metres per day (68 imperial gallons). In the summer, the average water usage was 0.45 cubic metres per day (99 imperial gallons). Based on these figures, the annual consumption per capita is estimated to be 146 L/day (based on 2.4 people per household). This consumption is *47% lower* than the average of all the other RDN water systems of 278 L/day/capita for 2020.



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 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 2020 Completed Studies & Projects

- Updated asset database with new assets;
- Calibrated and serviced all Hach spectrophotometer lab equipment;
- Completed a Water System Condition Assessment report and Capital Plan;
- Corresponded with residents regarding water conservation;
- Enforced outdoor sprinkling regulations;
- Completed irrigation checks for high-water users;
- Advised residents regarding water leak repairs;
- Completed the 2020-2030 Water Conservation Plan;
- Implemented a Water Systems SCADA Master Plan;
- Completed regular watermain flushing;
- Maintained a high level of water quality; and
- Continued quality control through regular testing and monitoring of water system.



Well site and fence

9.2 2021 Proposed Projects & Upgrades

- Clean the water storage cisterns;
- Continue watermain flushing program;
- Review well protection plans;
- Implement the 2020-2030 Water Conservation Plan; and
- Continue to offer numerous water-saving incentives via rebates.

10.0 Emergency Response Plan

The Regional District Emergency Response Plan (ERP) 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 ERP was reviewed and updated in 2020, and copies are available on our website, at each RDN office, in each pumphouse, and in each Water Services vehicle. A copy of the ERP 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

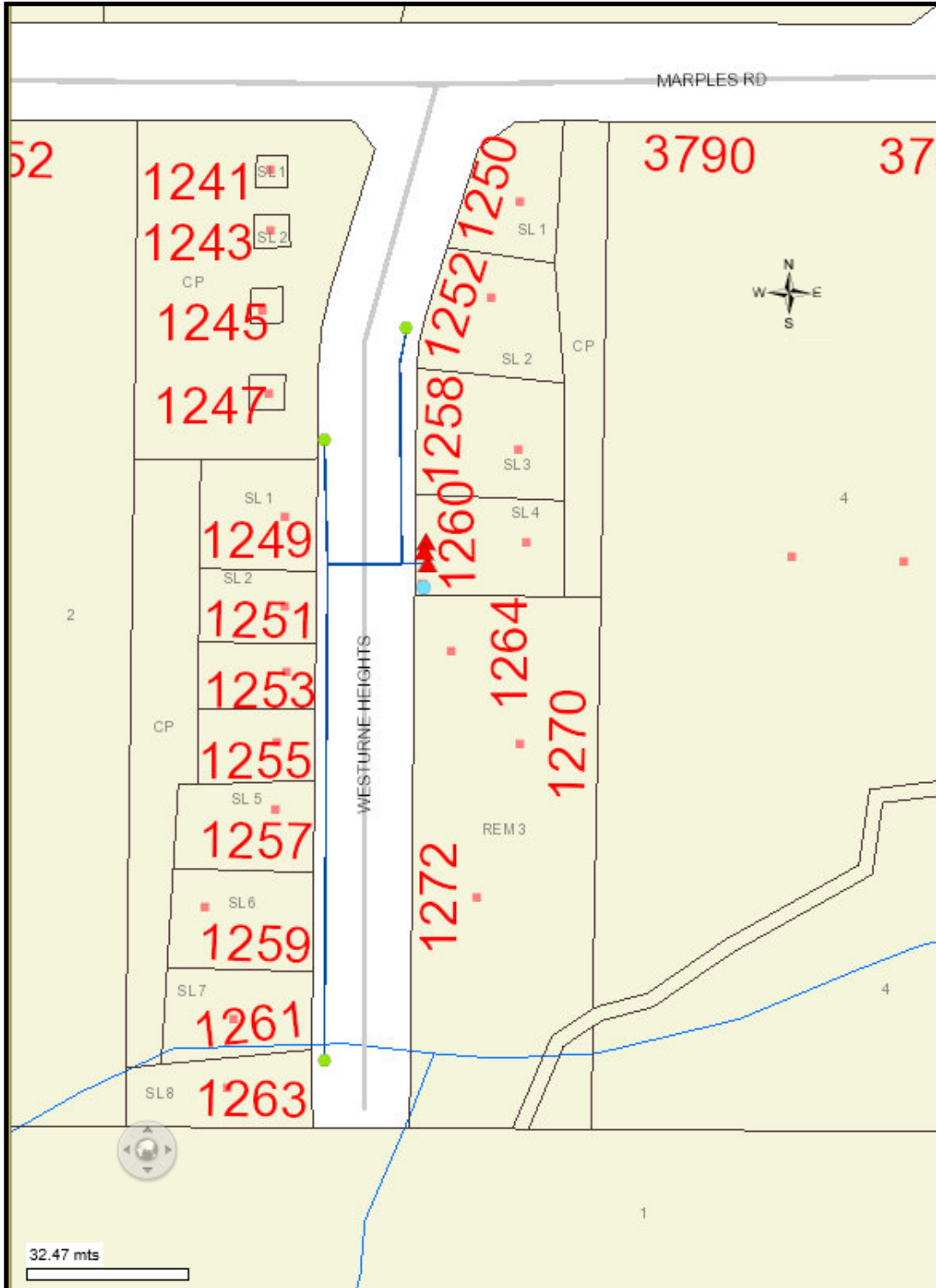
An annual report for the year 2021 will be prepared and submitted to Island Health in the Spring of 2022. Annual reports are also available on our website at: www.rdn.bc.ca/westurne-heights.

APPENDIX A

MAP OF WESTURNE HEIGHTS

WATER SERVICE AREA

WESTURNE HEIGHTS WATER SERVICE AREA



APPENDIX B

WATER QUALITY TESTING RESULTS

WESTURNE HEIGHTS WATER SERVICE AREA



Facility Location:

1262 Westerne Heights Road, Qualicum Beach

Facility Information: Facility Type: 15-300 connections DWC

Facility Sampling History:

<u>Location</u>	<u>Date</u>	<u>Total Coliform</u>	<u>E. Coli</u>
WESTURNE Sample Port, 1263 WESTURNE HEIGHTS ROAD	14-Dec-2020	LT1	LT1
Westerne Sample Port, 1252 WESTURNE HEIGHTS RD.	7-Dec-2020	LT1	LT1
WESTURNE Sample Port, 1263 WESTURNE HEIGHTS ROAD	1-Dec-2020	LT1	LT1
Well Head Sample Port , 1260 Westerne Heights Rd.	1-Dec-2020	LT1	LT1
WESTURNE Sample Port, 1263 WESTURNE HEIGHTS ROAD	23-Nov-2020	LT1	LT1
Well Head Sample Port , 1260 Westerne Heights Rd.	16-Nov-2020	LT1	LT1
Westerne Sample Port, 1252 WESTURNE HEIGHTS RD.	9-Nov-2020	LT1	LT1
WESTURNE Sample Port, 1263 WESTURNE HEIGHTS ROAD	2-Nov-2020	LT1	LT1
Westerne Sample Port, 1252 WESTURNE HEIGHTS RD.	26-Oct-2020	LT1	LT1
Well Head Sample Port , 1260 Westerne Heights Rd.	19-Oct-2020	LT1	LT1
Westerne Sample Port, 1252 WESTURNE HEIGHTS RD.	13-Oct-2020	LT1	LT1
WESTURNE Sample Port, 1263 WESTURNE HEIGHTS ROAD	5-Oct-2020	LT1	LT1
Well Head Sample Port , 1260 Westerne Heights Rd.	14-Sep-2020	LT1	LT1
WESTURNE Sample Port, 1263 WESTURNE HEIGHTS ROAD	14-Sep-2020	LT1	LT1
Westerne Sample Port, 1252 WESTURNE HEIGHTS RD.	8-Sep-2020	LT1	LT1
WESTURNE Sample Port, 1263 WESTURNE HEIGHTS ROAD	2-Sep-2020	LT1	LT1
Westerne Sample Port, 1252 WESTURNE HEIGHTS RD.	24-Aug-2020	LT1	LT1
Well Head Sample Port , 1260 Westerne Heights Rd.	17-Aug-2020	LT1	LT1
Well Head Sample Port , 1260 Westerne Heights Rd.	12-Aug-2020	LT1	LT1
WESTURNE Sample Port, 1263 WESTURNE HEIGHTS ROAD	4-Aug-2020	LT1	LT1
Westerne Sample Port, 1252 WESTURNE HEIGHTS RD.	27-Jul-2020	LT1	LT1
Well Head Sample Port , 1260 Westerne Heights Rd.	20-Jul-2020	LT1	LT1
WESTURNE Sample Port, 1263 WESTURNE HEIGHTS ROAD	13-Jul-2020	LT1	LT1
Well Head Sample Port , 1260 Westerne Heights Rd.	8-Jul-2020	LT1	LT1
Westerne Sample Port, 1252 WESTURNE HEIGHTS RD.	22-Jun-2020	LT1	LT1
Well Head Sample Port , 1260 Westerne Heights Rd.	15-Jun-2020	LT1	LT1
WESTURNE Sample Port, 1263 WESTURNE HEIGHTS ROAD	8-Jun-2020	LT1	LT1
Well Head Sample Port , 1260 Westerne Heights Rd.	1-Jun-2020	LT1	LT1

<u>Location</u>	<u>Date</u>	<u>Total Coliform</u>	<u>E. Coli</u>
Westurne Sample Port, 1252 WESTURNE HEIGHTS RD.	25-May-2020	LT1	LT1
Well Head Sample Port , 1260 Westurne Heights Rd.	20-May-2020	LT1	LT1
WESTURNE Sample Port, 1263 WESTURNE HEIGHTS ROAD	11-May-2020	LT1	LT1
Well Head Sample Port , 1260 Westurne Heights Rd.	4-May-2020	LT1	LT1
Westurne Sample Port, 1252 WESTURNE HEIGHTS RD.	28-Apr-2020	LT1	LT1
Well Head Sample Port , 1260 Westurne Heights Rd.	20-Apr-2020	LT1	LT1
WESTURNE Sample Port, 1263 WESTURNE HEIGHTS ROAD	14-Apr-2020	LT1	LT1
Well Head Sample Port , 1260 Westurne Heights Rd.	6-Apr-2020	LT1	LT1
Westurne Sample Port, 1252 WESTURNE HEIGHTS RD.	23-Mar-2020	LT1	LT1
Well Head Sample Port , 1260 Westurne Heights Rd.	16-Mar-2020	LT1	LT1
WESTURNE Sample Port, 1263 WESTURNE HEIGHTS ROAD	9-Mar-2020	LT1	LT1
Well Head Sample Port , 1260 Westurne Heights Rd.	2-Mar-2020	LT1	LT1
Westurne Sample Port, 1252 WESTURNE HEIGHTS RD.	24-Feb-2020	LT1	LT1
Well Head Sample Port , 1260 Westurne Heights Rd.	18-Feb-2020	LT1	LT1
WESTURNE Sample Port, 1263 WESTURNE HEIGHTS ROAD	10-Feb-2020	LT1	LT1
Well Head Sample Port , 1260 Westurne Heights Rd.	3-Feb-2020	LT1	LT1
Westurne Sample Port, 1252 WESTURNE HEIGHTS RD.	28-Jan-2020	LT1	LT1
Well Head Sample Port , 1260 Westurne Heights Rd.	20-Jan-2020	L1	L1
WESTURNE Sample Port, 1263 WESTURNE HEIGHTS ROAD	13-Jan-2020	L1	L1
Well Head Sample Port , 1260 Westurne Heights Rd.	6-Jan-2020	L1	L1

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 - 2020 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-Dec-20	1263 Westurne	0	0	0	0	9	7.19	0.35	43.4	0.04	92.5	Fe and Mn are no longer tested in-house. See Annual Tap Water Results at https://www.rdn.bc.ca/we-sturne-heights	
7-Dec-20	1252 Westurne	0	0	0	0	9	7.11	0.40	48.9	0.04	72.0		
14-Dec-20	1263 Westurne	0	0	0	0	8	7.38	0.48	49.7	0.04	92.7		
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:

* 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 - 2020 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-Nov-20	1263 Westurne	0	0	0	0	10	7.40	0.43	44.7	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	
9-Nov-20	1252 Westurne	0	0	0	0	10	7.36	0.39	44.0	0.04	93.4		
16-Nov-20	Well Head	0	0	0	0	9	7.20	0.35	44.0	0.04	93.5		
23-Nov-20	1263 Westurne	0	0	0	0	8	7.17	0.46	43.6	0.04	92.4		
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:

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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)
5-Oct-20	1263 Westurne	0	0	0	0	15	7.44	0.43	55.6	0.05	97.9	Fe and Mn are no longer tested in-house. See Annual Tap Water Results at https://www.rdn.bc.ca/we-sturne-heights	
13-Oct-20	1252 Westurne	0	0	0	0	12	7.34	0.38	45.4	0.04	96.2		
19-Oct-20	Well Head	0	0	0	0	10	7.45	0.66	45.4	0.04	96.2		
26-Oct-20	1252 Westurne	0	0	0	0	9	7.32	0.47	44.8	0.04	95.1		
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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		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-Sep-20	1263 Westurne	0	0	0	0	16	7.37	0.43	46.2	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	
8-Sep-20	1252 Westurne	0	0	0	0	15	7.40	0.54	47.9	0.05	97.1		
15-Sep-20	Well Head	0	0	0	0	10	7.49	0.44	51.1	0.05	96.9		
21-Sep-20	Well Head			0	0	11	7.24	0.42	46.1	0.05	97.8		
28-Sep-20	1263 Westurne			0	0	17	7.41	0.54	54.7	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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		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-Aug-20	1063 Westurne Heights	0	0	0	0	14	7.04	0.41	47.1	0.05	100.0	Fe and Mn are no longer tested in-house. See Annual Tap Water Results at https://www.rdn.bc.ca/westurne-heights	
12-Aug-20	Well Head	0	0				7.12	0.48	44.5	0.04	94.2		
17-Aug-20	1260 Westurne Heights	0	0	0	0	11	7.41	0.48	45.6	0.04	96.8		
24-Aug-20	1252 Westurne Heights	0	0	0	0	14	7.16	0.42	42.1	0.04	96.1		
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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		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)
6-Jul-20	Well Head	0	0	0	0	9	7.01	0.37	47.1	0.04	98.1	0.12	0.001
13-Jul-20	1263 Westurne Heights	0	0	0	0	14	7.20	0.40	46.7	0.05	99.0		
20-Jul-20	Well Head	0	0	0	0	10	7.27	0.40	46.1	0.05	98.0		
27-Jul-20	1252 Westurne	0	0	0	0	14	6.99	0.75	46.3	0.05	98.3		
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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Red font indicates non-compliance with the Maximum Acceptable Concentration (MAC) in the CDWG

Comments:

Notes below about Manganese (2019) from: <https://www.canada.ca/en/health-canada/services/environmental-workplace-health/reports-publications/water-quality/guidelines-canadian-drinking-water-quality-summary-table.html>

Type	Parameter (published, reaffirmed)	MAC (mg/L)	Other value (mg/L)	Common sources of parameter in water	Health considerations	Comments
I = Inorganic chemical parameter	Manganese (2019)	0.12	AO: <0.02	Dissolution of naturally-occurring minerals commonly found in soil and rock. Other sources include industrial discharge, mining activities and leaching from landfills.	Health Basis of MAC: Effects on neurological development and behaviour; deficits in memory, attention, and motor skills. Other: Formula-fed infants (where water containing manganese at levels above the MAC is used to prepare formula) may be especially at risk.	AO based on minimizing the occurrence of discoloured water, consumer complaints and staining of laundry.



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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)
1-Jun-20	Well Head	0	0	0	0	10	7.00	0.41	45.6	0.04	96.8	0.11	0.001
8-Jun-20	1263 Westurne Heights	0	0	0	0	14	7.01	0.47	46.0	0.04	97.7		
15-Jun-20	Well Head	0	0	0	0	10	7.32	0.37	45.2	0.04	95.8		
22-Jun-20	1252 Westurne Heights	0	0	0	0	14	7.28	0.52	46.2	0.05	98.1		
29-Jun-20	1252 Westurne Heights			0	0	11	7.21	0.40	46.4	0.05	98.4		
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)

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 Manganese (2019) from: <https://www.canada.ca/en/health-canada/services/environmental-workplace-health/reports-publications/water-quality/guidelines-canadian-drinking-water-quality-summary-table.html>

Type	Parameter (published, reaffirmed)	MAC (mg/L)	Other value (mg/L)	Common sources of parameter in water	Health considerations	Comments
I= Inorganic chemical parameter	Manganese (2019)	0.12	AO: <0.02	Dissolution of naturally-occurring minerals commonly found in soil and rock. Other sources include industrial discharge, mining activities and leaching from landfills.	Health Basis of MAC: Effects on neurological development and behaviour; deficits in memory, attention, and motor skills. Other: Formula-fed infants (where water containing manganese at levels above the MAC is used to prepare formula) may be especially at risk.	AO based on minimizing the occurrence of discoloured water, consumer complaints and staining of laundry.



Regional District of Nanaimo - Water Services Department

Westurne Heights Water Analysis - 2020 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-20	Well Head	0	0	0	0	9	7.23	0.42	45.9	0.05	97.4	0.14	0.001
11-May-20	1263 Westurne Heights	0	0	0	0	11	7.58	0.44	46.0	0.05	97.5		
19-May-20	Well Head	0	0	0	0	10	7.37	0.41	45.3	0.04	96.2		
25-May-20	1252 Westurne Hights	0	0	0	0	11	7.24	0.43	45.7	0.04	97.1		
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:

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

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Type	Parameter (published, reaffirmed)	MAC (mg/L)	Other value (mg/L)	Common sources of parameter in water	Health considerations	Comments
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Regional District of Nanaimo - Water Services Department

Westurne Heights Water Analysis - 2020 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)
6-Apr-20	Well Head	0	0	0	0	8	7.08	0.40	54.9	0.05	120.1	0.13	0.007
14-Apr-20	1263 Westurne Heights	0	0	0	0	9	7.29	0.48	45.5	0.04	96.5		
20-Apr-20	Well Head	0	0	0	0	9	7.38	0.45	45.6	0.04	96.9		
27-Apr-20	1252 Westurne Heights	0	0	0	0	9	7.05	0.50	45.9	0.05	97.3		
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)

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Regional District of Nanaimo - Water Services Department

Westurne Heights Water Analysis - 2020 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-20	Well Head	0	0	0	0	8	6.99	0.39	55.3	0.05	117.0	0.13	0.024
9-Mar-20	1263 Westurne Heights	0	0	0	0	5	7.50	0.50	46.2	0.05	98.0		
16-Mar-20	Well Head	0	0	0	0	8	7.31	0.50	45.9	0.05	97.4		
23-Mar-20	1252 Westurne Heights	0	0	0	0	6	7.62	0.50	45.6	0.05	96.8		
30-Mar-20	Well Head			0	0	8	7.25	0.86	46.4	0.05	98.4		
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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Westurne Heights Water Analysis - 2020 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-Feb-20	Well Head	0	0	0	0	8	7.02	0.38	50.0	0.05	98.9	0.10	0.019
10-Feb-20	1263 Westurne Heights	0	0	0	0	5	7.64	0.40	47.8	0.05	100.9		
18-Feb-20	Well Head	0	0	0	0	8	7.14	0.39	47.1	0.05	99.9		
24-Feb-20	1252 Westurne Heights	0	0	0	0	5	7.08	0.44	46.7	0.01	99.0		
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)

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Regional District of Nanaimo - Water Services Department

Westurne Heights Water Analysis - 2020 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)
6-Jan-20	Well Head	0	0	0	0	8	7.01	0.39	47.0	0.05	99.8	0.11	0.043
13-Jan-20	1263 Westurne Heights	0	0	0	0	5	7.08	0.35	47.6	0.05	100.9		
20-Jan-20	Well Head	0	0	0	0	8	7.09	0.37	50.0	0.05	99.7		
28-Jan-20	1252 Westurne Heights	0	0	0	0	6	6.99	0.48	46.6	0.05	99.1		
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:

* 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:

Notes below about Manganese (2019) from: <https://www.canada.ca/en/health-canada/services/environmental-workplace-health/reports-publications/water-quality/guidelines-canadian-drinking-water-quality-summary-table.html>

Type	Parameter (published, reaffirmed)	MAC (mg/L)	Other value (mg/L)	Common sources of parameter in water	Health considerations	Comments
I= Inorganic chemical parameter	Manganese (2019)	0.12	AO: <0.02	Dissolution of naturally-occurring minerals commonly found in soil and rock. Other sources include industrial discharge, mining activities and leaching from landfills.	Health Basis of MAC: Effects on neurological development and behaviour; deficits in memory, attention, and motor skills. Other: Formula-fed infants (where water containing manganese at levels above the MAC is used to prepare formula) may be especially at risk.	AO based on minimizing the occurrence of discoloured water, consumer complaints and staining of laundry.

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		
Miscellaneous Inorganics									
Fluoride	mg/L	1.5	MAC	0.03	0.031	0.026	<0.05		
Alkalinity (total as CaCO ₃)	mg/L			42.7	39.9	45.1	42		
Anions									
Dissolved Sulphate	mg/L	500	AO	1.91	2.7	3.2	1.9		
Dissolved Chloride	mg/L	250	AO	2.6	2.8	3.3	2.7		
Nitrite	mg/L	1	MAC	<0.0050	<0.0050	<0.005	<0.005		
Miscellaneous									
Apparent Colour	Colour Unit			10	5	<2	10		
Nutrients									
Total Ammonia	mg/L			0.095	0.35	<0.015	<0.015		
Physical Properties									
Conductivity	µS/cm			93.3	93	95.2	93		
pH	pH	7.0:10.5	AO	7.8	7.74	7.41	7.65		
TDS	mg/L	500	AO	62	56	68	58		
Turbidity	NTU			0.13	0.18	0.2	0.23		
Microbiological Parameters									
E.coli	MPN/100mL	<1	MAC	<1.0	<1.0	0	0		
Total Coliforms	MPN/100mL	<1	MAC	<1.0	<1.0	0	0		
Calculated Parameters									
Total Hardness (CaCO ₃)	mg/L			45.1	38.9	40.5	39.5		
Nitrate	mg/L	10	MAC	0.113	0.116	0.105	0.1		
Elements									
Total Mercury	mg/L	0.001	MAC	<0.00001	<0.000002	0.0000029	<0.0000019		
Total Metals									
Total Aluminum	mg/L	0.1	OG	<0.003	<0.003	<0.003	<0.003		
Total Antimony	mg/L	0.006	MAC	<0.0005	<0.0005	<0.0005	<0.0005		
Total Arsenic	mg/L	0.01	MAC	<0.0001	<0.0001	<0.0001	0.00011		
Total Barium	mg/L	1	MAC	0.0015	0.0012	0.0013	0.0013		
Total Beryllium	mg/L			<0.0001	<0.0001	<0.0001	<0.0001		
Total Bismuth	mg/L			<0.001	<0.001	<0.001	<0.001		
Total Boron	mg/L	5	MAC	<0.050	<0.050	<0.05	<0.05		
Total Cadmium	mg/L	0.005	MAC	<0.00001	<0.00001	<0.00001	<0.00001		
Total Chromium	mg/L	0.05	MAC	<0.001	<0.001	<0.001	<0.001		
Total Cobalt	mg/L			<0.0002	<0.0002	<0.0002	<0.0002		
Total Copper	mg/L	1	AO	0.00863	0.00424	0.00348	0.00459		
Total Iron	mg/L	0.3	AO	0.0867	0.0879	0.0993	0.184		
Total Lead	mg/L	0.01	MAC	0.00134	<0.0002	<0.0002	<0.0002		
Total Manganese	mg/L	0.02 0.12	AO MAC	0.0035	0.0028	0.0031	0.0038		
Total Molybdenum	mg/L			<0.001	<0.001	<0.001	<0.001		
Total Nickel	mg/L			<0.001	<0.001	<0.001	<0.001		
Total Selenium	mg/L	0.05	MAC	<0.0001	<0.0001	<0.0001	<0.0001		
Total Silicon	mg/L			9.03	7.62	7.19	7.45		
Total Silver	mg/L			<0.00002	<0.00002	<0.00002	<0.00002		
Total Strontium	mg/L			0.0267	0.0262	0.0246	0.0261		
Total Thallium	mg/L			<0.00001	<0.00001	<0.00001	<0.00001		
Total Tin	mg/L			<0.005	<0.005	<0.005	<0.005		
Total Titanium	mg/L			<0.005	<0.005	<0.005	<0.005		
Total Uranium	mg/L	0.02	MAC	<0.0001	<0.0001	<0.0001	<0.0001		
Total Vanadium	mg/L			<0.005	<0.005	<0.005	<0.005		
Total Zinc	mg/L	5	AO	0.0185	0.0152	0.011	0.0169		
Total Zirconium	mg/L			<0.0001	<0.0001	<0.0001	<0.0001		
Total Calcium	mg/L			12.4	10.9	11.3	10.9		
Total Magnesium	mg/L			3.42	2.87	2.99	2.99		
Total Potassium	mg/L			0.22	0.171	0.181	0.182		
Total Sodium	mg/L	200	AO	3.91	3.49	3.99	3.4		
Total Sulphur	mg/L			<3.0	<3.0	<3	<3		

CDWG=Canadian Drinking Water Guidelines
OG= Operational Guidance Value

MAC=Maximum Acceptable Concentration
AO= Aesthetic Objective

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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
Miscellaneous Inorganics									
Fluoride	mg/L	1.5	MAC	<0.05	0.026	0.031	0.026	<0.05	<0.05
Alkalinity (total as CaCO ₃)	mg/L			46	44.5	47.5	45.1	47	40
Anions									
Dissolved Sulphate	mg/L	500	AO	1.6	1.7	1.8	2.3	1.4	2.9
Dissolved Chloride	mg/L	250	AO	1.4	1.8	2.3	1.6	1.5	1.6
Nitrite	mg/L	1	MAC	<0.05	<0.0050	<0.0050	<0.0050	<0.005	<0.0005
Miscellaneous									
Apparent Colour	Colour Unit			<5	5	5	5	5	5
Nutrients									
Total Ammonia	mg/L			<0.02	0.1	<0.020	0.02	0.07	0.027
Physical Properties									
Conductivity	µS/cm			90.7	97.6	98.5	95.4	95	91
pH	pH	7.0:10.5	OG	7.2	7.79	7.79	7.78	7.61	7.04
TDS	mg/L	500	AO	76	78	82	60	50	74
Turbidity	NTU			<0.5	0.55	0.15	0.34	0.25	0.44
Microbiological Parameters									
E.coli	MPN/100mL	<1	MAC	<1.0	<1.0	<1.0	<1.0	<1.0	0
Total Coliforms	MPN/100mL	<1	MAC	<1.0	4.2	<1.0	<1.0	<1.0	0
Calculated Parameters									
Total Hardness (CaCO ₃)	mg/L			42	41.5	42.6	43.3	41.4	41.2
Nitrate	mg/L	10	MAC	0.10	0.118	0.115	0.117	0.12	0.117
Elements									
Total Mercury	mg/L	0.001	MAC	<0.00001	<0.00001	<0.00001	0.0000083	<0.000002	<0.0000019
Total Metals									
Total Aluminum	mg/L	0.1	OG	<0.025	<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
Total Arsenic	mg/L	0.01	MAC	0.00041	<0.0001	<0.0001	0.00011	<0.001	<0.0001
Total Barium	mg/L	1	MAC	0.00315	0.0015	0.0014	0.0014	0.0015	0.0015
Total Beryllium	mg/L			<0.00025	<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
Total Boron	mg/L	5	MAC	<0.010	<0.050	<0.050	<0.050	<0.05	<0.05
Total Cadmium	mg/L	0.005	MAC	0.00015	<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
Total Cobalt	mg/L			<0.0005	<0.0005	<0.0002	<0.0002	<0.002	<0.0002
Total Copper	mg/L	1	AO	0.0085	0.0028	0.00469	0.00418	0.00249	0.00168
Total Iron	mg/L	0.3	AO	0.058	0.123	0.0845	0.142	0.121	0.152
Total Lead	mg/L	0.01	MAC	0.0035	<0.0002	<0.0002	0.00032	0.00076	0.00063
Total Manganese	mg/L	0.02 0.12	AO MAC	<0.0050	0.0075	0.0028	0.003	0.0031	0.0033
Total Molybdenum	mg/L			0.00028	<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
Total Selenium	mg/L	0.05	MAC	<0.0005	<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
Total Silver	mg/L			<0.00025	<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
Total Thallium	mg/L			<0.00005	<0.00005	<0.00001	<0.00001	<0.00001	<0.00001
Total Tin	mg/L			0.0006	<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
Total Uranium	mg/L	0.02	MAC	<0.00005	<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
Total Zinc	mg/L	5	AO	0.121	<0.005	0.0058	<0.005	<0.005	<0.005
Total Zirconium	mg/L				<0.0005	<0.0001	<0.0001	<0.0001	<0.0001
Total Calcium	mg/L			11.7	11.1	11.7	12	11.3	11.2
Total Magnesium	mg/L			3.16	3.34	3.25	3.27	3.2	3.21
Total Potassium	mg/L			<0.5	0.189	0.192	0.179	0.172	0.18
Total Sodium	mg/L	200	AO	2.7	3.18	3.57	2.8	2.52	265
Total Sulphur	mg/L				<3.0	<3.0	<3.0	<3	<3