

REGIONAL DISTRICT OF NANAIMO

Water Service Area Annual Report 2020



Melrose Terrace Water Service Area

June 2020

REGIONAL DISTRICT OF NANAIMO

Water & Utility Services Department

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Appendix A - Map of Melrose Terrace Water Service Area

Appendix B - Water Quality Testing Results

Appendix C - Emergency Response Plan

1.0 Introduction

The following annual report describes the Melrose 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 Melrose Terrace Water Service Area

The Melrose Water Service Area was established in April 2005 when the RDN acquired the existing Melrose Terrace Strata Plan VIS3747 water system. The water service area is comprised of 28 residential properties on Melrose Road located near the Alberni Highway, west of Coombs. The water source for the Melrose Water Service Area comes from one groundwater well located nearby. The water is chlorinated and stored in a single reservoir. The water is then filtered through sand and charcoal filters before entering the distribution system. A portable generator is available in the event of a power outage. A map of the Melrose Water Service Area is provided in Appendix A for reference.

2.1 Groundwater Wells

One groundwater production well is present at the reservoir site on Melrose 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

One service reservoir (steel structure) is present at 3853 Melrose Road, and has a capacity of 136 m³ (30,000 imperial gallons).

2.3 Distribution System

The water distribution system in Melrose is comprised of 0.3 km of 150mm PVC watermains. There are no fire hydrants located within the system.

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



Melrose Well and Pumphouse

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, Monthly- Iron and Manganese
Monthly	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/melrose-terrace. 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.



Melrose Road Bridge

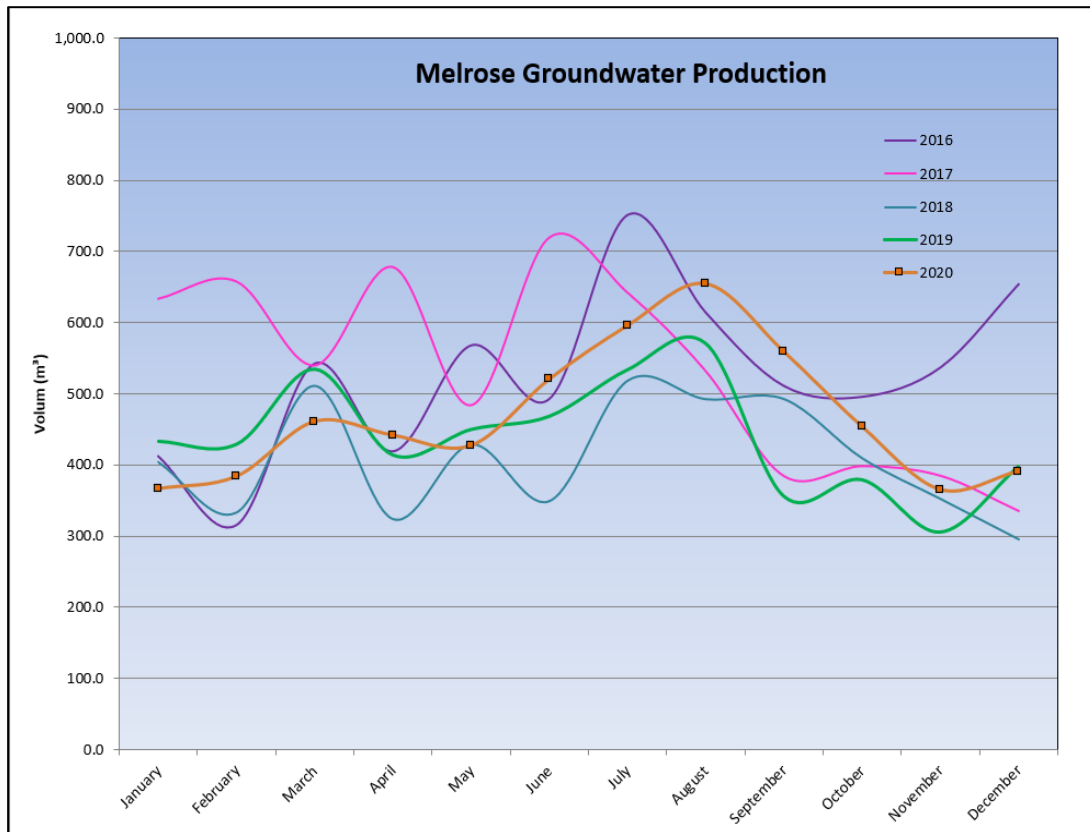
5.0 Water Quality Inquiries and Complaints

No complaints or inquiries were received from the Melrose water service area in 2020. A summary of the water system incidents in 2020 is given in the table below.

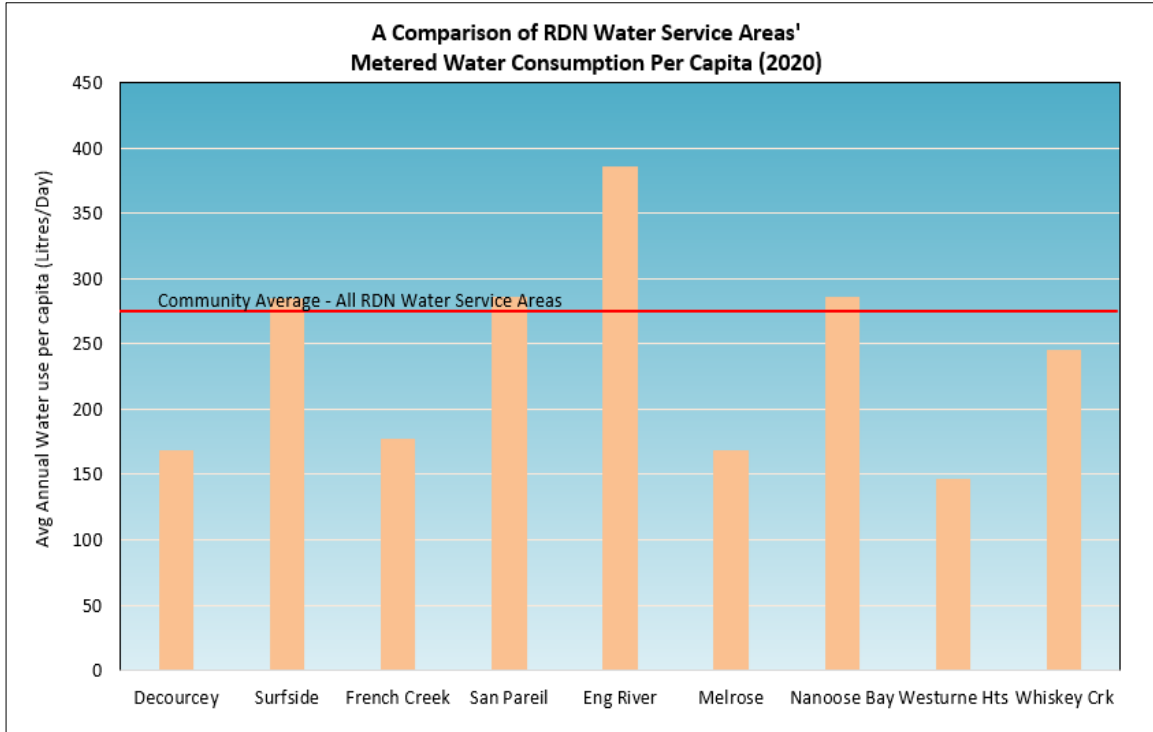
Activity in 2020	Date(s)	History/Notes
Boil Water Advisories	None	None, ever.
High Turbidity Events	None	None, ever.
Equipment Malfunction	None	None.
Water Main Breaks	None	None.
Pump Failures	None	Temp power outages.

6.0 Groundwater Production and Consumption

The monthly groundwater production in the Melrose system for the past 5 years is shown in the chart below. Overall groundwater production in 2020 was average in comparison to previous years.



In the Fall/Winter of 2020, the average usage per home in the Melrose Terrace water service area was approximately 0.36 cubic metres per day (79.2 imperial gallons). In the summer, the average water usage was 0.5 cubic metres per day (110 imperial gallons). Based on these figures, the annual consumption per capita is estimated to be 168 L/day (based on 2.4 people per household). This consumption is *39% less* than the RDN system average of 278 L/day/capita in 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 reservoir is drained and cleaned once a year. Twenty-four hour on-call coverage is in place to respond to water system emergencies and alarms.

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

9.0 Water Service Area Projects

9.1 2020 Completed Studies & Projects

- Cleaned the Melrose reservoir in 2020;
- Replaced the media in one of the carbon filter vessels;
- Updated the 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 program;
- Maintained a high level of water quality; and
- Continued quality control through regular testing and monitoring of water system.



Melrose
Pumphouse and
Reservoir

9.2 2021 Proposed Projects & Upgrades

- Clean the Melrose reservoir in Feb 2021;
- Complete a GARP assessment of Melrose well;
- Review well protection plans;
- Complete well conditioning project;
- Complete pumphouse interior building repairs;
- Develop plans to replace the Melrose reservoir;
- Continue watermain flushing program;
- Continue implementing the Water Systems SCADA Master Plan;
- Implement the 2020-2030 DWWP 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/melrose-terrace.

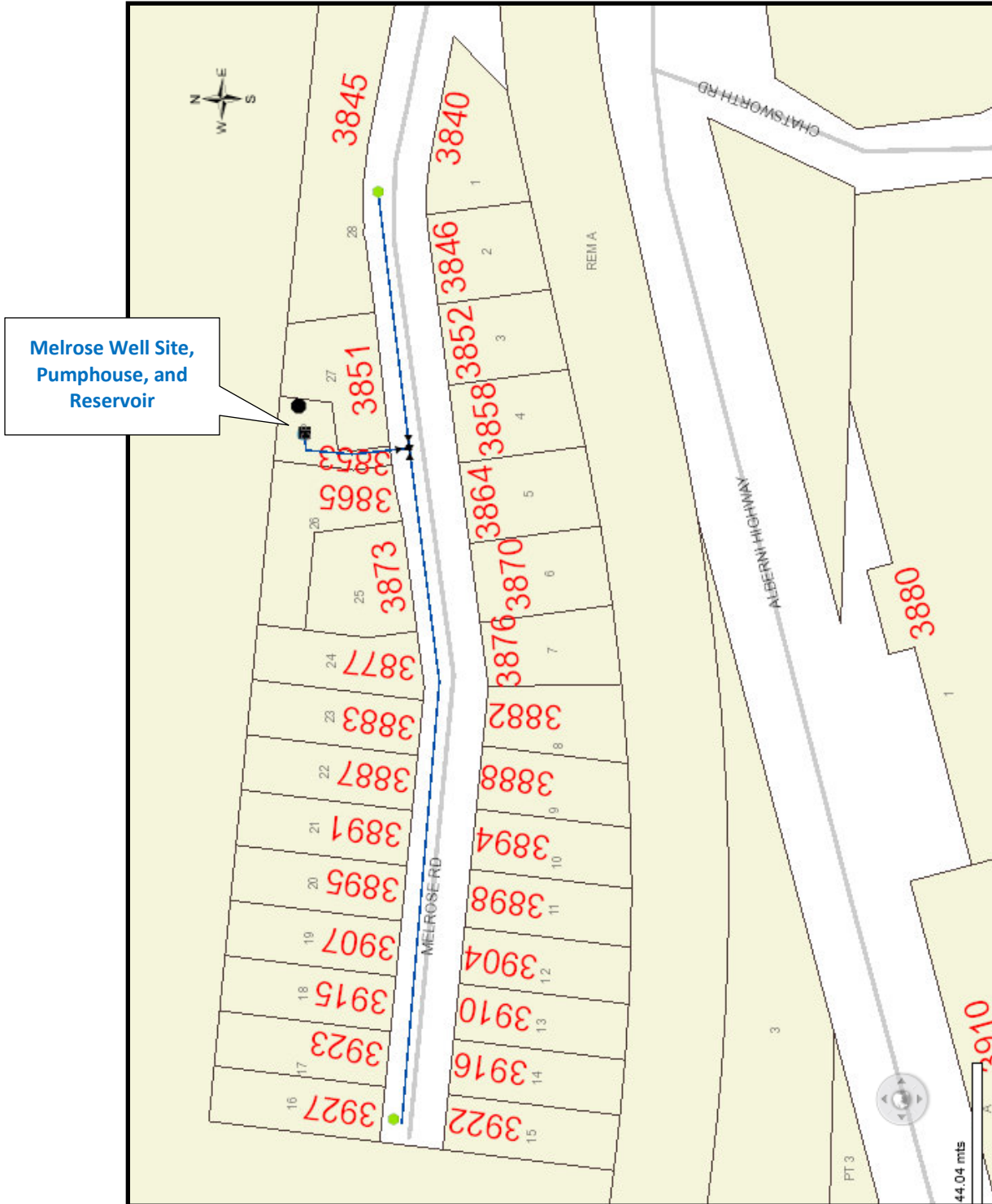
APPENDIX A

MAP OF MELROSE TERRACE

WATER SERVICE AREA

MELROSE TERRACE

WATER SERVICE AREA



APPENDIX B

WATER QUALITY TESTING RESULTS

MELROSE TERRACE COMMUNITY WATER SYSTEM

**Facility Location:**

3887 Melrose 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>
Melrose Sample Report, 3927 Melrose Rd.	1-Dec-2020	LT1	LT1
Melrose Sample Report, 3927 Melrose Rd.	2-Nov-2020	LT1	LT1
Melrose Sample Report, 3927 Melrose Rd.	5-Oct-2020	LT1	LT1
Melrose Sample Report, 3927 Melrose Rd.	2-Sep-2020	LT1	LT1
Melrose Sample Report, 3927 Melrose Rd.	4-Aug-2020	LT1	LT1
Melrose Sample Report, 3927 Melrose Rd.	8-Jul-2020	LT1	LT1
Melrose Sample Report, 3927 Melrose Rd.	1-Jun-2020	LT1	LT1
Melrose Sample Report, 3927 Melrose Rd.	4-May-2020	LT1	LT1
Melrose Sample Report, 3927 Melrose Rd.	6-Apr-2020	LT1	LT1
Melrose Sample Report, 3927 Melrose Rd.	2-Mar-2020	LT1	LT1
Melrose Sample Report, 3927 Melrose Rd.	3-Feb-2020	LT1	LT1
Melrose Sample Report, 3927 Melrose 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

Melrose 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	3927 Melrose	0	0	0	0	8	7.33	0.06	208.0	0.21	430.0	Fe and Mn are no longer tested in-house. See Annual Tap Water Results at https://www.rdn.bc.ca/melrose-terrace	
7-Dec-20	3927 Melrose			0	0	9	7.05	0.02	208.0	0.24	438.0		
14-Dec-20	3927 Melrose			0	0	9	7.31	0.11	213.0	0.21	441.0		
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)

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

Melrose 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	3927 Melrose	0	0	0	0	12	7.38	0.02	204.4	0.22	422.0	Fe and Mn are no longer tested in-house. See Annual Tap Water Results at https://www.rdn.bc.ca/melrose-terrace	
9-Nov-20	3927 Melrose			0	0	11	7.40	0.02	205.3	0.20	426.0		
16-Nov-20	3927 Melrose			0	0	11	7.16	0.04	205.8	0.21	427.0		
23-Nov-20	3927 Melrose			0	0	10	7.30	0.03	204.7	0.20	425.0		
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

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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	3927 Melrose	0	0	0	0	16	7.14	0.05	202.0	0.17	399.0	Fe and Mn are no longer tested in-house. See Annual Tap Water Results at https://www.rdn.bc.ca/melrose-terrace	
13-Oct-20	3927 Melrose			0	0	15	7.63	0.02	206.0	0.21	428.0		
19-Oct-20	3927 Melrose			0	0	14	7.33	0.02	207.0	0.21	427.0		
26-Oct-20	3927 Melrose			0	0	13	7.43	0.02	207.0	0.21	428.0		
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

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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)
2-Sep-20	3927 Melrose	0	0	0	0	19	7.15	0.03	208.0	0.21	431.0	Fe and Mn are no longer tested in-house. See Annual Tap Water Results at https://www.rdn.bc.ca/melrose-terrace	
8-Sep-20	3927 Melrose			0	0	18	7.11	0.02	201.0	0.19	441.0		
14-Sep-20	3927 Melrose			0	0	17	7.16	0.05	209.0	0.17	430.0		
21-Sep-20	3927 Melrose			0	0	17	7.07	0.01	209.1	0.21	435.0		
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

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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	3927 Melrose	0	0	0	0	18	7.02	0.03	217.0	0.22	449.0	Fe and Mn are no longer tested in-house. See Annual Tap Water Results at https://www.rdn.bc.ca/melrose-terrace	
17-Aug-20	3927 Melrose			0	0	18	6.94	0.03	147.9	0.15	309.0		
24-Aug-20	3927 Melrose			0	0	18	7.12	0.04	208.0	0.21	431.0		
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

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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	3927 Melrose	0	0	0	0	15	7.22	0.03	225.0	0.23	460.0	0.07	0.002
13-Jul-20	3927 Melrose			0	0	15	7.41	0.04	221.0	0.22	459.0		
20-Jul-20	3927 Melrose			0	0	17	7.11	0.05	222.0	0.20	460.0		
27-Jul-20	3927 Melrose			0	0	17	7.02	0.03	217.3	0.22	450.0		
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:

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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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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-20	3927 Melrose	0	0	0	0	14	7.39	0.02	218.2	0.22	452.0	0.07	0.014
8-Jun-20	3927 Melrose			0	0	15	7.41	0.05	220.0	0.23	460.0		
15-Jun-20	3927 Melrose			0	0	14	7.11	0.04	220.0	0.22	455.0		
22-Jun-20	3927 Melrose			0	0	14	7.18	0.02	219.0	0.22	455.0		
29-Jun-20	3927 Melrose			0	0	15	7.10	0.03	220.0	0.22	454.0		
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:

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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-May-20	3927 Melrose	0	0	0	0	11	7.10	0.03	220.0	0.22	456.0	0.07	0.015
11-May-20	3927 Melrose			0	0	11	7.19	0.02	222.0	0.20	441.0		
19-May-20	3927 Melrose			0	0	13	7.44	0.03	217.0	0.22	449.0		
25-May-20	3927 Melrose			0	0	14	7.07	0.03	220.0	0.22	456.0		
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:

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6-Apr-20	3927 Melrose	0	0	0	0	8	7.23	0.02	220.0	0.22	444.0	0.07	0.011
14-Apr-20	3927 Melrose			0	0	10	7.09	0.03	221.0	0.22	459.0		
20-Apr-20	3927 Melrose			0	0	10	7.63	0.03	217.0	0.22	450.0		
27-Apr-20	3927 Melrose			0	0	10	6.99	0.02	220.0	0.22	457.0		
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)

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

Melrose 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	3927 Melrose	0	0	0	0	7	7.22	0.03	219.0	0.22	454.0	0.10	0.012
9-Mar-20	3927 Melrose			0	0	7	7.51	0.02	224.0	0.22	463.0		
16-Mar-20	3927 Melrose			0	0	8	7.17	0.06	228.0	0.23	471.0		
23-Mar-20	3927 Melrose			0	0	7	7.61	0.04	233.0	0.22	462.0		
30-Mar-20	3927 Melrose			0	0	8	7.07	0.02	223.0	0.22	463.0		
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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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

Melrose 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	3927 Melrose	0	0	0	0	5	7.28	0.06	224.0	0.22	463.0	0.03	0.028
10-Feb-20	3927 Melrose			0	0	6	7.47	0.08	223.0	0.22	462.0		
18-Feb-20	3927 Melrose			0	0	7	6.93	0.02	222.0	0.20	459.0		
24-Feb-20	3927 Melrose			0	0	6	7.07	0.02	217.9	0.22	452.0		
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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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

Melrose 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	3927 Melrose	0	0	0	0	8	7.38	0.05	216.0	0.22	448.0	0.03	0.032
13-Jan-20	3927 Melrose			0	0	6	7.10	0.14	218.4	0.22	452.0		
20-Jan-20	3927 Melrose			0	0	8	7.20	0.09	211.1	0.21	450.0		
27-Jan-20	3927 Melrose			0	0	4	7.33	0.03	218.0	0.22	450.0		
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)

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= Aesthetic 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 13 2014	May 19 2015	May 10 2016	May 8 2017	May 7 2018	May 13 2019	May 21 2020
Miscellaneous Inorganics										
Fluoride	mg/L	1.5	MAC	0.05	0.042	0.039	0.038	0.038	0.039	<0.05
Alkalinity (total as CaCO ₃)	mg/L			84	84.9	102	110	109	109	99
Anions										
Dissolved Sulphate	mg/L	500	AO	1.2	0.82	0.83	0.98	1.3	3.1	1.2
Dissolved Chloride	mg/L	250	AO	78	87	82	79	69	69	77
Nitrite	mg/L	1	MAC	<0.05	<0.0050	<0.0050	<0.0050	<0.005	<0.005	<0.005
Miscellaneous										
Apparent Colour	Colour Unit			<5	<5	10	10	5	9.2	5
Nutrients										
Total Ammonia	mg/L			<0.02	0.024	0.011	0.15	0.044	0.016	0.039
Physical Properties										
Conductivity	µS/cm			458	468	472	460	455	444	430
pH	pH	7.0:10.5	AO	7	7.95	7.66	8.06	7.96	7.85	7.63
TDS	mg/L	500	AO	290	294	306	304	272	270	280
Turbidity	NTU			<0.5	0.12	0.14	0.13	0.17	0.19	0.11
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	<1.0	<1.0	<1.0	<1.0	0	0
Calculated Parameters										
Total Hardness (CaCO ₃)	mg/L			140	144	146	152	144	137	131
Nitrate	mg/L	10	MAC	<0.05	<0.020	<0.020	0.029	0.024	0.042	0.044
Elements										
Total Mercury	mg/L	0.001	MAC	<0.00001	<0.00001	<0.00001	<0.00001	<0.000002	<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	<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	<0.00025	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Total Barium	mg/L	1	MAC	0.0264	0.03	0.0328	0.038	0.031	0.0286	0.0289
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	<0.050	<0.05	<0.05
Total Cadmium	mg/L	0.005	MAC	<0.00005	<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	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002
Total Copper	mg/L	1	AO	0.0062	0.00147	0.00167	0.00218	0.00219	0.00452	0.00377
Total Iron	mg/L	0.3	AO	0.135	0.0693	0.0704	0.0456	0.0689	0.0587	0.0361
Total Lead	mg/L	0.01	MAC	0.0007	0.0004	0.00029	0.00043	0.0004	0.00055	0.00048
Total Manganese	mg/L	0.02 0.12	AO MAC	<0.0050	0.0028	0.0027	0.0021	0.0029	0.0027	0.0021
Total Molybdenum	mg/L			<0.00025	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Total Nickel	mg/L			<0.0010	<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			14.3	14.8	15.2	22.1	15.2	14.2	14.1
Total Silver	mg/L			<0.00025	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002
Total Strontium	mg/L			0.0692	0.0691	0.0787	0.0913	0.0774	0.0668	0.0679
Total Thallium	mg/L			<0.00005	<0.00005	<0.00005	<0.00001	<0.00001	<0.00001	<0.00001
Total Tin	mg/L			<0.0005	<0.005	<0.005	0.0088	<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			<0.0005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Total Zinc	mg/L	5	AO	0.0892	0.0603	0.0316	0.0342	0.0212	0.0098	0.0087
Total Zirconium	mg/L				<0.0005	<0.0005	<0.0001	<0.0001	<0.0001	<0.0001
Total Calcium	mg/L			36.4	37.8	36.8	38.8	37.1	35.9	34
Total Magnesium	mg/L			12.7	12	13.1	13.5	12.4	11.4	11.1
Total Potassium	mg/L			<0.5	0.426	0.469	0.51	0.45	0.467	0.456
Total Sodium	mg/L	200	AO	35.4	29	31.1	31.4	29.7	30.7	32.6
Total Sulphur	mg/L				<3.0	<3.0	<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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	Units	CDWG		September 18 2017	October 25 2018	October 3 2019	October 21 2020
Miscellaneous Inorganics							
Fluoride	mg/L	1.5	MAC	0.04	0.036	<0.05	<0.05
Alkalinity (total as CaCO ₃)	mg/L			89.8	92.5	87	99
Anions							
Dissolved Sulphate	mg/L	500	AO	<1.0	<1.0	<1.0	2.3
Dissolved Chloride	mg/L	250	AO	66	57	53	52
Nitrite	mg/L	1	MAC	0.0094	<0.0050	<0.005	<0.005
Miscellaneous							
Apparent Colour	Colour Unit			300	100	200	200
Nutrients							
Total Ammonia	mg/L			0.23	0.24	0.31	0.3
Physical Properties							
Conductivity	µS/cm			388	371	340	350
pH	pH	7.0:10.5	OG	7.61	7.81	7.6	7.1
TDS	mg/L	500	AO	236	250	220	230
Turbidity	NTU			47	28	16	32
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			142	135	130	131
Nitrate	mg/L	10	MAC	0.023	<0.020	0.043	0.045
Elements							
Total Mercury	mg/L	0.001	MAC	<0.00001	<0.000002	0.0000023	<0.0000019
Total Metals							
Total Aluminum	mg/L	0.1	OG	0.0037	0.0044	<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	0.00046	0.00032	0.00034	0.00039
Total Barium	mg/L	1	MAC	0.0329	0.0293	0.0281	0.0293
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	<0.050	<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	0.0016	<0.001
Total Cobalt	mg/L			<0.0002	<0.0002	<0.0002	<0.0002
Total Copper	mg/L	1	AO	0.00783	0.00126	0.00314	0.00134
Total Iron	mg/L	0.3	AO	16.3	8.59	9.25	9.84
Total Lead	mg/L	0.01	MAC	0.00033	0.00021	<0.0002	0.00026
Total Manganese	mg/L	0.02 0.12	AO MAC	0.271	0.259	0.254	0.246
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			15.7	14.8	15.2	16.1
Total Silver	mg/L			<0.00002	<0.00002	<0.00002	<0.00002
Total Strontium	mg/L			0.0705	0.0675	0.0644	0.0657
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	0.0752	0.0272	0.0139	0.006
Total Zirconium	mg/L			0.00015	0.00012	0.00014	0.00017
Total Calcium	mg/L			35.8	34.9	33.9	34.1
Total Magnesium	mg/L			12.8	11.5	10.9	11.2
Total Potassium	mg/L			0.454	0.418	0.433	0.442
Total Sodium	mg/L	200	AO	17.2	17.4	17.9	17.5
Total Sulphur	mg/L			<3.0	<3.0	<3.0	<3

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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.