

REGIONAL DISTRICT OF NANAIMO

Water Service Area Annual Report 2021



Rivers Edge (Englishman River) Water Service Area

June 2022

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Appendix A - Map of Rivers Edge Water Service Area

Appendix B - Water Quality Testing Results

Appendix C - Emergency Response & Contingency Plan

1.0 Introduction

The following annual report describes the Rivers Edge Community Water Service Area (also previously known as the Englishman River Community 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 Rivers Edge Water Service Area

The Rivers Edge Community Water Service Area was established in 2003 and is comprised of the Rivers Edge residential subdivision near the southern boundary of the City of Parksville. The water source for the Englishman River Community Water Service Area comes from a series of groundwater wells located within the neighbourhood. The water source is chlorinated and stored in one reservoir. There are 152 water service connections in the Englishman River Water Service Area. A generator is available for emergency power outages. A map of the Englishman River Water Service Area is provided in Appendix A for reference. In 2022 the name of the service area was officially changed from Englishman River to Rivers Edge.

2.1 Groundwater Wells

Groundwater production wells ER #2 and ER #3 are located at 2231 Rascal Lane, Parksville, B.C. Test well PW #1 is located on Peterson Road, and was converted to a monitoring well in 2005. Test Well PW #4 is located on Rivers Edge Drive and was converted to a provincial monitoring well in 2012.

Well / Name	Well Depth	In Use	Wellhead Protection	Treated/Untreated with Chlorine
ER #2	29.3 m	Yes	Yes	Treated
ER #3	32.6 m	Yes	Yes	Treated

2.2 Reservoirs

One dual-chambered concrete service reservoir is present at 890 Stonefly Close and has a capacity of 795 m³ (175,000 imperial gallons).

2.3 Distribution System

The water distribution system is summarized in the table below. Fire hydrants (24) are located throughout the system.

Watermain Material	Length of mains in service area	Prevalence in Water Service Area
Asbestos-concrete	none	n/a
<u>PVC</u> : 150mm or smaller	3.6 km	28.8%
200mm or larger	8.9 km	71.2%

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

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 watermain. 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
Semi-Monthly	BC Centre for Disease Control	Total coliforms, E.Coli
Quarterly	Bureau Veritas	Total Iron & Total Manganese
Annual Source Water Testing (every Fall)	Bureau Veritas	Complete potability testing of raw well water (including T-Ammonia in 2012)
Annual Water System Testing (every Spring)	Bureau Veritas	Complete potability testing of distribution system (including T-Ammonia in 2012)

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/englishman-river. 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.

5.0 Water Quality Inquiries and Complaints

A few complaints and inquiries were received from the Rivers Edge Water Service Area in 2021, and were typically related to irrigation leaks, iron and manganese discoloration, and high water bills.



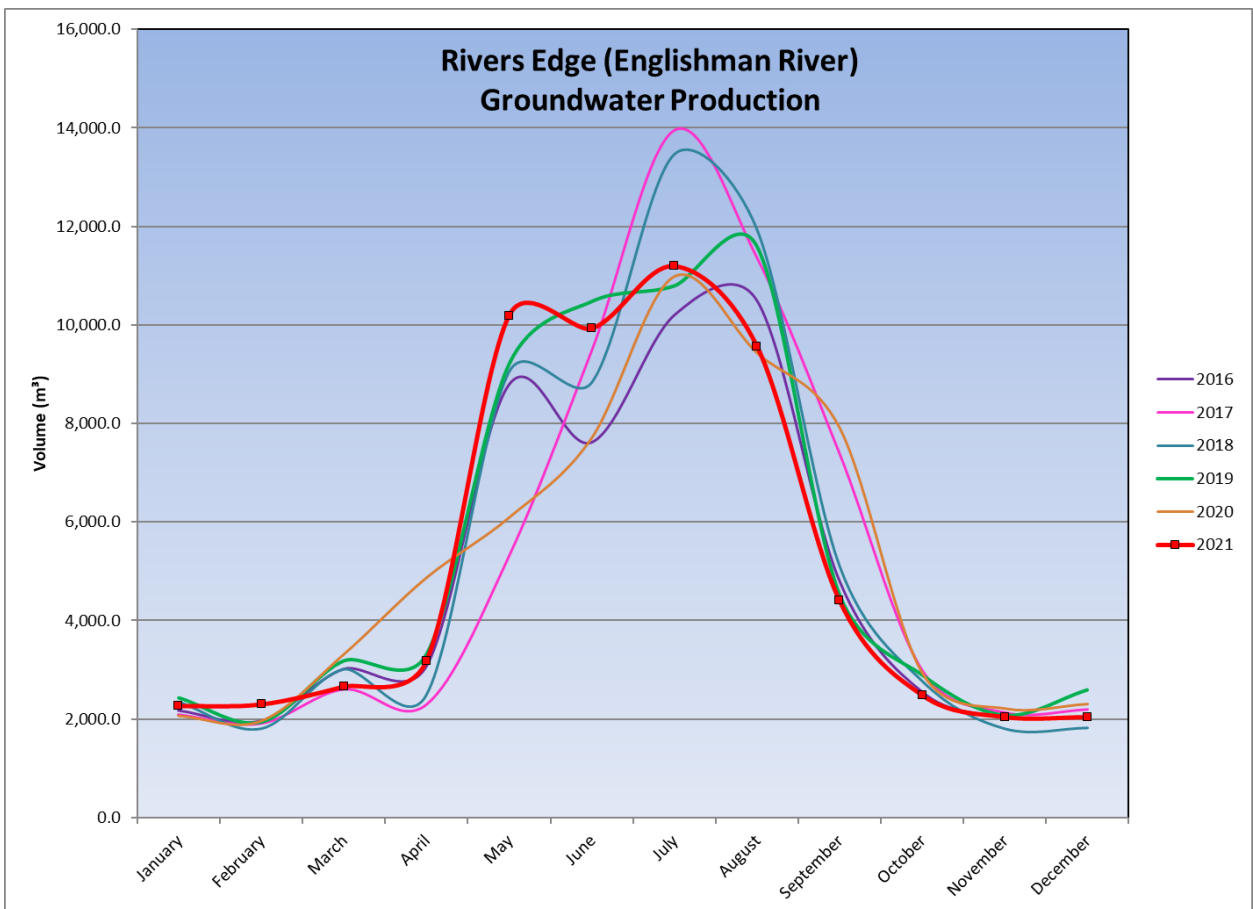
Water Sampling Station in Rivers Edge

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, ever.
High Turbidity Events	None	None, ever.
Equipment Malfunction	None	None.
Water Main Breaks	None	None.
Pump Failures	None	Temp power outages.

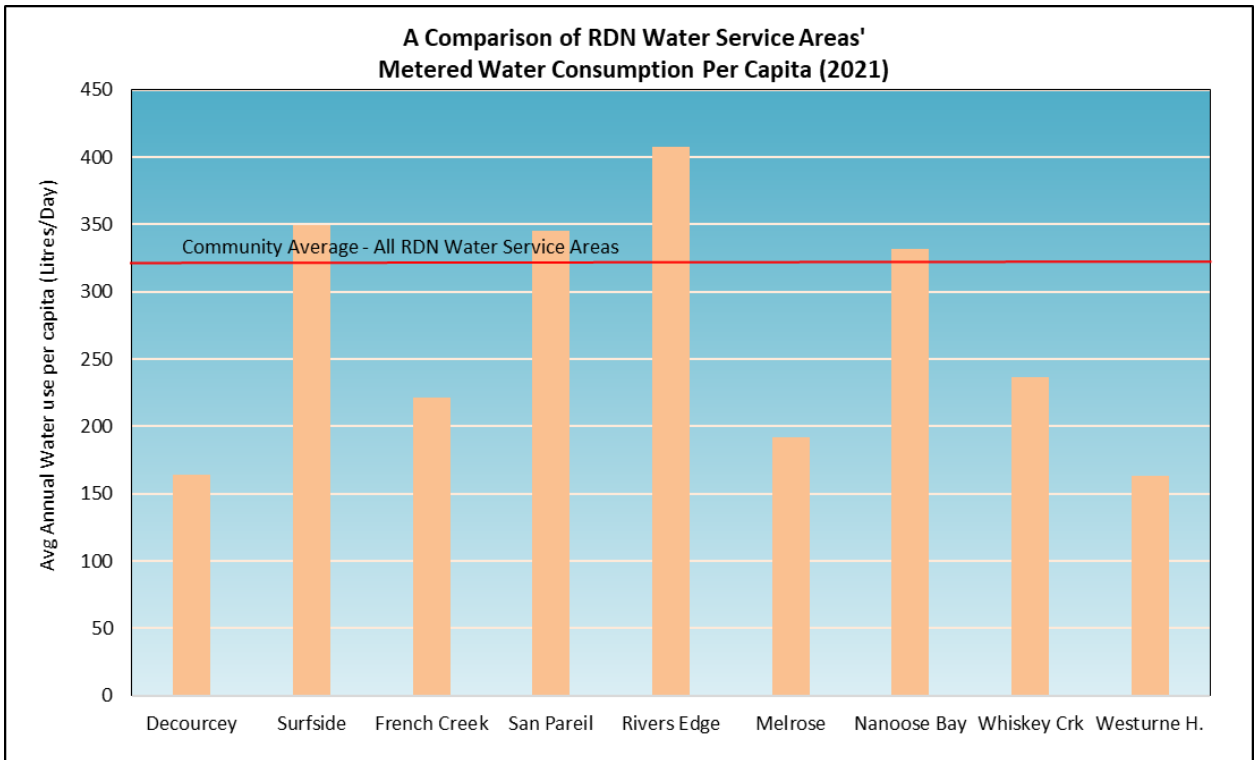
6.0 Groundwater Production and Consumption

Monthly groundwater production in the Rivers Edge Water Service Area for the past 6 years is shown in the chart below. Water production in 2021 was below average in comparison to the previous years likely due to increased summer watering restrictions.



Consumption

In the Fall/Winter of 2021, the average usage per home in the Rivers Edge Water Service Area was 0.64 cubic metres per day (140.8 imperial gallons). In the summer, the average water usage was 1.67 cubic metres per day (367.4 imperial gallons). Based on these figures, the annual consumption per capita is estimated to be 408 L/day (based on 2.4 people per household). This consumption is **27% higher** than the average of all the other RDN water systems of 321 L/day/capita for 2021.



7.0 Maintenance Program

A weekly pump station inspection is 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 annually in the spring. Fire hydrants are serviced once per year (either 'A-level' or 'B-level' maintenance). The water storage reservoir is drained and cleaned as required, every 4-5 years. 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 is 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

- Completed a groundwater source study;
- 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.

Watering Restriction Sign on Kaye Road



9.2 2022 Proposed Projects & Upgrades

- Island Health to administer Groundwater At Risk of containing Pathogens (GARP) assessment;
- Design additional well site and transmission main infrastructure;
- 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.

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 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 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/englishman-river.

APPENDIX A

**MAP OF RIVERS EDGE
WATER SERVICE AREA**

APPENDIX B

WATER QUALITY TESTING RESULTS

RIVERS EDGE COMMUNITY WATER SYSTEM



Facility Location: 1116 Herring Gull Way

Facility Information: Facility Type: 301-10000 (DWT)

Facility Sampling History:

<u>Date Collected</u>	<u>Drinking Water System</u>	<u>Total E. Coli</u>	<u>Total Coliform</u>	<u>Site Name</u>
01/06/2021	RIVERS EDGE COMMUNITY WATER SYSTEM	LT1	LT1	Rivers Edge Sample Port - 1969 Kaye Road
02/03/2021	RIVERS EDGE COMMUNITY WATER SYSTEM	LT1	LT1	Rivers Edge Sample Port - 1969 Kaye Road
02/17/2021	RIVERS EDGE COMMUNITY WATER SYSTEM	LT1	LT1	Rivers Edge Sample Port - 1969 Kaye Road
03/03/2021	RIVERS EDGE COMMUNITY WATER SYSTEM	LT1	LT1	Rivers Edge Sample Port - 1969 Kaye Road
04/07/2021	RIVERS EDGE COMMUNITY WATER SYSTEM	LT1	LT1	Rivers Edge Sample Port - 1969 Kaye Road
05/03/2021	RIVERS EDGE COMMUNITY WATER SYSTEM	LT1	LT1	Rivers Edge Sample Port - 1969 Kaye Road
06/07/2021	RIVERS EDGE COMMUNITY WATER SYSTEM	LT1	LT1	Rivers Edge Sample Port - 1969 Kaye Road
07/13/2021	RIVERS EDGE COMMUNITY WATER SYSTEM	LT1	LT1	Rivers Edge Sample Port - 1969 Kaye Road
08/09/2021	RIVERS EDGE COMMUNITY WATER SYSTEM	LT1	LT1	Rivers Edge Sample Port - 1969 Kaye Road
09/13/2021	RIVERS EDGE COMMUNITY WATER SYSTEM	LT1	LT1	Rivers Edge Sample Port - 1969 Kaye Road
12/14/2021	RIVERS EDGE COMMUNITY WATER SYSTEM	LT1	LT1	Rivers Edge Sample Port - 1969 Kaye Road
01/11/2021	RIVERS EDGE COMMUNITY WATER SYSTEM	LT1	LT1	Rivers Edge Sample Port - 2235 Rascal Lane
02/08/2021	RIVERS EDGE COMMUNITY WATER SYSTEM	LT1	LT1	Rivers Edge Sample Port - 2235 Rascal Lane
03/10/2021	RIVERS EDGE COMMUNITY WATER SYSTEM	LT1	LT1	Rivers Edge Sample Port - 2235 Rascal Lane
04/12/2021	RIVERS EDGE COMMUNITY WATER SYSTEM	LT1	LT1	Rivers Edge Sample Port - 2235 Rascal Lane
05/10/2021	RIVERS EDGE COMMUNITY WATER SYSTEM	LT1	LT1	Rivers Edge Sample Port - 2235 Rascal Lane
06/01/2021	RIVERS EDGE COMMUNITY WATER SYSTEM	LT1	LT1	Rivers Edge Sample Port - 2235 Rascal Lane

<u>Date Collected</u>	<u>Drinking Water System</u>	<u>Total E. Coli</u>	<u>Total Coliform</u>	<u>Site Name</u>
06/22/2021	RIVERS EDGE COMMUNITY WATER SYSTEM	LT1	LT1	Rivers Edge Sample Port - 2235 Rascal Lane
07/06/2021	RIVERS EDGE COMMUNITY WATER SYSTEM	LT1	LT1	Rivers Edge Sample Port - 2235 Rascal Lane
08/03/2021	RIVERS EDGE COMMUNITY WATER SYSTEM	LT1	LT1	Rivers Edge Sample Port - 2235 Rascal Lane
09/07/2021	RIVERS EDGE COMMUNITY WATER SYSTEM	LT1	LT1	Rivers Edge Sample Port - 2235 Rascal Lane
10/04/2021	RIVERS EDGE COMMUNITY WATER SYSTEM	LT1	LT1	Rivers Edge Sample Port - 2235 Rascal Lane
10/18/2021	RIVERS EDGE COMMUNITY WATER SYSTEM	LT1	LT1	Rivers Edge Sample Port - 2235 Rascal Lane
11/01/2021	RIVERS EDGE COMMUNITY WATER SYSTEM	LT1	LT1	Rivers Edge Sample Port - 2235 Rascal Lane
12/07/2021	RIVERS EDGE COMMUNITY WATER SYSTEM	LT1	LT1	Rivers Edge Sample Port - 2235 Rascal Lane

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

Englishman River Water Analysis - 2021 Monthly Report

Date	Sample Location (Address)	BC Centre for Disease Control		RDN In-House Laboratory & Spectrophotometer								Bureau Veritas Lab	
		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	2235 Rascal			0	0	8	7.12	0.68	264.0	0.26	545.0	0.0218	0.0123
14-Dec-21	1969 Kaye			0	0	7	7.38	0.58	261.0	0.26	539.0	0.0102	0.0056
20-Dec-21	1969 Kaye			0	0	6	7.56	0.74	256.0	0.26	528.0		
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.

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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)
01-Nov-21	2235 Rascal	0	0	0	0	11	8.05	0.51	270.0	0.27	556.0		
08-Nov-21	1969 Kaye	0	0	0	0	10	7.67	0.50	268.0	0.27	553.0		
15-Nov-21	2235 Rascal			0	0	9	7.76	0.64	275.0	0.28	564.0		
22-Nov-21	2235 Rascal			0	0	8	8.03	0.67	266.0	0.27	550.0		
29-Nov-21	1969 Kaye			0	0	9	7.89	0.61	229.0	0.25	561.0		
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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04-Oct-21	2235 Rascal	0	0	0	0	14	7.99	0.50	277.0	0.28	571.0		
13-Oct-21	2235 Rascal			0	0	13	7.87	0.47	276.0	0.27	569.0		
18-Oct-21	1969 Kaye			0	0	13	7.97	0.40	271.0	0.27	559.0		
27-Oct-21	2235 Rascal	0	0	0	0	13	7.91	0.49	265.0	0.27	566.0		
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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07-Sep-21	2235 Rascal	0	0	0	0	14	7.89	0.77	210.4	0.24	500.0		
13-Sep-21	1969 Kaye	0	0	0	0	16	7.91	0.64	219.0	0.26	519.0	0.0131	0.01
20-Sep-21	2235 Rascal			0	0	16	8.09	0.60	274.0	0.27	566.0	0.0124	0.0142
27-Sep-21	2235 Rascal			0	0	14	8.01	0.53	277.0	0.26	571.0		
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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03-Aug-21	2235 Rascal	0	0	0	0		8.10	0.83	273.0	0.28	562.0		
09-Aug-21	1969 Kaye	0	0	0	0	17	7.99	0.92	276.0	0.28	567.0		
16-Aug-21	2235 Rascal			0	0	15	8.03	0.79	273.0	0.27	562.0		
23-Aug-21	2235 Rascal			0	0	14	8.33	0.75	274.0	0.27	564.0		
30-Aug-21	1969 Kaye			0	0	17	8.05	0.71	278.0	0.28	572.0		
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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06-Jul-21	2235 Rascal	0	0	0	0	14	8.25	0.60	272.0	0.27	560.0		
13-Jul-21	1969 Kaye	0	0	0	0	16	8.21	0.67	270.0	0.27	556.0		
19-Jul-21	2235 Rascal			0	0	14	8.20	0.75	271.0	0.27	558.0		
27-Jul-21	2235 Rascal			0	0	17	8.16	0.80	274.0	0.27	564.0		
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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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 & Spectrophotometer								Bureau Veritas Lab	
		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	2235 Rascal			0	0	12	7.71	0.70	264.0	0.26	544.0		
07-Jun-21	1969 Kaye	0	0	0	0	12	7.97	0.75	265.0	0.26	537.0		
14-Jun-21	2235 Rascal			0	0	12	7.22	0.66	262.0	0.26	540.0		
22-Jun-21	2235 Rascal			0	0	13	7.55	0.60	266.0	0.26	544.0	0.0181	0.0233
29-Jun-21	1969 Kaye	0	0	0	0	16	7.19	0.64	266.0	0.27	548.0	0.0197	0.0224
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)

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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
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Date	Sample Location (Address)	BC Centre for Disease Control		RDN In-House Laboratory & Spectrophotometer								Bureau Veritas Lab	
		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	1969 Kaye	0	0	0	0	9	7.42	0.56	262.0	0.26	541.0		
10-May-21	2235 Rascal	0	0	0	0	10	7.29	0.52	261.0	0.26	538.0		
17-May-21	1969 Kaye			0	0	11	7.22	0.46	261.0	0.26	539.0		
25-May-21	2235 Rascal			0	0	11	7.31	0.83	255.0	0.24	540.0		
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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Date	Sample Location (Address)	BC Centre for Disease Control		RDN In-House Laboratory & Spectrophotometer								Bureau Veritas Lab	
		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-Apr-21	1969 Kaye	0	0	0	0	7	7.35	0.40	261.0	0.26	540.0		
12-Apr-21	2235 Rascal	0	0	0	0	9	7.14	0.41	254.0	0.25	524.0		
19-Apr-21	1969 Kaye			0	0	9	7.46	0.57	253.0	0.25	522.0		
26-Apr-21	2235 Rascal			0	0	9	7.50	0.49	261.0	0.26	538.0		
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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Date	Sample Location (Address)	BC Centre for Disease Control		RDN In-House Laboratory & Spectrophotometer								Bureau Veritas Lab	
		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	1969 Kaye	0	0	0	0	5	7.66	0.60	255.0	0.26	527.0		
08-Mar-21	2235 Rascal	0	0	0	0	7	7.77	0.58	259.0	0.26	535.0		
15-Mar-21	1969 Kaye			0	0	6	7.40	0.51	255.0	0.25	526.0		
22-Mar-21	2235 Rascal			0	0	7	7.80	0.60	239.0	0.24	501.0	0.0147	0.0103
28-Mar-21	1969 Kaye			0	0	6	7.31	0.58	254.0	0.25	524.0	0.0138	0.0047
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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Date	Sample Location (Address)	BC Centre for Disease Control		RDN In-House Laboratory & Spectrophotometer								Bureau Veritas Lab	
		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	1969 Kaye	0	0	0	0	7	7.65	0.63	258.0	0.26	531.0		
08-Feb-21	2235 Rascal	0	0	0	0	7	7.77	0.70	256.0	0.26	528.0		
17-Feb-21	1969 Kaye	0	0	0	0	6	8.03	0.76	256.0	0.26	528.0		
22-Feb-21	2235 Rascal			0	0	8	7.70	0.72	255.0	0.26	526.0		
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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Date	Sample Location (Address)	BC Centre for Disease Control		RDN In-House Laboratory & Spectrophotometer								Bureau Veritas Lab	
		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)
04-Jan-21	1969 Kaye	0	0	0	0	7.5	7.40	0.59	253.0	0.25	522.0		
11-Jan-21	2235 Rascal	0	0	0	0	8	7.89	0.75	254.0	0.24	525.0		
18-Jan-21	1969 Kaye			0	0	7	7.75	0.68	255.0	0.26	527.0	0.0112	0.0057
25-Jan-21	2235 Rascal			0	0	7	7.69	0.66	254.0	0.25	524.0	0.0093	0.0025
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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CDWG=Canadian Drinking Water Guidelines

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OG= Operational Guidance Value

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	Units	CDWG		October 29 2018	October 17 2019	October 20 2020	July 14 2021	October 14 2021
Miscellaneous Inorganics								
Fluoride	mg/L	1.5	MAC	0.09	0.085	0.082	0.08	0.089
Alkalinity (total as CaCO ₃)	mg/L			126	130	130	130	130
Anions								
Dissolved Sulphate	mg/L	500	AO	6.8	7.5	8	9.4	9.3
Dissolved Chloride	mg/L	250	AO	56	67	83	92	82
Nitrite	mg/L	1	MAC	<0.0050	<0.005	<0.005	<0.005	<0.005
Miscellaneous								
Apparent Colour	Colour Unit			5	5	10	<5	<5
Nutrients								
Total Ammonia	mg/L			0.045	0.13	0.061	0.049	0.049
Physical Properties								
Conductivity	µS/cm			446	460	510	530	500
pH	pH	7.0:10.5	OG	8.17	8	8.2	7.9	8.24
TDS	mg/L	500	AO	266	270	240	350	330
Turbidity	NTU			0.18	<0.1	<0.1	0.19	0.12
Microbiological Parameters								
E.coli	MPN/100mL	1	MAC	<1.0	0	0	0	0
Total Coliforms	MPN/100mL	1	MAC	<1.0	0	0	0	0
Calculated Parameters								
Total Hardness (CaCO ₃)	mg/L			169	168	190	194	188
Nitrate	mg/L	10	MAC	<0.020	<0.02	<0.02	<0.02	<0.02
Elements								
Total Mercury	mg/L	0.001	MAC	<0.000002	<0.000002	<0.0000019	<0.0000019	<0.0000019
Total Metals								
Total Aluminum	mg/L	0.1	OG	<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
Total Arsenic	mg/L	0.01	MAC	0.00172	0.00163	0.0017	0.00164	0.0017
Total Barium	mg/L	1	MAC	0.0263	0.0269	0.0307	0.0329	0.0306
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	<0.05	<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	0.00137	0.00043	0.0004	0.00699	0.00267
Total Iron	mg/L	0.3	AO	0.0247	0.0216	0.0055	0.0544	0.025
Total Lead	mg/L	0.01	MAC	0.00037	<0.0002	<0.0002	0.0004	<0.0002
Total Manganese	mg/L	0.02 0.12	AO MAC	0.0311	0.0304	0.0339	0.0365	0.034
Total Molybdenum	mg/L			0.0014	0.0012	0.0013	0.0014	0.0014
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			6.9	6.5	6.72	5.86	7.03
Total Silver	mg/L			<0.00002	<0.00002	<0.00002	<0.00002	<0.00002
Total Strontium	mg/L			0.315	0.317	0.371	0.373	0.382
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	0.00032	0.00031	0.00033	0.00032	0.00032
Total Vanadium	mg/L			<0.005	<0.005	<0.005	<0.005	<0.005
Total Zinc	mg/L	5	AO	0.0091	0.0052	<0.005	0.0059	0.0095
Total Zirconium	mg/L			<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Total Calcium	mg/L			43.8	43.6	47.9	49	48.1
Total Magnesium	mg/L			14.4	14.4	17	17.5	16.4
Total Potassium	mg/L			1.35	1.36	1.5	1.53	1.5
Total Sodium	mg/L	200	AO	17.4	18	21.5	22.2	20.8
Total Sulphur	mg/L			<3.0	<3	<3	<3	<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.

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	Units	CDWG		October 29 2018	October 17 2019	October 20 2020	July 14 2021	October 14 2021
Miscellaneous Inorganics								
Fluoride	mg/L	1.5	MAC	0.094	0.084	0.086	0.087	0.091
Alkalinity (total as CaCO ₃)	mg/L			129	130	130	130	140
Anions								
Dissolved Sulphate	mg/L	500	AO	7.5	8.1	8.5	10	9
Dissolved Chloride	mg/L	250	AO	85	98	99	100	100
Nitrite	mg/L	1	MAC	<0.0050	<0.005	<0.005	<0.005	<0.005
Miscellaneous								
Apparent Colour	Colour Unit			5	10	10	<5	<5
Nutrients								
Total Ammonia	mg/L			0.058	0.13	0.069	0.058	0.05
Physical Properties								
Conductivity	µS/cm			554	570	570	550	580
pH	pH	7.0:10.5	OG	8.16	7.96	8.21	7.97	8.29
TDS	mg/L	500	AO	326	330	330	340	370
Turbidity	NTU			0.35	0.41	0.13	0.21	1.1
Microbiological Parameters								
E.coli	MPN/100mL	<1	MAC	<1.0	0	0	0	0
Total Coliforms	MPN/100mL	<1	MAC	<1.0	0	0	0	0
Calculated Parameters								
Total Hardness (CaCO ₃)	mg/L			182	186	197	180	193
Nitrate	mg/L	10	MAC	<0.020	<0.02	<0.02	<0.02	<0.02
Elements								
Total Mercury	mg/L	0.001	MAC	<0.000002	<0.000002	<0.0000019	<0.0000019	<0.0000019
Total Metals								
Total Aluminum	mg/L	0.1	OG	<0.003	<0.03	<0.003	<0.003	<0.003
Total Antimony	mg/L	0.006	MAC	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Total Arsenic	mg/L	0.01	MAC	0.00146	0.00148	0.00154	0.00151	0.00162
Total Barium	mg/L	1	MAC	0.032	0.0331	0.034	0.034	0.0353
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	0.068	0.075	0.08	0.073	0.081
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	0.0018	<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	0.00175	0.00065	0.00048	0.00324	0.00358
Total Iron	mg/L	0.3	AO	0.0477	0.0541	0.0286	0.0492	0.101
Total Lead	mg/L	0.01	MAC	0.00031	<0.0002	<0.0002	<0.0002	0.0003
Total Manganese	mg/L	0.02 0.12	AO MAC	0.0481	0.0475	0.0452	0.0456	0.0467
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			6.97	6.83	7.57	6.1	7.38
Total Silver	mg/L			<0.00002	<0.00002	<0.00002	<0.00002	<0.00002
Total Strontium	mg/L			0.357	0.377	0.388	0.365	0.426
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	0.00034	0.00035	0.00035	0.00034	0.00034
Total Vanadium	mg/L			<0.005	<0.005	<0.005	<0.005	<0.005
Total Zinc	mg/L	5	AO	0.0123	0.0174	<0.005	<0.005	0.0258
Total Zirconium	mg/L			<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Total Calcium	mg/L			47.6	49.2	52.4	46.1	50.5
Total Magnesium	mg/L			15.4	15.3	16.1	15.7	16.2
Total Potassium	mg/L			1.48	1.47	1.53	1.53	1.54
Total Sodium	mg/L	200	AO	27.3	29.6	31.9	32.1	31.7
Total Sulphur	mg/L			3.1	<3	<3	<3	<3

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

AO= Aesthetic Objective

OG= Operational Guidance Value

MAC= Maximum Acceptable Concentration in the CDWG

Red font indicates non-compliance with Canadian Drinking Water Guidelines

	Units	CDWG		May 10 2016	May 8 2017	May 7 2018	May 15 2019	May 21 2020	May 6 2021
Miscellaneous Inorganics									
Fluoride	mg/L	1.5	MAC	0.087	0.096	0.09	0.087	0.095	0.075
Alkalinity (total as CaCO)	mg/L			133	134	124	128	120	130
Anions									
Dissolved Sulphate	mg/L	500	AO	7.98	8.52	9.6	8.7	8.3	8.8
Dissolved Chloride	mg/L	250	AO	65	70	79	84	93	98
Nitrite	mg/L	1	MAC	<0.0050	<0.0050	<0.0050	<0.005	<0.005	<0.005
Miscellaneous									
Apparent Colour	Colour Unit			10	10	10	<2.0	5	10
Nutrients									
Total Ammonia	mg/L			0.0097	0.085	<0.020	<0.015	0.016	<0.015
Physical Properties									
Conductivity	µS/cm			483	480	503	539	540	560
pH	pH	7.0:10.5	AO	8.19	8.23	8.17	8.1	8.16	8.13
TDS	mg/L	500	AO	264	316	264	290	310	340
Turbidity	NTU			0.2	0.16	0.24	0.39	0.25	0.23
Microbiological Parameters									
E.coli	MPN/100mL	<1	MAC	<1.0	<1.0	<1.0	0	0	0
Total Coliforms	MPN/100mL	<1	MAC	<1.0	<1.0	<1.0	0	0	0
Calculated Parameters									
Total Hardness (CaCO)	mg/L			173	221	176	189	184	189
Nitrate	mg/L	10	MAC	<0.020	<0.020	<0.020	<0.02	<0.02	<0.02
Elements									
Total Mercury	mg/L	0.001	MAC	<0.00001	<0.00001	<0.000002	<0.000002	<0.0000019	<0.0000019
Total Metals									
Total Aluminum	mg/L	0.1	OG	<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
Total Arsenic	mg/L	0.01	MAC	0.00163	0.00192	0.00164	0.0015	0.00164	0.00162
Total Barium	mg/L	1	MAC	0.03	0.0349	0.0305	0.0317	0.0324	0.0339
Total Beryllium	mg/L			<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Total Bismuth	mg/L			<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Total Boron	mg/L	5	MAC	0.052	0.064	0.064	0.064	0.069	0.074
Total Cadmium	mg/L	0.005	MAC	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Total Chromium	mg/L	0.05	MAC	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Total Cobalt	mg/L			<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Total Copper	mg/L	1	AO	0.00237	0.00616	0.00523	0.00437	0.00311	0.00286
Total Iron	mg/L	0.3	AO	0.0148	0.0167	0.0117	0.0201	0.0159	0.0151
Total Lead	mg/L	0.01	MAC	<0.0002	<0.0002	<0.0002	0.00052	0.00024	0.00021
Total Manganese	mg/L	0.02 0.12	AO MAC	0.0174	0.0084	0.0095	0.0168	0.0106	0.0141
Total Molybdenum	mg/L			<0.001	0.0012	<0.001	<0.001	<0.001	0.0011
Total Nickel	mg/L			<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Total Selenium	mg/L	0.05	MAC	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Total Silicon	mg/L			7.4	9.3	7.25	6.94	7.11	7
Total Silver	mg/L			<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002
Total Strontium	mg/L			0.359	0.396	0.389	0.348	0.387	0.399
Total Thallium	mg/L			<0.00005	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Total Tin	mg/L			<0.005	0.005	<0.005	<0.005	<0.005	<0.005
Total Titanium	mg/L			<0.005	0.005	<0.005	<0.005	<0.005	<0.005
Total Uranium	mg/L	0.02	MAC	0.00035	0.00039	0.00032	0.00032	0.00034	0.00035
Total Vanadium	mg/L			<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Total Zinc	mg/L	5	AO	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Total Zirconium	mg/L			<0.0005	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Total Calcium	mg/L			43	56.5	44.7	48.4	47.5	47.8
Total Magnesium	mg/L			15.9	19.4	15.5	16.5	15.8	16.9
Total Potassium	mg/L			1.45	1.78	1.4	1.5	1.46	1.61
Total Sodium	mg/L	200	AO	23.6	29.6	25.1	27.2	28.7	30.7
Total Sulphur	mg/L			3.2	3.5	<3.0	<3.0	3.2	<3