



## **Water Operations**

**Annual Summary Report**  
**~ Churchill Drinking Water System ~**  
**DWS #220005063**  
**~ Town of Innisfil ~**

Reporting Year -2021

## InnServices Utilities Inc.

### Churchill DWS

## **Introduction**

Effective January 1, 2016, the Town of Innisfil transferred ownership of its municipal Drinking Water Systems to InnServices Utilities Inc. (InnServices). InnServices is a municipal service corporation, wholly-owned by the Town of Innisfil, charged with the responsibility to operate, maintain and expand the municipal drinking water systems that service the Town of Innisfil.

The Churchill Drinking Water System (DWS) services a population of approximately 510, on 170 connections, 169 of which are residential. The distribution system is comprised of approximately 6 kilometers of cast iron piping, 31 hydrants and 52 valves. The system relies on 3 drilled wells as its source of groundwater. Wells #1 and 2 feed directly into the reservoir, and run on an as-needed basis. Well #3 is the main source of raw water which feeds the distribution and can also fill the reservoir.

InnServices has prepared this Summary Report for the operations conducted during the 2021 calendar year.

This Annual Summary Report has been prepared to meet the following commitments:

- To provide InnServices Utilities Inc. Board of Directors, as “Owners” of the DWS, a summary of the operations and maintenance of the Churchill DWS that took place during the reporting period of January 1 to December 31, 2021.
- To provide a status update of the systems capabilities and capacities as of December 31, 2021.
- To satisfy the requirements of O. Reg 170/03 Section 11
- To satisfy the requirements of O. Reg.170/03 Schedule 22

The Annual Summary Report identifies specific details regarding the overall quality of the drinking water submitted to the Ministry of the Environment Conservation and Parks (MECP) for the Churchill DWS and is available on the Town of Innisfil website (<https://innisfil.ca/en/my-government/annual-water-performance-reports.aspx?mid=3185>) and at InnServices Headquarters at 7251 Yonge St., Innisfil, Ontario.

This report provides information to the InnServices Board of Directors and Town of Innisfil Mayor and Council related to the operations, maintenance, drinking water quality, and system capacities of the Churchill DWS, which aids decision making related to system expansion needs, and assists Board and Council in meeting their Statutory Standard of Care requirements.

## MECP Approvals

The Churchill DWS is classified as a Large Municipal Residential DWS, as defined by Ontario Regulation 170/03.

The **Safe Drinking Water Act, 2002** requires that the Owner of a municipal DWS have MECP approvals in the form of a Drinking Water Works Permit (DWWP) and a Municipal Drinking Water Licence (MDWL). The DWWP provides a description of the overall system and provides the authority to establish or alter the DWS. The MDWL provides the authority to use or operate the system.

The Churchill DWS operated under the following:

**DWWP # 120-206, Issue #4, issued December 15, 2020**

**MDWL # 120-106, Issue #3, issued December 15, 2020**

For the reporting period covered in this report, InnServices Utilities Inc. was defined as the Operating Authority of the Churchill DWS.

InnServices Utilities Inc. has established and maintains accreditation to the Drinking Water Quality Management Standard Version 2-2017 (DWQMS) under Certificate of Accreditation # 0136878, issued November 4, 2020 by SAI Global. The Certificate of Accreditation expires September 20, 2023.

## Drinking Water System

The Churchill DWS (DWS) relies on 3 drilled wells as its source of groundwater.

Well #3 is the main source of raw water. It has its own chlorine contact chamber which feeds the distribution and can also fill the reservoir.

Wells #1 and 2 feed directly into the reservoir, and run on an as-needed basis.

Sodium hypochlorite is used for primary and secondary disinfection.

The below-grade, twin-cell concrete reservoir has a total volume of approximately 1100 cubic meters and provides fire protection for the community.

A 200 kilowatt standby generator ensures that the system is provided with water in the event of a power failure.

Expenses incurred in relation to well and well pump maintenance and repairs amounted to approximately \$19,300:

Communication cable run	\$2050
Auto flusher	\$7621
Pump – Well #1	\$9627

## Analytical Laboratory Water Quality Monitoring

### Bacteriological Analysis

Bacteriological testing is completed to verify that no microbiological contamination of the treated drinking water can be detected. Raw water is also analyzed to inform operations if there is microbiological contamination in the DWS. Bacteriological monitoring for the reporting period was conducted as required by Ontario Regulation 170/03.

SGS Environmental Services, Lakefield, Ontario, conducted the bacteriological analysis of the drinking water.

Zero (0) items of non-compliance with the Ontario Drinking Water Standards related to bacteriological analyses occurred during the reporting period.

Below is a summary of microbiological testing done under the Schedule 10 of Regulation 170/03, during this reporting period.

	<b>Number of Samples</b>	<b>Range of E.coli Results (min #)-(max #) CFU/100mL</b>	<b>Range of Total Coliform Results (min #)-(max #) CFU/100mL</b>	<b>Number of HPC Samples</b>	<b>Range of HPC Results (min #)-(max #) CFU/1mL</b>
<b>Raw</b>	156	0-0	0-1	n/a	n/a
<b>Treated</b>	104	0-0	0-0	104	0-190
<b>Distribution</b>	183	0-0	0-0	183	0-71

### **Chemical Analysis**

Chemical analysis of this water supply is conducted as required by Ontario Regulation 170/03.

SGS Environmental Services, Lakefield, Ontario, conducted the required chemical analyses for the DWS during the reporting period. This lab, as well as any laboratories to which they sub-contract certain types of analyses, are licensed by the MECP and accredited by the Canadian Association for Laboratory Accreditation (CALA) and/or Standard Council Canada (SCC).

InnServices engaged the Walkerton Clean Water Centre to undertake a study to investigate THM (Trihalomethanes) formation in the Churchill DWS. Raw water quality was assessed, which identified bromide reaction time with chlorine and organics contributed to an increase in THM formation. Bench scale testing was conducted in 2020; pilot studies for treatment options (using Well #3) were undertaken during 2021.

Using the information from the study, Operations has come up with short-term strategies to lower the THM levels. This includes closely monitoring chlorine levels and reservoir circulation time, and putting Well #2 into more frequent rotation, increased frequency of dead-end flushing and uni-directional flushing (UDF) performed on the distribution system. Plans for 2022 include installing an underground automatic flusher at a dead-end in the distribution system and installing an in-line THM analyzer.

The long-term mitigation strategy is to add Granular Activated Carbon (GAC) process. This is a capital project which is under development.

With the issuance of the new Municipal Drinking Water Licence December 15, 2020, the Ministry has added a requirement to increase testing and monitoring of the health-related parameter for THM from quarterly to monthly, beginning in January 2021. There were zero out-of-compliance events related to the THM levels in 2021.

One (1) incident of non-compliance with Ontario Drinking Water Standards related to chemical analysis was reported during 2021. Sodium in the drinking water is tested every 60 months. Results were above the Maximum Allowable Concentration, but below the Aesthetic Objective. This is not a concern for most people. The Simcoe Muskoka District Health Unit was advised, and they share this information with physicians who may need to consider the potential impact on their patients. InnServices has posted this information on their website, in billing inserts, and will share the information from time to time on social media.

A summary of all analytical results for Organic and Inorganic testing is attached in Appendix A.

## Continuous Water Quality Monitoring

### Free Chlorine Residual

The Churchill DWS utilizes NSF® certified 12% sodium hypochlorite to meet primary disinfection requirements and provide an adequate chlorine residual for secondary disinfection requirements.

A requirement of O.Reg. 170/03 and the Procedure for Disinfection of Drinking Water in Ontario is that the chlorine residual must be recorded at the point directly after primary disinfection is achieved, at a frequency of every 5 minutes. Grab samples are taken and analyzed for free chlorine residual (FCR) when microbiological samples are taken throughout the distribution system. Ontario Regulation 170/03 requires that sufficient residual be available in the water to achieve a residual of greater than 0.05 mg/L at all points in the distribution system.

During the reporting period covered by this report, zero (0) incidents of non-compliance with these requirements were reported.

A summary of the chlorination monitoring that took place directly after primary disinfection is achieved is depicted below:

	<b>Number of Grab Samples</b>	<b>Range of Results (min #)-(max #)</b>	<b>Unit of Measure</b>
<b>Chlorine – Well #3</b>	8760	0.00 – 5.00	mg/L
<b>Chlorine – Well # 1 and 2</b>	8760	0.001– 5.17	mg/L

All instances where Free Chlorine Residual (FCR) was less than 0.60 mg/L were investigated and confirmed to be isolated instantaneous readings, or coincide with a power outage, equipment malfunction, calibration activities, and/or appropriate corrective actions were taken to remove non-compliant water from the system.

## Plant Flow Monitoring

### Raw Water Takings

The Churchill DWS utilizes groundwater wells as its raw water source. The raw water takings from groundwater wells are authorized by the MECP through a Permit to Take Water (PTTW # 0557-B4HNR7)

Raw water takings for 2021 were reported to the electronic Water Taking Recording System (WTRS).

Table 1 on the following page provides a summary of the raw water takings in 2021.

There were zero (0) incidents of non-compliance related to water takings in 2021.

Table 1: Summary of 2021 Raw Water Takings

	Units	Well #1	Well #2	Well #3	System
<b>PTTW Daily Maximum</b>	(m <sup>3</sup> /day)	<b>262.08</b>	<b>295.2</b>	<b>743</b>	<b>743</b>
<b>Maximum Day</b>	(m <sup>3</sup> /day)	175	253	484	484
<b>Average Day</b>	(m <sup>3</sup> /day)	19	24	79	129
<b>2021 Takings</b>	(m <sup>3</sup> )	6855	10212	30105	47,172

### System Performance Summary

The volume of daily treated water delivered to the distribution system is authorized by the MECP through the designation of a Rated Capacity within the Municipal Drinking Water Licence (MDWL). The Treated Water volume is essentially the same as the Raw Water Takings.

The Wells #1 & 2 subsystem is operating at approximately 8% of the rated capacity of 557 m<sup>3</sup>/day. At the maximum flow, treated water demand flow in 2021 was at 64% of the rated capacity. With the raw water quality of Well #2 being better than Well #3, Operations is putting Well #2 into rotation more frequently to help reduce the THM levels. Use of Wells #1 & 2 has increased approximately 5% since 2020.

The Well #3 subsystem is operating at approximately 11% of the rated capacity, 743m<sup>3</sup>/day. This is approximately 4% less than 2020. At the maximum flow, treated water demand flow in 2021 was at 65% of the rated capacity.

The Treated Water Demand is summarized in Table 2 below.

There were zero (0) incidents of non-compliance related to rated capacity in 2021.

Table 2: Summary of 2019 Treated Water Demand

	<b>Wells #1 &amp; 2</b>	<b>Well #3</b>
System Rated Capacity (m <sup>3</sup> /day)	557	743
Maximum Day (m <sup>3</sup> /day)	357	484
Average Day (m <sup>3</sup> /day)	47	79
Total Annual Demand (m <sup>3</sup> )	17,067	30,105
System Performance- rated capacity	8%	11 %
System Performance- at Maximum Flow	64 %	65%

## Distribution Flow Monitoring

The Churchill DWS produces water for distribution to homes and businesses in the village of Churchill in the Town of Innisfil.

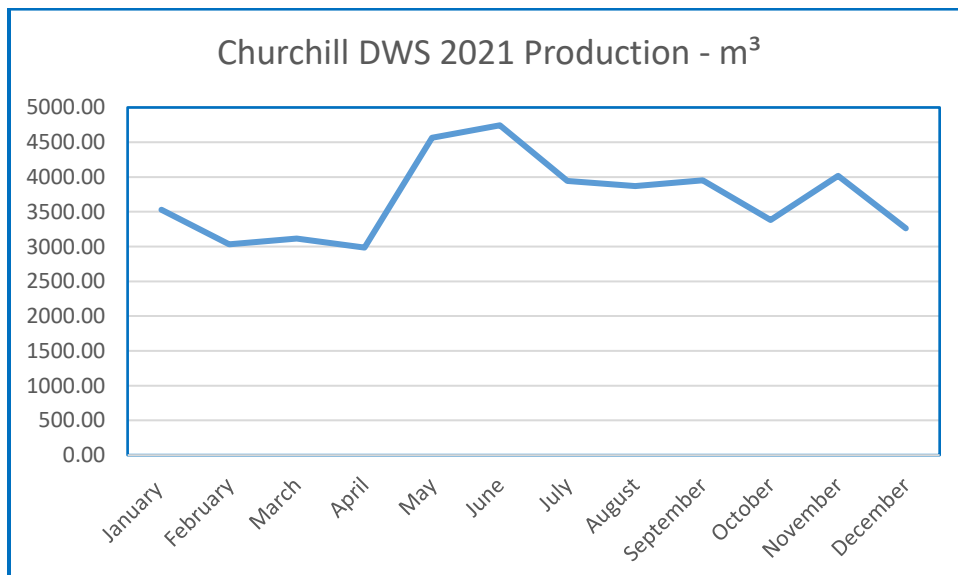
The following table and graph demonstrate the monthly water system demand.

Table 3 demonstrates the monthly volumes of drinking water directed toward the Churchill distribution systems in 2021.

*Table 3: Monthly Water Production*

Month	Treated Water Produced (m <sup>3</sup> )
January	3529
February	3032
March	3115
April	2985
May	4563
June	4744
July	3945
August	3870
September	3954
October	3383
November	4019
December	3261
<b>Annual Total</b>	<b>44,400</b>

The following graph provides a visual display of the information provided in Table 3



## **MECP Annual Inspection**

The MECP annual inspection was not conducted until February 10, 2022, due to scheduling complicated by COVID-19 restrictions. The report is not currently available.

As reported last year, an Unannounced Focused inspection was conducted on December 3, 2020, by the Ministry of the Environment, Conservation and Parks. The inspection covered the period of September 5, 2019, to December 3, 2020.

### **Items of Non-Compliance**

There were zero (0) items of non-compliance identified during the inspection period.

### **Provincial Officer's Orders**

No Provincial Officer's Orders were issued in the Report as a result of the 2020 inspection.

### **Inspection Risk Rating**

In 2020 the Churchill system received an Inspection Risk Rating of 0%, resulting in a Compliance Rating of 100%.



## Appendix A – Chemical Analysis

Organic and Inorganic parameters testing is required at least once every 36 months from a raw water supply that is ground water.

### Churchill Well 1 & 2

Inorganic Parameter	Sample Date	Result Value	Unit of Measure	Exceedance
Antimony	18-Nov-2021	<0.06	µg/L	No
Arsenic	18-Nov-2021	<0.2	µg/L	No
Barium	18-Nov-2021	194	µg/L	No
Boron	18-Nov-2021	65	µg/L	No
Cadmium	18-Nov-2021	<0.003	µg/L	No
Chromium	18-Nov-2021	0.25	µg/L	No
Mercury	18-Nov-2021	<0.01	µg/L	No
Selenium	18-Nov-2021	<0.04	µg/L	No
Uranium	18-Nov-2021	0.051	µg/L	No

Organic Parameter	Sample Date	Result Value	Unit of Measure	Exceedance
Alachlor	18-Nov-2021	<0.02	µg/L	No
Atrazine + N-dealkylated metabolites	18-Nov-2021	<0.01	µg/L	No
Azinphos-methyl	18-Nov-2021	<0.05	µg/L	No
Benzene	18-Nov-2021	<0.32	µg/L	No
Benzo(a)pyrene	18-Nov-2021	<0.004	µg/L	No
Bromoxynil	18-Nov-2021	<0.33	µg/L	No
Carbaryl	18-Nov-2021	<0.05	µg/L	No
Carbofuran	18-Nov-2021	<0.01	µg/L	No
Carbon Tetrachloride	18-Nov-2021	<0.17	µg/L	No
Chlorpyrifos	18-Nov-2021	<0.02	µg/L	No
Diazinon	18-Nov-2021	<0.02	µg/L	No
Dicamba	18-Nov-2021	<0.20	µg/L	No
1,2-Dichlorobenzene	18-Nov-2021	<0.41	µg/L	No
1,4-Dichlorobenzene	18-Nov-2021	<0.36	µg/L	No

1,2-Dichloroethane	18-Nov-2021	<0.35	µg/L	No
1,1-Dichloroethylene (vinylidene chloride)	18-Nov-2021	<0.33	µg/L	No
Dichloromethane	18-Nov-2021	<0.35	µg/L	No
2-4 Dichlorophenol	18-Nov-2021	<0.15	µg/L	No
2,4-Dichlorophenoxy acetic acid (2,4-D)	18-Nov-2021	<0.19	µg/L	No
Diclofop-methyl	18-Nov-2021	<0.40	µg/L	No
Dimethoate	18-Nov-2021	<0.03	µg/L	No
Diquat	18-Nov-2021	<1	µg/L	No
Diuron	18-Nov-2021	<0.03	µg/L	No
Glyphosate	18-Nov-2021	<1	µg/L	No
Malathion	18-Nov-2021	<0.02	µg/L	No
2-Methyl-4-chlorophenoxyacetic acid (MCPA)	18-Nov-2021	<0.0001 2	Mg/L	No
Metolachlor	18-Nov-2021	<0.01	µg/L	No
Metribuzin	18-Nov-2021	<0.02	µg/L	No
Monochlorobenzene	18-Nov-2021	<0.3	µg/L	No
Paraquat	18-Nov-2021	<1	µg/L	No
Pentachlorophenol	18-Nov-2021	<0.15	µg/L	No
Phorate	18-Nov-2021	<0.01	µg/L	No
Picloram	18-Nov-2021	<1	µg/L	No
Polychlorinated Biphenyls(PCB)	18-Nov-2021	<0.04	µg/L	No
Prometryne	18-Nov-2021	<0.03	µg/L	No
Simazine	18-Nov-2021	<0.03	µg/L	No
Terbufos	18-Nov-2021	<0.01	µg/L	No
Tetrachloroethylene	18-Nov-2021	<0.35	µg/L	No
2,3,4,6-Tetrachlorophenol	18-Nov-2021	<0.2	µg/L	No
Triallate	18-Nov-2021	<0.01	µg/L	No
Trichloroethylene	18-Nov-2021	<0.44	µg/L	No

2,4,6-Trichlorophenol	18-Nov-2021	<0.25	µg/L	No
Trifluralin	18-Nov-2021	<0.02	µg/L	No
Vinyl Chloride	18-Nov-2021	<0.17	µg/L	No

Inorganic or Organic parameter(s) that exceeded half the standard prescribed in Schedule 2 of Ontario Drinking Water Quality Standards.

Parameter	Result Value	Unit of Measure	Date of Sample
N/A			

**One water sample is taken every 60 months to test for Sodium and Fluoride**

Parameter	Date of Sample	Result	Unit of Measure	Exceedance
Sodium*	18-Nov-2021	22.3	mg/L	Yes
Sodium re-sample	29-Nov-2021	21.8	mg/L	Yes
Fluoride	18-Nov-2021	0.22	mg/L	No

\*Sodium result was reported to both the MECP and the Simcoe Muskoka District Health Unit.

**One water sample is taken every 3 months and tested for nitrate and nitrite**

Parameter	Date of latest Sample	Result	Unit of Measure	Exceedance
Nitrite	19-Nov-2021	<0.003	mg/L	No
Nitrate	19-Nov-2021	0.017	mg/L	No

**Churchill Well 3**

Parameter	Sample Date	Result Value	Unit of Measure	Exceedance
Antimony	18-Nov-2021	0.02	µg/L	No
Arsenic	18-Nov-2021	<0.2	µg/L	No
Barium	18-Nov-2021	29.6	µg/L	No
Boron	18-Nov-2021	163	µg/L	No
Cadmium	18-Nov-2021	<0.003	µg/L	No
Chromium	18-Nov-2021	0.09	µg/L	No
Mercury	18-Nov-2021	<0.01	µg/L	No
Selenium	18-Nov-2021	<0.04	µg/L	No
Uranium	18-Nov-2021	<0.002	µg/L	No

Parameter	Sample Date	Result Value	Unit of Measure	Exceedance
Alachlor	18-Nov-2021	<0.02	µg/L	No
Atrazine + N-dealkylated metabolites	18-Nov-2021	<0.01	µg/L	No
Azinphos-methyl	18-Nov-2021	<0.05	µg/L	No

Benzene	18-Nov-2021	<0.32	µg/L	No
Benzo(a)pyrene	18-Nov-2021	<0.004	µg/L	No
Bromoxynil	18-Nov-2021	<0.33	µg/L	No
Carbaryl	18-Nov-2021	<0.05	µg/L	No
Carbofuran	18-Nov-2021	<0.01	µg/L	No
Carbon Tetrachloride	18-Nov-2021	<0.17	µg/L	No
Chlorpyrifos	18-Nov-2021	<0.02	µg/L	No
Diazinon	18-Nov-2021	<0.02	µg/L	No
Dicamba	18-Nov-2021	<0.2	µg/L	No
1,2-Dichlorobenzene	18-Nov-2021	<0.41	µg/L	No
1,4-Dichlorobenzene	18-Nov-2021	<0.36	µg/L	No
1,2-Dichloroethane	18-Nov-2021	<0.35	µg/L	No
1,1-Dichloroethylene (vinylidene chloride)	18-Nov-2021	<0.33	µg/L	No
Dichloromethane	18-Nov-2021	<0.35	µg/L	No
2-4 Dichlorophenol	18-Nov-2021	<0.15	µg/L	No
2,4-Dichlorophenoxy acetic acid (2,4-D)	18-Nov-2021	<0.19	µg/L	No
Diclofop-methyl	18-Nov-2021	<0.4	µg/L	No
Dimethoate	18-Nov-2021	<0.03	µg/L	No
Diquat	18-Nov-2021	< 1	µg/L	No
Diuron	18-Nov-2021	<0.03	µg/L	No
Glyphosate	18-Nov-2021	< 1	µg/L	No
Malathion	18-Nov-2021	<0.02	µg/L	No
2-Methyl-4-chlorophenoxyacetic acid (MCPA)	18-Nov-2021	<0.00012	Mg/L	No
Metolachlor	18-Nov-2021	<0.01	µg/L	No
Metribuzin	18-Nov-2021	<0.02	µg/L	No
Monochlorobenzene	18-Nov-2021	<0.3	µg/L	No
Paraquat	18-Nov-2021	<1	µg/L	No

Pentachlorophenol	18-Nov-2021	<0.15	µg/L	No
Phorate	18-Nov-2021	<0.01	µg/L	No
Picloram	18-Nov-2021	< 1	µg/L	No
Polychlorinated Biphenyls(PCB)	18-Nov-2021	<0.04	µg/L	No
Prometryne	18-Nov-2021	<0.03	µg/L	No
Simazine	18-Nov-2021	<0.01	µg/L	No
Terbufos	18-Nov-2021	<0.01	µg/L	No
Tetrachloroethylene	18-Nov-2021	<0.35	µg/L	No
2,3,4,6-Tetrachlorophenol	18-Nov-2021	<0.20	µg/L	No
Triallate	18-Nov-2021	<0.01	µg/L	No
Trichloroethylene	18-Nov-2021	<0.44	µg/L	No
2,4,6-Trichlorophenol	18-Nov-2021	<0.25	µg/L	No
Trifluralin	18-Nov-2021	<0.02	µg/L	No
Vinyl Chloride	18-Nov-2021	<0.17	µg/L	No

Inorganic or Organic parameter(s) that exceeded half the standard prescribed in Schedule 2 of Ontario Drinking Water Quality Standards.

Parameter	Result Value	Unit of Measure	Date of Sample
N/A			

**One water sample is taken every 60 months to test for Sodium and Fluoride**

Parameter	Date of Sample	Result	Unit of Measure	Exceedance
Sodium*	20-Nov-2021	53.3	Mg/L	Yes
Sodium re-sample	29-Nov-2021	60.1	Mg/L	Yes
Fluoride	20-Nov-2021	0.48	mg/L	No

\*Sodium result was reported to both the MECP and the Simcoe Muskoka District Health Unit.

**One water sample is taken every 3 months and tested for nitrate and nitrite**

Parameter	Date of latest Sample	Result	Unit of Measure	Exceedance
Nitrite	19-Nov-2021	<0.003	mg/L	No
Nitrate	19-Nov-2021	0.007	mg/L	No

## **Distribution Sampling**

Based on results of community lead sampling program conducted, Churchill DWS has qualified for reduced sampling protocol as per O. Reg .170/03 Schedule 15.1. Under this protocol, only alkalinity and pH are required from 2 sampling points for each summer and winter period. Lead is tested every **third** 12-month period.

<b>Location Type</b>	<b>Number of Samples</b>	<b>Range of Alkalinity Results Minimum - maximum</b>	<b>Range of Lead Results- 2020</b>	<b>Number of Exceedances</b>
		Aesthetic Objective 30-500 Mg/L	Maximum Concentration 10 µg/L	
Distribution	4	132-169 Mg/L	0.02 – 0.21 µg/L	0

Haloacetic Acids (HAAs) were sampled on a quarterly basis in accordance with O. Reg. 170/03 Schedule 13.

Trihalomethanes (THMs) are sampled monthly in accordance with the Municipal Drinking Water Licence #120-106, Issue #3.

The most recent sample results:

<b>Parameter</b>	<b>Sample Date</b>	<b>Result Value</b>	<b>Maximum Allowable Concentration</b>
THM (latest rolling annual average)	3-Dec-2021	92.06 µg/L	100 µg/L
HAA (latest rolling annual average)	19-Nov-2021	13.89 µg/L	80 µg/L

Lead, Haloacetic Acids or Trihalomethanes results that exceeded half the standard prescribed in Schedule 2 of Ontario Drinking Water Quality Standards

<b>Parameter</b>	<b>Result Value</b>	<b>Unit of Measure</b>	<b>Date of Sample</b>
THM (running annual average)	Q1 – 97.56	µg/L	January 14, 2021 February 5, 2021 March 4, 2021
	Q2 – 91.86	µg/L	April 9, 2021 May 10, 2021 June 10, 2021
	Q3 – 91.33	µg/L	July 8, 2021 August 6, 2021 September 13, 2021
	Q4 – 92.06	µg/L	October 7, 2021 November 5, 2021 December 3, 2021