Brechin and Lagoon City Drinking Water System

Waterworks # 210001273
System Category – Large Municipal Residential

Annual Water Report

Prepared For: The Township of Ramara

Reporting Period of January 1st – December 31st, 2022

Issued: February 24, 2023

Revision: 0

Operating Authority:

OCWA
ONTARIO CLEAN WATER AGENCY
AGENCE ONTARIENNE DES EAUX

This report has been prepared to satisfy the annual reporting requirements in O. Reg. 170/03 Section 11 and Schedule 22

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Report Availability

This system does not serve more than 10,000 residence and the annual reports will be available to residents at the Township Of Ramara Administration Office and on the Township's website at www.ramara.ca. Notification that reports are available free of charge will be made on the Township of Ramara website. The Township of Ramara Administration Office is located at 2297 Highway 12, Brechin, ON L0K 1B0.

Compliance Report Card

Drinking Water System Number: 210001273
Drinking Water System Name: Brechin and Lagoon City DWS
Drinking Water System Owner: Township of Ramara
Drinking Water System Category: Large Municipal Residential
Period Being Reported: January 1, 2022 - December 31, 2022

	# of Events	Date	Details
Health & Safety			
Number of Incidents	1	May 30, 2022	Sodium Hypochlorite and PAX XL6 were accidently mixed, resulting in chemical off gassing. As a precautionary measure the operator was taken to the hospital for an assessment.
Drinking Water			
MECP Inspections	1	July 22, 2022	Announced – Focused-Drinking Water Inspection – Final Inspection Rating of 100%
AWQI's	2	October 20, 2022	A category 2 watermain break occurred on Harrigan Drive. The portion of the watermain was isolated. Adequate pressure was maintained in the rest of the system.
		December 24, 2022	Filter #1 and Filter #2 effluent turbidity greater than 1.0 NTU for a period greater than 15 minutes while in production (total of 18 minutes)
Number of Non-Compliances	0	May 30, 2022	Sodium Hypochlorite and PAX XL6 were accidently mixed, resulting in chemical off gassing. All doors were open to the facility causing a release to atmosphere.
Number of Boil Water Advisories	1	October 20, 2022	A category 2 watermain break occurred on Harrigan Drive, a boil water advisory was issued to the affected residents after the repair was complete.

System Process Description

Raw Source

The Brechin and Lagoon City DWS is supplied with surface water from Lake Simcoe.

Treatment

The treatment system is a dual train direct filtration package plant consisting of the following:

- Raw water is sourced from Lake Simcoe through an intake well with two (2) removable screens further the low lift pumping station consisting of three (3) low lift pumps
- Inlet line connected to sodium hypochlorite and a coagulant feed line diffuser
- Raw water flow meter and turbidity analyzer
- Carbon Dioxide injection system for adjusting pH to optimize coagulation process with a metering panel equipped with actuated control valve and bypass piping, gas feed flowmeter, filter, carbon dioxide gas pressure regulator and isolating manual ball valves
- Coagulant is added to the raw water intake well at the low lift pumping station
- Four (4) spiral flow flocculation tanks allows for floc to settle
- Two (2) filter-absorber units each consisting of granular activated carbon over sand and gravel with three backwash troughs and two surface water agitators and an underdrain
- Continuously monitoring turbidity analyzers on each filter line
- Waste backwash holding tank with discharge to sanitary sewer
- Chlorine injection system
- Single in-ground clearwell with five (5) highlift pumps
- Chlorine residual and pH analyzers prior to distribution connection
- Water tower
- SCADA computer control system
- Standby power generator

Treatment Chemicals used during the reporting year:

Chemical Name	Use	Supplier
Sodium Hypochlorite	Disinfection	Brenntag
Poly-Aluminum Chloride	Flocculation	Brenntag
Carbon Dioxide	pH Optimization	Praxair

Summary of Non-Compliance

Adverse Water Quality Incidents

Date	AWQI #	Location	Problem	Details	Legis-lation	Corrective Action Taken
October 20, 2022	160387	Distribution	Pressure loss at Harrigan Drive due to a category 2 watermain break	A category 2 watermain break occurred at Harrigan Drive, the portion of watermain was isolated. Adequate pressure was maintained in the rest of the system.	O. Reg 170/03	The watermain was repaired, the area was flushed, samples were collected and a boil water advisory was issued to the affected residents.
December 24, 2022	161066	Facility	Filter effluent turbidity greater than 1.0 NTU for a period greater than 15 minutes while in production (total of 18 minutes)	Filter #1 and Filter #2 effluent turbidity greater than 1.0 NTU for a period greater than 15 minutes while in production (total of 18 minutes)	O. Reg 170/03	Due to severe weather conditions the raw water quality was poor. Filters were taken offline, coagulant dosage was increased to try to accommodate the raw water quality.

Non-Compliance

Legislation	Requirement(s) system failed to meet	Duration of the failure (i.e. date(s))	Corrective Action	Status
Part X of EPA	Sodium Hypochlorite and PAX XL6 were accidently mixed, resulting in chemical off gassing causing a release to the atmosphere	May 30, 2022	The water quality was not impacted, the operator immediately isolated the system after the accidental mixing. Fire department contacted, air quality monitored/facility ventilated, clean-up company contacted to properly dispose of mixed chemical, new poly lines installed on suction side and closest hydrant to facility was flushed and a free chlorine residual was collected.	Complete

Non-Compliance Identified in a Ministry Inspection:

Legislation	Requirement(s) system failed to meet	Duration of the failure (i.e. date(s))	Corrective Action	Status
There were no non-compliance issues reported during the reporting period.				

Flows

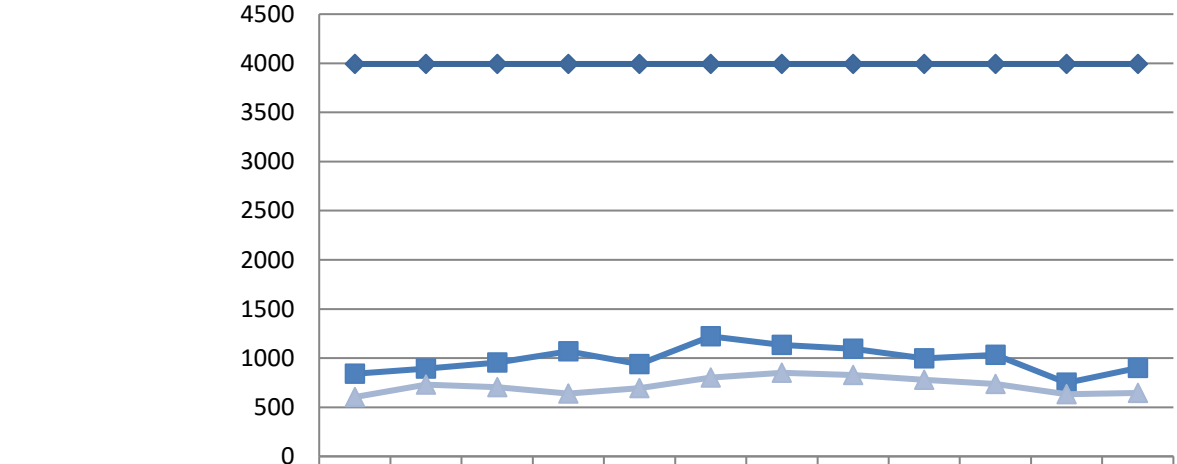
The Brechin and Lagoon City Drinking Water System is operating on average under half the rated capacity.

Raw Water Flows

The Raw Water flows are regulated under the Permit to Take Water. 2022 Raw Flow Data was submitted to the Ministry electronically under permit #0278-AQ4LYS. The confirmation and a copy of the data that was submitted are attached in Appendix A.

Total Monthly Flows (m^3/d)

Max Allowable PTTW –Raw

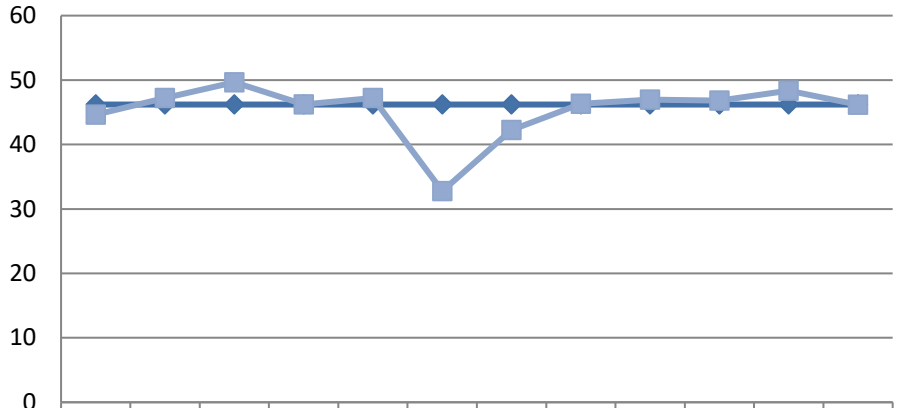


	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Rated Capacity (m^3/d)	3993	3993	3993	3993	3993	3993	3993	3993	3993	3993	3993	3993
Max Daily Flow (m^3/d)	842	892	956	1,068	938	1,221	1,134	1,094	996	1,033	748	899
Avg (m^3/d)	603	731	703	639	694	800	851	829	780	738	633	646

Note: On June 8, 2022 raw water and treated water total flows were estimated due to work being done on the facility's PLC.

Monthly Rated Flows (L/s)

Max allowable rate – PTTW −Raw



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Max Allowable Rate (L/s)	46.2	46.2	46.2	46.2	46.2	46.2	46.2	46.2	46.2	46.2	46.2	46.2
Max Rate (L/s)	44.65	47.23	49.66	46.21	47.23	32.77	42.25	46.33	46.96	46.83	48.34	46.15

Note: The above table shows there were exceedances in instantaneous peak flow rate (L/s) caused by a communication blip in the local PLC as well as on pump start-up. All spikes are reviewed for compliance.

Treated Water Flows

The Treated Water flows are regulated under the Municipal Licence. The average water consumption for the Brechin/Lagoon City Drinking Water System during 2022 was: 719 m^3/day.

Brechin Lagoon City Drinking Water System Historical Demands

Year	Number of Connections	Average Daily Demand (m^3)	Maximum Daily Demand (m^3/day)	Rated Capacity	Per Capita Consumption* (L/p/day)	
					Average	Maximum
2012	1257	732	1247	4000	281	479
2013	1258	770	1411	4000	296	542
2014	1258	783	1239	4000	297	476
2015	1261	781	1670	4000	299	639
2016	1264	837	1546	4000	320	591
2017	1269	699	1207	4000	266	459
2018	1273	870	1829	4000	329	694
2019	1274	893	1798	4000	317	681
2020	1279	676	1333	4000	242	644
2021	1279	684	1090	4000	245	390
2022	1286	719	1246	4000	269	467
3 Year Average/Max		693	1333	4000	252	644

*Based on estimated service connections in Lagoon City and Brechin: 1,130 and 156 single family dwellings. The estimated population in Lagoon City: 2,260 (based on a population density of 2.0 persons per dwelling), and the estimated population in Brechin: 406 (based on a population density of 2.6 persons per dwelling). Assumptions made on location of new developments for 2022 connections for population estimation.
Note: Excluding pipe leaks/breaks & system flushing
Note: This calculation was completed based on current connections in the system, growth within the drinking water system has not been considered.

System Reserve Capacity

In accordance with the MECP Procedure D-5-1, the reserve capacity is calculated by the following formula:

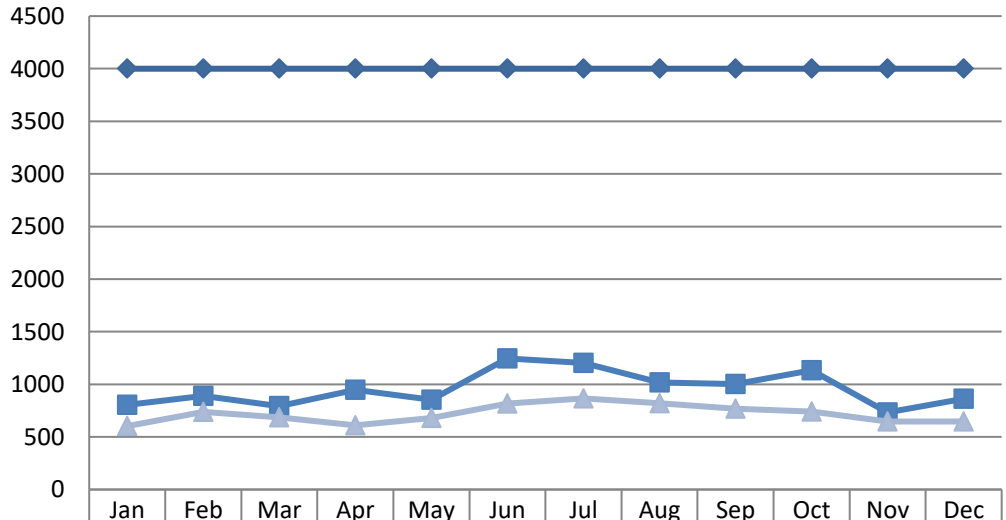
Reserve Capacity= Design Flow- Committed Flow

Design flow is the maximum permissible flow approved by the MDWL and/or PTTW. Brechin Lagoon City Water Works maximum daily rated capacity is 4000 m³/day.

The committed flow is the total expected water demand from the existing and proposed connections based on the previous three years of data. The committed number of service connections is: 1367.The three-year (2020-2022) maximum per capita water consumption is: 644 L/p/day. At this water consumption rate, the committed flow is: 1717 m³/day.

As a result, the calculated reserve capacity is: 2283 m³/day.

Monthly Rated Flows
Rated Capacity – MDWL

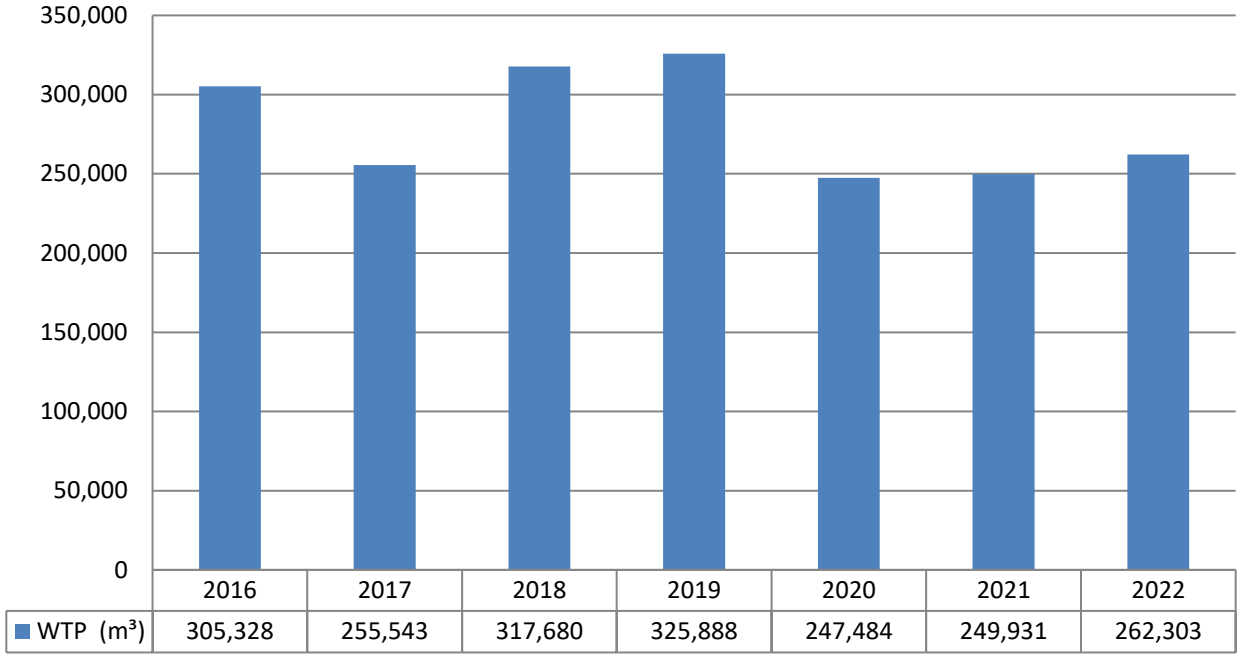


	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Rated Capacity (m³/d)	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000
Max Daily Flow (m³/d)	805	889	792	948	854	1,246	1,202	1,019	1,002	1,134	733	863
Avg (m³/d)	603	738	687	611	680	815	866	820	770	739	647	648

Note: On June 8, 2022 raw water and treated water total flows were estimated due to work being done on the facility's PLC.

Annual Total Flow Comparison

Total Annual m³



Regulatory Sample Results Summary

Microbiological Testing

	No. of Samples Collected	Range of E. Coli Results		Range of Total Coliform Results		Range of HPC Results	
		Min	Max	Min	Max	Min	Max
Raw	52	0	6	0	92*		
Treated	54	0	0	0	0	0	2
Distribution	158	0	0	0	0	0	4

*Note: One result for raw water resulted in Total Coliform and E. Coli as NDOGT (No Data: Overgrown with Target Bacteria).

Operational Testing

	No. of Samples Collected	Range of Results	
		Minimum	Maximum
Turbidity – Filter Line 1 (NTU)	8760	0.00	2.00
Turbidity – Filter Line 2 (NTU)	8760	0.00	2.00
Turbidity-Treated (NTU)	8760	0.00	2.00

	No. of Samples Collected	Range of Results	
		Minimum	Maximum
Treated Water Chlorine	8760	0.00	5.17
Distribution Water Chlorine	365	0.63	2.33
Fluoride (If the DWS provides fluoridation)	N/A	N/A	N/A

Note: Record the unit of measure if it is **not** milligrams per litre.
Note: For continuous monitors 8760 is used as the number of samples**.** Spikes recorded by on-line instrumentation were a result of air bubbles and various maintenance/calibration activities. All spikes are reviewed for compliance with O. Reg. 170/03.

Inorganic Parameters

These parameters are tested as a requirement under O. Reg. 170/03. Sodium and Fluoride are required to be tested every 5 years. Nitrate and Nitrite are tested quarterly and the metals are tested annually as required under O. Reg. 170/03. In the event any of the parameters exceed half of the maximum allowable concentration the parameter is required to be sampled quarterly.

- MAC = Maximum Allowable Concentration as per O. Reg. 169/03
- MDL = Method Detection Limit

	Sample Date (yyyy/mm/dd)	Sample Result	MAC	Exceedances	
				MAC	1/2 MAC
Treated Water					
Antimony: Sb (ug/L) - TW	2022/08/03	<MDL 0.6	6.0	No	No
Arsenic: As (ug/L) - TW	2022/08/03	0.4	10.0	No	No
Barium: Ba (ug/L) - TW	2022/08/03	33.6	1000.0	No	No
Boron: B (ug/L) - TW	2022/08/03	14.0	5000.0	No	No
Cadmium: Cd (ug/L) - TW	2022/08/03	<MDL 0.003	5.0	No	No
Chromium: Cr (ug/L) - TW	2022/08/03	0.27	50.0	No	No
Mercury: Hg (ug/L) - TW	2022/08/03	<MDL 0.01	1.0	No	No
Selenium: Se (ug/L) - TW	2022/08/03	0.49	50.0	No	No
Uranium: U (ug/L) - TW	2022/08/03	0.269	20.0	No	No
Additional Inorganics					
Fluoride (mg/L) - TW	2022/08/03	<MDL 0.06	1.5	No	No
Nitrite (mg/L) - TW	2022/02/07	<MDL 0.003	1.0	No	No
Nitrite (mg/L) - TW	2022/05/02	<MDL 0.003	1.0	No	No
Nitrite (mg/L) - TW	2022/08/03	<MDL 0.003	1.0	No	No
Nitrite (mg/L) - TW	2022/11/07	<MDL 0.003	1.0	No	No
Nitrate (mg/L) - TW	2022/02/07	0.180	10.0	No	No
Nitrate (mg/L) - TW	2022/05/02	0.087	10.0	No	No
Nitrate (mg/L) - TW	2022/08/03	0.035	10.0	No	No
Nitrate (mg/L) - TW	2022/11/07	0.037	10.0	No	No
Sodium: Na (mg/L) - TW	2020/08/12	34.8	20*	Yes	Yes
Sodium: Na (mg/L) - TW	2020/08/24	31.5	20*	Yes	Yes

*There is no "MAC" for Sodium. The aesthetic objective for sodium in drinking water is 200 mg/L. The local Medical Officer of Health should be notified when the sodium concentration exceeds 20 mg/L so that this information may be communicated to local physicians for their use with patients on sodium restricted diets.

Schedule 15 Sampling:

The Schedule 15 Sampling is required under O. Reg. 170/03. This system is under reduced sampling. No plumbing samples were collected.

Distribution System	Number of Samples	Range of Results Minimum	Range of Results Maximum	MAC (ug/L)	Number of Exceedances
Alkalinity (mg/L)	4	95	132	N/A	N/A
pH	4	7.2	7.7	N/A	N/A
Lead (ug/l)	4	0.11	0.94	10	0

Note: Samples shown above are reflective of the 2022 lead sampling period.

Organic Parameters

These parameters are tested annually as a requirement under O.Reg 170/03. In the event any of the parameters exceed half of the maximum allowable concentration the parameter is required to be sampled quarterly.

	Sample Date (yyyy/mm/dd)	Sample Result	MAC	Number of Exceedances	
				MAC	1/2 MAC
Treated Water					
Alachlor (ug/L) - TW	2022/08/03	<MDL 0.02	5.00	No	No
Atrazine + N-dealkylated metabolites (ug/L) - TW	2022/08/03	0.02	5.00	No	No
Azinphos-methyl (ug/L) - TW	2022/08/03	<MDL 0.05	20.00	No	No
Benzene (ug/L) - TW	2022/08/03	<MDL 0.32	1.00	No	No
Benzo(a)pyrene (ug/L) - TW	2022/08/03	<MDL 0.004	0.01	No	No
Bromoxynil (ug/L) - TW	2022/08/03	<MDL 0.33	5.00	No	No
Carbaryl (ug/L) - TW	2022/08/03	<MDL 0.05	90.00	No	No
Carbofuran (ug/L) - TW	2022/08/03	<MDL 0.01	90.00	No	No
Carbon Tetrachloride (ug/L) - TW	2022/08/03	<MDL 0.17	2.00	No	No
Chlorpyrifos (ug/L) - TW	2022/08/03	<MDL 0.02	90.00	No	No
Diazinon (ug/L) - TW	2022/08/03	<MDL 0.02	20.00	No	No
Dicamba (ug/L) - TW	2022/08/03	<MDL 0.2	120.00	No	No
1,2-Dichlorobenzene (ug/L) - TW	2022/08/03	<MDL 0.41	200.00	No	No
1,4-Dichlorobenzene (ug/L) - TW	2022/08/03	<MDL 0.36	5.00	No	No
1,2-Dichloroethane (ug/L) - TW	2022/08/03	<MDL 0.35	5.00	No	No
1,1-Dichloroethylene (ug/L) - TW	2022/08/03	<MDL 0.33	14.00	No	No

	Sample Date (yyyy/mm/dd)	Sample Result	MAC	Number of Exceedances	
				MAC	1/2 MAC
Dichloromethane (Methylene Chloride) (ug/L) - TW	2022/08/03	<MDL 0.35	50.00	No	No
2,4-Dichlorophenol (ug/L) - TW	2022/08/03	<MDL 0.15	900.00	No	No
2,4-Dichlorophenoxy acetic acid (2,4-D) (ug/L) - TW	2022/08/03	<MDL 0.19	100.00	No	No
Diclofop-methyl (ug/L) - TW	2022/08/03	<MDL 0.4	9.00	No	No
Dimethoate (ug/L) - TW	2022/08/03	<MDL 0.06	20.00	No	No
Diquat (ug/L) - TW	2022/08/03	<MDL 1.0	70.00	No	No
Diuron (ug/L) - TW	2022/08/03	<MDL 0.03	150.00	No	No
Glyphosate (ug/L) - TW	2022/08/03	<MDL 1.0	280.00	No	No
Malathion (ug/L) - TW	2022/08/03	<MDL 0.02	190.00	No	No
Metolachlor (ug/L) - TW	2022/08/03	<MDL 0.01	50.00	No	No
Metribuzin (ug/L) - TW	2022/08/03	<MDL 0.02	80.00	No	No
Monochlorobenzene (Chlorobenzene) (ug/L) - TW	2022/08/03	<MDL 0.3	80.00	No	No
Paraquat (ug/L) - TW	2022/08/03	<MDL 1.0	10.00	No	No
PCB (ug/L) - TW	2022/08/03	<MDL 0.04	3.00	No	No
Pentachlorophenol (ug/L) - TW	2022/08/03	<MDL 0.15	60.00	No	No
Phorate (ug/L) - TW	2022/08/03	<MDL 0.01	2.00	No	No
Picloram (ug/L) - TW	2022/08/03	<MDL 1.0	190.00	No	No
Prometryne (ug/L) - TW	2022/08/03	<MDL 0.03	1.00	No	No
Simazine (ug/L) - TW	2022/08/03	<MDL 0.01	10.00	No	No
Terbufos (ug/L) - TW	2022/08/03	<MDL 0.01	1.00	No	No
Tetrachloroethylene (ug/L) - TW	2022/08/03	<MDL 0.35	10.00	No	No
2,3,4,6-Tetrachlorophenol (ug/L) - TW	2022/08/03	<MDL 0.2	100.00	No	No
Triallate (ug/L) - TW	2022/08/03	<MDL 0.01	230.00	No	No
Trichloroethylene (ug/L) - TW	2022/08/03	<MDL 0.44	5.00	No	No
2,4,6-Trichlorophenol (ug/L) - TW	2022/08/03	<MDL 0.25	5.00	No	No
2-Methyl-4chlorophenoxyacetic Acid (MCPA) (ug/L)	2022/08/03	<MDL 0.12	100	No	No
Trifluralin (ug/L) - TW	2022/08/03	<MDL 0.02	45.00	No	No
Vinyl Chloride (ug/L) - TW	2022/08/03	<MDL 0.17	1.00	No	No
Distribution Water					
Trihalomethane: Total (ug/L) Annual Average - DW	2022 Annual Average	78.8	100	No	Yes
HAA Total (ug/L) Annual Average - DW	2022 Annual Average	58.8	80	No	Yes

MAC = Maximum Allowable Concentration as per O. Reg. 169/03
MDL = Method Detection Limit

Additional Legislated Samples

Municipal Drinking Water Licence (MDWL)	Collected Weekly June – Oct 2022	Total Microcystin Raw Results Range (ug/L)	Total Microcystin Treated Water Results Range (ug/L)	Treated Water Total Microcystin Limit 1.5 ug/L Exceeded Y/N
Harmful Algal Blooms Monitoring required June to October at a minimum. Samples collected weekly. Raw and Treated water tested for Total Microcystins.	June	<0.1 – <0.1	<0.1 - <0.1	N
	July	<0.1 - <0.1	<0.1 - <0.1	N
	August	<0.1 - <0.1	<0.1 - <0.1	N
	September	<0.1 - <0.1	<0.1 - <0.1	N
	October	<0.1 – <0.1	<0.1 - <0.1	N

Inorganic or Organic Parameter Exceedances

List any 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
Trihalomethane: Total (ug/L) Annual Average	78.8	ug/L	2022 Annual Average
HAA Total (ug/L) Annual Average	58.8	ug/L	2022 Annual Average

Major Maintenance Summary incurred to install, repair or replace required equipment.

Item #	Description
1	Repair curb stops
2	Replace failed pH probe
3	Remove old generator exhaust
4	New polymer storage tank
5	Clearwell ROV inspection and report
6	Raw level milltronics replaced
7	Highlift pump controls replaced
8	New exterior heat trace line
9	Raw analyzer supply pump replaced

10	Raw intake cleaning and inspection
11	Lowlift 3 actuator motor replacement
12	Harrigan Drive water service break
13	Hydrant repairs

Appendix A

WTRS Data Submission Confirmation