



# LAGOON CITY WATER WORKS

2019 Water Quality Summary  
Report



Environmental Services

March 31, 2020

# TABLE OF CONTENTS

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1	Introduction .....	1
2	Approvals .....	2
3	Description of Water Works .....	3
3.1	Water Source .....	3
3.2	Water Treatment .....	3
3.3	Emergency Generator .....	4
3.4	Water Distribution System.....	4
4	Water Quality Monitoring.....	5
4.1	Bacteriological Sampling and Results .....	5
4.2	Free Chlorine Residual Monitoring and Results.....	5
4.3	Physical/Chemical Testing Results .....	6
4.3.1	Raw Water.....	6
4.3.2	Treated Water.....	7
5	Water Usage .....	9
5.1	Water Consumption and Chemical Usage .....	9
5.2	Lawn Watering Ban.....	10
5.3	System Reserve Capacity .....	10
6	Operation and Maintenance .....	11
6.1	System Inspection.....	11
6.2	Summary of Maintenance and Repairs .....	11
6.3	Summary of Upgrades and Improvements.....	11
6.4	Public Complaints .....	12
	Water Works and Operator Licenses .....	12
7	Compliance Status .....	13

## LIST OF TABLES

---

Table 1: Summary of Approvals .....	2
Table 2: Lagoon City - 2019 Free Chlorine Residuals.....	7
Table 3: Lagoon City – 2019 Lead Testing Results.....	8
Table 4: Lagoon City - 2019 Water Consumption and Chemical Usage .....	9
Table 5: Lagoon City Historical Treated Water Demand .....	10
Table 6: Certified Operators .....	12

## APPENDICES

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Appendix A: Raw Water Quality Summary

Appendix B: 2019 Annual Report

# 1 INTRODUCTION

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The Lagoon City/Brechin Water Works (Water Works) serves residential and commercial properties within the communities of Lagoon City and Brechin. In 2019, the number of service connections in Lagoon City and Brechin is estimated to be equivalent to 1,122 and 152 single family dwellings, respectively. The estimated population in Lagoon City was 2,244 (based on a population density of 2.0 persons per dwelling), and the estimated population in Brechin was 395 (based on a population density of 2.6 persons per dwelling).

This report provides a description of the Water Works and summarizes the monitoring program, water quality, water consumption, chemical usage, system repairs, and maintenance completed in 2019.

This report also summarizes the Water Works compliance status with the Safe Drinking Water Act (SDWA), the Ministry of the Environment, Conservation and Parks (MECP) Drinking Water Works Permit (DWWP) and the MECP Municipal Drinking Water License (MDWL). This annual report summary was prepared for presentation to the Township of Ramara Council as required by Ontario Regulation 170/03 – Drinking Water Systems (O. Reg. 170/03), Schedule 22.

## 2 APPROVALS

The Water Works is approved under DWWP No. 147-201, Issue No 3 dated February 16, 2017, and MDWL No. 147-101, Issue No. 2 dated July 20, 2016. Table 1 summarizes all approvals issued since 1978.

Table 1: Summary of Approvals

Date Issued	Approval Number	Description
August 30, 2017	0278-AQ4LYS	PTTW issued
February 16, 2017	147-201 Issue No. 3	DWWP reissued
July 20, 2016	147-101 Issue No. 2	MDWL renewed
July 20, 2016	147-201 Issue No. 2	DWWP renewed
July 30, 2013	147-201 Issue No. 1	DWWP Schedule C Authorization for the installation of a carbon dioxide injection system
August 4, 2011	147-101 Issue No. 1	MDWL. Replaces and revokes # 2116-7WVHXK.
August 3, 2011	147-201 Issue No. 1	DWWP. Replaces and revokes # 2116-7WVHXK
October 22, 2009	2116-7WVHXK	Amendment to the approval for coagulant performance testing to extend the testing period to August 31, 2011. To be read in conjunction with # 6673-6E2N2B. Replaces and revokes #2390-79JU2R.
February 11, 2008	2390-79JU2R	Approval for coagulant performance testing. To be read in conjunction with #6673-6E2N2B
July 28, 2005	6673-6E2N2B	Amendment for chemical feed systems. Replaces and revokes # 5211-5QBLCG.
September 22, 2003	5211-5QBLCG	Issued under SDWA. Approves upgrades to the chlorination systems, addition of filter to waste, and installation of a second turbidimeter. Revokes # 8220-543MYF.
January 18, 2002	8220-543MYF	Consolidated C of A. Revokes # 7-0603-89-006.
September 10, 1997	7-0603-89-006	Amendment for conversion of filters to GAC filter-absorbers, and addition of zebra mussel control.
May 31, 1989	7-0603-89-006	Approval for improvements to the Water Works to bring firm pumping capacity to 4,000 m <sup>3</sup> /day.
March 2, 1978	5-271-78-006	Approval for 4,000 m <sup>3</sup> /d Water Works and reservoir.

Permit to Take Water (PTTW) No. 0278-AQ4LYS was issued on August 30, 2017 and expires on August 30, 2027. The PTTW limits water taking from Lake Simcoe to 3,993 m<sup>3</sup>/d or 2,773 L/min.

### 3 DESCRIPTION OF WATER WORKS

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The Water Works are described below as they operated in 2019.

#### 3.1 WATER SOURCE

The Lagoon City Water Works draws and treats raw water from Lake Simcoe.

#### 3.2 WATER TREATMENT

The treatment process consists of carbon dioxide injection, pre-chlorination, coagulation with polyaluminum chloride, flocculation, filtration through sand and granular activated carbon (GAC), and primary and secondary chlorination with sodium hypochlorite.

The components of the treatment process are described below:

- 1) A low lift pumping station, located at the Water Works, draws water from Lake Simcoe through a 300 mm diameter 485 m long intake. It is equipped with manually cleaned screens, and three 3.7 kW (5 HP) vertical turbine pumps, one with a capacity of 2,435 m<sup>3</sup>/d (372 gpm) and two at 2,029 m<sup>3</sup>/d (310 gpm) at a TDH of 10.4 m.
- 2) Carbon dioxide is injected into the raw water for pH adjustment.
- 3) Raw water is pre-chlorinated with sodium hypochlorite and injected with alum at the low lift pumping station well. Both chlorine and alum addition are flow-paced to the raw water flowmeter signal.
- 4) Raw water flows are measured by a magnetic flowmeter.
- 5) Water flows to four spiral flow flocculators, each having a volume of approximately 12.7 m<sup>3</sup>.
- 6) Water then passes through two filter-absorbers, each 1.9 m by 3.7 m (7.1 m<sup>2</sup>). The filter media consists of 990 mm GAC over 150 mm sand over 250 mm gravel, sitting on a 200 mm underdrain. The filter provides a GAC contact time of 5 minutes and a filtration rate of 11.7 m<sup>3</sup>/m<sup>2</sup>·h (4 gpm/ft<sup>2</sup>) at the design maximum day flow of 4,000 m<sup>3</sup>/d.
- 7) Each filter-absorber is equipped with three backwash troughs and two agitators. The 15 HP backwash water vertical turbine pump has a capacity of 7,514 m<sup>3</sup>/d (1,148 gpm) providing a backwash rate of 44 m<sup>3</sup>/m<sup>2</sup>·h (15 gpm/ft<sup>2</sup>). Backwash wastewater is stored in an 80 m<sup>3</sup> chamber equipped with two 524 m<sup>3</sup>/d (80 gpm) submersible centrifugal pumps for discharge to the Lagoon City sewer system.

Sodium hypochlorite is added to the filter effluent prior to discharge to the clear well, for primary disinfection.

- 8) Sodium hypochlorite is also used for secondary disinfection by injecting into the high lift pump's well to ensure adequate chlorine residuals in the distribution system.
- 9) Treated water is stored in a 1,091 m<sup>3</sup> (240,000 IG) clear well under the Water Works.
- 10) The high lift pumping station in the clear well has four vertical turbine pumps and one submersible pump as follows: two pumps with capacities of 1,145 m<sup>3</sup>/d (175gpm), two pumps with capacities of 4,542 m<sup>3</sup>/d (694 gpm) and one six inch 30 hp 22 kw submersible pump.
- 11) Treated water flows are measured using a magnetic flowmeter on the high lift pumps discharge line.
- 12) The plant is equipped with a 24-hour alarm system which alerts the operator of illegal entry, high and low filter levels, high and low levels in the clear well, low level in the Brechin water tower, ac power failure, high turbidity (Filter No. 1, Filter No. 2 and distribution), high and low chlorine residuals and flooded tower chamber.
- 13) The water distribution system includes an elevated water reservoir located in Brechin. It provides a storage volume of 945 m<sup>3</sup> (208,000 IG).

### 3.3 EMERGENCY GENERATOR

The Water Works is equipped with a 175kW stand-by diesel generator set, located outside the Water Works building. The 1,890 L (500 gal.) diesel fuel tank is sufficient to supply power to run the Water Works for a 32-hour period.

### 3.4 WATER DISTRIBUTION SYSTEM

The distribution system services Lagoon City and Brechin.

Lagoon City has approximately 11,800 m of PVC, ductile iron and asbestos cement water mains, ranging in diameter from 150 mm to 300 mm.

Brechin has approximately 6,100 m of PVC water mains, ranging in diameter from 150 mm to 250 mm.

## 4 WATER QUALITY MONITORING

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### 4.1 BACTERIOLOGICAL SAMPLING AND RESULTS

Five water samples are taken on a weekly basis for bacteriological analysis: one raw water sample, one treated water sample and three distribution water samples from various points in the distribution system. Raw water samples are tested for Total Coliforms, Escherichia coli (E. coli) and background colonies. Treated and distribution water samples are tested for Total Coliforms, E. coli, Heterotrophic Plate Count (HPC), and background colonies. All testing was performed by the accredited laboratory SGS Lakefield Research Limited (SGS).

The results of the bacteriological analyses are reviewed by the overall responsible operator and kept on file at the Township office. If a treated or distribution water sample contains Total Coliforms or E.coli, the Spills Action Centre and the Simcoe Muskoka District Health Unit are notified immediately, verbally and in writing. The site is also re-sampled.

The 2019 bacteriological results from the Lake Simcoe raw water samples were as follows:

- Samples contained Total Coliform counts up to 340cfu per 100 mL;
- Samples contained E. coli with counts up to 5cfu per 100 mL.

All treated water bacteriological test results met the Ontario Drinking - Water Quality Standards of O. Reg. 169/03, Schedule 1 microbiological requirements. Copies of the laboratory results are available upon request.

### 4.2 FREE CHLORINE RESIDUAL MONITORING AND RESULTS

In order to provide the required primary disinfection in accordance with MECP's Procedure for Disinfection of Drinking Water in Ontario, an adequate CT value must be maintained. The CT value is the effective disinfectant contact time (T) multiplied by the free chlorine residual (C).

The Water Works must provide the necessary chlorine contact time to achieve 1-log (90%) inactivation of Giardia cysts and 3-log (99.9%) inactivation of viruses. The chemically-assisted direct filtration process will remove Cryptosporidium oocysts, and will assist in the removal of Giardia cysts and viruses.

A CT value of 125 is needed to provide 1-log inactivation of Giardia cysts at a pH of 8.5 and a water temperature of  $< 0.5^{\circ}\text{C}$ . Since enteric viruses are much easier to inactivate than Giardia cysts, the disinfection requirements are governed by Giardia cysts inactivation. To ensure that the CT value of 125 is achieved, a free chlorine residual at or above 1.2 mg/L leaving the clear well must be maintained.



Free chlorine residuals at the Water Works building are monitored using a continuous analyzer, to verify the free chlorine residual is maintained within the operation limits of 1.2 mg/L to 4.0 mg/L. In 2019, free chlorine residuals ranged from 0 mg/L to 5.00 mg/L. When the continuous analyzer measured a free chlorine residual outside of the operation limits, the on-duty operator compared the results with those of a hand-held analyzer. The on-duty operator also confirmed all Water Works equipment was operating normally at the time to verify a triggered alarm was a non-reportable event.

All measurements recorded outside of the operation limits in 2019 were caused by testing of alarm set points, a short-term power failure, regular maintenance or cleaning. The continuous analyzer was recalibrated as required. Hand-held measurements of free chlorine residual ranged from 1.54 mg/L to 2.77 mg/L. A CT of 125 was achieved at all times.

Free chlorine residuals in the distribution system are monitored daily, in accordance with Ontario Regulation 170, Schedule 7. The operator used a portable Hach Chlorine Residual Meter to verify the free chlorine residual was maintained within the distribution system. Free chlorine residuals in the water distribution samples ranged between 0.34 mg/L and 2.40 mg/L.

Free chlorine residual monitoring results are summarized in Table 2.

#### 4.3 PHYSICAL/CHEMICAL TESTING RESULTS

##### 4.3.1 Raw Water

The quality of Lake Simcoe water at the Lagoon City Water Works was tested by SGS in February, May, August and November of 2019. The frequency of increased colour and turbidity events requiring jar testing and coagulant adjustment has increased. Raw water quality laboratory results for 2019 are summarized in Appendix A.

Raw water quality observed in 2019 is consistent with results from previous years. Three of four quarterly taken samples had levels of organic nitrogen exceeding the aesthetic objectives (AO/OG) specified in Table 4 of the Technical Support Document for Ontario Drinking Water Standards, Objectives and Guidelines (June 2003) (ODWS).

Continuous monitoring of raw water turbidity ranged from 0.00 NTU to 10.210 NTU.

Table 2: Lagoon City - 2019 Free Chlorine Residuals

Free Chlorine Residuals (ppm)						
Month	Water Works				Distribution System	
	Continuous Analyser		Hand-held Instrument (Daily)			
	Min*	Max	Min	Max	Min	Max
January	1.64	3.33	1.54	2.77	0.34	2.40
February	1.59	3.36	1.73	2.12	0.72	1.92
March	0.00	5.00	1.74	2.11	0.79	2.18
April	0.00	2.49	1.72	2.19	0.60	2.19
May	-0.25	2.50	1.67	2.22	0.71	2.20
June	0.00	2.07	1.54	2.02	0.63	1.83
July	0.00	2.19	1.58	2.05	0.38	1.82
August	0.00	2.50	1.80	2.25	0.41	2.06
September	-1.25	5.00	1.80	2.19	0.48	2.16
October	-0.25	5.00	1.83	2.77	0.46	2.12
November	-0.25	5.00	1.71	2.20	0.34	2.00
December	-0.25	2.40	1.76	2.04	0.52	2.00

\*Low chlorine alarm test or non-reportable event

#### 4.3.2 Treated Water

Treated water quality was tested by SGS in February, May, August and November of 2019. Treated water was tested for nitrite, nitrate, alkalinity, aluminum, total ammonia nitrogen, organic nitrogen, dissolved organic carbon, TKN, and all inorganic and organic parameters listed in Schedules 23 and 24 of O. Reg. 170/03. Water in the distribution system was tested for Trihalomethanes (THMs), Haloacetic Acids (HAAs) and lead.

Treated water quality laboratory results for 2019 are summarized in Appendix B (annual report).

All samples of treated water met the water quality standard set in Reg. 169/03, Schedule 2.

##### 4.3.2.1 Aluminum Residual

Three of the four treated water samples had aluminum concentrations exceeding the AO/OG. However, aluminum levels have decreased since the installation of the carbon dioxide system for pH adjustment in 2013. Carbon dioxide and alum dosages will continue to be adjusted to optimize the coagulation process and further reduce aluminum concentrations in treated water.

#### 4.3.2.2 Microcystin

Microcystin in the raw and treated water was tested in June, July, August, September and October of 2019. The concentration of microcystin was below the method detection limits in all samples, and they were below the MAC specified in Table 2 of the ODWS and Ontario Regulation 169/03, Schedule 2.

#### 4.3.2.3 Lead

In accordance with the lead testing requirements of O. Reg.170, Schedule 15.1-5 (10), treated water in the distribution system was tested for lead, alkalinity and pH in March and August 2019. All parameters were within the OG and MAC of the ODWS. The laboratory results are summarized in Table 3.

#### 4.3.2.4 Turbidity

Treated water and filter effluent turbidity was monitored by the continuous analyzer.

Measurements of the treated water ranged from 0.0 NTU and 2.04 NTU. Turbidity readings that were outside the operating range of 0.0 NTU to 1.0 NTU occurred during routine maintenance (continuous analyzer cleaning and calibration) or were caused by air bubbles in the treated water, or failure of the turbidity meter wiper.

A filtered water turbidity of less than or equal to 0.3 NTU must be achieved in 95% of the measurements taken each month, in order for the filters to contribute towards disinfection credits in accordance with the MECP's Procedure for Disinfection of Drinking Water in Ontario.

Table 3: Lagoon City – 2019 Lead Testing Results

Date	Location	pH	Alkalinity (mg/L)	Lead (ug/L)
March 11, 2019	Sample Station Lake	7.36	125	0.04
	Sample Station Laguna	-	125	0.04
August 21, 2019	Sample Station Lone Birch	7.30	110	0.46
	Sample Station Laguna	-	113	0.51
	Municipal office	-	108	0.35

Maximum Acceptable Concentration for Lead: 10 ug/L

Operational Guideline for Alkalinity: 30-500 mg/L

Operational Guideline for pH: 6.5-8.5

## 5 WATER USAGE

### 5.1 WATER CONSUMPTION AND CHEMICAL USAGE

The average daily water consumption in Lagoon City/Brechin during 2019 was 893.1 m<sup>3</sup>/day as shown in Table 4. This corresponds to an estimated per capita average water consumption of 317 L/p/day. A maximum daily demand of 1,798 m<sup>3</sup>/day was measured in June, which corresponds to 45% of the Water Works' rated capacity of 4,000 m<sup>3</sup>/day. Sodium hypochlorite and aluminum sulphate usage for 2019 are also summarized in Table 4.

Total annual water consumption was 3% higher than in 2018. A summary of the average daily demand (ADD), maximum daily demand (MDD) and the three year (2017 to 2019) historical averages and maximums are presented in Table 5. The repair of two leaks in the distribution system (1 public, 1 private) have drastically reduced daily water consumption as illustrated in the final months of 2019.

Table 4: Lagoon City - 2019 Water Consumption and Chemical Usage

Month	Water Consumption				Sodium Hypochlorite Usage** (L)	Alum Usage (kg)
	Flow					
	Total (m <sup>3</sup> )	Average Daily (m <sup>3</sup> )	Maximum Daily (m <sup>3</sup> )	Minimum Daily (m <sup>3</sup> )		
January	25,747	830.5	1276	757	1021.06	174.88
February	26,008	928.9	1130	791	937.16	180.30
March	27,756	895.4	1568	669	1097.64	185.63
April	27,052	901.7	1705	313	1148.88	461.02
May	43,228	1394.5	1634	1200	1738.71	355.86
June	42,596	1419.9	1798	1248	1572.00	280.55
July	33,665	1086.0	1613	604	1507.49	134.06
August	26,418	852.2	1356	640	1208.86	134.88
September	20,377	679.2	939	497	873.16	124.28
October	18,770	605.5	808	212	734.09	114.85
November	16,214	540.5	671	430	600.06	110.16
December	18,057	582.5	750	450	615.89	119.91
<b>Total</b>	<b>325,888</b>				<b>13,054.99</b>	<b>2,376.38</b>
<b>Average</b>		<b>893.1</b>				
<b>Min. / Max.</b>			<b>1798</b>	<b>212</b>		

Treated water flow meter recalibrated on January 18, 2019

\*\* Total volume of Sodium Hypochlorite for pre-chlorination and post-chlorination

Table 5: Lagoon City Historical Treated Water Demand

Year	No. of Equivalent Units	ADD (m <sup>3</sup> /day)	MDD (m <sup>3</sup> /day)	Rated Capacity (m <sup>3</sup> /day)	Per Capita Consumption (L/p/day)	
					Average	Maximum
2009	1,253	920	1,632	4,000	355	629
2010	1,253	872	1,422	4,000	336	548
2011	1,254	793	1,733	4,000	306	668
2012	1,257	732	1,247	4,000	281	479
2013	1,258	770	1,411	4,000	296	542
2014	1,258	783	1,239	4,000	297	476
2015	1,261	781	1,670	4,000	299	639
2016	1,264	837	1,546	4,000	320	591
2017	1,269	698.9	1,207	4,000	266	459
2018	1273	870	1829	4,000	329	694
2019	1274	893	1798	4,000	317	681
<b>3 Yr Avg / Max</b>		<b>820</b>	<b>1829</b>	<b>4,000</b>	<b>304</b>	<b>694</b>

## 5.2 LAWN WATERING BAN

In 2005 through Bylaw No. 2005.72, the Township of Ramara established watering restrictions for non-domestic water use, such as lawn watering. Residents are permitted to water their lawns between the hours of 6:00 a.m. and 8:00 a.m., and 7:00 p.m. and 9:00 p.m., on alternate days; even numbered houses on even numbered days and odd numbered houses on odd numbered days. A full watering ban is required if water demands reach 80% of the PTTW maximum daily rate, which corresponds to 3,200 m<sup>3</sup>/day.

## 5.3 SYSTEM RESERVE CAPACITY

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

$$\text{Reserve Capacity} = \text{Design Flow} - \text{Committed Flow}$$

Design flow is the maximum permissible flow approved by the MDWL and/or PTTW. Lagoon City Water Works' maximum day rated capacity is 4,000 m<sup>3</sup>/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 equivalent service connections estimate is 1,367. The three-year (2017-2019) maximum day per capita water consumption is 694 L/p/day. At this water consumption rate, the committed flow is 1,992 m<sup>3</sup>/day.

Therefore, the calculated reserve capacity is 2,008 m<sup>3</sup>/day.

## 6 OPERATION AND MAINTENANCE

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### 6.1 SYSTEM INSPECTION

The water system is inspected annually by the Ministry of Environment, Conservation and Parks (MECP) to confirm compliance with MECP legislation and authorizing documents (the DWWP and MDWL), as well as evaluating conformance with Ministry drinking water-related policies and guidelines. The physical inspection took place on November 1, 2019 with the inspection review period of November 1, 2018 – November 1, 2019.

There were no issues of non-compliance with regulatory requirements identified during the inspection review period.

### 6.2 SUMMARY OF MAINTENANCE AND REPAIRS

Throughout the year, regular maintenance was completed at the Water Works such as cleaning and calibrating the chlorine and turbidity analyzers, cleaning the chlorine pumps, injectors and lines, cleaning alum lines, backwashing and draining filters, and responding to AC power failures.

Flow meters were checked for calibration by a qualified technician in January of 2019.

Repairs and regular maintenance were as follows during 2019:

- Replace raw and treated pH probes (\$1500)
- Replace post cl<sub>2</sub> injection panel (\$2000)
- Water main repair on Lake avenue (\$15000)
- Replace coagulant injection pump (\$5000)
- Replace clearwell circulation pump (\$2000)
- Rebuild chlorine post pump #1 (\$500)
- Install new standby generator and transfer switch (\$106,000)
- Replace post chlorine and pH analyser (\$5000)
- Replace water box corner of Lone Birch and Simcoe Road (\$3000)
- Replace fire hydrant on Harrigan Drive (\$7500)
- Replace final turbidity analyser (\$3500)

### 6.3 SUMMARY OF UPGRADES AND IMPROVEMENTS

In addition to the regular maintenance and repairs listed above, the following upgrades and improvements were completed in 2019:

- Install new 3" tower fill line, new fence with gate and pave driveway. (\$25,000)

## 6.4 PUBLIC COMPLAINTS

No complaints were received in 2019.

## WATER WORKS AND OPERATOR LICENSES

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The Water Works has been classified in accordance with O. Reg. 435/93 as:

- Water Distribution Class I (Certificate No. 269 issued October 27, 2005)
- Water Treatment Class II (Certificate No. 268 issued October 27, 2005)

The MECP Water Works number is 210001273. The Water Works is categorized as a Large Municipal Residential system.

A summary of the facility operators in 2019 and their level of certification are listed in Table 6.

Table 6: Certified Operators

<b>Operator</b>	<b>Water Treatment Class</b>	<b>License No./ Expiry Date</b>	<b>Water Dist. Class</b>	<b>License No./ Expiry Date</b>
Dave Readman	Class II	12460 / July 31.21	Class II	13530 / July 31.21
Donald O'Connell	Class II	53308 / Feb 29.23	N/A	N/A
Rob Smith	Class III	53310 / Feb 28.23	Class III	96079 / Feb 28.23
Nicholas Leroux	Class III	68579 / July 31.21	Class III	83999 / Mar 31.23
Joe Foley	Class II	87270 / Aug 31.21	N/A	N/A
Kyle Readman	Class I	102761 / Oct. 31.21	N/A	N/A

The Operators attended workshops, seminars and training throughout the year to ensure they maintain and enhance their knowledge pertaining to the operation of drinking water systems and remain knowledgeable on current trends in the industry.

Each operator is mandated by Ontario Regulation 128/04 under the Safe Drinking Water Act, 2002 to complete the applicable number of required training hours over a 3-year period in order to renew their licence.

## 7 COMPLIANCE STATUS

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The MECP conducted an inspection of the Water Works on November 1, 2019. The primary focus of this inspection is to confirm compliance with the Ministry of the Environment, Conservation and Parks legislation and authorizing documents, as well as conformance with Ministry drinking water-related policies and guidelines during the inspection review period.

No issues of non-compliance were identified in the inspection.

In 2019, the Water Works adhered to the sampling and testing requirements of the Safe Drinking Water Act and Municipal Drinking Water Licence. A summary of minimum sampling and testing frequencies is listed in the corresponding water works' Operations and Maintenance Manual.

The Lagoon City Water Works operated in accordance with the DWWP, MDWL and PTTW during 2019. Based on the 2019 treated water quality testing results, at no time were the residents of Lagoon City and Brechin at any health risk. All treated water samples tested below the maximum acceptable concentrations for all microbiological and chemical parameters, as specified in O. Reg. 169/03, Schedules 1 and 2.

The annual report required by O. Reg. 170/03, Section 11 was made available to the public on the Township of Ramara website on February 28, 2019. A copy of the report is included in Appendix B.



APPENDIX A:  
Raw water sample results

Lagoon City Water Treatment Plant  
 Raw Water Quality - 2019  
 Laboratory Results

Parameter	Treated Water		27-Feb-19	28-May-19	21-Aug-19	27-Nov-19
	MAC	AO/OG				
	Alkalinity (as CaCO <sub>3</sub> ), mg/L		30 - 500	126	111	105
Ammonia + Ammonium (N), mg/L			0.05	0.08	0.13	<0.04
Dissolved Organic Carbon, mg/L		5	4	4	4	4
Nitrogen - Kjeldahl (N), mg/L			0.24	0.22	0.36	0.32
Organic Nitrogen, mg/L		0.15	0.19	0.1	0.2	0.31

MAC - Maximum Acceptable Concentration in Treated Water  
 AO - Aesthetic Objective  
 OG - Operational Guideline

APPENDIX B:  
2019 Annual Report

**Part III Form 2**
**Section 11. ANNUAL REPORT.**

<b>Drinking-Water System Number:</b>	210001273
<b>Drinking-Water System Name:</b>	Brechin/Lagoon City Water Treatment Plant
<b>Drinking-Water System Owner:</b>	The Corporation of the Township of Ramara
<b>Drinking-Water System Category:</b>	Large Municipal Residential
<b>Period being reported:</b>	January 1, 2019 to December 31, 2019

<p><b><u>Complete if your Category is Large Municipal Residential or Small Municipal Residential</u></b></p> <p>Does your Drinking-Water System serve more than 10,000 people? Yes [ ] No [X]</p> <p>Is your annual report available to the public at no charge on a web site on the Internet? Yes [X] No [ ]</p> <p>Location where Summary Report required under O. Reg. 170/03 Schedule 22 will be available for inspection.</p> <div style="border: 1px solid black; padding: 5px;">                 Township of Ramara Municipal Office                  2297 Highway 12                  Brechin, ON L0K 1B0             </div>	<p><b><u>Complete for all other Categories.</u></b></p> <p>Number of Designated Facilities served:  <div style="border: 1px solid black; padding: 2px; display: inline-block;">N/A</div> </p> <p>Did you provide a copy of your annual report to all Designated Facilities you serve? Yes [ ] No [ ]</p> <p>Number of Interested Authorities you report to:  <div style="border: 1px solid black; padding: 2px; display: inline-block;">N/A</div> </p> <p>Did you provide a copy of your annual report to all Interested Authorities you report to for each Designated Facility? Yes [ ] No [ ]</p>
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**Note: For the following tables below, additional rows or columns may be added or an appendix may be attached to the report**

List all Drinking-Water Systems (if any), which receive all of their drinking water from your system:

Drinking Water System Name	Drinking Water System Number

Did you provide a copy of your annual report to all Drinking-Water System owners that are connected to you and to whom you provide all of its drinking water?

Yes [ ] No [ ]

\*Not applicable

**Indicate how you notified system users that your annual report is available, and is free of charge.**

- Public access/notice via the web**
- Public access/notice via Government Office**
- Public access/notice via a newspaper**
- Public access/notice via Public Request**
- Public access/notice via a Public Library**
- Public access/notice via other method**

**Describe your Drinking-Water System**

The Brechin and Lagoon City Drinking Water System includes withdrawal of raw water from Lake Simcoe, providing treatment to this water and distributing it to the communities of Brechin and Lagoon City.

The treatment process consists of carbon dioxide injection, pre-chlorination, coagulation with alum, flocculation, filtration through sand and granular activated carbon and post-chlorination with sodium hypochlorite.

Three vertical turbine pumps draw water from Lake Simcoe to a low lift pumping station, located at the WTP. The water intake line is equipped with manually cleaned screens. Raw water is pre-chlorinated with sodium hypochlorite and injected with alum at the low lift pumping station well. The low lift pumping station also contains a plasma sparker for zebra mussel control.

Water is pumped into four spiral flow flocculators before passing through two filter absorbers. The filter media consists of granular activated carbon and sand. The filtered water is then injected with sodium hypochlorite prior to discharge to the clear well. The treated water is stored in a 1,091 m<sup>3</sup> clear well located under the Water Treatment Plant (WTP). From the clear well, treated water is fed to the distribution system by one submersible and four vertical turbine pumps. The water distribution system includes a 945 m<sup>3</sup> elevated water reservoir located in Brechin.

The WTP has a 175 kW stand-by diesel generator set, located in the WTP building, with sufficient capacity to supply power to run the WTP for 32 hours.

The WTP is equipped with a 24-hour alarm system, which alerts the operator of illegal entry, low filter levels, high and low levels in the clear well and in the Brechin stand pipe, diesel failure, and treated water quality.

Continuous water quality on-line analyzers monitor the free chlorine residual, pH and turbidity of each filter's effluent and of the treated water before it enters the distribution system. The analyzers are logged continuously by the paperless chart recorder and have alarm set points to notify the operators of adverse water quality results.

**List all water treatment chemicals used over this reporting period**

Sodium Hypochlorite Polyaluminum Chloride Carbon Dioxide
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**Were any significant expenses incurred to?**

- Install required equipment
- Repair required equipment
- Replace required equipment

**Please provide a brief description and a breakdown of monetary expenses incurred**

- Replace raw and treated pH probes (\$1500)
- Replace post cl2 injection panel (\$2000)
- Water main repair on Lake avenue (\$15000)
- Replace coagulant injection pump (\$5000)
- Replace clearwell circulation pump (\$2000)
- Rebuild chlorine post pump #1 (\$500)
- Install new standby generator and transfer switch (\$106,000)
- Replace post chlorine and pH analyser. (\$5000).
- Replace water box corner of lone birch and simcoe rd. (\$3000)
- Replace fire hydrant on Harrigan Drive. (\$7500)
- Install new 3" tower fill line, new fence with gate and pave driveway. (\$25000)
- Replace final turbidity analyser (\$3500)

**Provide details on the notices submitted in accordance with subsection 18(1) of the Safe Drinking-Water Act or section 16-4 of Schedule 16 of O.Reg.170/03 and reported to Spills Action Centre**

Incident Date	Parameter	Result	Unit of Measure	Corrective Action	Corrective Action Date

**Microbiological testing done under the Schedule 10, 11 or 12 of Regulation 170/03, during this reporting period.**

	Number of Samples	Range of E.Coli Or Fecal Results (min #)-(max #)	Range of Total Coliform Results (min #)-(max #)	Number of HPC Samples	Range of HPC Results (min #)-(max #)
Raw	52	0 - 5	0 - 340	0	0
Treated	52	0	0	52	0 - 2
Distribution	164	0	0	156	0 - 6

**Operational testing done under Schedule 7, 8 or 9 of Regulation 170/03 during the period covered by this Annual Report.**

	Number of Grab Samples	Range of Results (min #)-(max #)
Turbidity	8760	0 – 2.04 NTU
Chlorine	8760	0 – 5.00 mg/L
Fluoride (If the DWS provides fluoridation)		N/A

*NOTE: For continuous monitors use 8760 as the number of samples.*

*NOTE: When free chlorine residual was measured to be outside of the operating range of 0.4 mg/L to 4.0 mg/L, the results were confirmed by operators as non-reportable events by use of a hand held analyzer. All results obtained outside the operating range were attributed to testing of alarm set-points, short term power failure, regular maintenance or cleaning.*

*When a turbidity value was recorded to exceed the limit of 1.0 NTU, the results were checked by operators by use of a hand held analyzer. All results obtained outside the objective range were attributed to testing of alarm set-points, short term power failure, regular maintenance or cleaning*

### Summary of additional testing and sampling carried out in accordance with the requirement of an approval, order or other legal instrument.

Date of legal instrument issued	Parameter	Date Sampled	Result	Unit of Measure

### Summary of Inorganic parameters tested during this reporting period or the most recent sample results

Parameter	Sample Date	Result Value	Unit of Measure	Exceedance
Antimony	21-Aug-19	0.10	µg/L	
Arsenic	21-Aug-19	0.3	µg/L	
Barium	21-Aug-19	27.9	µg/L	
Boron	21-Aug-19	22	µg/L	
Cadmium	21-Aug-19	<0.003	µg/L	
Chromium	21-Aug-19	0.12	µg/L	
Lead (Distribution)	11-Mar-19	0.04	µg/L	
Lead (Distribution)	11-Mar-19	0.04	µg/L	
Lead (Distribution)	21-Aug-19	0.46	µg/L	
Lead (Distribution)	21-Aug-19	0.51	µg/L	
Lead (Distribution)	21-Aug-19	0.35	µg/L	
Mercury	21-Aug-19	<0.01	µg/L	
Selenium	21-Aug-19	0.05	µg/L	
Sodium	2-Sept-15	31.2	mg/L	
Uranium	21-Aug-19	0.213	µg/L	
Fluoride	15-Aug-17	0.07	mg/L	
Nitrite	27-Feb-19	<0.003	mg/L	
Nitrite	28-May-19	<0.003	mg/L	
Nitrite	21-Aug-19	<0.003	mg/L	

Nitrite	27-Nov-19	<0.003	mg/L	
Nitrate	27-Feb-19	0.120	mg/L	
Nitrate	28-May-19	0.074	mg/L	
Nitrate	21-Aug-19	0.034	mg/L	
Nitrate	27-Nov-19	0.094	mg/L	

**Summary of lead testing under Schedule 15.1 during this reporting period**

(applicable to the following drinking water systems; large municipal residential systems, small municipal residential systems, and non-municipal year-round residential systems)

Location Type	Number of Samples	Range of Lead Results (min#) – (max #)	Unit of Measure	Number of Exceedances
Plumbing				
Distribution	5	0.04-0.51	µg/L	0

**Summary of Organic parameters sampled during this reporting period or the most recent sample results**

Parameter	Sample Date	Result Value	Unit of Measure	Exceedance
Alachlor	21-Aug-19	<0.02	µg/L	
Atrazine + N-dealkylated metabolites	21-Aug-19	0.02	µg/L	
Azinphos-methyl	21-Aug-19	<0.05	µg/L	
Benzene	21-Aug-19	<0.32	µg/L	
Benzo(a)pyrene	21-Aug-19	<0.004	µg/L	
Bromoxynil	21-Aug-19	<0.33	µg/L	
Carbaryl	21-Aug-19	<0.05	µg/L	
Carbofuran	21-Aug-19	<0.01	µg/L	
Carbon Tetrachloride	21-Aug-19		µg/L	
Chlorpyrifos	21-Aug-19	<0.02	µg/L	
Diazinon	21-Aug-19	<0.02	µg/L	
Dicamba	21-Aug-19	<0.20	µg/L	
1,2-Dichlorobenzene	21-Aug-19	<0.41	µg/L	
1,4-Dichlorobenzene	21-Aug-19	<0.36	µg/L	
1,2-Dichloroethane	21-Aug-19	<0.35	µg/L	
1,1-Dichloroethylene (vinylidene chloride)	21-Aug-19	<0.33	µg/L	
Dichloromethane	21-Aug-19		µg/L	
2-4 Dichlorophenol	21-Aug-19	<0.15	µg/L	
2,4-Dichlorophenoxyacetic acid (2,4-D)	21-Aug-19	<0.19	µg/L	
Diclofop-methyl	21-Aug-19	<0.40	µg/L	
Dimethoate	21-Aug-19	<0.06	µg/L	
Diquat	21-Aug-19	<1	µg/L	
Diuron	21-Aug-19	<0.03	µg/L	
Glyphosate	21-Aug-19	<1	µg/L	
Malathion	21-Aug-19	<0.02	µg/L	
Metolachlor	21-Aug-19	<0.01	µg/L	
Metribuzin	21-Aug-19	<0.02	µg/L	



Parameter	Sample Date	Result Value	Unit of Measure	Exceedance
Monochlorobenzene	21-Aug-19	<0.3	µg/L	
Paraquat	21-Aug-19	<1	µg/L	
Pentachlorophenol	21-Aug-19	<0.15	µg/L	
Phorate	21-Aug-19	<0.01	µg/L	
Picloram	21-Aug-19	<1	µg/L	
Polychlorinated Biphenyls (PCB)	21-Aug-19	<0.04	µg/L	
Prometryne	21-Aug-19	<0.03	µg/L	
Simazine	21-Aug-19	<0.01	µg/L	
THM – Quarterly Average <i>(NOTE: Latest annual average)</i>	27-Feb-19 to 27-Nov-19	70.7	µg/L	
Terbufos	21-Aug-19	<0.01	µg/L	
Tetrachloroethylene	21-Aug-19	<0.35	µg/L	
2,3,4,6-Tetrachlorophenol	21-Aug-19	<0.2	µg/L	
Triallate	21-Aug-19	<0.01	µg/L	
Trichloroethylene	21-Aug-19	<0.44	µg/L	
2,4,6-Trichlorophenol	21-Aug-19	<0.25	µg/L	
4-Chloro-4-methylphenoxy acetic acid	21-Aug-19	<0.00012	µg/L	
Trifluralin	21-Aug-19	<0.02	µg/L	
Vinyl Chloride	21-Aug-19	<0.17	µg/L	

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
THM – Quarterly Average	70.7	µg/L	Quarterly Average 27-Feb-19 to 27-Nov-19

**(Only if DWS category is large municipal residential, small municipal residential, large municipal non residential, non municipal year round residential, large non municipal non residential)**

#### Notes on Additional Sampling

None.