



SOUTH RAMARA WATER WORKS

2019 Water Quality Summary
Report



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APPENDICES

Appendix A: Raw Water Quality Summary

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1 INTRODUCTION

The South Ramara Water Works (Water Works) consists of a water treatment plant, the Heritage Farm water distribution system, and the Mara Shores Estates water distribution system.

The Heritage Farm distribution system supplies water to 76 lots in the Heritage Farm subdivision, located in Part Lot 16, Concession B. Five lots on Florida Avenue, directly south of the subdivision, are connected to the distribution system by a servicing easement.

The Mara Shores Estates distribution system supplies water to 36 lots of the Mara Shores Estates subdivision located on Lot 15, Concession C, and eight lots on Furniss Crescent.

Bayview Drive was added in 2019 and includes 29 services.

In 2019, 114 lots were connected and served an estimated population of 296 residents (based on the Township of Ramara's average population of 2.6 people 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 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. 147-203 Issue No. 2 and MDWL No. 147-103 Issue No. 2 both dated July 20, 2016. Table 1 summarizes all approvals issued since 1982.

Table 1: Summary of Approvals

| Date Issued | Approval Number | Description |
|-------------------|-----------------|---|
| July 20, 2016 | 147-103 | MDWL Issue No. 2 replaces Issue No. 1 |
| July 20, 2016 | 147-203 | DWWP Issue No. 2 replaces Issue No. 1 |
| April 22, 2015 | 4371-9UYKYB | Permit to Take Water. Revokes and replaces PTTW #2683-5YWNWN |
| July 30, 2013 | 147-203 | DWWP Schedule C for the installation of a chlorine dioxide injection system. |
| August 4, 2011 | 147-103 | MDWL Issue No. 1. Revokes and replaces # 1739-6ZRKV5. |
| August 3, 2011 | 147-203 | DWWP Issue No. 1. Revokes and replaces # 1739-6ZRKV5. |
| April 23, 2007 | 1739-6ZRKV5 | Approval for upgrades to Filter No. 2 and for full scale coagulant testing. Revokes and replaces # 4394-6CJNVU. |
| June 1, 2005 | 4394-6CJNVU | Extends deadline for upgrades. Revokes and replaces # 6028-5XSP5X. |
| July 5, 2004 | 6028-5XSP5X | Extends deadlines for upgrades. Revokes and replaces # 7429-5SHHA3. |
| November 18, 2003 | 7429-5SHHA3 | Issued under SDWA. Extends deadline for upgrades. Revokes and replaces # 1742-RJ8RGX. |
| February 7, 2003 | 1742-RJ8RGX | Extends deadline for upgrades. Revokes and replaces # 6703-5BXP8K. |
| July 15, 2002 | 6703-5BXP8K | Adds Mara Shores Estates. Revokes and replaces # 4607-56EMA9. |
| February 13, 2002 | 4607-56EMA9 | Consolidated C of A. Revokes and replaces # 7-0449-82-006 |
| October 30, 1998 | 7-0449-82-006 | Amendment for zebra mussel control system. |
| August 23, 1982 | 7-0449-82-006 | Approval for water supply, treatment and reservoir. |

Permit to Take Water (PTTW) No. 4371-9UYKYB was issued on April 22, 2015 and will expire on March 31, 2025. The PTTW limits water taking from Lake Simcoe to 542.88 m³/day, or 377 L/min.

3 DESCRIPTION OF WATER WORKS

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

3.1 WATER SOURCE

The South Ramara Water Works draws and treats raw water from Lake Simcoe.

3.2 WATER TREATMENT

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

The components of the treatment process are described below:

1. An intake crib is located approximately 80 m from shore in 3 m of water. A 150 mm diameter intake pipe connects it to an on-shore low-lift pumping station. The intake is equipped with a chlorine injection line and diffuser for zebra mussel control.
2. The low-lift pumping station is a 1.8 m diameter and 6.8 m deep well. The water level in the pumping station is approximately 4.6 m, but varies depending on the time of year. Two 3 kW raw water pumps, each rated at 543 m³/day at a TDH of 18.9 m, lift raw water to the Water Works. The pumps alternate duty at start-up
3. Raw water flows are measured by an ABB magnetic flow meter.
4. Carbon dioxide is injected into the raw water for pH adjustment.
5. Sodium hypochlorite is added for pre-chlorination of the raw water upstream of the water treatment units.
6. Coagulant polyaluminum chloride is injected into the raw water upstream of the water treatment units.
7. In-line static mixer just upstream of the filter unit.
8. Two treatment units each rated for a maximum capacity of 387 m³/d are utilized. A USFilter WaterBoy 133 (Filter No. 1) was installed in 2005 as part of the upgrades to duplicate the existing Neptune Microfloc WaterBoy Model WB-133 (Filter No. 2). Each package treatment unit consists of a flocculation tank, a settling tank, and a mixed media filter. After an approximate detention time of 35 minutes in the flocculation tank, water overflows into the settling tank. The settling tank consists of

horizontal tube settlers, and a sump pipe that is used for backwashing and the prevention of overflows. Settled water flows through the filter media. Filters No. 1 and No. 2 have GAC and sand media. Water is drawn through the filter media by a 1.5 kW effluent pump that is controlled by an on/off float switch. A second float valve regulates the amount of water being filtered.

9. The mixed media filter is backwashed manually once a week or more if necessary. The backwash cycle uses a 5.6 kW pump to draw water from the clearwell and flush the filter media. Backwash water overflows from the filter tank into the sedimentation tank. The sump pipe lowers the water level in the sedimentation tank to allow the settling tubes to be hosed off manually. Water from the backwash process is drained from near the bottom of the sedimentation tank, and discharged to a backwash water storage facility which after a settling period is pumped to Lake Simcoe. The backwash cycle is approximately 10 to 15 minutes. Upon completion of a backwash, a filter-to-waste cycle is completed.
10. An ABB magnetic flow meter is installed on the filter effluent discharge pipe. A 4-20 mA signal is provided for flow pacing the primary disinfection chemical feed pumps.
11. Sodium hypochlorite is injected in the filter effluent header for primary disinfection. The feed system consists of two chemical feed pumps, one duty and one standby with automatic switchover in case of duty pump failure, each with an injection point and one chemical solution tank with secondary containment. The injection rate is flow paced with the treated effluent water flow. The chemical feed pump operates when the filter units are producing water.
12. Filtered water is discharged into two above ground concrete clearwells located in the building. Clearwell No. 1 has an approximate operating volume of 104 m³ and Clearwell No. 2 has an approximate operating volume of 72 m³.
13. Two 7.5 kW (10 HP) pumps equipped with variable speed drives deliver the water from the clearwell to the distribution system. One pump operates on continuous duty, while the other is on standby. The duty pump maintains line pressure of 70-75 psi. If it cannot keep up with the water demand, and the pressure drops to approximately 60 psi, the backup pump will start. Should the main pump fail, and pressure fall to 60 psi, the backup pump will start to maintain line pressure.
14. Treated water flows are measured using an ABB magnetic flow meter on the high lift pumps' discharge line.
15. A continuous free chlorine residual analyzer, ph. meter and turbidimeter monitor treated water quality at the Water Works. The analyzers are connected to the alarm system.
16. The plant is equipped with a 24-hour alarm system which alerts the operator of illegal entry, main entry door, side entry door, low chlorine, high chlorine, turbidity,

low temperature, chlorine duty pump fail, chlorine system fault, high level clearwell, low level clearwell, high CO₂, low pressure and fire.

3.3 BACKWASH WASTEWATER SETTLING AND STORAGE

The filter backwash wastewater settling and storage facility consists of three manholes. Two 1.8 m diameter maintenance holes are hydraulically connected to provide 25 m³ of storage for the filter backwash process. A sump pump is utilized to discharge settled water to the overflow to the 1.2 m diameter maintenance hole, from where the supernatant outlets to the lake via a 200 mm diameter discharge pipe. The sump pump is controlled by a float switch and timer. Once the float is activated, the pump operation is delayed between 12 and 24 hours, based on the set point controlled by the operators.

3.4 EMERGENCY GENERATOR

A 47 kW propane powered generator is located in an enclosure just north of the Water Works building, to supply power during hydro power outages. The generator has sufficient capacity to run the entire plant.

3.5 WATER DISTRIBUTION SYSTEM

The distribution system services the Heritage Farm and Mara Shore Estates Subdivision. It consists of approximately 4,300 metres of distribution piping, 9 hydrants and 4 sample stations.

4 WATER QUALITY MONITORING

4.1 BACTERIOLOGICAL SAMPLING AND RESULTS

Four water samples are taken on a weekly basis for bacteriological testing: one sample from the raw water line, one sample of the treated water at the Water Works, and two samples at various locations 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. In 2019, testing was performed by the accredited laboratory SGS Lakefield Research Limited (SGS) in Lakefield, Ontario.

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*, Ontario's Spills Action Centre and the Simcoe County Muskoka 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:

- 49 of 52 samples contained Total Coliforms with counts to 8900cfu/100 mL;
- 17 of 52 samples contained *E. coli* with counts up to 13cfu/100 mL.

All treated water bacteriological test results in 2018 met Ontario Regulation 169/03 – Ontario Drinking Water Quality Standards (O. Reg. 169/03), Schedule 1, Microbiological Standards. 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 0.5-log inactivation of *Giardia* cysts and 2-log (99%) inactivation of viruses. The chemically-assisted filtration process will remove *Cryptosporidium* oocysts, and will assist in the removal of *Giardia* cysts and viruses.

A CT value of 49 is needed to provide 0.5-log inactivation of *Giardia* cysts at a chlorine residual of 0.8 mg/L, a pH of 8 and a water temperature of less than 0.5°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 49 is achieved under regular operating conditions, a free chlorine residual at or above 0.8 mg/L leaving the clearwell must be maintained.

Free chlorine residuals at the Water Works building were monitored using a continuous analyzer, to verify the free chlorine residuals were maintained within the operation limits of 0.8 mg/L to 4.0 mg/L. In 2019, free chlorine residuals ranged between 0.0 mg/L and 5.00 mg/L. When the continuous analyzer measured 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 investigated immediately or 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 instrument measurements of free chlorine residual ranged between 0.92 mg/L and 3.23 mg/L. A CT of 49 or more was achieved at all times.

Free chlorine residuals in the distribution system were monitored as required by O. Reg. 170/03, Schedule 7. The operator uses a portable Hach Chlorine Residual Meter to verify if the free chlorine residual is maintained within the operation limits of 0.2 mg/L to 4.0 mg/L. Free chlorine residuals in the distribution samples ranged between 0.24 mg/L and 2.31 mg/L. Free chlorine residual monitoring results are summarized in Table 2.

Table 2: South Ramara - 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 | 0.60 | 2.74 | 1.99 | 2.64 | 1.51 | 1.91 |
| February | 1.08 | 2.94 | 1.05 | 2.89 | 0.87 | 2.31 |
| March | 0.03 | 3.50 | 0.99 | 2.63 | 0.78 | 2.25 |
| April | 0.04 | 2.27 | 1.35 | 2.19 | 1.02 | 2.05 |
| May | 0.07 | 2.48 | 1.34 | 2.13 | 0.85 | 1.50 |
| June | 0.03 | 2.48 | 0.92 | 2.20 | 0.74 | 1.78 |
| July | 0.02 | 2.34 | 1.32 | 2.32 | 0.73 | 1.95 |
| August | 0.02 | 5.01 | 1.25 | 3.23 | 0.50 | 1.57 |
| September | 0.00 | 2.34 | 1.37 | 2.15 | 0.32 | 1.87 |
| October | 0.13 | 1.98 | 1.24 | 1.93 | 0.24 | 1.43 |
| November | 0.03 | 1.78 | 1.32 | 1.74 | 0.27 | 1.34 |
| December | 0.33 | 1.83 | 1.47 | 1.79 | 0.39 | 1.51 |

*Low chlorine alarm test or non-reportable event

4.3 PHYSICAL/CHEMICAL TESTING RESULTS

4.3.1 Raw Water

The quality of Lake Simcoe water at the Water Works was tested in February, May, August and November of 2019 according to the sampling and testing requirements of Ontario Regulation 170/03. Raw water quality laboratory results are summarized in Appendix A and are available upon request.

Raw water quality observed in 2019 is consistent with results from previous years. All samples of organic nitrogen exceeded 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).

Hand-held measurements of turbidity ranged between 0.24 NTU and 8.30 NTU.

4.3.2 Treated Water

Treated water quality was tested by SGS in February, May, August and November 2019. Treated water was tested for nitrite, nitrate, aluminum, organic nitrogen, dissolved organic carbon and alkalinity. Water in the distribution system was tested for trihalomethanes (THMs) and haloacetic acids (HAAs).

Treated water quality laboratory results for 2019 are summarized in Table 3 and are available upon request.

No parameters tested had concentrations exceeding the specifications in O. Reg. 169/03, Schedule 2.

4.3.2.1 Aluminum Residual

Aluminum residuals are present in treated water due to alum addition. Due to the addition of a carbon dioxide injection system in 2013, aluminium concentrations are typically below the AO/OG, 15 of 16 samples in 2019 were below the AO/OG.

4.3.2.2 Nitrogen

Organic nitrogen is present in the raw water and is not fully removed by the treatment process. Organic nitrogen levels greater than 0.15 mg/L can adversely affect the taste and odour of the treated water. Treated water is tested quarterly for organic nitrogen. February and November samples in 2019 exceed the aesthetic objective of 0.15 mg/L operational guideline.

Table 3: South Ramara – 2019 Treated Water Quality Results

| Parameter | MAC | AO/OG | FEB | MAY | AUG | NOV |
|---|-----|--------|--------|--------|--------|--------|
| Alkalinity (mg/L as CaCO ₃) | | 30-500 | 118 | 109 | 103 | 113 |
| Organic Nitrogen (mg/L) | | 0.15 | 0.16 | 0.10 | 0.15 | 0.18 |
| Nitrite (as N) (mg/L) | 1 | | <0.003 | <0.003 | <0.003 | <0.003 |
| Nitrate (as N) (mg/L) | 10 | | 0.139 | 0.094 | 0.037 | 0.094 |
| Nitrite + Nitrate (as N)(mg/L) | 10 | | 0.139 | 0.094 | 0.037 | 0.094 |
| Aluminum (ug/L) | | 100 | 78.1 | 36 | 124 | 22 |
| Dissolved Organic Carbon (mg/L) | | 5 | 3 | 3 | 3 | 4 |
| THM (Distribution)(total) (µg/L) | | | 40.2 | 77.8 | 84.6 | 57.1 |
| THM (Distribution) (µg/L)* | 100 | | 61.8 | 64.05 | 64.6 | 64.9 |
| HAA (Distribution)(total) (µg/L) | | | 38 | 48.1 | 44.4 | 49.2 |
| HAA (Distribution) (µg/L)* | | | 52.0 | 49.63 | 46.75 | 44.93 |

* Four quarter running annual average

MAC – Maximum Acceptable Concentration

AO/OG – Aesthetic Objective/Operational Guideline

4.3.2.3 Microcystin

Microcystin in the raw and distribution 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 Reg. 169, Schedule 2.

4.3.2.4 Turbidity

Treated water turbidity was monitored by the continuous analyzer.

Measurements of treated water turbidity ranged between 0.0 NTU and 10.2 NTU. Turbidity readings measured outside of 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, 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. The filtered water turbidity measurements met this criterion for all months in 2019.

4.3.2.5 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 4.

Table 4: 2019 Lead Testing Results

| Date | Location | pH | Alkalinity (mg/L) | Lead (ug/L) |
|-----------------|------------------------------|------|-------------------|-------------|
| March 11, 2019 | Sample Station Mara Shores | 7.04 | 126 | <0.01 |
| August 21, 2019 | Sample Station Furniss Drive | 7.74 | 104 | 0.34 |

Maximum Acceptable Concentration for Lead: 10 ug/L
 Operational Guideline for Alkalinity: 30-500 mg/L
 Operational Guideline for pH: 6.5-8.5

4.4 WASTE WATER QUALITY MONITORING

In accordance with the MDWL, effluent from the filter backwash waste water tank was sampled and analyzed each month for aluminum, pH, and total suspended solids (TSS). The annual average concentration of TSS in the effluent discharge must not exceed 25 mg/L. In 2019, the annual average concentration of TSS was 15.4 mg/L.

Laboratory results are summarized in Table 5.

Table 5: South Ramara - 2019 Backwash Waste Water Effluent Quality Results

| Month | TSS (mg/L) | pH | Aluminum (mg/L) |
|----------------|-------------|-------------|-----------------|
| January | 2 | 7.86 | 0.08 |
| February | 6 | 7.46 | 0.25 |
| March | 4 | 7.81 | 0.07 |
| April | 8 | 7.70 | 1.64 |
| May | 11 | 7.27 | 1.31 |
| June | 3 | 7.84 | 0.19 |
| July | 76 | 7.79 | 2.87 |
| August | 2 | 8.28 | 0.15 |
| September | 57 | 7.87 | 18.6 |
| October | 12 | 8.13 | 1.59 |
| November | 2 | 7.88 | 0.137 |
| December | 2 | 7.78 | 0.092 |
| Average | 15.4 | 7.81 | 2.25 |

5 WATER USAGE

5.1 WATER CONSUMPTION AND CHEMICAL USAGE

The average water consumption in South Ramara during 2019 was 46.9 m³/day as shown in Table 6. This corresponds to an estimated per capita average water consumption of 158.4 L/p/day. A maximum daily demand of 135 m³/day was measured in July, which corresponds to 35% of the Water Works' rated capacity of 387 m³/day. Sodium hypochlorite and aluminum sulphate usage for 2019 are also summarized in Table 6.

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 7.

Table 6: South Ramara - 2019 Water Consumption and Chemical Usage

| Month | Water Consumption | | | | Sodium Hypochlorite Usage** (L) | Alum Usage (kg) |
|--------------------|-------------------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|-----------------|
| | Flow | | | | | |
| | Total (m ³) | Average Daily (m ³) | Maximum Daily (m ³) | Minimum Daily (m ³) | | |
| January | 1034 | 33.4 | 43 | 29 | 83.80 | 33.59 |
| February | 1044 | 37.3 | 62 | 28 | 64.38 | 20.10 |
| March | 1044 | 33.7 | 45 | 29 | 87.31 | 44.07 |
| April | 1002 | 33.4 | 48 | 27 | 77.92 | 49.98 |
| May | 1228 | 39.6 | 58 | 28 | 75.09 | 38.20 |
| June | 1497 | 49.9 | 99 | 31 | 70.37 | 28.38 |
| July | 2207 | 71.2 | 135 | 42 | 139.33 | 36.91 |
| August | 1973 | 63.6 | 100 | 39 | 129.65 | 36.13 |
| September | 2031 | 67.7 | 101 | 53 | 113.30 | 33.45 |
| October | 1762 | 56.8 | 75 | 49 | 93.40 | 28.64 |
| November | 1109 | 37.0 | 61 | 28 | 56.07 | 14.72 |
| December | 1205 | 38.9 | 72 | 29 | 62.56 | 16.44 |
| Total | 17,136 | | | | 1053.16 | 380.60 |
| Average | | 46.9 | | | | |
| Min. / Max. | | | 135 | 27 | | |

Treated water flow meter recalibrated on January 17, 2019

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

Table 7: South Ramara Historical Treated Water Demand

| Year | No. of Connections | ADD (m ³ /day) | MDD (m ³ /day) | Rated Capacity (m ³ /day) | Per Capita Consumption (L/p/day) | |
|-----------------------|--------------------|---------------------------|---------------------------|--------------------------------------|----------------------------------|------------|
| | | | | | Average | Maximum |
| 2008 | 91 | 55 | 195 | 387 | 232 | 824 |
| 2009 | 91 | 59 | 187 | 387 | 249 | 790 |
| 2010 | 91 | 53 | 245 | 387 | 224 | 1,036 |
| 2011 | 94 | 45 | 178 | 387 | 186 | 728 |
| 2012 | 99 | 50 | 136 | 387 | 193 | 528 |
| 2013 | 100 | 52 | 98 | 387 | 199 | 377 |
| 2014 | 100 | 59 | 181 | 387 | 227 | 696 |
| 2015 | 102 | 51 | 124 | 387 | 193 | 468 |
| 2016 | 104 | 54 | 148 | 387 | 200 | 547 |
| 2017 | 104 | 40.5 | 104 | 387 | 150 | 385 |
| 2018 | 106 | 41.7 | 111 | 387 | 151 | 402 |
| 2019 | 114 | 46.9 | 135 | 387 | 158 | 689 |
| 3 Yr Avg / Max | | 45.4 | 135 | 387 | 158 | 689 |

5.2 LAWN WATERING BAN

In 2005 through Bylaw No. 2005.72, the Township 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 alternating days; even numbered houses on even numbered days and odd numbered houses on odd numbered days. A full watering ban is enforced if water demands reach 80% of the PTTW maximum daily rate which is equivalent to 434 m³/day.

The maximum daily water flow was 135 m³/day in 2019, therefore no watering bans were implemented for South Ramara.

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. South Ramara Water Works' maximum day rated capacity is 387 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 146. The three-year (2017-2019) maximum day per capita water

consumption is 689 L/p/day. At this water consumption rate, the committed flow is 261 m³/day.

Therefore, the calculated reserve capacity is 126 m³/day.

6 OPERATION AND MAINTENANCE

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 May 10, 2019 with the inspection review period of September 17, 2018 – May 10, 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 calibrating the chlorine and turbidity analyzers, cleaning the chlorine pumps, injectors and lines, and responding to AC power failures.

The flow meters were checked for calibration by a qualified technician in January 2019.

Repairs and regular maintenance were as follows during 2019:

- Replace filter #1 float control valve. (\$9000)
- Replace post chlorine pump #2 purge solenoid (\$1000)
- Replace post pH probe (\$800)
- Replace backwash holding tank effluent pump (\$400)

6.3 PUBLIC COMPLAINTS

No complaints were received in 2019.

7 WATER WORKS AND OPERATOR LICENSES

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

Heritage Farms

- Water Distribution Class I (Certificate No. 2170 issued September 6, 2005)
- Water Treatment Class II (Certificate No. 2169 issued September 6, 2005)

The MECP Water Works number is 220010681. The Water Works is categorized as a Large Municipal Residential system.

A summary of the facility operators in 2018 and their level of certification is listed in Table 7.

Table 8: Certified Operators

| Operator | Water Treatment Class | License No./ Expiry Date | Water Dist. Class | License No./ Expiry Date |
|-----------------|------------------------------|---------------------------------|--------------------------|---------------------------------|
| Dave Readman | Class II | 12460 / July 31.21 | Class II | 13530 / July 31.21 |
| Don O'Connell | Class II | 53308 / Feb 28.23 | 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.

8 COMPLIANCE STATUS

The MECP conducted an inspection of the Water Works on May 10, 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.

In 2019, the Water Works adhered to the sampling and testing requirements of the SDWA and MDWL. A summary of the minimum sampling and testing frequencies is included in the corresponding water works' Operations and Maintenance Manual.

The South Ramara Water Works was operated in accordance with the DWWP, MDWL, and PTTW during 2019. Based on 2019 treated water quality test results, at no time were residents of South Ramara at any health risk. All treated and distribution water samples tested were 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 Ontario Regulation 170/03, Schedule 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

**South Ramara Water Works
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 ₃), mg/L | | 30 - 500 | 118 | 118 | 107 | 121 |
| Ammonia+Ammonium (N), mg/L | | | <0.04 | 0.04 | 0.07 | <0.04 |
| Dissolved Organic Carbon, mg/L | | 5 | 3 | 4 | 4 | 4 |
| Nitrogen-Kjeldahl (N), mg/L | | | 0.24 | 0.27 | 0.44 | 0.4 |
| Organic Nitrogen, mg/L | | 0.15 | 0.22 | 0.20 | 0.37 | 0.38 |

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.

| | |
|--|---|
| Drinking-Water System Number: | 220010681 |
| Drinking-Water System Name: | South Ramara Water Treatment Plant |
| Drinking-Water System Owner: | The Corporation of the Township of Ramara |
| Drinking-Water System Category: | Large Municipal Residential |
| Period being reported: | January 1, 2019 to December 31, 2019 |

| | |
|--|---|
| <p><u>Complete if your Category is Large Municipal Residential or Small Municipal Residential</u></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><u>Complete for all other Categories.</u></p> <p>Number of Designated Facilities served: <div style="border: 1px solid black; padding: 2px; width: 100px; text-align: center;">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; width: 100px; text-align: center;">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> |
|--|---|

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 [X]

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

South Ramara water supply is from Lake Simcoe via an intake pipe approximately 80 m from shore to an on-shore low-lift pumping station. The intake is equipped with a chlorine injection line and diffuser for zebra mussel control.

Two package water treatment units are utilized in parallel. Treatment consists of a flocculation tank, settling tank and mixed media filter. Raw water is injected with carbon dioxide, alum and sodium hypochlorite. Each filter consists of GAC, sand, and gravel.

Treated water is injected with sodium hypochlorite for primary disinfection and discharged to the two above ground clear wells that are operated in series, with a total volume of 170 m³. Treated water is pumped to the distribution system by two high lift pumps.

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.

The water works is equipped with a 47 kW propane emergency generator. The generator has sufficient capacity to run the entire Water Works. The generator can operate for 5 days at maximum capacity when its fuel tank is full.

List all water treatment chemicals used over this reporting period

Sodium Hypochlorite, Polyaluminum Chloride, Carbon Dioxide

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 filter #1 float control valve. (\$9000)
- Replace post chlorine pump #2 purge solenoid (\$1000)
- Replace post pH probe (\$800)
- Replace backwash holding tank effluent pump (\$400)

- Repair filter #1 flocculator, surface washer bearings and nozzles. (\$9500)
- Replace surefeed control panel on post chlorination system (\$1900)

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 #) |
|---------------------|-------------------|--|---|-----------------------|--------------------------------------|
| 1Raw | 52 | 0 - 17 | 0 - 8900 | 0 | 0 |
| Treated | 52 | 0 | 0 | 52 | 0 - 1 |
| Distribution | 107 | 0 | 0 | 106 | 0 - 13 |

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 – 10.2 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 | Compliance Requirement | Exceedance |
|---|---|--------------|--------|-----------------------|------------------------|------------|
| July 20, 2016 MDWL No. 147-103 Issue No. 2 | Suspended Solids in Backwash Water | Monthly | 15.4 | mg/L (annual average) | 25 mg/L | No |
| July 20, 2016 MDWL No. 147-103 Issue No. 2 | pH of Backwash Water | Monthly | 7.81 | (annual average) | N/A | N/A |
| July 20, 2016 MDWL No. 147-103 Issue No. 2 | Aluminum in Backwash Water | Monthly | 2.25 | mg/L (annual average) | N/A | N/A |

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 | <0.09 | µg/L | |
| Arsenic | 21-Aug-19 | 0.3 | µg/L | |
| Barium | 21-Aug-19 | 26.7 | µg/L | |
| Boron | 21-Aug-19 | 26 | µg/L | |
| Cadmium | 21-Aug-19 | <0.003 | µg/L | |
| Chromium | 21-Aug-19 | 0.15 | µg/L | |
| Lead (Distribution) | 21-Aug-19 | 0.34 | µg/L | |
| Mercury | 21-Aug-19 | <0.01 | µg/L | |
| Selenium | 21-Aug-19 | 0.06 | µg/L | |
| Sodium | 02-Sept-15 | 30.7 | mg/L | |
| Uranium | 21-Aug-19 | 0.128 | µg/L | |
| Fluoride | 15-Aug-17 | 0.06 | µg/L | |
| Nitrite | 21-Nov-19 | <0.003 | mg/L | |
| Nitrate | 21-Nov-19 | 0.037 | 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 | 2 | 0.01-0.34 | ug/L | |

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 | 0.01 | 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 | <0.16 | 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 | <0.35 | µg/L | |
| 2-4 Dichlorophenol | 21-Aug-19 | <0.15 | µg/L | |
| 2,4-Dichlorophenoxy acetic 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 | |
| Methoxychlor | 19-Aug-16 | <0.01 | µg/L | |
| Metolachlor | 21-Aug-19 | <0.01 | µg/L | |
| Metribuzin | 21-Aug-19 | <0.02 | µg/L | |
| 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 (NOTE: Latest annual average) | 27-Feb-19 to 27-Nov-19 | 64.9 | 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 | |

| Parameter | Sample Date | Result Value | Unit of Measure | Exceedance |
|--------------------------------------|-------------|--------------|-----------------|------------|
| 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 | |
| 2-Methyl-4-chlorophenoxy 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 (NOTE: Latest annual average) | 64.9 | µg/L | 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.