

WASHAGO

**Water Supply and
Distribution System
DWS# 220005161**

2017 Summary Report

**For the period of January 1, 2017
to December 31, 2017**



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1. Overview and Background

Safe Drinking Water Act

Safe Drinking Water Act Ontario Regulation 170/03, Schedule 22-2, requires that owners of municipal drinking water systems prepare a Summary Report and present this report to the members of Municipal Council by March 31st of each year. The report is prepared for the previous calendar year and the following criteria must be included as per the regulation:

- a) List the requirements of the Act, the regulations, the system's approval, drinking water works permit, municipal drinking water license, and any order applicable to the system that was not met at any time during the period covered by the report.
- b) For each requirement referred to in clause (a) that was not met specify the duration of the failure and the measures that were taken to correct the failure.
- c) A summary of the quantities and flow rates of the water supplied during the period covered by the report, including monthly average and maximum daily flows.
- d) A comparison of the summary referred to in (c) to the rated capacity and flow rates approved by the system's certificate of approval, drinking water works permit or municipal drinking water license.

This Summary Report also serves as a comprehensive review of the systems performance of the drinking water system as it relates to regulations and criteria that fall under the municipal drinking water licensing program.

Municipal Drinking Water Licensing Program

A Municipal Drinking Water License (MDWL) is required in Ontario to operate the drinking water system. The Municipal Drinking Water License (# 148-104 - Issue Number 3) was re-issued in May of 2016 and is valid until May 25, 2021. The reissuance was initiated by the Ministry of Environment and Climate Change (MOECC) due to regulatory amendments that required timelines to be outlined in the MDWL. There are five requirements that must be achieved in order to obtain an MDWL:

- A valid Drinking Water Works Permit (#148-204 Issue Number 3)
- A valid Permit to Take Water for each source (#7611-APGJ7S)
- An Operational Plan
- Must have an Accredited Operating Authority (C0124837-DWQ3-C0124836)
- A Financial Plan approved by Council

2. Introduction

System and Process Description

The Corporation of the Township of Severn is the owner and operator of the Washago Supply and Distribution System. The system was constructed in 1984. It currently has 120 residential and commercial services connections. It also supplies water to the Knob Hill/Somerset system that is comprised of 20 connections, owned and operated by the Township of Ramara. It is classified as a Class 2 Water Treatment system and a Class 2 Water Distribution system.

Source Water

The Washago Water Supply and Distribution System obtains its raw water from Lake Couchiching. The area of Lake Couchiching and Lake Simcoe combined is approximately 76,285ha with a total drainage area of approximately 3,850km². Lake Couchiching is part of the Trent Severn Waterway and is a controlled body of water with monitored water levels. Lake Couchiching has a surface area of 44.75 km² with a maximum depth of 12m and a mean depth of 6m. The Lake and its immediate watershed are underlain by limestone bedrock in the southern and western areas and with Precambrian bedrock along the northern and eastern areas.

Raw Water Characteristics

The raw water is of low turbidity for a surface water system and is of acceptable pH. The temperature varies widely between summer and winter. Raw water temperature can range from 0.5° Celsius to 25° Celsius.

Water Treatment

The Washago water treatment plant is located at 3398 Quetton. Raw water is treated through two Culligan filtration systems followed by GAC filtration. Primary disinfection takes place in the form of chlorine dioxide. The system also uses sodium hypochlorite for secondary disinfection. Water is delivered to the distribution system by three vertical turbine high lift pumps discharging the treated water through a common header.

Online analyzers monitor and record raw water flows, treated water flows, chlorine, ORP, pH, and turbidity values. Level sensing probes record reservoir levels. The plant is also equipped with full SCADA control.

A propane fueled generator provides backup power to the plant and its equipment.

Water Distribution

The distribution system is comprised of 8.3 km of PVC water main ranging in size between 19 mm and 200 mm. There are 2 sample stations, 10 municipal fire hydrants and 1 private hydrant connected to the system. There is a recirculation line at all the dead ends in the system where by water is circulated back to the water treatment plant reservoir. This ensures that the water at the ends of the distribution system mains is always kept fresh.

3. Regulatory Compliance

All municipally owned and operated water systems are governed under the Safe Drinking Water Act, 2002, Ontario Water Resources Act (OWRA), and associated regulations. The following regulations, and associated standards and documents, are all applicable, and most relevant, to the compliant operation of the Township of Severn's Drinking Water system:

Ontario Regulation 170/03

This regulation includes requirements for:

- Sampling and analytical testing (microbiological and chemical)
- Adverse water quality incidents
- Corrective actions
- Continuous water quality monitoring

Ontario Regulation 169/03

This regulation includes requirements for:

- Water Quality Standards

Ontario Regulation 128/04

This regulation includes requirements for:

- Classifications of Drinking Water Systems
- Certifications and responsibilities of Operators
- Proper record keeping of the drinking water system

Wells Regulation 903

This regulation includes requirements for:

- Well maintenance
- Well specifications

Drinking Water Quality Management Standard (DWQMS)

This Standard specifies:

- Minimum requirements for the Quality Management System to allow for the accreditation of the Operating Authority

Municipal Drinking Water License

This document includes requirements for:

- Specific conditions / testing / monitoring
- Flow limits through the treatment system
- Regulatory relief conditions
- Operations & Maintenance manual criteria

Drinking Water Works Permit License

This document includes criteria for:

- Making alterations to the system

Summary of Non-Compliance and Adverse Water Quality Incidents

November 8/2017 - AWQI was filed for a Total Coliform of 1cfu/100mL collected on a distribution sample. Distribution resampled with no Total Coliform detected.

November 22/2017 - AWQI was filed for a Total Coliform of 2cfu/100mL collected on a distribution sample. Distribution resampled with no Total Coliform detected.

DWQMS & Municipal Drinking Water Licensing Program

Third Party Audit and Accreditation

On an annual basis, a third party accreditation authority conducts an audit to determine whether the Quality Management System conforms to the requirements of the MOECC Drinking Water Quality Management Standard (DWQMS).

In November 2017, NSF International completed an on-site audit with 1 non-conformance noted. These findings were included in the Management Review.

Internal Audit

As per the DWQMS, an internal audit is to be conducted once per year.

In July, 2017 an internal audit was conducted by the Tavares Group. The findings were included in the Management Review.

Management Review

As per the DWQMS, an annual Management Review is to be conducted and findings conveyed to the Owner. A Management Review was conducted in March as well as in December 2017. The review included findings from the internal and external audits, MOECC inspections and other prescribed items.

4. System Improvements and Maintenance

The following improvements and maintenance were carried out in 2017 in order to provide the highest possible drinking water quality:

1. The water distribution system was directionally flushed to maintain the drinking water quality.
2. Over 25% of the main valves in the distribution system were exercised to ensure their reliability when needed.
3. The standby generator was run under load monthly to ensure reliability when needed.
4. All critical alarms were tested monthly to ensure they functioned as intended.
5. A new SCADA computer was installed to improve operations.
6. Drinking water quality was tested at the water treatment plant and in the distribution system weekly.
7. A new dialer was installed to improve reliability in the event of an alarm.
8. Two (2) new peristaltic chlorine pumps were installed to improve the chemical feed system.
9. A new block heater was replaced in the generator to ensure reliability when needed.
10. A new carrying pump was installed to improve the chemical feed system.

5. Microbiological Testing

E. Coli and Total Coliform

Bacteriological samples, to be tested for E. Coli and Total Coliforms, are taken weekly from the raw and treated water at the facility and from the distribution system. Extra samples are taken after major repairs or maintenance work as per Regulation 170/03. Any E. Coli or Total Coliform results above 0 in treated water must be reported to the MOECC and Medical Officer of Health. Resamples and any other required actions are undertaken as quickly as possible. The results from the 2017 sampling program are shown on the table below.

	Number of Samples	Range of E-Coli Results (cfu/100ml) (Min – Max) MAC=0	Range of Total Coliform Results (cfu/100ml) (Min – Max) MAC=0
Raw	52	0 - 16	0 - 920
Treated	160	0 - 0	0 - 2

Heterotrophic Plate Count (HPC)

HPC analyses are completed weekly from the distribution water for large systems. HPC should be less than 500 colonies (cfu) per 1mL. Results over 500 colonies (cfu) per 1 mL may indicate a change in water quality but it is not considered an indicator of unsafe water. The results from the 2017 sampling program are shown on the table below.

	Number of Samples	Range of HPC Results (cfu/1ml) (Min – Max)
Distribution	104	0 - 2

Chlorine Residual and Turbidity

Free chlorine levels of the treated water are monitored continuously at the discharge point of the treatment facility. In the distribution system, free chlorine is checked twice weekly at various locations. As a target, free chlorine residual within the distribution system should be above 0.20 mg/L. A free chlorine level lower than 0.05 mg/L must be reported to MOECC and corrective action taken. There were no reportable incidents in 2017. The results from the 2017 sampling program are shown on the table below.

Turbidity of treated water is continuously monitored at the treatment facility, as a change in turbidity can indicate an operational problem. The turbidity of untreated water from the wells is checked monthly. Turbidity is measured in Nephelometric Turbidity Units (NTU). The results from the 2017 sampling program are shown on the table below

Parameter	Number of Tests	Range of Results (Min – Max) Average
Chlorine residual in distribution (mg/L)	104	(0.74 - 2.02) 150
Chlorine residual after treatment (mg/L)	CONTINUOUS	(1.61 - 2.09) 1.82
Turbidity after treatment (NTU)	CONTINUOUS	(0.083 - 0.186) 0.115

6. Chemical Testing

The Safe Drinking Water Act requires periodic testing of the water for different chemical parameters. The latest results for all parameters are provided in Appendix A. The sampling frequency varies for different types and sizes of water systems and chemical parameters. If the concentration of a parameter is above half of the Maximum Allowable Concentration (MAC) under the Ontario Drinking Water Quality Standards, an increased testing frequency of once every three months is required by the Regulation. Where concerns regarding a parameter exist, the MOECC can also require additional sampling be undertaken. Information on the health effects and allowable limits of components in drinking water may be found on the MOECC web page.

Understanding Chemical Test Results

Tables below are shown with concentrations units of either milligrams per litre (mg/L) or micrograms per litre ($\mu\text{g/L}$): 1 mg/L is equal to 1000 $\mu\text{g/L}$. The Maximum Acceptable Concentration (MAC) is the highest amount of a parameter that is acceptable in Municipal drinking water and can be found in the MOECC Drinking Water Standards. The Method Detection Limit (MDL) is the lowest amount to which the laboratory can confidently measure. A result of “ND” stands for “Not Detected” and means that the concentration of the chemical is lower than the laboratory’s equipment is capable of measuring.

Nitrate and Nitrite samples are required every 3 months in normal operation

Parameter	Result Range Min - Max	Average	MAC (mg/L)	MDL (mg/L)
Nitrite (mg/L)	0.003 - 0.003	0.003	1	0.003
Nitrate (mg/L)	0.021 - 0.066	0.039	10	0.006

A Trihalomethane (THM) sample is required every 3 months from the distribution system

Parameter	Annual	Result (Avg.)	MAC ($\mu\text{g/L}$)	MDL ($\mu\text{g/L}$)
THM	2017	52.4	100	0.37

Summary of the most recent sodium and fluoride results

Parameter	Sample Date	Result (µg/L)	MAC (µg/L)	MDL (µg/L)
Sodium	2017	31.8	20	0.01
Fluoride	2013	0.06	1.5	0.06

Summary of the most recent lead testing results

Parameter	Sample Date	Result Range (Min – Max)	Number of samples	Acceptable Level
Distribution Alkalinity	2017	85 - 98 mg/L	2	30 - 500 mg/L
Distribution pH	2017	7.4 - 7.7	2	6.5 - 8.5
Distribution Lead 2017	2017	0.26 - 0.35 µg/L	2	10 µg/L

Summary of the most recent Schedule 23/24 testing as per Regulation 170/03

All results are measured in µg/L unless otherwise stated.

Parameter	Sample Date	Result Value	MAC	MDL
Antimony	Oct. 2, 2017	0.07	6	0.02
Arsenic	Oct. 2, 2017	0.4	25	0.2
Barium	Oct. 2, 2017	21.5	1000	0.02
Boron	Oct. 2, 2017	23	5000	0.2
Cadmium	Oct. 2, 2017	0.016	5	0.003
Chromium	Oct. 2, 2017	0.65	50	0.03
Mercury	Oct. 2, 2017	0.01	1	0.01
Selenium	Oct. 2, 2017	0.06	10	0.04
Uranium	Oct. 2, 2017	0.088	20	0.002
Benzene	Oct. 2, 2017	0.32	5	0.32
Carbon tetrachloride	Oct. 2, 2017	0.16	5	0.16
1,2-Dichlorobenzene	Oct. 2, 2017	0.41	200	0.41
1,4-Dichlorobenzene	Oct. 2, 2017	0.36	5	0.36
1,1-Dichloroethylene	Oct. 2, 2017	0.33	14	0.33
1,2-Dichloroethane	Oct. 2, 2017	0.35	5	0.35
Dichloromethane	Oct. 2, 2017	0.35	50	0.35

Parameter	Sample Date	Result Value	MAC	MDL
Monochlorobenzene	Oct. 2, 2017	0.3	80	0.3
Tetrachloroethylene	Oct. 2, 2017	0.35	30	0.35
Trichloroethylene	Oct. 2, 2017	0.44	5	0.44
Vinyl Chloride	Oct. 2, 2017	0.17	2	0.17
Bromoform	Oct. 2, 2017	0.34	--	0.34
Bromodichloromethane	Oct. 2, 2017	12	--	0.41
Chloroform	Oct. 2, 2017	31	--	0.29
Dibromochloromethane	Oct. 2, 2017	3.5	--	0.37
Diquat	Oct. 2, 2017	1	70	1
Paraquat	Oct. 2, 2017	1	10	1
Glyphosate	Oct. 2, 2017	1	280	1
PCBs	Oct. 2, 2017	0.04	3	0.04
Benzo(a)pyrene	Oct. 2, 2017	0.004	0.01	0.004
Alachlor	Oct. 2, 2017	0.02	5	0.02
Aldicarb	Oct. 26, 2015	0.01	9	0.01
Aldrin+Dieldrin	Oct. 26, 2015	0.01	0.7	0.01
Aldrin	Oct. 26, 2015	0.01	--	0.01
Dieldrin	Oct. 26, 2015	0.01	--	0.01
Atrazine+N-dealkylated metabolites	Oct. 2, 2017	0.01	5	0.01
Atrazine	Oct. 2, 2017	0.01	--	0.01
Desethyl atrazine	Oct. 2, 2017	0.01	--	0.01
Azinphos-methyl	Oct. 2, 2017	0.05	20	0.05
Carbaryl	Oct. 2, 2017	0.05	90	0.05
Carbofuron	Oct. 2, 2017	0.01	90	0.01
Chlorpyrifos	Oct. 2, 2017	0.02	90	0.02
Diazinon	Oct. 2, 2017	0.02	20	0.02
Dimethoate	Oct. 2, 2017	0.03	20	0.03
Diuron	Oct. 2, 2017	0.03	150	0.03
Malathion	Oct. 2, 2017	0.02	190	0.02
Methoxychlor	Oct. 26, 2015	0.01	900	0.01
Metolachlor	Oct. 2, 2017	0.01	50	0.01
Metribuzin	Oct. 2, 2017	0.02	80	0.02
Phorate	Oct. 2, 2017	0.01	2	0.01
Prometryne	Oct. 2, 2017	0.03	1	0.03
Simazine	Oct. 2, 2017	0.01	10	0.01
Terbufos	Oct. 2, 2017	0.01	1	0.01
Triallate	Oct. 2, 2017	0.01	230	0.01

Parameter	Sample Date	Result Value	MAC	MDL
Trifluralin	Oct. 2, 2017	0.02	45	0.02
Bromoxynil	Oct. 2, 2017	0.33	5	0.33
Dicamba	Oct. 2, 2017	0.20	120	0.20
Dichlofop-methyl	Oct. 2, 2017	0.40	9	0.40
Dinoseb	Oct. 26, 2015	0.36	10	0.36
Picloram	Oct. 2, 2017	1	190	1
2,4-dichlorophenol	Oct. 2, 2017	0.15	900	0.15
2,3,4,6-trichlorophenol	Oct. 2, 2017	0.20	5	0.25
Pentachlorophenol	Oct. 2, 2017	0.15	100	0.20

7. Water Quantity

Continuous monitoring of flow rates from source water into the treatment system and from the facility into the distribution system is required by Regulation 170/03. The Municipal Drinking Water License and Permit to Take Water issued by the MOECC regulate the amount of water that can be utilized over a given time period. A summary of the 2017 flows are provided in the tables below.

Month	Monthly Total (m ³)	Average Daily Flow (m ³ /day)	Minimum Daily Flow (m ³ /day)	Maximum Daily Flow (m ³ /day)
January	2189	88	63	107
February	3649	118	56	156
March	2324	90	32	159
April	2793	90	32	113
May	2855	92	59	117
June	2909	94	59	117
July	2506	107	75	132
August	3426	111	86	146
September	3238	104	69	138
October	2898	93	69	129
November	2973	99	73	130
December	3011	100	63	148
TOTAL	34771			

FLOW SUMMARY	QUANTITY
Permit to Take Water Limit	544.3 m ³ /day
Municipal Drinking Water License Limit	544.3 m ³ /day
2017 Average Daily Flow	98.8 m ³ /day
2017 Maximum Daily Flow	159 m ³
2017 Total Amount of Water Supplied	34771 m ³

8. Appendix A – Flow Charts

