Township of
SEVERN

Water Supply and Distribution System

Washago
2020 Summary Report

Contents

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:

- List the requirements of the Act, the regulations, the system's approval, drinking water works permit, municipal drinking water license, and orders applicable to the system that were not met during the period covered by the report.
- 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.
- 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.
- 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 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 (#148-102 Issue Number 2) was re-issued in May of 2016 and is valid until May 25, 2021. The reissuance was initiated by the Ministry of Environment, Conservation and Parks (MECP) 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 (#148-202 Issue Number 2)
- A valid Permit to Take Water for each source (#0578-9JFPKZ)
- An Operational Plan
- Must have an Accredited Operating Authority (C0124837-DWQ3-C0122096)
- A Financial Plan approved by Council

System and Process Description

The Corporation of the Township of Severn is the owner and operator of the Washago Supply and Distribution System (DWS#220005161). The system was constructed in 1984. It currently has 120 residential and commercial service connections. It also supplies water to the Knob Hill/Somerset system that is comprised of 20 connections, owned by the Township of Ramara and operated by Ontario Clean Water Agency. 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 3,850km^2. 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 km^2 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 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 and 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 4 sample stations, 10 municipal fire hydrants and 1 private hydrant connected to the system. There is a recirculation line at dead ends of the system, water is circulated back to the water treatment plant. This ensures that the water at the ends of the distribution system maintains a chlorine residual.

Regulatory Compliance

Regulations

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

Non-Compliance and Adverse Water Quality Incidents

There were two non-compliance or adverse water quality incidents that occurred in 2020.

- A chlorate sample exceeded the maximum acceptable concentration of 1mg/L. Laboratory results of the sample on August 21, 2020 resulted in a chlorate level of 1.1mg/L. District health Unit and MECP were notified and system was resampled. Laboratory results of resample resulted in a chlorate level of 0.85mg/L. The resample value was below the maximum acceptable concentration and the AWQI was closed.
- Laboratory analysis results on December 16, 2020 resulted in 47 total coliform presents in one sample. District Health Unit and MECP were notified and system resampled. 0 total coliform were present in resample and AWQI was closed.

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 MECP Drinking Water Quality Management Standard (DWQMS). On

November 16 and 17, 2020 NSF International completed a satellite audit with no non-conformances noted.

Internal Audit

As per the DWQMS, an internal audit is to be conducted once per year.
October 5-9, 2020 an internal audit was conducted by Aet Group Inc. The findings were included during Management Review.

Management Review

As per the DWQMS, an internal audit is to be conducted once per year.
On October 5-9, 2020, an internal audit was conducted by Aet Group Inc. The findings were included during Management Review.

Annual Operations Summary

System Improvements and Maintenance

The following maintenance and improvements were carried out in 2020 to provide the highest possible drinking water quality:

- The water distribution system was directionally flushed to maintain the drinking water quality.
- Over 25% of the main valves in the distribution system were exercised to ensure their reliability.
- The standby generator was tested under load monthly to ensure reliability.
- All critical alarms were tested monthly to ensure reliability.
- Drinking water quality was tested at the water treatment plant and in the distribution system weekly.

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. E. Coli or Total Coliform results above 0 in treated water must be reported to the MECP and MOH. Resamples and other required actions are undertaken as quickly as possible. The results are from the 2020 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	53	0 - 60	0 - 200
Treated	159	0 - 0	0 - 47

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 2020 sampling program are shown on the table below.

	Number of Samples	Range of HPC Results (cfu/1ml) (Min – Max)
Distribution	104	0 - <10

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 the MECP and corrective action taken. There were no reportable incidents in 2020. The results from the 2020 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. Turbidity of the wells are checked monthly. Turbidity is measured in Nephelometric Turbidity Units (NTU).

The results from the 2020 sampling program are shown on the table below.

Parameter	Number of Tests	Range of Results (Min – Max) Average
Chlorine residual in distribution (mg/L)	362	(0.84 – 1.74) 1.28
Chlorine residual after treatment (mg/L)	CONTINUOUS	(1.13 – 1.89) 1.51
Turbidity after treatment (NTU)	CONTINUOUS	(0.03 - 0.31) 0.06

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 MECP can also require additional sampling. Information on the health effects and allowable limits of components in drinking water may be found on the MECP web page.

Understanding Chemical Test Results

Tables below are shown with concentrations units of either milligrams per litre (mg/L) or micrograms per litre (µg/L): 1 mg/L is equal to 1000 µg/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 MECP 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)	0.033 - 0.098	0.062	10	0.006

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

Parameter	Annual	Result (Avg.)	MAC (µg/L)	MDL (µg/L)
THM	2020	47.25	100	0.37

A Haloacetic Acid (HAA) sample is required every 3 months from the distribution system

Parameter	Annual	Result (Avg.)	MAC (µg/L)	MDL (µg/L)
HAA	2020	27.05	80	5.3

Summary of the most recent sodium and fluoride results

Parameter	Sample Date	Result (mg/L)	MAC (mg/L)	MDL (mg/L)
Sodium	2020	33.6	20	0.01
Fluoride	2018	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	2020	72- 107 mg/L	2	30 - 500 mg/L
Distribution pH	2020	7.4 – 7.5	2	6.5 - 8.5
Distribution Lead	2020	0.07 - 0.22 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. 26, 2020	0.10	6	0.09
Aluminum	Oct. 26, 2020	38	--	1
Arsenic	Oct. 26, 2020	0.3	10	0.2
Barium	Oct. 26, 2020	24.3	1000	0.02
Boron	Oct. 26, 2020	19	5000	2
Cadmium	Oct. 26, 2020	0.003	5	0.003
Chromium	Oct. 26, 2020	0.08	50	0.08
Mercury	Oct. 26, 2020	0.01	1	0.01
Selenium	Oct. 26, 2020	0.05	50	0.04
Uranium	Oct. 26, 2020	0.071	20	0.002
Benzene	Oct. 26, 2020	0.32	1	0.32
Carbon tetrachloride	Oct. 26, 2020	0.17	2	0.17
1,2-Dichlorobenzene	Oct. 26, 2020	0.41	200	0.41
1,4-Dichlorobenzene	Oct. 26, 2020	0.36	5	0.36
1,1-Dichloroethylene	Oct. 26, 2020	0.33	14	0.33
1,1-Dichloroethylene	Oct. 26, 2020	0.33	14	0.33
1,2-Dichloroethane	Oct. 26, 2020	0.35	5	0.35
Dichloromethane	Oct. 26, 2020	0.35	50	0.35
Monochlorobenzene	Oct. 26, 2020	0.3	80	0.3
Tetrachloroethylene	Oct. 26, 2020	0.35	10	0.35
Trichloroethylene	Oct. 26, 2020	0.44	5	0.44
Vinyl Chloride	Oct. 26, 2020	0.17	1	0.17
Bromoform	Oct. 26, 2020	0.34	--	0.34
Bromodichloromethane	Oct. 26, 2020	10	--	.26
Chloroform	Oct. 26, 2020	28	--	0.29
Dibromochloromethane	Oct. 26, 2020	2.6	--	0.37
Diquat	Oct. 26, 2020	<1	70	1
Paraquat	Oct. 26, 2020	<1	10	1
Glyphosate	Oct. 26, 2020	<1	280	1
PCBs	Oct. 26, 2020	0.04	3	0.04

Parameter	Sample Date	Result Value	MAC	MDL
Benzo(a)pyrene	Oct. 26, 2020	0.004	0.01	0.004
Alachlor	Oct. 26, 2020	0.02	5	0.02
Atrazine+N-dealkylated metabolites	Oct. 26, 2020	0.01	5	0.01
Atrazine	Oct. 26, 2020	0.01	--	0.01
Desethyl atrazine	Oct. 26, 2020	0.01	--	0.01
Azinphos-methyl	Oct. 26, 2020	0.05	20	0.05
Carbaryl	Oct. 26, 2020	0.05	90	0.05
Carbofuron	Oct. 26, 2020	0.01	90	0.01
Chlorpyrifos	Oct. 26, 2020	0.02	90	0.02
Diazinon	Oct. 26, 2020	0.02	20	0.02
Dimethoate	Oct. 26, 2020	0.06	20	0.06
Diuron	Oct. 26, 2020	0.03	150	0.03
Malathion	Oct. 26, 2020	0.02	190	0.02
Metolachlor	Oct. 26, 2020	0.01	50	0.01
Metribuzin	Oct. 26, 2020	0.02	80	0.02
Phorate	Oct. 26, 2020	0.01	2	0.01
Antimony	Oct. 26, 2020	0.09	6	0.02
Prometryne	Oct. 26, 2020	0.03	1	0.03
Simazine	Oct. 26, 2020	0.01	10	0.01
Terbufos	Oct. 26, 2020	0.01	1	0.01
Triallate	Oct. 26, 2020	0.01	230	0.01
Trifluralin	Oct. 26, 2020	0.02	45	0.02
2,4-dichlorophenoxyacetic acid	Oct. 26, 2020	0.19	100	0.19
Bromoxynil	Oct. 26, 2020	0.33	5	0.33
Dicamba	Oct. 26, 2020	0.20	120	0.20
Dichlofop-methyl	Oct. 26, 2020	0.40	9	0.40
MCPA (mg/L)	Oct. 26, 2020	0.00012	0.1	0.00012
Picloram	Oct. 26, 2020	<1	190	1
2,4-dichlorophenol	Oct. 26, 2020	0.15	900	0.15
2,4,6-trichlorophenol	Oct. 26, 2020	0.25	5	0.25
2,3,4,6-tetrachlorophenol	Oct. 26, 2020	0.20	100	0.2

Parameter	Sample Date	Result Value	MAC	MDL
Pentachlorophenol	Oct. 26, 2020	0.15	60	0.15

Water Quantity

Continuous monitoring of flow rates from supply wells 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 MECP regulate the amount of water that can be utilized over a given time period. A summary of the 2020 flows is provided in the tables below.

FLOW SUMMARY	QUANTITY
Permit to Take Water Limit	544.3 m^3/day
Municipal Drinking Water License Limit	544.3 m^3/day
2020 Average Daily Flow	124 m^3/day
2020 Maximum Daily Flow	213 m^3
2020 Total Amount of Water Supplied	45264 m^3

Summary of Raw Water Flows

Month	Monthly Total (m^3)
January	2387
February	2313
March	2335
April	2406
May	2509
June	2862
July	2862
August	3487
September	4456
October	3509
November	4146
December	4216
TOTAL	**37528**

Summary of Distribution Flows

Month	Monthly Total (m^3)	Average Daily Flow (m^3/day)	Minimum Daily Flow (m^3/day)	Maximum Daily Flow (m^3/day)
Month	**Monthly**	**Average**	**Minimum**	**Maximum**
January	3168	102	90	115
February	2997	103	75	115
March	3079	99	75	114
April	3106	104	69	187
May	3272	106	80	122
June	3493	116	83	145
July	3416	110	70	135
August	4056	131	75	175
September	4925	164	115	213
October	4146	134	121	150
November	4760	159	110	197
December	4845	156	134	173
Total	**45264**			

Appendix A – Flow Charts