

SEVERN ESTATES

Water Supply and
Distribution System
DWS# 220005152



2018 Summary Report

For the period of January 1, 2018
to December 31, 2018



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Issued January 2019

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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 orders applicable to the system that were not met 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 (# 148-103 - 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 (148-203 Issue Number 3)
-  A valid Permit to Take Water for each source (#1184-BNK7B)
-  An Operational Plan
-  Must have an Accredited Operating Authority (C0124837-DWQ3-C0124835)
-  A Financial Plan approved by Council

Introduction

System and Process Description

The Corporation of the Township of Severn is the owner and operator of the Severn Estates Water Supply and Distribution System. The system was initially constructed in 1971. In 2006, the treatment facility underwent a major overhaul with the addition of a below ground storage reservoir and new pump house. It currently has 23 service connections. It is classified as a Class 1 Water Treatment system and a Class 1 Water Distribution system.

Source Water

The Severn Estates Water Treatment and Distribution System obtains its raw water from a 150 mm diameter drilled well located inside the treatment plant at 4532 Trent Trail.

Raw Water Characteristics

The raw water is of low turbidity and is of acceptable pH. Due to the depth of the source water the temperature is relatively constant.

Water Treatment

The water enters from a well, located within the pump house, to a discharge header. Chlorine is added in the form of sodium hypochlorite. After chlorination, water is directed to 450 L contact tanks to facilitate precipitation. It is then filtered using a twin train Kinetico macrolite filtration system and then discharged to a common header. It then flows into a 13.6 m³, two (2) cell concrete underground storage reservoir.

Water is pumped to the distribution header, where it passes through a magnetic flow meter, via two vertical turbine high lift pumps to a common header. Pressure in the distribution system is maintained between 50 and 65 PSI by three 450L pressure tanks.

Online analyzers monitor and record raw and treated water flow rates, distribution pressure, treated water turbidity, free chlorine residual and pH. Level sensing probes record well level and reservoir level. The plant is also equipped with full SCADA control.

Standby power is provided to the building and all of its equipment by a 16kW propane fueled generator.

Water Distribution

The distribution system is comprised 665 meters of 100mm and 50mm PVC water main. There are 2 sample stations and 3 blow-offs located throughout the system.

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

There were two (2) non-compliance or AWQI incidents that occurred in 2018.

- 1) June 18, 2018 – An AWQI was filed for well and reservoir maintenance. A Boil Water Advisory (BWA) was issued for the entire system. Two (2) sets of samples were collected. Lab results tested zero (0) Total Coliform or E. Coli. BWA was rescinded June 24, 2018.
- 2) Annual sodium sampling exceeded the regulatory limit and was reported as per legislation. Although sodium testing is completed on an annual basis, it is only reportable every 5 years.

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 Ontario Ministry of the Environment's Drinking Water Quality Management Standard (DWQMS).

In November 2018, 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.

In July, 2018 an internal audit was conducted by the Tavares Group. The findings were included during 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 September of 2018. The review included findings from the internal audit, MECP inspections and other prescribed items.

System Improvements and Maintenance

The following maintenance and improvements were carried out in 2018 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.
3. The standby generator was tested under load monthly to ensure reliability.
4. All critical alarms were tested monthly to ensure reliability.
5. Drinking water quality was tested at the water treatment plant and in the distribution system weekly.
6. Addition of 2nd sample station to assist with sampling requirements.
7. Well rehabilitation and cleaning were completed to ensure quality of source water.
8. Cleaning and inspection of the reservoir to ensure integrity.
9. Replacement of filter media was completed to ensure quality.
10. Replacement of well pump to ensure reliability.
11. Replacement of both high lift pumps to ensure reliability.
12. Replacement of auto-dialer to ensure reliability and compliance.

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 MECP and Medical Officer of Health. Resamples and other required actions are undertaken as quickly as possible. The results from the 2018 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	56	0 - 0	0 - 19
Treated	111	0 - 0	0 - 0

Heterotrophic Plate Count (HPC)

HPC analyses are completed weekly from the distribution water for small 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 2018 sampling program are shown on the table below.

	Number of Samples	Range of HPC Results (cfu/1ml) (Min – Max)
Distribution	53	0 - 45

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 MECP and corrective action taken. There were no reportable incidents in 2018. The results from the 2018 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 untreated water from the well is checked monthly. Turbidity is measured in Nephelometric Turbidity Units (NTU). The results from the 2018 sampling program are shown on the table below.

Parameter	Number of Tests	Range of Results (Min – Max) Average
Chlorine residual in distribution (mg/L)	105	(0.86 - 2.90) 1.37
Chlorine residual after treatment (mg/L)	CONTINUOUS	(0.92 – 3.60) 1.46
Turbidity after treatment (NTU)	CONTINUOUS	(0.12 – 0.98) 0.39

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 (mg/L)	Average	MAC (mg/L)	MDL (mg/L)
Nitrite	0.003 - 0.003	0.003	1	0.003
Nitrate	0.006 - 0.041	0.018	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	2018	91	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	2018	25.35	--	5.3

Summary of the most recent sodium and fluoride results

Parameter	Sample Date	Result (mg/L)	MAC (mg/L)	MDL (mg/L)
Sodium	2018	50.7	20	0.01
Fluoride	2018	0.15	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	2018	164 – 168 mg/L	2	30 - 500 mg/L
Distribution pH	2018	6.9 - 7.0	2	6.5 - 8.5
Distribution Lead 2017	2017	0.59 - 0.62 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, 2015	0.02	6	0.02
Arsenic	Oct. 26, 2015	0.7	25	0.2
Barium	Oct. 26, 2015	268	1000	0.02
Boron	Oct. 26, 2015	65.8	5000	0.2
Cadmium	Oct. 26, 2015	0.003	5	0.003
Chromium	Oct. 26, 2015	0.58	50	0.03
Mercury	Oct. 26, 2015	0.01	1	0.01
Selenium	Oct. 26, 2015	0.28	10	0.04
Uranium	Oct. 26, 2015	0.260	20	0.002
Benzene	Oct. 26, 2015	0.32	5	0.32
Carbon tetrachloride	Oct. 26, 2015	0.16	5	0.16
1,2-Dichlorobenzene	Oct. 26, 2015	0.41	200	0.41
1,4-Dichlorobenzene	Oct. 26, 2015	0.36	5	0.36
1,1-Dichloroethylene	Oct. 26, 2015	0.33	14	0.33
1,2-Dichloroethane	Oct. 26, 2015	0.35	5	0.35
Dichloromethane	Oct. 26, 2015	0.35	50	0.35
Monochlorobenzene	Oct. 26, 2015	0.3	80	0.3
Tetrachloroethylene	Oct. 26, 2015	0.35	30	0.35
Trichloroethylene	Oct. 26, 2015	0.44	5	0.44
Vinyl Chloride	Oct. 26, 2015	0.17	2	0.17
Diquat	Oct. 26, 2015	1	70	1
Paraquat	Oct. 26, 2015	1	10	1
Glyphosate	Oct. 26, 2015	1	280	1
PCBs	Oct. 26, 2015	0.04	3	0.04
Benzo(a)pyrene	Oct. 26, 2015	0.004	0.01	0.004
Alachlor	Oct. 26, 2015	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-daelkylated metabolites	Oct. 26, 2015	0.01	5	0.01
Atrazine	Oct. 26, 2015	0.01	--	0.01
Desethyl atrazine	Oct. 26, 2015	0.01	--	0.01
Azinphos-methyl	Oct. 26, 2015	0.05	20	0.05
Bendiocarb	Oct. 26, 2015	0.01	40	0.01
Carbaryl	Oct. 26, 2015	0.05	90	0.05
Carbofuron	Oct. 26, 2015	0.01	90	0.01
Chlodane	Oct. 26, 2015	0.01	7	0.01
a-chlordane	Oct. 26, 2015	0.01	--	0.01

Parameter	Sample Date	Result Value	MAC	MDL
g-chlordane	Oct. 26, 2015	0.01	--	0.01
Oxychlordane	Oct. 26, 2015	0.01	--	0.01
Chlorpyrifos	Oct. 26, 2015	0.02	90	0.02
Cyanazine	Oct. 26, 2015	0.03	10	0.03
Diazinon	Oct. 26, 2015	0.02	20	0.02
(DDT)+Metabolites	Oct. 26, 2015	0.01	30	0.01
Op-DDT	Oct. 26, 2015	0.01	--	0.01
pp-DDD	Oct. 26, 2015	0.01	--	0.01
pp-DDE	Oct. 26, 2015	0.01	--	0.01
pp-DDT	Oct. 26, 2015	0.01	--	0.01
Dimethoate	Oct. 26, 2015	0.03	20	0.03
Diuron	Oct. 26, 2015	0.03	150	0.03
Heptachlor+Heptachlor Epoxide	Oct. 26, 2015	0.01	3	0.01
Heptachlor	Oct. 26, 2015	0.01	--	0.01
Heptachlor Epoxide	Oct. 26, 2015	0.01	--	0.01
Lindane	Oct. 26, 2015	0.01	4	0.01
Malathion	Oct. 26, 2015	0.02	190	0.02
Methoxychlor	Oct. 26, 2015	0.01	900	0.01
Metolachlor	Oct. 26, 2015	0.01	50	0.01
Metribuzin	Oct. 26, 2015	0.02	80	0.02
Parathion	Oct. 26, 2015	0.02	50	0.02
Phorate	Oct. 26, 2015	0.01	2	0.01
Prometryne	Oct. 26, 2015	0.03	1	0.03
Simazine	Oct. 26, 2015	0.01	10	0.01
Temephos	Oct. 26, 2015	0.01	280	0.01
Terbufos	Oct. 26, 2015	0.01	1	0.01
Triallate	Oct. 26, 2015	0.01	230	0.01
Trifluralin	Oct. 26, 2015	0.02	45	0.02
2,4-dichlorophenoxyacetic acid	Oct. 26, 2015	0.19	100	0.19
2,4,5-trichlorophenoxyacetic acid	Oct. 26, 2015	0.22	280	0.22
Bromoxynil	Oct. 26, 2015	0.33	5	0.33
Dicamba	Oct. 26, 2015	0.20	120	0.20
Dichlofop-methyl	Oct. 26, 2015	0.40	9	0.40
Dinoseb	Oct. 26, 2015	0.36	10	0.36
Picloram	Oct. 26, 2015	1	190	1
2,4-dichlorophenol	Oct. 26, 2015	0.15	900	0.15
2,3,4,6-trichlorophenol	Oct. 26, 2015	0.25	5	0.25
Pentachlorophenol	Oct. 26, 2015	0.20	100	0.20

Water Quantity

Continuous monitoring of flow rates from the supply well 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 2018 flows are provided in the tables below.

FLOW SUMMARY	QUANTITY
Permit to Take Water Limit	185.7 m ³ /day
Municipal Drinking Water License Limit	109 m ³ /day
2018 Average Daily Flow	9 m ³ /day
2018 Maximum Daily Flow	18 m ³ /day
2018 Total Amount of Water Supplied	3392 m ³

Summary of Raw Flows

Month	Monthly Total (m ³)
January	399
February	339
March	402
April	410
May	457
June	463
July	505
August	375
September	375
October	413
November	359
December	368
TOTAL	4864

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)
January	250	8	4	10
February	208	7	6	10
March	235	8	4	9
April	239	8	5	10
May	318	10	7	14
June	352	12	6	18
July	395	13	9	17
August	290	9	7	12
September	288	10	6	13
October	301	10	7	15
November	258	9	4	16
December	259	8	6	12
TOTAL	3392			

Appendix A – Flow Charts

