



— Township of —

**SEVERN**

Water Supply and Distribution System

# **Bass Lake Woodlands 2020 Summary Report**

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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 31<sup>st</sup> 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

# Introduction

## System and Process Description

The Corporation of the Township of Severn is the owner and operator of the Bass Lake Woodlands Water Treatment and Distribution System (DWS# 220005143). The system was constructed in 1976 and was expanded in 1987 and 2008. It currently has 161 service connections. It is classified as a Class 2 Water Distribution and Supply System.

## Source Water

Bass Lake Woodlands obtains its raw water from three drilled wells located on the pump house property at 1852 Ridley Blvd. The wells are in a confined artesian aquifer found locally in the elevation range of approximately 210 and 225 meters above sea level.

## 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

Sodium hypochlorite is the primary disinfection of the raw water source. Water is pumped from the wells into the pump house. The piping is then combined to a common discharge header. At this point, the water is disinfected by sodium hypochlorite. Water is then directed to the 32 m<sup>3</sup> baffled chlorine contact chamber and then into the 136 m<sup>3</sup> clear wells for storage.

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

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

## **Water Distribution**

The distribution system is comprised of 2.8 km of 150mm PVC water main. There are 4 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 NO Adverse Water Quality Incidents that occurred in 2020.

## **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 the Aet Group Inc. 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. Management Reviews were conducted August 19, 2020 and November 30, 2020. The review included findings from the internal and external audits, MECP inspections and other prescribed items.

# 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.
- Vertical turbine high lift pump #2 was rebuilt to ensure reliability.

# 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 from the 2020 sampling program are shown on the table below.

	<b>Number of Samples</b>	<b>Range of E-Coli Results (cfu/100ml) (Min - Max) MAC=0</b>	<b>Range of Total Coliform Results (cfu/100ml) (Min - Max) MAC=0</b>
Raw	157	0 - 0	0 - 1
Treated	156	0 - 0	0 - 0

## 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 1 mL. 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.

	<b>Number of Samples</b>	<b>Range of HPC Results (cfu/1ml) (Min - Max)</b>
Distribution	105	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)	367	(0.56 – 1.09) 0.86
Chlorine residual after treatment (mg/L)	CONTINUOUS	(0.87 – 1.12) 0.98
Turbidity after treatment (NTU)	CONTINUOUS	(0.06- 0.70) 0.10

## 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 - 0.008	0.004	1	0.003
Nitrate (mg/L)	1.58 – 1.77	1.68	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	7.80	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	< 5.3	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	50.4	20	0.01
Fluoride	2018	0.08	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	231 - 240 mg/L	2	30 -500 mg/L
Distribution pH	2020	7.3 - 7.8	2	6.5 - 8.5
Distribution Lead 2020	2020	0.05-0.09 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	0.09	6	0.02
Arsenic	Oct. 26, 2020	0.2	10	0.2
Barium	Oct. 26, 2020	226	1000	0.02
Boron	Oct. 26, 2020	25	5000	2
Cadmium	Oct. 26, 2020	0.003	5	0.003
Chromium	Oct. 26, 2020	0.96	50	0.03
Mercury	Oct. 26, 2020	0.01	1	0.01

Selenium	Oct. 26, 2020	0.14	50	0.04
Uranium	Oct. 26, 2020	0.231	20	0.002
Benzene	Oct. 26, 2020	0.32	1	0.32
Carbon tetrachloride	Oct. 26, 2020	0.17	2	0.16
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
1,2-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	0.57	--	0.34
Bromodichloromethane	Oct. 26, 2020	3.6	--	0.26
Chloroform	Oct. 26, 2020	2.8	--	0.29
Dibromochloromethane	Oct. 26, 2020	3.1	--	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
Benzo(a)pyrene	Oct. 26, 2020	0.004	0.01	0.004
Alachlor	Oct. 26, 2020	0.02	5	0.02
Atrazine+N-daelkylated 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	0.03
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

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
Dinoseb	Oct. 26, 2020	0.36	10	0.36
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
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	Well 1 - 655.2 m <sup>3</sup> /day Well 2 - 280.8 m <sup>3</sup> /day Well 3 - 741.6 m <sup>3</sup> /day
Total Taking	1211.2 m <sup>3</sup> /day
Municipal Drinking Water License Limit	818 m <sup>3</sup> /day
2020 Average Daily Flow	124 m <sup>3</sup> /day
2020 Maximum Daily Flow	279 m <sup>3</sup> /day
2020 Total Amount of Water Supplied	45468 m <sup>3</sup>

### Summary of Raw Water Flows

Month	Well #1 (m <sup>3</sup> )	Well #2 (m <sup>3</sup> )	Well #3 (m <sup>3</sup> )
January	11	9	4197
February	13	11	3890
March	15	7	2941
April	13	7	2594
May	14	12	3747
June	14	13	5294
July	38	34	5189
August	15	11	4079
September	11	9	3416
October	11	12	2753
November	12	10	2519
December	17	12	2931
<b>TOTAL</b>	<b>43883</b>		

### Summary of Distribution Flows

Month	Monthly Total (m <sup>3</sup> )	Average Daily Flow (m <sup>3</sup> /day)	Minimum Daily Flow (m <sup>3</sup> /day)	Maximum Daily Flow (m <sup>3</sup> /day)
January	4350	140	106	166
February	4048	140	111	156
March	3093	100	63	157
April	2754	92	74	109
May	3909	126	73	196
June	5465	182	109	279
July	5403	174	116	254
August	4248	137	103	181
September	3572	119	91	151
October	2924	94	73	111
November	2650	88	53	118
December	3052	98	73	135
<b>TOTAL</b>	<b>45468</b>			

# Appendix A - Flow Charts

