

BASS LAKE WOODLANDS

Water Supply and
Distribution System
DWS# 220005143



2018 Summary Report

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



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Table of Contents

OVERVIEW AND BACKGROUND	3
Safe Drinking Water Act	3
Municipal Drinking Water Licensing Program	3
INTRODUCTION	4
System and Process Description	4
Source Water	4
Raw Water Characteristics	4
Water Treatment	4
Water Distribution	4
REGULATORY COMPLIANCE	5
Ontario Regulation 170/03	5
Ontario Regulation 169/03	5
Ontario Regulation 128/04	5
Wells Regulation 903	5
Drinking Water Quality Management Standard (DWQMS)	5
Municipal Drinking Water License	5
Drinking Water Works Permit License	6
Summary of Non-Compliance and Adverse Water Quality Incidents	6
DWQMS & Municipal Drinking Water Licensing Program	6
Third Party Audit and Accreditation	6
Internal Audit	6
Management Review	6
SYSTEM IMPROVEMENTS AND MAINTENANCE	6
MICROBIOLOGICAL TESTING	7
E. Coli and Total Coliform	7
Heterotrophic Plate Count (HPC)	7
Chlorine Residual and Turbidity	8
CHEMICAL TESTING	8
Understanding Chemical Test Results	8
WATER QUANTITY	12
APPENDIX A – FLOW CHARTS	14

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 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. 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 located 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 m³ baffled chlorine contact chamber and then into the 136 m³ 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 was one AWQI that occurred in 2018. 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 MECP 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 2018. 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 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. Well #2 & #3 were inspected and rehabilitated to improve source water quality.
7. Upgraded to full SCADA control to improve operations.
8. Replaced two (2) sample stations to improve sampling requirements.
9. 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. Any 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 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	162	0 - 0	0 - 3
Treated	159	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 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 - 13

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 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 the wells are 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)	369	(0.50 – 1.04) 0.82
Chlorine residual after treatment (mg/L)	CONTINUOUS	(0.76 – 1.06) 0.93
Turbidity after treatment (NTU)	CONTINUOUS	(0.13- 0.39) 0.19

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 ($\mu\text{g/L}$): 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 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)	0.979 – 1.11	1.047	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	6.15	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	< 5.3	--	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	39.5	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	2017	223 – 227 mg/L	2	30 -500 mg/L
Distribution pH	2017	7.5 - 7.8	2	6.5 - 8.5
Distribution Lead 2017	2017	0.38-0.65 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	Jan. 8, 2018	0.02	6	0.02
Arsenic	Jan. 8, 2018	0.2	10	0.2
Barium	Jan. 8, 2018	248	1000	0.02
Boron	Jan. 8, 2018	17	5000	2
Cadmium	Jan. 8, 2018	0.005	5	0.003
Chromium	Jan. 8, 2018	0.99	50	0.03
Mercury	Jan. 8, 2018	0.01	1	0.01
Selenium	Jan. 8, 2018	0.08	50	0.04
Uranium	Jan. 8, 2018	0.229	20	0.002
Benzene	Jan. 8, 2018	0.32	1	0.32
Carbon tetrachloride	Jan. 8, 2018	0.16	2	0.16
1,2-Dichlorobenzene	Jan. 8, 2018	0.41	200	0.41
1,4-Dichlorobenzene	Jan. 8, 2018	0.36	5	0.36
1,1-Dichloroethylene	Jan. 8, 2018	0.33	14	0.33
1,2-Dichloroethane	Jan. 8, 2018	0.35	5	0.35
Dichloromethane	Jan. 8, 2018	0.35	50	0.35
Monochlorobenzene	Jan. 8, 2018	0.3	80	0.3
Tetrachloroethylene	Jan. 8, 2018	0.35	10	0.35
Trichloroethylene	Jan. 8, 2018	0.44	5	0.44
Vinyl Chloride	Jan. 8, 2018	0.17	1	0.17
Bromoform	Jan. 8, 2018	0.34	--	0.34
Bromodichloromethane	Jan. 8, 2018	2.3	--	0.26
Chloroform	Jan. 8, 2018	1.9	--	0.29
Dibromochloromethane	Jan. 8, 2018	1.8	--	0.37
Diquat	Jan. 8, 2018	1	70	1
Paraquat	Jan. 8, 2018	1	10	1
Glyphosate	Jan. 8, 2018	1	280	1
PCBs	Jan. 8, 2018	0.04	3	0.04
Benzo(a)pyrene	Jan. 8, 2018	0.004	0.01	0.004
Alachlor	Jan. 8, 2018	0.02	5	0.02
Atrazine+N-daelkylated metabolites	Jan. 8, 2018	0.01	5	0.01
Atrazine	Jan. 8, 2018	0.01	--	0.01
Desethyl atrazine	Jan. 8, 2018	0.01	--	0.01
Azinphos-methyl	Jan. 8, 2018	0.05	20	0.05

Parameter	Sample Date	Result Value	MAC	MDL
Carbaryl	Jan. 8, 2018	0.05	90	0.05
Carbofuron	Jan. 8, 2018	0.01	90	0.01
Chlorpyrifos	Jan. 8, 2018	0.02	90	0.02
Diazinon	Jan. 8, 2018	0.02	20	0.02
Dimethoate	Jan. 8, 2018	0.03	20	0.03
Diuron	Jan. 8, 2018	0.03	150	0.03
Malathion	Jan. 8, 2018	0.02	190	0.02
Metolachlor	Jan. 8, 2018	0.01	50	0.01
Metribuzin	Jan. 8, 2018	0.02	80	0.02
Phorate	Jan. 8, 2018	0.01	2	0.01
Prometryne	Jan. 8, 2018	0.03	1	0.03
Simazine	Jan. 8, 2018	0.01	10	0.01
Terbufos	Jan. 8, 2018	0.01	1	0.01
Triallate	Jan. 8, 2018	0.01	230	0.01
Trifluralin	Jan. 8, 2018	0.02	45	0.02
2,4-dichlorophenoxyacetic acid	Jan. 8, 2018	0.19	100	0.19
2,4,5-trichlorophenoxyacetic acid	Jan. 8, 2018	0.22	280	0.22
Bromoxynil	Jan. 8, 2018	0.33	5	0.33
Dicamba	Jan. 8, 2018	0.20	120	0.20
Dichlofop-methyl	Jan. 8, 2018	0.40	9	0.40
Dinoseb	Jan. 8, 2018	0.36	10	0.36
MCPA (mg/L)	Jan. 8, 2018	0.00012	0.1	0.00012
Picloram	Jan. 8, 2018	1	190	1
2,4-dichlorophenol	Jan. 8, 2018	0.15	900	0.15
2,4,6-trichlorophenol	Jan. 8, 2018	0.25	5	0.25
2,3,4,6-tetrachlorophenol	Jan. 8, 2018	0.20	100	0.2
Pentachlorophenol	Jan. 8, 2018	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 2018 flows are provided in the tables below.

FLOW SUMMARY	QUANTITY
Permit to Take Water Limit	Well 1 - 655.2 m ³ /day Well 2 - 280.8 m ³ /day Well 3 - 741.6 m ³ /day
Total Taking	1211.2 m ³ /day
Municipal Drinking Water License Limit	818 m ³ /day
2018 Average Daily Flow	131 m ³ /day
2018 Maximum Daily Flow	312 m ³ /day
2018 Total Amount of Water Supplied	47691 m ³

Summary of Raw Water Flows

Month	Well #1 (m ³)	Well #2 (m ³)	Well #3 (m ³)
January	4767	15	17
February	4263	13	15
March	3794	10	16
April	2487	9	14
May	4008	9	9
June	5344	29	73
July	5372	12	164
August	3661	5	13
September	3330	5	11
October	2782	10	15
November	2391	9	13
December	2548	26	82
TOTAL	44747	152	442

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	5056	163	131	209
February	4527	162	112	200
March	4034	130	74	187
April	2656	89	58	116
May	4257	137	76	218
June	5714	190	109	276
July	5827	188	92	312
August	3867	125	91	180
September	3524	117	67	150
October	2966	96	65	136
November	2541	85	56	104
December	2722	88	64	101
TOTAL	47691			

Appendix A – Flow Charts

