

BASS LAKE WOODLANDS

**Water Supply and
Distribution System
DWS# 220005143**

2017 Summary Report

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



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Issued January 12, 2018

Table of Contents

1. OVERVIEW AND BACKGROUND	4
Safe Drinking Water Act	4
Municipal Drinking Water Licensing Program	4
2. INTRODUCTION	5
System and Process Description	5
Source Water	5
Raw Water Characteristics	5
Water Treatment	5
Water Distribution	5
3. REGULATORY COMPLIANCE	6
Ontario Regulation 170/03	6
Ontario Regulation 169/03	6
Ontario Regulation 128/04	6
Wells Regulation 903	6
Drinking Water Quality Management Standard (DWQMS)	6
Municipal Drinking Water License	6
Drinking Water Works Permit License	7
Summary of Non-Compliance and Adverse Water Quality Incidents	7
DWQMS & Municipal Drinking Water Licensing Program	7
Third Party Audit and Accreditation	7
Internal Audit	7
Management Review	7
4. SYSTEM IMPROVEMENTS AND MAINTENANCE	8
5. MICROBIOLOGICAL TESTING	8
E. Coli and Total Coliform	8
Heterotrophic Plate Count (HPC)	9
Chlorine Residual and Turbidity	9

6. CHEMICAL TESTING	10
Understanding Chemical Test Results	10
7. WATER QUANTITY	13
8. APPENDIX A – FLOW CHARTS	15

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 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 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 (#148-202 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

2. 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 water flows, treated water flows, chlorine, pH, and turbidity values. Level sensing probes record the well levels and reservoir level. The plant is equipped with full HMI 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.

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

There were no non-compliances or AWQIs that occurred in 2017.

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. Two (2) new peristaltic chlorine pumps were installed to improve the chemical feed system.
6. Drinking water quality was tested at the water treatment plant and in the distribution system weekly.
7. Two (2) new magnetic flow meters were installed to improve flow monitoring.
8. Well #1 was inspected and rehabilitated to improve source water quality.

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 MOH. 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	165	0 - 0	0 - 40
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 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	99	0 - 6

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 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 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)	364	(0.54 – 0.99) 0.77
Chlorine residual after treatment (mg/L)	CONTINUOUS	(0.96 – 1.04) 0.85
Turbidity after treatment (NTU)	CONTINUOUS	(.05- 0.59) 0.19

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 (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 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)	0.006 - 0.021	0.016	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	2017	6.23	100	0.01

Summary of the most recent sodium and fluoride results

Parameter	Sample Date	Result (µg/L)	MAC (µg/L)	MDL (µg/L)
Sodium	2017	38.8	20	0.01
Fluoride	2013	0.09	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	Oct. 26, 2015	0.02	6	0.02
Arsenic	Oct. 26, 2015	0.5	25	0.2
Barium	Oct. 26, 2015	258	1000	0.02
Boron	Oct. 26, 2015	16.1	5000	0.2
Cadmium	Oct. 26, 2015	0.003	5	0.003
Chromium	Oct. 26, 2015	0.86	50	0.03
Mercury	Oct. 26, 2015	0.01	1	0.01
Selenium	Oct. 26, 2015	0.33	10	0.04
Uranium	Oct. 26, 2015	0.221	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

Parameter	Sample Date	Result Value	MAC	MDL
Trichloroethylene	Oct. 26, 2015	0.44	5	0.44
Vinyl Chloride	Oct. 26, 2015	0.17	2	0.17
Bromoform	Oct. 2, 2017	0.42	--	0.34
Bromodichloromethane	Oct. 2, 2017	3.1	--	0.41
Chloroform	Oct. 2, 2017	1.8	--	0.29
Dibromochloromethane	Oct. 2, 2017	2.4	--	0.37
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
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

Parameter	Sample Date	Result Value	MAC	MDL
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	0.15	100	0.20

7. 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 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	4572	147	127	161
February	4117	147	129	164
March	4589	148	109	187
April	4876	163	112	251
May	5842	188	143	235
June	6121	204	152	305
July	5759	199	148	238
August	6722	217	137	280
September	6145	205	134	188
October	5318	172	122	228
November	4915	164	145	182
December	5083	164	131	200
TOTAL	64060			

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
2017 Average Daily Flow	176 m ³ /day
2017 Maximum Daily Flow	305 m ³ /day
2017 Total Amount of Water Supplied	64060 m ³

8. Appendix A – Flow Charts

