Township of
SEVERN

Water Supply and Distribution System

Bass Lake Woodlands 2023 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 31 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 3) was re-issued on May 20, 2021, and is valid until May 19, 2026. 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 to obtain an MDWL:

- a valid Drinking Water Works Permit (#148-202 Issue Number 3)
- a valid Permit to Take Water for each source (#0578-9JFPKZ)
- an Operational Plan
- must have an Accredited Operating Authority (C0124837-DWQ4-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 Bass Lake Woodlands Water Treatment and Distribution System (DWS# 2200051). 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 32m^3 baffled chlorine contact chamber and then into the 136m^3 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 2.8km of 150mm PVC water main. There are 4 sample stations and 3 blow-offs located throughout the system.

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 and 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 was one Adverse Water Quality Incidents that occurred in 2023.

- Bass Lake Woodlands had a five-year reporting period for sodium. On October 27, 2023, sodium lab results of 57.9 mg/L exceeded the limit of 20 mg/L.

DWQMS and 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).

From October 11 to October 13, 2023, NSF International completed a onsite audit with no corrective actions required.

Internal Audit

As per the DWQMS, an internal audit is to be conducted once per year. September 1, 6, and 7, 2023, an internal audit was conducted by Acclaims Environmental. The findings were included during the 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 February 15, 2023,

and August 29, 2023. The review included findings from the internal and external audits, MECP inspections and other prescribed items.

Annual Operations Summary

System Improvements and Maintenance

The following maintenance and improvements were carried out in 2023 to provide the highest possible drinking water quality:

- The water distribution system was directionally flushed to maintain the drinking water quality.
- Over 25 per cent 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.
- Reservoirs were inspected.
- Piping rehab was completed off high lift pumps.
- Engineering was completed for the installation of two new wells.

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 Medical Officer of Health (MOH). Resamples and other required actions are undertaken as quickly as possible.

The results from the 2023 sampling program are shown on the table below.

Type of Water	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	158	0 - 0	0 - 39
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 2023 sampling program are shown on the table below.

Type of Water	Number of Samples	Range of HPC Results (cfu/1ml) (Min – Max)
Treated Water	156	0 - 420

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 2023. The results from the 2023 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 2023 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	(0.96 - 1.45) 1.23
Chlorine residual after treatment (mg/L)	Continuous	(1.09 - 1.47) 1.28
Turbidity after treatment (NTU)	Continuous	(0.05 - 0.19) 0.08

Chemical Testing

The Safe Drinking Water Act requires periodic testing of the water for different chemical parameters. The latest results are provided below. 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 three 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)	1.66-1.91	1.79	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	2023	8.20	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	2023	< 5.3	80	5.3

Summary of the most recent sodium, fluoride and hardness results.

Parameter	Sample Date	Result (mg/L)	MAC (mg/L)	MDL (mg/L)
Sodium	2023	57.8	20	0.01
Fluoride	2023	0.06	1.5	0.06
Hardness	2023	292	N/A	0.05

Summary of the most recent lead testing results.

Parameter	Sample Date	Result Range (Min – Max)	Number of samples	Acceptable Level
Distribution Alkalinity	2023	224 – 229 mg/L	2	30-500 mg/L
Distribution pH	2023	7.7 – 8.6	2	6.5-8.5
Distribution Lead	2023	0.03 – 0.17 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. 23, 2023	0.6	6	0.6
Arsenic	Oct. 23, 2023	0.2	10	0.2
Barium	Oct. 23, 2023	283	1000	0.02
Boron	Oct. 23, 2023	19	5000	2
Cadmium	Oct. 23, 2023	0.003	5	0.003
Chromium	Oct. 23, 2023	1.38	50	0.08
Mercury	Oct. 23, 2023	0.01	1	0.01
Selenium	Oct. 23, 2023	0.12	50	0.04
Uranium	Oct. 23, 2023	0.221	20	0.002
Benzene	Oct. 23, 2023	0.32	1	0.32
Carbon tetrachloride	Oct. 23, 2023	0.17	2	0.17
1,2-Dichlorobenzene	Oct. 23, 2023	0.41	200	0.41
1,4-Dichlorobenzene	Oct. 23, 2023	0.36	5	0.36
1,1-Dichloroethylene	Oct. 23, 2023	0.33	14	0.33
1,2-Dichloroethane	Oct. 23, 2023	0.35	5	0.35
Dichloromethane	Oct. 23, 2023	0.35	50	0.35
Monochlorobenzene	Oct. 23, 2023	0.3	80	0.3
Tetrachloroethylene	Oct. 23, 2023	0.35	10	0.35
Trichloroethylene	Oct. 23, 2023	0.44	5	0.44
Vinyl Chloride	Oct. 23, 2023	0.17	1	0.17
Bromoform	Oct. 23, 2023	0.57	--	0.34
Bromodichloromethane	Oct. 23, 2023	3.8	--	0.26
Chloroform	Oct. 23, 2023	3.2	--	0.29
Dibromochloromethane	Oct. 23, 2023	3.2	--	0.37
Diquat	Oct. 23, 2023	1	70	1
Paraquat	Oct. 23, 2023	1	10	1
Glyphosate	Oct. 23, 2023	1	280	1
PCBs	Oct. 23, 2023	0.04	3	0.04
Benzo(a)pyrene	Oct. 23, 2023	0.004	0.01	0.004
Alachlor	Oct. 23, 2023	0.02	5	0.02
Atrazine+N-daelkylated metabolites	Oct. 23, 2023	0.01	5	0.01
Atrazine	Oct. 23, 2023	0.01	--	0.01

Parameter	Sample Date	Result Value	MAC	MDL
Desethyl atrazine	Oct. 23, 2023	0.01	--	0.01
Azinphos-methyl	Oct. 23, 2023	0.05	20	0.05
Bromoacetic Acid	Oct. 23, 2023	2.9		2.9
Carbaryl	Oct. 23, 2023	0.05	90	0.05
Chloroform	Oct. 23, 2023	3.5		.29
Chloroacedic Acid	Oct. 23, 2023	4.7		4.7
Carbofuron	Oct. 23, 2023	0.01	90	0.01
Chlorpyrifos	Oct. 23, 2023	0.02	90	0.02
Diazinon	Oct. 23, 2023	0.02	20	0.02
Dimethoate	Oct. 23, 2023	0.06	20	0.06
Diuron	Oct. 23, 2023	0.03	150	0.03
Dichloroacetic Acid	Oct. 23, 2023	2.6		2.6
Dibromoacetic Acid	Oct. 23, 2023	2.0		2.0
Desethyl atrazine	Oct. 23, 2023	0.01		.01
Malathion	Oct. 23, 2023	0.02	190	0.02
Metolachlor	Oct. 23, 2023	0.01	50	0.01
Metribuzin	Oct. 23, 2023	0.02	80	0.02
Phorate	Oct. 23, 2023	0.01	2	0.01
Prometryne	Oct. 23, 2023	0.03	1	0.03
Simazine	Oct. 23, 2023	0.01	10	0.01
Terbufos	Oct. 23, 2023	0.01	1	0.01
Triallate	Oct. 23, 2023	0.01	230	0.01
Trifluralin	Oct. 23, 2023	0.02	45	0.02
2,4-dichlorophenoxyacetic acid	Oct. 23, 2023	0.19	100	0.19
Bromoxynil	Oct. 23, 2023	0.33	5	0.33
Dicamba	Oct. 23, 2023	0.20	120	0.20
Dichlofop-methyl	Oct. 23, 2023	0.40	9	0.40
MCPA (mg/L)	Oct. 23, 2023	0.00012	0.1	0.00012
Picloram	Oct. 23, 2023	1	190	1
2,4-dichlorophenol	Oct. 23, 2023	0.15	900	0.15
2,4,6-trichlorophenol	Oct. 23, 2023	0.25	5	0.25
2,3,4,6-tetrachlorophenol	Oct. 23, 2023	0.20	100	0.20

Parameter	Sample Date	Result Value	MAC	MDL
Pentachlorophenol	Oct. 23, 2023	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.

A summary of the 2023 flows is 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 Limit	1211.2 m^3/day
Municipal Drinking Water License Limit	818 m^3/day
2023 Average Daily Flow	105 m^3/day
2023 Maximum Daily Flow	256 m^3/day
2023 Total Amount of Water Supplied	38357 m^3

Summary of Raw Water Flows

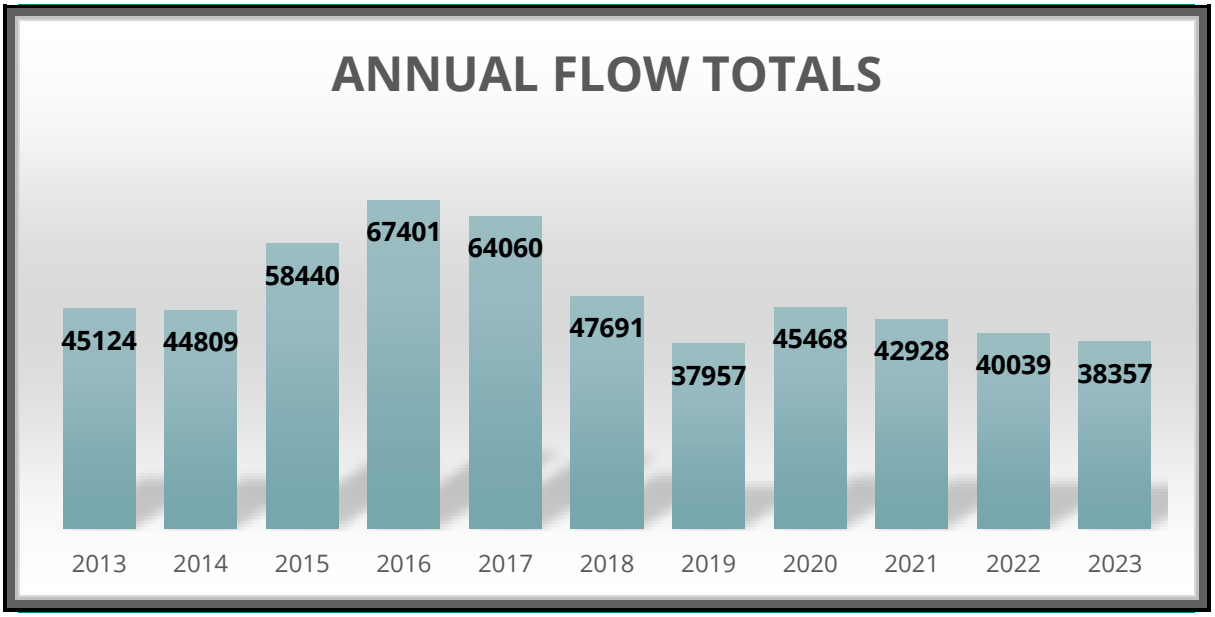
Month	Well #1 (m^3)	Well #2 (m^3)	Well #3 (m^3)
January	14	14	2394
February	11	9	2131
March	9	8	2434
April	7	8	2455
May	8	9	3858
June	61	10	4786
July	15	11	3628
August	14	12	3781
September	9	5	3880
October	7	4	2733
November	6	18	2393
December	11	35	2496
TOTAL	**37283**		

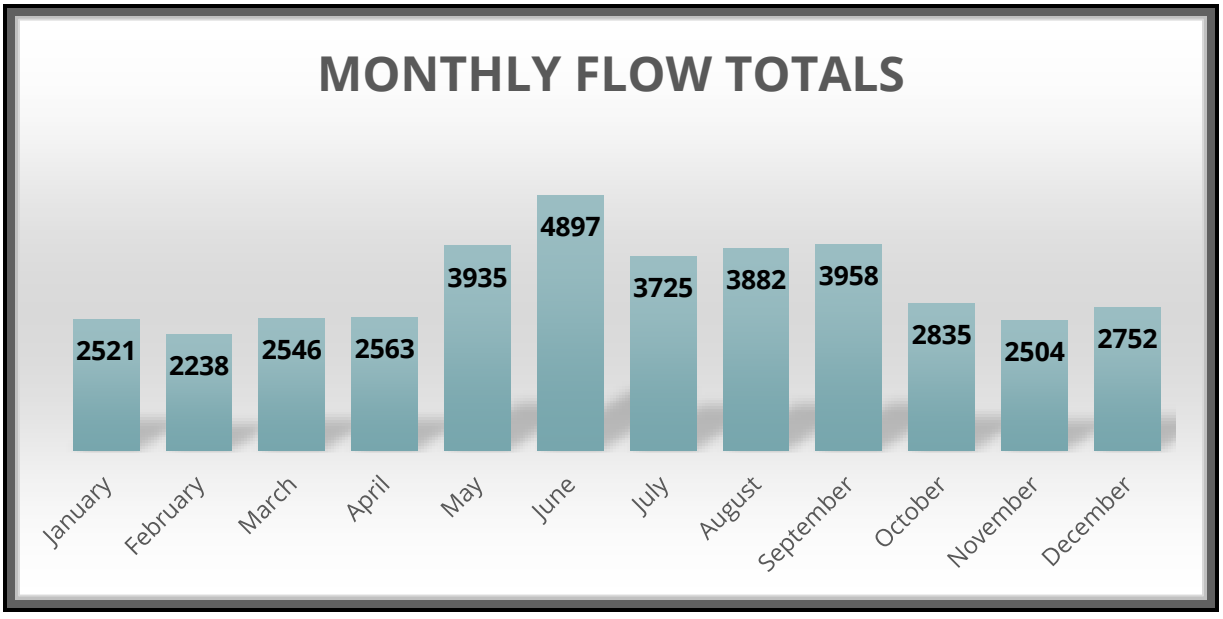
Summary of Distribution Flows

Month	Monthly Total (m^3)	Average Daily Flow (m^3/day)	Minimum Daily Flow (m^3/day)	Maximum Daily Flow (m^3/day)
January	2521	81	61	94
February	2238	80	57	90
March	2546	82	64	113
April	2563	85	55	95
May	3935	131	76	208
June	4897	163	97	256
July	3725	120	97	141
August	3882	125	91	168
September	3958	132	98	152
October	2835	91	66	134
November	2504	83	54	106
December	2752	89	62	112
TOTAL	**38357**			

Flow Charts

*Note all values are in (m^3).





Appendix A

Common Acronyms

Regulatory and Compliance

MECP	Ministry of Environment, Conservation and Parks *(formerly Ministry of the Environment)*
DWQMS	Drinking Water Quality Management System
QMS	Quality Management System
PTTW	Permit to Take Water
MDWL	Municipal Drinking Water License
DWWP	Drinking Water Works Permit
C of A	Certificate of Approval
DWS	Drinking Water System
AWQI	Adverse Water Quality Incident
BWA	Boil Water Advisory
ORO	Overall Responsible Operator
OIC	Operator in Charge
OFI	Opportunity for Improvement
BMP	Best Management Practices

Parameters and Measurements

ppm	parts per million
mg/L	milligrams per litre
µg/L	micrograms per litre
mj/cm^2	millijoule per square centimeter
psi	pounds per square inch
w/m^2	watt per square meter
THM	Trihalomethane
HAA	Haloacetic Acid
UV	Ultra Violet
CCP	Critical Control Point

Facilities and Training/Licensing

OWWCO	Ontario Water Wastewater Certification Office
WCWC	Walkerton Clean Water Centre
OIT	Operator in Training
WTP	Water Treatment Plant
CEU	Credited Education Units

Other

GAC	Granular Activated Carbon
VFD	Variable Frequency Drive
HL	High Lift (pump)
SCADA	Supervisory Control and Data Acquisition
LL	Low Lift (pump)