



— Township of —

**SEVERN**

Water Supply and Distribution System

# **West Shore 2021 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 (#148-106 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 in order to obtain an MDWL:

- A valid Drinking Water Works Permit (#148-206 Issue Number 3)
- A valid Permit to Take Water for each source (#7763-9U4LB4)
- An Operational Plan
- Must have an Accredited Operating Authority (C0124837-DWQ5)
- A Financial Plan approved by Council

## **System and Process Description**

The Corporation of the Township of Severn is the owner and operator of the West Shore Water Supply and Distribution Systems (DWS# 260061958). The system began operation in October of 2005. It currently has approximately 991 residential and commercial service connections. It also supplies water to the West Shore Beach Club distribution system that is comprised of approximately 86 connections. It is classified as a Class 2 Water Treatment system and a Class 2 Water Distribution system.

## **Source Water**

The West Shore Water Supply and Distribution System obtains its raw water from Lake Couchiching. The area of Lake Couchiching and Lake Simcoe combined is approximately 76,285ha with a total drainage area of approximately 3,850km<sup>2</sup>. Lake Couchiching is part of the Trent Severn Waterway and is a controlled body of water with monitored water levels. Lake Couchiching has a surface area of 44.75 km<sup>2</sup> with a maximum depth of 12m and a mean depth of 6m. The lake and its immediate watershed are underlain by limestone bedrock in the southern and western areas with Precambrian bedrock along the northern and eastern areas.

## **Raw Water Characteristics**

The raw water is of low turbidity and is of acceptable pH. Temperatures will range between seasons from as low as 2.5 °C during the winter months and up to 20 °C during the summer months.



## **Water Treatment**

The water treatment plant is located at 3333 New Brailey Line. The water treatment plant is comprised of two packaged treatment plant trains which consist of coagulation, flocculation, sedimentation, filtration, and backwashing. The control and instrumentation include influent and effluent magnetic flow meters on each treatment train, four turbidity meters (raw and one on each treatment train and a final), level sensors and pressure differential sensors. Once filtered, water is then pumped to GAC filtration. Primary disinfection is achieved with two (one duty, one standby) ultraviolet (UV) systems. Secondary disinfection then takes place by sodium hypochlorite. Water is then stored in an underground reservoir with a total storage volume of 2143 m<sup>3</sup>.

Water is delivered to the distribution system by three VFD driven vertical turbine high lift pumps to supply water for domestic use and firefighting. Pressure in the distribution system is maintained between 60-65 PSI.

Online analyzers monitor and record raw, filtered and distribution water flows, raw water turbidity, pH and temperature, filtered water turbidity and treated water turbidity, free chlorine residual, pH and temperature. The plant is also equipped with full SCADA control.

A 500-kW diesel generator provides emergency backup power to the water and wastewater treatment systems.

## **Water Distribution**

The distribution system is comprised of 19 km of PVC water main ranging in size between 150 mm and 300 mm. There are 12 sample stations, 127 fire hydrants and 7 private hydrants connected to 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 & 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 were NO adverse water quality incident in 2021.

## **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).

On December 2 and 3, 2021, NSF International completed a satellite audit with one corrective action required. The findings are included during Management Review.

### **Internal Audit**

As per the DWQMS, an internal audit is to be conducted once per year. November 3-4, 2021, an internal audit was conducted by 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 16, 2021, and December 16, 2021. 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 2021 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.
- Fire hydrants painted and color coded.
- High lift #2 rebuilt.
- Two new Trojan UV systems installed.
- Fire flow testing completed.

## 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 are from the 2021 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	52	0 - 20	0 - 560
Treated	230	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 2021 sampling program are shown on the table below.

Type of Water	Number of Samples	Range of HPC Results (cfu/1ml) (Min - Max)
Distribution	131	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 2021. The results from the 2021 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 2021 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	(0.95 – 1.88) 1.39
Chlorine residual after treatment (mg/L)	CONTINUOUS	(1.24 – 1.91) 1.60
Turbidity after treatment (NTU)	CONTINUOUS	(0.05 – 0.19) 0.07

## 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 3 months in normal operation.

Parameter	Result Range Min - Max	Average	MAC (mg/L)	MDL (mg/L)
Nitrite (mg/L)	0.003 - 0.059	0.029	1	0.003
Nitrate (mg/L)	0.003 - 0.104	0.046	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	2021	41.75	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	2021	26.68	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	2021	37.5	20	0.01
Fluoride	2021	0.06	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	2021	67 - 93 mg/L	2	30 - 500 mg/L
Distribution pH	2021	7.0 - 7.5	2	6.5 - 8.5
Distribution Lead	2021	0.04 - 0.54 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. 28, 2021	0.6	6	0.6
Aluminum	Oct. 29, 2021	16	--	--
Arsenic	Oct. 28, 2021	0.3	10	0.2
Barium	Oct. 28, 2021	26.2	1000	0.02
Boron	Oct. 28, 2021	21	5000	2
Cadmium	Oct. 28, 2021	0.003	5	0.003
Chromium	Oct. 28, 2021	0.23	50	0.08
Mercury	Oct. 27, 2021	0.01	1	0.01
Selenium	Oct. 28, 2021	0.04	50	0.04
Uranium	Oct. 28, 2021	0.018	20	0.002
Benzene	Oct. 26, 2021	0.32	1	0.32
Carbon tetrachloride	Oct. 26, 2021	0.17	2	0.17
1,2-Dichlorobenzene	Oct. 26, 2021	0.41	200	0.41
1,4-Dichlorobenzene	Oct. 26, 2021	0.36	5	0.36
1,1-Dichloroethylene	Oct. 26, 2021	0.33	14	0.33
1,2-Dichloroethane	Oct. 26, 2021	0.35	5	0.35
Dichloromethane	Oct. 26, 2021	0.35	50	0.35
Monochlorobenzene	Oct. 26, 2021	0.3	80	0.3
Tetrachloroethylene	Oct. 26, 2021	0.35	10	0.35
Trichloroethylene	Oct. 26, 2021	0.44	5	0.44
Vinyl Chloride	Oct. 26, 2021	0.17	1	0.17
Bromoform	Oct. 26, 2021	0.34	--	0.34
Bromodichloromethane	Oct. 26, 2021	13	--	0.26
Chloroform	Oct. 26, 2021	34	--	0.29
Dibromochloromethane	Oct. 26, 2021	3.7	--	0.37
Diquat	Nov. 2, 2021	<1	70	1
Paraquat	Nov. 2, 2021	<1	10	1
Glyphosate	Nov. 1, 2021	<1	280	1
PCBs	Oct. 29, 2021	0.04	3	0.04

Parameter	Sample Date	Result Value	MAC	MDL
Benzo(a)pyrene	Oct. 28, 2021	0.004	0.01	0.004
Alachlor	Oct. 28, 2021	0.02	5	0.02
Atrazine+N-daelkylated metabolites	Oct. 28, 2021	0.01	5	0.01
Atrazine	Oct. 28, 2021	0.01	--	0.01
Desethyl atrazine	Oct. 28, 2021	0.01	--	0.01
Azinphos-methyl	Oct. 28, 2021	0.05	20	0.05
Carbaryl	Oct. 28, 2021	0.05	90	0.05
Carbofuron	Oct. 28, 2021	0.01	90	0.01
Chlorpyrifos	Oct. 28, 2021	0.02	90	0.02
Diazinon	Oct. 28, 2021	0.02	20	0.02
Dimethoate	Oct. 28, 2021	0.06	20	0.06
Diuron	Oct. 28, 2021	0.03	150	0.03
Malathion	Oct. 28, 2021	0.02	190	0.02
Metolachlor	Oct. 28, 2021	0.01	50	0.01
Metribuzin	Oct. 28, 2021	0.02	80	0.02
Phorate	Oct. 28, 2021	0.01	2	0.01
Prometryne	Oct. 28, 2021	0.03	1	0.03
Simazine	Oct. 28, 2021	0.01	10	0.01
Terbufos	Oct. 28, 2021	0.01	1	0.01
Triallate	Oct. 28, 2021	0.01	230	0.01
Trifluralin	Oct. 28, 2021	0.02	45	0.02
2,4-dichlorophenoxyacetic acid	Nov. 2, 2021	0.19	100	0.19
Bromoxynil	Nov. 2, 2021	0.33	5	0.33
Dicamba	Nov. 2, 2021	0.20	120	0.20
Diclofop-methyl	Nov. 2, 2021	0.40	9	0.40
MCPA (mg/L)	Nov. 2, 2021	0.00012	0.1	0.00012
Picloram	Nov. 2, 2021	<1	190	1
2,4-dichlorophenol	Nov. 2, 2021	0.15	900	0.15
2,4,6-trichlorophenol	Nov. 2, 2021	0.25	5	0.25
2,3,4,6 tetrachlorophenol	Nov. 2, 2021	0.20	100	0.20
Pentachlorophenol	Nov. 2, 2021	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 2021 flows is provided in the tables below.

Flow Summary	Quantity
Permit to Take Water Limit	3041 m <sup>3</sup> /day
Municipal Drinking Water License Limit	2780 m <sup>3</sup> /day
2021 Average Daily Flow	659 m <sup>3</sup> /day
2021 Maximum Daily Flow	1059 m <sup>3</sup> /day
2021 Total Amount of Water Supplied	240468 m <sup>3</sup>

### Summary of Raw Water Flows

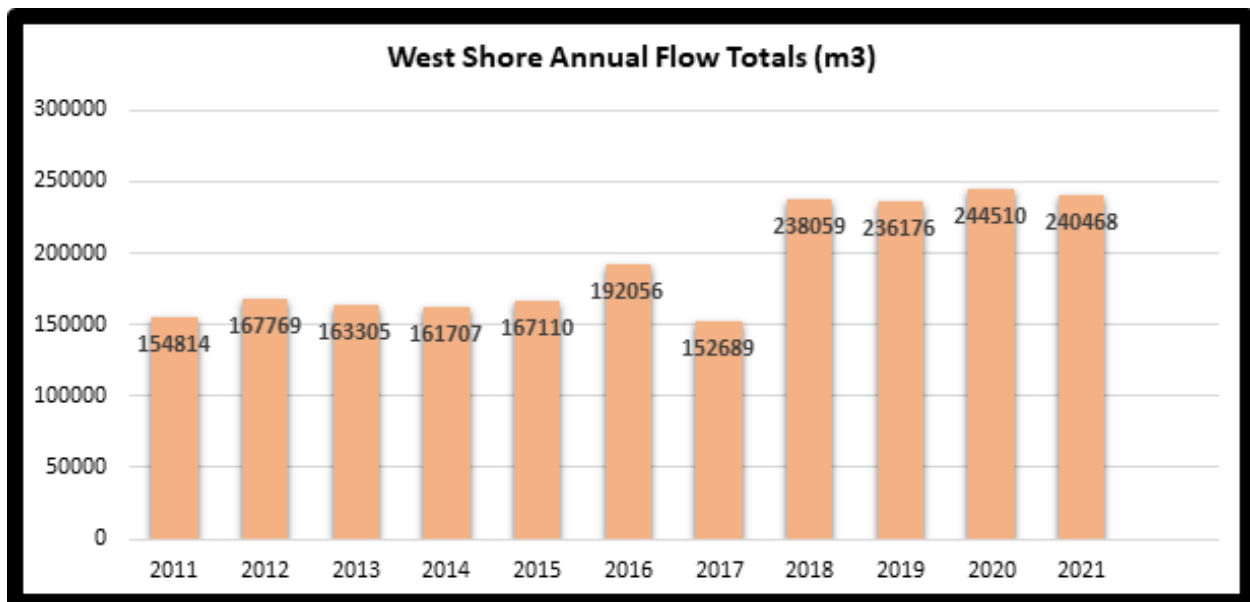
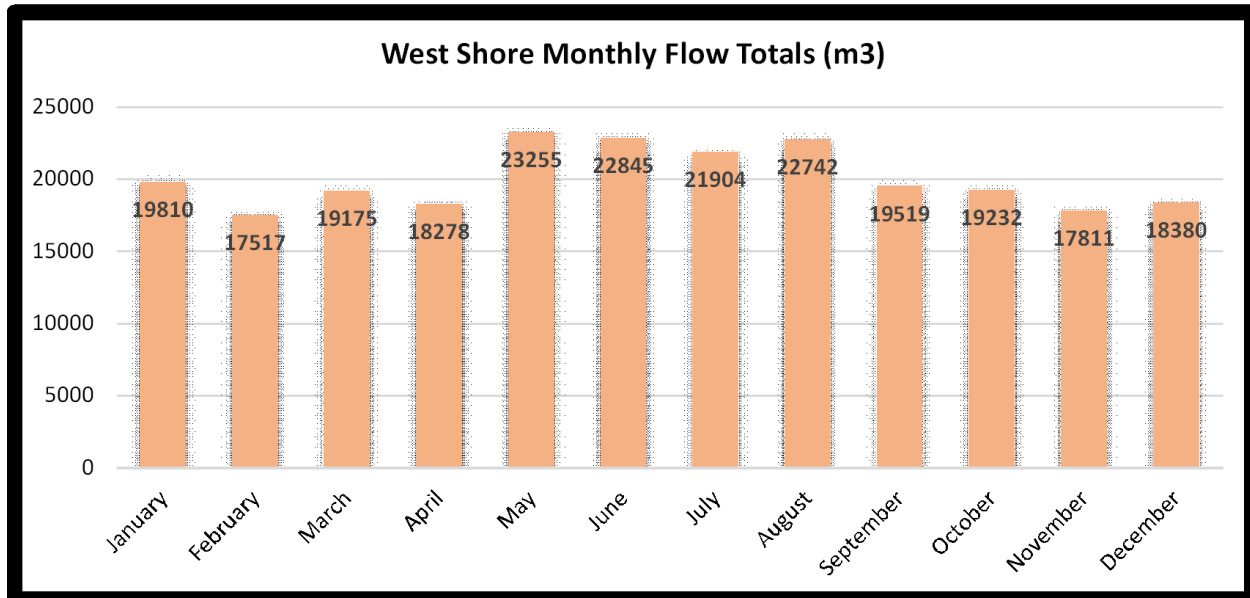
Month	Monthly Total (m <sup>3</sup> )	
January	10667	11789
February	9408	10568
March	10503	11119
April	10069	10450
May	12644	12892
June	11298	13823
July	11806	12789
August	14375	12098
September	10825	12107
October	10989	11634
November	10587	9313
December	9606	11034
<b>TOTAL</b>	<b>132777</b>	<b>139616</b>
<b>COMBINED TOTAL</b>	<b>272392</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	19810	639	515	713
February	17517	626	497	727
March	19175	619	543	722
April	18278	609	474	661
May	23255	750	585	897
June	22845	761	606	1059
July	21904	707	566	779
August	22742	734	575	894
September	19519	651	455	746
October	19232	620	439	823
November	17811	594	464	686
December	18380	593	499	642
<b>Total</b>	<b>240468</b>			



# Flow Charts



# Appendix A

## Common Acronyms

### Regulatory and Compliance

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

## Parameters and Measurements

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

## Facilities and Training/Licensing

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

## Other

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