Township of
SEVERN

Water Supply and Distribution System

Washago
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 (#148-104 Issue Number 4) 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 (#148-204 Issue Number 4)
- a valid Permit to Take Water for each source (#7611-APGJ7S)
- an Operational Plan
- must have an Accredited Operating Authority (C0124837-DWQ4-C0124836)
- a Financial Plan approved by Council

System and Process Description

The Corporation of the Township of Severn is the owner and operator of the Washago Supply and Distribution System (DWS#220005161). The system was constructed in 1984. It currently has 124 residential and commercial service connections. It also supplies water to the Knob Hill/Somerset system that is comprised of 20 connections, owned by the Township of Ramara and operated by Ontario Clean Water Agency. It is classified as a Class 2 Water Treatment system and a Class 2 Water Distribution system.

Source Water

The Washago Water Supply and Distribution System obtains its raw water from Lake Couchiching. The area of Lake Couchiching and Lake Simcoe combined is approximately 76,285 hectares with a total drainage area of approximately 3,850 square kilometres (km^2). 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^2 with a maximum depth of 12 metres (m) and a mean depth of 6m. The Lake and its immediate watershed are underlain by limestone bedrock in the southern and western areas and with Precambrian bedrock along the northern and eastern areas.

Raw Water Characteristics

The raw water is of low turbidity and is of acceptable pH. The temperature varies widely between summer and winter. Raw water temperature can range from 0.5° Celsius to 25° Celsius.

Water Treatment

The Washago water treatment plant is located at 3398 Quetton Street. Raw water is treated through two Culligan filtration systems followed by GAC filtration. Primary disinfection takes place in the form of chlorine dioxide. The system also uses sodium hypochlorite for secondary disinfection. Water is delivered to the distribution system by three vertical turbine high lift pumps discharging the treated water through a common header.

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

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

Water Distribution

The distribution system is comprised of 8.3 kilometres (km) of PVC water main ranging in size between 19 millimetres (mm) and 200 mm. There are 4 sample stations, 10 municipal fire hydrants and 1 private hydrant connected to the system. There is a recirculation line at dead ends of the system, water is circulated back to the water treatment plant. This ensures that the water at the ends of the distribution system maintains a chlorine residual.

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 were two adverse water quality incidents that occurred in 2023.

- Washago had a five-year reporting period for sodium. On October 27, 2023, sodium lab results of 34.4 mg/L exceeded the limit of 20 mg/L.
- July 26, 2023, lab results for Total Coliforms and E coli exceeded the limits of 0 mg/L. System was resampled with no exceedances.

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). October 11 to 13, 2023, NSF International completed an onsite audit with no non-conformances noted.

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 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.
- New chlorine chemical feed system.
- Low lift pump inspection completed.
- New security gate installed.

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 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	52	0 - 20	0 – 1300
Treated	158	0 - 24	0 - 67

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)
Distribution	155	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 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)	363	(0.95 – 1.81) 1.39
Chlorine residual after treatment (mg/L)	CONTINUOUS	(1.11 – 2.07) 1.56
Turbidity after treatment (NTU)	CONTINUOUS	(0.05 – 0.13) 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 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)	0.043 - 0.075	0.062	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	53.0	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	32.06	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	34.4 & 35.5	20	0.01
Fluoride	2023	0.06	1.5	0.06
Hardness	2023	133	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	80- 104 mg/L	2	30 - 500 mg/L
Distribution pH	2023	7.7 – 8.0	2	6.5 - 8.5
Distribution Lead	2023	0.39- 0.40 µg/L	2	0-10 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	0.3	10	0.2
Barium	Oct. 23, 2023	26.4	1000	0.02
Boron	Oct. 23, 2023	15	5000	2
Cadmium	Oct. 23, 2023	0.005	5	0.003
Chromium	Oct. 23, 2023	0.16	50	0.08
Mercury	Oct. 23, 2023	0.01	1	0.01
Selenium	Oct. 23, 2023	0.06	50	0.04
Uranium	Oct. 23, 2023	0.096	20	0.002
Benzene	Oct. 23, 2023	0.32	1	0.32
Bromodichloromethane	Oct. 23, 2023	14		0.26
Bromoform	Oct. 23, 2023	0.34		0.34
Bromoacetic Acid	Oct. 23, 2023	2.9		2.9
Carbon tetrachloride	Oct. 23, 2023	0.17	2	0.17
Chloroacetic Acid	Oct. 23, 2023	4.7		4.7
Chloroform	Oct. 23, 2023	44		0.29
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
Dibromoacetic Acid	Oct. 23, 2023	2		2
Dichloroacetic Acid	Oct. 23, 2023	18.2		2.6
Desethyl atrazine	Oct. 23, 2023	0.01		0.01
Monochlorobenzene	Oct. 23, 2023	0.3	80	0.3
Dibromochloromethane	Oct. 23, 2023	2.9		0.37
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
Diquat	Oct. 23, 2023	<1	70	1

Parameter	Sample Date	Result Value	MAC	MDL
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	0.04	0.01	0.004
Alachlor	Oct. 23, 2023	0.02	5	0.02
Atrazine+N-dealkylated metabolites	Oct. 23, 2023	0.01	5	0.01
Atrazine	Oct. 23, 2023	0.01	--	0.01
Azinphos-methyl	Oct. 23, 2023	0.05	20	0.05
Carbaryl	Oct. 23, 2023	0.05	90	0.05
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
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
Trichloroacetic Acid	Oct. 23, 2023	14.8		
2,4-dichlorophenoxyacetic acid	Oct. 23, 2023	0.19	100	0.19
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

Parameter	Sample Date	Result Value	MAC	MDL
2,3,4,6-tetrachlorophenol	Oct. 23, 2023	0.20	100	0.2
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	544.3 m^3/day
Municipal Drinking Water License Limit	544.3 m^3/day
2023 Average Daily Flow	63m^3/day
2023 Maximum Daily Flow	104 m^3
2023 Total Amount of Water Supplied	23105 m^3

Summary of Raw Water Flows

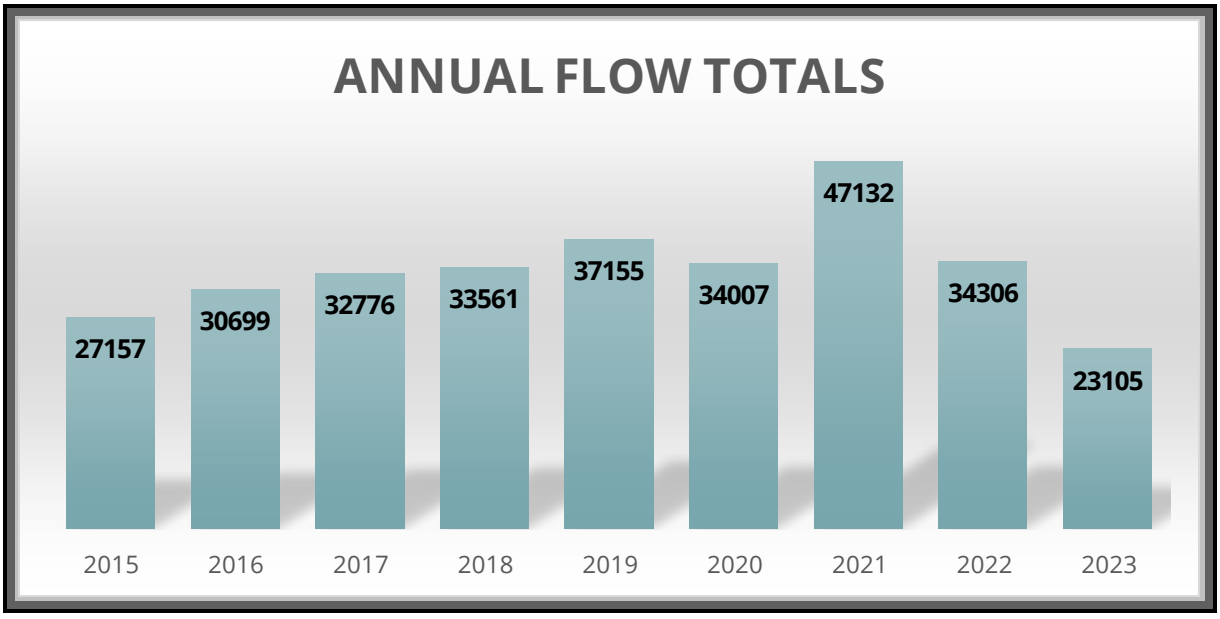
Month	Monthly Total (m^3)
January	2051
February	1702
March	1935
April	1865
May	2043
June	2109
July	2399
August	2420
September	2484
October	2204
November	1990
December	1998
TOTAL	**25200**

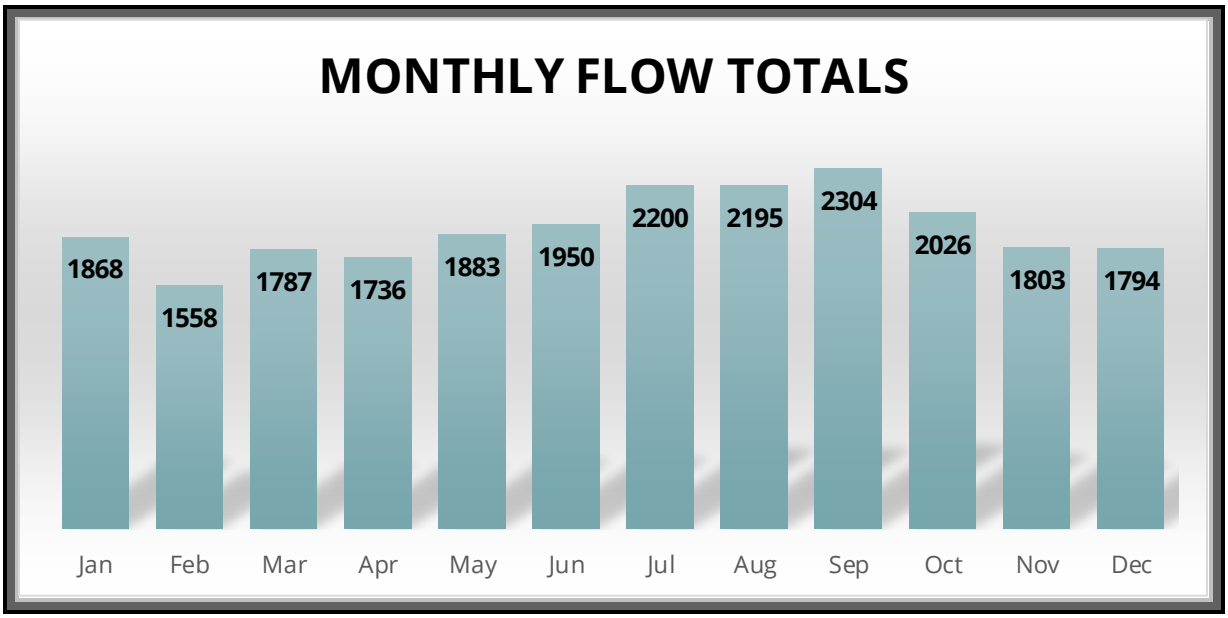
Summary of Distribution Flows

Month	Monthly Total (m^3)	Average Daily Flow (m^3/day)	Minimum Daily Flow (m^3/day)	Maximum Daily Flow (m^3/day)
Month	**Monthly**	**Average**	**Minimum**	**Maximum**
January	1868	60	47	78
February	1558	56	47	66
March	1787	58	47	64
April	1736	58	43	70
May	1883	61	47	73
June	1950	65	52	84
July	2200	71	58	104
August	2195	71	60	92
September	2304	77	60	100
October	2026	65	55	83
November	1803	60	45	66
December	1794	58	49	68
Total	**23105**			

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/cm²	millijoule per square centimeter
psi	pounds per square inch
w/m²	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)