Township of
SEVERN

Water Supply and Distribution System

Sandcastle Estates
2024 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 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 system's 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 (#148-105 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 (#148-205 Issue Number 4)
- a valid Permit to Take Water for each source (04266-APMJMH)
- An Operational Plan
- Must have an Accredited Operating Authority (C0124837-DWQ6- C0124834)
- A Financial Plan approved by the Council

System and Process Description

The Corporation of the Township of Severn is the owner and operator of the Sandcastle Estates Water Supply and Distribution System (DWS# 220010654). The system was initially constructed in the early 1970's and was serviced by a well. In 1986 a new water treatment facility was built, and Lake Couchiching became the new source of water. It currently has 66 residential service connections. It is classified as a Class 2 Water Treatment system and a Class 2 Water Distribution system.

Source Water

The Sandcastle Estates Water Supply and Distribution System obtain 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 kilometers (km2). 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 km2 with a maximum depth of 12 meters (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

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 Sandcastle Estates water treatment plant is located at 3992 Sandcastle Court. Raw water is treated through two Culligan Omni filtration systems. Primary disinfection takes place in the form of ultraviolet treatment. The system also uses sodium hypochlorite for secondary disinfection. Water is delivered to the distribution system by three VFD controlled vertical turbine high lift pumps discharging through a common header. Pressure is maintained with one 450 liters (L) pressure tank.

Online analyzers monitor and record raw and treated water flows, chlorine, pH, UV intensity and turbidity values. A level sensing probe records the reservoir level. The plant is equipped with full SCADA control.

A 75-kilowatt (kW) propane fueled generator provides backup power to the plant and its equipment.

Water Distribution

The distribution system is comprised of 1.2 kilometers (km) of 50 millimeters (mm) and 100 mm PVC water main. There are 2 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 no adverse water quality incident that occurred in 2024.

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). November 11, 2024, 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. August 22 and 29, 2024, an internal audit was conducted by Acclaims Environmental. No non-conformances were noted, and a full report was 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 13, 2024, and September 11, 2024. 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 2024 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.

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

The results from the 2024 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	53	0 - 35	0 - 130
Treated	106	0 - 0	0 - 0

Heterotrophic Plate Count (HPC)

HPC analyses are completed weekly from the distribution water for small 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 2024 sampling program are shown on the table below.

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Type of Water	Number of Samples	Range of HPC Results (cfu/1ml) (Min – Max)

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 MECP and corrective action taken. There were no reportable incidents in 2024. The results from the 2024 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 source water is checked monthly. Turbidity is measured in Nephelometric Turbidity Units (NTU).

The results from the 2024 sampling program are shown on the table below.

Parameter	Number of Tests	Range of Results (Min – Max) Average
Chlorine residual in distribution (mg/L)	105	(1.15 – 1.86) 1.55
Chlorine residual after treatment (mg/L)	CONTINUOUS	(1.26 – 2.18) 1.76
Turbidity after treatment (NTU)	CONTINUOUS	(0.03 – 0.21) 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 liter (mg/L) or micrograms per liter (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)	0.027 – 0.089	0.055	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	2024	61.25	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)

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

Parameter	Sample Date	Result (mg/L)	MAC (mg/L)	MDL (mg/L)
Sodium	2024	39.1	20	0.01
Fluoride	2024	0.06	1.5	0.06
Hardness	2024	135	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	2024	95 – 108 mg/L	2	30 – 500 mg/L
Distribution pH	2024	7.1 – 7.5	2	6.5 – 8.5
Distribution Lead	2024	0.02 – 0.05 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. 21, 2024	0.6	6	0.6
Arsenic	Oct. 21, 2024	0.3	10	0.2
Barium	Oct. 21, 2024	25.4	1000	0.02
Boron	Oct. 21, 2024	20	5000	0.2
Cadmium	Oct. 21, 2024	0.003	5	0.003
Chromium	Oct. 21, 2024	0.14	50	0.08
Mercury	Oct. 21, 2024	0.01	1	0.01
Selenium	Oct. 21, 2024	0.07	50	0.04
Uranium	Oct. 21, 2024	0.105	20	0.002
Benzene	Oct. 21, 2024	0.32	1	0.32
Carbon tetrachloride	Oct. 21, 2024	0.17	2	0.17
1,2-Dichlorobenzene	Oct. 21, 2024	0.41	200	0.41
1,4-Dichlorobenzene	Oct. 21, 2024	0.36	5	0.36
1,1-Dichloroethylene	Oct. 21, 2024	0.33	14	0.33
1,2-Dichloroethane	Oct. 21, 2024	0.35	5	0.35
Dichloromethane	Oct. 21, 2024	0.35	50	0.35
Monochlorobenzene	Oct. 21, 2024	0.3	80	0.3
Tetrachloroethylene	Oct. 21, 2024	0.35	10	0.35
Trichloroethylene	Oct. 21, 2024	0.44	5	0.44
Vinyl Chloride	Oct. 21, 2024	0.17	1	0.17
Diquat	Oct. 21, 2024	<1	70	1
Paraquat	Oct. 21, 2024	<1	10	1
Glyphosate	Oct. 21, 2024	<1	280	1

Parameter	Sample Date	Result Value	MAC	MDL
PCBs	Oct. 21, 2024	0.04	3	0.04
Benzo(a)pyrene	Oct. 21, 2024	0.004	0.01	0.004
Bromoform	Oct. 21, 2024	0.34	--	0.34
Bromodichloromethane	Oct. 21, 2024	0.15	--	0.26
Bromoacetic Acid	Oct. 21, 2024	2.9	--	2.9
Bromoxynil	Oct. 21, 2024	0.33	5	0.33
Alachlor	Oct. 21, 2024	0.02	5	0.02
Atrazine+N-daelkylated metabolites	Oct. 21, 2024	0.03	5	0.01
Atrazine	Oct. 21, 2024	0.02	--	0.01
Desethyl atrazine	Oct. 21, 2024	0.01	--	0.01
Azinphos-methyl	Oct. 21, 2024	0.05	20	0.05
Carbaryl	Oct. 21, 2024	0.05	90	0.05
Carbofuran	Oct. 21, 2024	0.01	90	0.01
Chlorpyrifos	Oct. 21, 2024	0.02	90	0.02
Chloroform	Oct. 21, 2024	54		0.29
Chloroacetic Acid	Oct. 21, 2024	4.7		4.7
Carbofuran	Oct. 21, 2024	0.01	90	0.01
Diazinon	Oct. 21, 2024	0.02	20	0.02
Dimethoate	Oct. 21, 2024	0.06	20	0.03
Diuron	Oct. 21, 2024	0.03	150	0.03
Dibromochloromethane	Oct. 21, 2024	2.5	50	0.35
Dichloroacetic Acid	Oct. 21, 2024	22.3	--	2.6
Dibromoacetic Acid	Oct. 21, 2024	2	--	2
Metribuzin	Oct. 21, 2024	0.02	80	0.02
Phorate	Oct. 21, 2024	0.01	2	0.01

Parameter	Sample Date	Result Value	MAC	MDL
Prometryne	Oct. 21, 2024	0.03	1	0.03
Simazine	Oct. 21, 2024	0.01	10	0.01
Terbufos	Oct. 21, 2024	0.01	1	0.01
Triallate	Oct. 21, 2024	0.01	230	0.01
Trifluralin	Oct. 21, 2024	0.02	45	0.02
Trichloroacetic Acid	Oct. 21, 2024	42.7	--	5.3
2,4-dichlorophenoxyacetic Acid	Oct. 21, 2024	0.19	100	0.19
Dicamba	Oct. 21, 2024	0.20	120	0.20
Dichlofop-methyl	Oct. 21, 2024	0.40	9	0.40
MCPA	Oct. 21, 2024	0.00012	0.1	0.00012
Picloram	Oct. 21, 2024	<1	190	1
2,4-dichlorophenol	Oct. 21, 2024	0.15	900	0.15
2,3,4,6-trichlorophenol	Oct. 21, 2024	0.20	5	.25
Pentachlorophenol	Oct. 21, 2024	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 2024 flows is provided in the tables below.

Flow Summary	Quantity
Permit to Take Water Limit	388.8 m3/day
Municipal Drinking Water License Limit	388.8 m3/day
2024 Average Daily Flow	29 m3/day
2024 Maximum Daily Flow	61 m3/day
2024 Total Amount of Water Supplied	10564 m3

Summary of Raw Water Flows

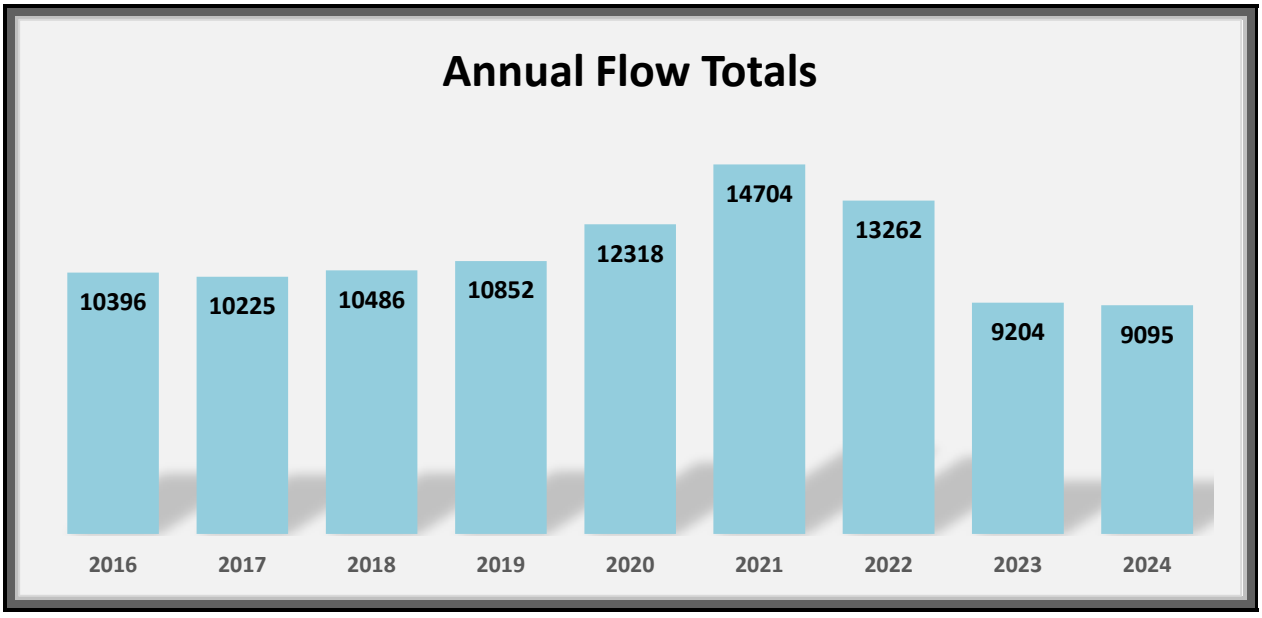
Month	Monthly Total (m3)
January	746
February	704
March	840
April	862
May	979
June	968
July	1071
August	1053
September	871
October	852
November	775
December	842
TOTAL	**10564**

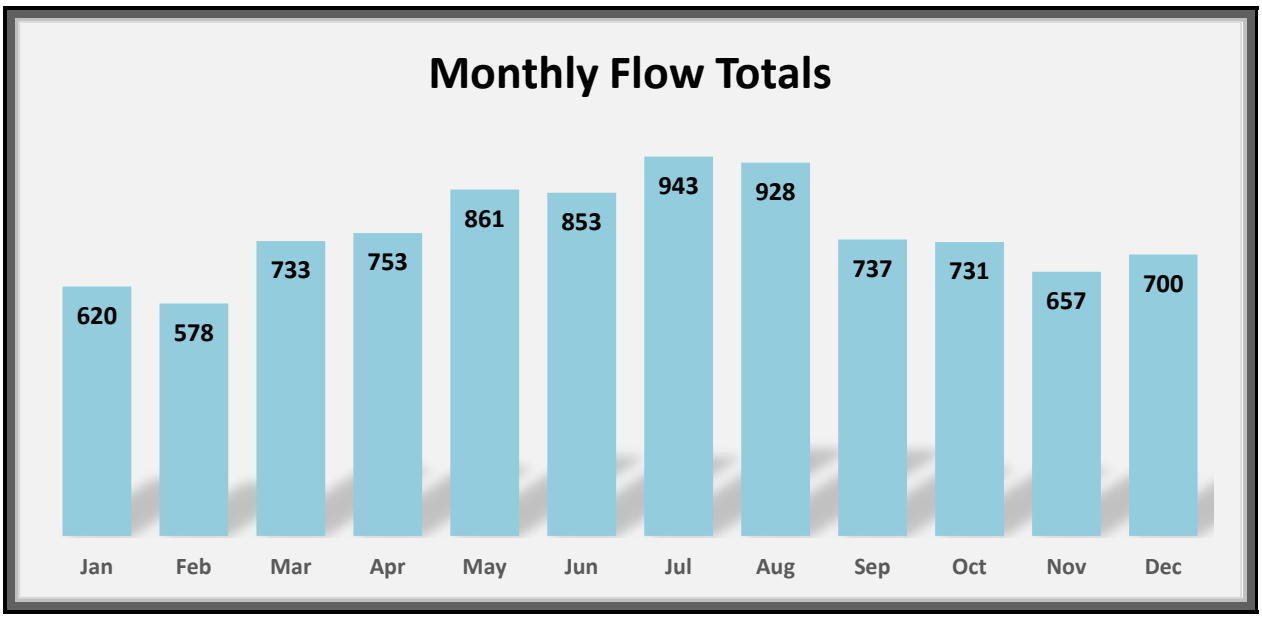
Summary of Distribution Flows

Month	Monthly Total (m3)	Average Daily Flow (m3/day)	Minimum Daily Flow (m3/day)	Maximum Daily Flow (m3/day)
January	620	20	13	23
February	578	20	16	22
March	733	24	15	30
April	753	25	15	30
May	861	28	18	58
June	853	28	21	38
July	943	30	20	37
August	928	30	22	38
September	737	25	16	33
October	731	24	13	29
November	657	22	16	28
December	700	23	18	27
TOTAL	**9095**			

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)