2024

Annual Drinking Water System Report

Sandhurst Shores Drinking Water System

DWS# 220003877

Shore Drive
Sandhurst, Ontario

Prepared: January 2025

Executive Summary

The Sandhurst Shores Water Treatment Plant is a chemically assisted filtration plant that services approximately 101 homes. Due to residential growth within the service area of the Sandhurst Shores, the drinking water system changed from a small to large municipal residential drinking water system in 2021. Reliability of the large municipal residential drinking water system is enhanced by continuous monitoring instrumentation, process alarms, and critical equipment redundancy.

During 2024, the total volume of treated water provided to the community decreased by 13% when compared to the volume produced during 2023. Significant capacity for treated water remains available to the community as the maximum day flow recorded during 2024 represented approximately 25 percent of the plant design capacity. On an average day during 2024, the community used approximately 13 percent of the plant capacity.

Water samples collected throughout the process at varying frequencies were tested for approximately 70 different parameters to evaluate treatment efficiency and to ensure finished water quality. Target parameters range from critical indicators related to potential acute health effects, to non-health related parameters that aid in assessing process efficiency or the aesthetic quality of the drinking water. All samples analyzed during 2024 met the stringent requirements of the Ontario Drinking Water Quality Standards.

The continual provision of safe and reliable municipal water supply requires diligent upkeep and timely replacement of existing equipment, as well as ongoing efforts to improve efficiency and system reliability. Routine preventive maintenance practices were consistently applied throughout 2024 at the Sandhurst Shores Water Treatment Plant. A replacement pressure tank bladder was purchased in 2024, and is expected to be replaced in 2025. A high lift pump motor was also replaced in 2024.

Table of Contents

List of Figures

List of Tables

Key Words & Terms

m^3 /d	cubic metres per day, ($1m^3$ = 1000 litres)
mg/L	milligrams per litre, (1 part in 1,000,000)
ug/L	micrograms per litre, (1 part in 1,000,000,000)
ACU	apparent colour measurement units (standard unit to quantify colour in water)
NTU	nephelometric turbidity units (standard unit to quantify turbidity in water)
MAC	maximum acceptable concentration
IMAC	interim maximum acceptable concentration
AO	aesthetic objective (non-health related)

Coagulation / Flocculation refers to the water treatment chemical processes that convert small particles of suspended solids into larger, more settleable clumps.

Disinfection refers to the process that inactivates disease-causing organisms in water, usually by the addition of chlorine.

***Escherichia Coli* (*E. Coli*)** refers to a subgroup of fecal coliform bacteria that reside in the digestive systems of warm blooded animals. The presence of *E. Coli* in drinking water is a strong indicator of fecal contamination. *E. Coli* is rapidly destroyed by chlorine.

Heterotrophic Plate Count (HPC) is a microbial test method that quantifies levels of heterotrophic bacteria. Most bacteria, including many of those common in drinking water systems, are heterotrophs. Within a distribution system, increases in the density of HPC bacteria are usually the result of bacterial re-growth which is influenced by the quality of the water entering the system, temperature, flow conditions (i.e. stagnation), presence of a disinfectant residual, construction materials, and the availability of nutrients for growth. HPC in drinking water are not considered a direct health threat to the general public.

Inorganic refers to all non-carbon based substances. Common inorganic substances in water include metals, minerals, nutrients, and salts.

ODWQS – refers to the Ontario Drinking Water Quality Standards. The ODWQS define the quality standards, objectives, and guidelines to be followed for the protection of public health through the provision of safe and aesthetically acceptable drinking water supply.

Ontario Regulation 170/03 or O.Reg.170/03 - refers to the Drinking Water Systems Regulation as amended.

Ontario Regulation 169/03 or O.Reg.169/03 - refers to the ODWQS Regulation as amended.

Organic refers to a large group of carbon-based chemical compounds including all animal and vegetable matter plus many synthetic compounds such as pesticides and industrial solvents.

Raw Water is defined as surface (lakes, rivers) or ground water (wells) available as a source of drinking water that has not received any treatment.

Sedimentation refers to the water treatment process that involves reducing the velocity of process water to allow gravity settling of suspended material within relatively large (sedimentation) tanks.

Total Coliform Bacteria are a group of commonly occurring, mostly harmless bacteria that live in soil and water as well as the gut of animals. Their presence in a water sample may be indicative of inadequate filtration and/or inadequate disinfection.

Turbidity refers to a physical characteristic of water that causes a cloudy appearance. Turbidity is caused by the presence of suspended matter. The substances that cause turbidity may be a source of disease causing organisms, and can shield potentially pathogenic organisms from disinfection.

Introduction

The 2024 Annual Drinking Water Report for the Sandhurst Shores Drinking Water System summarizes plant operations and treated water quality with reference to the requirements of Ontario Regulation 170/03 (O.Reg.170/03), Ontario Regulation 169/03 (O.Reg.169/03), Municipal Drinking Water Licence 157-102, Drinking Water Works Permit 157-202, and Permit to Take Water 85-P-4008. This report consolidates the reporting requirements specified as “Annual Report” in O.Reg.170/03, Sec.11, and “Summary Report” in O.Reg.170/03, Schedule 22.

- Section 1 of the report provides a description of the water treatment process.
- Section 2 provides a summary of reports to the Ministry under Subsection 18(1) of the Safe Drinking Water Act (notices of adverse water quality) and Schedule 16, Section 16-4 of O. Reg. 170/03 (notice of inadequate disinfection), as well as any corrective actions taken under Schedule 18.
- Section 3 summarizes the analytical data generated from “in house” analysis as well as contracted analyses conducted at an accredited laboratory in accordance with O.Reg.170/03. Raw and treated water flow rates are also discussed in Section 3. Chemicals used in the treatment process are discussed in both Sections 1 and 3 and are summarized in the tables appearing at the end of this report.
- Maintenance and upgrades carried out during 2024 are summarized in Section 4.

Copies of the Annual Drinking Water Report are available to the public, free of charge, from the Administration Office located at 99-A Advance Avenue in Napanee. Reports are also available on-line at: http://www.greaternapanee.com.

Additional information on drinking water standards in Ontario is available from the Ontario Ministry of the Environment, Conservation and Parks (http://www.ontario.ca).

1 Description of the Treatment Process

Raw Water Supply

Raw water enters the treatment plant through a 250 mm diameter intake pipe which extends approximately 250 m into Lake Ontario and is submerged to a depth of about 12 m. Screens at the plant inlet prevent any large debris from passing into the treatment process. After screening, raw water flows into a tank referred to as a low lift well from where it is pumped to the treatment process. The low lift pumps are controlled by the volume of treated water stored at the plant. As community use lowers the level of the treated water storage tanks, the low lift pumps are activated to replenish the used volume.

Package Plant Treatment Unit

The Sandhurst Shores treatment process combines coagulation, flocculation, sedimentation, and filtration in one large, partitioned steel tank (Figure 1). This integrated process design, which is common in smaller communities, is referred to as a package plant. Within the package plant, raw water first enters a vertical cylinder known as a draft tube. The draft tube contains a turbine that creates a rapid mixing zone where coagulation is induced by the addition of alum and polymer. As the coagulating chemicals mix with the water, flocculation (gathering together) of suspended particles occurs. As flow progresses downstream from the draft tube, velocity decreases within the flocculation zone where baffles gently mix the flocculated solids causing them to collide and join together to form larger clumps prior to entering the settling compartment.

The settling compartment contains a series of inclined hollow 50mm plastic tubes. The inclined tubes are designed to maximize the rate at which flocculated solids settle to the bottom of the tank. The accumulated settled solids are periodically drained from the bottom of the settling compartment to a waste holding tank. The relatively clear water at the top of the settling compartment flows into the dual media (sand and anthracite) filters. The filters remove particulate matter that may remain in suspension following the settling compartment. The filters require regular cleaning which is accomplished by a process referred to as backwashing. Backwashing temporarily reverses flow through the filter and discharges the wash water to a waste holding tank.

Clearwell Storage and Distribution

Treated water is stored within two reservoirs, commonly referred to as the clearwell, with a total capacity of 227 m^3. The reservoirs are located below the package plant. Currently, only one clearwell reservoir is being used. Water from the clearwell is pumped to the distribution system using one of three high lift pumps (1 duty and 2 standbys). Constant distribution system pressure is maintained by a variable speed pump controller and two large pressure tanks.

Waste Residuals Treatment

Waste residuals generated through the treatment process, which includes settling compartment solids and filter backwash water, are discharged from the package plant to a waste holding tank. The thickened, settled material at the bottom of the waste holding tank is withdrawn and hauled to the Napanee Water Pollution Control Plant for further treatment. The relatively clear top treated portion of the waste tank volume is pumped to an exfiltration pit located west of the treatment plant building. The exfiltration pit contains a large volume of granular material that allows the treated water to gradually seep into the surrounding soil.

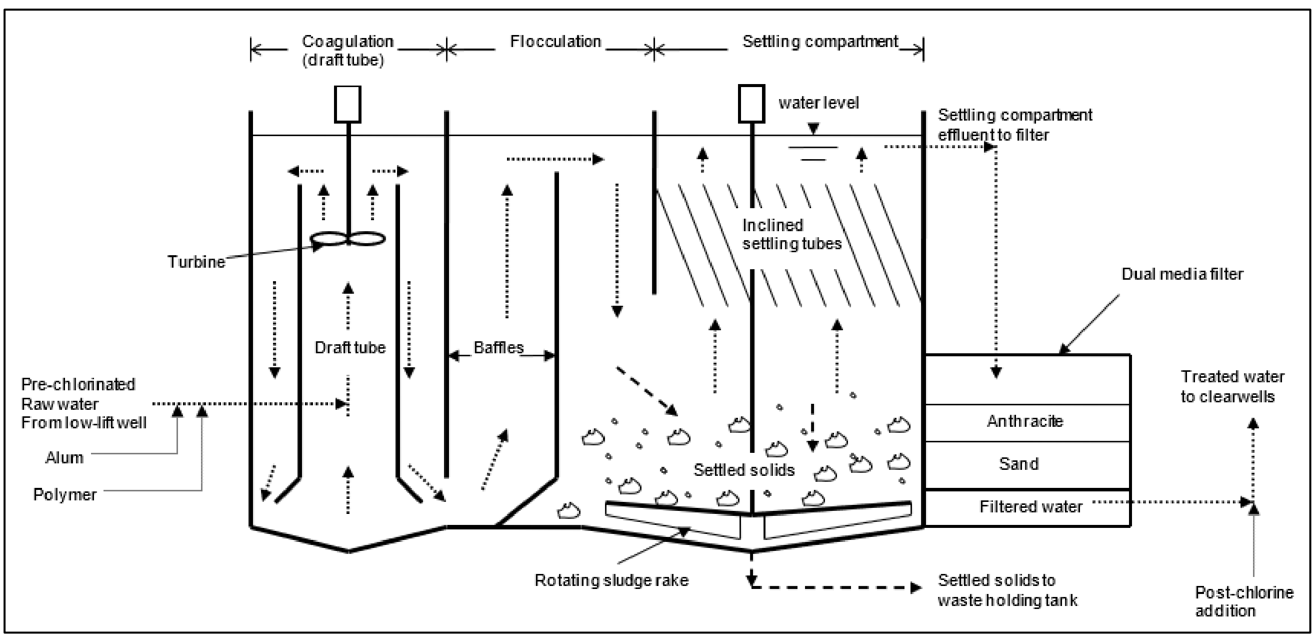

Figure 1: Sandhurst Shores Package Treatment Process Schematic

Disinfection and Zebra Mussel Control

The Sandhurst Shores water supply is dosed with chlorine at two points; one for pre-chlorination / Zebra Mussel control upstream from the package treatment process, and the other for post-chlorination immediately following the package treatment process.

Pre-chlorination is applied at the opening of the Lake Ontario intake pipe. Although marginally useful for initial disinfection, the primary role of pre-chlorination is to control nuisance biological growth and Zebra Mussel infestation within the raw water intake pipe.

Disinfection of treated water (post-chlorination) occurs as the filtered water enters the clearwell. Post-chlorination is a critical and final disinfection step prior to distributing the water to the community. Post-chlorination dosing is adjusted to optimize the inactivation of potentially harmful bacteria, and to ensure that a sufficient concentration of chlorine persists throughout the distribution system. Distribution system chlorine residual prevents biological growth at the farthest reaches of the system.

Treatment Chemicals

Three chemicals; sodium hypochlorite, aluminum sulfate (alum), and polymer are used in the Sandhurst Shores water treatment process.

Sodium hypochlorite contains approximately 12 percent chlorine and is added to the system to control biological growth and ultimately to inactivate pathogens that may be present in the raw water. The sodium hypochlorite solution meets the requirements of the Canadian General Standards Board and American Water Works Association (AWWA) B-300-18 for use in drinking water.

Aluminum sulfate, also known as liquid alum, is used as the primary coagulant in the treatment process. The liquid alum meets AWWA Standard B-403-24 and is approved by the National Sanitation Foundation (NSF), for use in drinking water to a maximum dosage of 150 mg/L.

The anionic polymer used in the water treatment process acts as a flocculant aid. It is supplied in powder form which is mixed with water at the plant and added to the process as a solution. The polymer is approved by NSF for use in drinking water treatment processes to a maximum dose of 1 mg/L.

Origins and Types of Contaminants

As water travels over the surface of the land or through the ground, it dissolves naturally occurring minerals and can pick up substances resulting from human activity or the presence of animals.

The types of contaminants that may be present in source water include:

- Microbiological contaminants that may come from septic systems, livestock, sewage treatment plants, and wildlife. Microbiological quality is a critical component of drinking water quality because of its ability to cause acute illness in consumers.
- Inorganic contaminants, such as salts and metals, can be naturally occurring or may result from urban storm water runoff, industrial or domestic wastewater discharges, oil and gas production, mining, or farming.
- Organic contaminants can be naturally occurring, but most of the compounds of concern are man-made. Pesticides and herbicides are included in this group and may originate from a variety of sources such as agriculture, storm water runoff, and septic systems.

Multiple Barriers to Microbiological Pathogens

Potentially pathogenic organisms are removed from the raw water source by the following processes:

- pre-chlorination
- flocculation / sedimentation
- filtration
- post-chlorination
- distribution system chlorine residual

Laboratory Testing

Ontario Regulation 170/03 and the Municipal Drinking Water License issued for the plant dictate the sampling and monitoring requirements for the Sandhurst Shores Drinking Water System. Water quality is tested routinely throughout the treatment process and at the extremities of the distribution system. Testing for any parameters listed as Schedules 1, 2, and 3 of Ontario Regulation 169/03 are conducted at a certified contract laboratory as required by legislation.

Alarms and Staffing

The Sandhurst Shores Water Treatment Plant is visited by a licensed operator 7 days per week to perform equipment and process inspections, maintenance, routine lab testing, data collection and review. When the plant is unattended, process irregularities or building security breaches are detected by the plant alarm system and relayed to an on-call operator who is available 24 hours per day, 7 days per week.

2 Reporting of Adverse Water and Other Deficiencies

All samples collected and tested in accordance with O.Reg.170/03 met the requirements of the Ontario Drinking Water Quality Standards. Disinfection of treated water was maintained consistently as prescribed in the MECP publication, *Procedure for Disinfecting Drinking Water in Ontario.* No corrective actions, as detailed in O.Reg.170/03, Schedule 18, were required.

Water quality data and disinfectant residuals are provided in summary tables throughout Section 3 of this report.

3 Flow Measurement and Analytical Testing

Raw and Treated Water Flow

Raw water is pumped from Lake Ontario in accordance with the terms and conditions stated in a Permit to Take Water (PTTW) issued by the Ministry of the Environment, Conservation and Parks. The PTTW allows a maximum withdrawal from the lake of 600 cubic meters per day (m^3/d), which was not exceeded at any time during 2024.

The Sandhurst Shores Water Treatment Plant is licenced to discharge a maximum flow of 372 m^3/d into the distribution system. During 2024 the average flow into the distribution system was 47 m^3/d while the maximum day flow was 93 m^3/d. The maximum day flow represents approximately 25 percent of the plant capacity. The total volume of treated water provided to the Sandhurst Shores community during 2024 was decreased by 12.9% when compared to 2023. Table 1 provides a summary of raw and treated water flows.

Table 1: Summary of raw and treated water flow for 2024

Month	Raw Water (m³/day)				Total Raw Water Flow (m³)	Treated Water (m³/day)				Total Treated Water Flow (m³)
	Min.	Max.	Max. Inst.	Avg.		Min.	Max.	Max. Inst.	Avg.	
January	30	65	201	51	1595	31	54	113	40	1254
February	18	109	196	56	1544	21	74	128	42	1174
March	28	64	242	50	1561	29	59	112	39	1199
April	32	65	215	51	1519	30	55	109	41	1220
May	41	108	236	60	1845	35	93	205	49	1539
June	41	84	197	54	1632	37	70	196	48	1436
July	40	91	226	64	1981	33	82	137	57	1776
August	49	88	201	66	2049	43	80	162	59	1839
September	45	77	198	60	1808	39	66	147	51	1526
October	20	89	225	58	1791	37	62	126	47	1467
November	38	91	244	53	1551	38	76	134	44	1298
December	38	163	251	62	1921	28	72	124	46	1418
Annual	18	163	251	57	20797	21	93	205	47	17146
Limits		**600**	Permit to Take Water				**372**	Drinking Water License		

The chart below (Figure 2) shows monthly average day flows for 2023 and 2024, as well as monthly maximum day flows for 2024.

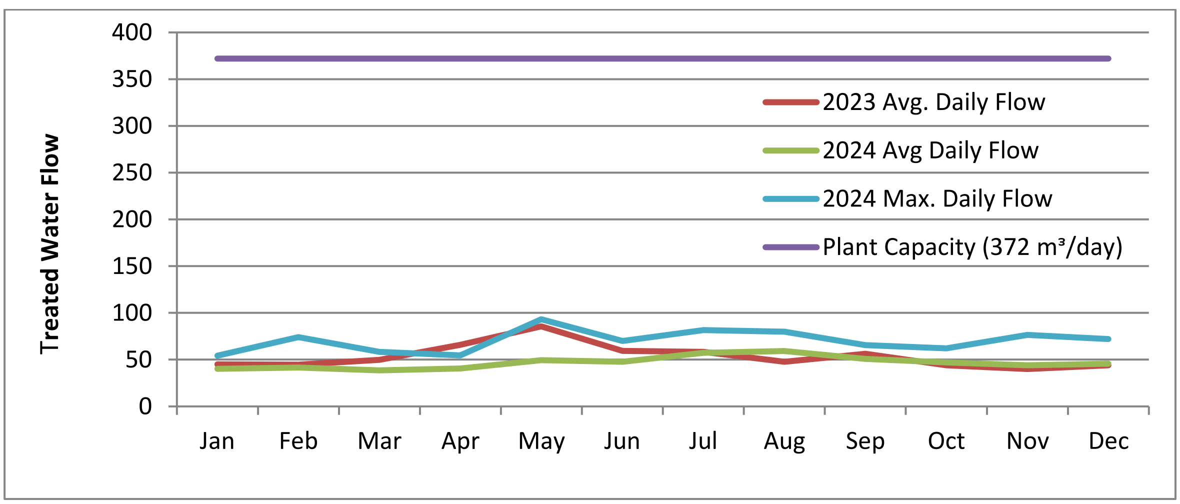

Figure 2: Monthly treated water flow trends for 2023 and 2024

Flow meter accuracy is verified annually by a qualified instrumentation technician.

Temperature, Colour, Alkalinity, and pH

Temperature, colour, alkalinity, and pH are monitored in raw and treated water throughout each week. Measurements recorded during 2024 are summarized in Table 2.

The data shows that the Sandhurst Shores Water Treatment Plant treats a raw water supply which varies significantly in temperature over the course of the year. Raw water temperature recorded daily ranged from 3.8ºC to 23.0ºC, while treated water temperature ranged from 6.9ºC to 22.3ºC. Coagulants do not act as quickly in colder water and therefore higher dosages may be required during winter months.

Colour develops in raw water sources primarily from the decay of naturally occurring aquatic plants. The resulting colloidal and dissolved organic compounds react with coagulant chemicals and can increase dosage requirements. Colour removal can be enhanced by oxidation which occurs during pre-chlorination. In 2024, raw water colour ranged from 0 ACU to a maximum of 21 ACU. Effective removal was achieved through the treatment process as the maximum colour result on a treated water sample was 3 ACU.

Coagulants are most effective within specific ranges of pH. For example, alum performs best between pH 5.8 and pH 8.5. It is important to note that alum is an acidic solution which tends to lower the alkalinity and pH of process water. The raw and treated water average monthly pH values measured during 2024 were 7.8 and 7.0, respectively.

Closely related to pH, alkalinity is a measurement of the acid buffering capacity of water. (The higher the alkalinity, the more acid that can be added before a change in pH occurs.) Several substances naturally present in raw water are measured as alkalinity, the majority of which are carbonate compounds. Coagulants, when added to water, combine with the alkalinity to produce insoluble metal hydroxides that play an important role in flocculation. Alum, as mentioned above, is acidic and therefore decreases alkalinity. If too much natural alkalinity is consumed by the alum, there may be insufficient alkalinity for optimal floc formation. Therefore, if a noticeable drop in pH (and alkalinity) is occurring, it may be necessary to lower the coagulant dosage to conserve alkalinity or alter the process by adding alkalinity to the incoming raw water.

During 2024, raw and treated water alkalinities were consistently within the range recommended in the ODWS, Objectives and Guidelines, with a monthly average of 85 mg/L and 77 mg/L as $CaCO_3$, respectively.

Table 2: Summary of average monthly temperature, pH, alkalinity and colour in raw and treated water for 2024

Month	Raw Water				Treated Water			
	Average Temperature *(°C)*	Average pH	Average Alkalinity *(mg $CaCO_3$/L)*	Average Colour *(ACU)*	Average Temperature *(°C)*	Average pH	Average Alkalinity *(mg $CaCO_3$/L)*	Average Colour *(ACU)*
January	8.0	7.8	83	5	9.6	6.9	72	0
February	5.7	7.5	92	10	8.0	6.8	80	1
March	4.7	7.7	82	5	7.5	6.9	74	0
April	9.1	7.0	80	1	8.4	6.9	82	0
May	11.1	7.6	86	3	10.6	6.9	77	0
June	15.4	7.8	89	3	13.9	6.9	78	0
July	19.6	7.8	90	5	18.3	6.9	76	1
August	21.9	8.0	83	4	21.2	7.0	74	0
September	20.8	7.6	81	7	20.7	7.0	73	0
October	18.2	7.8	83	6	19.0	7.0	73	0
November	14.6	7.7	88	4	15.8	7.1	80	0
December	11.0	7.6	84	3	12.0	7.0	80	0
Annual Average	13.3	7.6	85	5	13.7	7.0	77	0
Total Range	**3.8 – 23.0**	**6.6 – 8.3**	**66 – 110**	**0 – 21**	**6.9 – 22.3**	**6.8 – 8.3**	**66 – 110**	**0 - 3**
Objective	**-**	**-**	**-**	**-**	**<15**	**6.5 - 8.5**	**30 - 500**	**5**

Turbidity

Effective operation of the treatment processes is verified by continuous monitoring of filter effluent turbidity. In the event of a significant upward trend in filtered water turbidity, an alarm is triggered to notify staff of a process abnormality. If turbidity continues to rise above the alarm limit, a second limit (typically set to half of the compliance limit) will trigger an interlock switch that automatically shuts down the treatment process until the cause is investigated and corrected. The regulation requires that filtered water turbidity must not exceed 1 NTU and that each month at least 95 percent of values are less than or equal to 0.3 NTU.

Table 3 is a summary of raw, filtered, and treated water turbidity measured during 2024. The summary is based on continuous measurement of filtered water and from measurements of raw and treated samples taken at least twice weekly using a portable bench top turbidity meter. The turbidity analyzers are routinely maintained and calibrated by Staff.

During 2024 the treatment process consistently complied with the regulatory limit for turbidity, averaging 0.026 NTU.

Table 3: Summary of turbidity in raw, filtered and treated water for 2024

Month	Raw Water Turbidity (NTU)			Treated Water Turbidity (NTU)			Filtered Water Turbidity (NTU)		
	Min.	Max.	Avg.	Min.	Max.	Avg.	Min.	Max.	Avg.
January	0.36	1.77	0.87	0.10	0.24	0.19	0.021	0.040	0.023
February	0.18	0.64	0.36	0.06	0.33	0.12	0.022	0.048	0.025
March	0.31	1.46	0.73	0.12	0.25	0.17	0.023	0.042	0.028
April	0.12	0.84	0.38	0.09	0.29	0.18	0.025	0.040	0.029
May	0.25	0.97	0.52	0.10	0.21	0.16	0.024	0.047	0.029
June	0.27	0.76	0.46	0.13	0.29	0.18	0.027	0.051	0.034
July	0.39	0.78	0.51	0.13	0.29	0.20	0.017	0.082	0.025
August	0.23	2.70	0.82	0.08	0.24	0.17	0.018	0.052	0.021
September	0.16	1.94	1.12	0.10	0.20	0.13	0.019	0.102	0.024
October	0.41	2.66	1.32	0.11	0.24	0.15	0.021	0.053	0.027
November	0.24	1.29	0.44	0.09	0.16	0.12	0.021	0.057	0.025
December	0.15	1.43	0.59	0.09	0.20	0.13	0.020	0.096	0.024
# samples	104			104			*Continuous		
Annual	0.12	2.70	0.68	0.06	0.33	0.16	0.018	0.102	0.026
ODWS MAC								1.0	

Raw and treated water turbidity is measured throughout each week to monitor raw water quality trends and to ensure that treated water meets the ODWQS aesthetic objective. Raw water values reflected relatively good source water clarity ranging from 0.12 NTU to 2.70 NTU. Treated water turbidity was consistently below the aesthetic objective of 5 NTU, averaging 0.16 NTU.

Disinfection and Bacteriological Testing

Tables 4, 5 and 6 summarize raw, treated, and distribution system disinfectant residuals as well as bacteriological testing results. Chlorine residuals are continuously monitored in pre-chlorinated raw water entering the plant, in treated water leaving the plant, and at one location in the distribution system. Sufficient chlorine must be added to the treated water to satisfy disinfectant contact time requirements (CT), and to maintain a free residual of at least 0.05 mg/L at all locations in the distribution system. The operational guideline (non-health related) maximum concentration for chlorine at any point in the distribution system is 4 mg/L measured as free chlorine, and 3 mg/L measured as combined chlorine.

During 2024, treated water free chlorine residual measured at the treatment plant averaged 1.64 mg/L while the free residual in the distribution system averaged 1.58 mg/L. Disinfection CT, as defined by the Ministry of the Environment, Conservation and Parks publication *Procedure for Disinfection of Drinking Water in Ontario,* was monitored daily, and was consistently achieved.

Table 4: Summary of treated water disinfection and bacteriological results from 2024

Month	Treated Water								
	Free Cl_2 Residual			Total Cl_2 Residual			Total Coliforms *(org./100mL)*	E.Coli *(org./100mL)*	HPC Range *(org./100mL)*
	Min. *(mg/L)*	Max. *(mg/L)*	Avg. *(mg/L)*	Min. *(mg/L)*	Max. *(mg/L)*	Avg. *(mg/L)*			
January	1.12	1.83	1.65	1.61	2.17	1.92	0	0	<10
February	1.11	1.87	1.66	1.59	2.11	1.86	0	0	<10 – 10
March	1.08	1.90	1.58	1.54	2.13	1.79	0	0	<10 – 10
April	1.09	1.99	1.68	1.44	2.23	1.93	0	0	<10 – 10
May	0.75	2.37	1.74	1.54	2.33	1.95	0	0	<10
June	1.01	2.07	1.62	1.57	2.23	1.90	0	0	<10 – 20
July	0.96	1.83	1.57	1.50	2.05	1.77	0	0	<10 – 20
August	1.11	1.74	1.57	1.67	1.93	1.80	0	0	<10
September	1.05	1.92	1.67	1.54	2.20	1.94	0	0	<10 – 20
October	1.12	1.88	1.63	1.59	2.12	1.90	0	0	<10 – 40
November	1.08	1.87	1.62	1.58	2.03	1.82	0	0	<10 – 10
December	1.14	1.89	1.72	1.74	2.12	1.97	0	0	<10
# of samples	**continuous**			**366**			**53**	**53**	**53**
Annual	**0.75**	**2.37**	**1.64**	**1.44**	**2.33**	**1.88**	**0**	**0**	**<10 – 40**
ODWQS	**0.05**	**4.00**	**-**	**0.05**	**7.00**	**-**	**<1**	**<1**	**<200**

****** In addition to continuous monitoring, treated water free chlorine residuals are measured daily through bench top analysis.
Note: Bacteriological results are presented as the range observed for each month.

Verifications of continuous chlorine analyzer readings at the plant are conducted daily using portable bench-top instrumentation. Both continuous and portable instrumentation are routinely maintained and calibrated by staff.

Disinfection of the treated drinking water is confirmed by bacteriological testing on samples collected at the treatment plant as well as from various locations in the distribution system. Of the 159 treated drinking water samples tested for bacteriological quality during 2024, all met the bacteriological requirements of the ODWQS.

Table 5: Summary of distribution water disinfection and bacteriological results from 2024

Month	Distribution Water								
	Continuous Free Cl_2 Residual			Grab Sample Free Cl_2 Residual			Total Coliforms *(org./100mL)*	E.Coli *(org./100mL)*	HPC Range *(org./100mL)*
	Min. *(mg/L)*	Max. *(mg/L)*	Avg. *(mg/L)*	Min. *(mg/L)*	Max. *(mg/L)*	Avg. *(mg/L)*			
January	1.40	1.68	1.55	1.20	1.31	1.37	0	0	<10 – 20
February	1.27	166	1.50	1.18	1.46	1.33	0	0	<10 – 10
March	1.05	1.61	1.31	1.02	1.26	1.12	0	0	<10 – 20
April	1.47	2.07	1.83	1.20	1.26	1.12	0	0	<10 – 20
May	1.15	2.63	1.81	1.15	1.85	1.40	0	0	<10 – 20
June	1.24	2.17	1.55	1.08	1.57	1.34	0	0	<10 – 20
July	1.11	1.64	1.39	1.08	1.34	1.25	0	0	<10 – 210
August	1.21	1.77	1.59	1.29	1.51	1.40	0	0	<10 – 10
September	1.37	1.87	1.65	1.17	1.54	1.43	0	0	<10 – 10
October	1.30	1.86	1.65	1.37	1.49	1.43	0	0	<10 – 10
November	1.35	1.71	1.52	1.04	1.28	1.16	0	0	<10
December	1.40	1.78	1.63	1.15	1.38	1.28	0	0	<10
# of samples	**continuous**			**106**			**106**	**106**	**<10 - 210**
Annual	**1.05**	**2.63**	**1.58**	**1.02**	**1.85**	**1.30**	**0**	**0**	
ODWQS	**0.05**	**4.00**	**-**	**0.05**	**4.00**	**-**	**<1**	**<1**	**-**

Note: Bacteriological results are presented as the range observed for each month.

Table 6: Summary of raw water disinfection and bacteriological results from 2024

Month	Pre-Chlorine				Raw Water		
	Continuous Total Cl_2 Residual			Grab Free Cl_2 Residual	Total Coliforms *(org./100mL)*	E.Coli *(org./100mL)*	HPC *(org./100mL)*
	Min. *(mg/L)*	Max. *(mg/L)*	Avg. *(mg/L)*	Avg. *(mg/L)*			
January	0.00	5.16	0.37	0.07	0 – 3	0	<10 – 970
February	0.00	5.16	0.30	0.09	0	0	<10 – 10
March	0.00	5.16	0.16	0.05	0	0	<10 – 10
April	0.00	5.16	0.33	0.17	0	0	10 – 460
May	0.08	5.16	0.41	0.35	0	0	80 – 860
June	0.01	5.16	0.58	0.24	0 – 6	0	40 - >2000
July	0.00	4.39	0.52	0.38	0 – 20	0	240 - >2000
August	0.00	4.51	0.47	0.42	0 – 2	0	<10 - >2000
September	0.01	5.16	0.25	0.14	0 – 2	0	960 - >2000
October	0.00	5.16	0.27	0.10	0 – 1	0	460 - >2000
November	0.00	1.87	0.12	0.07	0	0	180 - >200
December	0.00	2.87	0.28	0.17	0	0	<10 - 1050
# of samples	**continuous**			**366**	**53**	**53**	**53**
Annual	**0.00**	**5.16**	**0.28**	**0.13**	**0 - 20**	**0**	**<10 - >2000**

Process Chemical Addition

Table 7 provides a summary of process chemicals used at the plant during 2024.

The average alum dosage observed during 2024 was 43.4 mg/L, which was comparable to the previous year's average dosage of 41.7 mg/L. The average polymer dosage for 2024 was 0.16 mg/L which was comparable to the 0.15 mg/L which was observed in 2023. Average pre and post-chlorine dosages were 3.00 mg/L and 4.23 mg/L respectively. The total volume of sodium hypochlorite used during 2024 was 950 L.

Sodium hypochlorite is added as a disinfectant to ensure that the treated water is free of active pathogens. Variations in chlorine dosages are typical throughout any given year. Dosage adjustments are made necessary by changes in water temperature, pH, flow rates, and distribution system residuals. Overall chlorine consumption is typically higher during summer months due to the seasonal increase in water demand. The volume of disinfectant used in 2024 was 2.7% less than that used in 2023, which amounts to 26 litres.

Table 7: Summary of process chemical usage and dosages for 2024

Month	Alum			Polymer		Sodium Hypochlorite			
	Monthly Usage *(L)*	Average Dosage *(mg/L)*	Treated Water Aluminum Residual *(mg/L)*	Monthly Usage *(L)*	Average Dosage *(mg/L)*	Pre-Cl_2 Usage *(mL)*	Pre-Cl_2 Dosage *(mg/L)*	Post-Cl_2 Usage *(mL)*	Post-Cl_2 Dosage *(mg/L)*
January	111.6	44.3	0.030	108	0.15	32600	2.87	39200	4.46
February	109.7	45.1	0.030	110	0.17	32300	3.06	34800	4.30
March	99.3	40.1	0.022	96	0.14	30300	2.69	36600	4.39
April	104.2	43.0	0.032	93	0.14	32300	2.96	36500	4.30
May	128.7	43.8	0.030	129	0.16	38300	2.95	40200	3.79
June	121.4	47.0	0.038	122	0.17	37600	3.24	35800	3.60
July	134.8	43.4	0.038	136	0.16	41900	2.88	46200	3.75
August	133.6	41.2	0.056	142	0.16	43600	3.00	54500	4.23
September	122.6	42.7	0.043	130	0.16	40200	3.11	50300	4.69
October	122.6	43.9	0.020	132	0.17	44100	3.43	51300	4.94
November	105.4	42.9	0.022	112	0.16	32300	2.92	38900	4.24
December	132.4	43.1	0.023	138	0.16	39700	2.89	40100	4.12
Annual Avg.	**118.9**	**43.4**	**0.032**	**121**	**0.16**	**37100**	**3.00**	**42033**	**4.23**
Annual Total	**1426.4**	**-**	**-**	**1448**	**-**	**445200**	**-**	**504400**	**-**

Chemical Testing

Analyses of over 70 additional organic and inorganic chemical parameters in the treated water are conducted at various frequencies. The majority of those substances, listed as Schedules 23 and 24 in Ontario Regulation 170/03 must be tested at least annually. Testing for nitrite, nitrate, trihalomethane, and haloacetic acid compounds is required quarterly, while sodium and fluoride must be tested once every 5 years.

The results of those analyses are summarized in Tables 8, 9, 10, 11 and 12. Concentrations of most the substances were lower than the analytical method detection limits (either non-existent or in trace levels too low to measure), while the remaining substances measured a detectable amount, still below the ODWQS limits.

Table 8: Results of samples collected and analyzed to meet quarterly testing requirements under Schedule 15 of O.Reg.170/03

Parameter	Units	ODWQS Limit	Date of Sample Collection				Annual Average
			09-Jan-24	04-Apr-24	02-Jul-24	01-Oct-24	
Nitrate	mg/L	**10**	0.25	0.31	0.22	<0.05	
Nitrite	mg/L	**1**	<0.05	0.07	<0.05	<0.05	
Chloroform	µg/L	**-**	30	76	61	48	
Bromodichloromethane	µg/L	**-**	10	11	14	13	
Dibromochloromethane	µg/L	**-**	3	<2	3	5	
Bromoform	µg/L	**-**	<5	<5	<5	<5	
Total THMs	µg/L	**100**	43.0	89.0	78.0	65.0	**73.3**

Table 9: Results of samples collected and analyzed to meet quarterly testing requirements under Schedule 13 of O.Reg.170/03

Parameter	Units	ODWQS Limit	Sample Collected				Annual Average
			09-Jan-24	04-Apr-24	02-Jul-24	01-Oct-24	
Haloacetic Acid	µg/L	80	24.7	72.1	43.1	25.7	41.4
Chloroacetic Acid	µg/L	-	<1.3	<4.7	<4.7	<4.7	
Bromoacetic Acid	µg/L	-	0.6	<2.9	<2.9	<2.9	
Dichloroacetic Acid	µg/L	-	12.5	33.9	22.4	14.8	
Dibromoacetic Acid	µg/L	-	1.9	<2.0	<2.0	<2.0	
Trichloroacetic Acid	µg/L	-	8.4	38.1	20.7	10.9	

Table 10: Results of samples collected on July 07, 2020 to meet testing requirements for Fluoride and Sodium in O. Reg. 170/03

Parameter	ODWQS Limit *(mg/L)*	Concentration *(mg/L)*
Fluoride	1.5	<0.1
Sodium	20*	18

*aesthetic objective is 200 mg/L, but the local Medical Officer of Health must be notified when the sodium concentration exceeds 20 mg/L.

Table 11: Results of samples collected on January 9, 2024 to meet testing requirements listed in Sched. 23 of O. Reg. 170/03

Parameter	ODWQS Limit *(mg/L)*	Concentration *(mg/L)*
Antimony	0.006	0.0001
Arsenic	0.025	0.0002
Barium	1	0.026
Boron	5	0.015
Cadmium	0.005	<0.000015
Chromium	0.05	<0.0010
Mercury	0.001	<0.00002
Selenium	0.01	<0.001
Uranium	0.1	<0.00005

Table 12: Results of samples collected on January 9, 2024 to meet testing requirements listed in Sched. 24 of O. Reg. 170/03

Parameter	ODWQS		Concentration *(µg/L)*
	Limit	Type	
Alachlor	5	IMAC	<0.3
Atrazine + Metabolites	5	MAC	<0.5
Azinphos-methyl	20	MAC	<1
Benzene	5	MAC	<0.5
Benzo(a)pyrene	0.01	IMAC	<0.006
Bromoxynil	5	IMAC	<0.5
Carbaryl	90	IMAC	<3
Carbofuran	90	MAC	<1
Carbon tetrachloride	5	MAC	<0.2
Chlorpyrifos	90	MAC	<0.5
Diazinon	20	IMAC	<1
Dicamba	120	MAC	<1.0
1,2-dichlorobenzene	200/ 3	MAC/ AO	<0.5
1,4-dichlorobenzene	5/ 1	MAC/ AO	<0.5
1,2-dichloroethane	5	MAC	<0.5
1,1-dichloroethylene	14	MAC	<0.5
Dichloromethane	50	MAC	<5
2,4-dichlorophenol	900/ 0.3	MAC/ AO	<0.2
2,4-dichlorophenoxy acetic acid	100	MAC	<1
Diclofop-methyl	9	MAC	<0.9
Dimethoate	20	IMAC	<1
Diquat	70	MAC	<5
Diuron	150	MAC	<5
Glyphosate	280	MAC	<25
Malathion	190	MAC	<5
2-Methyl-4-chlorophenoxyacetic acid	100	MAC	<10
Metolachlor	50	IMAC	<3
Metribuzin	5	MAC	<3
Monochlorobenzene	80 /30	MAC/ AO	<0.5
Paraquat	10	IMAC	<1
Pentachlorophenol	60/ 30	MAC/ AO	<0.2
Phorate	2	IMAC	<0.3
Picloram	190	IMAC	<5.0
Polychlorinated Biphenyls	3	IMAC	<0.05
Prometryne	1	IMAC	<0.1
Simazine	10	IMAC	<0.5
Terbufos	1	IMAC	<0.5
Tetrachloroethylene	30	MAC	<0.5
2,3,4,6-Tetrachlorophenol	100/ 1	MAC/ AO	<0.2
Triallate	230	MAC	<10
Trichloroethylene	50	MAC	<0.5
2,4,6-Trichlorophenol	5/ 2	MAC/ AO	<0.2
Trifluralin	45	IMAC	<0.5
Vinyl Chloide	2	MAC	<0.2

Lead Testing

The Sandhurst Shores Drinking Water System qualified for reduced sampling requirements, as measured lead concentrations observed in samples collected from residential plumbing do not pose a risk to public health based on current standards. The most recent municipal lead sampling program took place this year, in 2024, with distribution system testing on January 9, 2024 and July 2, 2024. During each round, staff were required to sample one distribution system location. Staff collected two distribution samples during each round in 2024. All were below the Ontario Drinking Water Quality Standards limit for lead. The Sandhurst Shores Drinking Water System continues to be exempt from any further residential plumbing sampling unless future distribution testing indicates a change in water chemistry or elevated lead concentrations.

Table 13: Results of samples collected and analyzed to meet the testing requirements under Schedule 15.1 of O. Reg. 170/04

Sample Location	09-Jan-24			02-Jul-24		
	Lead (mg/L)	Alkalinity (mg/L)	pH	Lead (mg/L)	Alkalinity (mg/L)	pH
Sample Hydrant: Richmond St.	0.00004	81	7.21	0.00007	96	6.84
Sample Hydrant: Bathurst St	0.00020	81	7.17	0.00037	96	6.99
ODWQS Limit / Objective	0.001*	30 - 500	6.5 - 8.5	0.001*	30 - 500	6.5 - 8.5

*indicates objective for reduced sampling

4 System Maintenance and Improvements

The following maintenance and system improvement projects were completed during 2024:

- Preventive maintenance was conducted on various plant equipment including automation controls, pumps, flow meters, analytical instrumentation, safety equipment, and the auxiliary power diesel generator. Ongoing preventive maintenance maximizes the life cycle of equipment and minimizes unexpected emergency repairs.
- The data historian was upgraded to allow for enhanced storage of continuous monitoring data. As part of the data historian project, a new PLC was installed.
- The Town of Greater Napanee continued to work closely with Quinte Conservation and Cataraqui Region Conservation Authority regarding the approved Source Water Protection Plans and Education and Outreach programs.
- Distribution system fire hydrants were inspected and lubricated. The hydrant program serves as a preventive maintenance measure that identifies required repairs and ensures reliability for community fire protection.
- The pressure tanks and bladder was inspected with plans to install a replacement bladder in one of the tanks in early 2025.
- A motor was replaced in one of the high lift pumps.
- Raw water intake crib was inspected.