

2023

**Annual Drinking Water
System Report**

North Fredericksburgh Community Centre
Drinking Water System

DWS# 260035958

1178 County Road #8
Napanee, Ontario

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Key Words and Terms

mg/L	milligrams per litre, (1 part in 1,000,000)
ug/L	micrograms per litre, (1 part in 1,000,000,000)
NTU	nephelometric turbidity units (standard unit to quantify turbidity in water)
MAC	maximum acceptable concentration
MOE	Ontario Ministry of the Environment

Cryptosporidium are a group of protozoa (single celled organisms) that are parasitic in the intestines of humans and most other animals, and are capable of causing diarrhoea.

Designated Facility refers to facilities that serve vulnerable populations such as children and the elderly. These facilities include children’s camps, child and youth care facilities, health care and social care facilities, schools, universities, and colleges.

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.

Giardia are a group of protozoa (single celled organisms) that are parasitic in the intestines of humans and most other animals, and are capable of causing diarrhoea.

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.

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.

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.

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 can be a source of disease causing organisms, and can shield potentially pathogenic organisms from disinfection.

Introduction

The 2023 Annual Drinking Water Report for the North Fredericksburgh Community Centre (North Fred) Drinking Water System summarizes treatment system operations and treated water quality with reference to the requirements of Ontario Regulation 170/03 (O. Reg. 170/03).

On December 1, 2008, oversight of small drinking water systems was transferred from the Ministry of the Environment to the Ministry of Health and Long-Term Care under the Health Protection and Promotion Act. The North Fredericksburgh Drinking Water System is classified as a small municipal non-residential system, and therefore would not normally be subject to the requirements of O.Reg.170/03, except that the building has been used for various childcare, day camp, and/or seniors-type facilities. These uses are considered designated facilities and the drinking water systems supplying them must comply with O.Reg.170/03, regardless of the size of the system.

Description of the Treatment Process

Raw Water Supply

Source water is supplied to the North Fredericksburgh Drinking Water System from the raw water main that is used to supply the A.L. Dafoe Purification Plant in Napanee. Two pumps located at the Lake Ontario Pumping Station (County Road #21 and Highway #33) are used to transfer raw water through a 500 mm diameter water main, 16 km along County Road #8 from Lake Ontario to the A.L. Dafoe Purification Plant raw water reservoir.

The water drawn from Lake Ontario is chlorinated at the Lake Ontario Pumping Station to prevent biological growth within the raw water pipeline, to provide initial disinfection, and to control the growth of Zebra Mussels at the lake intake.

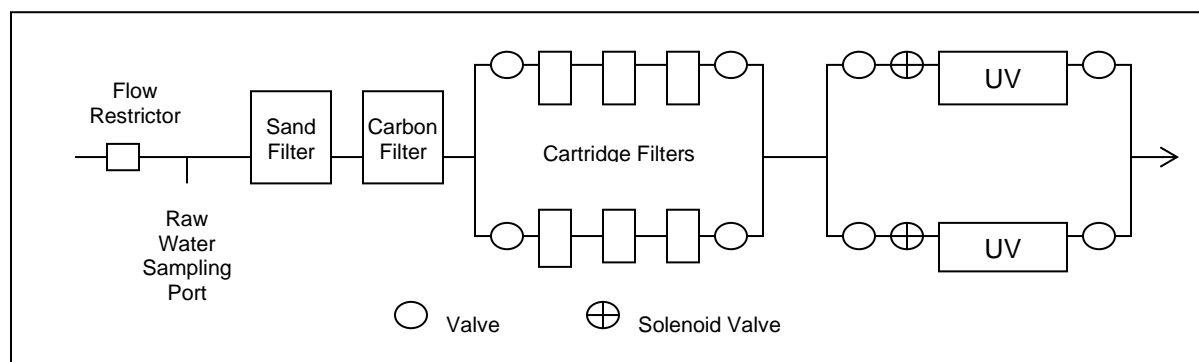
Filtration

The North Fredericksburgh Drinking Water System uses a series of three different types of filters to achieve effective levels of filtration (see Figure 1 below). Raw water entering the drinking water system first passes through a sand filter to physically remove suspended particles and thereby reduce turbidity. The sand filter backwashes automatically, once each day. Second, the water passes through an activated carbon filter which removes the chlorine that was added at the Lake Ontario Pumping Station, along with any other tastes or odours that may be present. Third, the water passes through a series of cartridge filters that successively decrease in pore size. The cartridge filters are installed in parallel series of three filters each (see Figure 1) and are capable of removing most of the Giardia and Cryptosporidium cysts that may be present in the water. The cartridge filters are not NSF-certified and therefore cannot obtain official MECP Giardia and Cryptosporidium removal credits. Disinfection is achieved by the UV system.

Disinfection

Filtered water in the North Fredericksburgh Drinking Water System is disinfected by twin parallel ultraviolet light (UV) systems (Figure 1). UV radiation effectively disinfects drinking water by penetrating the cell walls of any organisms that are present and disrupting the ability of the organisms to reproduce.

Figure 1: Diagram of North Fredericksburgh Community Centre Drinking Water System



No secondary disinfection is required since the treated water is distributed only within the building that houses the treatment system itself.

Declaration of Professional Engineer

A Professional Engineer has declared in writing that the North Fredericksburgh Drinking Water System provides all equipment required to ensure compliance with all applicable provisions of Ontario Regulation 170/03. The Engineering Evaluation Report was prepared by Totten Sims Hubicki Associates in March of 2004.

Laboratory Testing

Ontario Regulation 170/03 dictates the sampling and monitoring requirements for the North Fredericksburgh Drinking Water System. Testing for any parameters listed as Schedules 1, 2, and 3 of Ontario Regulation 169/03 are conducted at a certified laboratory as required by legislation.

Alarms and Staffing

Each of the UV disinfection systems is equipped with a solenoid valve which shuts off the supply of water to the building if an alarm is triggered. The system contains visual and audible notification if the lamp output is low or the system stops working.

Staff inspects the North Fredericksburgh Drinking Water System at a minimum of once each week.

Reporting of Adverse Water and Other Deficiencies

During 2023, there were no indications of adverse water quality based on the testing of treated water samples.

Analytical Testing

Turbidity

Turbidity is measured typically once each week, in both the raw water entering the

treatment system and in the effluent from the filters. Although the regulations do not require turbidity measurement at small municipal non-residential systems, at this site, our Staff conduct the testing to verify the treatment process performance. The Ontario Drinking Water Quality Standards (ODWQS) maximum acceptable turbidity applicable to municipal filtered water is 1 NTU. Treated water turbidity did not exceed the standard of 1 NTU during 2023 (Figure 2).

Figure 2: Filtered Water Turbidity measurements collected in 2023

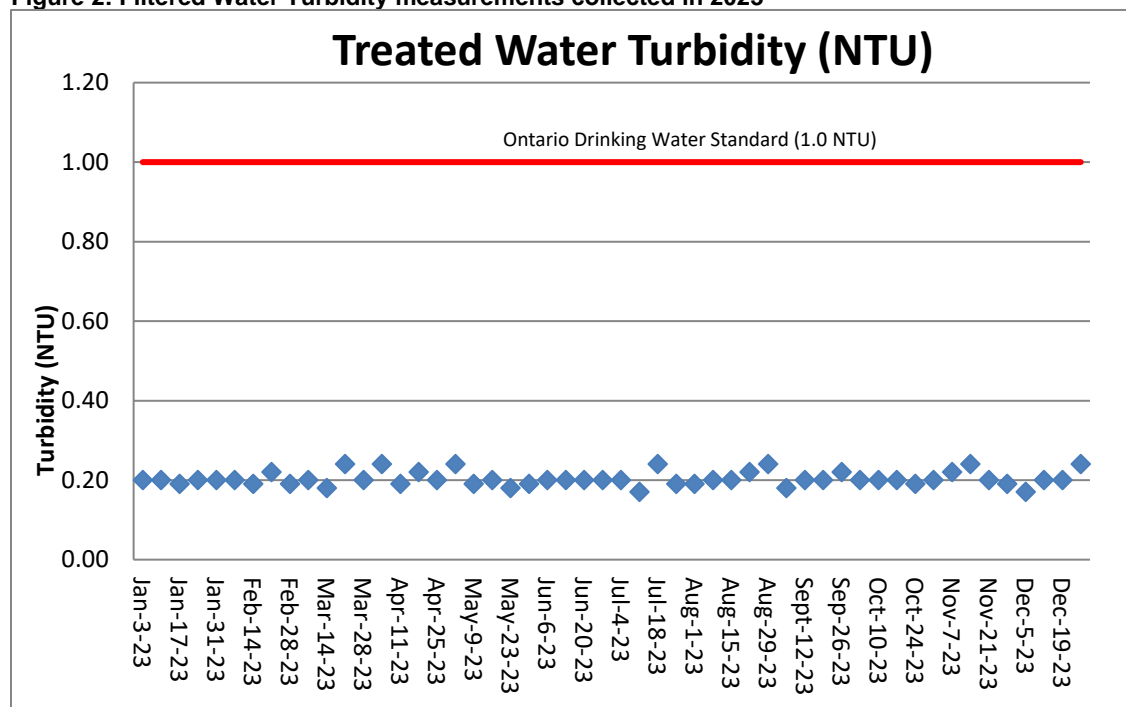


Table 1 is a summary of raw and filtered water turbidity measured during 2023. Raw water turbidity values indicated a source water of generally good clarity, averaging 1.01 NTU and ranging seasonally from 0.56 NTU to 1.78 NTU. The annual average of the treated water turbidity was 0.21 NTU, indicating an effective treatment process.

Table 1: Summary of turbidity in raw and treated water for 2023

Month	Raw Water Turbidity (NTU)			Treated Water Turbidity (NTU)		
	Min.	Max.	Avg.	Min.	Max.	Avg.
January	0.61	1.09	0.78	0.19	0.20	0.20
February	0.81	1.45	1.17	0.19	0.22	0.20
March	1.11	1.39	1.24	0.18	0.24	0.21
April	0.79	1.77	1.12	0.19	0.24	0.21
May	0.61	1.77	0.94	0.18	0.24	0.20
June	0.93	1.77	1.24	0.20	0.20	0.20
July	0.77	1.25	0.94	0.17	0.24	0.20
August	0.70	1.19	0.91	0.19	0.24	0.21
September	0.71	1.98	1.20	0.18	0.22	0.20
October	0.81	1.71	1.08	0.19	0.20	0.20
November	0.79	1.08	0.89	0.19	0.24	0.21
December	0.51	0.81	0.71	0.17	0.24	0.20
Annual	0.76	1.44	1.02	0.18	0.23	0.17
ODWQS					1.00	

Bacteriological Testing

Bacteriological testing measures the effectiveness of the disinfection process by monitoring the presence of indicator organisms in the water supply. The indicator tests include total coliforms (TC), *Escherichia coli* (*E. coli*), and heterotrophic plate count (HPC). The presence of any TC or *E. coli* in the water supply indicates insufficient disinfection and that the water may pose a health hazard if consumed.

Samples were collected by Staff at a minimum of once per month to evaluate the bacteriological quality of pre-chlorinated raw water entering the North Fredericksburgh Drinking Water System from the Lake Ontario Pumping Station.

Treated water is tested for bacteriological quality once per week, which exceeds the monthly sampling that is required by the regulation. Analytical results from samples collected during 2023 indicated that the drinking water met the bacteriological requirements of the ODWQS, which are summarized in Table 2, below.

Table 2: Summary of raw and treated water disinfection and bacteriological results from 2023

Month	Treated Water			Raw Water		
	Total Coliforms (cfu/100mL)	E. Coli (cfu/100mL)	HPC Range (cfu/mL)	Total Coliforms (cfu/100mL)	E. Coli (cfu/100mL)	HPC (cfu/mL)
January	0	0	10 – 30	0	0	10
February	0	0	<10 - 200	0	0	<10
March	0	0	<10 - 70	0	0	<10
April	0	0	<10 – 30	0	0	50
May	0	0	<10 – 60	0	0	610
June	0	0	<10 – 60	0	0	20
July	0	0	10 – 20	0	0	560
August	0	0	<10 - 40	0	0	600
September	0	0	10 – 140	0	0	50
October	0	0	<10 - 230	0	0	370
November	0	0	<10 - 290	0	0	180
December	0	0	< 10 - 1400	0	0	<10
# of samples	52	52	52	12	12	12
Range	0	0	<10 - 1400	0	0	<10 - 610
ODWS	<1	<1				

Chemical Testing

Chemical testing for the substances required under Schedule 15 of O.Reg.170/03 was conducted during 2019 and 2023, and is summarized in tables 3, 4, 5 and 6, below. All results from collected samples complied with the requirements of the ODWQS.

Table 3: Results of samples to meet quarterly testing requirements under Schedule 15 of O.Reg. 170/03

Parameter	Units	ODWQS Limit	Date Sample Collected				Annual Average
			10-Jan-23	04-Apr-23	04-Jul-23	03-Oct-23	
Nitrate	mg/L	10.0	0.3	0.4	0.2	<0.05	0.23
Nitrite	mg/L	1.0	0.1	0.1	0.1	<0.05	0.088

Table 4: Results of samples to meet testing requirements for Lead, Fluoride and Sodium in O.Reg. 170/03

Parameter	Units	ODWQS Limit	Date Sample Collected	Concentration
Lead	mg/L	0.01	18-Jan-22	0.00066
			12-Jul-22	0.00088
Fluoride	mg/L	1.5	08-Jan-19	<0.1
Sodium	mg/L	20*	08-Jan-19	16.6

Note: *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 5: Results of samples collected on Jan. 08, 2019 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	0.0004
Barium	1	0.009
Boron	5	<0.005
Cadmium	0.005	<0.000015
Chromium	0.05	<0.002
Mercury	0.001	<0.00002
Selenium	0.01	<0.001
Uranium	0.1	0.00052

Table 6: Results of samples collected on Jan. 08, 2019, as per requirements of Sched. 24 of O.Reg. 170/03

Parameter	ODWQS		Concentration (µg/L)
	Limit (µg/L)	Type	
Alachlor	5	IMAC	<0.3
Atrazine + Metabolites	5	MAC	<3
Azinphos-methyl	20	MAC	<1
Benzene	5	MAC	<0.5
Benzo(a)pyrene	0.01	IMAC	<0.005
Bromoxynil	5	IMAC	<0.3
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	<5
1,2-dichlorobenzene	200/3	MAC/AO	<0.1
1,4-dichlorobenzene	5/1	MAC/AO	<0.2
1,2-dichloroethane	5	MAC	<0.1
1,1-dichloroethylene	14	MAC	<0.1
Dichloromethane	50	MAC	<0.3
2,4-dichlorophenol	900/0.3	MAC/AO	<0.1
2,4-dichlorophenoxy acetic acid	100	MAC	<5
Diclofop-methyl	9	MAC	<0.5
Dimethoate	20	IMAC	<1
Diquat	70	MAC	<5
Diuron	150	MAC	<5

Parameter	ODWQS		Concentration (µg/L)
	Limit (µg/L)	Type	
Glyphosate***	280	MAC	<25
Malathion	190	MAC	<5
Metolachlor	50	IMAC	<3
Metribuzin	5	MAC	<3
Monochlorobenzene	80/30	MAC/AO	<0.2
Paraquat	10	IMAC	<1
Pentachlorophenol	60/30	MAC/AO	<0.1
Phorate	2	IMAC	<0.3
Picloram	190	IMAC	<5
Polychlorinated Biphenyls	3	IMAC	<0.05
Prometryne	1	IMAC	<0.1
Simazine	10	IMAC	<0.5
Terbufos	1	IMAC	<0.3
Tetrachloroethylene	30	MAC	<0.2
2,3,4,6-Tetrachlorophenol	100/1	MAC/AO	<0.1
Triallate	230	MAC	<10
Trichloroethylene	50	MAC	<0.1
2,3,4,6-Trichlorophenol	5/2	MAC/AO	<0.1
Trifluralin	45	IMAC	<0.5
Vinyl Chloride	2	MAC	<0.2

System Maintenance and Improvements

The North Fredericksburgh Water Treatment System was maintained throughout 2023 by The Town of Greater Napanee, Infrastructure Services – Utilities Staff. Maintenance and improvements included the following:

- Testing of solenoid operations
- Replaced cartridge filters
- Cleaning of sensors and quartz sleeves
- Replacement of UV light bulbs