

Annual Report

Marathon Drinking Water System



2023

Prepared by **Northern Waterworks Inc.**
on behalf of the **Town of Marathon**



Contents

1	Introduction	3
	1.1 Annual Reporting Requirements	3
	1.2 Report Availability	3
2	System Overview & Expenses	4
	2.1 System Description	4
	2.2 Water Treatment Chemicals	5
	2.3 System Expenses	6
3	Water Quality.....	7
	3.1 Overview	7
	3.2 Operational Parameters	7
	3.3 Microbiological Parameters	8
	3.4 Nitrate & Nitrite	9
	3.5 Trihalomethanes & Haloacetic Acids	11
	3.6 Lead Sampling	11
	3.7 Inorganic & Organic Parameters	12
4	Water Production.....	16
	4.1 Overview	16
	4.2 Flow Monitoring Results	16
	4.3 Recent Historical Flows.....	19
5	Compliance	20
	5.1 Overview	20
	5.2 Adverse Water Quality Incidents	20
	5.3 Regulatory Compliance.....	21

1 Introduction

1.1 Annual Reporting Requirements

This consolidated Annual Report (the Report) has been prepared in accordance with both section 11 (Annual Reports) and Schedule 22 (Summary Reports for Municipalities) of Ontario Regulation 170/03 (Drinking Water Systems Regulation). This Report is intended to inform both the public and Municipal Council about the operation of the system over the previous calendar year (January 1 to December 31, 2023).

Section 11 of O. Reg. 170/03 requires the development and distribution to the public of an annual report summarizing water quality monitoring results, adverse water quality incidents, system expenses and chemicals used in the water treatment process.

Schedule 22 of O. Reg. 170/03 requires the development and distribution to Council of an annual report summarizing incidents of regulatory non-compliance and associated corrective actions, in addition to providing flow monitoring results for the purpose of enabling the Owner to assess the capability of the system to meet existing and planned demand.

1.2 Report Availability

In accordance with section 11 of O. Reg. 170/03, this Report must be given, without charge, to every person who requests a copy. Effective steps must also be taken to advise users of water from the system that copies of the report are available, without charge, and of how a copy may be obtained. This Annual Report shall be made available for inspection by the public at the Marathon Municipal Office and on the Town's website.

In accordance with Schedule 22 of O. Reg. 170/03, this Annual Report must be given to the members of Municipal Council. Section 19 (Standard of care, municipal drinking-water system) of Ontario's *Safe Drinking Water Act* (SDWA) also places certain responsibilities upon those municipal officials who oversee an accredited operating authority or exercise decision-making authority over a system. The examination of this Report is one of the methods by which municipal officials may fulfil the obligations required by section 19 of the SDWA.

System users and members of Council should contact a representative of NWI for assistance in interpreting this Report. Questions and comments may be directed to the local NWI Operations Manager or by email to compliance@nwi.ca.

2 System Overview & Expenses

2.1 System Description

The Marathon Drinking Water System must meet extensive treatment and testing requirements to ensure that human health is protected. The operation and maintenance of the system is governed by Ontario's *Safe Drinking Water Act* and the regulations therein, in addition to requirements within system-specific environmental approvals. Important system information is summarized in Table 1.

Drinking-Water System (DWS) Name:	Marathon Drinking Water System
DWS Number:	220000255
DWS Category:	Large Municipal Residential
DWS Owner:	The Corporation of the Town of Marathon
DWS Operating Authorities:	<ul style="list-style-type: none"> Northern Waterworks Inc. (treatment subsystem) The Corporation of the Town of Marathon (water distribution subsystem)
DWS Components:	<ul style="list-style-type: none"> Groundwater wells (wells 2, 3, 4, 5 & 6) Industrial Park Booster Station Penn Lake Heights Reservoir & Booster Station Marathon water distribution system
Treatment Process:	<ul style="list-style-type: none"> Free chlorine disinfection

As a groundwater source, aquifer overburden and soil act as an effective filter that removes micro-organisms and other particles by straining and antagonistic effect to a level where the water supply may already be potable, but disinfection is required as an additional health risk barrier. The active groundwater wells 2, 3, 4, 5 and 6 are located throughout the community of Marathon; wells 1 and 7 were previously abandoned and decommissioned in 2002 and 2003, respectively. A single multi-stage vertical turbine pump at each active well is used to draw water from the aquifer, and disinfectant is injected as groundwater is pumped from the well and directed to a chlorine contact loop. The contact loops are designed to provide the necessary amount of time required to achieve primary disinfection and they are the last treatment step prior to water entering the distribution system.

The Marathon water distribution system includes two substations and is comprised of various sized diameter water mains consisting of cast iron, ductile iron, high density polyethylene and PVC, totalling approximately 33 km in length and including over 200 fire hydrants. A 4,950 m³ capacity in-ground storage reservoir at the Penn Lake Heights Reservoir & Booster Station (PLHR&BS) is filled by the active wells and is used to balance system pressure and provide water for emergency situations. Booster pumps at the facility are also used to supply water to and maintain system pressure in the Penn Lake Heights subdivision. The Industrial Park Booster Station is located on Peninsula Road and is used to supply water to Industrial Park using booster pumps. Secondary disinfection requirements in the water distribution system are achieved by maintaining a free chlorine residual at all locations.

2.2 Water Treatment Chemicals

In accordance with section 11 of O. Reg. 170/03, this Report must include a list of all water treatment chemicals used by the system during the period covered by the report (summarized in Table 2). All chemicals used in the treatment process are NSF/ANSI 60 certified for use in potable water, as required by system approvals.

Table 2: Water treatment chemicals used in 2023

Treatment Chemical	Application	Locations
sodium hypochlorite	disinfectant	Wells 2, 3, 4, 5 & 6



2.3 System Expenses

In accordance with section 11 of O. Reg. 170/03, this Report must describe any major expenses incurred during the reporting period to install, repair or replace required equipment. This Report also summarizes those expenses related to strengthening equipment inventories and to maintenance activities undertaken by subcontracted service providers. Major expenses incurred in 2023 are summarized in Table 3.

Table 3: Significant expenses incurred in 2023

Category	Description (Location)	Expense
Replace	SCADA Installation and programing	\$208,556
Replace	Spare Metering Pump Check Valve Inventory/Replacement	\$5,070
Replace	Chlorine analyzer probes (2)	\$6,728
Inventory	Asco Valves Varies Sizes (Flow Control Valves)	\$2,938
inventory	Backflush Solenoid / Well 4 Cooling Line Solenoid	\$3,788
Replace	Flow Meter Well #6	\$8,185
Maintenance	Annual Safety Inspections (Fire Extinguishers, Lifting Devices)	\$4,450
Replace	Sodium Hypochlorite Chemical Metering Pumps x 4	\$11,926
Replace	Uninterruptible Power Supply (UPS)	\$2,448
Inventory	1" Corporation Cock c/w Injector, 4x injectors	\$1,826
Maintenance	Triennial Thermographic Imaging of Electrical Panels	\$9,808
Replace	1" Cash Pressure Reducing/Regulating Valve - IP Booster Station (spare)	\$3,357
Maintenance	Annual Flow Meter Verifications	\$2,955
Maintenance	Annual Testing of Backflow Preventers	\$4,613
Replace	VFD Install IP Booster	\$23,516

3 Water Quality

3.1 Overview

Water quality monitoring is conducted to determine and confirm that drinking water delivered to the consumer is safe and aesthetically pleasing. Monitoring is also required to assess compliance with legislation and to control the treatment process. In accordance with section 11 of O. Reg. 170/03, this Report must summarize the results of water quality tests required by regulations, approvals, and orders. The following sections summarize the results of all required water quality tests and compare the results to applicable water quality standards.

3.2 Operational Parameters

In accordance with Schedule 7 (Operational checks) of O. Reg. 170/03, regulated operational parameters that must be monitored include raw groundwater turbidity and the free chlorine residuals associated with primary and secondary disinfection. Table 4 summarizes water quality results for regulated and selected unregulated operational parameters. In accordance with Schedule 6 (Operational checks, sampling and testing – general) of O. Reg. 170/03, certain operational parameters are continuously monitored. No Adverse Water Quality Incidents (AWQIs) pertaining to operational parameters occurred during the reporting period.

Table 4: Results summary for operational parameters

Parameter (Location)	Number of Samples	Units	Min. Result	Max. Result	Annual Avg.
Raw Water Turbidity (Well 2)	53	NTU	0.05	0.23	0.09
Raw Water Turbidity (Well 3)	52	NTU	0.07	0.11	0.08
Raw Water Turbidity (Well 4)	52	NTU	0.07	0.10	0.08
Raw Water Turbidity (Well 5)	53	NTU	0.06	0.12	0.08
Raw Water Turbidity (Well 6)	53	NTU	0.06	0.90	0.10
Treated Water pH (Well 2)	52	---	7.1	8.0	7.8
Treated Water pH (Well 3)	53	---	7.6	7.9	7.8
Treated Water pH (Well 4)	52	---	7.7	8.2	7.8
Treated Water pH (Well 5)	53	---	7.7	8.0	7.8
Treated Water pH (Well 6)	53	---	7.7	8.2	7.8

Table 4 Continued: Results summary for operational parameters¹

Parameter (Location)	Number of Samples	Units	Min. Result	Max. Result	Annual Avg.
Treated Water FCR (Well 2)	Continuous	mg/L	0.68	1.67	1.26
Treated Water FCR (Well 3)	Continuous	mg/L	0.73	1.88	1.27
Treated Water FCR (Well 4)	Continuous	mg/L	0.25	1.92	1.34
Treated Water FCR (Well 5)	Continuous	mg/L	0.75	1.82	1.33
Treated Water FCR (Well 6)	Continuous	mg/L	0.67	1.88	1.19
Distribution Water FCR (IPBS)	365	mg/L	0.70	1.83	1.20
Distribution Water FCR (PLRH&BS)	365	mg/L	0.85	1.77	1.20
Distribution Water FCR (WWTP)	365	mg/L	0.67	1.85	1.26

1. FCR = Free Chlorine Residual; IPBS = Industrial Park Booster Station; PLRH&BS = Penn Lake Heights Reservoir & Booster Station; WWTP = Marathon Wastewater Treatment Plant.

3.3 Microbiological Parameters

Microbiological sampling and testing requirements are provided in Schedule 10 (Microbiological sampling and testing) of O. Reg. 170/03. In 2023, a total of 701 source, treated and distribution water samples were collected for microbiological analysis by an accredited laboratory. Samples were collected on a weekly basis and included tests for E. coli (EC), total



coliforms (TC) and heterotrophic plate counts (HPC). Results from microbiological analyses are summarized in Table 5. All results were below the associated Ontario Drinking Water Quality Standards.

Table 5: Results summary for microbiological parameters¹.

Sample Type (Location)	No. of Samples	EC Results Range (MPN/100mL)	TC Results Range (MPN/100mL)	# of HPC Samples	HPC Results Range (CFU/mL)
Raw Water (Well 2)	53	0	1 ²	n/a	n/a
Raw Water (Well 3)	54	0	0	n/a	n/a
Raw Water (Well 4)	54	0	0	n/a	n/a
Raw Water (Well 5)	54	0	0	n/a	n/a
Raw Water (Well 6)	54	0	0	n/a	n/a
Treated Water (Well 2)	52	absent	absent	52	0
Treated Water (Well 3)	54	absent	absent	54	0 - 3
Treated Water (Well 4)	54	absent	absent	54	0
Treated Water (Well 5)	54	absent	absent	54	0 - 1
Treated Water (Well 6)	54	absent	absent	54	0 - 2
Distribution	164	absent	absent	55	0 - 2

1. The Ontario Drinking Water Quality Standard for E. Coli and Total Coliforms in a treated or distribution sample is 'not detectable'. The presence of either parameter in a treated or distribution sample is considered an exceedance.

3.4 Nitrate & Nitrite

Treated water is tested at each production well for nitrate and nitrite concentrations on a quarterly basis in accordance with Schedule 13 (Chemical sampling and testing) of O. Reg. 170/03. Nitrate and nitrite results are provided in Table 6. All results were below the Ontario Drinking Water Quality Standards.

Table 6: Nitrate and nitrite results						
Parameter	ODWQS (mg/L)	Well 2 (mg/L)	Well 3 (mg/L)	Well 4 (mg/L)	Well 5 (mg/L)	Well 6 (mg/L)
Sample Date		15-Feb-2023				
Nitrate	10	0.835	0.900	0.623	0.898	0.724
Nitrite	1	<0.010	<0.010	<0.010	<0.010	<0.010
Sample Date		16-May-2023				
Nitrate	10	0.648	0.601	0.568	0.873	0.621
Nitrite	1	<0.010	<0.010	<0.010	<0.010	<0.010
Sample Date		16-Aug-2023	15-Aug-2023			
Nitrate	10	0.688	0.963	0.540	0.966	0.639
Nitrite	1	<0.010	<0.010	<0.010	<0.010	<0.010
Sample Date		14-Nov-2023				
Nitrate	10	0.675	0.912	0.466	0.905	0.594
Nitrite	1	<0.010	<0.010	<0.010	<0.010	<0.010



3.5 Trihalomethanes & Haloacetic Acids

Trihalomethanes (THMs) and haloacetic acids (HAAs) are sampled on a quarterly basis from a distribution system location that is likely to have an elevated potential for their formation, in accordance with Schedule 13 (Chemical sampling and testing) of O. Reg. 170/03. Total THM and HAA results are provided in Table 7 and Table 8, respectively. Compliance with the provincial standards for trihalomethane and haloacetic acid concentrations is determined by calculating a running annual average (RAA). The 2023 running annual averages for THMs and HAAs were below the respective Ontario Drinking Water Quality Standards.

Sample Date	Result (µg/L)
15-Feb-2023	2.9
19-Apr-2023	2.1
16-May-2023	4.7
15-Aug-2023	7.9
14-Nov-2023	9.4
Regulatory Average (RAA)	5.9
ODWQS (RAA)	100

Sample Date	Result (µg/L)
15-Feb-2023	<5
19-Apr-2023	<5
16-May-2023	<5
15-Aug-2023	<5
14-Nov-2023	<5
Regulatory Average (RAA)	<5
ODWQS (RAA)	80

3.6 Lead Sampling

Based upon favourable sampling results and a lack of lead exceedances in drinking-water in the community, the Marathon DWS previously qualified for reduced lead sampling and ultimately became exempt from sampling at plumbing locations in accordance with Schedule 15.1 (Lead) of O. Reg. 170/03. Six (6) distribution samples must now be collected every year and analyzed for pH and alkalinity. Additionally, these distribution system samples must be analyzed for lead in every third 12-month period after the plumbing sample exemption was activated. Table 9 summarizes the results of community lead sampling and related required tests.

Table 9: Distribution pH, alkalinity and lead sampling results

Sample Date	Distribution Sample Location	pH	Alkalinity (mg/L)	Lead Result (µg/L)
21-Mar-2023	Hydrant 19	7.94	212	Not Required
21-Mar-2023	Hydrant 56	7.77	219	
21-Mar-2023	Hydrant 115	8.05	228	
19-Sep-2023	Hydrant 19	7.38	167	
19-Sep-2023	Hydrant 56	7.82	178	
19-Sep-2023	Hydrant 115	7.76	175	

1. The Ontario Drinking Water Quality Standard for lead in drinking-water is 10 µg/L.



3.7 Inorganic & Organic Parameters

Most inorganic parameters are sampled every three (3) years in treated water from each production well in accordance with Schedules 13 (Chemical sampling and testing) and 23 (Inorganic parameters) of O. Reg. 170/03. The inorganic parameters sodium and fluoride are sampled every five (5) years in treated water from each well in accordance with Schedules 13 and 23 of O. Reg. 170/03. The most recent inorganic parameter sampling results are provided in Table 10. All results were below the associated Ontario Drinking Water Quality Standards. Sodium and fluoride were tested in 2019.

Table 10: Inorganic parameter sampling results

Parameter (Units)	Sample Location	Well 2	Well 3	Well 4	Well 5	Well 6
	Sample Date	31-Mar-22	24-Mar-22	23-Mar-22	23-Mar-22	24-Mar-22
	ODWQS					
Antimony (µg/L)	6	<0.60	<0.60	<0.60	<0.60	<0.60
Arsenic (µg/L)	10	<1.0	<1.0	<1.0	<1.0	<1.0
Barium (µg/L)	1000	21	22	20	22	21
Boron (µg/L)	5000	<50	<50	<50	<50	<50
Cadmium (µg/L)	5	<0.10	<0.10	<0.10	<0.10	<0.10
Chromium (µg/L)	50	<1.0	<1.0	<1.0	<1.0	<1.0
Mercury (µg/L)	1	<0.10	<0.10	<0.10	<0.10	<0.10
Selenium (µg/L)	50	<1.0	<1.0	<1.0	<1.0	<1.0
Uranium (µg/L)	20	<2.0	<2.0	<2.0	<2.0	<2.0
Fluoride (mg/L) ²	1.5	0.090	0.092	0.092	0.078	0.157
Sodium (mg/L) ²	20 ¹	15.0	14.4	17.6	15.1	20.1

1. The parameter sodium is not considered a toxic element and is not associated with a Standard as prescribed in O. Reg. 169/03, although an exceedance of 20 mg/L requires reporting and corrective actions. The sodium result for Well 6 is associated with Adverse Water Quality Incident No. 144802. Refer to the *2019 Annual Report* for more information.
2. The sodium and fluoride were last tested in 2019.

Organic parameters are sampled every three (3) years in treated water from each production well in accordance with Schedules 13 (Chemical sampling and testing) and 24 (Organic parameters) of O. Reg. 170/03. These parameters include various organic acids, pesticides, herbicides, PCBs and other organic chemicals. The most recent organic parameter sampling results are provided in Table 11. All results were below the associated Ontario Drinking Water Quality Standards.

Table 11: Organic parameter sampling results

Parameter (Units)	Sample Location	Well 2	Well 3	Well 4	Well 5	Well 6
	Sample Date	31-Mar-22	24-Mar-22	23-Mar-22	23-Mar-22	24-Mar-22
	ODWQS					
Alachlor (µg/L)	5	<0.10	<0.10	<0.10	<0.10	<0.10
Atrazine & Metabolites (µg/L)	5	<0.20	<0.20	<0.20	<0.20	<0.20
Azinphos-methyl (µg/L)	20	<0.10	<0.10	<0.10	<0.10	<0.10
Benzene (µg/L)	1	<0.50	<0.50	<0.50	<0.50	<0.50
Benzo(a)pyrene (µg/L)	0.01	<0.0050	<0.010	<0.010	<0.010	<0.010
Bromoxynil (µg/L)	5	<0.20	<0.20	<0.20	<0.20	<0.20
Carbaryl (µg/L)	90	<0.20	<0.20	<0.20	<0.20	<0.20
Carbofuran (µg/L)	90	<0.20	<0.20	<0.20	<0.20	<0.20
Carbon Tetrachloride (µg/L)	2	<0.20	<0.20	<0.20	<0.20	<0.20
Chlorpyrifos (µg/L)	90	<0.10	<0.10	<0.10	<0.10	<0.10
Diazinon (µg/L)	20	<0.10	<0.10	<0.10	<0.10	<0.10
Dicamba (µg/L)	120	<0.20	<0.20	<0.20	<0.20	<0.20
1,2-Dichlorobenzene (µg/L)	200	<0.50	<0.50	<0.50	<0.50	<0.50
1,4-Dichlorobenzene (µg/L)	5	<0.50	<0.50	<0.50	<0.50	<0.50
1,2-Dichloroethane (µg/L)	5	<0.50	<0.50	<0.50	<0.50	<0.50
1,1-Dichloroethylene (µg/L)	14	<0.50	<0.50	<0.50	<0.50	<0.50
Dichloromethane (µg/L)	50	<5.0	<5.0	<5.0	<5.0	<5.0
2,4 -Dichlorophenol (µg/L)	900	<0.30	<0.30	<0.30	<0.30	<0.30
2,4-D (µg/L)	100	<0.20	<0.20	<0.20	<0.20	<0.20
Diclofop-methyl (µg/L)	9	<0.20	<0.20	<0.20	<0.20	<0.20
Dimethoate (µg/L)	20	<0.10	<0.10	<0.10	<0.10	<0.10
Diquat (µg/L)	70	<1.0	<1.0	<1.0	<1.0	<1.0
Diuron (µg/L)	150	<1.0	<1.0	<1.0	<1.0	<1.0
Glyphosate (µg/L)	280	<5.0	<5.0	<5.0	<5.0	<5.0
Malathion (µg/L)	190	<0.10	<0.10	<0.10	<0.10	<0.10
MCPA (µg/L)	100	<0.20	<0.20	<0.20	<0.20	<0.20

Table 11: Organic parameter sampling results

Parameter (Units)	Sample Location	Well 2	Well 3	Well 4	Well 5	Well 6
	Sample Date	31-Mar-22	24-Mar-22	23-Mar-22	23-Mar-22	24-Mar-22
	ODWQS					
Metolachlor (µg/L)	50	<0.10	<0.10	<0.10	<0.10	<0.10
Metribuzin (µg/L)	80	<0.10	<0.10	<0.10	<0.10	<0.10
Monochlorobenzene (µg/L)	80	<0.50	<0.50	<0.50	<0.50	<0.50
Paraquat (µg/L)	10	<1.0	<1.0	<1.0	<1.0	<1.0
Pentachlorophenol (µg/L)	60	<0.50	<0.50	<0.50	<0.50	<0.50
Phorate (µg/L)	2	<0.10	<0.10	<0.10	<0.10	<0.10
Picloram (µg/L)	190	<0.20	<0.20	<0.20	<0.20	<0.20
Total PCBs (µg/L)	3	<0.035	<0.035	<0.035	<0.035	<0.035
Prometryne (µg/L)	1	<0.10	<0.10	<0.10	<0.10	<0.10
Simazine (µg/L)	10	<0.10	<0.10	<0.10	<0.10	<0.10
Terbufos (µg/L)	1	<0.20	<0.20	<0.20	<0.20	<0.20
Tetrachloroethylene (µg/L)	10	<0.50	<0.50	<0.50	<0.50	<0.50
2,3,4,6-Tetrachlorophenol (µg/L)	100	<0.50	<0.50	<0.50	<0.50	<0.50
Triallate (µg/L)	230	<0.10	<0.10	<0.10	<0.10	<0.10
Trichloroethylene (µg/L)	5	<0.50	<0.50	<0.50	<0.50	<0.50
2,4,6-Trichlorophenol (µg/L)	5	<0.50	<0.50	<0.50	<0.50	<0.50
Trifluralin (µg/L)	45	<0.10	<0.10	<0.10	<0.10	<0.10
Vinyl Chloride (µg/L)	1	<0.20	<0.20	<0.20	<0.20	<0.20

4 Water Production

4.1 Overview

In accordance with Schedule 22 (Summary Reports for Municipalities) of O. Reg. 170/03, this Annual Report must include certain information for the purpose of enabling the Owner to assess the capability of the system to meet existing and planned uses. Specifically, this Report must include a summary of the quantities and flow rates of the water supplied during the reporting period, including monthly average and maximum daily flows. The Report must also include a comparison of flow monitoring results to the rated capacity and flow rates approved in the system's *Municipal Drinking Water Licence*.

4.2 Flow Monitoring Results

Throughout the reporting period the Marathon Drinking Water System operated within its rated capacity and supplied a total of 868,049 m³ of treated water. On an average day in 2023, 2,174 m³ of treated water was supplied to the community, which represents 20% of the rated capacity of the system (10,968.64 m³/day). The maximum daily flow in 2023 was 4,539 m³/day, which represents 41% of the rated capacity. Flow monitoring results are summarized in Figure 1 and Table 12.

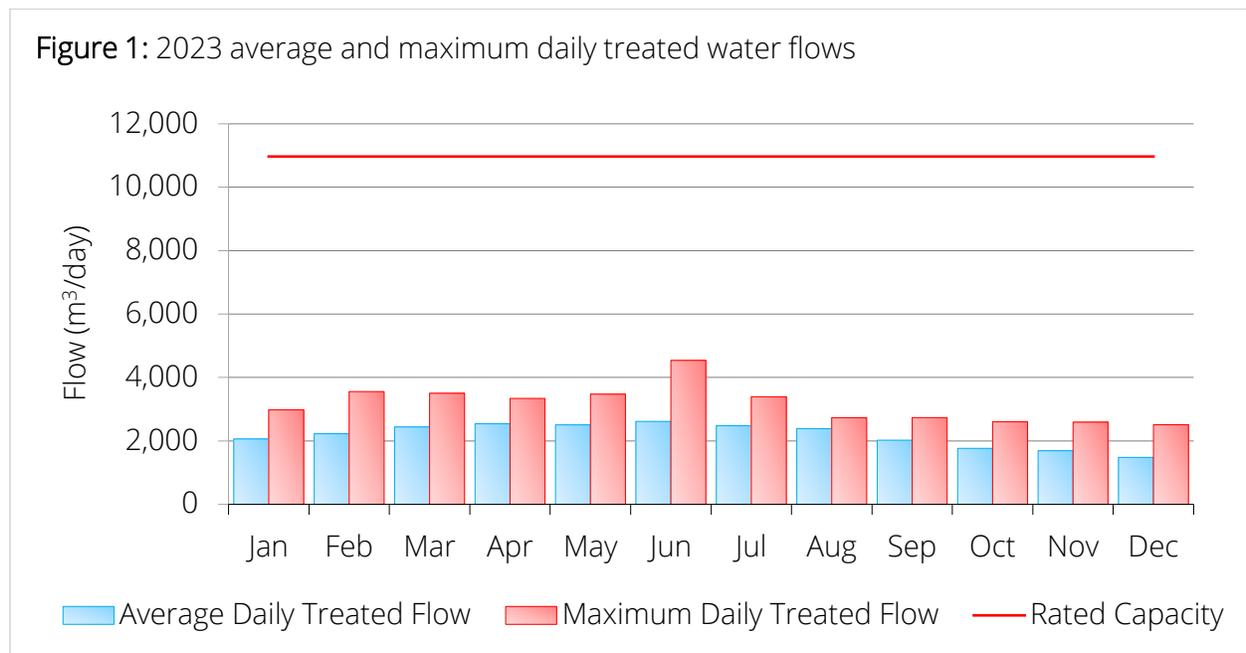


Table 12: 2023 water production summary

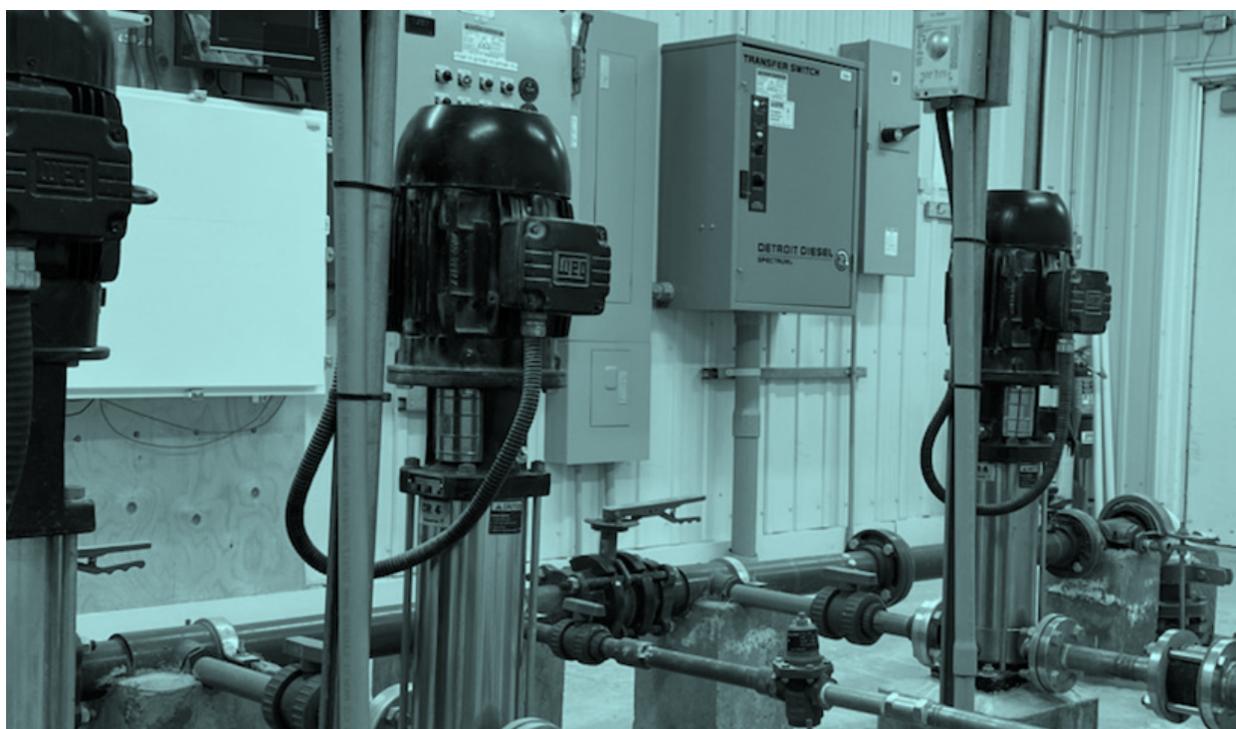
Month	Total Volumes ¹ (m ³)		Daily Flows (m ³ /day)		Capacity Assessments ²	
	Raw Water	Treated Water	Average - Treated Water	Maximum - Treated Water	Average - Treated Water	Maximum - Treated Water
Jan	63,957	63,871	2,060	2,979	19%	27%
Feb	62,367	62,341	2,226	3,556	20%	32%
Mar	75,658	75,638	2,440	3,502	22%	32%
Apr	76,230	76,216	2,541	3,340	23%	30%
May	77,713	77,689	2,506	3,474	23%	32%
Jun	78,478	78,454	2,615	4,539	24%	41%
Jul	76,824	76,802	2,477	3,393	23%	31%
Aug	74,024	73,996	2,387	2,732	22%	25%
Sep	60,689	60,673	2,022	2,735	18%	25%
Oct	51,231	51,208	1,766	2,603	16%	24%
Nov	50,728	50,713	1,690	2,591	15%	24%
Dec	45,924	45,915	1,481	2,510	14%	23%
Total	793,821	793,516	---	---	---	---
Average	66,152	66,126	2,174	---	20%	---

1. The difference between raw water and treated water volumes corresponds to the amount of water that is automatically directed to waste at the beginning of a well production cycle. In 2023, this difference accounted for approximately 0.04% of the total volume of withdrawn groundwater.
2. Capacity assessments compare the average and maximum daily treated water flows to the rated capacity of the system.

Throughout the reporting period wells 2, 3, 4, 5 and 6 contributed approximately <1%, 6.1%, 44.7%, 47.8% and 1.3% to overall water production, respectively. All treatment stations operated within their respective capacity limits in 2023. Table 13 summarizes flow monitoring results by location.

Table 13: 2023 water production summary – results by location

Location	Total Volumes (m ³)		Daily Flows (m ³ /day)			Capacity Assessments	
	Treated Water	% of Total	Rated Capacity	Average - Treated Water	Maximum - Treated Water	Average - Treated Water	Maximum - Treated Water
Well 2	809	0.1%	1,962.28	809	212	0%	11%
Well 3	45,905	6.1%	1,662.36	1,093	1,270	8%	76%
Well 4	335,984	44.7%	2,289.60	1,179	2,250	40%	98%
Well 5	359,587	47.8%	2,289.60	1,211	1,416	43%	62%
Well 6	9,933	1.3%	2,764.80	2,483	2,025	1%	73%
All Wells	752,218	100%	10,968.64	2,061	3,927	19%	36%



4.3 Recent Historical Flows

Table 14 summarizes recent historical flow monitoring results for the Marathon DWS. There was a decrease in the amount of treated water supplied in 2023 when compared to 2022. The Town of Marathon has a leak detection program in place to identify and correct these leaks. Since 2020 the flows have significantly decreased due to this program.

Year	Total Volumes (m ³)		Daily Flows (m ³ /day)	
	Treated Water	Annual % Change	Average – Treated Water	Maximum – Treated Water
2013	672,584	---	1,843	2,948
2014	881,333	+31.0%	2,415	3,962
2015	1,103,323	+25.2%	3,023	4,646
2016	1,137,539	+3.1%	3,108	5,314
2017	1,162,053	+2.2%	3,184	4,852
2018	1,308,340	+12.6%	3,584	5,366
2019	1,353,743	+3.5%	3,709	6,564
2020	1,137,440	-16.0%	3,108	5,942
2021	767,935	-32.5%	2,104	3,927
2022	868,048	13.0%	2,381	4,307
2023	752,218	-13.3%	2184	4539

5 Compliance

5.1 Overview

Northern Waterworks Inc. and the Town of Marathon employ an operational strategy that is committed to achieving the following goals:

- Providing a safe and reliable supply of drinking water to the community of Marathon;
- Meeting or exceeding all applicable legislative and regulatory requirements; and,
- Maintaining and continually improving the operation and maintenance of the system.

The following sections will summarize incidents of regulatory noncompliance and adverse water quality that occurred during the reporting period. NWI is committed to employing timely and effective corrective actions to prevent recurrence of all identified incidents of adverse water quality and noncompliance.

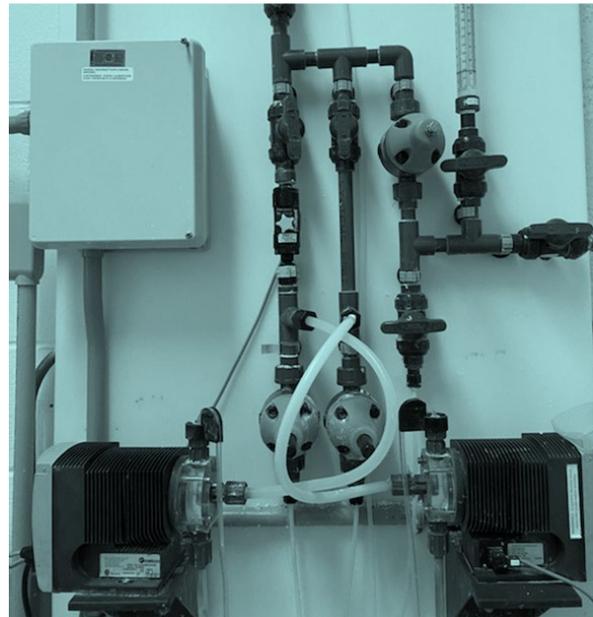
5.2 Adverse Water Quality Incidents

In accordance with section 11 (Annual Reports) of O. Reg. 170/03, this Report must summarize any reports made to the Ministry under subsection 18(1) (Duty to report adverse test results) of *the Act* or section 16-4 (Duty to report other observations) of Schedule 16 of O. Reg. 170/03. Additionally, this Report must describe any corrective actions taken under Schedule 17 of O. Reg. 170/03 during the period covered by the report.

The two (2) adverse water quality incidents (AWQIs) that occurred during the reporting period are summarized below..

- **AWQI 161283 (February 24, 2023)**

During normal bacti sampling received notification from ALS that IP-booster had a total Coliform hit. With instruction from Thunder Bay health unit, we started Flushing the Area Immediately 24th Feb 2023. Collected a resample at IP-Booster on 27th Feb 2023, this sample Did not make it to ALS in time for testing due to the weather and another sample was taken on



1st March 2023. Also took a Before sample at SPG gas Station on 27 Feb 2023, and the after sample at Moffatt Supply 27th Feb 2023. SPG being before IP Booster In the distribution system and Moffatt Supply Being after.

- **AWQI 161283 (February 24, 2023)**

A low distribution chlorine (0.07mg/L) was observed in the system. Received alarm at 9:08pm. Checked SCADA on the On-call phone and noted well 5 was alarmed out. It was placed in the off position on SCADA and the back-flush was turned on. Immediately responded to the site. While on the way I checked SCADA again and saw that the main water pump did not shutdown. Called OIC at 9:15pm. Notified OIC of the situation. Was on-site to shut down the well manually at 9:17pm. Back-flush was running but the main Distribution pump didn't shut down. A fitting at the end of the header had let go causing the lockout. Back flushed over night to restore Disinfection.

5.3 Regulatory Compliance

In accordance with Schedule 22 (Summary Reports for Municipalities) of O. Reg. 170/03, this Report must list any requirements of the *Act*, the regulations, the system's approval, drinking water works permit, municipal drinking water licence, and any orders applicable to the system that were not met at any time during the period covered by the report (i.e., an incident of regulatory noncompliance). Additionally, this Report must specify the duration of the failure and the measures that were taken to correct the failure.

The most recent inspection by Ontario's Ministry of the Environment, Conservation and Parks was initiated on February 14, 2023. but has not been completed and no reports have been received.