Annual Report

Marathon Drinking Water System

2024

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

NORTHERN WATERWORKS INC.

Marathon
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Contents

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, 2024).

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.

Table 1: System information	
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:	• Northern Waterworks Inc. (treatment subsystem) • The Corporation of the Town of Marathon (water distribution subsystem)
DWS Components:	• Groundwater wells (wells 2, 3, 4, 5 & 6) • Industrial Park Booster Station • Penn Lake Heights Reservoir & Booster Station • Marathon water distribution system
Treatment Process:	• 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 m^3 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 2024

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 2024 are summarized in Table 3.

Table 3: Significant expenses incurred in 2024

Category	Description (Location)	Expense
Replace	Reservoir Pump #2	$75,855
Replace	Uninterruptible Power Supply (UPS)	$2,205
Maintenance	Well #2 Inspection	$64,591
Replace	Spare Metering Pump Check Valve Inventory/Replacement	$7,350
Replace	Chlorine analyzer probes (2)	$9,006
Inventory	Asco Valves Varies Sizes (Flow Control Valves)	$3,078
Replace	Sodium Hypochlorite Flow Sensors x 2	$4,544
Replace	Sodium Hypochlorite Chemical Metering Pumps x 2	$8,790
Replace	Generator Battery	$3,441
Maintenance	Generator Inspection, Servicing and Load Testing	$8,126
Maintenance	Annual Safety Inspections (Fire Extinguishers, Lifting Devices)	$3,015
Maintenance	Annual Flow Meter Verifications	$2,209
Maintenance	Annual Testing of Backflow Preventers	$4,016
Repair	Pipe repair in Reservoir, discharge side of pump #4.	$3,810
Replace	Autodialer	$4,420

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	0.08	2.03	0.25
Raw Water Turbidity (Well 3)	49	NTU	0.09	0.30	0.11
Raw Water Turbidity (Well 4)	52	NTU	0.07	0.25	0.09
Raw Water Turbidity (Well 5)	54	NTU	0.06	0.18	0.09
Raw Water Turbidity (Well 6)	52	NTU	0.09	0.25	0.09
Treated Water pH (Well 2)	53	---	6.0	7.9	7.7
Treated Water pH (Well 3)	49	---	7.0	7.9	7.8
Treated Water pH (Well 4)	52	---	7.8	7.9	7.8
Treated Water pH (Well 5)	54	---	7.5	7.9	7.8
Treated Water pH (Well 6)	52	---	7.8	7.9	7.8

Table 4 Continued: Results summary for operational parameters[1]					
Parameter (Location)	Number of Samples	Units	Min. Result	Max. Result	Annual Avg.
Treated Water FCR (Well 2)	Continuous	mg/L	1.03	1.47	1.22
Treated Water FCR (Well 3)	Continuous	mg/L	1.14	1.55	1.31
Treated Water FCR (Well 4)	Continuous	mg/L	1.19	1.51	1.34
Treated Water FCR (Well 5)	Continuous	mg/L	1.04	1.43	1.22
Treated Water FCR (Well 6)	Continuous	mg/L	1.01	1.40	1.18
Distribution Water FCR (IPBS)	366	mg/L	1.05	1.36	1.19
Distribution Water FCR (PLRH&BS)	366	mg/L	1.10	1.30	1.19
Distribution Water FCR (WWTP)	366	mg/L	1.09	1.43	1.25

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 2024, a total of 746 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 parameters[1, 2]

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	0	n/a	n/a
Raw Water (Well 3)	53	0	0	n/a	n/a
Raw Water (Well 4)	54	0	0	n/a	n/a
Raw Water (Well 5)	54	0	0-8	n/a	n/a
Raw Water (Well 6)	53	0	0	n/a	n/a
Treated Water (Well 2)	52	absent	absent	52	0-2
Treated Water (Well 3)	53	absent	absent	53	0 - 3
Treated Water (Well 4)	53	absent	absent	53	0 - 3
Treated Water (Well 5)	54	absent	absent	54	0 – 1
Treated Water (Well 6)	53	absent	absent	53	0 - 6
Distribution	165	absent	absent	54	0 - 5

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..
2. Wells 2, 3 & 6 were not in continuous production in 2024.

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		20-Feb-2024				
Nitrate	10	0.858	0.784	0.780	0.879	0.810
Nitrite	1	<0.010	<0.010	<0.010	<0.010	<0.010
Sample Date		15-May-2024				
Nitrate	10	0.524	0.531	0.518	0.524	0.522
Nitrite	1	<0.010	<0.010	<0.010	<0.010	<0.010
Sample Date		14-Aug-2024				
Nitrate	10	0.447	0.569	0.448	0.460	0.474
Nitrite	1	<0.010	<0.010	<0.010	<0.010	<0.010
Sample Date		19-Nov-2024				
Nitrate	10	0.456	0.609	0.466	0.442	0.445
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 2024 running annual averages for THMs and HAAs were below the respective Ontario Drinking Water Quality Standards.

Table 7: Total THM results

Sample Date	Result (µg/L)	Quarterly Average (µg/L)
20-Feb-24	5.1	5.1
Q1 Regulatory Average (RAA)		6.5
22-May-24	4.2	4.2
Q2 Regulatory Average (RAA)		6.7
14-Aug-24	8.1	8.1
Q3 Regulatory Average (RAA)		6.7
20-Nov-23	8.2	8.2
Q4 Regulatory Average (RAA)		6.4
ODWQS Limit (RAA)		100

Table 9: Total HAA results

Sample Date	Result (µg/L)	Quarterly Average (µg/L)
20-Feb-24	<5	<5
Q1 Regulatory Average (RAA)		<5
15-May-24	<5	<5
Q2 Regulatory Average (RAA)		<5
14-Aug-24	<5	<5
Q3 Regulatory Average (RAA)		<5
19-Nov-24	<5	<5
Q4 Regulatory Average (RAA)		<5
ODWQS Limit (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. Lead testing will next be required beginning in the Winter 2026/27 sampling period. 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[1] (µg/L)
6-Feb-2024	Hydrant 19	8.84	189	2.8
6-Feb-2024	Hydrant 56	8.33	196	<1.0
6-Feb-2024	Hydrant 115	8.75	197	<1.0
23-Jul-2024	Hydrant 19	7.14	196	<1.0
23-Jul-2024	Hydrant 56	7.50	182	<1.0
23-Jul-2024	Hydrant 115	7.47	197	<1.0

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, except sodium.

Table 10: Inorganic parameter sampling results

Parameter (Units)	Sample Location / Sample Date / ODWQS	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
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	0.095	0.098	0.098	0.057	0.089
Sodium (mg/L) [2]	20[1]	22.9	23.0	22.2	16.4	21.3

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 Wells 2, 3, 4, & 6 is associated with Adverse Water Quality Incident No. 164540. Refer to section 5.2 of this report.
2. Sodium and fluoride were tested on 20 February 2024.

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 / ODWQS	31-Mar-22	24-Mar-22	23-Mar-22	23-Mar-22	24-Mar-22
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

Table 11: Organic parameter sampling results

Parameter (Units)	Sample Location	Well 2	Well 3	Well 4	Well 5	Well 6
	Sample Date / ODWQS	31-Mar-22	24-Mar-22	23-Mar-22	23-Mar-22	24-Mar-22
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
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 716,607 m^3 of treated water. On an average day in 2024, 1,957 m^3 of treated water was supplied to the community, which represents 14% of the rated capacity of the system (10,968.64 m^3/day). The maximum daily flow in 2024 was 3,278 m^3/day, which represents 30% of the rated capacity. Flow monitoring results are summarized in Figure 1 and Table 12.

Figure 1: 2024 average and maximum daily treated water flows

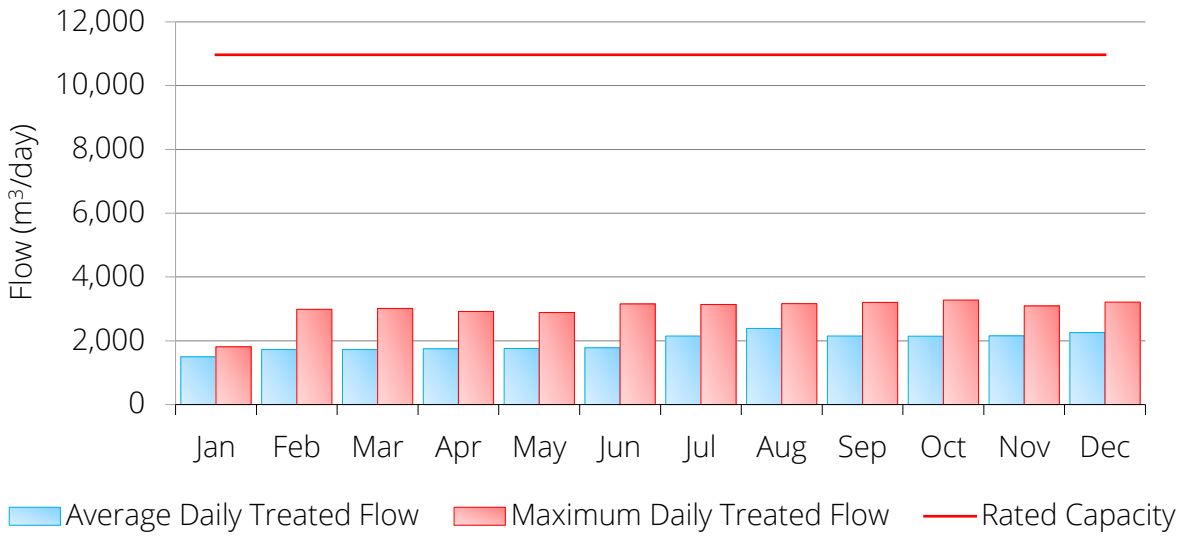


Table 12: 2024 water production summary

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	46,437	46,424	1,498	1,811	14%	17%
Feb	50,072	50,053	1,726	2,987	16%	27%
Mar	53,485	53,477	1,725	3,015	16%	27%
Apr	52,464	52,453	1,748	2,918	16%	27%
May	54,517	54,511	1,758	2,888	16%	26%
Jun	53,436	53,428	1,781	3,155	16%	29%
Jul	66,637	66,631	2,149	3,139	20%	29%
Aug	74,017	74,011	2,387	3,164	22%	29%
Sep	64,513	64,502	2,150	3,204	20%	29%
Oct	66,491	66,485	2,145	3,278	20%	30%
Nov	64,648	64,641	2,155	3,093	20%	28%
Dec	70,002	69,991	2,258	3,214	21%	29%
Total	716,719	716,607	---	---	---	---
Average	59,727	59,717	1,958	---	18%	---

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 2024, this difference accounted for approximately 0.02% 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%, 26.5%, 67.7%, 5.6% and <1% to overall water production, respectively. All treatment stations operated within their respective capacity limits in 2024. Table 13 summarizes flow monitoring results by location.

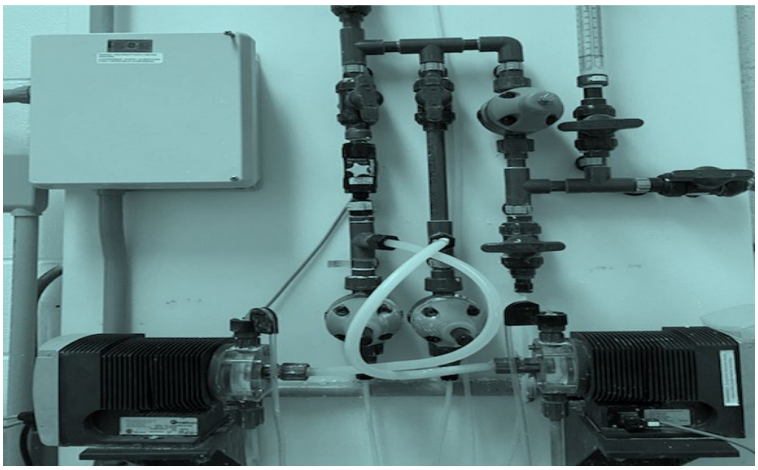
Table 13: 2024 water production summary – results by location							
Location	Total Volumes (m^3)		Daily Flows (m^3/day)			Capacity Assessments	
	Treated Water	% of Total	Rated Capacity	Average - Treated Water	Maximum - Treated Water	Average - Treated Water	Maximum - Treated Water
Well 2	375	0.05%	1,962.28	809	212	0.1%	11%
Well 3	189,714	26.5%	1,662.36	1,093	1,270	31%	76%
Well 4	485,172	67.7%	2,289.60	1,179	2,250	52%	98%
Well 5	40,180	5.61%	2,289.60	1,211	1,416	5%	62%
Well 6	1,166	0.16%	2,764.80	2,483	2,025	0.1%	73%
All Wells	716,607	100%	10,968.64	1,958	3,278	18%	30%

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 2024 when compared to 2023. The Town of Marathon has a leak detection program in place to identify and correct leaks. Since 2020 the flows have significantly decreased due to this program.

Table 14: Recent historical water production summary

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%	2,378	4,307
2023	752,218	-13.3%	2,061	4539
2024	716,607	-4.7	1,958	3,278



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 164300 (January 7, 2024)

An observation of improperly disinfected water potentially directed to users and low distribution chlorine (0.04mg/L) was observed in the system at Well 4. A low chlorine lockout at Well 4 occurred at 15 19, operator on site at 15:26. Chlorine fitting at end of header, burst causing lockout, backflush came on instantly however the pump failed to shut down resulting in a period of approximately 5 minutes of insufficiently treated water which could have reached consumers taps. New SCADA system installed recently is the suspected cause of pump not shutting down Well locked out with a residual of 0.45 mg/l (current low set point) with a flow of 16,54L/s providing a CT of 12, the pump continued to run as residual continued to lower. Upon shut down residual was 0.04 mg/l with a flow of 15.06Us providing a CT of 1 whereas a CT of 4 is required.

Lines were flushed, Well backflush operated to restored chlorine residual and repairs to equipment were completed, directed by Public Health to issue a precautionary boil water in the area surrounding Well #4, and to collect one sample for TC and E. coli. Results returned clear for samples taken one directly downstream from Well #4 and one additional sample collected at Well #4 through the sample line (would be representative of distribution sample) contacted Public Health and the precautionary BWA was rescinded.

- AWQI 164540 (February 29, 2024)

NWI received notice from the licensed laboratory that routine treated water samples collected from Wells 2, 3, 4 & 6 on February 20, 2024 yielded a sodium results over the regulatory reporting limit of 20 mg/L. The issue was reported to the Ministry's Spills Action Centre and to the Northwestern Health Unit on February 29, 2024.

Corrective action was performed in accordance with Schedule 17 of O. Reg. 170/03 and included collecting a water sample from the same locations as the samples that gave rise to the corrective action. These samples were collected on March 19 and yielded sodium concentrations of 20.6 mg/L (Well 2), 20.6 mg/L (Well 3), 20.4 mg/L (Well 4), 20.1 mg/L (Well 6). A sodium advisory was issued on March 11, 2024 by the Health Unit and no additional corrective actions were indicated.

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.

Two inspection reports were received during this reporting period. An inspection by Ontario's Ministry of the Environment, Conservation and Parks was initiated on February 14, 2024 and the final report was received on March 13, 2024. The final inspection rating was 100% and zero (0) incidents of regulatory noncompliance were identified.

The most recent inspection by Ontario's Ministry of the Environment, Conservation and Parks was initiated on November 4-5, 2024. The final inspection rating was 95.71% and one (1) incident of regulatory noncompliance was identified.

• Noncompliance item no. 1

All parts of the drinking water system were not disinfected in accordance with a procedure listed in Schedule B of the Drinking Water Works Permit. During the inspection period, work that required adherence to a disinfection protocol included the inspection and rehabilitation of Well 4, which took place from May 24 to May 30, 2024. The well was required to be disinfected following inspection and rehabilitation in accordance with AWWA C654 (Standard for Disinfection of Wells). However, upon reviewing the logbook and disinfection records prepared by the licensed well contractor, it was determined that disinfection was not performed in compliance with AWWA C654 requirements.

Key issues identified include the following:

a. Sterilene, which is a sodium-based, granular form of chlorine, is not one of the approved forms of chlorine for disinfection. AWWA C654 requires the use of liquid chlorine, sodium hypochlorite (liquid form), or calcium hypochlorite.

b. There was no record that the well was surged three times after chlorine was added on May 29, 2024.

c. Chlorine concentrations were measured using test strips. While AWWA C654 does not specify a measurement method for high-range chlorine, O. Reg. 170/03 requires the use of electronic direct-readout colorimetric or amperometric chlorine analyzers for required chlorine tests.

d. AWWA C654 requires a minimum of two water samples to be collected, at least 30 minutes apart, after disinfection, while the well is being continuously pumped. Only one sample was collected and tested for bacteriological analysis on May 30, 2024.

Despite these discrepancies, it is important to note that initial and final chlorine concentrations were within acceptable limits, and the raw water sample tested negative for total coliforms and E. coli. Where a contractor is responsible for adhering to a disinfection protocol, it is recommended that the owner and operating authority review the protocol with the contractor before the work begins.