

Annual Report

Marathon Drinking Water System



2021

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



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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, 2021).

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 are strongly encouraged to 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:	<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 2021

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 2021 are summarized in Table 3.

Table 3: Significant expenses incurred in 2021

Category	Description (Location)	Expense
Maintenance/Repair	Well inspections and rehabilitation (wells 3 & 5)	\$84,072
New Equipment	Redundant pressure switch control system for pump control (Penn Lake Reservoir & Booster Station)	\$7,461
Replace	SCADA computer terminal and software	\$7,412
Inventory/Replace	Two (2) chemical metering pumps (all wells)	\$6,034
Maintenance	Emergency generator load testing and service (all sites)	\$5,633
Replace	4-inch electromagnetic regulatory flow meter (well 2)	\$4,821
Inventory/Replace	Three (3) chemical flow monitors	\$3,723
Inventory	Inline chlorine sensor	\$3,578
Replace	Pump no. 3 chamber stack (Industrial Park Booster Station)	\$3,222
Maintenance/Repair	Security system inspections and repairs (all sites)	\$3,220
Maintenance	Annual flow meter calibration verifications (all sites)	\$3,172
Inventory/Replace	Five (5) solenoid valves (all wells)	\$2,565
Inventory	Security cameras and digital video recorder	\$1,910
Maintenance	Safety equipment inspections	\$1,789
Maintenance	Backflow prevention device testing (all sites)	\$1,084

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 parameters¹

Parameter (Location)	Number of Samples	Units	Min. Result	Max. Result	Annual Avg.
Raw Water Turbidity (Well 2)	40	NTU	0.06	0.08	0.07
Raw Water Turbidity (Well 3)	10	NTU	0.07	0.09	0.08
Raw Water Turbidity (Well 4)	52	NTU	0.06	0.09	0.07
Raw Water Turbidity (Well 5)	51	NTU	0.06	0.08	0.07
Raw Water Turbidity (Well 6)	52	NTU	0.05	0.09	0.07

1. Wells 2 & 3 were not in continuous production in 2021. Values reported for raw water turbidity correspond to periods of water production. When not in production, the site effectively functions as a distribution sampling station. Values reported for the treated water free chlorine residual and pH include all results in the calendar year irrespective of whether the well was in production.

Table 4 Continued: Results summary for operational parameters²

Parameter (Location)	Number of Samples	Units	Min. Result	Max. Result	Annual Avg.
Treated Water pH (Well 2)	49	---	7.7	7.8	7.8
Treated Water pH (Well 3)	50	---	7.7	7.8	7.8
Treated Water pH (Well 4)	52	---	7.7	7.8	7.8
Treated Water pH (Well 5)	51	---	7.7	7.8	7.7
Treated Water pH (Well 6)	52	---	7.7	7.8	7.7
Treated Water FCR (Well 2)	Continuous	mg/L	0.13	2.08	1.24
Treated Water FCR (Well 3)	Continuous	mg/L	0.10	2.26	1.25
Treated Water FCR (Well 4)	Continuous	mg/L	0.10	4.70	1.38
Treated Water FCR (Well 5)	Continuous	mg/L	0.08	3.59	1.32
Treated Water FCR (Well 6)	Continuous	mg/L	0.18	2.65	1.28
Distribution Water FCR (IPBS)	365	mg/L	1.01	1.54	1.25
Distribution Water FCR (PLRH&BS)	365	mg/L	0.82	1.67	1.24
Distribution Water FCR (WWTP)	365	mg/L	0.76	2.04	1.25

2. 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 2021, a total of 553 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.

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)	42	0	0 - 1	n/a	n/a
Raw Water (Well 3)	13	0	0	n/a	n/a
Raw Water (Well 4)	49	0	0	n/a	n/a
Raw Water (Well 5)	51	0	0	n/a	n/a
Raw Water (Well 6)	50	0	0	n/a	n/a
Treated Water (Well 2)	40	absent	absent	39	0 - 1
Treated Water (Well 3)	9	absent	absent	8	0 - 3
Treated Water (Well 4)	49	absent	absent	48	0 - 2
Treated Water (Well 5)	49	absent	absent	48	0 - 1
Treated Water (Well 6)	50	absent	absent	48	0 - 4
Distribution	151	absent	absent	50	0 - 3

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 were not in continuous production in 2021.

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.

Parameter	ODWQS (mg/L)	Well 2 (mg/L)	Well 3 ¹ (mg/L)	Well 4 (mg/L)	Well 5 (mg/L)	Well 6 (mg/L)
Sample Date		23-Feb-2021				
Nitrate	10	0.517	n/a	0.491	0.929	0.729
Nitrite	1	<0.010	n/a	<0.010	<0.010	<0.010
Sample Date		18-May-2021				
Nitrate	10	0.378	n/a	0.534	0.851	1.23
Nitrite	1	<0.010	n/a	<0.010	<0.010	<0.010
Sample Date		18-Aug-2021	30-Aug-2021	18-Aug-2021	25-Aug-2021	18-Aug-2021
Nitrate	10	1.00	0.484	0.597	0.833	0.909
Nitrite	1	<0.010	<0.010	<0.010	<0.010	<0.010
Sample Date		17-Nov-2021				
Nitrate	10	0.614	n/a	0.583	0.941	0.815
Nitrite	1	<0.010	n/a	<0.010	<0.010	<0.010
1. Well 3 was not in continuous production in 2021. No samples from well 3 were collected and tested for nitrate and nitrite in the first, second and fourth calendar quarters.						

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 2021 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)
23-Feb-2021	9.1
18-May-2021	8.3
18-Aug-2021	10.3
17-Nov-2021	<4.0
Regulatory Average (RAA)	7.9
ODWQS (RAA)	100

Table 8: Total HAA results

Sample Date	Result (µg/L)
23-Feb-2021	3.3
18-May-2021	3.2
18-Aug-2021	3.9
17-Nov-2021	<2.2
Regulatory Average (RAA)	3.2
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)	Lead ODWQS (µg/L)
01-Feb-2021	Hydrant 19	8.51	184	<1.0	10
01-Feb-2021	Hydrant 56	8.07	184	<1.0	
01-Feb-2021	Hydrant 115	8.09	192	<1.0	
14-Jul-2021	Hydrant 19	7.52	172	<1.0	
14-Jul-2021	Hydrant 56	7.78	170	<1.0	
14-Jul-2021	Hydrant 115	7.84	171	<1.0	



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.

Parameter (Units)	Sample Location	Well 2	Well 3	Well 4	Well 5	Well 6
	Sample Date	23-Apr-2019	12-Feb-2019	12-Feb-2019	12-Feb-2019	12-Feb-2019
	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	17	22	20	21	20
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)	1.5	0.090	0.092	0.092	0.078	0.157
Sodium (mg/L)	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.

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.

Parameter (Units)	Sample Location	Well 2	Well 3	Well 4	Well 5	Well 6
	Sample Date	23-Apr-2019	12-Feb-2019	12-Feb-2019	12-Feb-2019	12-Feb-2019
	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

Table 11 Continued: Organic parameter sampling results

Parameter (Units)	Sample Location	Well 2	Well 3	Well 4	Well 5	Well 6
	Sample Date	23-Apr-2019	12-Feb-2019	12-Feb-2019	12-Feb-2019	12-Feb-2019
	ODWQS					
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 767,935 m³ of treated water. On an average day in 2021, 2,104 m³ of treated water was supplied to the community, which represents 19% of the rated capacity of the system (10,968.64 m³/day). The maximum daily flow in 2021 was 3,927 m³/day, which represents 36% of the rated capacity. Flow monitoring results are summarized in Figure 1 and Table 12.

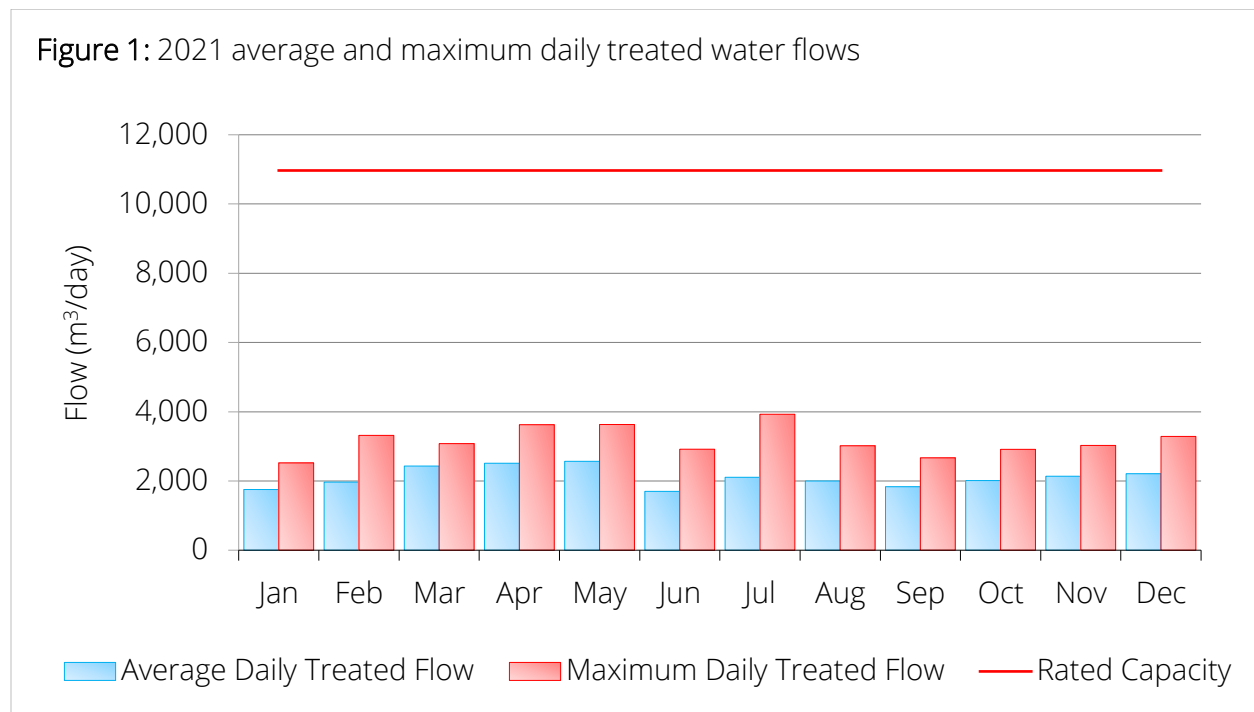


Table 12: 2021 water production summary

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	54,401	54,351	1,753	2,521	16%	23%
Feb	55,153	55,088	1,967	3,317	18%	30%
Mar	75,407	75,362	2,431	3,078	22%	28%
Apr	75,394	75,361	2,512	3,625	23%	33%
May	79,630	79,594	2,568	3,631	23%	33%
Jun	51,020	50,986	1,700	2,917	15%	27%
Jul	65,329	65,297	2,106	3,927	19%	36%
Aug	61,991	61,958	1,999	3,016	18%	27%
Sep	55,026	54,996	1,833	2,667	17%	24%
Oct	62,396	62,363	2,012	2,913	18%	27%
Nov	64,139	64,108	2,137	3,026	19%	28%
Dec	68,552	68,471	2,209	3,287	20%	30%
Total	768,437	767,935	---	---	---	---
Average	64,036	63,995	2,104	---	19%	---

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 2021, this difference accounted for approximately 0.07% 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 3%, <1%, 30%, 55% and 12% to overall water production, respectively. All treatment stations operated within their respective capacity limits in 2021. Table 13 summarizes flow monitoring results by location.

Table 13: 2021 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	19,757	3%	1,962.28	54	1,043	3%	53%
Well 3	3,721	<1%	1,662.36	10	401	1%	24%
Well 4	231,605	30%	2,289.60	635	1,834	28%	80%
Well 5	419,066	55%	2,289.60	1,148	1,692	50%	74%
Well 6	93,786	12%	2,764.80	257	1,451	9%	52%
All Wells	767,935	100%	10,968.64	2,104	3,927	19%	36%



4.3 Recent Historical Flows

Table 14 summarizes recent historical flow monitoring results for the Marathon DWS. There was a significant reduction in the amount of treated water supplied in 2021 when compared to 2020, and the annual average daily flow was at its lowest value since 2013. Notably, average daily flows decreased in the fourth calendar quarter of 2020 following the identification and repair of a substantial leak in the water distribution system.

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

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.

There were no adverse water quality incidents (AWQIs) during the reporting period.



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 September 22, 2021. Two (2) incidents of regulatory noncompliance were identified within the inspection report. Information concerning the duration of failures and the measures taken to address those failures is provided below.

- **Noncompliance item no. 1**

The monitoring and recording of flow at wells 2 & 3 did not meet the requirements set out in the Municipal Drinking Water Licence. The Licence requires that continuous flow measurement and recording shall be undertaken for the flow rate (L/s) and daily volume (m³/day) of water that flows into the treatment subsystem and that flows from the treatment subsystem to the distribution system.

Flow trends at each well were reviewed and it was determined that the flow meters at wells 2 & 3 were not measuring accurately during the review period. Specifically, several abnormal flow trends were evident, and the flow rate could not be accurately determined on numerous occasions. These trends were indicative of failing devices that were approaching the end of their expected service life. The accuracy of the flow meters is otherwise verified on an annual basis, and primary disinfection during periods of inaccurate flow measurement was determined by using the maximum pump output.

The flow meter at well 2 was ultimately replaced and calibrated on October 13, 2021. Well 3 was placed offline on October 26, 2021, until such a time that the flow measuring device can be replaced and accurate flow measurement restored. It is anticipated that the device will be replaced in the first calendar quarter of 2022.

- **Noncompliance item no. 2**

Logbooks were not properly maintained and/or did not contain the required information. Section 27 of O. Reg. 128/04 lists the record-keeping requirements for the operation of all subsystems, including the following:

- ensuring logs record information concerning the operation of the subsystem;
- recording any unusual or abnormal conditions that were observed in the subsystem during the shift, any action that was taken and any conclusions drawn from the observations;
- recording any departures from normal operating procedures that occurred during the shift and the time they occurred; and,
- recording any equipment that was taken out of service or ceased to operate during the shift and any action taken to maintain or repair equipment during the shift.

On May 23, 2021, a low chlorine alarm condition was activated at well 4 at 10:37 am. The well should have automatically shut down with the alarm condition but did not on this occasion. The main power switch to the building was subsequently shut off to shut the well down at 10:51 am. Primary disinfection was achieved at all times, but there were no further details in the logbook as to the resolution of the failure of the automatic well shut down feature. After troubleshooting and repairs to the chemical feed system, the operator did not identify any further issues and the automatic shutdown feature worked as intended later the same day at 18:58 and again on May 24, 2021.

During the inspection period there were also numerous instances where the specific well that an entry was referencing was not clear.

The owner and operating authority are required to ensure that all details pertaining to events as mentioned above are recorded in future logbook entries chronologically and meet requirements as detailed in Section 27 of O. Reg. 128. Logbook records were subsequently submitted to the Ministry as evidence of correction on February 1, 2022. The electronic logbooks were also reconfigured on January 6, 2022, to ensure that location references are clear.