

Matheson Drinking Water System

2022 Annual Summary Report



Prepared by the Ontario Clean Water Agency
On behalf of the Corporation of the Township of Black River-Matheson



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OVERVIEW

Municipalities throughout Ontario are required to comply with Ontario Regulation 170/03 made under the *Safe Drinking Water Act*, 2002. The Act was passed following recommendations made by Commissioner O'Conner after the Walkerton Inquiry. The Act's purpose is to protect human health through the control and regulation of drinking-water systems. O. Reg. 170/03 regulates drinking water testing, use of licensed laboratories, treatment requirements and reporting requirements.

Section 11 of O. Reg. 170/03 requires the owner to produce an Annual Report which must include the following:

- Description of system and chemical(s) used
- Summary of any adverse water quality reports and corrective actions
- Summary of all required testing
- 4. Description of any major expenses incurred to install, repair or replace equipment

This Annual Report must be completed by February 28 of each year.

Schedule 22 of the regulation requires that a Summary Report for Municipalities be prepared which must be presented and accepted by Council by March 31 of each year for the preceding calendar year reporting period.

The report must list the requirements of the Act, its regulations, the system's Drinking Water Works Permit (DWWP), Municipal Drinking Water Licence (MDWL), Certificate of Approval (if applicable), and any Provincial Officer Order the system failed to meet during the reporting period. The report must also specify the duration of the failure, and for each failure referred to, describe the measures that were taken to correct the failure.

The *Safe Drinking Water Act*, 2002 and the drinking water regulations can be viewed at the following website: <http://www.e-laws.gov.on.ca>.

To enable the Owner to assess the rated capacity of their system to meet existing and future planned water uses, the following information is also required in the report.

- A summary of the quantities and flow rates of water supplied during the reporting period, including the monthly average and the maximum daily flows.
- A comparison of the summary to the rated capacity and flow rates approved in the systems approval, drinking water works permit or municipal drinking water licence or a written agreement if the system is receiving all its water from another system under an agreement.

The Annual and Summary Reports have been combined and presented to council as the Matheson Drinking Water System 2022 Annual Summary Report.

1.0 INTRODUCTION

Drinking-Water System Name:	MATHESON DRINKING WATER SYSTEM
Drinking-Water System No.:	220002574
Drinking-Water System Owner:	The Corporation of the Township of Black River - Matheson
Drinking-Water System Category:	Large Municipal, Residential System
Municipal Drinking Water Licence No.:	204-103 (Issue 4 - April 23, 2021) 204-103 (Issue 5 - January 5, 2022) 204-103 (Issue 6 - March 14, 2022)
Drinking Water Work Permit No.:	204-203 (Issue 3 - June 2, 2017) 204-203 (Issue 4 - March 14, 2022)
Permit to Take Water No.:	300-1137081725 (Issued July 23, 2021)
Period being reported on:	January 1, 2022 to December 31, 2022

Does your Drinking Water System serve more than 10,000 people? No

Is your annual report available to the public at no charge on a web site on the Internet? No

Location where Report required under O. Reg. 170/03 Schedule 22 will be available for inspection.

**Black River - Matheson Municipal Office
429 Park Lane,
Matheson ON P0K 1N0**

Drinking Water Systems that receive drinking water from the Matheson Drinking Water System

Drinking Water System Name	Drinking Water System Number
Matheson Drinking Water System	220002574

The Annual Report was provided to all connected Drinking Water System owners

The Ontario Clean Water Agency prepared the 2022 Annual Summary Report for the Matheson Drinking Water System and provided a copy to the system owner; the Township of Black River Matheson. The Matheson Drinking Water System is a stand-alone system that does not receive water from or send water to another system.

System users are notified that the Annual Report is available through:

- Public access/notice via newspaper/website

2.0 DESCRIPTION OF THE DRINKING WATER SYSTEM

The Matheson Drinking water system is classified as a large municipal residential system that is fed from four wells which are situated on the west shore of Belleek Lake.

Well No. 1 is a 150 mm diameter, 38.2 m deep, drilled groundwater production well utilizing a submersible deep well pump rated at 11.34 L/sec. Discharge from this well is through a 100 mm diameter discharge line connected to a well pump header which is located in the Matheson Treatment Plant. This well commenced production in March/April 2000.

Well No. 2 is a 150 mm diameter, 43.6 m deep, drilled groundwater production well utilizing a submersible deep well pump rated at 5.70 L/sec. Discharge from this well is through a 75 mm diameter discharge line connected to a well pump header which is located in the Matheson Treatment Plant. This well commenced production in March/April 2000.

Well No. 3 is a 200 mm diameter, 39.6 m deep, drilled groundwater production well utilizing a submersible deep well pump rated at 11.34 L/s. Discharge from this well is through a 100 mm diameter discharge line connected to a well pump header which is located in the Matheson Treatment Works. This well commenced production in March/April 2000.

Well No. 4 is a 150 mm diameter, 35.3 m deep, drilled groundwater production well utilizing a submersible deep well pump rated at 2.66 L/s. Discharge from this well is through a 50 mm diameter discharge line connected to a well pump header which is located in the Matheson Treatment Plant. This well commenced production in March/April 2000.

The Matheson water treatment plant and four wells are situated on the west shore of Belleek Lake. This facility commenced operation in 2000 and was later reclassified as a Water Distribution and Supply Subsystem Class 2 facility. Within the treatment works, the four individual well discharge pipes are metered for flow and then join into one common header where the water is injected with a sodium hypochlorite solution. Raw water sample taps are located on each of the four well discharge headers. The disinfection system consists of two chemical metering pumps, one duty and one on standby; and one 450 L chemical solution tank. One chlorine pump is capable of pumping sodium hypochlorite solution at a rate of 2.3 L/hr and the other at a rate of 1.3 L/hr. After the water is injected with sodium hypochlorite, it is metered then discharged from the treatment works through a 150 mm diameter pipe which runs 1250 metres in length to provide for the minimum 15 minute chlorine contact time. The 1250 m water main also serves as discharge to the reservoir and to the distribution system.

The single chamber reservoir is located on a high point of land and has a storage capacity of 450 cubic metres. A 1,250 m treated water main runs from the water treatment plant to a valve chamber at the reservoir. This watermain is the chlorine contact vessel. The valve chamber at the end of the watermain directs the treated water either to storage or directly into the distribution system, depending on the time of day and/or the system pressure. Throughout the day, treated water is discharged to the distribution system while the reservoir provides storage/emergency supply. When demand is low (i.e. at night), the water is directed into the reservoir.

The water supply/treatment/storage system is located in the community of Matheson and serves an estimated population of 900 persons with approximately 390 residential service connections. There are approximately 32 fire hydrants. Watermains range in size from 25 mm to 250 mm and are made of PVC, asbestos-cement or galvanized steel.

3.0 LIST OF ALL WATER TREATMENT CHEMICALS USED

- Sodium Hypochlorite for disinfection

4.0 SIGNIFICANT EXPENSES INCURRED

- New chlorine analyzer at the reservoir
- New chemical feed pump for reservoir chlorine analyzer
- New chemical drum pump
- Operations and maintenance costs



5.0 NOTICES REPORTED & SUBMITTED TO THE SPILLS ACTION CENTER

1. Category 2 Watermain Break / Loss of Pressure / Boil Water Advisory

AWQI #	160816
Date	November 28, 2022
Details	Water was shut off in Matheson distribution system on the West side of 8th Avenue to perform watermain repair. Loss of pressure category two BWA. Air gap was not maintained and pressure down to 0 PSI. Flushed water main at closest hydrants achieved adequate free chlorine residual. The local HU and MOE SAC were notified and a BWA was issued for the affected area. Notified all residents affected with written boil water advisory on November 28, 2022. Approx. 100 houses affected.
Corrective Action	The HU issued a Boil Water Advisory for the affected residences. The watermain was repaired, the pressure was restored and the affected area was flushed. Two sets of 3 bacteriological samples were collected (upstream, downstream and at the site of the break) on November 28 and 30, 2022. Sample results indicated no total coliforms or E.coli. BWA was lifted on December 1 by the Health Unit. Resolution completed December 2, 2022.

6.0 MICROBIOLOGICAL TESTING

Sample Type	No. of Samples	<i>E. coli</i> Results (min to max)	Total Coliform Results (min to max)	# of HPC Samples	HPC Results (min to max)
Raw - Well 1	52	0 to 0	0 to 0	N/A	N/A
Raw - Well 2	52	0 to 0	0 to 0	N/A	N/A
Raw - Well 3	44*	0 to 0	0 to 3	N/A	N/A
Raw - Well 4	52	0 to 0	0 to 0	N/A	N/A
Treated	52	0 to 0	0 to 0	52	<10 to 30
Distribution	104	0 to 0	0 to 0	52	<10 to 50

Maximum Allowable Concentration (MAC) for treated and distribution samples: *E. coli* = 0 Counts/100 mL and Total Coliforms = 0 Counts/100 mL
 “<” denotes less than the laboratory’s method detection limit.

Note: One microbiological sample is collected and tested each week from the raw and treated water supply. A total of two microbiological samples are collected and tested each week from the distribution system.

*Well 3 was out of service for several weeks throughout 2022 therefore sampling was not conducted every week

7.0 OPERATIONAL TESTING

Raw Water Turbidity

Location	No. of Samples	Range of Results (min to max)	Unit of Measure
Well 1	13	0.15 to 0.65	NTU
Well 2	14	0.14 to 0.42	
Well 3	10*	0.15 to 0.56	
Well 4	13	0.31 to 0.91	

*Well 3 was out of service for several weeks throughout 2022 therefore sampling was not conducted every month

Continuous Monitoring in the Treatment Process

Parameter	No. of Samples	Range of Results (min to max)	Unit of Measure	Standard
Free Chlorine	8760	0.24 to 3.1	mg/L	N/A

Notes: For continuous monitors 8760 is used as the number of samples.

Chlorine Residuals from the Distribution System

Parameter	No. of Samples	Range of Results (min to max)	Unit of Measure	Standard
Free Chlorine	364	0.71 to 1.22	mg/L	0.05

Notes: A total of seven operational checks for chlorine residual in the distribution system are collected each week. Four (4) samples are tested one day and three (3) on a second day. The sample sets are collected at least 48-hours apart and samples collected on the same day are from different locations.

Nitrate & Nitrite Results from the Water Treatment Plant

Date of Sample	Nitrate Result Value (mg/L)	Nitrite Result Value (mg/L)	Exceedance
January 4	0.11	<0.05	No
April 11	0.19	<0.05	No
July 4	0.2	<0.01	No
October 11	0.13	<0.05	No

Maximum Acceptable Concentration (MAC) for Nitrate = 10 mg/L

MAC for Nitrite = 1.0 mg/L

Total Trihalomethane Results from the Distribution System

Date of Sample	Result Value (ug/L)	Four Quarter Running Average	Exceedance
January 4	0.7	1.35	No
April 11	1.2	1.48	No
July 4	1.8	1.43	No
October 11	0.6	1.08	No

Maximum Acceptable Concentration (MAC) = 100 ug/L (Four Quarter Running Average)

Total Haloacetic Acid Results from the Distribution System

Date of Sample	Result Value (ug/L)	Four Quarter Running Average	Exceedance
January 4	<8	<8	No
April 11	<8	<8	No
July 4	<8	<8	No
October 11	<8	<8	No

Maximum Acceptable Concentration (MAC) = 80 ug/L (Four Quarter Running Average)

Lead (most recent), pH & Alkalinity Results (from the distribution system)

Date of Sample	# of Samples	Range of Results (min to max)		
		pH Results	Alkalinity Results (mg/L)	Lead Results (ug/L)
April 14, 2022	2	7.7 to 7.8	142 to 146	<0.1 to <0.1 (April 7, 2020)
September 22, 2022	2	8.1 to 8.2	140 to 142	<0.1 to 0.1 (Oct 15, 2020)

MAC for Lead -10 ug/L

Note: Every year the system is required to test for total alkalinity and pH in two distribution samples collected during the period of December 15 to April 15 and two distribution samples during the period of June 15 to October 15. This testing is required in every 12-month period with lead testing in every third 12-month period. The next round of lead sampling will be completed in April and October of 2023.

Summary of Most Recent Schedule 23 Inorganic Results from the Water Treatment Plant

Sample Date: September 21, 2020

Parameter (ug/L)	Result Value	Maximum Acceptable Concentration	Exceedance
Antimony	<0.5	6	No
Arsenic	2	10	No
Barium	8	1000	No
Boron	3	5000	No
Cadmium	<0.1	5	No
Chromium	<1	50	No
Mercury	<0.1	0.001	No
Selenium	0.2	10	No
Uranium	<1	20	No

Note: Sampling required once every 36 months (next sample scheduled for October 2023)

Summary of Most Recent Schedule 24 Organic Results from the Water Treatment Plant

Sample Date: September 21, 2020

Parameter	Result Value	Unit of Measure	Standard	Exceedance
1,1-Dichloroethylene	<0.3	ug/L	14	No
1,2-Dichlorobenzene	<0.3	ug/L	200	No
1,2-Dichloroethane	<0.3	ug/L	5	No
1,4-Dichlorobenzene	<0.3	ug/L	5	No
2,3,4,6-Tetrachlorophenol	<0.2	ug/L	100	No
2,4,6-Trichlorophenol	<0.2	ug/L	100	No
2,4-Dichlorophenoxy acetic acid (2,4-D)	<0.333	ug/L	100	No
2-4 Dichlorophenol	<0.2	ug/L	900	No
Alachlor	<0.222	ug/L	5	No
Atrazine + N-dealkylated metabolites	<0.5	ug/L	5	No
Azinphos-methyl	<0.166	ug/L	20	No
Benzene	<0.1	ug/L	1	No
Benzo(a)pyrene	<0.01	ug/L	0	No
Bromoxynil	<0.0889	ug/L	5	No
Carbaryl	<2	ug/L	90	No
Carbofuran	<3	ug/L	90	No
Carbon Tetrachloride	<0.2	ug/L	2	No
Chlorobenzene	<0.5	ug/L	80	No
Chlorpyrifos	<0.166	ug/L	90	No
Diazinon	<0.166	ug/L	20	No
Dicamba	<0.0778	ug/L	120	No
Dichloromethane	<1	ug/L	50	No
Diclofop-methyl	<0.111	ug/L	9	No
Dimethoate	<0.166	ug/L	20	No
Diquat	<0.2	ug/L	70	No
Diuron	<10	ug/L	150	No

Parameter	Result Value	Unit of Measure	Standard	Exceedance
Glyphosate	<20	ug/L	280	No
Malathion	<0.166	ug/L	190	No
MCPA	<5.55	ug/L	230	N/A
Metolachlor	<0.111	ug/L	50	No
Metribuzin	<0.111	ug/L	80	No
Paraquat	<0.1	ug/L	10	No
Pentachlorophenol	<0.3	ug/L	3	No
Phorate	<0.111	ug/L	60	No
Picloram	<0.0778	ug/L	2	No
Prometryne	<0.0555	ug/L	1	No
Simazine	<0.166	ug/L	10	No
Terbufos	<0.111	ug/L	1	No
Tetrachloroethylene	<0.3	ug/L	10	No
Total PCB's	<0.06	ug/L	190	No
Triallate	<0.111	ug/L	5	No
Trichloroethylene	<0.2	ug/L	5	No
Trifluralin	<0.111	ug/L	45	No
Vinyl Chloride	<0.1	ug/L	1	No

Note: Sampling required once every 36 months (next sample scheduled for October 2023)

Most Recent Sodium Results from the Water Treatment Plant

Date of Sample	No. of Samples	Result Value	Unit of Measure	Standard	Exceedance
September 21, 2020	1	2.47	mg/L	20	No

Note: Sample required every 60 months. Next sampling scheduled for October 2025

Most Recent Fluoride Results from the Water Treatment Plant

Date of Sample	No. of Samples	Result Value	Unit of Measure	Standard	Exceedance
September 21, 2020	1	<0.05	mg/L	1.5	No

Note: Sample required every 60 months. Next sampling scheduled for October 2025

Inorganic or Organic Results that Exceeded Half the Standard

No inorganic or organic parameter(s) listed in Schedule 23 and 24 of Ontario Regulation 170/03 exceeded half the standard found in Schedule 2 of the Ontario Drinking Water Standard (O. Reg. 169/03) during the reporting period.

Additional Testing Performed in Accordance with a Legal Instrument.

No additional testing was required in 2022.

8.0 REQUIREMENTS THE SYSTEM FAILED TO MEET

The Matheson Drinking Water system met all requirements in 2022.

9.0 SUMMARY OF FLOW RATES AND QUANTITIES

The following tables and graphs indicate the quantities and flow rates of water taken and produced during the reporting period, including monthly average flows, maximum daily flows and the total monthly volumes. A comparison of the water data is made to the rated capacity and flow rates specified in the system's Permit to Take Water and the Municipal Drinking Water License.

All raw water flow rate exceedances in 2022 were checked and determined to be inflated numbers due to momentary spikes on pump start up/shutdown that lasted less than 5 minutes and are not representative. The actual maximum flow rates have been depicted in the tables below.

Well 1 - Summary of Water Taking

Regulated by Permit to Take Water (PTTW) #300-1137081725 (Issued July 23, 2021)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year to Date
Total Volume (m ³)	6366	5337	7153	6810	4635	4555	4378	4370	7554	8897	7453	4671	72179
Average Volume (m ³ /d)	205	191	231	227	150	152	141	141	252	287	248	151	198
Maximum Volume (m ³ /d)	380	369	409	380	287	268	169	223	298	321	318	212	409
PTTW - Maximum Allowable Volume (m ³ /day)	980	980	980	980	980	980	980	980	980	980	980	980	980
Maximum Flow Rate (L/min)	679	679	678	668	671	673	673	675	674	677	672	673	679
PTTW - Maximum Allowable Flow Rate (L/min)	680	680	680	680	680	680	680	680	680	680	680	680	680

The system's Permits to Take Water allow the municipality to withdraw a maximum volume of 980 cubic meters from Well 1 each day. A review of the raw water flow data indicates that the system never exceeded this allowable limit having a maximum volume of 409 m³.

The Permit also allows a maximum flow rate of 680 L/minute. The maximum flow rate was 679 L/min, which is below the limit.

Well 2 - Summary of Water Taking

Regulated by Permit to Take Water (PTTW) #300-1137081725 (Issued July 23, 2021)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year to Date
Total Volume (m ³)	1811	1547	1551	1413	4096	4136	4168	3933	3825	4025	3842	4254	38601
Average Volume (m ³ /d)	58	55	50	47	132	138	134	127	128	130	128	137	105.8
Maximum Volume (m ³ /d)	140	124	94	116	169	165	161	151	138	148	174	149	174
PTTW - Maximum Allowable Volume (m ³ /day)	500	500	500	500	500	500	500	500	500	500	500	500	500
Maximum Flow Rate (L/min)	328	329	335	322	327	318	319	320	323	323	322	326	335
PTTW - Maximum Allowable Flow Rate (L/min)	347	347	347	347	347	347	347	347	347	347	347	347	347

The system's Permits to Take Water allow the municipality to withdraw a maximum volume of 500 cubic meters from Well 2 each day. A review of the raw water flow data indicates that the system never exceeded this allowable limit having a maximum volume of 174 m³.

The Permit also allows a maximum flow rate of 347 L/minute. The maximum flow rate was 335 L/min, which is under the limit.

Well 3 - Summary of Water Taking

Regulated by Permit to Take Water (PTTW) #300-1137081725 (Issued July 23, 2021)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year to Date
Total Volume (m ³)	5466	6092	5827	4968	4919	4676	4451	4457	741	31	1416	4448	47492
Average Volume (m ³ /d)	176	218	188	166	159	156	144	144	25	1	47	143	130
Maximum Volume (m ³ /d)	379	382	395	353	369	366	180	241	137	1	175	169	395
PTTW - Maximum Allowable Volume (m ³ /day)	980	980	980	980	980	980	980	980	980	980	980	980	980
Maximum Flow Rate (L/min)	668	652	667	674	670	672	673	673	677	<1	670	679.8	679.8
PTTW - Maximum Allowable Flow Rate (L/min)	680	680	680	680	680	680	680	680	680	680	680	680	680

The system's Permits to Take Water allow the municipality to withdraw a maximum volume of 980 cubic meters from Well 3 each day. A review of the raw water flow data indicates that the system never exceeded this allowable limit having a maximum volume of 395 m³.

The Permit also allows a maximum flow rate of 680 L/minute. The maximum flow rate was 679.8 L/min, which is just under the limit.

Well 4 - Summary of Water Taking

Regulated by Permit to Take Water (PTTW) #300-1137081725 (Issued July 23, 2021)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year to Date
Total Volume (m ³)	7	5	14	4	6	5	5	6	6	6	9	6	79
Average Volume (m ³ /d)	0.23	0.18	0.45	0.13	0.19	0.17	0.16	0.19	0.20	0.19	0.30	0.19	0.22
Maximum Volume (m ³ /d)	2	2	7	1	2	2	2	2	2	2	4	2	7
PTTW - Maximum Allowable Volume (m ³ /day)	230	230	230	230	230	230	230	230	230	230	230	230	230
Maximum Flow Rate (L/min)	137	143	156	133	131	141	134	139	137	140	142	137	156
PTTW - Maximum Allowable Flow Rate (L/min)	160	160	160	160	160	160	160	160	160	160	160	160	160

The system's Permits to Take Water allow the municipality to withdraw a maximum volume of 230 cubic meters from Well 4 each day. A review of the raw water flow data indicates that the system never exceeded this allowable limit having a maximum volume of 7 m³.

The Permit also allows a maximum flow rate of 160 L/minute. The maximum flow rate was 156 L/min, which is under the limit.

Treated Water Supplied to the Distribution System

Regulated by Municipal Drinking Water Licence (MDWL) #204-103 Issue 4 (April 23, 2021), #204-103 Issue 5 (January 5, 2022), and #204-103 Issue 6 (March 14, 2022)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year to Date
Total Volume (m ³)	13654	12977	14514	13160	13673	13396	12956	12662	12073	12890	12690	13375	158020
Average Volume (m ³ /d)	440	463	468	439	441	447	418	408	402	416	423	431	433
Maximum Volume (m ³ /d)	498	493	507	485	527	510	498	463	428	456	547	458	547
MDWL - Rated Capacity (m ³ /day)	1710	1710	1710	1710	1710	1710	1710	1710	1710	1710	1710	1710	1710
% Rated Capacity	29	29	30	28	31	30	29	27	25	27	32	27	32

Schedule C, Section 1.1 of MDWL No. 204-103 states that the maximum daily volume of treated water that flows from the treatment subsystem to the distribution system shall not exceed a maximum flow rate of 1,710 m³ on any calendar day. The Matheson DWS complied with this limit having a recorded maximum volume of 547 m³, which is 32% of the rated capacity.

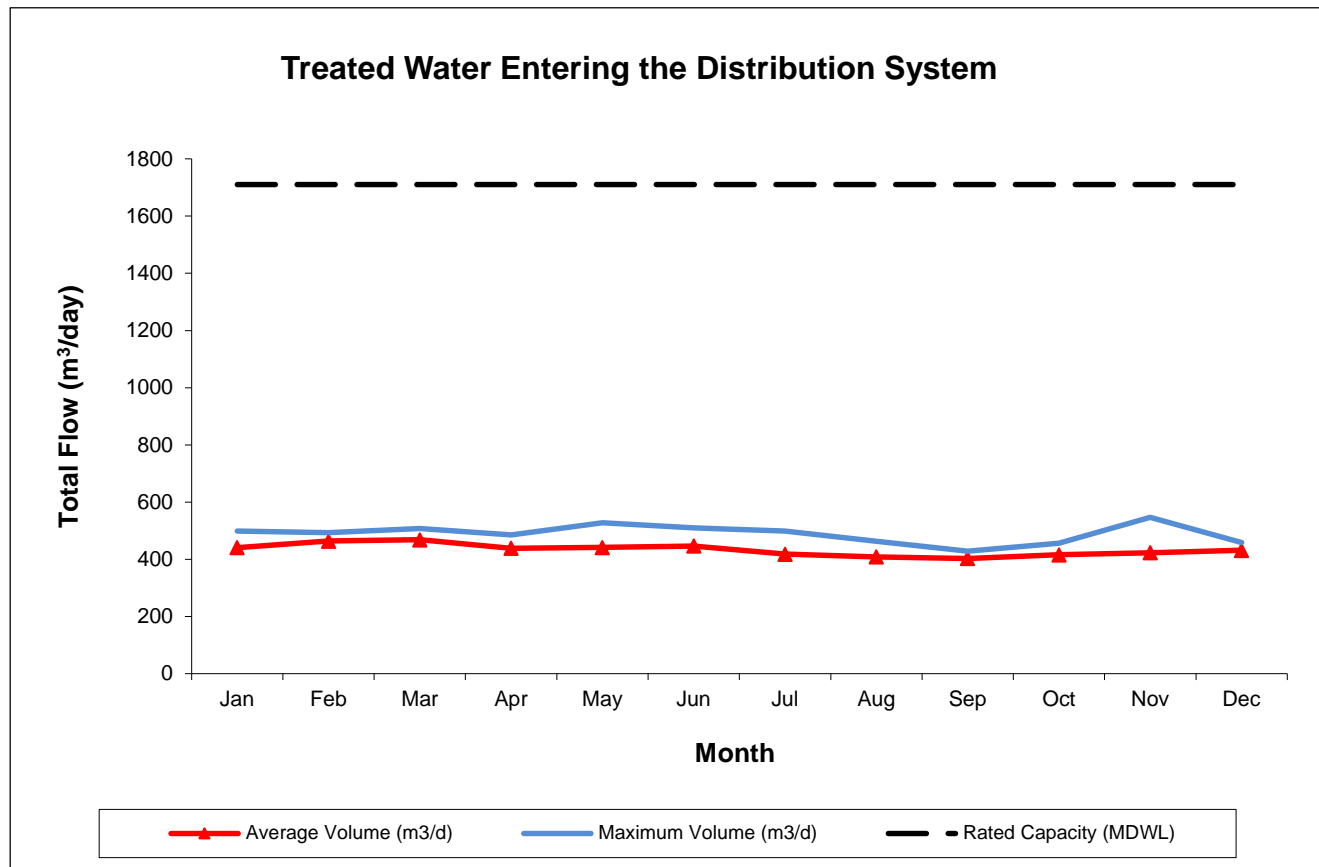


Figure 1: Daily Volumes of Treated Water Supplied to the Distribution System. A comparison of the rate specified in the system’s Municipal Drinking Water Licence to the average and maximum volumes entering the distribution system.

Comparison of the Flow Summary to Systems Licence & Permit

Rated Capacity of the Plant (MDWL)	1,710 m ³ /day	
Average Daily Flow for 2022	433 m ³ /day	25% of the rated capacity
Maximum Daily Flow for 2022	547 m ³ /day	32% of the rated capacity
Total Treated Water Produced in 2022	158,020 m ³	

The Matheson water treatment plant is rated at 1,710 cubic meters of water per day as specified in the system’s Municipal Drinking Water Licence. The average daily flow was 433 m³ per day, which is 25% of the rated capacity. This information clearly shows that the plant is well within its rated capacity and is able to meet current demands of consumers.

10.0 CONCLUSION

The Matheson Drinking Water System was able to meet the community’s demand for drinking water while complying with the terms and conditions outlined in its Drinking Water Works Permit and Municipal Drinking Water Licence and the regulatory requirements of the Safe Drinking Water Act and its Regulations.