



Ontario Clean Water Agency
Agence Ontarienne Des Eaux

Matachewan Drinking Water System

2020 ANNUAL/SUMMARY REPORT

Prepared by the Ontario Clean Water Agency
on behalf of the Township of Matachewan

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INTRODUCTION

Municipalities throughout Ontario have been required to comply with Ontario Regulation 170/03 made under the *Safe Drinking Water Act* (SDWA) since June 2003. The Act was enacted 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 Regulation 170/03 requires the owner to produce an Annual Report. This report must include the following:

1. Description of system & chemical(s) used
2. Summary of any adverse water quality reports and corrective actions
3. 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 28th of each year.

Schedule 22 of the regulation also requires a Summary Report which must be presented & accepted by Council by March 31st of each year for the preceding calendar year.

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 regulatory requirements 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.

1. A summary of the quantities and flow rates of water supplied during the reporting period, including the monthly average and the maximum daily flows,
2. 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 reports have been prepared by the Ontario Clean Water Agency (OCWA) on behalf of the Owner and presented to council as the 2020 Annual/Summary Report.



Matachewan Drinking Water System

Section 11

2020 ANNUAL REPORT



Section 11 - ANNUAL REPORT

1.0 INTRODUCTION

Drinking-Water System Name:	Matachewan Drinking Water System
Drinking-Water System No.:	220003653
Drinking-Water System Owner:	The Corporation of the Township of Matachewan
Drinking-Water System Category:	Large Municipal, Residential System
Period being reported:	January 1, 2020 to December 31, 2020

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? Yes
at <http://www.matachewan.com/>

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

Matachewan Township Office
1 Moyneur Avenue,
Matachewan Ontario P0K 1N0

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

The Matachewan Drinking Water System provides all drinking water to the community of Matachewan.

The Annual Report was not provided to any other Drinking Water System Owners.

The Ontario Clean Water Agency prepared the 2020 Annual/Summary Report for the Matachewan Drinking Water System and provided a copy to the system owner; the Township of Matachewan. The Matachewan Drinking Water System is a stand-alone system that does not receive water from or send water to another system.

Notification to system users that the Annual Report is available for viewing is accomplished through:

- Notice on the Town's website
- Notice in the Town's News Letter



2.0 MATACHEWAN DRINKING WATER SYSTEM (DWS No. 220003653)

The Matachewan Drinking Water System is a communal ground water well supply that services the Town of Matachewan. It is owned by the Corporation of the Township of Matachewan and is operated by the Ontario Clean Water Agency (OCWA). The system consists of Class 1 water treatment subsystem and a Class 1 water distribution subsystem. OCWA is the accredited operating authority and is designated the Overall Responsible Operator for both the water treatment and water distribution facilities.

Raw Water Supply

The water treatment system obtains its water from two production wells with a combined allowable daily volume of 908 m³/day. The wells are located at 391 Bernard Street, adjacent to the Montreal River. The well head assembly for Well 1 is located within the main building for the water treatment plant while the well head assembly for Well 2 is located outside adjacent to the water treatment plant building. Both wells consist of a 150 mm diameter steel casing; Well 1 is drilled to a depth of 39.6 m and Well 2 is drilled to a depth of 55 m. Well 1 is equipped with a 30 hp vertical turbine pump assembly and a variable frequency drive (VFD) to pump at a maximum rate of 20 L/s. Well 2 is equipped with a 30 hp submersible pump (VFD compatible) rated at 20 L/s. Each well is equipped with a magnetic flow meter installed in a 150 mm diameter line that directs water into the treatment process. Also included are pump-to-waste capabilities from a common pump discharge line.

Water Treatment

The wells feed the water treatment plant that has a maximum rated capacity of 908 cubic meters per day (m³/d). The wells operate on an alternating basis but can be adjusted as required.

The plant is controlled by a programmable logic controller (PLC) which communicates with the elevated water storage facility (EWSF) to control the plant start and stop cycles. There is a set point for both wells to prevent them from running more than the permit to take water allows. When the set point is reached, the operational well shuts down and the other well takes over.

The raw water discharges to a combined header in the water treatment plant which is directed to a Filtronics Inc. iron and manganese removal filtration system consisting of two reaction vessels fed with sodium hypochlorite and one pressure filter rated at 10.5 L/second. The filter is filled with Filtronic's Electromedia®, a proprietary media. Sodium hypochlorite solution is injected at the raw water header before the first reaction vessel to oxidize the iron and manganese so it can be removed by the filtration system and provide primary disinfection. The sodium hypochlorite system consists of duplicate chemical pumps (one duty, one back-up) with automatic switchover and a 400 L double walled chemical tank.

The filter is automatically backwashed, prior to shutdown to clean contaminants from the media. Manual backwashes can also be initiated when required. The backwash water is



pumped from a 22,700 L underground backwash water storage tank and the wastewater is discharged to the backwash reclaim water tank. A typical backwash time is four (4) minutes.

The system will also go through a purge cycle prior filtration when there is a call for water or after a backwash cycle if the call for water signal is still on. This step allows the filter to reform. Discharge water from the purge cycle goes to the reclaim tank. Normal purge time is from 1 to 10 minutes.

The backwash and purge discharge water stored in the reclaim tank are blended with raw well water to be reprocessed through the filter during filtration mode. The reclaim pump is rated at 1.04 L/second and when in operation, the reclaim water is continuously monitored for turbidity to ensure it will not cause fouling of the media. Settled sludge from the reclaim tank will be removed via hauling truck when needed.

Filtered water is continuously monitored using free chlorine residual analyzer that is alarmed and is measured by an in-line magnetic flow meter before entering the underground chlorine contact chamber pipe. The 23.87 m³ chlorine contact pipe consists of a 750 mm diameter x 54 m long PVC constructed pressure pipe which provides appropriate contact time to ensure adequate primary disinfection of the water before entering the distribution system.

To ensure water entering the chlorine contact chamber / pipe has sufficient free chlorine there is a post filter sodium hypochlorite system (redundant duty back-up system) to provide trim chlorination as required. If the free chlorine residual drops below an operator specified low set point the post filter sodium hypochlorite chemical system will automatically start to provide a sodium hypochlorite dosage to achieve a specified free chlorine residual set-point. The post filter sodium hypochlorite system is also used to provide primary disinfection when operating in filter bypass or EWSF bypass modes.

A compliance free chlorine residual analyzer is installed after the chlorine contact chamber to ensure water entering the distribution system meets primary disinfection requirements and has a sufficient chlorine to maintain a residual throughout the distribution system. The analyzer is pH compensated and equipped with alarms.

An ammonium sulphate system was installed downstream from the compliance free chlorine analyzer to convert the free chlorine residual to combined chlorine residual before entering the distribution system. The ammonium sulphate chemical addition is fully redundant having a duty backup system consisting of two chemical pumps. After the ammonia injection point there is a total chlorine analyzer to measure and record the total chlorine residual entering the distribution system. The ammonia sulphate solution is stored in a 350 L double walled storage tank. Currently the system is not in use, but may be required if trihalomethane (THM) and/or haloacetic acid (HAA) results increase in the distribution system.

Water Storage and Pumping Capabilities

An elevated water storage facility (EWSF) with a tank volume of 650 m³ was constructed and put into operation on December 16, 2015. The EWSF is located at the South East corner of



Anita Street and Amabilis Avenue in the community of Matachewan and has approximately two days of water storage. It is used to provide fire storage, equalization storage and emergency storage capability. The EWSF houses a sodium hypochlorite feed system consisting of two metering pumps (one duty and one spare), two sodium hypochlorite tanks and a chlorine residual analyzer. A flow meter, pressure gauge, process piping, valves, controls and instrumentation are also on-site.

Emergency Power

A 100 KW diesel powered generator is available at the water treatment building and is capable of supplying power to the entire facility during power failures.

A 15 KW diesel generator is also available outside the water tower to provide standby power during emergencies.

Distribution System

The Matachewan Drinking Water System is categorized as a Large Municipal Residential Drinking Water System and serves an estimated population of 266 residents. The distribution system consists of approximately 191 active residential service connections and 177 homes. A review of the distribution system drawings indicated that water mains are primarily six, eight and ten inch in diameter and constructed of ductile iron with PVC constructed pipe used in the upgraded sections of Town. Additionally, service connections to private residences consist primarily of ¾ inch copper pipe. There are an estimated 71 fire hydrants connected to the system for fire protection. An auto-flushing device at the end of Rye Street is programmed to flush at a certain time each day for a specified duration to help maintain the quality of the water.

3.0 LIST OF WATER TREATMENT CHEMICALS USED OVER THE REPORTING PERIOD

The following chemicals were used in the treatment process at the Matachewan Water Treatment Plant.

- Sodium hypochlorite – Oxidation and Disinfection

All treatment chemicals meet AWWA and NSF/ANSI standards.

4.0 SIGNIFICANT EXPENSES INCURRED IN THE DRINKING WATER SYSTEM

OCWA is committed to maintaining the assets of the drinking water system and maintains a program of scheduled inspection and maintenance activities using a computerized Work Management System (WMS).

Significant expenses incurred in the drinking water system include:



- The installation of the iron and manganese removal system was completed in December 2019 and put into operation on January 6, 2020.
- Sodium hypochlorite line was permanently installed inside the plant and a fill line for sodium hypochlorite was installed outside the plant.
- Contact pipe flush line permanently installed to outside of building and routed underground as with the flush line to both wells to prevent the erosion of the water plant grounds.
- Reclaim pump installed.
- Replaced two post sodium hypochlorite metering pumps.
- A new transfer switch controller was installed on the generator panel.
- A new gasket was fabricated to repair a leaking pressure vessel.
- Building improvements as part of the upgrade project were completed in 2020.
- The addition of approximately 37 meters of 150mm PVC water main on Roche Street.

5.0 DETAILS ON NOTICES OF ADVERSE TEST RESULTS AND OTHER PROBLEMS REPORTED TO & SUBMITTED TO THE SPILLS ACTION CENTER

Based on information kept on record by OCWA, the Matachewan Drinking Water System was in full compliance in 2020 with no adverse water quality incidents reported to the Ministry’s Spills Action Centre.

6.0 MICROBIOLOGICAL TESTING PERFORMED DURING THE REPORTING PERIOD

Summary of Microbiological Data

Sample Type	# of Samples	Range of <i>E. coli</i> Results (min to max)	Range of Total Coliform Results (min to max)	# of HPC Samples	Range of HPC Results (min to max)
Raw (Well No. 1)	52	0 to 0/NDOGN	0 to 0/NDOGN	0	N/A
Raw (Well No. 2)	50*	0 to 0	0 to 3	0	N/A
Treated	52	0 to 0	0 to 0	53	< 10 to 350
Distribution	104	0 to 0	0 to 0	52	< 10 to > 2000**

Maximum Allowable Concentration (MAC) for *E. coli* = 0 Counts/100 mL

MAC for Total Coliforms = 0 Counts/100 mL

NDOGN = No Data, Overgrown with Non-Target

“<” denotes less than the laboratory’s method detection limit

“>” denotes greater than the laboratory’s method detection limit

Notes:

1. One microbiological sample is collected and tested each week from the raw (each well) and treated water supply. A total of two microbiological samples are collected and tested each week from the Matachewan distribution system. At least 25% of the distribution samples must be tested for HPC bacteria.
2. *Well 2 was taken off-line on December 18, 2020 when the filter system was bypassed due to mechanical failure.
3. **High HPC count detected in a distribution water sample collected on March 16th. Laboratory confirmed quality control data.



Refer to [Appendix A](#) for a monthly summary of microbiological test results.

7.0 OPERATIONAL TESTING PERFORMED DURING THE REPORTING PERIOD

Summary of Raw Water Turbidity Data

Parameter	# of Samples	Range of Results (min to max)	Unit of Measure
Turbidity (Well No. 1)	23	0.15 to 3.51	NTU
Turbidity (Well No. 2)	23	0.26 to 0.75	NTU

Note: Turbidity samples are required once every month.

Continuous Monitoring in the Treatment Process

Parameter	# of Samples	Range of Results (min to max)	Unit of Measure	Standard
Free Chlorine Residual	8760	0.09 to 5.02	mg/L	CT*

Notes:

1. For continuous monitors 8760 is used as the number of samples.
2. CT is the concentration of chlorine in the water times the time of contact that the chlorine has with the water. It is used to demonstrate the level of disinfection treatment in the water. CT calculations are performed for the Matachewan water plant if the free chlorine residual level drops below 0.15 mg/L to ensure primary disinfection is achieved. On May 28, 2020, the free chlorine dropped for a short duration (0.09 mg/L). A CT calculation was done and met.

Summary of Chlorine Residual Data in the Distribution System

Parameter	# of Samples	Range of Results (min to max)	Unit of Measure	Standard
Free Chlorine Residual	367	0.28 to 5.7	mg/L	≥ 0.05

Note: 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.

Refer to [Appendix B](#) for a monthly summary of the above operational data.

Summary of Nitrate & Nitrite Data (sampled at the plant's point of entry into the distribution every quarter)

Date of Sample	Nitrate Result Value	Nitrite Result Value	Unit of Measure	Exceedance
January 13	< 0.05	< 0.05	mg/L	No
April 14	0.19	< 0.05	mg/L	No
July 14	0.32	< 0.05	mg/L	No
October 5	< 0.05	< 0.05	mg/L	No

Maximum Allowable Concentration (MAC) for Nitrate = 10 mg/L
MAC for Nitrite = 1 mg/L



Summary of Total Trihalomethane Data (additional THM samples collected in 2020)

Date of Sample	Result Value	Unit of Measure	Quarter Average	Running Annual Average	Exceedance
January 13	92.4	ug/L			
January 20	50.3	ug/L			
January 20	70.8	ug/L			
February 18	80.3	ug/L			
February 18	98.9	ug/L	78.3		
February 18	75.2	ug/L			
March 10	81.2	ug/L			
March 10	58.0	ug/L			
March 10	97.6	ug/L			
April 14	67.4	ug/L		72.5	No
April 20	33.9	ug/L			
April 20	65.7	ug/L			
May 29	42.2	ug/L			
May 29	28.9	ug/L	47.8		
May 29	61.8	ug/L			
June 23	27.0	ug/L			
June 23	45.5	ug/L			
June 23	57.4	ug/L			
July 14	109	ug/L	109		
October 5	54.8	ug/L	54.8		

Maximum Allowable Concentration (MAC) for Total Trihalomethanes = 100 ug/L (Four Quarter Running Average)

Note:

* THM samples are collected and tested quarterly as required under section 13-6 of Schedule 13, under O. Reg. 170/03. Additional distribution sampling was done after the new iron and manganese filtration system was commissioned to determine the location with the highest concentration of THMs.

Three samples were collected each month from January to June at locations near the plant, in the middle of the distribution system and at the end of the distribution system. All results are used to calculate the four quarter running annual average (RAA) for THMs.

Summary of Total Haloacetic Acid Data (additional HAA samples collected in 2020)

Date of Sample	Result Value	Unit of Measure	Quarter Average	Running Annual Average	Exceedance
January 13	68	ug/L			
January 20	39	ug/L			
January 20	38	ug/L	52.2	45.6	No
February 18	56	ug/L			



Summary of Total Haloacetic Acid Data (additional HAA samples collected in 2020)

Date of Sample	Result Value	Unit of Measure	Quarter Average	Running Annual Average	Exceedance
February 18	62	ug/L			
February 18	44	ug/L			
March 10	41	ug/L			
March 10	60	ug/L			
March 10	62	ug/L			
April 14	29	ug/L			
April 20	17	ug/L			
April 20	39	ug/L			
May 29	20	ug/L			
May 29	20	ug/L	26.0		
May 29	35	ug/L			
June 23	15	ug/L			
June 23	29	ug/L			
June 23	30	ug/L			
July 14	69	ug/L	69		
October 5	35	ug/L	35		

Maximum Allowable Concentration (MAC) for Total Haloacetics Acid = 80 ug/L (Four Quarter Running Average)

Note:

* HAA samples are collected and tested quarterly as required under section 13-6 of Schedule 13, under O. Reg. 170/03. Additional distribution sampling was done after the new iron and manganese filtration system was commissioned to determine the location with the highest concentration of HAAs.

Three samples were collected each month from January to June at locations near the plant, in the middle of the distribution system and at the end of the distribution system. All results are used to calculate the four quarter running annual average (RAA) for HAAs.

Summary of Most Recent Lead Data under Schedule 15.1

(applicable to the following drinking water systems; large municipal residential systems, small, municipal residential systems, and non-municipal year-round residential systems)

The Matachewan Drinking Water System was eligible to follow the “Exemption from Plumbing Sampling” as described in section 15.1-5(9) and 15.1-5(10) of Schedule 15.1 of Ontario Regulation 170/03. The exemption applies to a drinking water system if, in two consecutive periods at reduced sampling, not more than 10% of all samples from plumbing exceed the maximum allowable concentration (MAC) of 10 ug/L for lead. As such, the system was required to test for total alkalinity and pH in one distribution sample collected during the periods of December 15 to April 15 (winter period) and June 15 to October 15 (summer period). This testing is required in every 12-month period with lead testing in every third 12-month period.



Two rounds of lead, alkalinity and pH testing were carried out on March 16th and September 22nd of 2020. Results are summarized in the table below.

Summary of Lead Data (sampled in the distribution system)

Date of Sample	# of Samples	Field pH	Field Temperature (°C)	Alkalinity (mg/L)	Lead (ug/L)
March 16	1	8.11	7.4	116	0.1
September 22	1	7.1	11.4	117	6.3

Note: Next lead sampling scheduled for 2023

Most Recent Schedule 23 Inorganic Data Tested at the Water Treatment Plant

Parameter	Result Value	Unit of Measure	MAC	MAC Exceedance	½ MAC Exceedance
Antimony	< 0.5	ug/L	6	No	No
Arsenic	< 1.0	ug/L	10	No	No
Barium	24.0	ug/L	1000	No	No
Boron	6.0	ug/L	5000	No	No
Cadmium	< 0.1	ug/L	5	No	No
Chromium	< 1.0	ug/L	50	No	No
Mercury	< 0.1	ug/L	1	No	No
Selenium	0.3	ug/L	50	No	No
Uranium	< 1.0	ug/L	20	No	No

Note: Sample required every 36 months (sample date = October 5, 2020). Next sampling scheduled for October 2023

Most Recent Schedule 24 Organic Data Tested at the Water Treatment Plant

Parameter	Result Value	Unit of Measure	MAC	MAC Exceedance	½ MAC Exceedance
Alachlor	< 0.2	ug/L	5	No	No
Atrazine + N-dealkylated metabolites	< 0.5	ug/L	5	No	No
Azinphos-methyl	< 0.2	ug/L	20	No	No
Benzene	< 0.233	ug/L	1	No	No
Benzo(a)pyrene	< 0.5	ug/L	0.01	No	No
Bromoxynil	< 0.175	ug/L	5	No	No
Carbaryl	< 0.1	ug/L	90	No	No
Carbofuran	< 0.01	ug/L	90	No	No
Carbon Tetrachloride	< 0.118	ug/L	2	No	No
Chlorpyrifos	< 1.0	ug/L	90	No	No
Diazinon	< 2.0	ug/L	20	No	No
Dicamba	< 0.2	ug/L	120	No	No
1,2-Dichlorobenzene	< 0.175	ug/L	200	No	No
1,4-Dichlorobenzene	< 0.175	ug/L	5	No	No
1,2-Dichloroethane	< 0.104	ug/L	5	No	No
1,1-Dichloroethylene (vinylidene chloride)	< 0.3	ug/L	14	No	No

**Most Recent Schedule 24 Organic Data Tested at the Water Treatment Plant**

Parameter	Result Value	Unit of Measure	MAC	MAC Exceedance	½ MAC Exceedance
Dichloromethane	< 0.3	ug/L	50	No	No
2-4 Dichlorophenol	< 0.3	ug/L	900	No	No
2,4-Dichlorophenoxy acetic acid (2,4-D)	< 0.3	ug/L	100	No	No
Diclofop-methyl	< 1.0	ug/L	9	No	No
Dimethoate	< 0.2	ug/L	20	No	No
Diquat	< 0.444	ug/L	70	No	No
Diuron	< 0.148	ug/L	150	No	No
Glyphosate	< 0.175	ug/L	280	No	No
Malathion	< 0.2	ug/L	190	No	No
Methoxychlor	< 6.0	ug/L	900	No	No
Metolachlor	< 20.0	ug/L	50	No	No
Metribuzin	< 0.175	ug/L	80	No	No
Monochlorobenzene	< 0.116	ug/L	80	No	No
Paraquat	< 0.116	ug/L	10	No	No
Polychlorinated Biphenyls (PCBs)	< 0.5	ug/L	3.0	No	No
Pentachlorophenol	< 0.2	ug/L	60	No	No
Phorate	< 0.06	ug/L	2	No	No
Picloram	< 0.3	ug/L	190	No	No
Prometryne	< 0.116	ug/L	1	No	No
Simazine	< 0.104	ug/L	10	No	No
Terbufos	< 0.058	ug/L	1	No	No
Tetrachloroethylene	< 0.175	ug/L	30	No	No
2,3,4,6-Tetrachlorophenol	< 0.116	ug/L	100	No	No
Triallate	< 0.3	ug/L	230	No	No
Trichloroethylene	< 0.2	ug/L	10	No	No
2,4,6-Trichlorophenol	< 0.116	ug/L	5	No	No
2-methyl-4-chlorophenoxyacetic acid (MCPA)	< 0.2	ug/L	100	No	No
Trifluralin	< 0.2	ug/L	45	No	No
Vinyl Chloride	< 7.4	ug/L	1	No	No

Note: Sample required every 36 months (sample date = *October 5, 2020*). Next sampling scheduled for October 2023

Inorganic or Organic Test Results that Exceeded Half the Standard Prescribed in Schedule 2 of the Ontario Drinking Water Quality Standards.

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.



Most Recent Sodium Data Sampled at the Water Treatment Plant

Date of Sample	# of Samples	Result Value	Unit of Measure	Standard	Exceedance
October 5, 2020	1	9.9	mg/L	20	No

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

Most Recent Fluoride Data Sampled at the Water Treatment Plant

Date of Sample	# of Samples	Result Value	Unit of Measure	Standard	Exceedance
October 5, 2020	1	<0.05	mg/L	1.5	No

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

Additional Testing Performed in Accordance with an Approval, Order or Legal Instrument

No additional regulatory sampling and testing was required for the Matachewan Drinking Water System during the 2020 reporting period.



Matachewan Drinking Water System

Schedule 22

2020 SUMMARY REPORT

FOR MUNICIPALITIES



Schedule 22 - SUMMARY REPORTS FOR MUNICIPALITIES

1.0 INTRODUCTION

Drinking-Water System Name:	Matachewan Drinking Water System
Municipal Drinking Water Licence (MDWL) No.:	279-101-3 (expired November 23, 2020) 279-101-4 (issued September 24, 2020)
Drinking Water Work Permit (DWWP) No.:	279-201-3 (expired November 23, 2020) 279-201-4 (issued September 24, 2020)
Permit to Take Water (PTTW) No.:	3106-9E5LKA (issued January 6, 2014)
Period being reported:	January 1, 2020 to December 31, 2020

2.0 REQUIREMENTS THE SYSTEM FAILED TO MEET

According to information kept on record by OCWA, the Matachewan Drinking Water System failed to meet the following requirements during the 2020 reporting period:

Drinking Water Legislation	Requirement(s) the System Failed to Meet	Duration	Corrective Action(s)	Status
Section 3 (3.2) of PTTW #3106-9E5LKA	Well No.1 exceeded its maximum allowable volume limit of 454 m ³ /day several days in May and June (May 24 = 627 m ³ /d, May 25 = 545 m ³ /d, May 27 = 473 m ³ /d, May 30 = 476 m ³ /d, June 18 = 624 m ³ /d, June 19 = 528 m ³ /d and June 20 = 572 m ³ /d) during process issues with the new filtration system.	May 24, 25, 27, 30, June 18, 19 & 20	The Plant's SCADA was programmed with a set point for both wells to prevent them from running more than the permit to take water allows. When the set point is reached, the original well shuts down and the other well takes over.	Complete
Section 3 (3.2) of PTTW #3106-9E5LKA	Well No.2 exceeded its maximum allowable flow rate of 1400 (1500) L/minute on December 30th for approximately 2 minutes when testing the valve bank after it was repaired.	December 30, 2020 from 2:17 to 2:18 PM and from 2:47 to 2:50 pm	Repairs were completed and flow rate returned to normal.	Complete
Section 6-5(1)10(i) of Schedule 6 of O. Regulation 170/03	On 2 occasions during the inspection period, the chlorine analyzer was not calibrated as required (within a +/- 5% accuracy). - On May 26th, 2020, the operator took a handheld residual of 0.56 mg/L and recorded the online analyzer as reading 1.94 mg/L. There is no record of a calibration being completed on the analyzer, and;	December 12, 2019 and May 26, 2020	Operators have been trained to ensure that the analyzers are calibrated within +/- 5% accuracy. Operators are to record all hand-held and analyzer readings on the Chlorine Analyzer Verification/ Calibration Sheet and in the logbook. They must also indicate when a calibration was performed on this sheet	Complete



Drinking Water Legislation	Requirement(s) the System Failed to Meet	Duration	Corrective Action(s)	Status
	<p>- On December 12th, 2019 the operator took a handheld residual of 2.2+ mg/L and recorded the online analyzer as reading 1.3 mg/L. As described earlier in this report, the 2.2+ mg/L is an inaccurate reading and the operating authority indicated that the analyzer was calibrated.</p> <p>These issues were identified in the 2019-2021 MECP Inspection Report.</p>		<p>and document calibration details in the logbook.</p> <p>A system has been implemented so that all facility sheets, including the Chlorine Analyzer Verification/ Calibration Sheet will be brought to a designated document control person at the end of each month. This person will ensure all sheets are received and are complete.</p>	
<p>Section 6-10(1) 2 of Schedule 6 of O. Regulation 170/03</p>	<p>On six (6) occasions, from November 18th, 2019 to January 27th, 2020, the free chlorine residual in the distribution system exceeded the upper range of the hand-held colourimeter (2.2 mg/L) and was mistakenly recorded as the actual free chlorine residual.</p> <p>This issue was identified in the 2019-2021 MECP Inspection Report.</p>	<p>November 18, 19 & 25, 2019, December 2 & 9, 2019, January 27, 2020</p>	<p>Training on how to use the pocket colourimeter was provided to operators in September 2020.</p> <p>An SOP was developed to clearly indicate how to properly use the pocket colourimeter in low range mode, high range mode and if dilutions are needed.</p>	<p>Complete</p>
<p>Section 6-1.1(1) of Schedule 6 of O. Regulation 170/03</p>	<p>A treated water sample and 2 distribution water samples were collected only 4 days after the previous samples. Bacteriological samples must be collected no earlier than 5 days and no later than 10 days after the previous samples.</p> <p>On December 16th, 2019 weekly distribution system and treated water samples were taken only 4 days after the previous samples taken on December 12th, 2019 for the same purpose.</p> <p>This issue was identified in the 2019-2021 MECP Inspection Report.</p>	<p>December 16, 2019</p>	<p>A Sample Binder/Calendar system was developed and implemented in January 2020. It is a tool used by all operators to ensure samples are collected when scheduled and within the required timeframes</p> <p>The laboratory also sends sample confirmation reports to the operating authority (OA). The OA reviews these reports to ensure all samples are collected as required and marks this review on a check list.</p> <p>Starting in October 2020, operators were instructed to send pictures of the chlorine residual sheets after they recorded their results to a GroupText Chat which is reviewed by all operators, Manager and</p>	<p>Complete</p>



Drinking Water Legislation	Requirement(s) the System Failed to Meet	Duration	Corrective Action(s)	Status
			compliance personnel. This sheet also indicates whether distribution bacti samples are collected each week.	

3.0 SUMMARY OF FLOWS AND COMPARISON TO REGULATORY LIMITS

Flow Monitoring

MDWL No. 279-101 requires the owner to install a sufficient number of flow measuring devices to permit the continuous measurement and recording of:

- the flow rate and daily volume of treated water that flows from the treatment subsystem the distribution system, and
- the flow rate and daily volume of water that flows into the treatment subsystem.

The flow monitoring equipment identified in the MDWL is present and operating as required. These flow meters are calibrated on an annual basis as specified in the manufacturers' instructions.

Water Usage

The following water usage tables summarize the quantities and flow rates of water taken and produced during the 2020 reporting period, including total monthly volumes, average monthly volumes, maximum monthly volumes, and maximum flow rates.



Raw Water

2020 - Monthly Summary of Water Takings from the Source (Well No. 1 and Well No. 2)

Regulated by Permit to Take Water (PTTW) #3106-9E5LKA, issued January 6, 2014

Well No. 1

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year to Date
Total Volume (m ³)	8319	4979	5604	6606	9072	9039	5596	6872	5207	4922	5459	7944	79619
Average Volume (m ³ /d)	268	172	181	220	293	301	181	222	174	159	182	256	217
Maximum Volume (m ³ /d)	453	234	373	369	627	624	322	396	454	298	373	454	627
PTTW - Maximum Allowable Volume (m ³ /day)	454	454	454	454	454	454	454	454	454	454	454	454	454
Maximum Flow Rate (L/min)	1256	1215	1168	1198	1135	1157	1266	1224	1255	1241	1255	1400	1400
PTTW - Maximum Allowable Flow Rate (L/min)	1400	1400	1400	1400	1400	1400	1400	1400	1400	1400	1400	1400	1400

The system failed to meet the permit to take water (PTTW) limit for Well 1 several days in May (24, 25, 27 & 30) and June (18, 19 & 20) during process issues with the new filtration system. The Plant's SCADA was programmed with a set point for both wells to prevent them from running more than the permit to take water allows. When the set point is reached, the original well shuts down and the other well takes over.

Well No. 2

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year to Date
Total Volume (m ³)	2253	5158	5382	4528	2159	2075	5748	5967	5819	4842	4953	2809	51692
Average Volume (m ³ /d)	73	178	173.6	150.9	69.6	69.2	185.4	192.5	194.0	156.2	165.1	90.6	141.5
Maximum Volume (m ³ /d)	307	404	262	338	242.4	376	312	395	399	225	321	194	404
PTTW - Maximum Allowable Volume (m ³ /day)	454	454	454	454	454	454	454	454	454	454	454	454	454
Maximum Flow Rate (L/min)	1345	1123	1117	1100	1110	1129	1168	1389	1159	1103	1195	1536	1536
PTTW - Maximum Allowable Flow Rate (L/min)	1400	1400	1400	1400	1400	1400	1400	1400	1400	1400	1400	1400	1400

Well 2 failed to meet the PTTW limit on December 30th for approximately 2 minutes when testing the valve bank after it was repaired.

Combined Water Taking (Well No. 1 and Well No. 2)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year to Date
Total Volume (m ³)	10571	10137	10986	11134	11231	11114	11343	12840	11027	9764	10412	10753	131311
Average Volume (m ³ /d)	341	350	354	371	362	370	366	414	368	315	347	347	359
Maximum Volume (m ³ /d)	453	588	391	550	627	818	554	687	779	365	435	454	818
PTTW - Maximum Allowable Volume (m ³ /day)	908	908	908	908	908	908	908	908	908	908	908	908	908

The system's Permit to Take Water #3106-9E5LKA, allows the Township to withdraw water at the following rates:

Well No. 1: 454 m³/day 1400 L/minute (1500 L/min during pump start-ups and shut downs)

Well No. 2: 454 m³/day 1400 L/minute (1500 L/min during pump start-ups and shut downs)

Total Combined Daily Volume: 908 m³/day



A review of the raw water flow data indicates that the total daily volume of water taken from Well No. 1 exceeded the allowable limit for several days in May and June process issues with the new filtration plant (see comments under Well No. 1 above).

Well 2 failed to meet the PTTW limit on December 30th when testing the valve bank after it was repaired.

Treated Water

2020 - Monthly Summary of Treated Water Supplied to the Distribution System

Regulated by Municipal Drinking Water Licence (MDWL) #279-101 - Issue 4, effective September 29, 2020

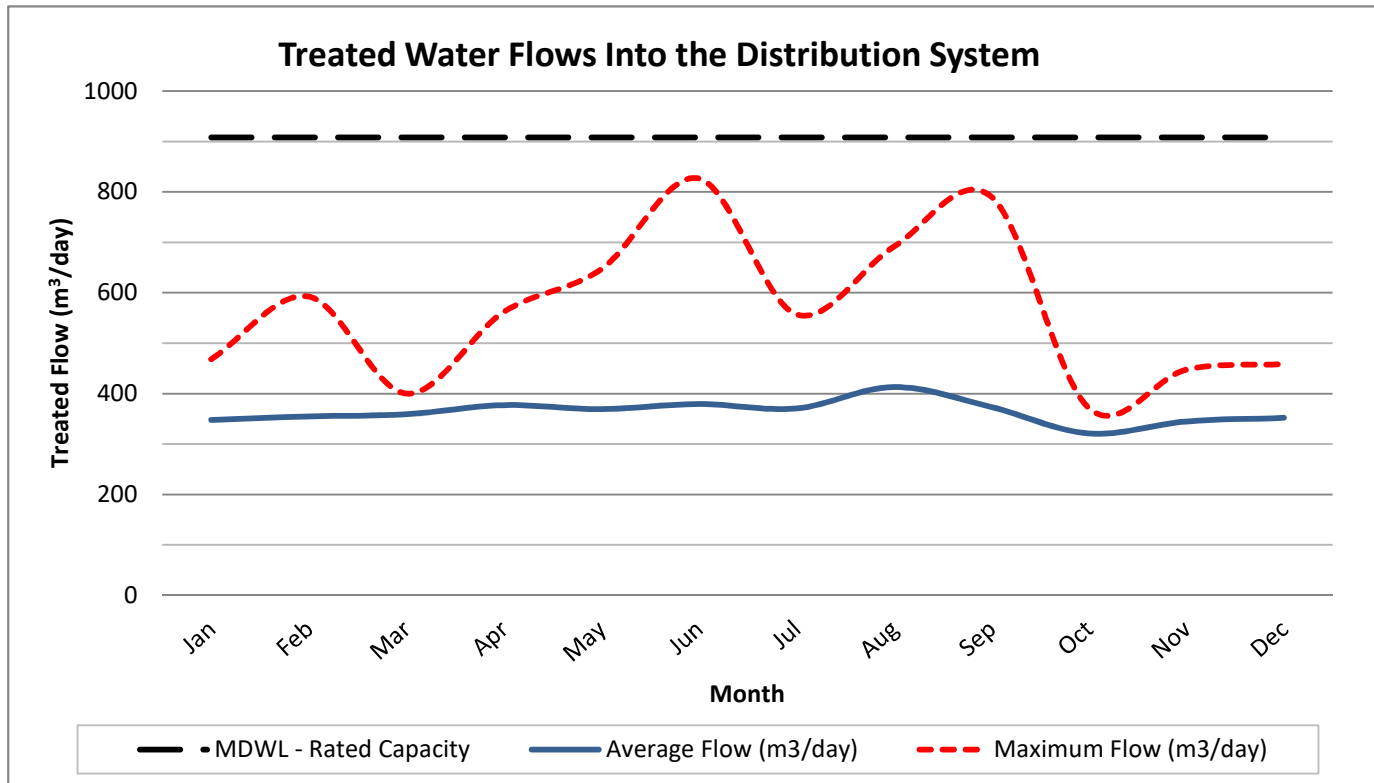
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year to Date
Total Volume (m ³)	10780	10284	11130	11311	11442	11382	11485	12803	11202	9950	10342	10907	133019
Average Volume (m ³ /d)	348	355	359	377	369	379	370	413	373	321	345	352	363
Maximum Volume (m ³ /d)	468	592	400	562	647	827	557	691	791	371	447	459	827
MDWL - Rated Capacity (m ³ /day)	908	908	908	908	908	908	908	908	908	908	908	908	908

Schedule C, Section 1.0 (1.1) of MDWL No. 279-101 states that the maximum daily volume of treated water that flows from the treatment subsystem to the distribution system shall not exceed 908 m³/day. The Matachewan DWS complied with this limit having a recorded maximum volume of 827 m³/day on June 17th during distribution flushing. This represents 91.1% of the rated capacity.

Figure 1 compares the average and maximum flow rates into the distribution system to the rated capacity of the system identified in the MDWL.

Figure 1: 2020 - Comparison of Treated Water Flows to the Rated Capacity

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Average Flow (m ³ /day)	348	355	359	377	369	379	370	413	373	321	345	352
Maximum Flow (m ³ /day)	468	592	400	562	647	827	557	691	791	371	447	459
MDWL - Rated Capacity	908	908	908	908	908	908	908	908	908	908	908	908
% Rated Capacity	52	65	44	62	71	91	61	76	87	41	49	51





Summary of System Performance

The following information is provided to enable the Owner to assess the capability of the system to meet existing and future water usage needs.

Rated Capacity of the Plant (MDWL)	908 m ³ /day	
Average Daily Flow for 2020	363m ³ /day	39.9 % of the rated capacity
Maximum Daily Flow for 2020	827 m ³ /day	91.1 % of the rated capacity
Total Treated Water Produced in 2020	133,019 m ³	

Historical Flows

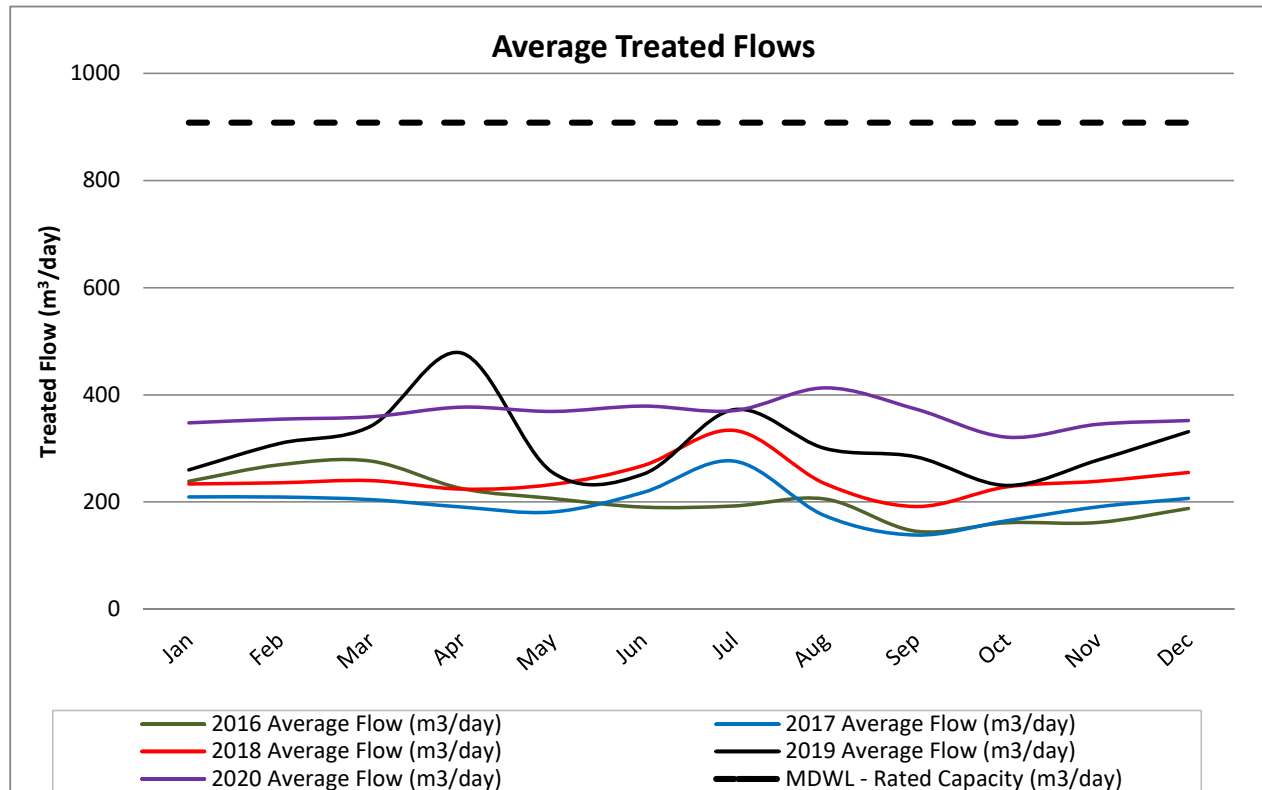
Matachewan Water Treatment Plant – Historical Flow Comparison

Year	Maximum Treated Flow (m ³ /d)	Average Daily Treated Flow (m ³ /d)	Average Day % of Rated Capacity (908 m ³ /d)
2020	827	363	39.9%
2019	995	308	33.9%
2018	850	243	26.8%
2017	955	201	22.1%
2016	724	205	22.6%

Figure 2 compares the average treated water flows from 2016 to 2020.

Figure 2 - Historical Water Usage Trends (2016 to 2020)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2016 Average Flow (m ³ /day)	239	270	276	225	207	190	193	206	145	161	162	188
2017 Average Flow (m ³ /day)	209	209	204	191	181	218	276	174	138	165	191	207
2018 Average Flow (m ³ /day)	234	236	240	224	233	268	334	234	192	228	239	255
2019 Average Flow (m ³ /day)	260	309	341	478	255	252	372	300	284	231	278	331
2020 Average Flow (m ³ /day)	348	355	359	377	369	379	370	413	373	321	345	352
MDWL - Rated Capacity (m ³ /day)	908	908	908	908	908	908	908	908	908	908	908	908





CONCLUSION

The water quality data collected in 2020 demonstrates that the Matachewan drinking water system provided high quality drinking water to its users which met all the Ontario Drinking Water Standards. The system experienced a few non-compliance issues which were resolved.

The system failed to meet the water taking limit of its Permit to Take Water (PTTW) several days during the reporting period during process issues with the new filtration plant.

The drinking water system is maintained by OCWA with continual improvements and programs in place to ensure water of the highest quality.



APPENDIX A

Monthly Summary of Microbiological
Test Results

**MATACHEWAN DRINKING WATER SYSTEM
2020 SUMMARY OF MICROBIOLOGICAL TEST RESULTS**

Facility Works Number: 220003653
 Facility Owner: Municipality: Township of Matachewan
 Facility Classification: Class 1 Water Treatment

RAW WATER	01/2020	02/2020	03/2020	04/2020	05/2020	06/2020	07/2020	08/2020	09/2020	10/2020	11/2020	12/2020	Total	Avg	Max	Min
Well 1 / Total Coliform: TC - cfu/100mL																
Count Lab	4	4	5	4	4	5	4	5	4	4	5	4	52			
Max Lab	0	0	0	0	0	0	0	0	0	0	0	0			0	
Mean Lab	0	0	0	0	0	0	0	0	0	0	0	0		0		
Min Lab	0	0	0	0	0	0	0	0	0	0	0	0				0
Well 1 / E. Coli: EC - cfu/100mL																
Count Lab	4	4	5	4	4	5	4	5	4	4	5	4	52			
Max Lab	0	0	0	0	0	0	0	0	0	0	0	0			0	
Mean Lab	0	0	0	0	0	0	0	0	0	0	0	0		0		
Min Lab	0	0	0	0	0	0	0	0	0	0	0	0				0
Well 2 / Total Coliform: TC - cfu/100mL																
Count Lab	4	4	5	4	4	5	4	5	4	4	5	2	50			
Max Lab	3	3	1	0	2	3	0	0	0	0	0	0			3	
Mean Lab	0.75	1.25	0.2	0	0.5	0.6	0	0	0	0	0	0		0.28		
Min Lab	0	0	0	0	0	0	0	0	0	0	0	0				0
Well 2 / E. Coli: EC - cfu/100mL																
Count Lab	4	4	5	4	4	5	4	5	4	4	5	2	50			
Max Lab	0	0	0	0	0	0	0	0	0	0	0	0			0	
Mean Lab	0	0	0	0	0	0	0	0	0	0	0	0		0		
Min Lab	0	0	0	0	0	0	0	0	0	0	0	0				0
TREATED WATER																
Treated Water (POE) / Total Coliform: TC - cfu/100mL																
Count Lab	4	4	5	4	4	5	4	5	4	4	5	4	52			
Max Lab	0	0	0	0	0	0	0	0	0	0	0	0			0	
Mean Lab	0	0	0	0	0	0	0	0	0	0	0	0		0		
Min Lab	0	0	0	0	0	0	0	0	0	0	0	0				0
Treated Water (POE) / E. Coli: EC - cfu/100mL																
Count Lab	4	4	5	4	4	5	4	5	4	4	5	4	52			
Max Lab	0	0	0	0	0	0	0	0	0	0	0	0			0	
Mean Lab	0	0	0	0	0	0	0	0	0	0	0	0		0		
Min Lab	0	0	0	0	0	0	0	0	0	0	0	0				0
Treated Water (POE) / HPC - cfu/mL																
Count Lab	4	4	5	4	4	5	4	5	4	4	5	4	52			
Max Lab	< 10	< 10	160	350	130	< 50	< 10	< 20	< 40	< 10	< 70	40			350	
Mean Lab	< 10	< 10	112	177.5	< 42.5	< 28	< 10	< 12	< 17.5	< 10	< 28	< 20		< 40.192		
Min Lab	< 10	< 10	60	80	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10				< 10
DISTRIBUTION WATER																
MW-3 (Bacti) / Total Coliform: TC - cfu/100mL																
Count Lab	4	4	5	4	4	5	4	5	4	4	5	4	52			
Max Lab	0	0	0	0	0	0	0	0	0	0	0	0			0	
Mean Lab	0	0	0	0	0	0	0	0	0	0	0	0		0		
Min Lab	0	0	0	0	0	0	0	0	0	0	0	0				0
MW-3 (Bacti) / E. Coli - cfu/100mL																
Count Lab	4	4	5	4	4	5	4	5	4	4	5	4	52			
Max Lab	0	0	0	0	0	0	0	0	0	0	0	0			0	
Mean Lab	0	0	0	0	0	0	0	0	0	0	0	0		0		
Min Lab	0	0	0	0	0	0	0	0	0	0	0	0				0
MW-3 (Bacti) / HPC - cfu/mL																
Count Lab	2	2	1	2	3	2	2	3	1	2	3	2	25			
Max Lab	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 20	< 10	< 10	< 100	60			100	
Mean Lab	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 13.333	< 10	< 10	< 40	< 35		< 16		
Min Lab	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10				< 10
MW-4 (Bacti) / Total Coliform: TC - cfu/100mL																
Count Lab	4	4	5	4	4	5	4	5	4	4	5	4	52			
Max Lab	0	0	0	0	0	0	0	0	0	0	0	0			0	
Mean Lab	0	0	0	0	0	0	0	0	0	0	0	0		0		
Min Lab	0	0	0	0	0	0	0	0	0	0	0	0				0
MW-4 (Bacti) / E. Coli - cfu/100mL																
Count Lab	4	4	5	4	4	5	4	5	4	4	5	4	52			
Max Lab	0	0	0	0	0	0	0	0	0	0	0	0			0	
Mean Lab	0	0	0	0	0	0	0	0	0	0	0	0		0		
Min Lab	0	0	0	0	0	0	0	0	0	0	0	0				0
MW-4 (Bacti) / HPC - cfu/mL																
Count Lab	2	2	4	2	1	3	2	2	3	2	2	2	27			
Max Lab	20	40	> 2000*	40	10	60	50	230	120	50	20	30			2000	
Mean Lab	< 15	< 25	> 530	35	10	< 26.667	< 30	135	70	40	< 15	< 20		112.963		
Min Lab	< 10	< 10	< 10	30	10	< 10	< 10	40	10	30	< 10	< 10				< 10

NOTES:
 NDOGN = No Data, Overgrown with Non-Target
 *High HPC count detected in a distribution water sample collected on March 16th. Laboratory confirmed quality control data.



APPENDIX B

Monthly Summary of Operational Data

**MATACHEWAN DRINKING WATER SYSTEM
2020 SUMMARY OF OPERATIONAL TEST RESULTS**

Facility Works Number: 220003653
 Facility Owner: Municipality of Matachewan
 Facility Classification: Class 1 Water Treatment

RAW WATER	01/2020	02/2020	03/2020	04/2020	05/2020	06/2020	07/2020	08/2020	09/2020	10/2020	11/2020	12/2020	Total	Avg	Max	Min
Well 1 / Turbidity - NTU																
Count IH	2	2	2	2	2	2	2	2	2	1	2	2	23			
Total IH	0.668	0.73	0.835	4.79	0.36	0.32	2.73	0.653	0.301	0.34	0.78	1.27	13.777			
Max IH	0.35	0.49	0.485	3.51	0.19	0.17	1.39	0.41	0.151	0.34	0.41	0.65			3.51	
Mean IH	0.334	0.365	0.418	2.395	0.18	0.16	1.365	0.327	0.151	0.34	0.39	0.635		0.599		
Min IH	0.318	0.24	0.35	1.28	0.17	0.15	1.34	0.243	0.15	0.34	0.37	0.62				0.15
Well 2 / Turbidity - NTU																
Count IH	2	2	2	2	2	2	2	2	2	1	2	2	23			
Total IH	0.925	0.71	0.805	1.139	1.2	0.69	0.901	0.757	0.669	0.51	1.19	1.47	10.966			
Max IH	0.48	0.45	0.445	0.75	0.62	0.35	0.459	0.48	0.409	0.51	0.61	0.75			0.75	
Mean IH	0.463	0.355	0.402	0.57	0.6	0.345	0.451	0.379	0.335	0.51	0.595	0.735		0.477		
Min IH	0.445	0.26	0.36	0.389	0.58	0.34	0.442	0.277	0.26	0.51	0.58	0.72				0.26
TREATED WATER	01/2020	02/2020	03/2020	04/2020	05/2020	06/2020	07/2020	08/2020	09/2020	10/2020	11/2020	12/2020	Total	Avg	Max	Min
Treated Water (POE) / Cl Residual: Free (0.15 mg/L) - mg/L																
Count OL	3.47	3.926	2.545	4.015	5.007	5.005	5.016	5.015	5.016	4.136	5.015	5.02			5.02	
Max OL	1.68	1.644	1.469	1.499	1.733	1.918	2.437	2.485	2.508	1.804	1.987	2.314		1.957		
Mean OL	0.551	0.217	0.559	0.421	0.09	0.27	0.414	0.592	0.666	0.746	0.468	0.201				0.09
Min OL																
TREATED WATER	01/2020	02/2020	03/2020	04/2020	05/2020	06/2020	07/2020	08/2020	09/2020	10/2020	11/2020	12/2020	Total	Avg	Max	Min
Residual No. 1 / Cl Residual: Free - mg/L																
Count IH	9	8	9	9	8	9	9	9	8	9	9	9	105			
Max IH	2.2	1.5	1.08	1.41	1.73	3.08	2.17	2.19	2.02	1.91	1.71	5.7			5.7	
Mean IH	1.169	0.916	0.728	1.003	1.086	1.571	1.31	1.561	1.426	1.05	0.886	1.8		1.211		
Min IH	0.52	0.54	0.4	0.62	0.54	1	0.85	1.1	0.96	0.68	0.55	0.58				0.4
Residual No. 2 / Cl Residual: Free - mg/L																
Count IH	9	8	9	9	8	9	9	9	8	9	9	9	105			
Max IH	2.05	1.23	5	1.77	1.8	2.78	1.7	2.17	1.96	1.85	2.08	5.3			5.3	
Mean IH	1.17	0.755	1.493	0.978	1.02	1.388	1.196	1.337	1.291	0.961	1.077	1.672		1.2		
Min IH	0.57	0.44	0.71	0.55	0.46	0.78	0.96	0.83	0.87	0.68	0.65	0.59				0.44
Residual No. 3 / Cl Residual: Free - mg/L																
Count IH	9	8	9	9	8	9	9	9	8	9	9	9	105			
Max IH	2.2	1.35	1.47	1.33	1.78	1.72	1.84	1.37	2.42	2.8	1.46	4.2			4.2	
Mean IH	1.17	1.014	1.014	0.897	0.963	1.284	1.333	1.073	1.393	1.282	1.029	1.937		1.201		
Min IH	0.53	0.71	0.84	0.57	0.51	0.98	0.92	0.6	0.9	0.68	0.8	0.4				0.4
Residual No. 4 / Cl Residual: Free - mg/L																
Count IH	4	4	5	4	4	5	4	5	4	4	5	4	52			
Max IH	1.5	1.49	1.13	1.02	1.32	1.59	2.03	1.6	2.85	1.4	1.79	2.4			2.85	
Mean IH	1.185	1.285	0.928	0.75	0.878	1.222	1.938	1.208	2.12	1.16	1.318	1.285		1.265		
Min IH	0.74	0.99	0.58	0.5	0.28	1.01	1.77	0.77	1.44	0.73	0.68	0.68				0.28

NOTES:
 * CT is the concentration of chlorine in the water times the time of contact that the chlorine has with the water. It is used to demonstrate the level of disinfection treatment in the water. CT calculations are performed for the Matachewan water plant if the free chlorine residual level drops below 0.15 mg/L to ensure primary disinfection is achieved. On May 28, 2020, the free chlorine dropped for a short duration (0.09 mg/L). A CT calculation was done and met.
 The filter was taken out of service from December 18 to December 30. During this time, the CT calculation is performed if the free chlorine concentration drops below 0.28 mg/L. No CT calculations were required during this time due to low free chlorine residuals.