

## 2022 Year End Report: Mactier Wastewater Treatment Plant (WWTP)



Environmental Compliance Approval: # 7599-7PCKPU

Engineering and Public Works Department

70 Pine Street, Bracebridge, Ontario P1L 1N3

Phone: 705-645-6764

Toll-Free: 1-800-281-3483

Fax: 705-645-7599

Email: [publicworks@muskoka.on.ca](mailto:publicworks@muskoka.on.ca)

Website: [www.muskoka.on.ca](http://www.muskoka.on.ca)

## Introduction

The MacTier Wastewater Treatment Plant (WWTP), which services the Town of MacTier, is owned and operated by the District Municipality of Muskoka. The plant is located at 20 Conger Marsh Lane and was commissioned in 2007. It currently services 260 customer connections.

The Plant operates under the MECP Certificate of Approval (Sewage) #7599-7PCKPU issued February 18, 2009, and MECP Certificate of Approval (Air) #0571-67WJB7 issued on December 22, 2004. Under the terms of the Certificate of Approval, the average rated capacity of the plant is 691 cubic meters per day (m<sup>3</sup>/day). Additionally, effluent limit criteria are as follows.

Table 1 Effluent Limit Criteria

Effluent Parameter	Concentration
CBOD	10 mg/L
Total Suspended Solids	10 mg/L
Total Phosphorous	0.50 mg/L
Total Ammonia Nitrogen Summer (May 15 to September 30)	2.0 mg/L
Total Ammonia Nitrogen Winter (October 01 to May 14)	4.0 mg/L
E. coli	100 CFU/mL
pH	6.0-9.5 inclusive at all times

The treatment process is comprised of two (2) sequencing batch reactors, phosphorus precipitation using aluminum sulphate, effluent tertiary filtration and ultraviolet disinfection. Treated effluent from the plant is discharged through a 300 millimeter effluent outfall line and discharge structure located in Conger Marsh.

Waste sludge from the plant process is digested aerobically at the plant and periodically hauled off site for disposal.

All pumping stations and treatment control systems use SCADA (Supervisor Control And Data Acquisition), in combination with Data Highway Plus, and programmable logic controllers.

## General Information

A review of the District of Muskoka infrastructure needs is conducted annually by the Director of Water and Sewer Services, Area Manager and Chief Operator, and recommendations for maintenance, rehabilitation and renewal programs are considered.

Efforts to eliminate the discharge of untreated or partially treated wastewater to receiving waters are being accomplished by a long-term financial commitment to correct excessive infiltration into the wastewater collection system by means of sewer main rehabilitation / replacement, manhole rehabilitation and pumping station rehabilitation programs.

The treatment facility is capable of effective operation during emergencies, maintenance shutdowns, and power failures. This is achieved through such measures as preventive maintenance of duty/standby units, the duplication of major treatment components, the provision of standby power sources and extensive use of the SCADA systems. All pumping stations and treatment control systems use SCADA (Supervisor Control and Data Acquisition), in

combination with Data Highway Plus, and programmable logic controllers.

All operators are qualified to operate the systems efficiently and effectively in order to always achieve the highest level of treatment. A commitment to provide Operator training and certification is being sustained.

Regulatory sampling is carried out to meet the requirements outlined in the ECA, and additional in-house operational sampling beyond these regulatory requirements is being performed on a routine basis. These efforts have resulted in an effective treatment process which ensures that effluent discharges consistently meet effluent objectives and are environmentally safe. All final effluent sample results for the MBR facilities met their effluent limits.

All data in this report is a compilation of test results received from SGS Canada and their accredited laboratory, Lakefield Research. All in-plant sampling, analysis and recording of results conforms, in order of precedence, to the following 3 standards: Ministry's Procedure F-10-1, "Procedures for Sampling and Analysis Requirements for Municipal and Private Sewage Treatment Works", Ministry's publication "Protocol for the Sampling and Analysis of Industrial/Municipal Wastewater" and the American Water Works Association/Water Environment Federation (AWWA/WEF) publication "Standard Methods for the Examination of Water and Wastewater".

### Executive Summary

In all respects, test results of the treated effluent for the parameters of CBOD<sub>5</sub>, suspended solids, ammonia, total phosphorous, and E. Coli are in compliance with the limits outlined in the ECA regarding monthly allowable concentrations and total effluent loading throughout the entire 2020.

Overall, the plant treatment processes performed satisfactorily and are deemed to be adequate. All sample test results of the final effluent were within levels outlined in the plant ECA (#7599-7PCKPU).

### Quantity of Flow Summary

The plant has a daily average flow design capacity of 691 meters cubed per day. The actual average daily flow for the 2022 was 131 m<sup>3</sup>/day, however, the 3-year average was 140 m<sup>3</sup>/day which represents 20% of the plant capacity. None of the individual system components exceeded the design flow rating.

### Plant Operational Upsets or Process Failures

There were plant operational problems in 2022 with maintaining adequate nitrification in the winter and spring months. In January the effluent ammonia average was 1.73 mg/L exceeding the objective but within compliance. Again, in April the effluent ammonia average was 1.28 mg/L exceeding the objective but within the summer compliance level of 2.0 mg/L. Both events appear to be the result of high influent flows of cold water.

### Summary of Maintenance

There were no significant plant upgrades on major infrastructure in 2022.

All equipment information at this plant is entered into a computer database. From this information, a scheduled preventive maintenance program has been established. The maintenance program includes (but is not limited to):

- Monthly testing of emergency testing (under load) of the standby generators.
- Annual servicing of emergency standby generators.
- Annual replacement of U.V. bulbs.
- Annual infrared inspection of Motor Control panels.
- Annual calibration of flow metering devices.
- Annual cleaning of all sewage pumping stations.
- Marine inspection of effluent outfall and diffuser completed in 2017. (5-year cycle)

### Evaluation of the Need for Improvement Works

The treatment facility is operating at a plant capacity of 20% and is in compliance with specified effluent parameter criteria. In addition, there has been no significant treatment process upsets and plant bypasses. As a result, there is no need for improvements to the existing works.

### Evaluation Summary of Proposed Work Requiring Approval under OWRA

Since the treatment facility is operating satisfactorily there is no anticipated works requiring an ECA amendment for 2022.

### Interpretation of Analytical Results

All sample results for Raw Sewage and Final Effluent are reported in this section. Other tables in this report include Chemical Usage, Biosolids Quality, and Biosolids Quantity.

### Raw Sewage

The information reported in the Raw Sewage sample results summary table consists of test results of analysis conducted on composite samples of the plant influent flow as required by the plant ECA. Samples are sent for analysis to Lakefield Research, as well as analysis conducted on site using Standard Methods or equivalent. Weekly analysis has been performed and reported as specified under the terms outline in the ECA.

### Influent Analysis

Table 2 Influent Analysis

Influent Parameter	Minimum	4 Week Average Maximum	Annual Average	Average loading kg/day
BOD5 (mg/L)	82	261.5	173.6	24.3
Suspended Solids (mg/L)	74	332.5	231	32.3
Total Phosphorus (mg/L)	1.2	5.3	3.65	0.51
Total Kjeldahl Nitrogen (mg/L)	23.6	49.5	35.4	5.0
pH	7.03	8.35 (max)	7.20	N/A

### Effluent Analysis

The information reported in the Final Effluent sample results summary table 3 consists of test results of analysis conducted on final effluent composite samples. Bacteriological samples, however, consisted of grab samples. Weekly analysis has been performed and reported as specified under the terms outlined in the ECA.

### Effluent Objective Analysis

Effluent objectives were not always met in 2022. In January the effluent ammonia average was 1.73 mg/L exceeding the objective but within compliance. Again, in April the effluent ammonia average was 1.28 mg/L exceeding the objective but within the summer compliance level of 2.0 mg/L. Both events appear to be the result of high influent flows of cold water.

### Final Effluent Analysis Summary

All final effluent samples tested for CBOD5, suspended solids, ammonia, E. Coli, and total phosphorous were below non-compliance limits outlined in the ECA.

. Table 3 Final Effluent Analysis Summary

Parameter	Minimum	4 Week Average Maximum	Annual Average	Average Loading kg/day
COBD5 (mg/L)	2	4.5	2.55	0.36
Suspended Solids (mg/L)	2	4.25	2.69	0.38
Total Phosphorus (mg/L)	0.03	0.10	0.07	0.01
Ammonia (mg/L)	0.1	1.7	0.46	0.06
E. Coli (#/100 mL)	0.00	10.8	1.0	N/A
pH	7.43	8.48 (max)	7.81	N/A

Average daily flow comparisons by day of week ensure ECA requirements for scheduled sampling are taken at a time, and in a location characteristic of the quality and quantity of the sewage stream over the time period being monitored. Average daily flow rates by day of the week compare the flow to the average daily flow for the entire year. This data is used to determine if a particular day of the week is best to ensure samples are taken to meet the requirements of scheduled monitoring sections of the ECA's. Sampling plans are reviewed and updated yearly based on the previous yearly flow data.

#### Final Effluent Sampling Summary

All samples were collected following the frequency and methods required by the facility approval. For the coming year, 2023, no changes to the sampling plan are being considered at this time.

#### Biosolids Generation

The quality and volume of biosolids hauled from the facility for disposal is outlined in the table provided. Dewatered biosolids from the plant were hauled to an approved disposal location. Private contractors were used by the District of Muskoka to transfer all material for disposal in 2022 and will continue to do so in 2023. It is not anticipated that there will be a significant increase in the total volume of biosolids produced in 2023.

#### Summary of Complaints received throughout the reporting period

There were no complaints received in the reporting period.

## Mactier Wastewater Collection Summary

### New or replaced sewer mains:

No new or replaced sewers in 2022.

### New Sewer Services:

3 new customers connected to existing municipal sewers.

### Sewer Lateral Blockages:

1 LPS sewer blockage on the customer property at 8 Stanley St., Mactier.

### Sewer Pump Stations:

All stations were inspected. Beech Station Cleaned.

### Main Line Sewer Blockages:

There were no main line sewer blockages in 2022.

### Sewer Force Mains:

All the low-pressure sewage force mains within the collection system were flushed by field staff through our annual preventive maintenance program.

### Air Release Valves:

All five (5) of the air release vacuum valves connected to the sewage force mains.

### Sewer Flushing and Video Inspections:

Mactier had no sewer flushing or inspections.

### Sewer Rehabilitation:

There was no MH rehab for this year.

### Locates:

Field staff addressed 73 locates for Mactier OneCall in 2022.

Table 4 Effluent Flow Summary - 2022

Month	Plant Total Monthly (m <sup>3</sup> )	Average Day Flow (m <sup>3</sup> /d)	Maximum Day Flow (m <sup>3</sup> /d)	Minimum Day Flow (m <sup>3</sup> /d)
January	3,797	122	154	95
February	3,122	111	190	83
March	5,255	170	287	100
April	5,321	177	243	145
May	3,809	123	159	100
June	3,844	128	171	100
July	3,700	119	163	87
August	3,555	115	152	87
September	3,384	113	162	88
October	4,088	132	223	91
November	3,617	121	168	95
December	4,360	141	262	88

Total Flow: 47,854m<sup>3</sup>  
 Average Day: 131m<sup>3</sup>  
 Maximum Day: 287m<sup>3</sup> Minimum Day: 83m<sup>3</sup>



Table 5 Influent Quarterly Analysis Summary – Weekly 24-Hour Composite Sample

Sample Date	Sample Identification Number	BOD5 mg/L	Total Kjeldahl Nitrogen mg/L	Total Phosphorus mg/L	Suspended Solids mg/L
Feb-07-22	CA13316	148	30.3	4.01	285
May-02-22	CA12046	151	26.4	3.03	222
Aug-02-22	CA13063	218	44.6	5.71	264
Nov-07-22	CA12446	301	39.4	4.23	139
<b>Yearly Average</b>	--	<b>204.5</b>	<b>35.2</b>	<b>4.2</b>	<b>227.5</b>
<b>Maximum</b>	--	<b>301.0</b>	<b>44.6</b>	<b>5.7</b>	<b>185.0</b>
<b>Minimum</b>	--	<b>148.0</b>	<b>26.4</b>	<b>3.0</b>	<b>139.0</b>

Table 6 Chemical Usage Summary: Alum

Month	Average Dosage mg/L	Total kg (dry)
January	91.4	793.5
February	105.8	782.6
March	74.8	830.8
April	70.1	820.8
May	97.3	831.0
June	92.2	761.1
July	85.0	664.6
August	86.7	664.6
September	108.5	804.0
October	96.2	830.8
November	101.0	804.0
December	89.6	830.8
Average	92	9,419

Total Yearly Kilograms: 9,419kg

Table 7 Chemical Usage Summary: Soda Ash

Month	Average Dosage mg/L	Total kg (dry)
January	139.9	593.0
February	141.6	517.0
March	170.8	686.0
April	109.6	633.5
May	130.0	542.0
June	137.3	553.0
July	132.9	507.0
August	148.1	554.5
September	166.9	609.0
October	161.0	695.5
November	164.9	641.0
December	166.5	767.0
Average	147	7,299

Total Yearly Kilograms: 7,299kg

Table 8 Effluent Quarterly Analysis Summary – Weekly 24-Hour Composite Sample

Sample Date	Sample Identification Number	CBOD5 mg/L	Total Ammonia Nitrogen mg/L	pH	Total Phosphorus mg/L	Suspended Solids mg/L
Feb-07-22	CA13316	2	0.3	7.48	0.10	3
May-02-22	CA12046	4	1.4	7.90	0.1	4
Aug-02-22	CA13063	2	0.1	8.27	0.1	2
Nov-07-22	CA12446	2	0.1	8.41	0.05	3
<b>Yearly Average</b>	--	<b>2.5</b>	<b>0.4750</b>	<b>8.015</b>	<b>0.09</b>	<b>3</b>
<b>Maximum</b>	--	<b>4.0</b>	<b>1.4</b>	<b>8.41</b>	<b>0.1</b>	<b>4</b>
<b>Minimum</b>	--	<b>2.0</b>	<b>0.1</b>	<b>7.48</b>	<b>0.05</b>	<b>2</b>

Table 9 Effluent Loading and Concentration Summary 2022: COBD5

<b>Month</b>	<b>Average mg/L</b>	<b>Average kg/day</b>	<b>Maximum Daily kg/day</b>
<b>January</b>	2.00	0.24	0.31
<b>February</b>	2.50	0.28	0.48
<b>March</b>	4.00	0.68	1.15
<b>April</b>	2.75	0.49	0.67
<b>May</b>	4.00	0.49	0.60
<b>June</b>	2.00	0.26	0.34
<b>July</b>	2.00	0.24	0.32
<b>August</b>	2.60	0.30	0.40
<b>September</b>	2.50	0.28	0.41
<b>October</b>	3.00	0.35	0.46
<b>November</b>	2.00	0.24	0.34
<b>December</b>	2.00	0.28	0.52
<b>Average Monthly</b>	2.61	0.34	
<b>Effluent Objective</b>	<b>5.0</b>		
<b>Non-Compliance</b>	<b>10.0</b>		

Table 10 Effluent Loading and Concentration Summary 2022: Suspended Solids

<b>Month</b>	<b>Average mg/L</b>	<b>Average kg/day</b>	<b>Maximum Daily kg/day</b>
<b>January</b>	2.60	0.32	0.40
<b>February</b>	2.67	0.30	0.51
<b>March</b>	2.50	0.42	0.72
<b>April</b>	4.25	0.75	1.03
<b>May</b>	3.20	0.39	0.48
<b>June</b>	2.25	0.29	0.38
<b>July</b>	2.50	0.30	0.41
<b>August</b>	2.00	0.23	0.30
<b>September</b>	2.00	0.23	0.32
<b>October</b>	3.25	0.37	0.49
<b>November</b>	3.25	0.39	0.55
<b>December</b>	3.00	0.42	0.79
<b>Average Monthly</b>	2.79	0.37	
<b>Effluent Objective</b>	<b>5.0</b>		
<b>Non-Compliance</b>	<b>10.0</b>		

Table 11 Effluent Loading and Concentration Summary 2022: Total Ammonia Nitrogen Summer

<b>Month</b>	<b>Average mg/L</b>	<b>Average kg/day</b>	<b>Maximum Daily kg/day</b>
<b>April</b>	1.275	0.23	0.31
<b>May</b>	0.72	0.09	0.11
<b>June</b>	0.15	0.02	0.03
<b>July</b>	0.10	0.01	0.02
<b>August</b>	0.10	0.01	0.02
<b>September</b>	0.10	0.01	0.02
<b>October</b>	0.13	0.01	0.02
<b>Average Monthly</b>	0.37	0.05	
<b>Effluent Objective</b>	<b>1.0</b>		
<b>Non-Compliance</b>	<b>2.0</b>		

Table 12 Effluent Loading and Concentration Summary 2022: Total Ammonia Nitrogen Winter

<b>Month</b>	<b>Average mg/L</b>	<b>Average kg/day</b>	<b>Maximum Daily kg/day</b>
<b>January</b>	0.22	0.03	0.04
<b>February</b>	0.80	0.09	0.15
<b>March</b>	1.73	0.29	0.49
<b>November</b>	0.13	0.02	0.07
<b>December</b>	0.16	0.02	0.04
<b>Average Monthly</b>	0.61	0.09	
<b>Effluent Objective</b>	<b>1.0</b>		
<b>Non-Compliance</b>	<b>4.0</b>		



Table 13 Effluent Loading and Concentration Summary 2022: Fecal Coliform

<b>Month</b>	<b>Geomean (#/100mL)</b>	<b>Maximum Daily (#/100mL)</b>
<b>January</b>	0.00	0.00
<b>February</b>	1.00	1.00
<b>March</b>	1.00	0.29
<b>April</b>	10.75	2.62
<b>May</b>	0.00	0.00
<b>June</b>	0.00	0.00
<b>July</b>	0.25	1.00
<b>August</b>	0.00	0.00
<b>September</b>	0.00	0.00
<b>October</b>	0.00	0.00
<b>November</b>	0.25	1.00
<b>December</b>	0.25	2.00
<b>Average Monthly</b>	1.13	
<b>Effluent Objective</b>		
<b>Non-Compliance</b>	<b>100</b>	

Table 14 Effluent Loading and Concentration Summary 2022: Total Phosphorus

<b>Month</b>	<b>Average mg/L</b>	<b>Average kg/day</b>	<b>Maximum Daily kg/day</b>
<b>January</b>	0.06	0.01	0.01
<b>February</b>	0.06	0.01	0.01
<b>March</b>	0.07	0.01	0.02
<b>April</b>	0.08	0.01	0.02
<b>May</b>	0.10	0.01	0.02
<b>June</b>	0.07	0.01	0.01
<b>July</b>	0.06	0.01	0.01
<b>August</b>	0.08	0.01	0.01
<b>September</b>	0.07	0.01	0.01
<b>October</b>	0.06	0.01	0.01
<b>November</b>	0.05	0.01	0.01
<b>December</b>	0.05	0.01	0.01
<b>Average Monthly</b>	0.07	0.01	
<b>Effluent Objective</b>	<b>0.2</b>		
<b>Non-Compliance</b>	<b>0.5</b>		

Table 15 Liquid Sludge Production Summary 2022

Month	Hauler	Liquid Volume m <sup>3</sup>	Cake Weight kg	Destination
January	ROHES	254.8	N/A	ROHES Storage Site
February	N/A	N/A	N/A	N/A
March	N/A	N/A	N/A	N/A
April	N/A	N/A	N/A	N/A
May	ROHES	70.0	N/A	ROHES Storage Site
June	N/A	N/A	N/A	N/A
July	N/A	N/A	N/A	N/A
August	N/A	N/A	N/A	N/A
September	N/A	N/A	N/A	N/A
October	N/A	N/A	N/A	N/A
November	N/A	N/A	N/A	N/A
December	N/A	N/A	N/A	N/A

Yearly Total Volume: 324.8 m<sup>3</sup>  
 Yearly Average Volume: N/A  
 Maximum Volume: N/A  
 Minimum Volume: N/A

Table 16 Sludge Quality Analysis 2022

Parameter Sampled (mg/L)	First Quarter	Second Quarter	Third Quarter	Fourth Quarter
Date	Feb-7-22	May-02-22	Aug-2-22	Nov-7-22
Sample ID	CA13317	CA12047	CA13064	CA12447
Nitrate	48	130	100	7.8
Mercury	0.001	0.001	0.002	0.003
Chromium	0.11	0.2	0.26	0.31
Cobalt	0.02	0.03	0.04	0.04
Copper	2.9	5.1	7.1	7.8
Lead	<0.1	0.1	0.2	0.30
Molybdenum	<.05	< 0.080	0.12	0.10
Nickel	0.09	0.16	0.2	0.25
Selenium	<0.1	< 0.10	<0.1	<0.1
Arsenic	<0.1	< 0.1	<0.1	<0.1
Zinc	4	7	9	11
Cadmium	0.005	0.012	0.013	0.015
Ammonia+ Ammonium	3.4	4.2	2.4	2.3
Total Kjeldahl Nitrogen	314	439	751	723
Total Phosphorus	220	440	580	560
Total Solids	8120	14500	18900	22900
Volitile Solids				
Nitrite	0.7	1.1	0.3	<0.2
Potassium	37	46	49	44

## Certification of Reports

I certify that the information in this document and all attachments are correct, accurate, and complete to the best of my knowledge.

Michael Currie  
Director, Water and Wastewater Services

Mark Pringle  
Manager of Water and Wastewater Operations