2024 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
Website: 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 approximately 280 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^3/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 achieve the highest level of treatment at all times. 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 CBOD5, 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 this reporting period was 154 m3/day, however, the 3-year average was 146 m3/day which represents 21% of the plant capacity. None of the individual system components exceeded the design flow rating.

Important to note the December 30th, 2024, flow of 513 m3 is the highest ever received by the facility in one day. This was found to be the result of a submerged maintenance hole, which was sealed off from inflow at a later date.

Plant Operational Upsets or Process Failures

There were no major plant upsets or process failures in this reporting period.

Summary of Maintenance

There were no significant plant upgrades on major infrastructure in this reporting period.

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 (and 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 2022. (5-year cycle)

Evaluation of the Need for Improvement Works

The treatment facility is operating at an average plant capacity of 21% and is in compliance with specified effluent parameter criteria. In addition, there has been no significant treatment process upsets or plant bypasses

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 due to this reporting period.

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)	38	287	146	19.85
Suspended Solids (mg/L)	32	366	197	26.38
Total Phosphorus (mg/L)	0.94	5.98	2.82	0.39
Total Kjeldahl Nitrogen (mg/L)	8	44	26.41	3.73
pH	6.95	7.58 (max)	7.21	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 met at all times during this reporting period.

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)	2.0	4.0	3.75	0.55
Suspended Solids (mg/L)	2	5	2.81	0.42
Total Phosphorus (mg/L)	0.03	0.08	0.05	0.01
Ammonia (mg/L)	0.1	1.5	0.58	Winter: 0.09 Summer: 0.08
E. Coli (#/100 mL)	0	2.75	0.32	N/A
pH	7.09	7.58 (max)	7.3	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.

Final Effluent Sampling Summary

All samples were collected following the frequency and methods required by the facility approval. For the coming operating year, 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 was hauled to an approved disposal location. Private contractors were used by the District of Muskoka to transfer all material for disposal during this reporting period and will continue to do so in the following reporting period. It is not anticipated that there will be a significant increase in the total volume of biosolids produced in the coming reporting period.

Summary of Complaints received throughout the reporting period.

There were no complaints received in the reporting period.

Mactier Wastewater Collection Summary 2024

New or Replaced Sewer Mains

No new or replaced sewers in 2024.

New Sewer Services:

2 new customers connected to existing municipal sewers on Hawkins Point Rd in 2024.

Sewer Lateral Blockages:

No sewer lateral blockages in 2024.

Sewer Pump Stations:

All stations were inspected. Beech Station and Curling Club cleaned.

Main Line Sewer Blockages:

There were no main line sewer blockages in 2024.

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 in 2024.

Air Release Valves:

All five (5) of the air release vacuum valves connected to the sewage force mains wre checked for operation in 2024.

Sewer Flushing and Video Inspections:

No Sewer flushing or video inspections conducted in 2024.

Sewer Rehabilitation:

There was no sewer rehabilitation rehab done in 2024.

Locates:

Field staff addressed 76 locates for Mactier in 2024.

Table 4 Effluent Flow Summary - 2023

Month	Plant Total Monthly (m^3)	Average Day Flow (m^3/d)	Maximum Day Flow (m^3/d)	Minimum Day Flow (m^3/d)
January	4,781	154	241	97
February	4,754	164	325	88
March	6,166	199	352	125
April	6,826	228	466	141
May	4,339	140	234	97
June	4,359	145	326	78
July	4,166	134	173	80
August	4,216	136	200	102
September	3,583	119	149	85
October	3,351	108	147	72
November	3,994	133	175	87
December	5,775	186	513	86

Total Flow: 56,310m3
Average Day: 154m3
Maximum Day: 413m3
Minimum Day: 72m3

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-05-24	CA13222	69	21.6	2.86	307
May-06-24	CA13346	117	20.9	2.02	75
Aug-06-24	CA12138	199	48.4	4.75	163
Nov-04-24	CA13067	114	21.9	1.7	152
Yearly Average	--	**124.8**	**28.2**	**2.8**	**174.3**
Maximum	--	**199.0**	**48.4**	**4.8**	**307.0**
Minimum	--	**69.0**	**20.9**	**1.7**	**75.0**

Table 6 Chemical Usage Summary: Alum

Month	Average Dosage mg/L	Total kg (dry)
January	107.8	1142.35
February	102.4	1068.65
March	105.4	1386.9
April	66.8	988.25
May	89.7	934.65
June	94.2	904.5
July	98.3	934.65
August	92.4	867.65
September	98.3	804
October	115.8	896.44
November	94.7	844.2
December	81.2	891.1
Average	**107.8**	**1142.35**

Total Yearly Kilograms: 11,663kg

Table 7 Chemical Usage Summary: Soda Ash

Month	Average Dosage mg/L	Total kg (dry)
January	185.24	960.0
February	186.1	966.0
March	168.6	1,108.0
April	152.9	1,165.5
May	183.4	945.0
June	190.2	935.0
July	198.8	929.7
August	185.8	863.0
September	152.0	609.0
October	178.5	675.0
November	189.1	824.0
December	177.2	1,035.0
Average	**185.24**	**960.0**

Total Yearly Kilograms: 11,015kg

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-05-24	CA13222	4	0.6	7.7	0.03	2
May-06-24	CA13346	4	0.9	7.79	0.04	2
Aug-06-24	CA12138	4	0.8	7.58	0.03	2
Nov-04-24	CA13067	4	0.1	7.83	0.06	2
Yearly Average		**4.0**	**0.6**	**7.7**	**0.0**	**2.0**
Maximum		**4.0**	**0.9**	**7.8**	**0.1**	**2.0**
Minimum		**4.0**	**0.1**	**7.6**	**0.0**	**2.0**

Table 9 Effluent Loading and Concentration Summary 2023: COBD5

Month	Average mg/L	Average kg/day	Maximum Daily kg/day
January	2.64	0.41	0.64
February	3.36	0.55	1.09
March	2.99	0.59	1.05
April	3.48	0.79	1.62
May	3.36	0.47	0.79
June	3.36	0.49	1.10
July	4.00	0.54	0.69
August	4.00	0.54	0.80
September	4.00	0.48	0.59
October	4.00	0.43	0.59
November	4.00	0.53	0.70
December	4.00	0.75	2.05
Average Monthly	**3.60**	**0.55**	**0.98**
Effluent Objective	**5.0**		
Non-Compliance	**10.0**		

Table 10 Effluent Loading and Concentration Summary: Suspended Solids

Month	Average mg/L	Average kg/day	Maximum Daily kg/day
January	2.70	0.42	0.65
February	2.00	0.33	0.65
March	3.13	0.62	1.10
April	4.32	0.98	2.02
May	2.00	0.28	0.47
June	2.21	0.32	0.72
July	3.31	0.45	0.57
August	2.30	0.31	0.46
September	2.38	0.28	0.35
October	2.17	0.23	0.32
November	2.00	0.27	0.35
December	2.79	0.52	1.43
Average Monthly	**2.61**	**0.42**	**0.76**
Effluent Objective	**5.0**		
Non-Compliance	**10.0**		

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

Month	Average mg/L	Average kg/day	Maximum Daily kg/day
April	1.20	0.18	0.28
May	0.63	0.09	0.17
June	0.28	0.04	0.07
July	0.24	0.05	0.10
August	1.28	0.11	0.19
September	0.30	0.04	0.08
October	0.22	0.03	0.03
Average Monthly	**0.59**	**0.09**	**0.16**
Effluent Objective	**1.0**		
Non-Compliance	**2.0**		

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

Month	Average mg/L	Average kg/day	Maximum Daily kg/day
January	0.62	0.09	0.14
February	0.55	0.09	0.18
March	0.98	0.19	0.33
November	0.30	0.03	0.04
December	0.28	0.05	0.14
Average Monthly	**0.55**	**0.09**	**0.17**
Effluent Objective	**1.0**		
Non-Compliance	**4.0**		

Table 13 Effluent Loading and Concentration Summary: Fecal Coliform

Month	Geomean (#/100mL)	Maximum Daily (#/100mL)
January	0.00	0.00
February	0.00	0.00
March	0.00	0.00
April	0.00	0.00
May	0.00	0.00
June	2.75	0.90
July	0.00	0.00
August	0.25	0.05
September	0.00	0.00
October	0.20	0.03
November	0.75	0.13
December	0.20	0.04
Average Monthly	**0.35**	**0.10**
Effluent Objective	**N/A**	
Non-Compliance	**100**	

Table 14 Effluent Loading and Concentration Summary: Total Phosphorous

Month	Average mg/L	Average kg/day	Maximum Daily kg/day
January	0.05	0.01	0.01
February	0.04	0.01	0.01
March	0.05	0.01	0.02
April	0.06	0.01	0.03
May	0.04	0.01	0.01
June	0.05	0.01	0.02
July	0.07	0.01	0.01
August	0.04	0.01	0.01
September	0.04	0.00	0.01
October	0.04	0.00	0.01
November	0.06	0.01	0.01
December	0.06	0.01	0.03
Average Monthly	**0.05**	**0.01**	**0.01**
Effluent Objective	**0.2**		
Non-Compliance	**0.5**		

Table 15 Liquid Sludge Production Summary

Month	Hauler	Liquid Volume m^3	Cake Weight kg	Destination
January	N/A	N/A	N/A	N/A
February	N/A	N/A	N/A	N/A
March	ROHES	430.12	N/A	ROHES Storage
April	N/A	N/A	N/A	N/A
May	N/A	N/A	N/A	N/A
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: 430.12 m3
Yearly Average Volume: N/A
Maximum Volume: N/A
Minimum Volume: N/A

Table 16 Sludge Quality Analysis

Parameter Sampled (mg/L)	First Quarter	Second Quarter	Third Quarter	Fourth Quarter
Date	Feb-05-24	May-06-24	Aug-06-24	Nov-04-24
Sample ID	CA13222	CA14162	CA12138	CA13068
Nitrate	99	79	110	110
Mercury	0.004	0.001	0.001	0.002
Chromium	0.41	0.11	0.19	0.23
Cobalt	0.06	0.01	0.03	0.03
Copper	10	2.1	4.5	5.9
Lead	0.3	<0.1	0.1	0.20
Molybdenum	0.17	<0.05	0.07	0.09
Nickel	0.3	0.08	0.15	0.16
Selenium	<0.1	<0.1	<0.1	<0.1
Arsenic	<0.1	<0.1	<0.1	<0.1
Zinc	14	4	6	8
Cadmium	0.022	<0.005	0.01	0.009
Ammonia+ Ammonium	1.5	2.2	4.1	1.2
Total Kjeldahl Nitrogen	758	288	589	451
Total Phosphorus	790	150	350	440
Total Solids	23300	7390	15100	16800
Nitrite	<3	8	<3	<3
PO4	47	33	35	40

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

Jamey Adams
Manager, Water and Wastewater Operations