

2020 Year End Report: MacTier Clean Water Plant (CWP)



Environmental Compliance Approval: # 7599-7PCKPU

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Introduction

The MacTier Clean Water Plant (CWP), 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 246 customers.

The Plant operates under the MOE Certificate of Approval (Sewage) #7599-7PCKPU issued February 18, 2009 and MOE 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 (m³/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/100mL
pH	6.0-9.5 inclusive at all times

The treatment process is comprised of 2 sequencing batch reactors, phosphorus precipitation using aluminum sulphate, post-secondary treatment and ultraviolet disinfection. Treated effluent from the plant is discharged through a 300 mm 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 shut downs, 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 m³/day. The actual average daily flow for the 2020 was 144m³/day, however, the 3year average is 166m³/day, which represents 24% of the plant capacity. None of the individual system components exceeded the design flow rating.

Plant Operational Upsets or Process Failures

There were no plant operational problems in 2020.

Summary of Maintenance

There were no significant plant upgrades on major infrastructure in 2020.

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 2017. (5-year cycle)

Evaluation of the Need for Improvement Works

The treatment facility is operating at a plant capacity of 24% 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 2020.

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)	43	281	214	30.53
Suspended Solids (mg/L)	77	301.5	251	35.71
Total Phosphorus (mg/L)	1.09	5.55	3.82	0.53
Ammonia (mg/L)	N/A	N/A	N/A	N/A
pH	7.27	Max 7.52	7.40	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

The effluent objectives were met during all sample periods.

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	3.31	0.32
Suspended Solids (mg/L)	2	3.75	2.65	0.35
Total Phosphorus (mg/L)	0.03	0.07	0.05	0.01
Ammonia (mg/L)	0.1	0.55	0.27	0.04
E. Coli (#/100 mL)	0	1.5	0.37	N/A
pH	7.22	8.04 Max	7.79	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, 2021, 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 landfill site. Private contractors were used by the District of Muskoka to transfer all material for disposal in 2020, and will continue to do so in 2021. It is not anticipated that there will be a significant increase in the total volume of bio solids produced in 2021.

Summary of Complaints received throughout the reporting period

There were no complaints received in the reporting period.

MacTier Wastewater Collection Summary

New Sewer Services:

A total of two (2) customers connected to existing sewer laterals in 2020.

New Sewer Mains:

There was no new sewer main installed in 2020

Sewer Main Replacements:

There were no sewer mains replaced in 2020.

Low Pressure Sewer Breaks:

There were no low pressure sewer breaks in 2020.

Sewer Force Main Breaks:

There were no sewer force main breaks in 2020.

Sewer Force Main Valve Replacement

There were no sewer force main valve replacements in 2020.

Main Line Sewer Blockage

There were no main line sewer blockages in 2020.

Sewer Lateral Blockage

There were three (3) sewer lateral blockages on the municipal side in 2020.

Low Pressure Sewer Blockages:

There were two (2) low pressure sewer blockages in 2020.

Frozen Sewer Force Mains:

No sewer force mains froze in 2020.

Frozen Sewer Service Laterals:

No sewer service laterals froze in 2020.

Frozen Low Pressure Sewer Services:

No low pressure sewer services froze in 2020.

Sewer Flushing/Video:

Approximately 1,594 meters of sewer main was flushed and video inspected in 2020.

Sewer Locates:

District staff addressed 203 written locate requests in 2020.

Table 4 Effluent Flow Summary - 2020

Month	Plant Total Monthly (m³)	Average Day Flow (m³/d)	Maximum Day Flow (m³/d)	Minimum Day Flow (m³/d)
January	4,577	148	224	115
February	3,702	128	152	105
March	6,276	202	349	114
April	4,618	154	228	115
May	3,833	124	175	88
June	3,302	110	178	51
July	4,114	133	227	61
August	4,277	138	214	90
September	4,239	141	228	60
October	4,446	143	213	78
November	4,520	151	224	96
December	4,719	152	247	111

Total Flow: 52,623m³
 Average Day: 144m³
 Maximum Day: 349m³
 Minimum Day: 51m³

Table 5 Influent Quarterly Analysis Summary – Weekly 24 Hour Composite Sample Part 1

Sample Date	Sample Identification Number	BOD5 mg/L	Total Kjeldahl Nitrogen mg/L	Total Phosphorus mg/L	Suspended Solids mg/L
Feb 10/20	CA12291	279	41.7	4.16	212
May 04/20	CA12111	228	38.5	4.60	257
Aug 04/20	CA12022	178	42.1	3.8	135
Nov 02/20	CA13096	175	31.3	3.97	297
Yearly Average		215	38.4	4.13	225
Maximum		279	42.1	4.6	297
Minimum		175	31.3	3.8	135

Table 6 Chemical Usage Summary: Alum

Month	Average Dosage mg/L	Total kg (dry)
January	90.5	830.8
February	102.3	777.2
March	73.8	897.8
April	105.8	1,018.4
May	100.7	900.5
June	79.5	621.8
July	71.5	627.1
August	73.1	660.6
September	71.2	643.2
October	73.0	689.0
November	73.6	505.3
December	80.1	774.5
Average	82.9	745.5

Total Yearly Kilograms: 8,946kg

Table 7 Chemical Usage Summary: Soda Ash

Month	Average Dosage mg/L	Total kg (dry)
January	148.9	674.5
February	159.0	589.5
March	145.7	902.0
April	145.2	688.0
May	144.6	629.0
June	140.1	537.0
July	134.1	580.5
August	146.0	651.0
September	149.8	669.5
October	140.3	650.0
November	156.8	709.5
December	157.5	757.5
Average	147.3	669.8

Total Yearly Kilograms: 8,038kg

Table 8 Effluent Quarterly Analysis Summary – Weekly 24 Hour Composite Sample Part 1

Sample Date	Sample Identification Number	CBOD5 mg/L	Total Ammonia Nitrogen mg/L	pH	Total Phosphorus mg/L	Suspended Solids mg/L
Feb 10/20	CA12291	<2	0.3	7.74	0.05	2
May 04/20	CA12111	<2	0.2	7.32	<0.03	3
Aug 04/20	CA12022	<2	0.2	7.60	0.06	<2
Yearly Average		<2	<0.1	7.55	0.47	2.3
Maximum		<2	0.2	7.74	0.06	3
Minimum		<2	0.3	7.32	<0.03	<2

Table 9 Effluent Loading and Concentration Summary 2020: COBD5

Month	Average mg/L	Average kg/day	Maximum Daily kg/day
January	2.25	0.33	0.50
February	2.00	0.26	0.30
March	2.20	0.44	0.77
April	2.25	0.35	0.51
May	2.25	0.28	0.39
June	2.20	0.24	0.39
July	3.00	0.40	0.68
August	2.00	0.28	0.43
September	2.00	0.28	0.43
October	2.00	0.29	0.43
November	2.00	0.30	0.45
December	2.50	0.38	0.62
Average Monthly	2.22	0.32	0.49
Effluent Objective	5		
Non-Compliance	10		

Table 10 Effluent Loading and Concentration Summary 2020: Suspended Solids

Month	Average mg/L	Average kg/day	Maximum Daily kg/day
January	2.00	0.30	0.45
February	2.00	0.26	0.30
March	2.20	0.44	0.77
April	2.50	0.38	0.57
May	2.25	0.28	0.39
June	2.00	0.22	0.36
July	4.50	0.60	1.02
August	2.00	0.28	0.43
September	2.00	0.28	0.43
October	2.75	0.29	0.43
November	3.20	0.48	0.72
December	2.50	0.38	0.62
Average Monthly	2.49	0.35	0.54
Effluent Objective	5.00		
Non-Compliance	10.00		

Table 11 Effluent Loading and Concentration Summary 2020: Total Ammonia Nitrogen Summer

Month	Average mg/L	Average kg/day	Maximum Daily kg/day
May	0.30	0.04	0.05
June	0.22	0.02	0.04
July	0.10	0.01	0.02
August	0.12	0.02	0.03
September	0.18	0.02	0.04
Average Monthly	0.18	0.02	0.036
Effluent Objective	1		
Non-Compliance	2		

Table 12 Effluent Loading and Concentration Summary 2020: Total Ammonia Nitrogen Winter

Month	Average mg/L	Average kg/day	Maximum Daily kg/day
January	0.45	0.07	0.1
February	0.40	0.05	0.06
March	0.50	0.10	0.17
April	0.23	0.03	0.05
October	0.10	0.1	0.02
November	0.16	0.02	0.04
December	0.23	0.03	0.06
Average Monthly	0.30	0.06	0.07
Effluent Objective	1.00		
Non-Compliance	4.00		

Table 13 Effluent Loading and Concentration Summary 2020: Fecal Coliform

Month	Geomean (#/100mL)	Maximum Daily (#/100mL)
January	0.25	1.00
February	0.00	0.00
March	0.40	1.00
April	0.25	1.00
May	0.25	1.00
June	0.20	1.00
July	0.50	1.00
August	0.20	1.00
September	0.75	1.00
October	0.25	1.00
November	0.00	0.00
December	1.50	3.00
Average Monthly	0.38	1.0
Effluent Objective		
Non-Compliance	100	

Table 14 Effluent Loading and Concentration Summary 2020: Total Phosphorus

Month	Average mg/L	Average kg/day	Maximum Daily kg/day
January	0.05	0.01	0.01
February	0.05	0.01	0.01
March	0.05	0.01	0.02
April	0.06	0.01	0.01
May	0.06	0.01	0.01
June	0.05	0.01	0.01
July	0.06	0.01	0.01
August	0.05	0.01	0.01
September	0.04	0.01	0.01
October	0.05	0.01	0.01
November	0.06	0.01	0.01
December	0.05	0.01	0.01
Average Monthly	0.05	0.01	0.011
Effluent Objective	0.20		
Non-Compliance	0.50		

Table 15 Liquid Sludge Production Summary 2020

Month	Hauler	Liquid Volume m ³	Cake Weight kg	Destination
January				
February				
March				
April				
May	ROHES	255		ROHES
June				
July				
August				
September				
October				
November				
December				

Yearly Total Volume: 255
Yearly Average Volume:
Maximum Volume:
Minimum Volume:

Table 16 Sludge Quality Analysis 2020

Parameter Sampled (mg/L)	First Quarter	Second Quarter	Third Quarter	Fourth Quarter
Date	Feb-10-2020	May-04-2020	Aug-04-2020	Nov-02-20
Sample ID	CA12292	CA12112	CA12023	CA13096
Nitrate	19	1.6	54	3.5
Mercury	0.005	0.003	0.003	0.003
Chromium	0.47	0.43	0.33	0.41
Cobalt	0.07	0.06	0.04	0.06
Copper	11	9.5	9.5	12
Lead	0.3	0.2	0.2	0.30
Molybdenum	0.14	0.12	0.1	0.15
Nickel	0.34	0.290	0.25	0.31
Selenium	<0.1	<0.1	<0.1	<0.1
Arsenic	<0.1	<0.1	<0.1	<0.1
Zinc	12	10	11	14
Cadmium	0.015	0.016	0.013	0.02
Ammonia+ Ammonium	2.2	4	<1	7.4
Total Kjeldahl Nitrogen	489	940	534	422
Total Phosphorus	690	580	570	630
Total Solids	23100	25800	17400	22300
Volitile Solids				
Nitrite	0.6	<0.2	0.2	<0.2
Potassium	76	66	65	62

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

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