2024 Year End Report: Port Carling Wastewater Treatment Plant (WWTP)



Environmental Compliance Approval: # 4174-AG8T75

Engineering and Public Works Department

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Introduction

The Port Carling Wastewater Treatment Plant (WWTP), which services the community of Port Carling, is owned, and operated by the District Municipality of Muskoka. The plant is located at 140 Medora Street, Port Carling, and was commissioned in 2015. It currently services 400 customers.

The Plant operates under the MOE Certificate of Approval (Sewage) #4174-AG8T75 issued February 18, 2009, and MOE Certificate of Approval (Air) #0571-67WJB7 December 1, 2016. Under the terms of the Certificate of Approval, the plant is permitted to treat an average daily flow of 926 meters cubed per day, and a peak flow of 3800 meters cubed per 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	0.30 mg/L
Total Ammonia Nitrogen Summer (May 15 to September 30)	1.10 mg/L
Total Ammonia Nitrogen Winter (October 01 to May 14)	5.40 mg/L
E. coli	80 CFU/mL
pH	6.0-9.0 inclusive at all times

The facility process consists of grit removal and screening facilities, an activated sludge based secondary treatment process using membrane filters for solids separation, followed by disinfection with ultraviolet radiation. Chemical addition includes an alkalinity adjustment feed system, a sodium hypochlorite and citric acid system for membrane cleaning and a coagulant system using poly-aluminum chloride for phosphorous removal.

Treated effluent from the plant is discharged through a 300 millimeters effluent outfall line and is discharged to Indian River.

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 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 reporting period.

CBOD5 exceeded the Maximum Daily Loading Objective on 3 occasions and are detailed in the Effluent Objective Analysis section.

Quantity of Flow Summary

The plant has a daily average flow design capacity of 926 meters cubed per day. The actual average daily flow for the reporting period was 632 meters cubed per day, however, the 3-year average was 609 meters cubed per day which represents 66% of the plant capacity. None of the individual system components exceeded the design flow rating.

Plant Operational Upsets or Process Failures

There historically have been operational problems during the winter cold temperature low loading period with meeting the Nitrate effluent objective of less than 10.0 mg/L. For this reporting period, process control changes were implemented for the bioreactor air blowers resulting in the Nitrate objective being met for the entire year.

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 (under load) of the standby generators.
- 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 a plant capacity of 66% 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 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)	12	203.8	103.3	51.49
Suspended Solids (mg/L)	22	256.6	153.0	64.80
Total Phosphorus (mg/L)	0.38	4.87	2.44	1.10
Ammonia (mg/L)	1.6	28.2	13.9	7.12

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

$CBOD_5$

The maximum daily $CBOD_5$ waste loading objective was exceeded on multiple days in 2024. Accredited lab results were commonly below the detectable limit; however, flows greater than 1157.5m^3 cause the loading calculation to exceed our $CBOD_5$ objective of 4.63kg/day. During the months of March, April, May, and December, flows exceeded this limit, causing an adverse loading result. Historically, the third-party analysis was conducted to a <2mg/L standard; whereas the objective would only be exceeded with flows greater than 2315m^3/day. Steps have been taken to reestablish the higher resolution method for DMM analysis.

The table below outlines the days in which the calculated $CBOD_5$ objective was exceeded.

Table 3 $CBOD_5$ Exceedances

Date	Fin Eff m3	CBOD5 mg/L	Loading kg/d
Mar-12	1178.16	6	7.07
Apr-12	1639.14	<4	6.56
Apr-13	1589.46	<4	6.36
Apr-14	1395.02	<4	5.58
Apr-18	1761.02	<4	7.04
Apr-19	1470.25	<4	5.88
Apr-20	1294.26	<4	5.18

Date	Fin Eff m3	CBOD5 mg/L	Loading kg/d
Apr-21	1193.36	<4	4.77
Apr-30	1660.31	<4	6.64
May-01	1415.90	<4	5.66
May-02	1214.50	<4	4.86
Dec-30	1781.37	<4	7.13
Dec-31	1355.43	<4	5.42

Nitrate

The maximum daily NO_3 waste loading objective was exceeded once in 2024. During the month of April, the nitrate concentration of the effluent was recorded at 9.42kg/d; this exceeded the objective of 9.26 kg/d. Operators made process adjustments to better balance the nitrification-denitrification cycle of the plant.

Final Effluent Analysis Summary

All final effluent samples tested for Suspended Solids, Ammonia, E. Coli, and total phosphorous were below non-compliance limits outlined in the ECA.

Table 4 Final Effluent Analysis Summary

Parameter	Minimum	4 Week Average Maximum	Annual Average	Average Loading kg/day
COBD5 (mg/L)	2	4	3.47	2.06
Suspended Solids (mg/L)	2	2.38	2.09	1.31
Total Phosphorus (mg/L)	0.03	0.03	0.03	0.02
Ammonia (mg/L)	0.1	0.21	0.11	Winter: 0.06 Summer: 0.07
Nitrate (mg/L)	0.36	6.93	3.84	2.42
E. Coli (#/100 mL)	0	0	0	N/A
pH	6.71	7.50 (max)	7.25	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

Acute Lethality to Rainbow Trout and *Daphnia magna*

Final effluent was sampled on 2025-08-06 and send to Nautilus Environmental for lethality testing against rainbow trout and *Daphnia magna*. The results were 0% impairment and 0% lethality.

Final Effluent Sampling Summary

All samples were collected following the frequency and methods required by the facility approval. 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. Biosolids from the plant was hauled to an approved site. 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 anticipated that there will not 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.

Port Carling Wastewater Collection Summary 2024

New or Replaced Sewer Mains

There was no new or replaced sewer mains in Port Carling in 2024.

New Sewer Services:

8 new customers connected to existing municipal services in 2024.

Sewer Lateral Blockages:

District had 1 lateral blockages on the municipal side in 2024. District staff responded and repaired with an approximate cost of $12000.00.

Sewer Pump Stations: Not applicable.

Main Line Sewer Blockages:

There were no main line sewer blockages in 2024.

Sewer Force Mains:

There was one sewer force main leak in 2024. District staff responded and repaired with an approximate cost of $7000.00

Air Release Valves:

All five (5) of the air release vacuum valves connected to the sewage force mains in our collection system had a maintenance inspection in 2024.

Sewer Flushing and Video Inspections:

There was no sewer flushing or video inspections done in Port Carling in 2024.

Sewer Rehabilitation:

There was no MH rehab in Port Carling in 2024.

Locates:

Field staff addressed approximately 58 locates for Port Carling in 2024.

Table 5 Effluent Flow Summary

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	20,667	667	847	536
February	21,543	743	1,206	586
March	26,752	863	1,436	547
April	32,610	1,087	1,761	600
May	23,565	760	1,416	505
June	18,174	606	1,564	417
July	19,105	616	861	481
August	15,822	510	714	395
September	12,546	418	517	323
October	11,334	366	493	245
November	10,481	349	453	265
December	18,002	581	1,781	340

Total Flow: 230,601m3
Average Day: 632m3
Maximum Day: 1,781m3
Minimum Day: 373m3

Table 6 Influent Quarterly Analysis Summary – Weekly 24-Hour Composite Sample

Sample Date	Sample Identification Number	BOD5 mg/L	Total Kjeldahl Nitrogen mg/L	Nitrate Nitrogen mg/L	Total Phosphorus mg/L	Suspended Solids mg/L
Feb-05-24	CA13215	40	8.4	0.33	0.65	32
May-06-24	CA14161	73	7.6	0.06	0.8	47
Aug-06-24	CA12131	118	26.4	0.06	3.34	178
Nov-04-24	CA13070	119	35.7	0.06	3.9	131
Yearly Average		80.0	15.7	0.1	1.6	77.0
Maximum		119.0	18.3	0.1	3.9	178.0
Minimum		40.0	7.6	0.1	0.7	32.0

Table 7 Chemical Usage Summary: SternPac

Month	Average Dosage mg/L	Total kg (dry)
January	42.2	722.2
February	42.2	755.0
March	42.2	940.0
April	42.2	1,134.9
May	42.2	827.1
June	45.3	704.4
July	46.1	749.8
August	48.4	656.1
September	49.9	538.3
October	49.9	477.8
November	49.9	431.9
December	49.9	739.0
Average	**45.9**	**723.0**

Total Yearly Kilograms: 8,677kg

Table 8 Chemical Usage Summary: Sodium Hydroxide

Month	Average Dosage mg/L	Total kg (dry)
January	20.5	275.3
February	26.6	375.7
March	15.2	290.0
April	10.8	220.5
May	45.5	636.8
June	37.9	455.5
July	44.2	564.8
August	40.0	422.6
September	42.1	357.6
October	48.5	360.9
November	45.5	306.9
December	13.9	155.4
Average	**32.6**	**368.5**

Total Yearly Kilograms: 4,422kg

Table 9 Effluent Quarterly Analysis Summary – Weekly 24-Hour Composite Sample Part 1

Sample Date	Sample Identification Number	CBOD5 mg/L	pH	Total Phosphorus mg/L	Suspended Solids mg/L
Feb-05-24	CA13214	<4	7.76	<0.03	<2
May-06-24	CA13347	<4	7.81	<0.03	<2
Aug-06-24	CA12130	<4	7.96	<0.03	<2
Nov-04-24	CA13069	<4	7.95	<0.03	2
Yearly Average		**4**	**7.87**	**0.03**	**2**
Maximum		**4**	**7.96**	**0.03**	**2**
Minimum		**4**	**7.76**	**0.03**	**2**

Table 10 Effluent Quarterly Analysis Summary – Weekly 24-Hour Composite Sample Part 2

Sample Date	Sample Identification Number	Total Kjeldahl Nitrogen mg/L	Nitrate Nitrogen mg/L	Nitrite Nitrogen mg/L	Total Ammonia Nitrogen mg/L
Feb-05-24	CA13214	1.1	4.73	0.13	<0.1
May-06-24	CA13347	0.5	4.3	<0.03	<0.1
Aug-06-24	CA12130	0.7	3.84	<0.03	<0.1
Nov-04-24	CA13069	0.6	5	<0.03	<0.1
Yearly Average		**0.7**	**4.5**	**0.06**	**<0.1**
Maximum		**1.1**	**4.7**	**0.13**	**<0.1**
Minimum		**0.5**	**3.8**	**<0.03**	**<0.1**

Table 11 Effluent Loading and Concentration Summary: COD5

Month	Average mg/L	Average kg/day	Maximum Daily kg/day
January	2.30	1.53	1.95
February	2.38	1.77	2.87
March	3.13	2.70	4.49
April	3.03	3.30	5.34
May	3.36	2.56	4.76
June	2.83	1.71	4.43
July	4.00	2.47	3.44
August	4.00	2.04	2.86
September	4.00	1.67	2.07
October	3.48	1.27	1.72
November	4.00	1.40	1.81
December	4.00	2.32	7.13
Average Monthly	**3.38**	**2.06**	**3.57**
Effluent Objective	**5.00**		**4.63**
Non-Compliance	**10.00**		**9.26**

Table 12 Effluent Loading and Concentration Summary: Suspended Solids

Month	Average mg/L	Average kg/day	Maximum Daily kg/day
January	2.30	1.53	1.95
February	2.00	1.49	2.41
March	2.21	1.91	3.18
April	2.00	2.17	3.52
May	2.00	1.52	2.83
June	2.21	1.34	3.46
July	2.17	1.34	1.87
August	2.00	1.02	1.43
September	2.00	0.84	1.03
October	2.00	0.73	0.99
November	2.00	0.70	0.91
December	2.00	1.16	3.56
Average Monthly	**2.07**	**1.31**	**2.26**
Effluent Objective	**5.00**		**4.63**
Non-Compliance	**10.00**		**9.26**

Table 13 Effluent Loading and Concentration Summary: Total Ammonia Nitrogen Summer

Month	Average mg/L	Average kg/day	Maximum Daily kg/day
May	0.10	0.08	0.14
June	0.10	0.06	0.16
July	0.18	0.11	0.16
August	0.10	0.05	0.07
September	0.10	0.04	0.05
October	0.10	0.04	0.05
Average Monthly	**0.11**	**0.06**	**0.10**
Effluent Objective	**0.80**		**0.74**
Non-Compliance	**1.10**		**1.02**

Table 14 Effluent Loading and Concentration Summary: Total Ammonia Nitrogen Winter

Month	Average mg/L	Average kg/day	Maximum Daily kg/day
January	0.10	0.07	0.08
February	0.10	0.07	0.12
March	0.10	0.09	0.14
April	0.10	0.11	0.18
November	0.10	0.03	0.05
December	0.10	0.06	0.18
Average Monthly	**0.10**	**0.07**	**0.12**
Effluent Objective	**4.00**		**3.70**
Non-Compliance	**5.40**		**5.00**

Table 15 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	0.00	0.00
July	0.00	0.00
August	0.00	0.00
September	0.00	0.00
October	0.00	0.00
November	0.00	0.00
December	0.00	0.00
Average Monthly	**0.00**	**0.00**
Effluent Objective	**2.20**	
Non-Compliance	**80.0**	

Table 16 Effluent Loading and Concentration Summary: Total Phosphorus

Month	Average mg/L	Average kg/day	Maximum Daily kg/day
January	0.03	0.02	0.03
February	0.03	0.02	0.04
March	0.03	0.03	0.04
April	0.03	0.03	0.05
May	0.03	0.02	0.04
June	0.03	0.02	0.05
July	0.03	0.02	0.03
August	0.03	0.02	0.02
September	0.03	0.01	0.02
October	0.03	0.01	0.01
November	0.03	0.01	0.01
December	0.03	0.02	0.05
Average Monthly	**0.03**	**0.02**	**0.03**
Effluent Objective	**0.10**		**0.09**
Non-Compliance	**0.30**		**0.28**

Table 17 Effluent Loading and Concentration Summary: pH

Month	Average	Minimum	Maximum
January	7.81	7.62	7.95
February	7.74	7.68	7.78
March	7.92	7.80	8.08
April	7.68	7.56	7.81
May	8.00	7.81	8.27
June	7.85	7.77	7.89
July	7.80	7.53	7.98
August	7.99	7.92	8.04
September	7.60	7.40	8.01
October	7.82	7.76	7.92
November	7.85	7.98	7.72
December	7.80	7.87	7.74
Average Monthly	**7.82**		

Table 18 Effluent Loading and Concentration Summary: Nitrate

Month	Average mg/L	Average kg/day	Maximum Daily kg/day
January	6.85	4.57	5.81
February	5.88	4.37	7.09
March	4.99	4.30	7.16
April	5.35	5.70	9.42
May	1.50	1.14	2.13
June	1.55	0.94	2.42
July	1.54	0.95	1.33
August	2.27	1.16	1.62
September	1.56	0.65	0.81
October	3.20	1.17	1.58
November	4.12	1.44	1.86
December	4.52	2.62	8.05
Average Monthly	**3.60**	**2.42**	**4.09**
Effluent Objective	**10.0**		**9.26**

Table 19 Liquid Sludge Production Summary

Month	Hauler	Liquid Volume m^3	Destination
January			
February			
March			
April	ROHES	504.0	ROHES
May			
June	ROHES	486.0	ROHES
July			
August	ROHES	462.0	ROHES
September			
October			
November	ROHES	444.0	ROHES
December			

Yearly Total Volume: 1,896m3
Yearly Average Volume: 474m3
Maximum Volume: 504m3
Minimum Volume: 0m3

Table 20 Sludge Quality Analysis

Parameter Sampled (mg/L)	First Quarter	Second Quarter	Third Quarter	Fourth Quarter
Date	Feb-05-24	May-6-24	Aug-06-24	Nov-04-24
Sample ID	CA13215	CA14161	CA12131	CA13070
Nitrate	6	10	3	7
Mercury	0.005	0.004	0.003	0.007
Chromium	0.24	0.11	0.16	0.24
Cobalt	0.03	0.02	0.02	0.03
Copper	5.9	1.9	3.6	6.8
Lead	0.2	<0.1	0.2	0.2
Molybdenum	0.05	<0.05	<0.05	0.07
Nickel	0.16	0.08	0.11	0.17
Selenium	<0.1	<0.1	<0.1	<0.1
Arsenic	<0.1	<0.1	<0.1	<0.1
Zinc	8	3	6.0	10
Cadmium	0.012	0.012	0.01	0.016
Ammonia+ Ammonium	4.2	1.3	16.7	5.1
Total Kjeldahl Nitrogen	612	370	766	604
Total Phosphorus	270	110	150	330
Total Solids	13800	8900	15600	12400
Volatile Solids				
Nitrite	<3	<3	<3	<3
Potassium	26	15	27	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
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Jamey Adams
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