

2022 Year End Report: Port Carling Wastewater Treatment Plant (WWTP)



Environmental Compliance Approval: # 4174-AG8T75

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 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 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 2022.

Overall, the plant treatment processes performed satisfactorily and are deemed to be adequate. All sample test results of the final effluent were within compliance levels outlined in the plant ECA (#4174-AG8T75).

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 2022 was 516 meters cubed per day, however, the 3-year average was 535 meters cubed per day which represents 58% 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 during the winter cold temperature low loading period. In January there was difficulty maintaining full denitrification and the

effluent nitrate objective was exceeded.

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 (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 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 58% 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 2023.

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)	20	763	134.2	69.2
Suspended Solids (mg/L)	13	358	205.5	106.0
Total Phosphorus (mg/L)	0.59	3.80	2.22	1.15
Ammonia (mg/L)	4.8	30.3	20.2	10.4
pH	7.01	7.70	7.33	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

There were plant operational problems in 2022 during the winter cold temperature low loading period. In January there was difficulty maintaining full denitrification and the effluent nitrate objective was exceeded. After this event, which has occurred in past winter periods, PLC programming changes were made to the aeration blower control. It is anticipated these changes will permit complete denitrification in colder low loading periods. The results of the PLC changes to aeration blower control will be documented in the 2023 facility report in 2024.

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	2.5	2.1	1.1
Suspended Solids (mg/L)	2.0	3.5	2.2	1.1
Total Phosphorus (mg/L)	0.03	0.04	0.03	0.02
Ammonia (mg/L)	0.1	0.15	0.1	0.05
Nitrate (mg/L)	0.06	11.4	5.44	2.8
E. Coli (#/100 mL)	0.00	0.25	0.02	N/A
pH	7.66	8.58 (max)	8.03	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 landfill site. Private contractors were used by the District of Muskoka to transfer all material for disposal in 2022 and will continue to do the same 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.

Port Carling Wastewater Collection Summary

New or Replaced Sewer Mains:

Approximately 150m of new sewer main was installed in Port Carling in 2022 with the addition of 3 new manholes on a new road named Ripplewood Way.

New Sewer Services:

1 new customer connected to existing municipal services in 2022.

Sewer Lateral Blockages:

No lateral blockages on the municipal side in 2022.

Main Line Sewer Blockages:

There were main line sewer blockages in 2022. Grease blocked Manhole W33 at Turtle Jacks, this grease blockage continued down the sanitary sewer and plugged the line at Manholes W39 and W40. The grease was cleared from the line as emergency work on Sunday June 26, 2022.

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 2022.

Sewer Flushing and Video Inspections:

Approximately 630 meters of various size sanitary sewer mains were flushed using high pressure equipment in 2022.

Sewer Rehabilitation:

There was no MH rehab in Port Carling in 2022

Locates:

Field staff addressed approximately 100 locates for Port Carling in 2022.

Table 4 Effluent Flow Summary - 2022

Month	Plant Total Monthly (m³)	Average Day Flow (m³/d)	Maximum Day Flow (m³/d)	Minimum Day Flow (m³/d)
January	12,060	389	500	308
February	9,902	354	466	287
March	20,687	667	1,332	307
April	23,746	792	979	615
May	17,515	565	746	446
June	15,154	505	708	406
July	14,729	475	591	399
August	15,173	489	620	385
September	14,140	471	594	369
October	15,559	502	760	396
November	13,151	438	637	359
December	16,612	536	1,102	405

Total Flow: 188,428m³
Average Day: 516m³
Maximum Day: 1,332m³
Minimum Day: 287m³

Table 5 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-07-22	CA13318	91	25.9	<.06	2.6	95
May-02-22	CA12042	52	15.8	0.07	1.56	43
Aug-02-22	CA13057	140	30.4	<0.06	2.68	116
Nov-07-22	CA12443	88	11.5	<0.06	1.38	81
Yearly Average		92.8	20.9	0.1	2.055	83.75
Maximum		140.0	30.4	0.1	2.68	116.00
Minimum		52.0	11.5	0.1	1.38	43.00

Table 6 Chemical Usage Summary: SternPac

Month	Average Dosage mg/L	Total kg (dry)
January	42.2	410.3
February	42.2	330.3
March	42.2	715.0
April	42.2	837.2
May	42.2	612.8
June	42.2	534.7
July	42.2	526.7
August	42.2	542.6
September	42.2	494.9
October	42.2	547.8
November	42.2	465.2
December	42.7	583.1
Average		550.06

Total Yearly Kilograms: 6,601kg

Table 7 Chemical Usage Summary: Sodium Hydroxide

Month	Average Dosage mg/L	Total kg (dry)
January	58.9	439.2
February	63.0	386.5
March	56.0	642.3
April	38.9	613.0
May	52.5	593.6
June	60.1	596.5
July	72.4	711.0
August	62.1	626.5
September	54.4	503.8
October	50.2	508.8
November	42.1	366.3
December	41.9	441.9
Average		535.77

Total Yearly Kilograms: 6,429kg

Table 8 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-07-22	CA13318	<2	7.94	<0.03	<2
May-02-22	CA12042	2	8.33	<0.03	2
Aug-02-22	CA13057	<2	7.92	<0.03	<2
Nov-07-22	CA12443	<2	8.58	<0.03	<2
Yearly Average		2	8.19	0.03	2
Maximum		2	8.58	0.03	2
Minimum		2	7.92	0.03	2

Table 9 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-07-22	CA13318	0.9	11.8	<0.03	<0.1
May-02-22	CA12042	<0.5	4.92	<0.03	<0.1
Aug-02-22	CA13057	0.6	1.34	<0.03	<0.1
Nov-07-22	CA12443	<0.5	3.92	<0.03	<0.1
Yearly Average		0.6	5.495	0.03	0.1
Maximum		0.9	11.8	0.03	0.1
Minimum		0.5	1.3	0.03	0.1

Table 10 Effluent Loading and Concentration Summary 2022: COBD5

Month	Average mg/L	Average kg/day	Maximum Daily kg/day
January	2.00	0.78	1.00
February	2.00	0.71	0.93
March	2.00	1.33	2.66
April	2.25	1.78	2.20
May	2.00	1.13	1.49
June	2.00	1.01	1.41
July	2.00	0.95	1.18
August	2.00	0.98	1.24
September	2.00	0.94	1.19
October	2.00	1.00	1.52
November	2.00	0.88	1.27
December	2.50	1.34	2.76
Average Monthly	2.06	1.07	1.57
Effluent Objective	5.00		4.63
Non-Compliance	10.00		9.26

Table 11 Effluent Loading and Concentration Summary 2022: Suspended Solids

Month	Average mg/L	Average kg/day	Maximum Daily kg/day
January	2.20	0.86	1.10
February	2.25	0.80	1.05
March	2.00	1.33	2.66
April	2.00	1.58	1.96
May	2.00	1.13	1.49
June	3.00	1.52	2.12
July	2.00	0.95	1.18
August	2.00	0.98	1.24
September	2.00	0.94	1.19
October	2.20	1.10	1.67
November	3.50	1.53	2.23
December	2.00	1.07	2.20
Average Monthly	2.26	1.15	1.67
Effluent Objective	5.00		4.63
Non-Compliance	10.00		9.26

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

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

Table 13 Effluent Loading and Concentration Summary 2022: Total Ammonia Nitrogen Winter

Month	Average mg/L	Average kg/day	Maximum Daily kg/day
January	0.10	0.04	0.05
February	0.10	0.04	0.05
March	0.10	0.07	0.13
April	0.10	0.08	0.10
November	0.10	0.04	0.06
December	0.15	0.08	0.17
Average Monthly	0.11	0.06	0.09
Effluent Objective	4.00		3.70
Non-Compliance	5.40		5.00

Table 14 Effluent Loading and Concentration Summary 2022: 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	0.20	0.19
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	0.02	0.02
Effluent Objective	2.20	
Non-Compliance	80.0	

Table 15 Effluent Loading and Concentration Summary 2022: Total Phosphorus

Month	Average mg/L	Average kg/day	Maximum Daily kg/day
January	11.14	4.33	5.57
February	9.98	3.53	4.65
March	6.91	4.61	9.20
April	6.44	5.10	6.30
May	2.27	1.28	1.69
June	2.00	1.01	1.42
July	0.86	0.41	0.51
August	1.10	0.54	0.68
September	3.34	1.57	1.99
October	5.52	2.77	4.20
November	5.98	2.62	3.81
December	7.07	3.79	7.79
Average Monthly	5.22	2.63	3.98
Effluent Objective	0.10		0.09
Non-Compliance	0.30		0.28

Table 16 Liquid Sludge Production Summary 2022

Month	Hauler	Liquid Volume m ³	Cake Weight kg	Destination
January			0.0	
February	ROHES	ROHES	261.4	ROHES
March	ROHES	ROHES	232.2	
April			0.0	
May	ROHES	ROHES	367.0	
June	ROHES	ROHES	74.0	ROHES
July	ROHES	ROHES	525.0	
August			0.0	ROHES
September	ROHES	ROHES	412.0	
October			0.0	ROHES
November			0.0	
December			0.0	

Yearly Total Volume: 1,872m³
Yearly Average Volume: 156m³
Maximum Volume: 525m³
Minimum Volume: 0m³

Table 17 Sludge Quality Analysis 2022

Parameter Sampled (mg/L)	First Quarter	Second Quarter	Third Quarter	Fourth Quarter
Date	Feb-07-22	May-02-22	Aug--02-22	Nov-07-22
Sample ID	CA13319	CA12043	CA13058	CA12444
Nitrate	2.4	11	0.5	1.9
Mercury	0.004	0.003	0.001	0.004
Chromium	0.31	0.32	0.11	0.19
Cobalt	0.03	0.03	0.01	0.02
Copper	6.2	5.2	2.4	5.4
Lead	0.2	0.2	0.2	0.2
Molybdenum	0.06	0.06	<0.05	<0.05
Nickel	0.19	0.19	0.08	0.16
Selenium	0.1	<0.1	<0.1	<0.1
Arsenic	0.1	<0.1	<0.1	<0.1
Zinc	10	8	3.0	5
Cadmium	0.014	0.012	<0.005	0.01
Ammonia+ Ammonium	2.8	2.4	3.3	1.2
Total Kjeldahl Nitrogen	520	477	372	546
Total Phosphorus	280	320	103	190
Total Solids	13200	14000	5860	11700
Volatile Solids				
Nitrite	0.2	0.9	1.1	<0.2
Potassium	33	36	32	35
Total Suspended Solids				

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