

2020 Year End Report: Port Severn Clean Water Plant (CWP)



Environmental Compliance Approval: # 3-0429-96-006

Engineering and Public Works Department

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Introduction

The Port Severn Clean Water Plant (CWP), which services the Town of Port Severn, is owned and operated by the District Municipality of Muskoka. The plant is located at 115 Long Pine Road, Port Severn, and was commissioned in October 1997. It currently services 209 customers.

The water pollution control plant operates under MECP Environmental Certificate of Approval (ECA) #3-0429-96-006 (Sewage), Certificate # 8-6071-96-976 (Air). Under the terms of the ECA, the average daily design flow rate for the plant is 700 m³/day and the maximum design flow rate is 2,230 m³/day. Additionally, effluent limit criteria are as follows:

Table 1 Effluent Limit Criteria

Effluent Parameter	Concentration
CBOD	15mg/L
Total Suspended Solids	15 mg/L
Total Phosphorous	0.30 mg/L
Total Ammonia Nitrogen Summer (May 15 to September 30)	2.5 mg/L
Total Ammonia Nitrogen Winter (October 01 to May 14)	15 mg/L
E. coli	80 CFU/100mL
pH	5.5-9.5 inclusive at all times

The treatment process is comprised of two (2) sequencing batch reactors, phosphorous precipitation using aluminum sulphate, deep sand effluent filtration, and ultraviolet disinfection. Treated effluent from the plant is discharged through a FRP (Fiberglass Reinforced Plastic) diffuser, located downstream of Lock 45, in Severn Sound.

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 Certificate of Approval 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 Certificate of Approval #3-0429-96-006.

Quantity of Flow Summary

The plant has a daily average flow design capacity of 700 m³/day. The actual average daily flow for the 2020 was 226m³/day, however, the 3year average is 213m³/day, which represents 30% 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

Significant capital upgrades were carried out at the facility including the following: filter media, process blower/vfd, autosampler, flow meters, valves/actuators, hatches, handrail, SCADA programming and WAS pump refurbish.

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)

All flow meter and analytical calibration verifications indicated all equipment was within calibration tolerances as required in the ECA.

Evaluation of the Need for Improvement Works

The treatment facility is operating at a plant capacity of 30% and is in compliance with specified effluent parameter criteria. In addition, there has been no significant treatment process upsets and 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 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)	42	171	125.92	31.31
Suspended Solids (mg/L)	70	221	162.81	41.37
Total Phosphorus (mg/L)	0.89	5.18	2.88	0.76
Ammonia (mg/L)	1.80	40.13	21.76	5.98
pH	6.29	7.97	7.25	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	2.75	2.06	0.71
Suspended Solids (mg/L)	2	3.50	2.21	0.77
Total Phosphorus (mg/L)	0.03	0.045	0.03	0.01
Ammonia (mg/L)	0.10	0.60	0.18	0.06
E. Coli (#/100 mL)	0	10.25	1.33	N/A
pH	7.12	8.2 max	7.71	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.

Port Severn Wastewater Collection Summary

New Sewer Services:

A total of one (1) new customer connected to existing sewer laterals in 2020.

New Sewer Mains:

There were two (2) new sewer mains installed in 2020.

Sewer Main Replacements:

There were no sewer main replacements 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.

Main Line Sewer Blockage

There were no sewer main blockages in 2020.

Sewer Lateral Blockage

There were no sewer lateral blockages in 2020.

Service Low Pressure Sewer Blockages:

There were no low pressure sewer blockages in 2020.

Frozen Sewer Force Mains:

There were no frozen sewer force mains 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:

Field staff Approximately 1,351 meters of sewer main was flushed and video inspected in 2020.

Sewer Locates:

Field 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	5,394.90	174.03	273.00	118
February	4,332.90	149.41	259.62	92
March	5,782.83	186.54	264.25	120
April	6,304.39	210.15	335.75	143
May	6,995.87	225.67	443.57	154
June	7,783.30	259.44	376.05	196
July	9,521.72	307.15	447.90	209
August	8,578.55	276.73	476.96	192
September	7,278.88	242.63	360.64	161
October	8,846.33	285.37	465.27	216
November	5,960.86	198.70	323.27	42
December	5,551.64	179.09	245.71	128

Total Flow: 82,332m³
 Average Day: 226m³
 Maximum Day: 477m³
 Minimum Day: 42m³

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

Sample Date	Sample Identification Number	BOD5 mg/L	pH	Total Phosphorus mg/L	Total Kjeldahl Nitrogen mg/L	Total Ammonia Nitrogen mg/L	Suspended Solids mg/L
10-Feb-20	CA13207	152	7.16	3.5	29.0	19.4	162
11-May-20	CA12245	106	7.02	2.5	22.7	24.5	168
10-Aug-20	CA12230	137	7.1	4.5	41.2	36.3	168
9-Nov-20	CA13328	239	7.15	2.59	29.6	23.6	158
Yearly Average		158.5	7.11	3.27	30.63	26	164
Maximum		239	7.16	4.5	41.2	36.3	168
Minimum		106	7.02	2.5	22.7	19.4	158

Table 6 Chemical Usage Summary: Alum

Month	Average Dosage mg/L	Total kg (dry)
January	127.9	1,558.4
February	129.2	1,272.4
March	126.0	1,664.5
April	112.5	1,589.3
May	109.3	1,791.9
June	110.5	1,908.6
July	121.4	2,658.2
August	125.4	2,453.0
September	124.0	0.0
October	104.8	0.0
November	121.3	0.0
December	121.3	0.0
Average	119.5	1241.4

Total Yearly Kilograms: 14,896kg

Table 7 Effluent Quarterly Analysis Summary – Weekly 24 Hour Composite Sample

Sample Date	Sample Identification Number	CBOD5 mg/L	pH	Total Ammonia Nitrogen mg/L	Total Phosphorus mg/L	Conductivity mg/L	Suspended Solids mg/L
10-Feb-20	CA13207	2	7.45	0.1	0.03	786	2
11-May-20	CA12245	2	7.60	0.1	0.03	508	2
10-Aug-20	CA12230	2	7.98	0.1	0.05	676	5
9-Nov-20	CA13328	2	8.00	0.1	0.03	677	3
Yearly Average		2	7.76	0.1	0.035	662	3
Maximum		2	8.00	0.1	0.05	786	5
Minimum		2	7.45	0.1	0.03	508	2

Table 8 Effluent Loading and Concentration Summary 2020: COBD5

Month	Average mg/L	Average kg/day	Maximum Daily kg/day
January	2.00	0.35	0.55
February	2.00	0.30	0.52
March	2.00	0.37	0.53
April	2.00	0.42	0.67
May	2.00	0.45	0.89
June	2.00	0.52	0.75
July	2.00	0.61	0.90
August	2.00	0.55	0.95
September	2.00	0.49	0.72
October	2.00	0.57	0.93
November	2.00	0.40	0.65
December	2.00	0.36	0.49
Average Monthly	2.00	0.45	0.71
Effluent Objective	<10	7	
Non-Compliance	15	10.5	

Table 9 Effluent Loading and Concentration Summary 2020: Suspended Solids

Month	Average mg/L	Average kg/day	Maximum Daily kg/day
January	2.75	0.48	0.75
February	2.00	0.30	0.52
March	2.00	0.37	0.53
April	2.00	0.42	0.67
May	2.00	0.45	0.89
June	2.00	0.52	0.75
July	2.00	0.61	0.90
August	2.00	0.55	0.95
September	2.00	0.49	0.72
October	3.00	0.86	1.40
November	2.20	0.44	0.71
December	2.00	0.36	0.49
Average Monthly	2.16	0.49	0.77
Effluent Objective	<10	7	
Non-Compliance	15.00	10.5	

Table 10 Effluent Loading and Concentration Summary 2020: Total Ammonia Nitrogen Summer

Month	Average mg/L	Average kg/day	Maximum Daily kg/day
May	0.10	0.02	0.04
June	0.10	0.03	0.04
July	0.15	0.05	0.07
August	0.20	0.06	0.10
September	0.10	0.02	0.04
Average Monthly	0.13	0.03	0.06
Effluent Objective	<1	0.7	
Non-Compliance	2.5	1.75	

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

Month	Average mg/L	Average kg/day	Maximum Daily kg/day
January	0.10	0.017	0.027
February	0.48	0.072	0.125
March	0.30	0.056	0.079
April	0.25	0.053	0.084
October	0.10	0.029	0.047
November	0.12	0.024	0.039
December	0.15	0.027	0.037
Average Monthly	0.21	0.04	0.06
Effluent Objective	4.00	0.7	
Non-Compliance	15.00	2.7	

Table 12 Effluent Loading and Concentration Summary 2020: Fecal Coliform

Month	Geomean (#/100mL)	Maximum Daily (#/100mL)
January	0.00	0.00
February	0.00	0.00
March	0.00	1.00
April	0.00	0.00
May	0.00	0.00
June	0.00	0.00
July	0.00	0.00
August	0.00	1.00
September	4.45	21.00
October	2.14	12.00
November	1.15	2.00
December	1.78	7.00
Average Monthly	0.79	3.67
Effluent Objective	0.00	
Non-Compliance	80.00	

Table 13 Effluent Loading and Concentration Summary 2020: Total Phosphorus

Month	Average mg/L	Average kg/day	Maximum Daily kg/day
January	0.05	0.009	0.014
February	0.04	0.006	0.010
March	0.03	0.006	0.008
April	0.04	0.008	0.013
May	0.03	0.007	0.013
June	0.03	0.008	0.011
July	0.03	0.009	0.013
August	0.04	0.011	0.019
September	0.04	0.010	0.014
October	0.04	0.011	0.019
November	0.03	0.007	0.011
December	0.03	0.01	0.007
Average Monthly	0.04	0.01	0.01
Effluent Objective	<0.15	0.11	
Non-Compliance	0.30	0.21	

Table 14 Liquid Sludge Production Summary 2020

Month	Hauler	Liquid Volume m ³	Cake Weight kg	Destination
January		0		
February	ROHES	145.60		ROHES
March	ROHES	128.00		ROHES
April		0		
May		0		
June	ROHES	99.4		ROHES
July	ROHES	72.8		ROHES
August	ROHES	145.6		ROHES
September		0		
October	ROHES	145.6		ROHES
November		0		
December	ROHES	100.1		ROHES

Yearly Total Volume: 837m³
 Yearly Average Volume: 70m³
 Maximum Volume: 146m³
 Minimum Volume: 0m³

Table 15 Sludge Quality Analysis 2020

Parameter Sampled (mg/L)	First Quarter	Second Quarter	Third Quarter	Fourth Quarter
Date	10-Feb-20	11-May-20	10-Aug-20	9-Nov-20
Sample ID	CA13207	CA12245	CA12230	CA12308
Nitrate	66	0.5	0.4	0.7
Mercury	0.065	0.040	0.036	0.034
Chromium	0.54	0.35	0.53	0.72
Cobalt	0.04	0.02	0.03	0.03
Copper	5.1	3.3	4.2	4.6
Lead	0.2	0.1	0.1	0.1
Molybdenum	0.10	0.05	0.07	0.08
Nickel	0.34	0.22	0.31	0.37
Selenium	0.1	0.1	0.10	<0.1
Arsenic	0.1	0.1	0.10	<0.1
Zinc	8	5	6	7
Cadmium	0.010	0.006	0.01	0.011
Ammonia+ Ammonium	1.0	1.5	1.1	5.3
Total Kjeldahl Nitrogen	466	390	230	580
Total Phosphorus	590	290	360	400
Total Solids	19300	11000	14500	17500
NO2	0.2	0.2	0.2	<0.2
Chloride	100	99	74	77
PO4(sol)(Dissolved Reactive Phosphorous	0.75	0.75	0.85	1.28
TSS	18600	10600	14200	16400
BOD	1700	1350	843	1640
COD	14200	10100	8200	13400

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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