

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



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

Engineering and Public Works Department

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## Introduction

The Port Severn Wastewater Treatment Plant (WWTP), which services the Town of Port Severn, is owned and operated by the District Municipality of Muskoka. The plant is located at 115 Lone Pine Road, Port Severn, and was commissioned in October 1997. It currently services 254 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 meters cubed per day and the maximum design flow rate is 2,230 meters cubed per 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/mL
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 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 Certificate of Approval regarding monthly allowable concentrations and total effluent loading throughout the entire 2022 year.

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 meters cubed per day. The actual average daily flow in 2022 was 268 meters cubed per day, however, the 3-year average was 243 meters cubed per day, which represents 35% 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 2022.

## Summary of Maintenance

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 (but are not limited to):

- Monthly testing of emergency testing (under load) of the standby generators
- Annual servicing of emergency standby generators
- Annual infrared inspection of Motor Control panels
- Annual calibration of flow metering devices
- Annual cleaning of 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 32% and is in compliance with specified effluent parameter criteria. In addition, there have been no significant treatment process upsets or 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 2022.

## 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 outlined 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)	36	258	143.3	38.4
Suspended Solids (mg/L)	36	726	246.3	66
Total Phosphorus (mg/L)	.57	8.8	3.58	0.96
Ammonia (mg/L)	6.4	36.4	19.7	5.3
pH	6.83	7.77 (max)	7.24	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	3	2.1	0.6
Suspended Solids (mg/L)	2	4.2	2.5	0.7
Total Phosphorus (mg/L)	0.03	0.04	0.03	0.01
Ammonia (mg/L)	0.1	0.4	0.1	0.04
E. Coli (#/100 mL)	0	1.7	0.2	N/A
pH	7.11	8.3 (max)	7.62	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. In 2022 samples were collected on Wednesday. For the coming year, 2023, 24-hour composite samples will be collected on Thursdays.

### Biosolids Generation

The quality and volume of biosolids hauled from the facility for disposal is outlined in the table provided. Aerobic biosolids from the plant were hauled to land application. Private contractors were used by the District of Muskoka to transfer all material for disposal in 2022 and will continue to do so 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 Severn Wastewater Collection Summary 2022

#### New or replaced sewer mains:

No new or replaced sewer main this year.

#### New Sewer Services:

21 new customers connected to existing municipal services.

#### Sewer Lateral Blockages:

No lateral blockages on the municipal side in 2022.

#### Sewer Pump Stations:

11 stations were cleaned by high velocity water pressure. 3 ARV's were inspected 2022.

#### Main Line Sewer Blockages:

There were no main line sewer blockages in 2022.

#### 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.

#### Air Release Valves:

All two (3) of the air release vacuum valves connected to the sewage force mains in our collection system had a maintenance inspection.

#### Sewer Flushing and Video Inspections:

No sewer flushing or video inspections for 2022.

#### Sewer Rehabilitation:

There was no MH rehab in Port Severn.

#### Locates:

Field staff addressed 75 locates for Port Severn Ontario One-Call.

Table 4 Effluent Flow Summary – 2022

<b>Month</b>	<b>Plant Total Monthly (m<sup>3</sup>)</b>	<b>Average Day Flow (m<sup>3</sup>/d)</b>	<b>Maximum Day Flow (m<sup>3</sup>/d)</b>	<b>Minimum Day Flow (m<sup>3</sup>/d)</b>
<b>January</b>	5,054	163	44	0
<b>February</b>	5,094	182	45	0
<b>March</b>	6,234	201	44	0
<b>April</b>	5,911	197	41	0
<b>May</b>	8,198	264	47	0
<b>June</b>	9,171	306	53	0
<b>July</b>	9,863	318	54	0
<b>August</b>	10,827	349	56	0
<b>September</b>	10,151	338	61	0
<b>October</b>	10,059	324	78	0
<b>November</b>	8,718	291	64	0
<b>December</b>	8,707	281	66	0

Total Flow: 97,986m<sup>3</sup>  
 Average Day: 268m<sup>3</sup>  
 Maximum hourly: 78  
 Minimum hourly:



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

Sample Date	Sample Identification Number	BOD5 mg/L	pH	Total Kjeldahl Nitrogen mg/L	Total Ammonia Nitrogen mg/L	Total Phosphorus mg/L	Suspended Solids mg/L
16-Feb-22	CA12658	125	7.23	15.4	12.2	1.96	185
4-May-22	CA12299	119	7.01	26.8	19.6	2.31	158
10-Aug-22	CA13553	117	7.22	27.7	24.2	3.02	173
9-Nov-22	CA13444	114	7.16	35.1	11.2	9.1	524
<b>Yearly Average</b>		118.8	7.2	26.3	16.8	4.1	260.0
<b>Maximum</b>		125.0	7.2	35.1	24.2	9.1	524.0
<b>Minimum</b>		114.0	7.0	15.4	11.2	2.0	158.0

Table 6 Chemical Usage Summary: Alum

<b>Month</b>	<b>Average Dosage mg/L</b>	<b>Total kg (dry)</b>
<b>January</b>	124.0	626.5
<b>February</b>	121.6	619.5
<b>March</b>	117.6	733.0
<b>April</b>	137.9	815.2
<b>May</b>	119.4	978.8
<b>June</b>	109.0	1,000.0
<b>July</b>	117.6	1,160.1
<b>August</b>	112.8	1,220.9
<b>September</b>	110.8	1,124.3
<b>October</b>	116.4	1,170.5
<b>November</b>	116.3	1,014.3
<b>December</b>	115.3	1,004.0
<b>Average</b>	118.2	955.6

Total Yearly Kilograms: 11,467kg

Table 7 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	Conductivity mg/L	Total Phosphorus mg/L	Suspended Solids mg/L
16-Feb-22	CA12658	2	0.2	7.83	697	0.07	4
4-May-22	CA12299	2	0.1	7.82	681	0.03	2
10-Aug-22	CA13553	2	0.1	7.46	586	0.03	2
9-Nov-22	CA13444	2	0.1	7.74	579	0.03	7
<b>Yearly Average</b>		2.0	0.1	7.7	635.8	0.0	3.8
<b>Maximum</b>		2.0	0.2	7.8	697.0	0.1	7.0
<b>Minimum</b>		2.0	0.1	7.5	579.0	0.0	2.0

Table 8 Effluent Loading and Concentration Summary 2022: COBD5

<b>Month</b>	<b>Average mg/L</b>	<b>Average kg/day</b>	<b>Maximum Daily kg/day</b>
<b>January</b>	2.00	0.326	0.089
<b>February</b>	2.25	0.409	0.101
<b>March</b>	2.00	0.402	0.087
<b>April</b>	2.50	0.493	0.103
<b>May</b>	2.00	0.529	0.094
<b>June</b>	2.00	0.611	0.105
<b>July</b>	2.00	0.636	0.107
<b>August</b>	2.00	0.698	0.113
<b>September</b>	2.25	0.761	0.137
<b>October</b>	2.00	0.649	0.156
<b>November</b>	2.60	0.756	0.166
<b>December</b>	2.00	0.562	0.132
<b>Average Monthly</b>	2.13	0.57	0.12
<b>Effluent Objective</b>	<10	7	
<b>Non-Compliance</b>	15	10.5	

Table 9 Effluent Loading and Concentration Summary 2022: Suspended Solids

<b>Month</b>	<b>Average mg/L</b>	<b>Average kg/day</b>	<b>Maximum Daily kg/day</b>
<b>January</b>	3.75	0.611	0.166
<b>February</b>	3.00	0.546	0.134
<b>March</b>	2.80	0.563	0.122
<b>April</b>	2.00	0.394	0.082
<b>May</b>	2.00	0.529	0.094
<b>June</b>	2.20	0.673	0.116
<b>July</b>	2.00	0.636	0.107
<b>August</b>	2.20	0.768	0.124
<b>September</b>	2.50	0.846	0.152
<b>October</b>	2.00	0.649	0.156
<b>November</b>	3.00	0.872	0.191
<b>December</b>	2.50	0.702	0.166
<b>Average Monthly</b>	2.50	0.65	0.13
<b>Effluent Objective</b>	<10	7	
<b>Non-Compliance</b>	15.00	10.5	

Table 10 Effluent Loading and Concentration Summary 2022: Total Ammonia Nitrogen Summer

<b>Month</b>	<b>Average mg/L</b>	<b>Average kg/day</b>	<b>Maximum Daily kg/day</b>
<b>May</b>	0.10	0.026	0.005
<b>June</b>	0.10	0.031	0.005
<b>July</b>	0.10	0.032	0.005
<b>August</b>	0.10	0.035	0.006
<b>September</b>	0.10	0.034	0.006
<b>October</b>	0.10	0.032	0.008
<b>Average Monthly</b>	0.10	0.03	0.01
<b>Effluent Objective</b>	<1	0.7	
<b>Non-Compliance</b>	2.5	1.75	

Table 11 Effluent Loading and Concentration Summary 2022: Total Ammonia Nitrogen Winter

<b>Month</b>	<b>Average mg/L</b>	<b>Average kg/day</b>	<b>Maximum Daily kg/day</b>
<b>January</b>	0.13	0.021	0.006
<b>February</b>	0.25	0.045	0.011
<b>March</b>	0.28	0.056	0.012
<b>April</b>	0.15	0.030	0.006
<b>November</b>	0.10	0.029	0.006
<b>December</b>	0.18	0.051	0.012
<b>Average Monthly</b>	0.18	0.04	0.01
<b>Effluent Objective</b>	4.00	0.7	
<b>Non-Compliance</b>	15.00	2.7	



Table 12 Effluent Loading and Concentration Summary 2022: Fecal Coliform

<b>Month</b>	<b>Geomean (#/100mL)</b>	<b>Maximum Daily (#/100mL)</b>
<b>January</b>	0.00	0.00
<b>February</b>	0.00	0.00
<b>March</b>	0.00	0.00
<b>April</b>	2.00	1.00
<b>May</b>	0.00	0.00
<b>June</b>	0.00	0.00
<b>July</b>	0.00	0.00
<b>August</b>	2.24	1.00
<b>September</b>	5.29	7.00
<b>October</b>	0.00	0.00
<b>November</b>	0.00	0.00
<b>December</b>	0.00	0.00
<b>Average Monthly</b>	0.79	0.75
<b>Effluent Objective</b>	0.00	
<b>Non-Compliance</b>	80.00	

Table 13 Effluent Loading and Concentration Summary 2022: Total Phosphorus

<b>Month</b>	<b>Average mg/L</b>	<b>Average kg/day</b>	<b>Maximum Daily kg/day</b>
<b>January</b>	0.03	0.005	0.001
<b>February</b>	0.05	0.009	0.002
<b>March</b>	0.03	0.006	0.001
<b>April</b>	0.03	0.006	0.001
<b>May</b>	0.03	0.008	0.001
<b>June</b>	0.03	0.009	0.002
<b>July</b>	0.03	0.010	0.002
<b>August</b>	0.03	0.010	0.002
<b>September</b>	0.05	0.017	0.003
<b>October</b>	0.03	0.010	0.002
<b>November</b>	0.03	0.009	0.002
<b>December</b>	0.03	0.008	0.002
<b>Average Monthly</b>	0.03	0.01	0.00
<b>Effluent Objective</b>	<0.15	0.11	
<b>Non-Compliance</b>	0.30	0.21	

Table 14 Liquid Sludge Production Summary 2022

Month	Hauler	Liquid Volume m <sup>3</sup>	Destination
January		0	
February		0	
March	WESSUC	145.6	NASM
April			
May			
June	WESSUC	465	NASM
July	WESSUC	80	NASM
August	WESSUC	80	NASM
September	WESSUC	38	NASM
October	WESSUC	190	NASM
November			
December			

Yearly Total Volume: 999m<sup>3</sup>  
 Yearly Average Volume: 166m<sup>3</sup>  
 Maximum Volume: 465m<sup>3</sup>  
 Minimum Volume: 0.00m<sup>3</sup>

Table 15 Sludge Quality Analysis 2022

Parameter Sampled (mg/L)	First Quarter	Second Quarter	Third Quarter	Fourth Quarter
Date	16-Feb-22	4-May-22	10-Aug-22	9-Nov-22
Sample ID	CA14275	CA12295	CA13534	CA13420
Nitrate	1.3	0.3	0.3	0.2
Mercury	0.063	0.049	0.029	0.032
Chromium	0.89	0.49	0.63	0.36
Cobalt	0.04	0.03	0.04	0.02
Copper	6.2	4.3	6	3.9
Lead	0.2	0.1	0.2	0.20
Molybdenum	0.11	<0.080	0.1	0.07
Nickel	0.53	0.30	0.38	0.26
Selenium	< 0.10	< 0.10	< 0.10	< 0.10
Arsenic	< 0.1	< 0.2	< 0.1	< 0.1
Zinc	9	6	8	6
Cadmium	0.016	0.008	0.012	0.012
Ammonia+ Ammonium	4.9	5.2	132	8
Total Kjeldahl Nitrogen	992	564	514	655
Total Phosphorus	450	330	363	300
Total Solids	21600	13200	18900	16500
Total Suspended Solids	20100	13200	17800	15800
Nitrite	0.2	0.2	0.2	0.2
Potassium	0.75	0.75	3.54	0.75

## 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

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