

## 2021 Year End Report: Port Severn Wastewater Treatment Plant (WWTP)



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

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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 213 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 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 2021 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 2021 was 236 meters cubed per day, however, the 3 year average was 224 meters cubed per day, which represents 32% 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 2021.

### Summary of Maintenance

Influent pump station was rebuilt in 2021 including new pumps, piping, valves and electrical components.

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 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 2021.

### 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)	42	247	156.1	36.37
Suspended Solids (mg/L)	27	293.5	186.3	43.96
Total Phosphorus (mg/L)	0.57	4.02	3.14	0.75
Ammonia (mg/L)	9.0	27.7	4.67	4.67
pH	6.73	7.54	7.23	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	3.25	2.31	0.51
Suspended Solids (mg/L)	2	3.50	2.56	0.57
Total Phosphorus (mg/L)	0.03	0.045	0.03	0.008
Ammonia (mg/L)	0.10	0.25	0.13	0.03
E. Coli (#/100 mL)	0	3.0	0.40	N/A
pH	6.73	7.74 max	7.36	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, 2022, 24 hour composite samples will be collected on Wednesday rather than Tuesday of each week.

## 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 2021, and will continue to do so in 2022. It is not anticipated that there will be a significant increase in the total volume of biosolids produced in 2022.

## 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 four (4) new customers connected to existing municipal services in 2021.

#### New Sewer Mains:

A total of three (3) new LPS force mains were installed in 2021.  
190m of 75mm HDPE DR17 at Oak Bay Development Marina Village.  
140m of 50mm HDPE DR17 at Oak Bay Development Marina Village.  
226m of 100mm HDPE DR17 at Port Severn Rd Parks Canada Dam.

#### Low Pressure Sewer Breaks:

There were no low pressure sewer breaks in 2021.

#### Sewer Force Main Breaks:

There were no sewer forcemain breaks in 2021.

#### Main Line Sewer Blockage

There were no sewer main blockages in 2021.

#### Sewer Lateral Blockage

There were no sewer lateral blockages in 2021.

#### Service Low Pressure Sewer Blockages:

There were no low pressure sewer blockages in 2021.

#### Sewage Pump Stations:

All stations were cleaned with high velocity water pressure and debris vacuumed out and hauled to the appropriate site for disposal. Three (3) ARV's at the SPS's were inspected in 2021.

#### Sewer Force mains:

All low pressure sewage force mains within the collection system were flushed by operations staff through annual preventive maintenance in 2021.

#### Air Release Valves:

Two (2) air release vacuum valves were inspected and one (1) new direct bury ARV valve was installed in Oak Bay on Marina Village Dr. in 2021.

#### Sewer Flushing/Video:

Approximately 723.9m of various size sanitary sewer mains were flushed and video inspected in 2021.

#### Sewer Locates:

Field staff addressed 99 locate requests as part of Ontario OneCall requirements in Port Severn in 2021.

Table 4 Effluent Flow Summary - 2021

Month	Plant Total Monthly (m <sup>3</sup> )	Average Day Flow (m <sup>3</sup> /d)	Maximum Day Flow (m <sup>3</sup> /d)	Minimum Day Flow (m <sup>3</sup> /d)
January	4,522	146	181	121
February	4,118	147	182	116
March	5,883	190	330	129
April	5,018	167	266	124
May	6,740	217	351	148
June	7,313	244	461	184
July	11,315	365	650	277
August	10,298	332	413	271
September	10,754	358	721	189
October	7,080	228	353	177
November	6,775	226	412	151
December	6,429	207	394	160

Total Flow: 86,244m<sup>3</sup>  
 Average Day: 236m<sup>3</sup>  
 Maximum Day: 720.7  
 Minimum Day: 116.41m<sup>3</sup>

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
9-Feb-21	CA13338	272	7.24	28.2	21.6	2.88	180
11-May-21	CA13497	151	7.14	38.2	27.1	3.85	190
10-Aug-21	CA13448	127	7.03	30.5	26.8	3.04	130
9-Nov-21	CA13420	128	7.13	18.3	14.8	1.87	121
<b>Yearly Average</b>		169.5	7.14	28.8	22.6	2.91	155.3
<b>Maximum</b>		272.0	7.24	38.2	27.1	3.85	190.0
<b>Minimum</b>		127.0	7.03	18.3	14.8	1.87	121.0



Table 6 Chemical Usage Summary: Alum

Month	Average Dosage mg/L	Total kg (dry)
January	121.3	1,294.6
February	116.3	1,255.5
March	123.2	1,678.2
April	121.3	1,465.5
May	112.9	1,698.6
June	119.0	1,995.3
July	124.7	3,128.4
August	124.7	3,031.6
September	124.4	3,054.2
October	116.3	2,042.7
November	133.1	2,156.4
December	119.7	1,847.0
Average	121.4	2054.0

Total Yearly Kilograms: 24,648kg

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
9-Feb-21	CA13338	5	0.1	7.34	667	0.03	7
11-May-21	CA13497	2	0.1	7.57	489	0.03	2
10-Aug-21	CA13448	2	0.2	7.09	611	0.03	2
9-Nov-21	CA13420	2	0.1	7.74	677	0.03	3
<b>Yearly Average</b>		2.8	0.1	7.4	611	0.03	3.5
<b>Maximum</b>		5.0	0.2	7.7	677	0.03	7.0
<b>Minimum</b>		2.0	0.1	7.1	489	0.03	2.0

Table 8 Effluent Loading and Concentration Summary 2021: COBD5

<b>Month</b>	<b>Average mg/L</b>	<b>Average kg/day</b>	<b>Maximum Daily kg/day</b>
<b>January</b>	3.00	0.52	0.82
<b>February</b>	2.75	0.41	0.71
<b>March</b>	2.40	0.45	0.63
<b>April</b>	2.75	0.58	0.92
<b>May</b>	2.00	0.45	0.89
<b>June</b>	2.40	0.62	0.90
<b>July</b>	2.00	0.61	0.90
<b>August</b>	2.00	0.55	0.95
<b>September</b>	2.00	0.49	0.72
<b>October</b>	2.00	0.57	0.93
<b>November</b>	2.20	0.44	0.71
<b>December</b>	2.25	0.40	0.55
<b>Average Monthly</b>	2.31	0.51	0.80
<b>Effluent Objective</b>	<10	7	
<b>Non-Compliance</b>	15	10.5	

Table 9 Effluent Loading and Concentration Summary 2021: Suspended Solids

<b>Month</b>	<b>Average mg/L</b>	<b>Average kg/day</b>	<b>Maximum Daily kg/day</b>
<b>January</b>	2.25	0.39	0.61
<b>February</b>	3.25	0.49	0.84
<b>March</b>	2.40	0.45	0.63
<b>April</b>	3.00	0.63	1.01
<b>May</b>	2.00	0.45	0.89
<b>June</b>	2.40	0.62	0.90
<b>July</b>	3.00	0.92	1.34
<b>August</b>	2.20	0.61	1.05
<b>September</b>	2.00	0.49	0.72
<b>October</b>	2.50	0.71	1.16
<b>November</b>	2.80	0.56	0.91
<b>December</b>	3.00	0.54	0.74
<b>Average Monthly</b>	2.57	0.57	0.90
<b>Effluent Objective</b>	<10	7	
<b>Non-Compliance</b>	15.00	10.5	

Table 10 Effluent Loading and Concentration Summary 2021: 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>	0.15	0.034	0.067
<b>June</b>	0.10	0.026	0.038
<b>July</b>	0.13	0.038	0.056
<b>August</b>	0.18	0.050	0.086
<b>September</b>	0.10	0.024	0.036
<b>Average Monthly</b>	0.13	0.034	0.056
<b>Effluent Objective</b>	<1	0.7	
<b>Non-Compliance</b>	2.5	1.75	

Table 11 Effluent Loading and Concentration Summary 2021: 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>	0.25	0.044	0.068
<b>February</b>	0.15	0.022	0.039
<b>March</b>	0.12	0.022	0.032
<b>April</b>	0.10	0.021	0.034
<b>October</b>	0.13	0.036	0.058
<b>November</b>	0.10	0.02	0.03
<b>December</b>	0.13	0.02	0.03
<b>Average Monthly</b>	0.14	0.027	0.042
<b>Effluent Objective</b>	4.00	0.7	
<b>Non-Compliance</b>	15.00	2.7	

Table 12 Effluent Loading and Concentration Summary 2021: 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	12.00
<b>March</b>	0.00	0.00
<b>April</b>	0.00	0.00
<b>May</b>	0.00	0.00
<b>June</b>	0.00	2.00
<b>July</b>	0.00	0.00
<b>August</b>	0.00	1.00
<b>September</b>	0.00	0.00
<b>October</b>	0.00	1.00
<b>November</b>	0.00	1.00
<b>December</b>	0.00	0.00
<b>Average Monthly</b>	0.00	1.42
<b>Effluent Objective</b>	0.00	
<b>Non-Compliance</b>	80.00	

Table 13 Effluent Loading and Concentration Summary 2021: Total Phosphorus

<b>Month</b>	<b>Average mg/L</b>	<b>Average kg/day</b>	<b>Maximum Daily kg/day</b>
<b>January</b>	0.04	0.007	0.012
<b>February</b>	0.04	0.006	0.010
<b>March</b>	0.03	0.006	0.009
<b>April</b>	0.04	0.008	0.013
<b>May</b>	0.03	0.007	0.013
<b>June</b>	0.03	0.008	0.012
<b>July</b>	0.04	0.012	0.018
<b>August</b>	0.03	0.008	0.014
<b>September</b>	0.03	0.007	0.011
<b>October</b>	0.04	0.011	0.019
<b>November</b>	0.03	0.006	0.010
<b>December</b>	0.03	0.005	0.007
<b>Average Monthly</b>	0.03	0.008	
<b>Effluent Objective</b>	<0.15	0.11	
<b>Non-Compliance</b>	0.30	0.21	



Table 14 Liquid Sludge Production Summary 2021

Month	Hauler	Liquid Volume m <sup>3</sup>	Destination
January		0	
February		0	
March	ROHES	72.8	ROHES
April	ROHES	72.8	ROHES
May	ROHES	72.8	ROHES
June		0	
July	ROHES	72.8	ROHES
August		0	
September	ROHES	291.2	ROHES
October	ROHES	72.8	ROHES
November			
December			

**Yearly Total Volume: 655m<sup>3</sup>**  
**Yearly Average Volume: 55m<sup>3</sup>**  
**Maximum Volume: 291m<sup>3</sup>**  
**Minimum Volume: 0.00m<sup>3</sup>**

Table 15 Sludge Quality Analysis 2021

<b>Parameter Sampled (mg/L)</b>	<b>First Quarter</b>	<b>Second Quarter</b>	<b>Third Quarter</b>	<b>Fourth Quarter</b>
<b>Date</b>	09-Feb-21	11-May-21	10-Aug-21	09-Nov-21
<b>Sample ID</b>	<b>CA13336</b>	<b>CA13480</b>	<b>CA13435</b>	<b>CA13422</b>
Nitrate	110	17	1.1	1.9
Mercury	0.037	0.051	0.061	0.009
Chromium	0.93	0.56	0.64	0.013
Cobalt	0.04	0.03	0.04	<0.01
Copper	5.1	4.1	5.1	0.08
Lead	0.2	0.1	0.2	<0.01
Molybdenum	0.12	0.07	0.09	0.05
Nickel	0.52	0.33	0.36	0.08
Selenium	< 0.1	<0.1	<0.1	<0.1
Arsenic	< 0.1	<0.1	<0.1	<0.1
Zinc	8	5	7	1
Cadmium	0.011	0.007	0.01	<0.005
Ammonia+ Ammonium	3.5	<1	1.2	
Total Kjeldahl Nitrogen	652	772	666	140
Total Phosphorus	380	240	360	63
Total Solids	18600	16300	17200	3330
Total Suspended Solids	13900	14800	11700	2950
Nitrite	0.9	0.9	<0.2	1.1
Potassium	< 0.75	<0.75	<0.75	<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 Spicer  
Director, Water and Wastewater Services

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Manager of Water and Wastewater Operations