2024 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 approximately 285 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 metres cubed per day and the maximum design flow rate is 2,230 metres 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 (Fibreglass 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 to achieve a high 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 2024 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 metres cubed per day. The actual average daily flow in 2024 was 306 metres cubed per day; however, the 3-year average was 295 metres cubed per day, which represents 42% of the plant capacity. None of the individual system components exceeded the design flow rating.

Plant Operational Upsets or Process Failures

There were no operational upsets or process failures in 2024.

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 (and 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 2022. (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 42% 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 2024.

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)	18	308	126.9	38.8
Suspended Solids (mg/L)	32	583	183	56
Total Phosphorus (mg/L)	0.28	6.73	3.14	0.96
Ammonia (mg/L)	5.4	60.3	25.4	7.8
pH	6.99	7.85	7.38	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 for CBOD5 were exceeded on 5 different occasions - May 6, 15, June 10, 17, and July 29, 2024
All other objective analyses were met during all sample periods.

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.
CBOD5 exceeded the limit within 1 occasion on June 17, 2024, however the monthly average was below objective values.

Table 3 Final Effluent Analysis Summary

Parameter	Minimum	4 Week Average Maximum	Annual Average	Average Loading kg/day
COBD5 (mg/L)	2	9.75	4.8	1.47
Suspended Solids (mg/L)	2	3.25	2.5	0.77
Total Phosphorus (mg/L)	0.03	0.05	0.03	0.01
Ammonia (mg/L)	0.1	0.26	0.12	0.04
E. Coli (#/100 mL)	0	1.15	0.43	N/A

Parameter	Minimum	4 Week Average Maximum	Annual Average	Average Loading kg/day
pH	6.62	7.96	7.15	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 2024 samples were collected on Monday. For the coming year, 2025, 24-hour composite samples will be collected on Tuesday as a one-time annual duration plan to determine weekend loading on the facility.

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 2024 and will continue to do so in 2025. It is not anticipated that there will be a significant increase in the total volume of biosolids produced in 2025.

Summary of Complaints received throughout the reporting period.

There were no complaints received in the reporting period.

New or Replaced Sewer Mains:

No new or replaced sewer mains in Port Severn.

New Sewer Services:

14 new customers connected to existing municipal sanitary services.

Sewer Lateral Blockages:

No lateral blockages on the municipal side in 2024.

Sewer Pump Stations:

All stations were cleaned by high velocity water pressure. All debris was vacuumed out and hauled to the appropriate landfill site. 3 ARV’s were inspected 2024.

Main Line Sewer Blockages:

There were no main line sewer blockages in 2024.

Sewer Force Mains:

All the low-pressure sewage force mains within the collection system were flushed by field staff through our annual preventive maintenance.

Air Release Valves:

All three (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 Sanitary Sewer Flushing or Video for 2024.

Sewer Rehabilitation:

There was no MH rehab in Port Severn in 2024.

Locates:

Field staff addressed 137 locates for Port Severn OneCall in 2024.

Table 4 Effluent Flow Summary - 2024

Month	Plant Total Monthly (m^3)	Average Day Flow (m^3/d)	Maximum Day Flow (m3/d)	Minimum Day Flow (m3/d)
January	7,307	236	276	0
February	7,040	243	291	0
March	7,763	250	305	0
April	10,240	341	720	0
May	9,808	316	500	0
June	9,063	302	462	0
July	11,621	375	629	0
August	11,286	364	491	0
September	9,458	315	406	0
October	9,366	302	349	0
November	7,992	266	318	0
December	10,910	352	637	0

Total Flow: 111,855m3
Average Day: 306m3

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
Feb 05/24	CA13176	89	7.08	17.9	14.6	1.71	124
May 06/24	CA13358	108	7.63	25.8	22.5	2.38	134
Aug 05/24	CA12081	146	7.35	54.0	54.8	6.24	340
Nov 04/24	CA12145	259	7.02	33.0	16.8	6.3	413
Yearly Average		150.5	7.3	32.7	27.2	4.2	252.8
Maximum		259.0	7.6	54.0	54.8	6.3	413.0
Minimum		89.0	7.0	17.9	14.6	1.7	124.0

Table 6 Chemical Usage Summary: Alum

Month	Average Dosage mg/L	Total kg
January	118.0	1,777.7
February	117.0	1,698.2
March	116.6	1,866.9
April	116.6	2,462.5
May	101.2	2,046.9
June	98.3	1,836.2
July	112.2	2,687.3
August	118.8	2,765.2
September	113.9	2,221.7
October	108.4	2,093.2
November	109.1	1,798.5
December	110.3	2,480.2
Average	118.2	955.6

Total Yearly Kilograms: 25,735kg

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
Feb 05/24	CA13176	4	0.1	7.63	914	0.03	2
May 06/24	CA13358	10	0.1	7.90	673	0.03	2
Aug 05/24	CA12081	4	0.1	7.67	772	0.04	5
Nov 04/24	CA12145	2	0.1	7.47	664	0.03	2
Yearly Average		5.0	0.1	7.66	755.75	0.03	2.75
Maximum		10.0	0.1	7.9	914	0.04	5
Minimum		2.0	0.1	7.47	664	0.03	2

Table 8 Effluent Loading and Concentration Summary 2024: COBD5

Month	Average mg/L	Average kg/day	Maximum Daily kg/day
January	2.00	0.47	0.55
February	3.00	0.73	0.87
March	4.00	1.00	1.22
April	4.20	1.43	3.02
May	9.75	3.08	4.88
June	9.00	2.72	4.16
July	5.40	2.02	3.40
August	4.00	1.46	1.96
September	4.00	1.26	1.62
October	4.00	1.21	1.40
November	4.25	1.13	1.35
December	3.20	1.13	2.04
Average Monthly	4.80	1.49	2.25
Effluent Objective	10	7	
Non-Compliance	15	10.5	

Table 9 Effluent Loading and Concentration Summary 2024: Suspended Solids

Month	Average mg/L	Average kg/day	Maximum Daily kg/day
January	2.00	0.47	0.55
February	2.00	0.49	0.58
March	3.25	0.81	0.99
April	2.20	0.75	1.58
May	2.75	0.87	1.38
June	2.75	0.83	1.27
July	2.80	1.05	1.76
August	2.75	1.00	1.35
September	2.40	0.76	0.97
October	2.00	0.60	0.70
November	2.00	0.53	0.64
December	3.20	1.13	2.04
Average Monthly	2.51	0.77	1.15
Effluent Objective	10	7	
Non-Compliance	15.00	10.5	

Table 10 Effluent Loading and Concentration Summary 2024: Total Ammonia Nitrogen - Summer

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

Table 11 Effluent Loading and Concentration Summary 2024: Total Ammonia Nitrogen - Winter

Month	Average mg/L	Average kg/day	Maximum Daily kg/day
January	0.10	0.02	0.03
February	0.10	0.02	0.03
March	0.10	0.03	0.03
April	0.10	0.03	0.07
November	0.10	0.03	0.03
December	0.26	0.09	0.17
Average Monthly	0.13	0.04	0.06
Effluent Objective	4.00	0.7	
Non-Compliance	15.00	2.7	

Table 12 Effluent Loading and Concentration Summary 2024: Fecal Coliform

Month	Geomean (#/100mL)	Maximum Daily (#/100mL)
January	0.00	0.00
February	0.00	0.00
March	0.25	1.00
April	0.00	0.00
May	0.25	1.00
June	0.00	0.00
July	0.20	1.00
August	0.00	0.00
September	0.00	0.00
October	0.50	1.00
November	0.00	0.00
December	0.40	1.15
Average Monthly	0.13	0.43
Effluent Objective	0.00	
Non-Compliance	200	

Table 13 Effluent Loading and Concentration Summary 2024: Total Phosphorus

Month	Average mg/L	Average kg/day	Maximum Daily kg/day
January	0.03	0.01	0.01
February	0.03	0.01	0.01
March	0.03	0.01	0.01
April	0.03	0.01	0.02
May	0.03	0.01	0.02
June	0.03	0.01	0.01
July	0.03	0.01	0.02
August	0.04	0.01	0.02
September	0.03	0.01	0.01
October	0.04	0.01	0.01
November	0.03	0.01	0.01
December	0.03	0.01	0.02
Average Monthly	0.03	0.01	0.01
Effluent Objective	0.15	0.11	
Non-Compliance	0.30	0.21	

Table 14 Final Effluent pH 2024

Month	Minimum	Maximum	Average
January	7.37	7.54	7.13
February	7.38	7..63	7.21
March	7.42	7.96	7.39
April	7.59	7.75	7.38
May	7.42	7.90	7.31
June	7.35	7.55	7.24
July	6.65	7.65	7.22
August	7.53	7.86	7.42
September	6.94	7.63	6.92
October	7.00	7.71	6.98
November	6.97	7.47	6.78
December	6.62	6.96	6.78
Annual Minimum	6.62	7.96	7.15
Non-Compliance	5.5	9.5	

Table 15 Liquid Sludge Production Summary 2024

Month	Hauler	Liquid Volume m^3	Destination
January		0	
February		0	
March		0	
April	ROHES	182	ROHES
May	ROHES	72.8	ROHES
June		0	
July	ROHES	145.6	ROHES
August		0	
September	ROHES	109.2	ROHES
October		72.8	
November	ROHES	139.3	ROHES
December		0	

Yearly Total Volume: 794.5m3
Yearly Average Volume: 79m3
Maximum Volume: 109m3
Minimum Volume: 36m3

Table 15 Sludge Quality Analysis 2024

Parameter Sampled (mg/L)	First Quarter	Second Quarter	Third Quarter	Fourth Quarter
Date	Feb 05/24	May 06/24	Aug 06/24	Nov 04/24
Sample ID	CA13174	CA13334	CA12080	CA12144
Nitrate	19	<3	<3	<3
Mercury	0.040	0.046	0.014	0.027
Chromium	0.50	0.39	0.25	0.37
Cobalt	0.04	0.03	0.02	0.02
Copper	4.8	3.5	2.2	3.6
Lead	0.1	0.1	<0.1	<0.1
Molybdenum	0.11	0.06	<0.05	0.06
Nickel	0.36	0.26	0.16	0.25
Selenium	<0.1	<0.1	<0.1	<0.1
Arsenic	<0.1	<0.1	<0.1	<0.1
Zinc	8	5	5	6
Cadmium	0.010	0.006	<0.005	0.006
Ammonia	5.6	4.1	4.4	1.3
Total Kjeldahl Nitrogen	946	686	533	353
Total Phosphorus	420	260	220	350
Total Solids	20300	16900	13000	14300
NO2	<3	<3	<3	<3
Chloride	110	78	97	100
PO4(sol)(Dissolved Reactive Phosphorous	<0.75	<0.75	<0.75	<0.75

Parameter Sampled (mg/L)	First Quarter	Second Quarter	Third Quarter	Fourth Quarter
Date	Feb 05/24	May 06/24	Aug 06/24	Nov 04/24
Sample ID	CA13174	CA13334	CA12080	CA12144
TSS	20600	16600	11700	13900
BOD	2000	1960	664	418
COD	17500	11800	9400	12100

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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Darren Ronson
Manager of Water and Wastewater Operations

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