2023 Year End Report: Baysville Wastewater Treatment Plant (WWTP)

Environmental Compliance Approval: # 8132-7QXPCV

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 Baysville Wastewater Treatment Plant (WWTP), which services the Village of Baysville, is owned and operated by the District Municipality of Muskoka. The plant is located at 2825 Highway 117 and was commissioned in September 2006. It services a population of approximately 348 people.

The Plant operates under the Ministry of the Environment Conservation and Parks (M.E.C.P.) Environmental Compliance Approval (ECA) # 8132-7QXPCV, issued August 04, 2009. Under the terms of the Certificate of Approval, the plant is permitted to treat an average daily flow of 475m3/day. Additionally, effluent limit criteria are as follows:

Table 1 Effluent Limit Criteria

Effluent Parameter	Concentration
CBOD	15 mg/L
Total Suspended Solids	15 mg/L
Total Phosphorous	1.00 mg/L
Total Ammonia Nitrogen Summer (May 01 to November 30)	4.0 mg/L
Total Ammonia Nitrogen Winter (December 01 to April 30)	10.0 mg/L
E. coli	Geometric Mean Density 80 Organisms/100 mL
pH	6.00 to 9.50 inclusive, at all times.

The plant is a Sequencing Batch Reactor (SBR) package plant, consisting of equalization basins, tertiary filters, aeration blowers, and sludge holding tanks. Disinfection is accomplished by ultraviolet. The facility is also equipped with aerated sludge digesters for bio-solids stabilization.

Waste sludge from the plant process is digested aerobically at the plant and periodically hauled off site for disposal.

General Information

A review of the District of Muskoka's 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 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 2023, test results of the treated effluent for the parameters of CBOD5, suspended solids, total phosphorous, total ammonia nitrogen and E. Coli are in compliance with the limits outlined in the ECA regarding monthly allowable concentrations and total effluent loading throughout the entire year. Plant systems functioned well, and no adverse or reportable incidents were observed.

Overall, the plant treatment processes performed satisfactorily and are deemed to be adequate.

Quantity of Flow Summary

The plant has a daily average flow design capacity of 475 m^3/day. The actual average daily flow for the 2023 was 103 m^3/day, however, the 3-year average is 94 m^3/day, which represents 20% of the plant capacity. None of the individual system components exceeded the design flow rating.

Plant Operational Upsets or Process Failures

Within the fourth quarter of 2023 the UV disinfection system underwent mechanical issues. Capital forecasting was established in 2020 for end-of-life replacement in 2024. Operations is moving forward in accomplishing this task.

Summary of Maintenance

In 2023, not only routine, scheduled maintenance was completed; but capital upgrade was exclusive to the aeration blowers, two of the three units underwent rotatory lobe lifecycle replacement.

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 calibration of flow metering devices.
- Annual cleaning of all sewage pumping stations if required.
- 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 the ECA.

Evaluation of the Need for Improvement Works

The treatment facility is operating at a plant capacity of 22% and is in compliance with specified effluent parameter criteria. As a result, there is no need for improvements to the existing works beyond scheduled annual maintenance typical to this type of facility.

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 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)	41	589	279	30.37
Suspended Solids (mg/L)	63	536	185	21.29
Total Phosphorus (mg/L)	0.44	9.3	4.99	0.54
TKN (mg/L)	3.8	74.8	38.98	4.65

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 for CBOD5, Suspended Solids, E.Coli, Total Phosphorous and pH and Total Ammonia Nitrogen throughout 2023

.

Final Effluent Analysis Summary

All final effluent samples tested for CBOD5, suspended solids, ammonia, E. Coli, total phosphorous and total ammonia nitrogen 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
CBOD5 (mg/L)	2.0	7.00	2.12	0.22
Suspended Solids (mg/L)	2.0	4.02	2.12	0.22
Ammonia (mg/L)	0.10	1.2	0.2	0.02
E. Coli (#/100 mL)	0	8	0.2	N/A
Total Phosphorus (mg/L)	0.03	0.08	0.05	0.01
pH	6.53	7.98	7.16	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, 2024, no changes to the sampling plan are being considered at this time.

Biosolids Generation

The quality and of biosolids hauled from the facility for disposal is outlined in the table provided.

Private contractors were used by the District of Muskoka to transfer all material for disposal in 2023 and will continue to do so in 2024. There are no significant increases in the total volume of bio solids produced anticipated in 2024.

Summary of Complaints received throughout the reporting period.

There were no complaints received in the reporting period.

Baysville Wastewater Collection Summary

New Sewer Services:
0 customers connected to existing sewer laterals in 2023.

New Sewer Mains:
There were no new sewer mains installed in 2023.

Sewer Main Replacements:
No sewer mains were replaced in 2023.

Low Pressure Sewer Breaks:
There were no low-pressure sewer breaks in 2023.

Sewer Force Main Breaks:
There were no sewer forcemain breaks in 2023.

Sewer Force Main Replacement:
No sewer force mains were replaced in 2023.

Main Line Sewer Blockage:
There were no sewer main blockages in 2023.

Sewer Lateral Blockage:
There were no sewer lateral blockages in 2023.

Service Low Pressure Sewer Blockages:
There were no low-pressure sewer blockages in 2023.

Frozen Sewer Force Mains:
No sewer force mains froze in 2023.

Frozen Sewer Service Laterals:
No sewer service laterals froze in 2023.

Frozen Low Pressure Sewer Services:
No low-pressure sewer services froze in 2023.

Sewer Flushing/Video:
202.1 metres of sewer main was flushed and no video was performed in 2023.
.

Sewer Locates:
Field staff addressed 16 written locate requests in 2023.

Table 4 Effluent Flow Summary - 2021

Month	Plant Total Monthly (m^3)	Average Day Flow (m^3/d)	Maximum Day Flow (m^3/d)	Minimum Day Flow (m^3/d)	Lagoons Monthly Flow (m^3)	Facility Total Monthly Flow (m^3)
January	2896	93	149	38	N/A	2896
February	2405	86	149	38	N/A	2405
March	2914	97	159	39	N/A	2914
April	3544	118	181	62	N/A	3544
May	3724	120	193	43	N/A	3724
June	3364	112	191	31	N/A	3364
July	3753	121	207	46	N/A	3753
August	3983	128	237	72	N/A	3983
September	3013	100	143	50	N/A	3013
October	2773	89	168	0	N/A	2773
November	2490	83	171	0	N/A	2490
December	2614	84	168	47	N/A	2614

Total Flow: 37,474
Average Day: 103
Maximum Day: 237
Minimum Day:

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

Sample Date	Sample Identification Number	BOD5 mg/L	Total Phosphorus mg/L	Suspended Solids mg/L	Total Kjeldahl Nitrogen mg/L	Total Ammonia Nitrogen mg/L
February 7, 2023	CA12209	398	6.32	200	60.8	49.4
May 9, 2023	CA12508	122	3.34	81	26	22.9
August 8, 2023	CA12266	218	3.24	274	25.5	20.3
November 14, 2023	CA13631	367	6.73	259	53.2	48.2
Yearly Average		276	4.91	204	41.58	35.2
Maximum		398	6.73	274	60.8	49.4
Minimum		122	3.24	81	25.5	20.3

Table 6 Chemical Usage Summary: Aluminum Sulfate (Alum)

Month	Average Dosage mg/L	Total kg (dry)
January	64.1	180.7
February	57.9	142.8
March	64.1	175.0
April	62.0	213.8
May	64.1	225.7
June	62.0	210.3
July	64.1	239.3
August	64.1	251.2
September	62	203.8
October	64.1	172.6
November	64.9	158.1
December	65.0	165.6
Average	63.2	194.9

Total Yearly Kilograms: 2,339 kg

Table 7 Chemical Usage Summary: Soda Ash

Month	Average Dosage mg/L	Total kg (dry)
January	29.6	96.8
February	28.6	76.5
March	30.4	93.8
April	27.5	114.5
May	29.5	120.9
June	26.7	112.7
July	31.2	128.2
August	28.7	134.6
September	28.9	109.2
October	29.6	92.5
November	29.6	81.1
December	29.6	87.7
Average	63.2	194.9

Total Yearly Kilograms: 1,249 kg

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
7-Feb-23	CA13439	2	7.72	0.03	2
9-May-23	CA12508	2	7.82	0.04	2
8-Aug-23	CA12266	2	8.03	0.04	2
14-Nov-23	CA13631	2	7.50	0.03	2
Yearly Average		2	7.77	0.04	2
Maximum		2	8.03	0.04	2
Minimum		2	7.50	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
7-Feb-23	CA13439	1.9	12.5	0.03	0.4
9-May-23	CA12508	0.8	5.81	0.03	0.4
8-Aug-23	CA12266	0.5	4.88	0.06	0.1
14-Nov-23	CA13631	0.5	5.15	0.05	0.1
Yearly Average		0.93	7.09	0.04	0.25
Maximum		1.9	12.5	0.06	0.4
Minimum		0.5	4.88	0.03	0.1

Table 10 Effluent Loading and Concentration Summary 2021: CBOD5

Month	Average mg/L	Average kg/day	Maximum Daily kg/day
January	2.6	0.24	0.39
February	2.00	0.17	0.30
March	2.00	0.19	0.32
April	2.00	0.24	0.36
May	2.00	0.24	0.39
June	2.00	0.22	0.33
July	2.25	0.27	0.47
August	2.00	0.26	0.47
September	2.00	0.20	0.29
October	2.20	0.20	0.37
November	2.13	0.18	0.36
December	2.13	0.18	0.36
Average Monthly	2.05	0.18	0.30
Effluent Objective	5.00	2.38	2.38
Non-Compliance	15.00	7.13	7.13

Table 11 Effluent Loading and Concentration Summary 2021: Suspended Solids

Month	Average mg/L	Average kg/day	Maximum Daily kg/day
January	2.00	0.19	0.30
February	2.00	0.17	0.30
March	2.00	0.19	0.32
April	2.00	0.24	0.36
May	2.00	0.24	0.39
June	2.00	0.22	0.28
July	2.50	0.30	0.52
August	2.00	0.26	0.47
September	2.00	0.20	0.29
October	2.40	0.21	0.40
November	2.25	0.19	0.36
December	2.25	0.19	0.39
Average Monthly	2.12	0.22	0.37
Effluent Objective	5.00	2.38	2.38
Non-Compliance	15.00	7.13	7.13

Table 12 Effluent Loading and Concentration Summary 2021: Total Ammonia Nitrogen - Summer

Month	Average mg/L	Average kg/day	Maximum Daily kg/day
May	0.18	0.02	0.03
June	0.10	0.01	0.02
July	0.13	0.02	0.03
August	0.10	0.01	0.02
September	0.10	0.01	0.01
October	0.10	0.01	0.02
November	0.18	0.01	0.03
Average Monthly	0.13	0.01	0.02
Effluent Objective	1.00	0.48	0.48
Non-Compliance	4.00	1.90	1.90

Table 13 Effluent Loading and Concentration Summary 2021: Total Ammonia Nitrogen - Winter

Month	Average mg/L	Average kg/day	Maximum Daily kg/day
January	0.10	0.01	0.01
February	0.28	0.02	0.04
March	0.53	0.05	0.08
April	0.15	0.02	0.03
December	0.50	0.04	0.08
Average Monthly	0.31	0.03	0.05
Effluent Objective	4.00	1.90	1.90
Non-Compliance	10.0	4.75	4.75

Table 14 Effluent Loading and Concentration Summary 2021: Fecal Coliform

Month	Geomean (#/100mL)	Maximum Daily (#/100mL)
January	0.00	0.01
February	0.00	0.01
March	0.00	0.01
April	0.00	0.01
May	0.00	0.01
June	0.00	0.01
July	0.00	0.01
August	0.00	0.01
September	0.00	0.01
October	0.00	0.01
November	0.00	0.01
December	0.00	0.01
Average Monthly	0	0.01
Effluent Objective	50 Organisms/100mL	80 Organisms/100mL
Non-Compliance	50 Organisms/100mL	80 Organisms/100mL

Table 15 Effluent Loading and Concentration Summary 2021: Total Phosphorus

Month	Average mg/L	Average kg/day	Maximum Daily kg/day
January	0.05	0.01	0.01
February	0.06	0.01	0.01
March	0.07	0.01	0.01
April	0.05	0.01	0.01
May	0.04	0.01	0.01
June	0.05	0.01	0.01
July	0.04	0.01	0.01
August	0.06	0.01	0.01
September	0.04	0.01	0.01
October	0.04	0.01	0.01
November	0.04	0.01	0.01
December	0.06	0.01	0.01
Average Monthly	0.05	0.01	0.01
Effluent Objective	0.30	0.143	0.143
Non-Compliance	1.00	0.475	0.475

Table 16 Sludge Quality Analysis 2021

Parameter Sampled (mg/L)	First Quarter	Second Quarter	Third Quarter	Fourth Quarter
Date	N/A	N/A	Sept 19, 2023	Nov 14, 2023
Sample ID	N/A	N/A	CA12754	CA13608
Mercury	N/A	N/A	0.070	0.074
Potassium	N/A	N/A	58	71
Chromium	N/A	N/A	0.83	0.94
Cobalt	N/A	N/A	0.04	0.04
Copper	N/A	N/A	3.9	4.5
Lead	N/A	N/A	0.1	0.20
Molybdenum	N/A	N/A	0.15	0.16
Nickel	N/A	N/A	0.5	0.57
Selenium	N/A	N/A	0.01	0.01
Arsenic	N/A	N/A	0.01	0.01
Zinc	N/A	N/A	5	7
Cadmium	N/A	N/A	0.019	0.023
Ammonia	N/A	N/A	4.1	2.9
Total Kjeldahl Nitrogen	N/A	N/A	817	560
Total Phosphorus	N/A	N/A	415	495
Total Solids	N/A	N/A	16500	15800
Nitrate	N/A	N/A	290	280
Nitrite	N/A	N/A	3	3

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

Darren Ronson
Manager of Water and Wastewater Operations