2024 Year End Report: Gravenhurst Wastewater Treatment Plant (WWTP)



Environmental Compliance Approval: # 7847-ABVPD3

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 Gravenhurst Wastewater Treatment Plant (WWTP), which services the Town of Gravenhurst, is owned, and operated by the District Municipality of Muskoka. The plant is located at 1083 Muskoka Beach Road and was commissioned in May 1993. It is capable of servicing a population of 9,500 people.

The Beach Road WWTP receives influent wastewater from a gravity sewer main, which runs underneath Muskoka Beach Road. The majority of the wastewater is from the James St. Sewage Pumping Station that is located on the site of the original Gravenhurst sewage treatment plant in central Gravenhurst. In addition, the collection system contains fourteen other sewage pumping stations. The pumping stations serve residential areas of Gravenhurst as well as customers as diverse as the Taboo Resort and Beaver Creek Correctional Institution. The WWTP also has a septage receiving facility, which processes septic and holding tank wastes that are trucked in.

The Plant operates under the MECP Environmental Compliance Approval (ECA) # 7847-ABVPD3, issued September 9, 2016. Under the terms of the Environmental Compliance Approval, the plant is permitted to treat an average daily flow of 5,165 meters cubed per day, and a peak flow of 13,791 meters cubed per day. Additionally, effluent limit criteria are as follows:

Table 1 Effluent Limit Criteria

Effluent Parameter	Concentration	Total Effluent Loading
CBOD	10 mg/L	51.65 kg/day
Total Suspended Solids	10 mg/L	51.65 kg/day
Total Phosphorous	0.3 mg/L	1.6 kg/day
Total Ammonia Nitrogen Summer (May 15 to September 30)	5 mg/L	51.65 kg/day
Total Ammonia Nitrogen Winter (October 01 to May 14)	10 mg/L	25.8 kg/day
E. coli	100 organisms/100mL for any month	N/A
pH	To be between 6.0 and 9.5 at all times	N/A

The treatment process is conventional activated sludge with tertiary filtration and ultraviolet disinfection before discharge of the effluent to Lake Muskoka. Biosolids from the primary and secondary plant processes are sent to anaerobic digesters. The stabilized biosolids are then dewatered with a centrifuge. The centrifuge cake is hauled off site for disposal at Lystek's Organic Material Recovery Centre in Southgate.

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 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. 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 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 ECA regarding monthly allowable concentrations and total effluent loading throughout 2024.

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 ECA (#7847ABVPD3).

Quantity of Flow Summary

The plant has a daily average flow design capacity of 5,165 meters cubed per day. The actual average daily flow for 2024 was 3,194 meters cubed per day, however, the 3-year average is 2,995 meters cubed per day, which represents 58% of the plant capacity. None of the individual system components exceeded the design flow rating.

Plant Operational Upsets or Process Failures

On July 2/2024 SGS Lakefield reported a pH of 6.45 on the GH-Final sample. The objective is 6.50. During this sampling period the plant was experiencing high flows due to increased significant rain events. The higher-than-normal flows also had minor impacts on the effluent turbidity, S.S., CBOD, and phosphorus. This was caused by floc carryover from the secondary clarifiers. pH was the only parameter that went outside of the objectives. In addition, on September 21/2024, the thermocouple within the waste gas flare failed causing a release of 31.9 m3 of methane to the environment. The MECP and SAC were notified, and the event was logged under number 1-B4T2DZ. The thermocouple was replaced by operations and a shelf spare has been procured.

Summary of Maintenance

There were no significant plant upgrades on major infrastructure in 2024.
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.
- Marine inspection of effluent outfall and diffuser completed in 2022. (5-year cycle)

Evaluation of the Need for Improvement Works

The treatment facility is operating at a plant capacity of 58% and is in compliance with specified effluent parameter criteria. In addition, there has been no significant treatment process upsets and plant bypasses. There are planned major capital upgrades for life-cycle process equipment replacements to occur in 2025 with engineering design work occurring now.

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)	36	373	152	468
Suspended Solids (mg/L)	40	685	242	740
Total Phosphorus (mg/L)	0.55	10.65	3.51	10.61
TKN (mg/L)	0.90	67.4	29.03	88.63

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

None of the monthly average concentrations for the effluent objectives were exceeded in the reporting period, the GH-Final sample taken on July 2/2024 SGS Lakefield reported a pH of 6.45. The objective is 6.50. During this sampling period the plant was experiencing high flows due to increased significant rain events. The higher-than-normal flows also had minor impacts on effluent turbidity, S.S, CBOD, and phosphorus. This was caused by floc carryover from the secondary clarifiers. pH was the only parameter that went outside of the objectives.

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	2.5 (July 2 - July 23)	2	6.72
Suspended Solids (mg/L)	2	5.5 (June 25 - July 16)	3	8.23
Total Phosphorus (mg/L)	0.03	0.12 (June 18 - July 9)	0.04	0.13
Ammonia(mg/L)	0.1	0.1 (Every Sample)	0.10	0.32
E. Coli (#/100 mL) GEOMEAN	0	19 (June 18 - July 9)	1.66	N/A
pH	6.45	7.48 (Mar 5 - Mar 26)	7.24	N/A

Final Effluent Sampling Summary

All samples were collected following the frequency and methods required by the facility approval. For the coming year, 2025, no changes to the sampling plan are being considered.

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 is hauled off site for disposal at Lystek's Organic Material Recovery Centre in Southgate. A contractor was used by the District of Muskoka to transport 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.

Biosolids Co-Treatment

The treatment plant has the capability to co-treat additional wastes through the Hauled Waste Receiving Facility, which located on site at headworks of the plant. Septage and holding tank waste are hauled in by vacuum trucks and discharged into the 76 cubic meter tank, which is then blended into the plant influent flow. Biosolids and water treatment sludge generated by smaller municipal treatment facilities may be processed in this fashion as well. Tables summarizing the septage analytical characteristics and monthly loading rates of the hauled wastes that have been co-treated at the plant in 2024 are included in this report.

Co-Treatment Flow Summary

The plant ECA (Sewage) #7847-ABVPD3, issued September 9, 2016, states that the monthly average quantity of septage and holding tank waste being co-treated at the plant shall not exceed 20 meters cubed per day. The certificate further stipulates that the monthly average volume of biosolids being cotreated shall not exceed a monthly average flow of 20 meters

cubed per day, and that volumes of water treatment plant sludges being co-treated shall not exceed a monthly average flow of 20 meters cubed per day as well.

The highest monthly average for septage was 9.74 meters cubed per day in August 2024 with no problems observed by this volume; samples of the septage waste were collected monthly. No other plant biosolids or water plant sludges were received in 2024.

Summary of Complaints received throughout the reporting period.

There were no complaints received in the reporting period.

Gravenhurst Wastewater Collection Summary 2024

New and Replaced Sanitary Sewer

Total of 300 meters of 200mm sewer main replaced on Bay St. Part of the Bay and Beyond project 2024.

New Sewer Services:

122 new customers connected to existing municipal services in 2024.

Sewer Lateral Blockages:

5 lateral blockages on the municipal side, cleared and replaced as needed in 2024

Sewer Pump Stations:

All maintenance was completed for 15 Pump stations in Gravenhurst.

Main Line Sewer Blockages:

2 sewer mains blocked in 2024. Bethune St N and Mary St S. Both cleared and videoed inspections completed.

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 in 2024

Air Release Valves:

All twenty (22) of the air release vacuum valves connected to the sewage force mains in our collection system were removed, cleaned, tested and reinstalled for the yearly maintenance inspection in 2024.

Sewer Flushing and Video Inspections:

Approximately 1153.05 meters of various size sanitary sewer mains were flushed using high pressure equipment. The two 250mm depressed (siphon) sewer mains from our Knister sewage pump station were swabbed from the collection chamber located in the Brydon Bay Road easement, through to the receiving chamber on Brydon Bay Road.

Sewer Rehabilitation:

No sanitary sewer rehab for 2024.

Locates:

Field staff addressed 961 locate requests for Ontario One Call in 2024

Table 4 Effluent Flow Summary

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	91,128	2,940	3,433	2,289	N/A	91,128
February	90,515	3,121	3,884	2,790	N/A	90,515
March	116,245	3,750	4,946	3,118	N/A	116,245
April	126,360	4,212	5,591	3,017	N/A	126,360
May	113,271	3,654	5,146	3,038	N/A	113,271
June	93,988	3,133	4,589	2,622	N/A	93,988
July	102,804	3,316	4,516	2,877	N/A	102,804
August	93,918	3,030	4,079	2,614	N/A	93,918
September	81,884	2,729	3,086	2,403	N/A	81,884
October	79,807	2,574	3,027	2,280	N/A	79,807
November	74,633	2,488	2,650	2,299	N/A	74,633
December	101,195	3,264	6,786	2,435	N/A	101,195

Total Flow: 1,165,751 m^3
Average Day: 3,194 m^3
Maximum Day: 6,786 m^3
Minimum Day: 2,280 m^3

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

Sample Date	Sample Identification Number	BOD5 mg/L	Total Phosphorus mg/L	Suspended Solids mg/L	Total Kjeldahl Nitrogen mg/L
Feb 06/24	CA12131	116	2.36	187	58.3
May 14/24	CA12437	86	0.97	108	0.9
Aug 6/24	CA13297	116	3.37	181	81.2
Nov 12/24	CA12376	158	2.56	364	19.9
Yearly Average		119.0	2.3	210.0	40.1
Maximum		158.0	3.4	364.0	81.2
Minimum		86.0	1.0	108.0	0.9

Table 6 Chemical Usage Summary: Alum

Month	Average Dosage mg/L	Total kg (dry)
January	94.2	8,580.0
February	94.8	8,580.0
March	73.8	8,580.0
April	67.9	8,580.0
May	75.7	8,580.0
June	91.3	8,580.0
July	83.5	8,580.0
August	91.4	8,580.0
September	104.8	8,580.0
October	107.5	8,580.0
November	115.0	8,580.0
December	84.8	8,580.0

Total Yearly Kilograms: 102,960 kg

Table 7 Chemical Usage Summary: Soda Ash

Month	Average Dosage mg/L	Total kg (dry)
January	120.7	1,100.0
February	88.4	8,000.0
March	68.8	8,000.0
April	71.2	9,000.0
May	70.6	8,000.0
June	127.7	12,000.0
July	107.0	11,000.0
August	127.8	12,000.0
September	122.1	10,000.0
October	150.4	12,000.0
November	147.4	11,000.0
December	108.7	11,000.0

Total Yearly Kilograms: 113,100 kg

Table 8 Chemical Usage Summary: Polymer

Month	Average Dosage mg/L	Total kg
January	150.0	100
February	276.3	150
March	182.1	125
April	203.2	125
May	133.8	125
June	127.6	125
July	115.1	100
August	125.3	125
September	168.8	150
October	148.3	150
November	145.0	125
December	152.7	125

Total Yearly kg: 1,525 kg

Table 9 Effluent Quarterly Analysis Summary – Weekly 24-Hour Composite Sample Part 1

Sample Date	Sample Identification Number	CBOD5 mg/L	Alkalinity (Total as CaCO3) mg/L	pH	Total Phosphorus mg/L	Suspended Solids mg/L
Feb 06/24	CA12131	2	95	7.35	0.04	2
May 14/24	CA12437	2	68	7.22	0.04	2
Aug 06/24	CA13297	2	55	7.08	0.05	3
Nov 12/24	CA12376	2	62	7.29	0.07	2
Yearly Average		2	70	7.24	0.04	3
Maximum		2	95	7.35	0.05	3
Minimum		2	55	7.08	0.03	2

Table 10 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
Feb 06/24	CA12131	1.3	16.1	0.03	0.1
May 14/24	CA12437	0.5	17.2	0.03	0.1
Aug 06/24	CA13297	1.1	26.7	0.03	0.1
Nov 12/24	CA12376	0.5	30.0	0.03	0.1
Yearly Average		0.9	22.5	0.03	0.1
Maximum		1.3	30.0	0.03	0.1
Minimum		0.5	16.1	0.03	0.1

Table 11 Effluent Loading and Concentration Summary: COBD5

Month	Average mg/L	Average kg/day	Maximum Daily kg/day
January	2.20	6.47	7.55
February	2.20	6.87	8.54
March	2.20	8.25	10.88
April	2.00	8.42	11.18
May	2.25	8.22	11.58
June	2.00	6.27	9.18
July	2.40	7.96	10.84
August	2.00	6.06	8.16
September	2.00	5.46	6.17
October	2.00	5.15	6.05
November	2.00	4.98	5.30
December	2.00	6.53	13.57
Average Monthly	2.10	6.72	9.08
Effluent Objective	5.00	25.82	
Non-Compliance	10.00	51.65	

Table 12 Effluent Loading and Concentration Summary: Suspended Solids

Month	Average mg/L	Average kg/day	Maximum Daily kg/day
January	2.20	6.47	7.55
February	2.00	6.24	7.77
March	2.00	7.50	9.89
April	2.00	8.42	11.18
May	3.00	10.96	15.44
June	4.50	14.10	20.65
July	3.60	11.94	16.26
August	2.75	8.33	11.22
September	3.00	8.19	9.26
October	2.00	5.15	6.05
November	2.00	4.98	5.30
December	2.00	6.53	13.57
Average Monthly	2.59	8.23	11.18
Effluent Objective	5.00	25.82	
Non-Compliance	10.00	51.65	

Table 13 Effluent Loading and Concentration Summary: Total Ammonia Nitrogen Summer

Month	Average mg/L	Average kg/day	Maximum Daily kg/day
May	0.10	0.37	0.51
June	0.10	0.31	0.46
July	0.10	0.33	0.45
August	0.10	0.30	0.41
September	0.10	0.27	0.31
October	0.10	0.26	0.30
Average Monthly	0.10	0.31	0.41
Effluent Objective	1.00	5.16	
Non-Compliance	5.00	25.8	

Table 14 Effluent Loading and Concentration Summary: Total Ammonia Nitrogen Winter

Month	Average mg/L	Average kg/day	Maximum Daily kg/day
January	0.10	0.29	0.34
February	0.10	0.31	0.39
March	0.10	0.37	0.49
April	0.10	0.42	0.56
November	0.10	0.25	0.27
December	0.10	0.33	0.68
Average Monthly	0.10	0.33	0.45
Effluent Objective	1.00	5.16	
Non-Compliance	10.00	51.65	

Table 15 Effluent Loading and Concentration Summary: E.coli

Month	Geomean (#/100mL)	Maximum Daily (#/100mL)
January	0.60	2.06
February	0.00	0.00
March	0.50	2.47
April	0.40	2.24
May	0.00	0.00
June	19.00	87.19
July	0.00	0.00
August	0.00	0.00
September	0.00	0.00
October	0.00	0.00
November	0.25	0.66
December	1.00	6.79
Average Monthly	1.81	8.45
Effluent Objective	0.00	
Non-Compliance	80.00	

Table 16 Effluent Loading and Concentration Summary: Total Phosphorus

Month	Average mg/L	Average kg/day	Maximum Daily kg/day
January	0.04	0.12	0.14
February	0.03	0.09	0.12
March	0.04	0.15	0.20
April	0.03	0.13	0.17
May	0.04	0.15	0.21
June	0.09	0.28	0.41
July	0.07	0.23	0.32
August	0.03	0.09	0.12
September	0.04	0.11	0.12
October	0.03	0.08	0.09
November	0.03	0.07	0.08
December	0.03	0.10	0.20
Average Monthly	0.04	0.13	0.18
Effluent Objective	0.30	1.55	
Non-Compliance	0.30	1.55	

Table 17 Dewatered Sludge Production Summary

Month	Hauler	Liquid Volume m^3	Cake Weight Tonnes	Destination
January	ROHES	667	20.03	Lystek
February	ROHES	543	48.24	Lystek
March	ROHES	686	49.18	Lystek
April	ROHES	615	27.39	Lystek
May	ROHES	934	79.71	Lystek
June	ROHES	980	71.82	Lystek
July	ROHES	869	78.23	Lystek
August	ROHES	997	51.04	Lystek
September	ROHES	889	76.66	Lystek
October	ROHES	1012	61.31	Lystek
November	ROHES	862	46.91	Lystek
December	ROHES	882	61.28	Lystek

Yearly Total Tonnes: 671.80
Yearly Average Tonnes: 55.98
Maximum Tonnes: 79.71
Minimum Tonnes: 20.03

Table 18 Sludge Quality Analysis

Parameter Sampled (mg/L)	First Quarter (Feb 06)	Second Quarter (May 14)	Third Quarter (Aug 06)	Fourth Quarter (Nov 13)
Sample ID	CA12132	CA12438	CA13298	CA12377
Nitrate	<3	<3	<3	<3
Mercury	0.005	0.006	0.006	0.005
Chromium	0.26	0.3	0.024	0.21
Cobalt	0.04	0.04	0.03	0.02
Copper	8.5	7.8	7.4	6.5
Lead	0.2	0.2	0.2	0.2
Molybdenum	0.09	0.09	0.08	0.07
Nickel	0.21	0.22	0.17	0.14
Selenium	<0.1	< 0.1	< 0.1	<0.1
Arsenic	<0.1	< 0.1	< 0.1	<0.1
Zinc	7	7	8	7
Cadmium	0.008	0.008	0.014	0.009
Ammonia+ Ammonium	605	726	564	487
Total Kjeldahl Nitrogen	1180	1510	1190	1010
Total Phosphorus	450	550	440	370
Total Solids	13100	19700	16000	12300
Total Suspended Solids	11300	20200	14900	11800
Nitrite	<3	<3	<3	<3
PO4	218	229	209	177

Table 19 Septage Quality and Quantity

Month	BOD5 Mg/L	TSS Mg/L	Total Solids Mg/L	COD Mg/L	TP Mg/L	TKN Mg/L	Volume Septage M^3	Volume Biosolids M^3
January	121	104	430	180	3.4	30.1	3.12	0.00
February	9430	28900	39100	54000	263	1230	11.63	0.00
March	241	1190	1200	1600	16.6	165	27.42	0.00
April	4320	22000	23515	10400	72	410	46.19	0.00
May	4450	17900	20100	22200	74.6	474	233.01	0.00
June	2390	16900	17038	6800	36.8	239	209.58	0.00
July	414	910	1120	1180	14.8	86	182.14	0.00
August	3580	7300	8560	9000	40.2	265	302.02	0.00
September	382	1000	2080	1720	12.1	75	185.52	0.00
October	4790	13100	13250	16800	63.4	385	283.13	0.00
November	4760	19200	23700	19800	70.4	568	198.19	0.00
December	837	3549	3370	4700	29.5	116	0.00	0.00

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

Jamey Adams
Area Manager, Treatment

Glenn Gardiner
Manager - Lines