

## 2020 Year End Report: Gravenhurst Clean Water Plant (CWP)



Environmental Compliance Approval: # 7847-ABVPD3

Engineering and Public Works Department

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## Introduction

The Gravenhurst Clean Water Plant(CWP), 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 Plant 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 CWP also has a septage receiving facility, which processes septic and holding tank wastes that are trucked in.

The Plant operates under the MOE 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 m<sup>3</sup>/day, and a peak flow of 13,791 m<sup>3</sup>/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	5 mg/L	25.8 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	1.6 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 ultra violet disinfection before discharge of the effluent to Lake Muskoka. Biosolids from the primary and secondary plant processes are 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 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 ECA regarding monthly allowable concentrations and total effluent loading throughout the entire 2020.

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 (#7847-ABVPD3).

### Quantity of Flow Summary

The plant has a daily average flow design capacity of 5,165 m<sup>3</sup> per day. The actual average daily flow for the 2020 was 3,022 m<sup>3</sup>/day, however, the 3 year average is 2,959 m<sup>3</sup> per day, which represents 57% 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 2020.

### Summary of Maintenance

There were no significant plant upgrades on major infrastructure in 2020.

All equipment information at this plant is entered into a computer database. From this information, a scheduled preventive maintenance programme has been established. The maintenance programme 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 calibration of flow metering devices.
- Annual cleaning of all sewage pumping stations.
- Marine inspection of effluent outfall and diffuser completed in 2017. (5 year cycle)

### Evaluation of the Need for Improvement Works

The treatment facility is operating at a plant capacity of 57% and is in compliance with specified effluent parameter criteria. In addition, there has been no significant treatment process upsets and plant bypasses. As a result, there is no need for improvements to the existing works.

### 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)	44	230	140	418
Suspended Solids (mg/L)	72	324	194	596
Total Phosphorus (mg/L)	1.13	3.98	2.23	6.66
Ammonia (mg/L)	1.10	22.05	10.32	30.72

### 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	2.25	2.06	6.16
Suspended Solids (mg/L)	2	2.25	2	6.09
Total Phosphorus (mg/L)	0.03	0.06	0.04	0.11
Ammonia (mg/L)	0.1	1.125	0.22	0.65
E. Coli (#/100 mL)- GEOMEAN	0	0.41	1.08	N/A
pH	Min- 6.39	Max- 7.87	7.32	N/A

## Final Effluent Sampling Summary

All samples were collected following the frequency and methods required by the facility approval. For the coming year, 2021, no changes to the sampling plan are being considered at this time.

## 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 transfer all material for disposal in 2020, and will continue to do so in 2021. It is not anticipated that there will be a significant increase in the total volume of bio solids produced in 2021.

## 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 dumped 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 2020 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 m<sup>3</sup>/day. The certificate further stipulates that the monthly average volume of biosolids being co-treated shall not exceed a monthly average flow of 20 m<sup>3</sup> per day, and that volumes of water treatment plant sludges being co-treated shall not exceed a monthly average flow of 20 m<sup>3</sup> per day as well.

The highest monthly average for septage was 16.6 m<sup>3</sup> per day in June 2020 with no problems observed by this volume; samples of the septage waste were collected monthly. The highest monthly average for biosolids was 4.5 m<sup>3</sup> per day which occurred in August 2020. There were no operational issues with the volume and quality of the biosolids hauled in in 2020. Biosolids being hauled in from the local non-municipal wastewater treatment plant (Red Leaves Resort) provided their set of analytical sample results, these were not conducted by the District. No water plant sludges were received in 2020.

#### Summary of Complaints received throughout the reporting period

There were no complaints received in the reporting period.

#### Gravenhurst Wastewater Collection Summary 2020

##### New or Replaced Sewer Mains

There was 200 m new sewer installed on Daffodil Court .

##### New Sewer Services:

Forty five new customers connected to existing municipal services in 2020.

##### Sewer Lateral Blockages:

One lateral blockage on the municipal side, which was cleared in 2020.

##### Sewer Pump Stations:

All stations were cleaned by high velocity water pressure. All debris was vacuumed out and hauled to the appropriate landfill site. The internal air-release vacuum valves at our four newest stations were removed, cleaned, reinstalled and tested for proper operation as part of the annual maintenance program.

##### Main Line Sewer Blockages:

There were no main line sewer blockages in 2020.

##### 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 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.

##### Sewer Flushing and Video Inspections:

Approximately 4651.0 meters of various size sanitary sewer mains were flushed using high - pressure equipment. The two 250mm depressed (siphon) sewer mains from our Kinister sewage pump station was swabbed from the collection chamber located in the Brydon Bay Road easement, through to the receiving chamber on Brydon Bay Road.

##### Sewer Rehabilitation:

There was twenty two sewer manholes repaired (auto stable, top sections)

##### Locates:

Field staff addressed 795 locate requests.

Table 4 Effluent Flow Summary 2020

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)	Lagoons Monthly Flow (m <sup>3</sup> )	Facility Total Monthly Flow (m <sup>3</sup> )
January	86,445	2,789	5,020	2,343	N/A	86,445
February	68,085	2,348	2,719	2,052	N/A	68,085
March	109,112	3,520	5,760	2,264	N/A	109,112
April	106,030	3,534	5,035	2,763	N/A	106,030
May	92,686	2,990	3,895	2,600	N/A	92,686
June	99,567	3,319	6,010	2,692	N/A	99,567
July	95,959	3,095	3,583	2,840	N/A	95,959
August	85,379	2,754	3,279	2,506	N/A	85,379
September	80,720	2,691	3,097	2,372	N/A	80,720
October	94,934	3,062	4,000	2,761	N/A	94,934
November	91,057	3,035	3,691	2,615	N/A	91,057
December	93,004	3,000	3,620	2,657	N/A	93,004

Total Flow: 1,102,977 m<sup>3</sup>  
 Average Day: 3,022 m<sup>3</sup>  
 Maximum Day: 6,010 m<sup>3</sup>  
 Minimum Day: 2,052 m<sup>3</sup>

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
February 4	CA13049	136	2.74	218	12.0
May 5	CA12348	102	2.00	126	9.9
August 18	CA12183	161	2.57	234	8.5
November 10	CA13136	198	3.20	277	3.2
Yearly Average		149	2.62	214	8.4
Maximum		198	3.20	277	12.0
Minimum		102	2.00	126	3.2



Table 6 Chemical Usage Summary: Alum

Month	Average Dosage mg/L	Total kg (dry)
January	99.3	8,580.0
February	126.0	8,580.0
March	78.6	8,580.0
April	80.9	8,580.0
May	92.6	8,580.0
June	86.2	8,580.0
July	89.4	8,580.0
August	100.5	8,580.0
September	106.3	8,580.0
October	90.4	8,580.0
November	94.2	8,580.0
December	92.3	8,580.0
Average	94.7	8580.0

Total Yearly Kilograms: 102,960

Table 7 Chemical Usage Summary: Soda Ash

Month	Average Dosage mg/L	Total kg (dry)
January	127.2	11,000.0
February	132.2	9,000.0
March	119.1	13,000.0
April	94.3	10,000.0
May	140.3	13,000.0
June	120.5	12,000.0
July	156.3	15,000.0
August	128.8	11,000.0
September	123.9	10,000.0
October	105.3	10,000.0
November	98.8	9,000.0
December	75.3	7,000.0
Average	118.5	10833.3

Total Yearly Kilograms: 130,000

Table 8 Chemical Usage Summary: Polymer

Month	Average Dosage mg/L	Total litres
January	191.6	150
February	161.3	75
March	165.6	100
April	136.8	100
May	178.6	100
June	144.5	125
July	155.6	175
August	112.5	225
September	175.8	125
October	172.1	175
November	179.9	75
December	210.4	150
Average	165.4	131

Total Yearly Litres: 1,575

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
February 4	CA12106	2	80	7.39	0.05	2
May 5	CA13158	2	80	7.05	0.03	2
August 18	CA13673	2	80	7.65	0.06	2
November 10	CA12344	2	61	7.31	0.03	2
Yearly Average		2	75	7.35	0.04	2
Maximum		2	80	7.65	0.06	2
Minimum		2	61	7.05	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
February 4	CA12106	0.5	26.7	0.03	0.1
May 5	CA13158	0.5	19.0	0.03	0.1
August 18	CA13673	0.5	33.5	0.03	0.1
November 10	CA12344	0.5	23.1	0.03	0.1
Yearly Average		0.5	25.6	0.03	0.1
Maximum		0.5	33.5	0.03	0.1
Minimum		0.5	19.0	0.03	0.1

Table 11 Effluent Loading and Concentration Summary 2020: COBD5

Month	Average mg/L	Average kg/day	Maximum Daily kg/day
January	2.00	5.58	10.04
February	2.00	4.70	5.44
March	2.20	7.74	12.67
April	2.25	7.95	11.33
May	2.00	5.98	7.79
June	2.00	6.64	12.02
July	2.00	6.19	7.17
August	2.00	5.51	6.56
September	2.00	5.38	6.19
October	2.00	6.12	8.00
November	2.00	6.07	7.38
December	2.00	6.00	7.24
<b>Average Monthly</b>	2.04	6.16	8.49
<b>Effluent Objective</b>	5	25.82	
<b>Non-Compliance</b>	10	51.65	

Table 12 Effluent Loading and Concentration Summary 2020: Suspended Solids

<b>Month</b>	<b>Average mg/L</b>	<b>Average kg/day</b>	<b>Maximum Daily kg/day</b>
<b>January</b>	2.00	5.58	10.04
<b>February</b>	2.00	4.70	5.44
<b>March</b>	2.00	7.04	11.52
<b>April</b>	2.00	7.07	10.07
<b>May</b>	2.00	5.98	7.79
<b>June</b>	2.00	6.64	12.02
<b>July</b>	2.00	6.19	7.17
<b>August</b>	2.00	5.51	6.56
<b>September</b>	2.00	5.38	6.19
<b>October</b>	2.25	6.89	9.00
<b>November</b>	2.00	6.07	7.38
<b>December</b>	2.00	6.00	7.24
<b>Average Monthly</b>	2.02	6.09	8.37
<b>Effluent Objective</b>	5.00	25.82	
<b>Non-Compliance</b>	10.00	51.65	

Table 13 Effluent Loading and Concentration Summary 2020: 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	0.30	0.39
<b>June</b>	0.10	0.33	0.60
<b>July</b>	0.10	0.31	0.36
<b>August</b>	0.10	0.28	0.33
<b>September</b>	0.10	0.27	0.31
<b>October</b>	0.10	0.31	0.40
<b>Average Monthly</b>	0.10	0.30	0.40
<b>Effluent Objective</b>	1	5.16	
<b>Non-Compliance</b>	5	25.8	



Table 14 Effluent Loading and Concentration Summary 2020: 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>	0.18	0.49	0.88
<b>February</b>	0.45	1.06	1.22
<b>March</b>	0.92	3.24	5.30
<b>April</b>	0.10	0.35	0.50
<b>November</b>	0.10	0.30	0.37
<b>December</b>	0.16	0.48	0.58
<b>Average Monthly</b>	0.32	0.99	1.48
<b>Effluent Objective</b>	1.00	5.16	
<b>Non-Compliance</b>	10.00	51.65	

Table 15 Effluent Loading and Concentration Summary 2020: E.Coli

<b>Month</b>	<b>Geomean (#/100mL)</b>	<b>Maximum Daily (#/100mL)</b>
<b>January</b>	0.75	2.00
<b>February</b>	1.00	2.00
<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	0.00
<b>July</b>	0.50	2.00
<b>August</b>	0.25	1.00
<b>September</b>	0.00	0.00
<b>October</b>	1.25	4.00
<b>November</b>	0.00	0.00
<b>December</b>	0.00	0.00
<b>Average Monthly</b>	0.31	0.92
<b>Effluent Objective</b>	0.00	
<b>Non-Compliance</b>	80.00	

Table 16 Effluent Loading and Concentration Summary 2020: 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	0.10	0.18
<b>February</b>	0.04	0.09	0.10
<b>March</b>	0.03	0.11	0.18
<b>April</b>	0.03	0.11	0.16
<b>May</b>	0.04	0.10	0.14
<b>June</b>	0.03	0.11	0.20
<b>July</b>	0.04	0.12	0.14
<b>August</b>	0.05	0.14	0.16
<b>September</b>	0.04	0.11	0.12
<b>October</b>	0.03	0.09	0.12
<b>November</b>	0.03	0.09	0.11
<b>December</b>	0.03	0.09	0.11
<b>Average Monthly</b>	0.04	0.11	0.14
<b>Effluent Objective</b>	0.30	1.55	
<b>Non-Compliance</b>	0.30	1.55	

Table 17 Dewatered Sludge Production Summary 2020

Month	Hauler	Liquid Volume m <sup>3</sup>	Cake Weight kg	Destination
January	WESSUC	783	42,480	Lystek
February	WESSUC	465	39,050	Lystek
March	WESSUC	604	51,690	Lystek
April	WESSUC	731	72,740	Lystek
May	WESSUC	560	39,550	Lystek
June	WESSUC	865	54,470	Lystek
July	WESSUC	1125	63,340	Lystek
August	WESSUC	2000	85,800	Lystek
September	WESSUC	711	51,720	Lystek
October	WESSUC	1017	69,180	Lystek
November	WESSUC	417	41,540	Lystek
December	WESSUC	713	55,600	Lystek

Yearly Total Volume: 9,991  
 Yearly Average Volume: 833  
 Maximum Volume: 2,000  
 Minimum Volume: 417

Table 18 Sludge Quality Analysis 2020

Parameter Sampled (mg/L)	First Quarter (Feb 04)	Second Quarter (May 05)	Third Quarter (Aug 18)	Fourth Quarter (Nov 19)
<b>Sample ID</b>	CA12107	CA13159	CA13674	CA12345
Nitrate	0.3	0.3	0.3	0.03
Mercury	0.007	0.004	0.008	0.007
Chromium	0.28	0.22	0.43	0.36
Cobalt	0.04	0.04	0.05	0.04
Copper	10	7	13	12
Lead	0.2	0.2	0.3	0.20
Molybdenum	0.09	0.09	0.12	0.10
Nickel	0.23	0.21	0.27	0.28
Selenium	< 0.10	< 0.10	< 0.10	< 0.10
Arsenic	< 0.1	< 0.1	< 0.1	< 0.1
Zinc	11	6	13	11
Cadmium	0.012	0.011	0.17	0.013
Ammonia+ Ammonium	685	578	542	495
Total Kjeldahl Nitrogen	1500	1400	1250	1080
Total Phosphorus	480	350	164	430
Total Solids	17000	17200	16000	14800
Total Suspended Solids	17600	15900	15800	12100
Nitrite	0.2	0.2	0.2	0.2
PO4	70.7	91.5	59	116

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 <sup>3</sup>	Volume Biosolids M <sup>3</sup>
January	1230	1470	2890	2900	52.4	426	73.07	17.42
February	3300	4640	6270	5650	49	368	128.2	34.24
March	166	364	800	495	13.7	91.1	239.29	96.5
April	1430	1900	4230	5000	24.6	163	386.87	42.18
May	879	10800	11300	12900	78.1	476	383.72	0
June	200	493	5920	1100	7.2	54.9	516.28	0
July	1530	6400	8000	8600	77.5	193	461.56	53
August	1580	9460	12300	21200	110	754	471.97	57
September	636	1580	2130	2720	22.3	195	367.62	163
October	2050	7140	8150	10100	68.3	476	413.54	79.5
November	1520	2940	11800	15400	131	596	242.72	0
December	2210	6330	7370	8600	60.8	412	116.76	19.17

### 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

Marcus Firman, C.E.T.  
Director, Water and Wastewater Services

Mark Pringle, C.E.T.  
Manager of Water and Wastewater Operations