2021 Year End Report: Huntsville Golden Pheasant Wastewater Treatment Plant (WWTP)

Environmental Compliance Approval: # 6591-&M9LU6 amended under ECA#9847B6KR4X Jan 14, 2019

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Introduction

The Huntsville Golden Pheasant Wastewater Treatment Plant (WWTP), which services the Town of Huntsville, is owned and operated by the District Municipality of Muskoka. The plant is located at 620 Highway 60, Huntsville. It services a population of approximately 7,900 people.

The Plant operated under the MECP Environmental Compliance Approval (Sewage) # 6591-7M9LU6, issued December 2008 and under MECP Environmental Compliance Approval (ECA) (Air) #66234YLK6T issued August 2001. On January 14, 2019 the ECA #9847-B6KR4X was issued by the Ministry of Environment as an amended ECA to account for upgrades to the UV disinfection system, the installation of a Soda Ash batching system for alkalinity addition and to provide for the construction of a Sludge Thickening System. Also, the amended ECA allows for the addition of an additional process tank and conversion of the aeration/mixing systems from coarse air to fine bubble diffusion which will significantly improve plant efficiency. Under the terms of the ECA, the plant is permitted to treat an average daily flow of 4,456 meters cubed per day, and a peak flow of 13,330 meters cubed per 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	0.30 mg/L 227.9 kg/year (combined with the Huntsville Mountview WWTP)
Total Ammonia Nitrogen Summer (May 15 to September 30)	NA
Total Ammonia Nitrogen Winter (October 01 to May 14)	NA
E. coli	80 counts/100mL
pH	NA

The plant is a conventional activated sludge treatment process, consisting of primary and secondary clarifiers with aeration basins. Tertiary filtration and Ultra-Violet disinfection are also part of the treatment process. The facility is also equipped with anaerobic digesters for bio-solids stabilization and a dewatering process for final disposal.

Waste sludge from the plant process is digested anaerobically 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 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 year. In late May through early June, plant effluent pH was observed to fall below objectives as the treatment microbiological population adjusted to the newly constructed process tankage and control strategy. Enhancements were made to the plant soda ash system and as the microbiological population bloomed, pH conditions were restored to higher, acceptable values. During this process, a major reduction in total ammonia nitrogen concentration in the final effluent was achieved and maintained throughout the balance of 2021. This is a significant success due to the upgrades completed in 2021 at Golden Pheasant.

Overall, the plant treatment processes performed satisfactorily and are deemed to be adequate. All sample test results (aside from the pH anomalies reported) of the final effluent were within levels outlined in the plant ECA #9847-B6KR4X.

Quantity of Flow Summary

The plant has a daily average flow design capacity of 4,456 meters cubed per day. The actual average daily flow for the 2021 was 2,169 meters cubed per day, however, the 3-year average is 2,175 meters cubed per day, which represents 48.8% of the plant capacity. None of the individual system components exceeded the design flow rating.

Plant Operational Upsets or Process Failures

In late 2021, an issue occurred with a worn bearing on the plant digested sludge centrifuge. This resulted in the transportation of liquid sludge by truck for further treatment offsite until this bearing could be received and replaced. Long delivery time for parts was experienced in 2021 due to the COVID-19 pandemic's effect on supply chains globally.

Summary of Maintenance

In 2021, significant upgrades were completed at Golden Pheasant under phase one (1) contract one (1) and contract two (2) improvements. Contract one (1) include construction of buildings to house new blowers and alkalinity addition equipment, renovation of the UV disinfection system and replacement of the centrifuge for the biosolids handling systems. As well, the second contract of phase one (1) of construction commenced to add additional process tankage, construct a waste activated sludge thickening process and to convert the aeration systems from coarse aeration to fine bubble diffusion. This second phase of construction was substantially completed in August of 2021. New process tankage, conversion to fine bubble aeration and modernized process controls have contributed to pronounced improvements in plant effluent quality.

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.
- Periodic infrared inspection of Motor Control panels.
- Annual calibration of flow metering devices.
- Annual cleaning of all sewage pumping stations if required.
- 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 48.8% 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 for these reasons, however, as Mountview Wastewater Treatment Plant is scheduled for conversion to a pump station then decommissioned, and the flows from Mountview collection area directed then to Golden Pheasant, a suite of phased projects is underway to provide sufficient treatment capacity. These projects are expected to commence construction in 2022 to provide adequate treatment capability for many years in the future.

To achieve the required treatment capabilities required by the ECA, the following upgrades will be necessary:

- Replacement of blowers and process tank diffusers
- Additional process tankage installed including at least one new clarifier unit
- Addition to Waste Activated Sludge Thickening systems completed in 2021.
- New plant outfall to Fairy Lake
- New filtration system
- Increased UV disinfection capacity.

Evaluation Summary of Proposed Work Requiring Approval under OWRA

All upgrade works described are subject to approval under OWRA. An application for amendment to the facility ECA was submitted and approval received in January 2019 which permits alteration/improvement of the works as part of the first phase of contracts. Further application will be required prior to commencement of construction of the second phase of contracts once design is complete in 2022.

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)	54	167	127	58.6
Suspended Solids (mg/L)	70	313	216	99.6
Total Phosphorus (mg/L)	0.67	7.62	3.55	1.6
Total Ammonia Nitrogen (mg/L)	5.3	30.1	22.6	10.4

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 aside from brief period in late May through early June when effluent pH was slightly lower than the objective during the process conversion after construction. This condition was reported to the M.E.C.P. and recovered once the process microbiological population matured and improvements were made to the plant soda ash system.

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	2.3	1.1
Suspended Solids (mg/L)	<2	4	2.7	1.2
Ammonia (mg/L)	<0.1	22.9	7.5	3.5
E. Coli (#/100 mL)	0	3.3	0.35	N/A
Total Phosphorus (mg/L)	<0.03	0.07	0.05	0.02
pH	5.97	8.11	6.97	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, 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 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 bio solids produced in 2022.

Biosolids Co-Treatment

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 disposal 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 bio solids produced in 2022.

Summary of Complaints received throughout the reporting period

There were no complaints received in the reporting period.

Huntsville Golden Pheasant Wastewater Collection Summary

New Sewer Services:

A total of 69 customers connected to existing sewer laterals in 2021, 13 of which were installed in 2021.

- One 200 mm PVC sewer service was installed by the owner's contractor. This service is located at 210 Hwy 60.

- One 200 mm PVC sewer service was installed by the owner's contractor. This service is located at 159 Howland Drive.

- One 200 mm PVC sewer service was installed by the owner's contractor. This service is located at 161 Townline Road.

- Ten 125 mm PVC sewer services were installed by the owner's contractor. These services are located at 47, 49, 51, 53, 55 Young Street South, 87 and 89 Hanes Road, 5 Rogers Road, 72 Centre Street South and 185 Hunter's Bay Drive.

New Sewer Mains:

A total of 483 meters of 300 mm gravity sewer was installed/replaced in 2021 on Main Street East and River Street as part of the "Diggin Downtown" capital works project.

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.

Sewer Force Main Replacement

No sewer forcemains were replaced 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.

Frozen Sewer Force Mains:

No sewer forcemains froze in 2021.

Frozen Sewer Service Laterals:

No sewer service laterals froze in 2021.

Frozen Low Pressure Sewer Services:

No low-pressure sewer services froze in 2021.

Sewer Flushing/Video:

Field staff Approximately 1,432 meters of sewer main was flushed and 422 meters video inspected in 2021.

Sewer Locates:

Field staff addressed 951 written locate requests in 2021.

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	55,742	1,798	2,153	1,528	491.63	56,234
February	48,856	1,745	2,351	1,442	444.65	49,301
March	80,693	2,603	4,169	1,724	569.32	81,262
April	67,899	2,263	2,815	1,889	643.9	68,543
May	59,506	1,920	2,268	1,541	593.82	60,100
June	58,048	1,935	3,574	1,518	554.54	58,603
July	85,123	2,746	4,479	2,093	553.79	85,677
August	68,329	2,204	3,230	704	519.25	68,848
September	65,353	2,178	3,578	677	527.36	65,880
October	76,335	2,462	2,847	2,107	709.89	77,045
November	61,451	2,048	2,470	1,794	597.18	62,048
December	65,952	2,127	2,873	1,668	690.27	66,642

Total Flow: 800,183m^3
Average Day: 2,169m^3
Maximum Day: 4,479m^3
Minimum Day: 677m^3

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

Sample Date	Sample Identification Number	BOD5 mg/L	Phosphate	Total Phosphorus mg/L	Suspended Solids mg/L
Feb. 04/21	CA12756-Feb21	26	0.08	0.83	180
May 27/21	CA15737-MAY21	120	0.34	2.51	100
Aug 12/21	CA12505-AUG21	130	0.99	2.76	107
Nov 11-21	CA12497-NOV21	118	0.24	41.4	1080
Yearly Average		98.5	0.41	11.9	367
Maximum		130	0.99	41.4	1080
Minimum		26	0.08	0.83	100

Table 6 Influent 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. 04/21	CA12756-Feb21	6.6	0.21	<0.03	5.3
May 27/21	CA15737-MAY21	34.5	<0.06	<0.03	30.8
Aug 12/21	CA12505-AUG21	25.3	<0.06	<0.03	21.6
Nov 11-21	CA12497-NOV21	94.4	<0.06	<0.03	45.1
Yearly Average		40.2	0.10	003	25.7
Maximum		94.4	0.21	0.03	45.1
Minimum		6.6	0.06	0.03	5.3

Table 7 Chemical Usage Summary: Clarion A405P

Month	Average Dosage mg/L	Total kg (dry)
January	65.2	3,788.9
February	95.4	4,568.3
March	54.2	4,010.7
April	54.8	3,700.2
May	58.9	3,516.5
June	43.7	2,471.0
July	34.6	2,857.5
August	41.5	2,585.1
September	43.3	2,648.4
October	37.9	2,870.2
November	45.6	2,768.8
December	42.7	2,756.2
Average	51.5	3211.8
Total		38,542

Total Yearly Kilograms: 38,542

Table 8 Chemical Usage Summary: Chlorine Gas

Month	Average Dosage mg/L	Total kg (dry)
January	Not Used	0
February	Not Used	0
March	Not Used	0
April	Not Used	0
May	Not Used	0
June	Not Used	0
July	Not Used	0
August	Not Used	0
September	Not Used	0
October	Not Used	0
November	Not Used	0
December	Not Used	0
Average	Not Used	0

Total Yearly Kilograms: 0

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

Sample Date	Sample Identification Number	CBOD5 mg/L	pH	Phosphate	Total Phosphorus mg/L	Suspended Solids mg/L
Feb. 04/21	CA12756-Feb21	3	7.26	<0.03	0.07	<2
May 27/21	CA15737-MAY21	2	7.39	<0.03	0.10	<2
Aug 12/21	CA12505-AUG21	<2	7.49	<0.03	0.06	2
Nov 11-21	CA12497-NOV21	<2	7.79	< 0.03	0.03	2
Yearly Average		2.3	7.48	0.03	0.07	2
Maximum				0.03	0.10	2
Minimum				0.03	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. 04/21	CA12756-Feb21	22.3	0.21	0.08	21.2
May 27/21	CA15737-MAY21	13.3	24.4	0.26	14.3
Aug 12/21	CA12505-AUG21	1.9	22.1	<0.03	<0.1
Nov 11-21	CA12497-NOV21	<0.5	16	<0.03	<0.1
Yearly Average		9.5	15.7	0.1	8.9
Maximum		22.3	24.4	.26	21.2
Minimum		0.5	16	0.03	0.1

Table 11 Effluent Loading and Concentration Summary 2021: COBD5

Month	Average mg/L	Average kg/day	Maximum Daily kg/day
January	3.00	5.39	6.46
February	3.00	5.23	7.05
March	2.00	5.21	8.34
April	2.00	4.53	5.63
May	2.75	5.28	6.24
June	2.40	4.64	8.58
July	2.00	5.49	8.96
August	2.00	4.41	6.46
September	2.20	4.79	7.87
October	2.25	5.54	6.41
November	2.00	4.10	4.94
December	2.00	4.25	5.75
Average Monthly	**2.3**	**4.91**	**6.89**
Effluent Objective	10	44.56	44.56
Non-Compliance	15	66.84	66.84

Table 12 Effluent Loading and Concentration Summary 2021: Suspended Solids

Month	Average mg/L	Average kg/day	Maximum Daily kg/day
January	2.75	4.94	5.92
February	2.25	3.93	5.29
March	2.00	5.21	8.34
April	2.75	6.22	7.74
May	2.75	5.28	6.24
June	2.60	5.03	9.29
July	2.50	6.86	11.20
August	2.25	4.96	7.27
September	3.60	7.84	12.88
October	2.25	5.54	6.41
November	2.25	4.61	5.56
December	3.60	7.66	10.34
Average Monthly	**2.63**	**5.67**	**8.04**
Effluent Objective	**10**	**44.56**	**44.56**
Non-Compliance	**15**	**66.84**	**66.84**

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

Month	Average mg/L	Average kg/day	Maximum Daily kg/day
May	11.60	22.27	26.31
June	1.32	2.55	4.72
July	5.75	15.79	25.76
August	0.78	1.72	2.52
September	0.01	0.02	0.04
Average Monthly	**3.89**	**8.47**	**11.87**
Effluent Objective	**N/A**	**N/A**	**N/A**
Non-Compliance	**N/A**	**N/A**	**N/A**

Table 14 Effluent Loading and Concentration Summary 2021: Total Ammonia Nitrogen Winter

Month	Average mg/L	Average kg/day	Maximum Daily kg/day
January	17.33	31.16	37.32
February	21.73	37.92	51.09
March	18.40	47.90	76.71
April	13.80	31.23	38.84
October	0.01	0.02	0.03
November	0.25	0.51	0.62
December	0.62	1.32	1.78
Average Monthly	**10.3**	**21.4**	**29.5**
Effluent Objective	**N/A**	**N/A**	**N/A**
Non-Compliance	**N/A**	**N/A**	**N/A**

Table 15 Effluent Loading and Concentration Summary 2021: Fecal Coliform

Month	Geomean (#/100mL)	Maximum Daily (#/100mL)
January	0.00	0.00
February	1.00	3.00
March	0.00	0.00
April	0.00	0.00
May	0.00	0.00
June	2.60	13.00
July	0.00	0.00
August	0.00	0.00
September	0.20	1.00
October	0.00	0.00
November	0.00	0.00
December	0.00	0.00
Average Monthly	**0.3**	**1.4**
Effluent Objective	**80**	**80**
Non-Compliance	**200**	**200**

Table 16 Effluent Loading and Concentration Summary 2021: Total Phosphorus

Month	Average mg/L	Average kg/day	Maximum Daily kg/day
January	0.04	0.07	0.09
February	0.06	0.10	0.14
March	0.04	0.10	0.17
April	0.03	0.07	0.08
May	0.07	0.13	0.16
June	0.05	0.10	0.18
July	0.07	0.19	0.31
August	0.05	0.11	0.16
September	0.05	0.11	0.18
October	0.04	0.10	0.11
November	0.04	0.08	0.10
December	0.04	0.09	0.11
Average Monthly	**0.05**	**0.10**	**0.15**
Effluent Objective	**0.30**		
Non-Compliance	**0.50**		**2.44**

Table 17 Liquid Sludge Production Summary 2021

Month	Hauler	Cake Weight kg	Destination
January	Waste Connections	75,740	Lystek
February	Waste Connections	53,990	Lystek
March	Waste Connections	78,300	Lystek
April	Waste Connections	51,350	Lystek
May	Waste Connections	55,830	Lystek
June	Waste Connections	114,210	Lystek
July	Waste Connections	66,440	Lystek
August	Waste Connections	91,190	Lystek
September	Waste Connections	42,940	Lystek
October	Waste Connections	31,590	Lystek
November	Waste Connections	87,900	Lystek
December	Waste Connections	72,290	Lystek

Yearly Total Volume: 821,770
Yearly Average Volume: 68,481
Maximum Volume: 114,210
Minimum Volume: 31,590

Table 18 Sludge Quality Analysis 2021

Parameter Sampled (mg/L)	First Quarter	Second Quarter	Third Quarter	Fourth Quarter
Date	Feb 04, 2021	May 27, 2021	Aug 12, 2021	Nov 11, 2021
Sample ID	Digester Sludge	Digester Sludge	Digester Sludge	Digester Sludge
Nitrate	<0.3	<0.3	<0.3	<0.3
Mercury	0.007	0.008	0.005	0.016
Chromium	0.23	0.29	0.29	0.34
Cobalt	0.04	0.04	0.05	0.05
Copper	6.0	6.8	7.9	8.9
Lead	0.2	0.3	0.3	0.30
Molybdenum	0.15	0.17	0.12	0.15
Nickel	0.15	0.18	0.18	0.21
Selenium	<0.1	<0.1	<0.1	<0.1
Arsenic	<0.1	<0.1	<0.1	<0.1
Zinc	7	10	10	11
Cadmium	0.014	0.016	0.015	0.017
Ammonia+ Ammonium	457	464	485	434
Total Kjeldahl Nitrogen	1160	988	1050	1160
Total Phosphorus	350	350	400	460
Total Solids	14200	15900	16600	17600
Volitile Acids	<40	57	98	45
Nitrite	<0.2	<0.2	<0.2	<0.2

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

Michael Currie
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