THE DISTRICT MUNICIPALITY OF MUSKOKA

Lone Pine Water Pollution Control Plant

2019 Wastewater, 2019 End Report

Environmental Certificate of Approval: #3-0429-96-006

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Introduction

The Lone Pine Road Water Pollution Control Plant (WPCP), 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, and was commissioned in October 1997. It currently services 209 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 m^3/day and the maximum design flow rate is 2,230 m^3/day.

The treatment plant began treating sewage from the Port Severn wastewater collection system on October 1997. The collection system includes three remote sewage lift stations and an influent pumping station. Located at the treatment plant site are 2 ICEAS Sequencing Batch Reactors, each with a rated design capacity of 1,115 m^3/day, giving a total peak design flow rate of 2,230 m^3/day. Additionally, effluent limit criteria are as follows:

Effluent Parameter	Concentration	Total Effluent Loading
CBOD5	15 mg/l	10.5 kg/day
Suspended Solids	15 mg/l	10.5 kg/day
Ammonia/Ammonia Nitrogen	2.5 mg/l (May-October)	1.75 kg/day
	15 mg/l (November-April)	2.7 kg/day
Total Phosphorous	0.30 mg/l	0.21 kg/day (or 100 kg/year)
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 (Fiberglass Reinforced Plastic) diffuser, located downstream of Lock 45, in Severn Sound.

Waste sludge from the plant process is digested aerobically at the plant, and is 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'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 Certificate of Approval 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 CoA #3-0429-96-006.

Quantity of Flow Summary

The plant has a daily average flow design capacity of 700 m^3/day. The actual average daily flow for the year was 211 m^3/day, however, the 3-year average is 209 m^3/day, which represents 30% 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 2019

Summary of Maintenance

There were no significant plant upgrades on major infrastructure in 2019.

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 infrared inspection of Motor Control panels.
- Annual calibration of flow metering devices.
- Annual cleaning of all sewage pumping stations.
- Marine inspection of effluent outfall and diffuser completed in 2017. (5 2019 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 30% 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.

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 2019.

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

	Minimum	4 Week Average Maximum	Annual Average	Average loading kg/day
BOD5 (mg/l)	42	244.00	157.68	40.22
Suspended Solids (mg/l)	27	299.80	184.74	46.90
Total Phosphorous (mg/l)	0.57	5.66	3.11	0.78
Ammonia (mg/l)	9.00	50.30	27.11	6.84
pH	Min – 6.98	Max – 8.35	7.28	Not Applicable

Effluent Objectives analysis

The information reported in the Final Effluent sample results summary table #7 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. All Objectives were met in 2019.

Final Effluent Analysis Summary

	Minimum	4 Week Average Maximum	Annual Average	Average Loading kg/day
CBOD5 (mg/l)	2.0	2.40	2.06	0.43
Suspended Solids (mg/l)	2.0	2.80	2.29	0.49
Total Phosphorous (mg/l)	0.03	0.11	0.05	0.01
Ammonia (mg/l)	0.10	0.28	0.17	0.04
E. Coli (#/100 ml)	0	13.50	1.53	Not Applicable
pH	Min – 6.37	Max – 7.45	6.90	Not Applicable

All final effluent samples tested for CBOD5, suspended solids, ammonia, E. Coli, and total phosphorous were below non-compliance limits outlined in the ECA.

Final Effluent Sampling Summary

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

Biosolids Generation

The quality and volume 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 2019, and will continue to do so in 2020. It is not anticipated that there will be a significant increase in the total volume of bio solids produced in 2020.

Wastewater Collection Summary

New Sewer Services
A total of 17 customers connected to existing sewer laterals in 2019, 2 of which were installed in 2019.

New Sewer Mains
There were new sewer mains to report in 2019.

Sewer Main Replacements
There were no sewer mains replaced in 2019.

Low Pressure Sewer Breaks
There were no low pressure sewer breaks in 2019.

Sewer Force Main Breaks
There were no sewer force main breaks in 2019.

Sewer Force Main Valve Replacement
There were no sewer force main valve replacements in 2019.

Main Line Sewer Blockage
There were no main line sewer blockages in 2019.

Sewer Lateral Blockage
There were no sewer lateral blockages in 2019.

Low Pressure Sewer Blockages
No low pressure sewer blockages in 2019.

Frozen Sewer Force Mains
No sewer force mains froze in 2019.

Frozen Sewer Service Laterals
No sewer service laterals froze in 2019.

Frozen Low Pressure Sewer Services
No low pressure sewer services froze in 2019.

Air Release Valves
All sewer Air-Vacuum Release Valves were inspected twice in 2019.

Sewer Flushing/Video
A total of 817 Meters of sewer main was flushed and video inspected in 2019.

Sewer Rehabilitation
There was no sewer rehabilitation in 2019.

Sewer locates
District staff addressed 93 locate requests in 2019.

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 of Water and Wastewater Operations

Mike Mitchell
Manager of Water and Wastewater Operations

TABLE 1: EFFLUENT FLOW SUMMARY - 2019

District of Muskoka - Lone Pine Dr. WPCP - Port Severn

Month	Total Monthly (m^3)	Average Day Flow (m^3/d)	Maximum Day Flow (m^3/d)	Minimum Day Flow (m^3/d)	Comments
January	3,945	127	192	97	
February	3,676	131	178	90	
March	5,274	170	284	99	
April	9,037	301	741	174	
May	8,821	285	445	214	
June	7,332	244	346	170	
July	8,036	259	337	196	
August	7,445	240	284	189	
September	5,777	193	267	138	
October	5,648	182	483	86	
November	6,297	210	487	59	
December	5,589	180	249	114	

Total	76,877
Average Day	211
Maximum Day	741
Minimum Day	59

TABLE 3: INFLUENT QUARTERLY ANALYSIS SUMMARY - 2019

District of Muskoka - Lone Pine Dr. WPCP - Port Severn

Sample Date	Sample Identification Number	Weekly 24 Hour Composite Sample					
		BOD5 mg/L	Alkalinity (Total as CaCO3) mg/L	pH	Phosphate mg/L	Total Phosphorus mg/L	Suspended Solids mg/L
11-Feb-19	CA12199	151		7.33		2.62	168
13-May-19	CA12597	202		7.07		2.53	214
12-Aug-19	CA12522	233		6.96		6.6	277
11-Nov-19	CA12448	115		7.26		1.74	93
Yearly Average		175.3		7.2		3.4	188.0
Maximum		233.0		7.3		6.6	277.0
Minimum		115.0		7.0		1.7	93.0

Sample Date	Weekly 24 Hour Composite Sample					
	Conductivity mg/L	Total Kjeldahl Nitrogen mg/L	Nitrate Nitrogen mg/L	Nitrite Nitrogen mg/L	Total Ammonia Nitrogen mg/L	Chloride mg/L
11-Feb-19		25.2			14.1	
13-May-19		29.2			26.4	
12-Aug-19		60.8			25.0	
11-Nov-19		21.1			4.2	
Yearly Average		34.1			17.4	
Maximum		60.8			26.4	
Minimum		21.1			4.2	

TABLE 4: CHEMICAL USAGE SUMMARY - 2019

District of Muskoka - Lone Pine Dr. WPCP - Port Severn

	ALUM			SODA ASH			SODIUM HYPOCHLORITE			POLYMER		
Month	Average Dosage	Total kg	Estimated Monthly Cost	Average Dosage	Total kg	Estimated Monthly	Average Dosage	Total kg	Estimated Monthly	Average Dosage	Total kg	Estimated Monthly
January	118.5	1,101.5	$373									
February	122.2	1,080.4	$366									
March	117.3	1,513.9	$513									
April	114.1	2,543.9	$862									
May	113.4	2,388.8	$810									
June	111.1	1,979.4	$671									
July	110.3	2,114.7	$717									
August	110.6	2,065.7	$700									
September	111.0	1,605.6	$544									
October	113.3	1,537.4	$521									
November	129.8	2,079.2	$705									
December	129.1	1,828.8	$620									
Average Monthly	116.7	1819.9	$617	0.0	0.0	$0	0	0.0	$0	0.0	0	$0
Unit Cost (see note 1)		$339.00	per MT			per kg			per MT			per MT
Total Yearly		21,839	$7,404		0	$0		0	$0		0	$0

TOTAL YEARLY COST OF CHEMICALS =	$7,404

TABLE 6: EFFLUENT QUARTERLY ANALYSIS SUMMARY - 2019

District of Muskoka - Lone Pine Dr. WPCP - Port Severn

Sample Date	Sample Identification Number	BOD5 mg/L	Alkalinity (Total as CaCO3) mg/L	pH	Phosphate mg/L	Total Phosphorus mg/L	Suspended Solids mg/L
11/Feb/19	CA12199	2		7.08		0.06	2
13/May/19	CA12597	2		7.73		0.03	3
12/Aug/19	CA12522	2		7.54		0.05	2
11/Nov/19	CA12448	2		7.88		0.06	2
Yearly Average		2		7.56		0.05	2
Maximum		2		7.88		0.06	3
Minimum		2		7.08		0.03	2

Sample Date	Conductivity mg/L	Total Kjeldahl Nitrogen mg/L	Nitrate Nitrogen mg/L	Nitrite Nitrogen mg/L	Total Ammonia Nitrogen mg/L	Chloride mg/L
11/Feb/19	878				0.2	
13/May/19	773				0.1	
12/Aug/19	750				0.4	
11/Nov/19	766				0.1	
Yearly Average	792				0.2	
Maximum	878				0.4	
Minimum	750				0.1	

INFLUENT LOADING 2019

District of Muskoka - Lone Pine Dr. WPCP - Port Severn

MONTH	BOD_5			SUSPENDED SOLIDS			Ammonia			TOTAL PHOSPHOROUS			pH	
	Average			Average			Average			Average			Minimum	Maximum
	mg/L	kg/d		mg/L	kg/d		mg/L	kg/d		mg/L	kg/d			
January	148.80	22.12		176.80	26.28		26.84	3.99		3.42	0.51		7.29	7.40
February	147.50	22.57		161.75	24.75		20.68	3.16		2.72	0.42		7.16	8.35
March	121.30	24.40		135.50	27.26		15.95	3.21		1.93	0.39		7.21	7.47
April	118.40	42.74		135.80	49.03		12.46	4.50		1.22	0.44		7.12	7.53
May	159.25	52.47		142.75	47.03		22.98	7.57		2.03	0.67		7.18	7.51
June	180.80	52.05		223.30	64.28		29.50	8.49		3.56	1.02		7.07	7.23
July	223.40	66.45		299.80	89.17		38.44	11.43		4.88	1.45		7.08	7.30
August	244.00	71.74		262.50	77.18		50.30	14.79		5.66	1.66		7.05	7.20
September	199.80	46.75		240.20	56.20		42.68	9.99		5.12	1.20		6.98	7.24
October	118.30	25.83		175.50	38.31		33.75	7.37		2.97	0.65		7.09	7.28
November	105.00	27.71		117.00	30.88		13.23	3.49		1.67	0.44		7.12	7.31
December	125.60	27.86		146.00	32.39		18.46	4.09		2.10	0.47		7.15	7.30
4 Week Average Maximum	244.00			299.80			50.30			5.66				
Annual Average	157.68	40.22		184.74	46.90		27.11	6.84		3.11	0.78		7.28	
Minimum	42			27.00			9.00			0.57			6.98	
Maximum														8.35

TABLE 7: EFFLUENT LOADING and CONCENTRATION SUMMARY - 2019

District of Muskoka - Lone Pine Dr. WPCP - Port Severn

MONTH	$CBOD_5$			SUSPENDED SOLIDS			TOTAL AMMONIA NITROGEN						pH		E.Coli.		TOTAL PHOSPHOROUS		
							Summer (May to Oct)			Winter (Nov to Apr)									
	Average		Maximum Daily	Average		Maximum Daily	Average		Maximum Daily	Average		Maximum Daily	Minimum	Maximum	Average	Maximum Daily	Average		Maximum Daily
	mg/L	kg/d	kg/d	mg/L	kg/d	kg/d	mg/L	kg/d	kg/d	mg/L	kg/d	kg/d			#/100 mL	#/100 mL	mg/L	kg/d	kg/d
January	2.00	0.25	0.07	2.00	0.25	0.07				0.14	0.02	0.01	6.37	6.99	0.40	1.00	0.03	0.004	0.001
February	2.00	0.26	0.07	2.25	0.30	0.08				0.28	0.04	0.01	6.47	7.06	0.50	2.00	0.05	0.007	0.002
March	2.25	0.38	0.09	2.00	0.34	0.08				0.10	0.02	0.00	6.38	7.11	0.00	0.00	0.04	0.007	0.002
April	2.40	0.72	0.13	2.80	0.84	0.15				0.18	0.05	0.01	6.61	7.17	0.00	0.00	0.06	0.018	0.003
May	2.00	0.57	0.11	2.25	0.64	0.13	0.10	0.03	0.02				6.71	7.24	0.50	2.00	0.03	0.009	0.002
June	2.00	0.49	0.10	2.25	0.55	0.11	0.20	0.05	0.05				6.77	7.02	0.25	1.00	0.04	0.010	0.002
July	2.00	0.52	0.12	2.20	0.57	0.13	0.20	0.05	0.05				6.70	7.27	0.20	1.00	0.06	0.016	0.003
August	2.00	0.48	0.11	2.50	0.60	0.13	0.18	0.04	0.03				6.58	7.16	1.00	3.00	0.04	0.010	0.002
September	2.00	0.39	0.08	2.40	0.46	0.10	0.16	0.03	0.03				6.46	7.33	1.00	4.00	0.04	0.008	0.002
October	2.00	0.36	0.08	2.25	0.41	0.09	0.13	0.02	0.03				6.71	7.45	13.50	43.00	0.11	0.020	0.005
November	2.00	0.42	0.09	2.50	0.52	0.11				0.20	0.04	0.01	6.87	7.40	0.75	1.00	0.06	0.013	0.003
December	2.00	0.36	0.07	2.00	0.36	0.07				0.58	0.10	0.02	6.50	7.41	0.20	1.00	0.04	0.007	0.001
4 Week Average Maximum	2.40			2.80			0.20			0.58					13.50		0.11		
Annual Average	2.06	0.43	0.09	2.29	0.49	0.11	0.16	0.038	0.038	0.25	0.045	0.010	6.91		1.53	4.92	0.05	0.011	0.002
Effluent Objective	<10.0	7.0		<10	7.0		<1.0	0.7		4.00	0.7		Annual Minimum	Annual Maximum	0.00		<0.15	0.11	
Non-Compliance	15.0	10.5		15.0	10.5		2.5	1.75		15.00	2.7		6.37	7.45	80.00		0.30	0.21	

TABLE 9: LIQUID SLUDGE PRODUCTION SUMMARY - 2019

District of Muskoka - Lone Pine Dr. WPCP - Port Severn

No.	Date	Hauler	Shipped To		Received From		Comments
			Location	Volume	Location	Volume	
1	JAN			0.00			
2	FEB			0.00			
3	MARCH			0.00			
4	APRIL			0.00			
5	MAY			0.00			
6	JUNE	ROHES	ROHES LAGOON	291.20			
7	JULY			0.00			
8	AUG	ROHES	ROHES LAGOON	72.80			
9	SEPT			0.00			
10	OCT	ROHES	ROHES LAGOON	109.20			
11	NOV			0.00			
12	DEC			0.00			
Yearly Total			473.20				

TABLE 10: SLUDGE QUALITY ANALYSIS - 2019

District of Muskoka - Lone Pine Dr. WPCP - Port Severn

Parameter Sampled Date		Quaterly Analysis 11/Feb/19	 13/May/19	 Aug-19	 Nov-19	Average	Comments
Sample ID		CA12190	CA12596	CA12521	CA12446		
Nitrate	mg/L	102	48	2.2	22	43.55	
Mercury	mg/L	0.065	0.154	0.066	0.019	0.08	
Chromium	mg/L	0.50	1	0.64	0.16	0.58	
Cobalt	mg/L	0.04	0.08	0.04	0.01	0.04	
Copper	mg/L	5.2	10	6.5	1.6	5.83	
Lead	mg/L	0.1	0.3	0.2	0.10	0.18	
Molybdenum	mg/L	0.08	0.2	0.13	0.05	0.12	
Nickel	mg/L	0.33	0.66	0.35	0.1	0.36	
Selenium	mg/L	<0.1	0.1	0.1	0.10	0.10	
Arsenic	mg/L	<0.1	0.2	0.1	0.1	0.15	
Zinc	mg/L	7.2	13	9	2.3	7.88	
Cadmium	mg/L	0.011	0.021	0.014	0.005	0.01	
Ammonia	mg/L	0.9	7.7	5.1	1	3.68	
Total Kjeldahl Nitrogen	mg/L	508	617	742	190	514.25	
Total Phosphorus	mg/L	530	1000	650	160	585.00	
Total Solids	mg/L	20500	31500	22500	5910	20103	
NO2	mg/L	0.4	0.8	0.2	0.2	0.40	
Chloride	mg/L	92	100	100	100	98	
PO4(sol)(Dissolved Reactive Phosphorous)	mg/L as P	0.75	0.75	0.75	0.75	0.75	
TSS	mg/L	18900	31300	19200	4880	18570	
BOD	mg/L	457	852	510	358	544.25	
COD	mg/L	12500	11000	13500	5600	10650.00	