



Wastewater Operations

Annual Performance Report **~ Cookstown Water Pollution Control Plant ~** **ECA #9741-B4GRWZ**

~ Town of Innisfil ~

Reporting Year – 2019

Introduction

Effective January 1, 2016, the Town of Innisfil (TOI) transferred ownership of its municipal sewage works to InnServices Utilities Inc. (InnServices). InnServices is a municipal service corporation, wholly-owned by the Town of Innisfil, charged with the responsibility to operate, maintain and expand the municipal sewage works that service the Town of Innisfil.

InnServices has prepared this Summary Report for the operations conducted during the 2019 calendar year.

This Annual Report has been prepared to meet the following commitments:

- To provide InnServices Utilities Inc. Board of Directors, as Owners of the sewage works, a summary of the operations and maintenance of the Cookstown Water Pollution Control Plant that took place during the reporting period of January 1 to December 31, 2019; and
- To comply with Condition 11 of ECA #9741-B4GRWZ

This Annual Report, provided to the InnServices Board of Directors and Town of Innisfil Mayor and Council, conveys information related to the performance of operations and maintenance, which aids decision making related to system expansion needs.

The Cookstown Water Pollution Control Plant (WPCP) is a package extended aeration facility constructed in 1986, located at 59 Victoria Street West in Cookstown. The treated effluent is discharged seasonally to Innisfil Creek through a pumping station and force main. The collection system consists of approximately 14 km of gravity sewers servicing the community of Cookstown.

Environmental Compliance Approval

For the reporting period covered in this report, InnServices Utilities Inc. was defined as the Operating Authority of the Cookstown Water Pollution Control Plant (WPCP) and the associated collection system.

The treatment facility and collection system are operated under the following Certificates of Classification:

Class II Wastewater Treatment certificate #950
Class I Wastewater Collection certificate #1479

The Cookstown WPCP operated under Environmental Compliance Approval (ECA) Number 4852-9Q3LC4 until the issuance of ECA #9741-B4GRWZ on May 29, 2019. The ECA identifies a design capacity of 825 m³/day.

ECA Number 4098-BC2SMK was issued May 30, 2019 for the Cookstown Sewage Collection System.

Influent Monitoring

The 2019 average daily influent flow was 540 m³ or 65.5% of plant capacity.

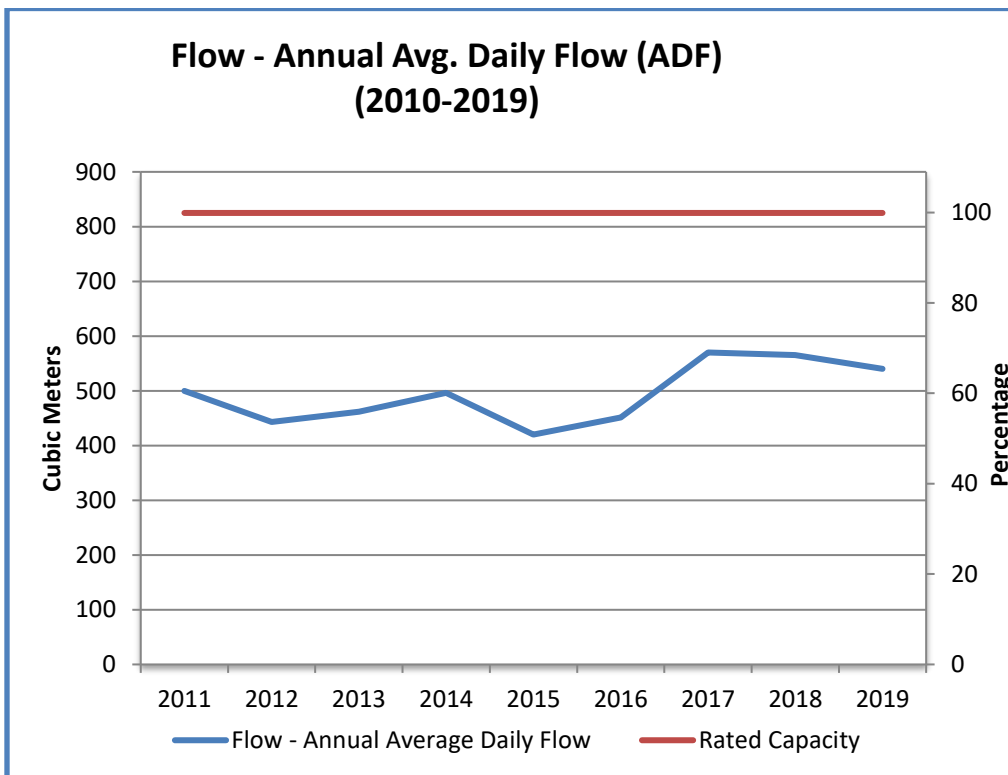
The plant received a raw influent total of 197,144 m³ for the entire year.

The 2019 maximum daily flow occurred April 20, when the flow recorded was 1,362 m³.

The overall removal efficiency is 95.3%.

Cookstown Flows	Design Capacity	80% of Rated Capacity	2019 Flows	Performance
Daily Flow	825 m ³ / day	660 m ³ / day	540 m ³ /day Average Daily Flow	65.5% of Design
Peak Flow	2634 m ³ /day	2107 m ³ / day	1362 m ³ /day (April 20, 2019)	51.7% of Design
Annual Total	-----	-----	197,144 m ³	

Figure 1 below provides a visual display of the annual average day influent flow trend for the ten year period of 2010 – 2019.



Monitoring of influent requires monthly sampling. The annual averages and removal efficiencies are depicted in this table:

Cookstown WPCP Parameter-Influent	Sample Type	Minimum Frequency	Monthly Average (mg/L)	Removal Efficiency
CBOD5	Grab	Monthly	278	98.6%
Total Suspended Solids (TSS)	Grab	Monthly	287	98%
Total Phosphorus (TP)	Grab	Monthly	5.44	99.1%
Total Kjeldahl Nitrogen (TKN)	Grab	Monthly	53.2	88.9%
Total Ammonia Nitrogen	Grab	Monthly	45.39	89.3%

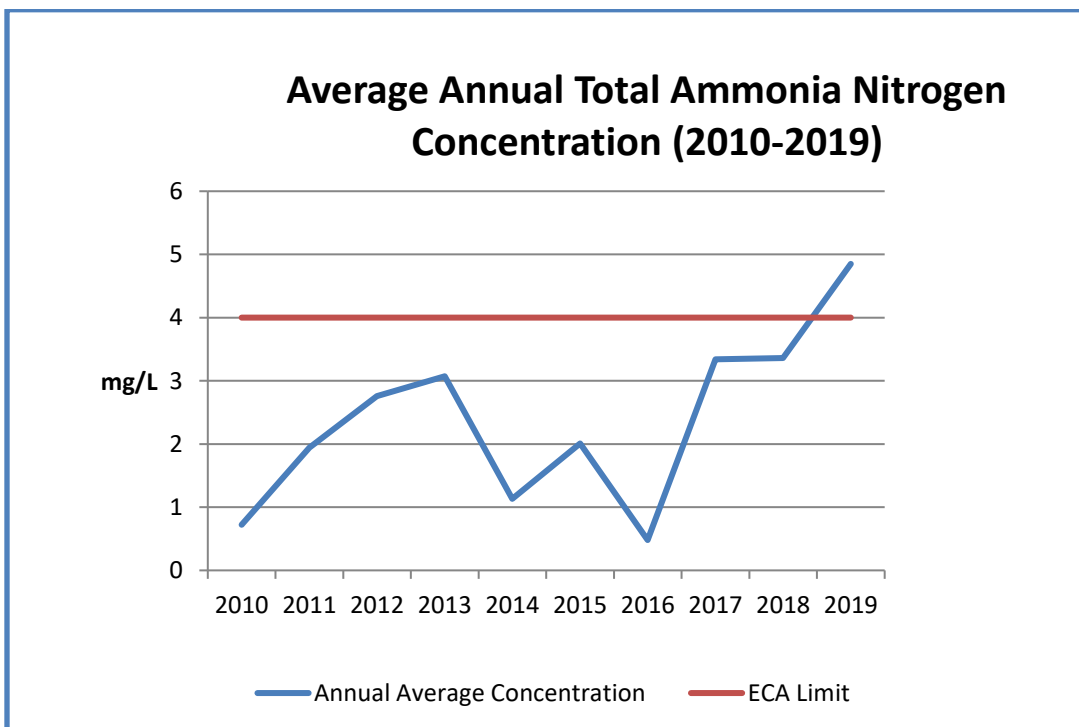
Final Effluent Monitoring

A total of 202,166 m³ of final effluent was discharged from the polishing lagoon during the discharge periods of January through June, and October through December, 2019.

Discharge activities were suspended April 1, 2019 due to elevated Total Ammonia Nitrogen. Permission to amend the discharge rates to the Innisfil Creek was granted by the MECP. Discharge rates were based upon the creek flow, which was checked daily. Details are in the Effluent Discharge Extension Report attached to this report.

The annual average concentration for Total Ammonia Nitrogen (TAN) was 4.86 mg/L which exceeded the limit of 4.0 mg/L.

The chart below shows the historic trend for TAN:



The table below identifies the effluent limits as set out in the ECA and the corresponding 2019 Effluent Quality data:

Cookstown WPCP Effluent Parameter	ECA Effluent Limits (mg/L unless otherwise indicated)	2019 Treated Effluent Annual Average Concentration (mg/L unless otherwise indicated)
<i>CBOD₅</i>	25	3.81
Total Suspended Solids	25	5.66
Total Phosphorus	1.0	0.05
Total Phosphorus Load	300 kg/year	10.5 kg/year
Total Ammonia Nitrogen (Ammonia Nitrogen + Ammonium Nitrogen)	4.0	4.86

Effluent Discharge 2019 Cookstown WPCP		
Month	Maximum Discharge Rate	Total Discharge (m ³)
January	10 L/sec	22,923
February	10 L/sec	19,931
March	10 L/sec	17,829
April	0 L/sec	0
May	10 L/sec	19,227
June	59 L/sec	67,613
October	10 L/sec	16,564
November	10 L/sec	19,862
December	10 L/sec	18,218
Total		202,166

Monitoring Schedule

Influent sampling is required at a minimum frequency of monthly by grab sampling. The influent sampling point is located in the Inlet Works.

Monitoring of final effluent is done during the designated discharge period (October 1 – May 31) except for April. In April, effluent is sampled once per week, the first sample is collected one day after commencement of lagoon draw-down, and the last within one day before the holding level in the lagoon is attained.

The pH and temperature of the Final Effluent is determined in the field at the time of sampling.

In 2019, weekly effluent sampling was completed weekly from May 15 to June 24 because discharge activities had been suspended in April due to elevated Total Ammonia Nitrogen.

Sampling type is determined by the parameter and includes grab, probe or analyzer. Samples for final effluent reporting were collected from the sample ports on the discharge side of the effluent pumps at the outlet of the storage pond.

Flow rates for influent and final effluent discharge are monitored by continuous flow measuring devices.

As per Condition 9.1.b of the ECA, Monday has been designated as the scheduled day for sampling, except for statutory holidays when this shifts to the next appropriate day. This schedule was maintained throughout 2019 without deviation. The scheduled sample day will be rotated (July 2020) to Tuesday and is expected to be maintained in 2020.

Operational Issues

Much of the equipment, structures mechanisms and apparatus forming the Works are aging and require frequent assessment. Repair and/or replacement is completed when necessary, those items of larger scope are put forth as Capital Works Projects.

The system experienced high TAN (Total Ammonia Nitrogen, expressed as $\text{NH}_3 + \text{NH}_4$) concentrations in late winter 2019, which has been attributed to cold temperatures, ice covering and lagoon turnover. The cold temperatures inhibit biological activity, which is needed for nitrification. As a result, conditions were not favorable for discharge from the period of April 1 – May 14, 2019.

An Emergency request for an amendment to the ECA was filed with the MECP. The amendment allows discharge and flexible discharge rates outside the previously defined discharge season. This was approved, and the new ECA with added conditions to extend the discharge season was issued May 30, 2019. The Effluent Discharge Extension Report is attached to this annual report.

There were continued mechanical issues with the aerators, and the new aerators installed in 2018 did not perform to expectations. An engineering consulting firm has been engaged to develop control processes and address operational issues.

Maintenance Activities

The Maintenance Mechanic and Operations Staff perform a variety of scheduled, preventative, predictive and reactive maintenance on a variety of equipment throughout the year. Equipment replacement and upgrades contribute to greater process control at the Plant and increased capacity in the collection system.

Notable maintenance activities in 2019 include:

- New block heater for generator

- Replaced 2 aerators with high efficiency motors

- New backflow preventers installed

Effluent Quality Assurance

Analytical tests to monitor required parameters are performed by SGS Environmental Services, which is accredited by Canadian Association for Laboratory Accreditation Inc. (CALA) in accordance with the recognized International Standard ISO/IEC 17025:2005. Plant operation and performance is monitored by licensed operators.

Calibration

Annual verifications/calibrations of flow monitoring equipment were performed in October, 2019 by a third party instrumentation and controls technician. This included influent and effluent monitoring equipment. All were found to be within the tolerance of the equipment as recommended by the manufacturer.

Summary of efforts made to achieve Design Objective

Design Objectives were achieved more than 50% of the year. The 2019 average daily influent flow was 540 m³, which equates to 65.5% of the plant's design rated capacity of 825 m³ per day.

The annual average effluent concentration for TAN is trending higher to the point of non-compliance for 2019. An engineering consulting firm has been engaged to help find a solution. They are conducting an assessment of data, operational processes and equipment to determine changes that may be implemented to meet effluent limits.

Sludge generation and removal

There were no activities related to the disposal of sludge (NASM) during 2019.

Complaints

Complaints are received and logged through the Town of Innisfil. There were zero (0) complaints logged with regard to the Cookstown WPCP facility and collections system in 2019.

Bypass and Spills

There were no bypasses or spills reported in 2019.

Notices of Modifications to Sewage Works

There were no Notices of Modification submitted to the Water Supervisor as per Paragraph 1.d of Condition 10.

Efforts to Achieve Conformance with Procedure F-5-1

InnServices Utilities (IUI) Engineering group have been working on a number of projects and initiatives to eliminate Bypass/Overflow incidents. These include, but are not limited to the following in 2019:

- Regular flushing and inspection program; CCTV inspection every 5 years as per ECA# 4098-BC2SMK, Condition 3.2.b
- Flow Monitoring of active subdivisions.
- Install bulkheads from un-occupied subdivision phases to existing sewer system
- CCTV mainline and laterals (development) twice prior to assumption
- Sanitary exfiltration testing of new sewers
- External MH wrapping of horizontal joints on new projects

IUI Engineering has identified the following practices and projects for 2020:

- Looking at External MH wrapping of horizontal joints and frame/moduloc on all projects (Capital and Development)
- Looking at Replacing MH lids with Waterproof MH Lids in grassed, low lying, or in areas with regular flooding
- Add Bulkhead requirement to Town Standards with regular Inspections and confirmation requirements
- Look at opportunities for more MH rehabilitation.
- Look at opportunities for more Sewer rehabilitation.
- Look at Wrapping of pipe to MH Connections similar to Region of Peel
- Add to Sewer bylaw Temporary capping of existing laterals during demolition to eliminate future infiltration
- Add to Sewer bylaw Mainline sewer lining of a lateral for permanent abandonment for a demolition to eliminate future infiltration
- Look at Rebate program for disconnection of sump pump from sanitary, similar to City of Barrie.
- Add I&I info and education to Town website
- Flow monitoring of new developments from first occupancy till assumption and emergency measures to be established for high flow events
- MH condition assessment program (Private and Municipal)
- Sewer-use By-law to include right-of-entry (ROE) to ensure access to private property for future I&I investigation

It has been recognized that the TOI Sewer Use Bylaw needs updating. A revision of the bylaw is underway, to be followed by third-party and TOI review before presentation to TOI Council anticipated in Q4-2020.

The need for a detailed Bypass/Overflow procedure has been recognized. This will be developed in 2020.

RAW INFLUENT							FINAL EFFLUENT												
2019 DATE	pH	BOD5	CBOD5	T.S.S.	total P	TKN	pH field	Temp. field	pH @ 15°	CBOD5	T.S.S.	total P	TKN	NH3+ NH 4	Un-ionized ammonia**	NO2	NO3	NO2+NO3 as Nitrogen	E. Coli
3-Jan-19	7.64		110	189	4.13	46.2	7.46		7.99	2	2	0.04	6.3	5.40	0.143	0.37	1.9	2.27	50
4-Feb-19	8.05		384	322	5.69	49.7	7.94		7.02	2	2	0.07	10.2	8.40	0.024	0.18	1.28	1.46	4
11-Jul-05	8.16		265	236	6.16	56.4	7.54		7.52	10	7	0.08	17.6	14.80	0.134	0.03	0.21	0.24	52
April AVG	8.17		219	206	3.87	42.5													
May AVG	7.19		234	204	3.1	22.5	7.755		7.798	3.5	2	0.04	1.68	1.34	0.0254	0.334	3.384	3.718	2
June AVG		221.00		257	5.02	45.8	7.92	18.03	7.92	6.00	7.25	0.06	2.33	1.93	0.07	0.42	1.78	2.20	11.27
Jul-19	7.86		354	342	7.03	71.9													
Aug-19	7.72		349	414	7.06	74.7													
Sep-19	7.36		372	311	6.57	71.3													
Oct-19	7.34		397	407	7.34	60	7.77	18.7	7.99	2	6	0.06	2.3	1.9	0.049	0.07	0.74	0.81	60
Nov-19	7.83		276	319	4.72	49.8	7.35	7.1	7.91	3	17	0.03	1.3	0.6	0.013	0.08	1.33	1.41	28
Dec-19	6.89		93	237	4.6	47.4	7.26	2.7	8.01	2	2	0.04	5.7	4.5	0.123	0.09	1.39	1.48	1320
Annual. Avg	7.66	221.00	278	287.00	5.44	53.18	7.62	11.63	7.77	3.81	5.66	0.05	5.93	4.86	0.07	0.20	1.50	1.70	29.14

Cookstown WPCP Effluent Discharge Extension Report – June 2019
 (Submitted to Cindy Hood, District Manager, MECP)

Background:

Due to elevated total ammonia nitrogen (TAN) concentration present in the Cookstown Water Pollution Control Plant (WPCP) storage lagoons in late March, 2019, it was not possible to discharge effluent over the period of April 1 through May 14, 2019. Because the majority of the effluent discharge typically occurs in the month of April, the levels in the storage lagoons approached critical levels.

InnServices Utilities Inc. along with Melody Johnson of Blue Sky Energy Engineering and Consulting Inc. reached out to the Ministry of Environment, Conservation and Parks (MECP) to amend the existing ECA to provide flexibility to extend the discharge season with requirements and limitations under specific conditions. The amended ECA was issued May 29, 2019.

Effluent Discharge Report:

Flow data for the receiving stream (Innisfil Creek- Station 02ED029) from the Water Survey of Canada (WSC) was closely monitored through the website (<https://wateroffice.ec.gc.ca>) and determined the Maximum allowable Daily Effluent flow rate for the following day. Here is the table (Table 1) used for determining maximum effluent flow:

Table 1 – Effluent Flow determination

Creek Flow	Max daily Eff. Flow (L/s)
> 2.3	60
1.92 - 2.3	50
1.53 - 1.91	40
1.15 - 1.52	30
0.77 - 1.14	20
0.38 - 0.76	10
<0.38	No discharge

Operators maintained a schedule of checking the creek flow and made adjustments to the discharge pump rate between 8-9 a.m. each day.

The previous day stream gauge reading is the reason for changing the discharge rate. This is the Average Flow recorded in column 2 on Table 2 (next page).

Discharge Flow rate which was determined by the stream gauge reading is recorded in column 3. The effluent flow was totalized on SCADA for the period of 12:01 a.m. to 12:00 midnight each day. This volume is recorded in column 4. Table 2 on the following page summarizes this information.

Table 2 – Daily data record

Column 1	Column 2	Column 3	Column 4	
Date	Average Flow (m³/sec)	Discharge flow rate (L/sec)	Volume discharged (m³)	
01-Jun	4.08	55	4769.3	
02-Jun	4.58	55	4842.7	
03-Jun	3.29	56	4906.2	
04-Jun	2.44	57	4963.3	
05-Jun	2.45	58	4999.4	
06-Jun	6.76	58	5035.3	
07-Jun	4.53	59	5034.4	
08-Jun	2.82	58	5035.8	
09-Jun	2.1	58	4974.7	
10-Jun	1.84	13	2518.2	
11-Jun	2.76	13	1118.9	
12-Jun	2.17	57	3220.3	
13-Jun	2.07	13	2509.1	
14-Jun	4.96	13	1132.4	
15-Jun	3.29	9	2036.6	
16-Jun	2.5	54	3803.1	
17-Jun	2.39	54	4703.1	
18-Jun	2.08	10	1978.8	
19-Jun	1.81	4	5.8	
20-Jun	1.64	0	0	
21-Jun	2.51	12.1	11.1	
22-Jun	2.29	0	0	
23-Jun	1.66	0	0	
24-Jun	1.37	48	14	
25-Jun		0	0	
26-Jun		0	0	
27-Jun		0	0	
28-Jun		0	0	
29-Jun		0	0	
30-Jun		0	0	
AVG:	2.85	27.14	67,612.50	total m³
Max	6.76	59	5035.8	
Min	1.37	0	0	



Weekly monitoring of the final effluent was conducted for the list of parameters specified within Schedule D of ECA # 9741-B4GRWZ issued May 29, 2019.

The Total Ammonia Nitrogen monthly average concentration for the month of June was 1.93 mg/L, well below the limit of 4.0 mg/L. Here in Table 3 are the Final Effluent lab results:

Table 3 – Effluent Monitoring for June

2019	pH	Temp.	CBOD5	T.S.S.	total P	TKN	TAN	Un-ionized	NO2	NO3	E. Coli
DATE	field	field						ammonia	as N	as N	
3-Jun-19	7.97	17.60	4	2	0.06	0.5	0.2	0.006	0.16	2.66	14
10-Jun-19	7.98	21.8	5	2	0.03	3.9	3.2	0.087	0.35	1.90	6
17-Jun-19	8.01	19.2	7	3	0.07	3.8	3.4	0.124	0.46	1.52	8
24-Jun-19	7.73	13.5	8	22	0.09	1.1	0.9	0.012	0.7	1.03	24
JUNE AVG	7.92	18.03	6.00	7.25	0.06	2.33	1.93	0.06	0.42	1.78	11.27

Summary:

Permission was granted to extend the discharge period for the Cookstown WPCP into the month of June, 2019.

Volume of discharged effluent totalled 67,612.5 cubic meters, which was discharged from June 1 through June 24, 2019. The maximum daily volume discharged was 5035.8 m³ on June 8.

The average flow of Innisfil Creek during this time was 2.85 m³/second, peaking at 6.76 m³/sec on June 6, 2019.

The average discharge flow rate for the period was 27.14 L/sec, peaking at 59 L/sec on June 7, 2019.

Submitted by

Jackie Matthews
Risk & Compliance Coordinator
InnServices Utilities Inc.

jmatthews@innservices.co

