

2021

Wastewater Performance Report

Township of Stirling-Rawdon



Reporting Period: January 1st- December 31st, 2021
Revision: 0

On December 3, 2021 the issuance of the environmental compliance approval number A-500-6126377731 revoked environmental compliance approval number 9487-9GFSJS issued on May 27, 2014.

Under the ECA # A-500-6126377731, Section 11 (4) requires the Performance Report to contain the following:

- a. A summary and interpretation of all Influent, Imported Sewage and Processed Organic Waste monitoring data, and a review of the historical trend of the sewage characteristics and flow rates;
- b. a summary and interpretation of all Final Effluent monitoring data, including concentration, flow rates, loading and a comparison to the design objectives and compliance limits in this Approval, including an overview of the success and adequacy of the Works;
- c. a summary of all operating issues encountered and corrective actions taken;
- d. a summary of all normal and emergency repairs and maintenance activities carried out on any major structure, equipment, apparatus or mechanism forming part of the Works;
- e. a summary of any effluent quality assurance or control measures undertaken;
- f. a summary of the calibration and maintenance carried out on all Influent, Imported Sewage and Final Effluent monitoring equipment to ensure that the accuracy is within the tolerance of that equipment as required in this Approval or recommended by the manufacturer;
- g. a summary of efforts made to achieve the design objectives in this Approval, including an assessment of the issues and recommendations for pro-active actions if any are required under the following situations:
 - a. when any of the design objectives is not achieved more than 50% of the time in a year, or there is an increasing trend in deterioration of Final Effluent quality;
 - b. when the Annual Average Daily Influent reaches 80% of the Rated Capacity
- h. a tabulation of the measured volume of sludge accumulated in the lagoon cells in five year intervals and the estimated volume in the interim years and when sludge was disposed of during the reporting period, a summary of disposal locations and volumes of sludge disposed at each location;
- i. a summary of any complaints received and any steps taken to address the complaints;
- j. a summary of all Bypasses, Overflows, other situations outside Normal Operating Conditions and spills within the meaning of Part X of EPA and abnormal discharge events;

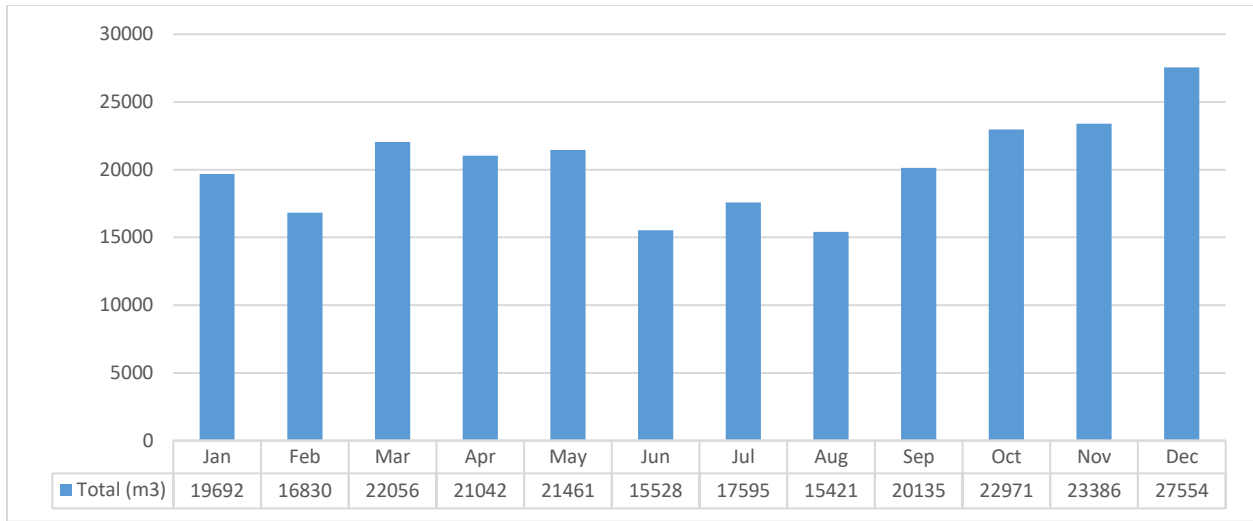
- k. a summary of all Notice of Modifications to Sewage Works completed under Paragraph 1.d of Condition 10, including a report on status of implementation of all modification;
- l. a summary of efforts made to achieve conformance with Procedure F-5-1 including but not limited to projects undertaken and completed in the sanitary sewer system that result in overall Bypass/Overflow elimination including expenditures and proposed projects to eliminate Bypass/Overflows with estimated budget forecast for the year following that for which the report is submitted;
- m. any changes or updates to the schedule for the completion of construction and commissioning operation of major process(es) equipment groups in the Proposed Works;
- n. a summary of any deviation from the monitoring schedule and reasons for the current reporting year and a schedule for the next reporting year.

The following report is composed of the records for the Stirling Lagoon and Constructed Wetlands for the year 2021. The facility is owned and operated by The Corporation of The Township of Stirling-Rawdon.

- a. Environmental Compliance Approval Number A-500-6126377731 a summary and interpretation of all Influent monitoring data, and a review of the historical trend of the sewage characteristics and flow rates.

The Environmental Compliance Approval requires that everything practicable be undertaken to operate the Sewage Treatment Plant so that the annual average daily influent is within the Rated Capacity. The Rated Capacity of the Stirling-Rawdon Lagoon is 1500 m³/day and the 2021 annual average daily influent flow was 667 m³/day or 44.5 % of the Rated Capacity. The total influent flow in 2021 was 243671 m³.

Graph 1: 2021 Influent Monthly Flow Totals



Graph 2: 2021 Influent Daily Minimum, Maximum and Average Flows

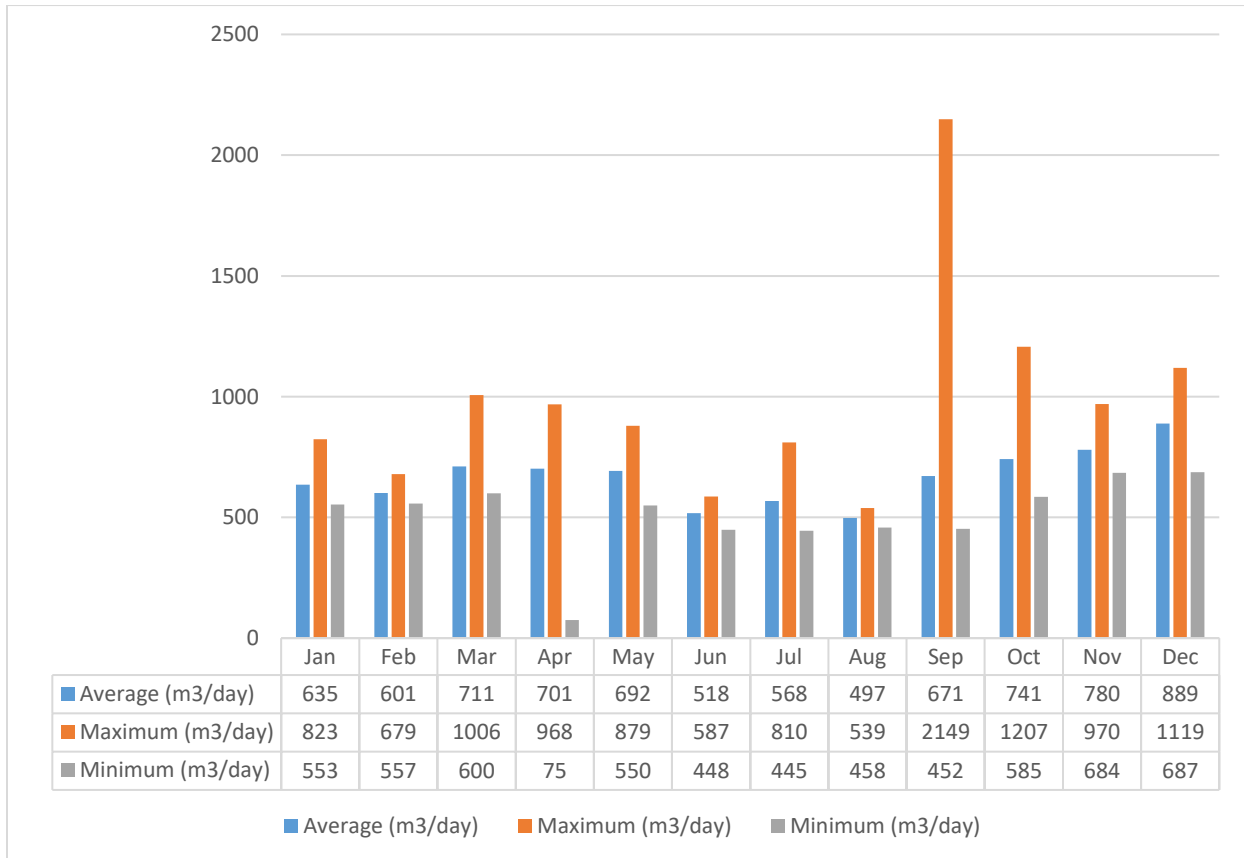


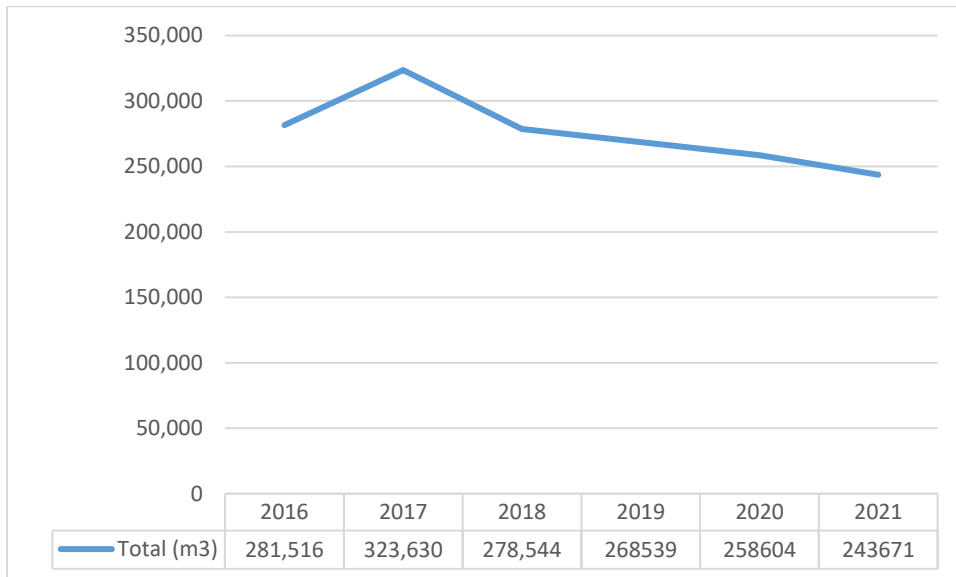
Table 1 reviews the historical trend of the influent sewage characteristics for the Stirling Lagoon, as required by Environmental Compliance Approval A-500-6126377731, Condition 11 (4) (a)

Table 1: 2016- 2021 Historical Average Influent Sewage Characteristics for the Stirling Lagoon

Year	BOD (mg/L)	TSS (mg/L)	TP (mg/L)	TKN (mg/L)
2016	371.7	299.8	7.36	49.4
2017	271.7	222.6	4.82	38.63
2018	354.5	327.3	5.08	40.53
2019	331.6	327	5.23	41.54
2020	359.7	398	4.1	36.78
2021	198.8	237.7	4.18	38.1

Table 1 shows that influent sewage nutrients have decreased slightly since 2016.

Graph 3: 2016 – 2021 Historical Influent Flows for the Stirling Sewage Lagoon

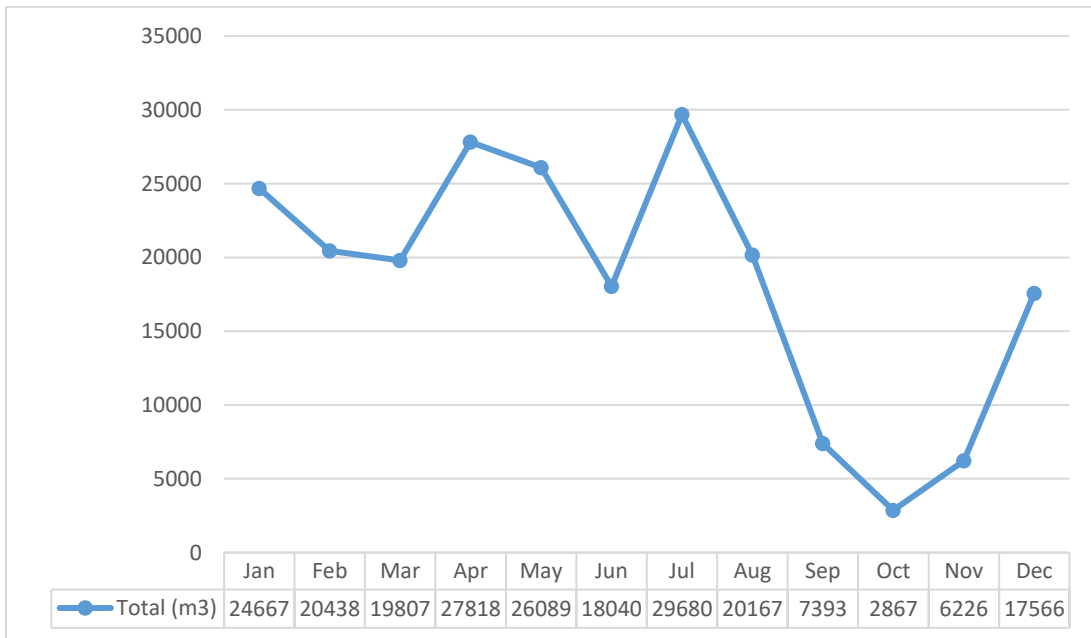


Graph 3 shows that the historical influent flows for the Stirling-Rawdon Lagoon since 2017 have been declining. The spike in 2017 can be attributed to the extremely wet spring season.

- a. Environmental Compliance Approval Number A-500-6126377731 requires a summary and interpretation of all Final Effluent monitoring data, including concentration, flow rate, loading and a comparison to the design objectives and compliance limits in this Approval, including an overview of the success and adequacy of the Works.

The following graphs provide final effluent flows for 2021 at the Stirling Sewage Lagoon. Final effluent is directed to the Mud Creek and ultimately discharged to Rawdon Creek. The Stirling lagoon can discharge final effluent year round without seasonal restrictions.

Graph 4: 2021 Final Effluent Monthly Flow Totals



Graph 5: 2021 Effluent Daily Minimum, Maximum and Average Flows

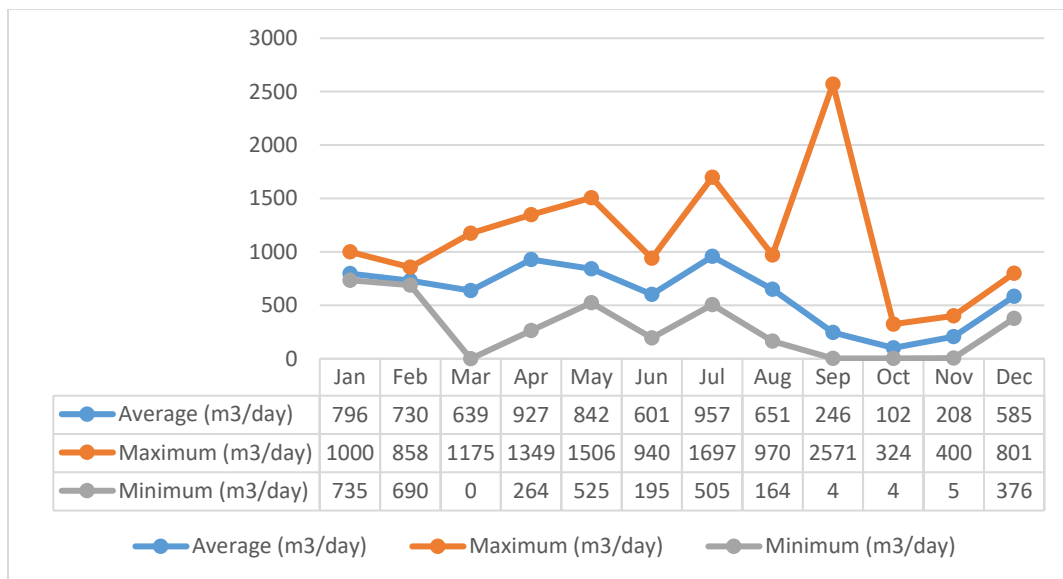


Table 2 outline effluent criteria limits as set out in Schedule C of the Environmental Compliance Approval Number A-500-6126377731.

Table 2: Stirling Sewage Lagoon- Final Effluent Compliance Limits 2021

Effluent Parameters	Average Effluent Concentration Limit (mg/L)	Actual Monthly Average Effluent Concentration (mg/l)	Compliant (Y/N)
CBOD5	10	2.3	Y
Total Suspended Solids	10	2.5	Y
Total Phosphorus	0.3	0.08	Y
Unionized Ammonia	0.1	0.004	Y
Undissociated Hydrogen Sulphide	0.02	0.006 (MDL 0.006)	Y
E.Coli	*200 organisms/100 ml Monthly Geometric Mean Density	11.07	Y
pH	ph to be maintained 6.0 to 9.5, inclusive, at all times	7.95	Y

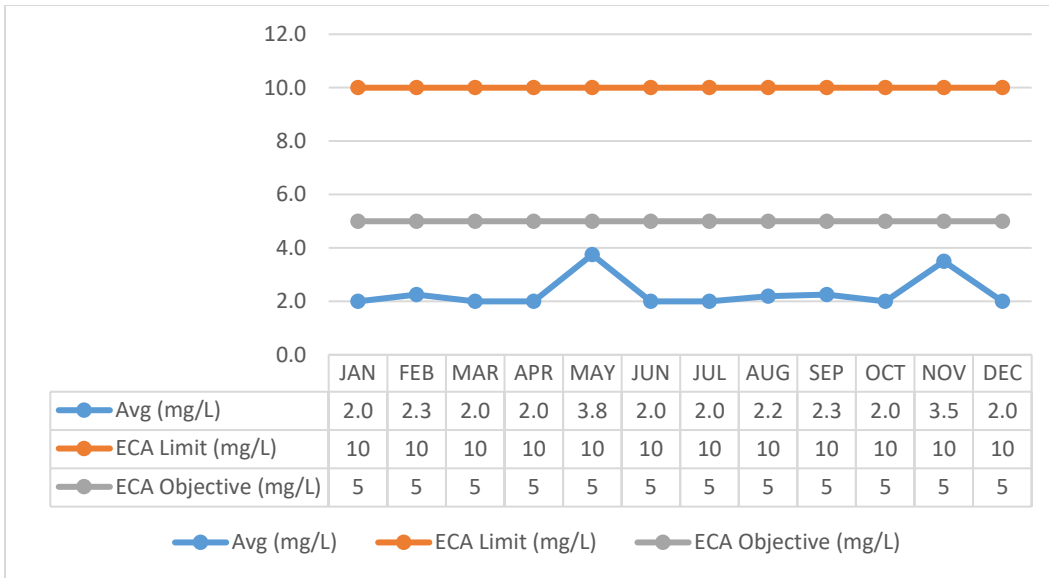
During the reporting period of 2021 the Stirling Sewage Lagoon met the compliance limits prescribed in the Environmental Compliance Approval Number A-500-6126377731.

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Sample Date	Daphnia Magna Mortality %	Rainbow Trout Mortality %	Dissolved Oxygen (mg/l)	pH	Conductivity (us/cm)	Hardness (mg/l as CaCO3)	Temp (°C)	H2O2 Dosage (mg/l)	N-NH3 (mg/l)
June 22, 2021	0	0	8.4	8.0	1304	170	20.0	0.15	0.003

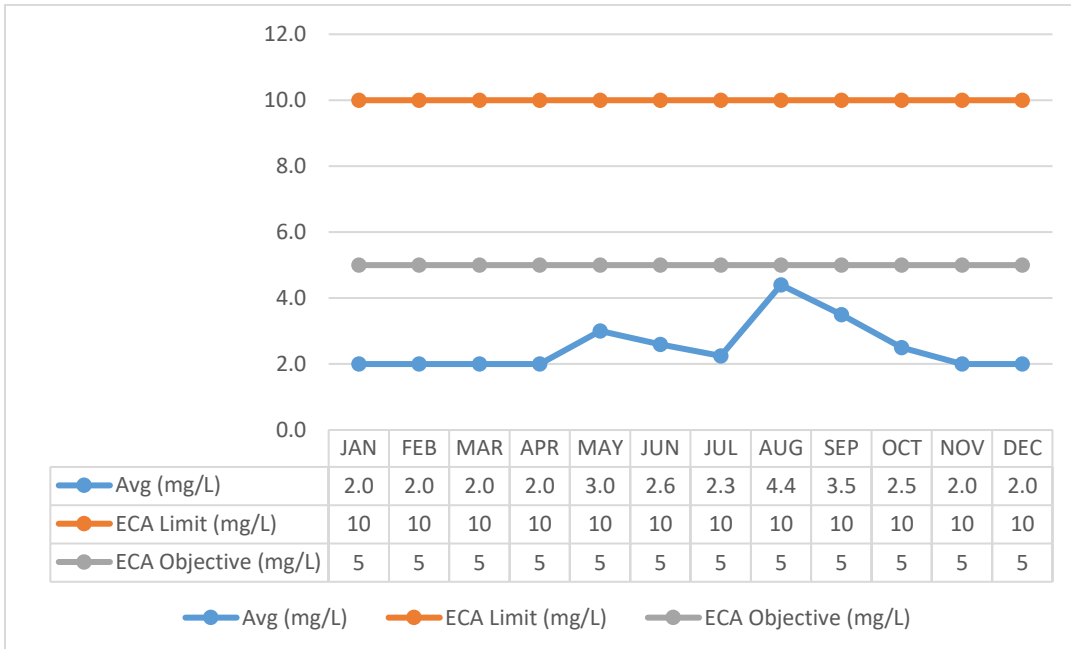
The requirement to report to Environment Canada for the 2021 reporting period is due by February 14th each year. Effluent limits were in compliance in 2021 for the acute lethality testing of Rainbow Trout and Daphnia Magna.

Graph 6: 2021 Monthly CBOD5 Final Effluent Concentration Comparisons



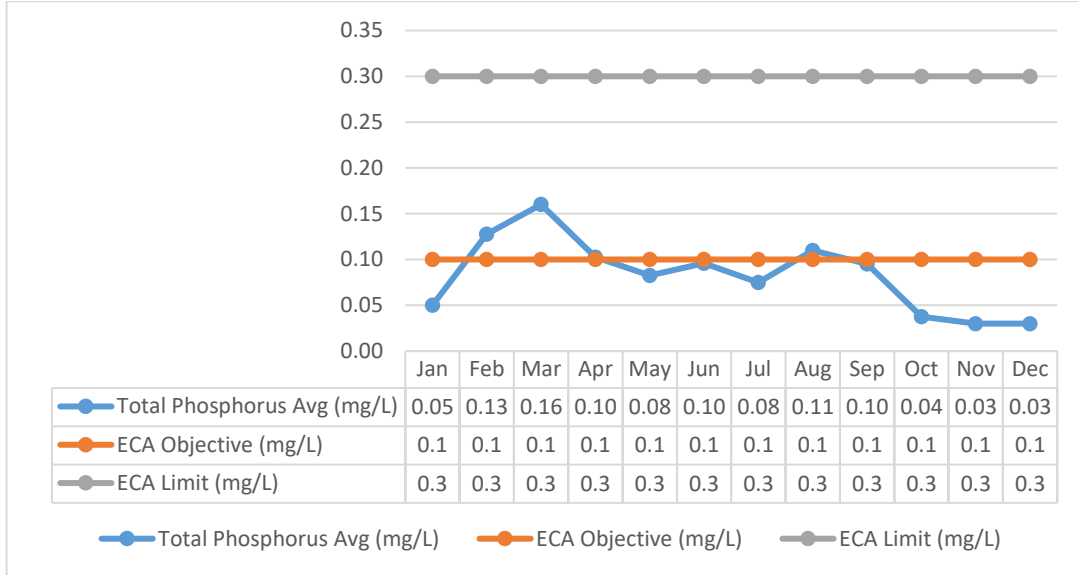
The Stirling Lagoon monthly average concentration for Carbonaceous Biochemical Oxygen Demand (CBOD5) was maintained below the ECA limit of 10.0 mg/L and below the ECA Objective of 5.0 mg/L as required as per Environmental Compliance Approval Number A-500-6126377731.

Graph 7: 2021 Monthly TSS Final Effluent Concentration Comparisons



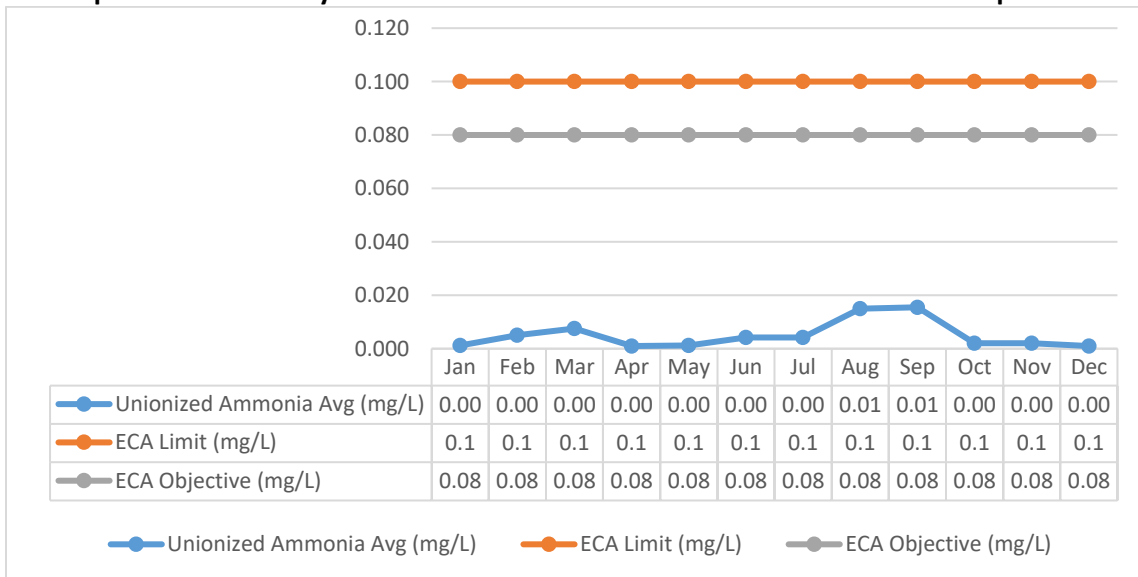
The Stirling Lagoon monthly average concentration for Total Suspended Solids (TSS) was maintained below the ECA limit of 10.0 mg/L and below the ECA Objective of 5.0 mg/L as required as per Environmental Compliance Approval Number A-500-6126377731

Graph 8: 2021 Monthly Total Phosphorus (TP) Final Effluent Concentration Comparisons



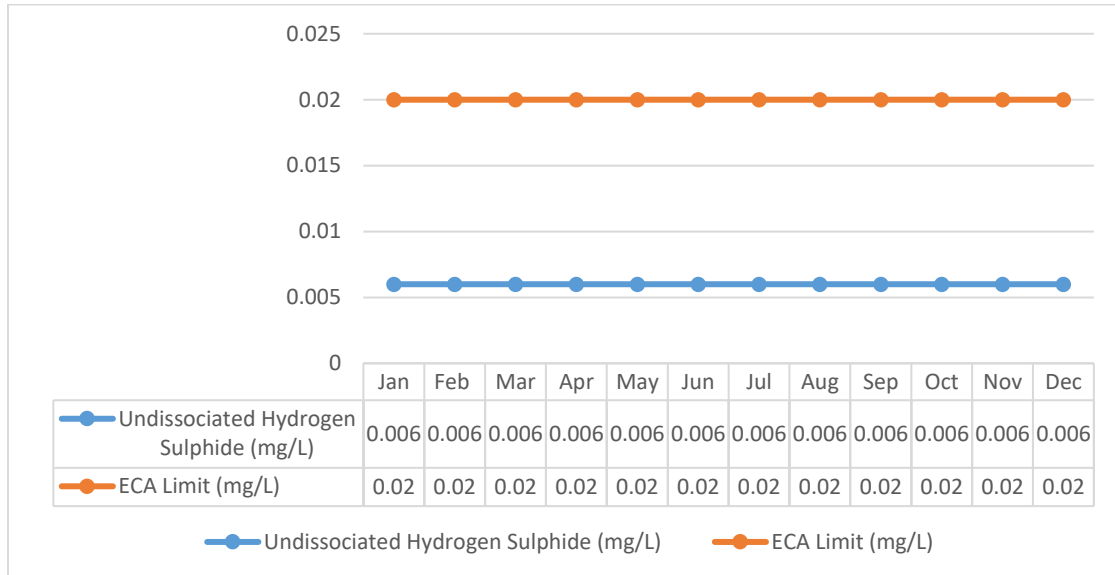
The Stirling Lagoon monthly average concentration for Total Phosphorus (TP) was maintained below the ECA limit of 0.3 mg/L however was slightly elevated above the ECA Objective of 0.1 mg/L as required as per Environmental Compliance Approval Number A-500-6126377731. The slightly elevated phosphorus levels in the spring are associated with the ice melt in the lagoon. The slight increase in the summer phosphorus levels are related to low final effluent flows.

Graph 9: 2021 Monthly Unionized Ammonia Final Effluent Concentration Comparisons



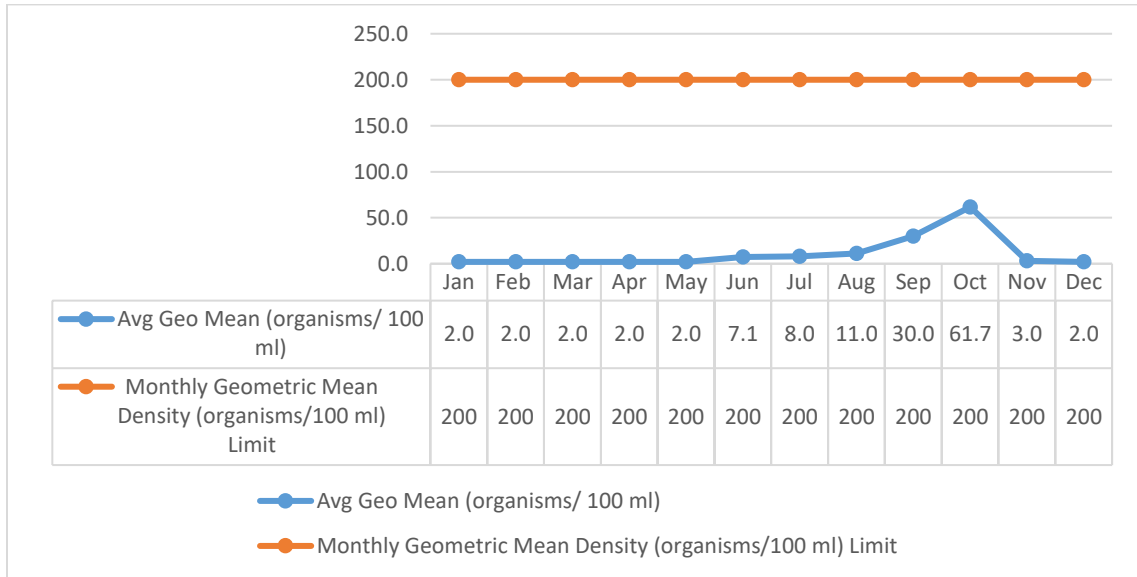
The Stirling Lagoon monthly average concentration for Unionized Ammonia (N-NH₃) was maintained below the ECA limit of 0.1 mg/L and the ECA Objective of 0.08 mg/L as required as per Environmental Compliance Approval Number A-500-6126377731.

Graph 10: 2021 Undissociated Hydrogen Sulphide Final Effluent Concentration Comparisons



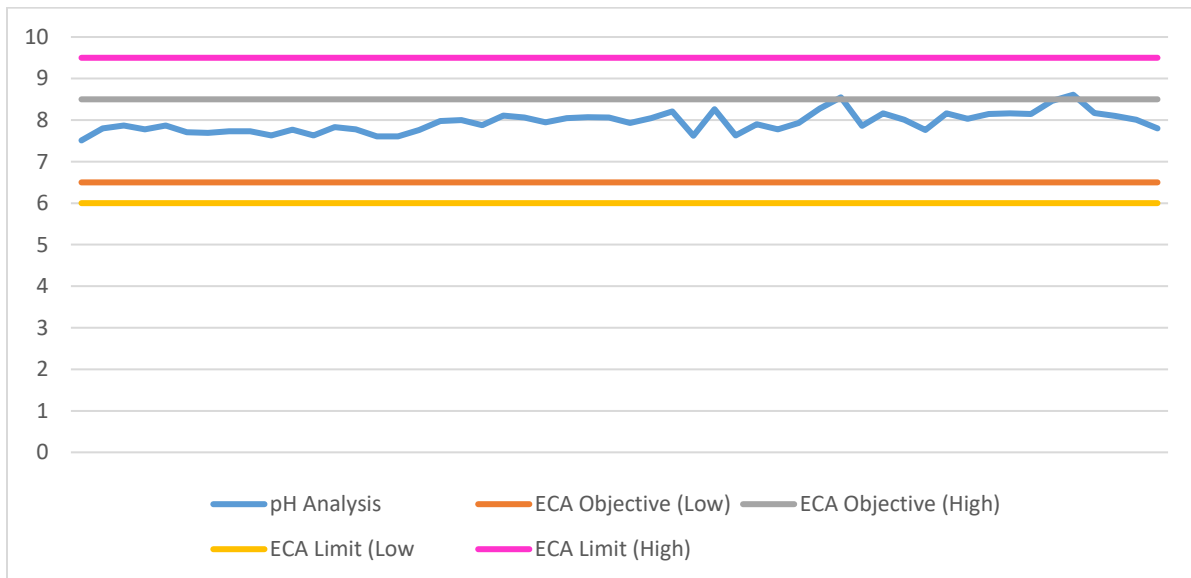
The Stirling Lagoon monthly average concentration for Undissociated Hydrogen Sulphide (H₂S) was maintained below the ECA limit of 0.02 mg/L and the ECA Objective of Non-Detect as required as per Environmental Compliance Approval Number A-500-6126377731. The method detection limit for analysis at the laboratory is 0.006 mg/L.

Graph 11: 2021 E.Coli Final Effluent Concentration Comparisons



The Stirling Lagoon monthly geometric mean density for Escherichia Coli (E.Coli) was maintained below the ECA limit of 200 organisms/100 mL Monthly Geometric Mean Density as per Environmental Compliance Approval Number A-500-6126377731. The method detection limit for analysis is 2 organisms/100 mL.

Graph 12: 2021 pH Final Effluent Concentration Comparisons



The Stirling Lagoon pH was maintained within the ECA limit of 6.0 – 9.5. The pH was maintained within the objectives except for two sampling events where the pH slightly exceeded the upper pH objective of 8.5. (September 14, 2022 pH of 8.55 and November 30, 2022 pH of 8.61.)

C. a summary of all operating issues encountered and corrective actions taken;

Challenges	Corrective Actions
Final Effluent Gravity flow meter failure	Installed temporary flow meter until replacement could be installed. Delays on flow meter due to global supply chain shortage due to Covid-19 pandemic. Replaced July 22, 2021
Multiple alarm system fail to test signals at lagoon buildings.	Installed cellular GSM dialers to transmit alarm communications instead of convention phone line communication.
Heny St. submersible sewage pump drawing high current and tripping breaker.	Pump was removed and rebuilt.
Frankford Road Sewage Pumping Station generator coolant heater malfunction.	Coolant heater was not heating to set point. Heater was removed and replaced.
Frankford Road Sewage Pumping Station leak on fuel lift pump causing delay in starting.	Fuel lift pump was replaced by a licensed diesel mechanic.

d. A summary of all normal and emergency repairs and maintenance activities carried out on any major structure, equipment, apparatus or mechanism forming part of the Works;

The Township of Stirling-Rawdon uses a work order tracking system that ensures facility maintenance and scheduled maintenance is scheduled on a weekly, monthly or annual basis. This ensures routine and preventative maintenance is carried out and assets are maintained to manufacturer’s and/or industry standards. In 2022 the Water and wastewater department will be transitioning to an electronic work order tracking and implementation software that will increase asset tracking and provide detailed maintenance summaries.

The Municipality approved upgrades to the main sewage pumping station (George St. Pumping Station) in which changes to pumps, controls, electrical components and the installation of a by-pass pumping chamber are to be completed. In late 2021 the by-pass pumping chamber was installed and in the Spring of 2022 the remainder of the infrastructure project will be initiated. These upgrades will provide increased capacity to the pumping station that are currently near maximum capacity. This project will provide increased service life to the station as well as providing potential for growth within the Municipality.

e. A summary of any effluent quality assurance or control measures undertaken; Effluent quality assurance is maintained in several ways. All samples collected during the reporting period required by the ECA sampling schedule were submitted to SGS Lakefield Research Ltd. Laboratory for analysis. SGS Lakefield Research has been deemed accredited by the Canadian Association for Laboratory Accreditation (CALA), meeting strict provincial guidelines including an extensive quality assurance/ quality control program. By choosing this laboratory, the Township of Stirling-Rawdon is ensuring appropriate control measures are undertaken during sample analysis. Sampling calendars are issued to

operations staff to ensure sampling is conducted as per the ECA requirements. Analysis is reviewed regularly to ensure compliance with the ECA limits and objectives.

f. A summary of the calibration and maintenance carried out on all Influent, Imported Sewage and Final Effluent monitoring equipment to ensure that the accuracy is within the tolerance of that equipment as required in this Approval or recommended by the manufacturer;

The calibration on influent and effluent monitoring equipment was performed by Tower Electronics in 2021.

Flow Meter Location	Date Calibrated
Annis St Pumping Station Effluent	April 27, 2021
George St Pumping Station Effluent	April 27, 2021
George St Alum Flow Meter	April 27, 2021
Lagoon Pumped Final Effluent	April 27, 2021
Lagoon Gravity Final Effluent	July 22, 2021 (New Install)

g. A summary of efforts made to achieve the design objectives in the approval, including an assessment of the issues and recommendations for pro-active actions if any are required under the following situations:

a. When the design objectives is not achieved more that 50% of the time in a year, or there is an increasing trend in deterioration of Final Effluent Quality;

All Design objectives associated with ECA # A-500-6126377731 were achieved at least 50 % of the time in a year or better. There was no evidence of an increasing trend in deterioration of Final Effluent Quality.

b.when the Annual Average Daily Influent Flow reaches 80 % of the Rated Capacity;

The Annual Average Daily Influent Flow for 2021 was 667.1 cubic meters which is 44.5% of the Rated Capacity of 1500 cubic meters per day.

h. a tabulation of the measured volume of sludge accumulated in the lagoon cells in five year intervals and the estimated volume in the interim years and when sludge was disposed of during the reporting period, a summary of disposal locations and volumes of sludge disposed at each location;

Date	Farm	NASM ID	Lot	Conc.	Municipality	Ward	Field #	Application Method	Hectares Spread	Volume (m3)
Aug 26	Dracup, Richard-Home	24799	8-9	2-3	Township of Stirling-Rawdon	Rawdon	3	Incorporated	14.77	560
Aug 27										480
Aug 30										880
Aug 31							1	Incorporated	17.65	760
Sep 1										
Total									32.42	3480

During the reporting period sludge was removed from the North Lagoon inlet area by the bio-solids contractor Terrapure Organic Solutions.

Sludge primarily settles in the North Lagoon Inlet area where the raw sewage is introduced to the lagoon. It is estimated that between 500-700 cubic meters of sludge accumulates annually.

i. a summary of any complaints received and any steps taken to address the complaints;

There were no complaints received in the reporting period for the wastewater system.

j. a summary of all Bypasses, Overflows, other situation outside Normal Operating Conditions and spills within the meaning of Part X of EPA and abnormal discharge events;

Bypasses:

There were no bypasses at the Stirling Lagoon in 2021

Overflows:

There were no overflows at the Stirling Lagoon in 2021

Situations outside Normal Operating Conditions

Immediately following the March failure of the Final Effluent Gravity flow meter at the lagoon the wastewater treatment facility installed a temporary flow meter on the gravity effluent discharge. The temporary flow meter was used to measure effluent in addition to the flow meter for pumped final effluent discharge.

K. a summary of all Notice of Modification to Sewage Works completed under Paragraph 1.d of Condition 10, including a report on status of implementation of all modifications;

On December 13, 2021 The Municipality provided notice to the District Manager of the MECP regarding commencement of the George Street Pumping Station. The station will provide upgrades to the submersible sewage pumps, pump rails, drives, piping and appurtenances. The Scheduled completion date is June 24, 2021.

I. a summary of efforts made to achieve conformance with Procedure F-5-1 including but not limited to projects undertaken and completed in the sanitary sewer system that result in overall Bypass/Overflow elimination including expenditures and proposed projects to eliminate Bypass/Overflows with estimated budget forecast for the year following that for which the report is submitted;

During the 2021 reporting period, there were no incidents of a bypass or overflow within the sanitary sewer system. Although there were no incidents it was noted in the 2019 Infrastructure Report that the potential for sewer surcharging based on hydraulic modeling is possible at the North St and Church St access structures. This combined with the George St Sewage Pumping Station to be at near full capacity it has been an active need to upgrade this infrastructure to service the collection systems capacity needs. The pumping station upgrades at George St have commenced and the linear infrastructure will be replaced in 2022.

m. any changes or updates to the schedule for the completion and commissioning operation of major process(es) / equipment groups in the Proposed Works;

The Municipality was contacted by the contractor (Peak Construction) on February 22, 2022 to provide notification that due to Covid-19 and the global supply shortage that components of the Programmable Logic Controller (PLC) would be delayed. The anticipated delivery date is end of March or early April 2022.

n. a summary of any deviation from the monitoring schedule and reasons for the current reporting year and a schedule for the next reporting year;

In the reporting period of 2021 the previous ECA did not stipulate the requirements of having a monitoring schedule for sampling. The Municipality has since developed a sampling schedule to sample on Tuesdays for the next reporting period of 2022.