

# **Township of North Glengarry**

## **Maxville Wastewater System**

### **2021 Annual Report**

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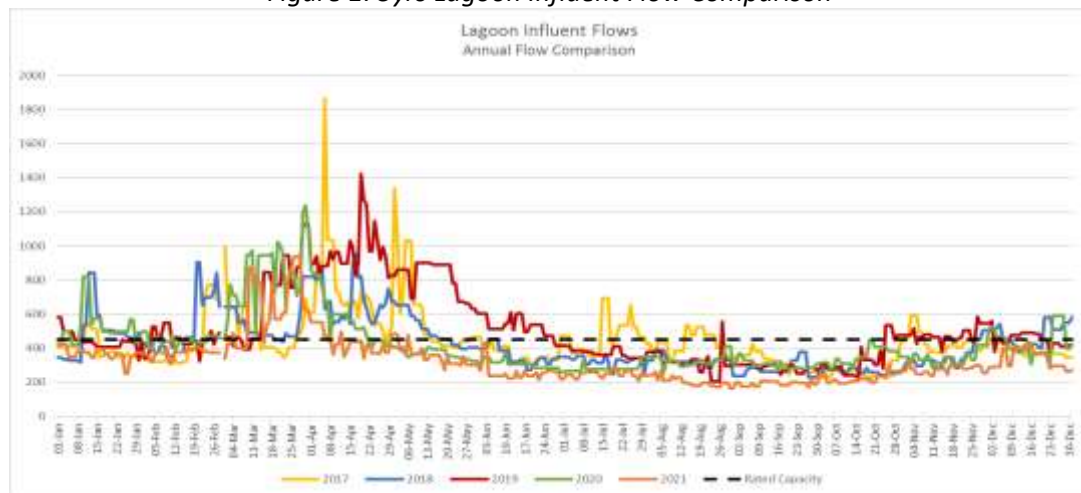
## A. Performance Assessment

Summary and interpretation of all monitoring data collected in accordance with condition 10 and a comparison to the effluent limits outlined in condition 7, including an overview of the success and adequacy of the works

The Maxville wastewater system is a class 1 facility, which is comprised of a collection system and a lagoon treatment system servicing the village of Maxville, Ontario. The collection system is comprised of an interconnected network of sanitary service laterals, sanitary sewage mains, sanitary manholes, sewage force mains and pumping stations used to collect and transport wastewater from the system to the treatment lagoons. The treatment lagoons are comprised of 2 facultative lagoon cells, where the influent wastewater is dosed with coagulant year-round to aid in reducing phosphorus levels. The wastewater is treated through natural biological means and only discharged annually, coinciding with the Spring thaw and peak flows conditions of the West branch of the Scotch River.

During the 2021 calendar year, 118,413m<sup>3</sup> of untreated raw sewage was directed to the Maxville Lagoon system for treatment, which is based on the influent meter at the lagoons. The observed flows have decreased from last year and are lower than observed over the last 5yrs. There were no additional effluent sewage sources into the system throughout this calendar year. In an effort to limit infiltration and inflow, the whole sanitary collection system was inspected by CCTV during this reporting period. As a result of CCTV inspection 6 sanitary lateral connections and 4 manholes were repaired.

Figure 1: 5yrs Lagoon Influent Flow Comparison



Raw sewage was monitored monthly and pre-discharge samples were taken on 3 occasions prior to stating the start of the discharge. Additional testing for Cell A TSS was completed due to 1 elevated result, but all requirements were met prior to allowing any discharge from Cell A. Please see subsection below for a full summary of results and refer to Appendix A for a full summary of all flows, raw influent and treated effluent results.

The system operated well throughout 2021 and produced effluent meeting the Federal Effluent Limits and the Provincial Environmental Compliance Approval Limits, which will be further discussed in **section G**.

**i. Raw Sewage Monitoring**

Table 3 under condition 10 (3) of the ECA requires monthly raw sewage sampling at the Main Station for CBOD<sub>5</sub>, Total Suspended Solids (TSS) and Total Phosphorus (TP). Sampling was completed bi-weekly until May, at which point sampling was adjusted to a monthly basis. Results were higher in concentration than previous year observed values, but still well within normal ranges for raw sewage. Please refer to Appendix A for a full summary of the raw quality analysis.

*Table 1: Annual Average Raw Sewage Monitoring:*

	Parameter		
	CBOD <sub>5</sub> (mg/L)	TSS (mg/L)	TP (mg/L)
2021 Average Concentration	183.1	170.5	4.12
2020 Average Concentration	83.9	127.0	3.92
2019 Average Concentration	112.3	222.2	3.32
2018 Average Concentration	157.4	212.1	3.97

**ii. Pre-Discharge Monitoring**

Table 4 under condition 10 (3) of the ECA requires pre-discharge monitoring for BOD<sub>5</sub>, TSS and TP prior to discharge commencement. Two samples, within a 14-day period must be at or lower than allowable limit to allow for discharge to start, ensuring effluent limits compliance during start up. The table below summarizes the samples taken and sample results before the March 26<sup>th</sup> start-up. In 2021 a total of 3 sets of samples were taken prior to the commencement of the discharge, the samples from March 10<sup>th</sup> are outside of the 14-day period. Due to an elevated TSS result in Cell A had additional testing to ensure results were within parameters to discharge from Cell A.

*Table 2: Pre-Discharge Sampling Summary*

Sampling Locations	Cell A			Cell B		
	BOD <sub>5</sub>	TSS	TP	BOD <sub>5</sub>	TSS	TP
Effluent Parameters (mg/L)						
ECA Effluent Limit (mg/L)	30	30	1	30	30	1
10-Mar-21	6	15	0.34	50	105	2
16-Mar-21	11	42	0.55	9	14	0.35
17-Mar-21	10	12	0.45	8	16	0.3
26-Mar-21		7				
27-Mar-21		23				

**iii. Spring Discharge Monitoring**

The 2021 annual spring discharge period was completed over 27 days over a calculated 621.0 hrs. The total amount of effluent discharged to the West Branch of the Scotch River during this period was 177,606m<sup>3</sup>. Throughout the discharge, daily monitoring was completed on flows and cell levels. Discharge effluent sampling was completed on 6 occasions, as per the ECA requirements and an annual sampling was for acute trout lethality was also taken, as per the Federal Wastewater System Effluent Regulation. All results will be further discussed in **section G**.

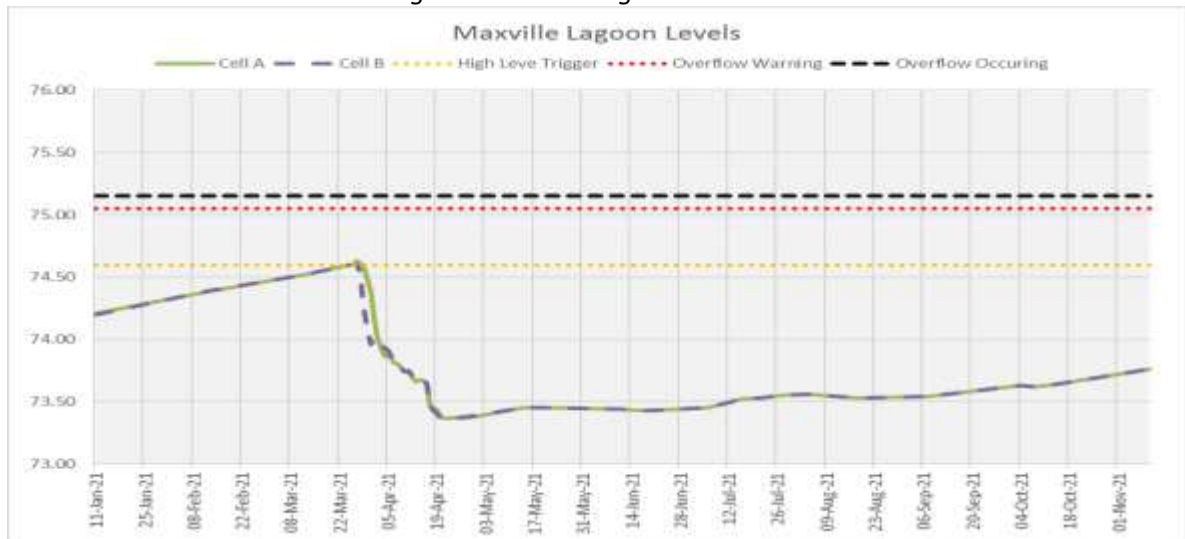
The table below shows the daily flows and mixing ratio figure below, at no point was the mixing ratio of 3:1 was exceeded. Please refer to Appendix D for a full summary of all flows, raw influent and treated effluent results.

Table 3: Spring Discharge Flows

Date	Start Time <small>(from Sting Ray Logs)</small>	Total Hours <small>(hrs)</small>	River Flow <small>(m<sup>3</sup>/s)</small>	Discharge Rate <small>(m<sup>3</sup>/s)</small>	Mixing Ratio <small>(3:1)</small>
26-Mar-21	8:50		0.860	0.064	13.44 :1
27-Mar-21	8:50	23.95	2.385	0.070	34.07 :1
28-Mar-21	9:03	24.16	1.294	0.200	6.47 :1
29-Mar-21	12:25	27.25	1.113	0.185	6.02 :1
30-Mar-21	11:50	23.35	0.806	0.169	4.77 :1
31-Mar-21	8:19	20.38	0.578	0.150	3.85 :1
01-Apr-21	8:23	24.1	0.565	0.132	4.28 :1
02-Apr-21	13:00	28.58	0.352	0.105	3.35 :1
03-Apr-21	12:26	23.31	0.272	0.085	3.20 :1
04-Apr-21	12:51	24.03	0.208	0.058	3.59 :1
05-Apr-21	10:44	21.83	0.179	0.052	3.44 :1
06-Apr-21	11:05	24.36	0.203	0.060	3.38 :1
07-Apr-21	10:48	23.70	0.188	0.050	3.76 :1
08-Apr-21	13:04	26.26	0.188	0.061	3.08 :1
09-Apr-21	12:09	23.03	0.185	0.059	3.14 :1
10-Apr-21	8:41	20.46	0.075	0.024	3.13 :1
11-Apr-21	8:08	23.36	0.164	0.053	3.09 :1
12-Apr-21	10:09	25.96	0.153	0.048	3.19 :1
13-Apr-21	12:08	26.00	0.093	0.031	3.00 :1
14-Apr-21	8:43	20.20	0.101	0.032	3.16 :1
15-Apr-21	9:10	24.35	0.150	0.049	3.06 :1
16-Apr-21	8:39	23.40	0.653	0.206	3.17 :1
17-Apr-21	10:13	25.50	0.259	0.080	3.24 :1
18-Apr-21	10:14	23.93	0.161	0.051	3.16 :1
19-Apr-21	8:21	22.01	0.235	0.075	3.13 :1
20-Apr-21	10:38	26.26	0.054	0.018	3.00 :1
21-Apr-21	7:55	21.28			:1

The figure displays the lagoon levels as measured throughout 2021. The top of the berm is represented by 76.00m and the bottom of the lagoon cell is represented by 73.00. The high-water level is located at 75.10m, above which are overflow culverts to prevent berm breaching. A high-water level trigger has been set at 76% capacity or 74.60m, at which point the township must start implementing contingency plans to prevent overflow. No issues or concerns with levels as observed.

Figure 2: Annual Lagoon Levels



## B. Groundwater and Surface Water Monitoring

*Summary and Interpretation of all groundwater monitoring data*

Table 6 under condition 10 (3) of the current ECA addresses the requirements of the monitoring program. Sampling is to be performed annually, semi-annually or three times per year depending on the parameter, as per Table 6-Groundwater Monitoring and Table 7-Surface Water Monitoring. JP2G Consultants in association with the Greer Galloway Group was retained by the Township to complete the annual monitoring program for the Maxville lagoon system. An annual report is submitted to the Ministry of Environment and to the Township upon completion each calendar year.

*As per the 2020 Annual Monitoring Report, the groundwater flow direction is east-northeast direction and results indicate that the lagoons do not appear to have a significant impact on the groundwater in the area, but as there are no potable water user within 500m downgradient, there is no requirement for contingency measures at this time. Even though minor impacts were observed, the final results were well within the compliance requirements of the MOECC B-7 guideline. The surface water results indicated the lagoons had little to no impact on the West Branch of the Scotch River, and the results observed in river were comparable to all upstream sampling results.*

## C. Operational Problems

*A description of any operating problems encountered and corrected*

Collection System:

- Sewage pump P1 failure at Manor station in December.
  - Pump was refurbished and reinstalled after 35 days out of service
- During valve testing isolation valve not operational
  - no repair noted
- Generator in emergency stop due to oil loss
  - caused by water damage to transfer switch
  - repaired by JC Cayer
- Manor Station hour meter intermittent operation
  - units changed
- Generator control panel failure
  - unit was replaced
- Flow measurement inaccuracies
  - contact EVB to verify miltronic operation vs PLC vs magmeter
  - recalibrate unit to ensure proper measurement
  - adjust plc settings
  - to utilize lagoon magmeter for reporting values

Treatment System:

- Minor H2S smells were noted during annual discharge, until ice cover from cells were removed and some foaming noted at discharge due to valve operations, once adjusted foam dissipated
- Minor issues with data logger batteries, small periods of time flows were calculated to ensure total flows were accurate.
- Influent slide gate seized, unable to switch over influent flow

## D. Maintenance

*Summary of all maintenance carried out on any major structure, equipment, apparatus, mechanism or thing forming part of the Works*

### Collection System:

- Annual generator maintenance
- Annual lifting device and hoisting device inspection
- Annual inspection and replacement (as required) of force main signage
- Annual level monitoring equipment calibration
- Monthly emergency generator testing, no issues noted
- Monthly alarm signal testing
- Monthly pest control monitoring, no issues noted
- CCTV inspection over the whole collection system (as previously described)

### Treatment System:

- Annual generator maintenance
- Flow meter calibration
- Vegetation removed from around berms and buildings
- Propane tank replaced by supplier

## E. Effluent Quality Control and Assurance

*Summary of any effluent quality assurance or control measures undertaken in the reporting period*

All sampling was performed within provincial guidelines by licensed operators, as per internal SOP's. Sampling schedules with sign off are also used to ensure that operational staff are aware of sampling requirements and timelines as per ECA and Federal requirements.

Effluent quality control and assurance measures were undertaken by a MOE certified laboratory, Caduceon Environmental laboratories and AGAT Laboratories, which conduct analysis for the Township.

## F. Flow Measurement and Calibration

*Summary of the calibration and maintenance carried out on all effluent monitoring equipment*

Due to flow discrepancies, EVB was brought in to verify the main pumping station miltronics and PLC operations. Units were adjusted in April 2021 to ensure proper volumes were being measured. The flow meter at the Maxville Lagoon influent was calibrated by Capital Controls in April 2021. Please refer to Appendix E for a monthly flow comparison between the pumping stations and the influent flow meter.

Annual calibrations on the flow sensing devices (miltronics) were completed by St- Laurent Instrumentation in December 2021.

No issues were noted in regard to the operation of the equipment.

## G. Effluent Objectives

*A description of efforts made, and results achieved in meeting the effluent objectives of condition 6 & 7*

All staff strive to ensure that effluent objectives and limits were met throughout this period, through rigorous monitoring measures, as prescribed. All municipal utility monitoring program reports were

sent into the environmental monitoring and reporting branch of the Ministry of the Environment electronically for each month for raw and treated parameters.

As required two samples meeting the effluent limit were taken within 14 days prior to discharge start. During the pre-discharge sampling an elevated TSS sample was noted in Cell A, additional sampling was completed to ensure TSS was below limit prior to allowing any discharge from the cell.

The annual discharge occurred between March 26<sup>th</sup> and April 21<sup>st</sup> and the total volume of released effluent to the West branch of the Scotch River was calculated to be 177,606m<sup>3</sup>. No effluent sampling limits, or flow conditions were exceeded during this time. The only noted issue during the discharge was foaming noted at the outfall structure caused by flow conditions created by valve operations, once adjustments were made, foaming was no longer observed.

The table below lists and annual average residuals throughout the discharge period. Please refer to **appendix A** for a monthly summary of flows, raw and treated effluent quality analysis for the Maxville Sewage Treatment Works or **appendix E** for the annual spring discharge report.

Table 4: Provincial and Federal Effluent Sampling Results

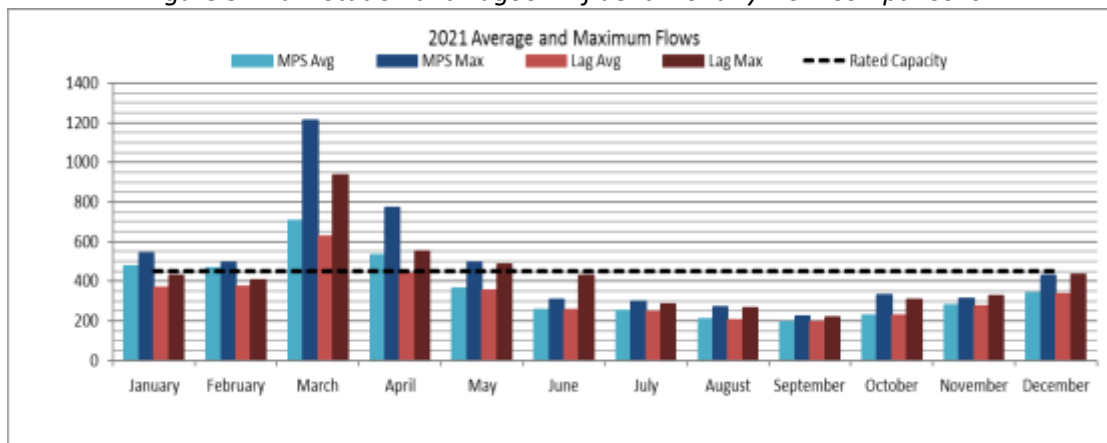
Effluent Parameter	CBOD <sub>5</sub> (mg/L)	TSS (mg/L)	TP (mg/L)	pH	
				(min)	(max)
Provincial Effluent Limits (mg/L)	30	30	1	6.0	9.5
Federal Effluent Limits (mg/L)	25	25			
2021 Maxville Average Concentration (mg/L)	7.7	15.5	0.4	6.76	8.84

Table 5: Provincial Waste Loading Results

Waste Loading Parameter	CBOD <sub>5</sub>	TSS	TP
Provincial Average Waste Loading Limits (kgs)	4932	4932	164
2021 Maxville Average Waste Loading (kgs)	1361.64	2752.89	62.16

The annual average daily flow for 2021 was calculated to be 324m<sup>3</sup>/day, and the maximum daily flow for the year was reported to be 936m<sup>3</sup>/day. This represents 72% of the total rated capacity, which is within the compliance for the rated capacity of this facility. Please refer to the chart below and to Appendix A for a full summary of flows, for the Maxville Sewage Treatment Works. The flow values used for the calculation was the lagoon influent due to flow discrepancies noted with miltronics, both values are displayed to show the observed discrepancies.

Figure 3: Main Station and Lagoon Influent Monthly Flow Comparisons



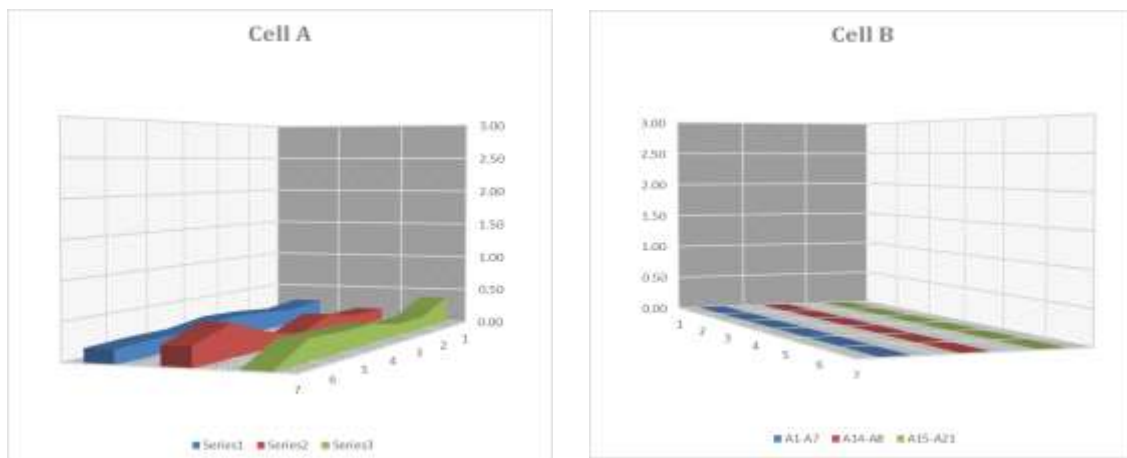
There were observations of minor foaming in discharge effluent, determined to be caused by valve operations and outfall configuration, but no reports in regard to floating or settleable solids within the wastewater effluent. There were also no reports made that the effluent wastewater contained oil or any other substance that created a visible film, sheen, or discoloration to the receiving waters.

### H. Sludge Accumulation

*A tabulation of the volume of sludge generated in the reporting period, an outline of anticipated volumes to be generated in the next reporting period and a summary of the locations to where the sludge was disposed*

A Sludge Management Plan was created by McIntosh Perry and put into place in 2008. As part of monitoring methods, it is recommended sludge levels are to be collected annually by staff. The levels were not measured during 2021, due to staff shortages.

As per the previous findings, only Cell A levels were collected due to access issues in Cell B. No points exceeded the volume/depth elevation as per setpoints and total sludge volume decreased 5%. However elevated sludge depth measurements were also observed near Cell A outfall, and as such the sludge should be removed or dispersed as per recommendations. The township is to determine if any action is required.



### I. Complaints

*Summary of any complaints received during the reporting period and any steps taken to address the complaints.*

There were no complaints within this reporting period from the wastewater system.

### J. Bypass, Overflow, Spill or Abnormal Discharge Event

*A summary of all bypass, overflow, spill, abnormal discharge events*

There were no bypasses, overflows, spills or abnormal discharge events in 2021.

### K. Other

*Any other information the District Manager requires from time to time*

There are no additional monitoring or reporting requirements at this time



## NORTH GLENGARRY WATER WORKS

### WASTEWATER TREATMENT WORKS PERFORMANCE RESULTS

**Municipality:** North Glengarry

**Year:** 2021

**Project:** Maxville WWTP

**Receiving Stream:** West Branch Scotch River

**Description:** 1 Pumping Station, 2 Facultative Cells  
Seasonal Discharge with Phosphorous Removal

**Design Capacity:** 450 m<sup>3</sup>/day

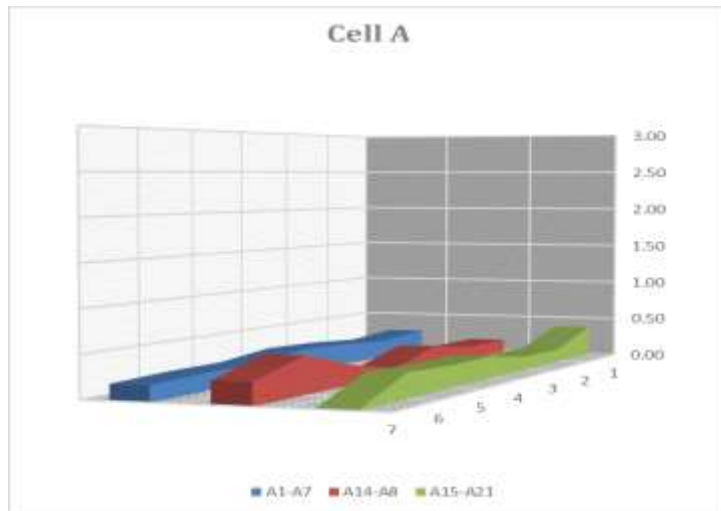
MONTH	Flows						Biochemical Oxygen Demand				Suspended Solids			
	Total Influent Flow (m <sup>3</sup> )	Average Daily Influent Flow (m <sup>3</sup> )	Maximum Daily Influent Flow (m <sup>3</sup> )	Total Effluent Flow (m <sup>3</sup> )	Average Daily Effluent Flow (m <sup>3</sup> )	Maximum Daily Effluent Flow (m <sup>3</sup> )	Average Raw BOD <sub>5</sub> (mg/L)	Average Effluent CBOD <sub>5</sub> (mg/L)	Percent Removal (%)	Average CBOD <sub>5</sub> Loading (kgs)	Average Raw TSS (mg/L)	Average Effluent TSS (mg/L)	Percent Removal (%)	Average TSS Loading (kgs)
January	11,389	367	427				70				97			
February	10,444	373	408				61				80			
March	19,383	625	936	68,556	11,426	18,598	52	7	87	75	73	15	80	182
April	13,113	437	552	109,050	5,452	17,421	77	8	89	42	94	16	83	67
May	10,914	352	484				51				64			
June	7,697	257	428				20				140			
July	7,663	247	283				192				84			
August	6,305	203	267				547				425			
September	5,788	193	220				159				290			
October	6,987	225	306				610				258			
November	8,288	276	327				911				430			
December	10,442	337	435				231				680			
<b>Total</b>	118,413			177,606			2,980			1,362				2,753
<b>Average</b>	9,868	324		88,803	8,439		248	8	88		226	16	81	
<b>Maximum</b>	19,383		936	109,050		18,598	911	8	89		680	16	83	
<b>Criteria</b>		450						30		4932		30		4932





### 2021 Annual Cell A Sludge Monitoring

Maxville	Cell A-Sample Point Sludge Volume (m <sup>3</sup> )																					Total Sludge Volume (m <sup>3</sup> )	Total Sludge Volume (%)	Warning Trigger <sup>2</sup>
Date	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21			
12-Nov-08	1754	271	624	458	937	791	545	715	608	608	608	608	608	1038	356	624	624	937	937	624	1446	15,717	62	Total Sludge Volume is Elevated
22-Apr-09	356	312	312	562	312	146	711	392	203	608	1215	871	810	254	284	728	312	312	937	416	1067	11,119	44	
27-Apr-10	711	416	583	520	416	271	237	0	101	263	263	304	101	415	237	271	167	416	520	416	711	7,340	29	
07-Oct-10	237	354	312	208	250	312	284	277	405	243	1337	243	142	2076	356	458	354	312	312	208	284	8,963	36	
08-Dec-11	0	0	0	0	0	312	237	277	203	142	0	0	0	119	146	42	312	354	1186	1114	4,442	18		
24-Oct-12	119	104	146	0	146	42	166	115	101	41	0	101	203	231	47	42	104	42	42	104	356	2,249	9	
06-Oct-14	521	395	291	271	291	395	427	438	81	446	162	344	284	438	616	437	479	458	333	500	403	8,010	32	
06-Nov-15	379	437	1478	229	541	437	498	369	324	324	527	628	628	600	379	541	749	645	1082	749	379	11,923	47	
07-Nov-16	403	125	458	333	229	562	142	369	324	446	446	446	446	507	24	562	354	458	458	250	261	7,600	30	
29-Oct-19	687	458	458	500	229	500	332	323	527	425	648	547	344	738	569	604	604	604	562	770	853	11,279	45	
28-Oct-20	450	437	437	604	541	437	616	600	911	486	182	527	324	369	24	604	541	541	333	333	877	10,174	40	

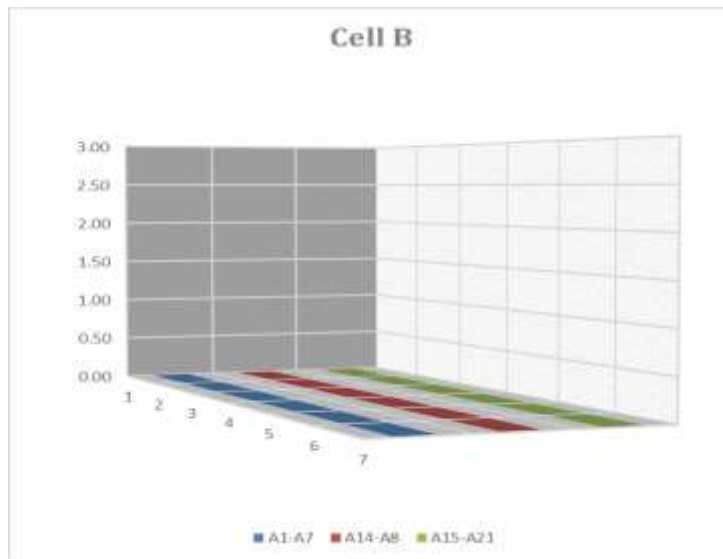


#### Triggers and Suggested Actions

- Sludge depth completed on October 28, 2021
- Currently Cell A is at 40% of allowable volume, which is a 5% decrease from 2019
- No single point location exceeded sludge depth triggers

### 2021 Annual Cell B Sludge Monitoring

Maxville	Cell B-Sample Point Sludge Volume (m <sup>3</sup> )																					Total Sludge Volume (m <sup>3</sup> )	Total Sludge Volume (%)	Warning Trigger <sup>2</sup>												
	Date	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20				21											
	12-Nov-08	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	22-Apr-09	1422	312	354	624	624	791	1185	507	405	304	203	770	446	1268	1304	624	937	1249	687	1145	1730	16,890	67	Total Sludge Volume is Elevated											
	27-Apr-10	474	312	583	479	312	167	308	346	101	0	304	0	405	185	853	479	104	312	208	208	237	6,376	25												
	07-Oct-10	356	104	250	250	104	208	284	231	304	304	203	243	243	0	119	146	458	312	354	146	356	4,972	20												
	08-Dec-11	0	0	354	312	354	312	1967	231	446	142	142	101	668	0	166	208	146	520	562	312	521	7,464	30												
	24-Oct-12	237	208	250	208	146	208	166	346	243	142	304	142	203	161	166	146	104	146	104	146	237	4,011	16												
	06-Oct-14	640	333	666	479	541	395	593	254	263	263	81	101	284	392	403	520	458	187	479	208	593	8,133	32												
	06-Nov-15	640	458	333	333	229	229	735	369	225	20	243	344	344	623	640	354	125	354	770	229	261	7,857	31												
	07-Nov-16	284	354	354	562	354	562	521	277	243	344	344	547	446	623	166	21	562	562	354	354	877	8,710	35												
	29-Oct-19	924	125	333	562	291	395	379	969	648	425	324	446	385	969	616	333	500	562	500	708	379	10,772	43												
	28-Oct-20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			



#### Triggers and Suggested Actions

- Sludge depth were not completed on October 28, 2021, due to reported access issues caused by algae.

## 2021 Annual Additional Triggers Monitoring

Triggers	Monitoring Point	Warning <sup>1</sup> - Sludge Depth Exceeds Trigger on	Monitoring Point	Warning <sup>1</sup> - Sludge Depth Exceeds Trigger on	Monitoring Point	Warning <sup>1</sup> - Sludge Depth Exceeds Trigger on	Monitoring Point	Warning <sup>1</sup> - Sludge Depth Exceeds Trigger on
Cell A	13	12-Nov-08	14	12-Nov-08	15		16	12-Nov-08
	13	22-Apr-09	14		15		16	22-Apr-09
	13		14		15		16	
	13		14	07-Oct-10	15		16	
	13		14		15		16	
	13		14		15		16	
	13		14		15	06-Oct-14	16	
	13	06-Nov-15	14	06-Nov-15	15		16	06-Nov-15
	13		14		15		16	07-Nov-16
	13		14	29-Oct-19	15		16	29-Oct-19
13		14		15		16	28-Oct-20	
Cell B	1		2		13		14	
	1	22-Apr-09	2		13		14	22-Apr-09
	1		2		13		14	
	1		2		13		14	
	1		2		13	08-Dec-11	14	
	1		2		13		14	
	1	06-Oct-14	2		13		14	
	1	06-Nov-15	2		13		14	06-Nov-15
	1		2		13		14	07-Nov-16
	1	29-Oct-19	2		13		14	29-Oct-19
1		2		13		14		

### Triggers and Suggested Actions

— Note <sup>2</sup>: If a sample point is underlined, this signifies that the volume/depth of a sludge in that section of the cell is elevated and action might be required to obtain a uniform sludge distribution

1 Trigger depth of 0.25 m near outlet is exceeded  
Removal or Dispersal of sludge may be required

2 More than half the Total Sludge Volume (25,170 m<sup>3</sup>) noted on the ECA is estimated in each cell  
Depending on location of elevated sludge depths, removal or dispersal of sludge may be required

3 The trigger sludge depths (see Sample Points Area sheet) is exceeded in this cell  
At an individual locations, the sludge depth in more than 1/3 of the working depth in the cell (1.8 m); sludge removal or dispersal may be required

### Triggers and Suggested Actions

- Sludge depth for Cell A outlet, exceeded the trigger. Recommended actions are removal or dispersion. Township to look into action plans.





**Maxville  
Spring  
Discharge  
2021**

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**April 2021**

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**Township of North Glengarry  
Water Works Department**

Authored by Angela Cullen



## Maxville Spring Discharge 2021 Annual Report

### Discharge Summary

The annual discharge was continuously run over 27 days from Friday March 26, 2021 until Wednesday April 21, 2021. The total discharge time frame meets the minimum requirements of set out in ECA#5368-8PPQA2 and it also coincided with the spring peak flows.

Full lagoon effluent volume released to the west branch of the Scotch River was calculated to be 177,606m<sup>3</sup>, with an average daily flow of 6,831m<sup>3</sup>. The flows were maintained to ensure greater than 3:1 mixing ratio, for a 4-part downstream flow.

Total Days Discharged	27
Total Hours Discharged	621.0
Total Amount Discharge to Creek(m <sup>3</sup> )	177,606

Date	Start Time (from Sting Ray Logs)	Total hours	River Flow m <sup>3</sup> /s	Discharge Rate m <sup>3</sup> /s	Mixing Ratio (3:1)	Discharge Amount m <sup>3</sup> (from Sting Ray)
26-Mar-21	8:50		0.860	0.064	13.44	:1
27-Mar-21	8:50	23.95	2.385	0.070	34.07	:1
28-Mar-21	9:03	24.16	1.294	0.200	6.47	:1
29-Mar-21	12:25	27.25	1.113	0.185	6.02	:1
30-Mar-21	11:50	23.35	0.806	0.169	4.77	:1
31-Mar-21	8:19	20.38	0.578	0.150	3.85	:1
01-Apr-21	8:23	24.1	0.565	0.132	4.28	:1
02-Apr-21	13:00	28.58	0.352	0.105	3.35	:1
03-Apr-21	12:26	23.31	0.272	0.085	3.20	:1
04-Apr-21	12:51	24.03	0.208	0.058	3.59	:1
05-Apr-21	10:44	21.83	0.179	0.052	3.44	:1
06-Apr-21	11:05	24.36	0.203	0.060	3.38	:1
07-Apr-21	10:48	23.70	0.188	0.050	3.76	:1
08-Apr-21	13:04	26.26	0.188	0.061	3.08	:1
09-Apr-21	12:09	23.03	0.185	0.059	3.14	:1
10-Apr-21	8:41	20.46	0.075	0.024	3.13	:1
11-Apr-21	8:08	23.36	0.164	0.053	3.09	:1
12-Apr-21	10:09	25.96	0.153	0.048	3.19	:1
13-Apr-21	12:08	26.00	0.093	0.031	3.00	:1
14-Apr-21	8:43	20.20	0.101	0.032	3.16	:1
15-Apr-21	9:10	24.35	0.150	0.049	3.06	:1
16-Apr-21	8:39	23.40	0.653	0.206	3.17	:1
17-Apr-21	10:13	25.50	0.259	0.080	3.24	:1
18-Apr-21	10:14	23.93	0.161	0.051	3.16	:1
19-Apr-21	8:21	22.01	0.235	0.075	3.13	:1
20-Apr-21	10:38	26.26	0.054	0.018	3.00	:2
21-Apr-21	7:55	21.28				:1

\*Note on March 29, April 3 and April 17 data filters were used to generate daily flow values due to flow discrepancies or battery issues.

## Sampling Summary

During this discharge period, sample were taken on 6 occasions and no resulting values were found to exceed the limits or objectives set out in the ECA, indicating good quality treatment. All average readings and loading results were found to be well within normal ranges and limits. No additional sampling was completed during this discharge due to unrelated operational challenges, noted in next section.

Parameter	# Samples Taken	ECA Parameter Limits (mg/L)	Average Reading (mg/L)	ECA Average Waste Loading Limits (Kgs)	Average Waste Loading (kgs)	Adverse Samples
CBOD <sub>5</sub>	6	30	7.7	4932	1361.64	0
T.S.S	6	30	15.5	4932	2752.89	0
T.P.	6	1	0.4	164	62.16	0
pH	27		7.94			
Temperature	27		10.85			
Dissolved Oxygen	27		7.86			

Date	Discharge pH	DO mg/L	Temperature °C	T.S.S. Sample mg/L	T.S.S. Loading kg	C.B.O.D. Sample mg/L	C.B.O.D. Loading kg	T.P. Sample mg/L	T.P. Loading kg	Acute Lethality
26-Mar-21	6.76	6.94	5.8	20		6		0.4		
27-Mar-21	7.30	5.4	3		101.26		30.38		2.03	
28-Mar-21	7.40	4.82	4.9		121.60		36.48		2.43	
29-Mar-21	7.40	3.92	5.2		371.95		111.59		7.44	
30-Mar-21	7.54	2.55	6.1	12	173.63	7	101.29	0.36	5.21	0
31-Mar-21	7.53	2.70	7.1	12	143.11	8	95.40	0.38	4.53	
1-Apr-21	7.91	6.16	7.2		149.04		99.36		4.72	
2-Apr-21	8.84	10.20	7.2		150.43		100.29		4.76	
3-Apr-21	8.23	11.92	7.1		75.19		50.12		2.38	
4-Apr-21	8.80	12.40	12.6		89.31		59.54		2.83	
5-Apr-21	8.51	10.71	11.0	12	49.91	6	24.95	0.25	1.04	
6-Apr-21	8.45	10.14	10.5		58.97		29.49		1.23	
7-Apr-21	8.16	10.92	11.9		48.62		24.31		1.01	
8-Apr-21	7.97	8.95	17.6		61.81		30.90		1.29	
9-Apr-21	7.93	8.84	16.3		51.14		25.57		1.07	
10-Apr-21	7.22	6.08	16.2		23.14		11.57		0.48	
11-Apr-21	7.56	4.28	16.0		54.21		27.11		1.13	
12-Apr-21	7.83	7.61	14.8		52.38		26.19		1.09	
13-Apr-21	7.90	8.52	16.1		29.63		14.81		0.62	
14-Apr-21	7.91	8.42	15.5	11	27.16	8	19.75	0.23	0.57	
15-Apr-21	7.69	8.24	14.9		32.12		23.36		0.67	
16-Apr-21	8.07	8.02	11.5		44.73		32.53		0.94	
17-Apr-21	8.42	9.70	11.4		191.63		139.37		4.01	
18-Apr-21	8.60	10.96	11.2		68.35		49.71		1.43	
19-Apr-21	8.44	7.76	12.0		39.43		28.68		0.82	
20-Apr-21	7.87	9.07	10.6		76.34		55.52		1.60	
21-Apr-21	8.12	6.91	9.2	26	37.80	11	15.99	0.48	0.70	
<b>Annual Average Limits</b>	<b>6.0-9.5</b>			<b>30</b>	<b>4932</b>	<b>30</b>	<b>4932</b>	<b>1</b>	<b>164</b>	
<b>Minimum</b>	6.76	2.6	3.0	11	23.14	6	11.57	0.23	0.48	0
<b>Average</b>	7.94	7.9	10.8	16	89.34	8	48.63	0.35	2.15	0.00
<b>Maximum</b>	8.84	12.4	17.6	26	371.95	11	139.37	0.48	7.44	0.00
<b>Total</b>					<b>2322.89</b>		<b>1264.26</b>		<b>56.01</b>	<b>0</b>

### Lagoon Levels

Lagoon cell level in Cell A was discharge over 25 days and decreased 1.26m in total, from 74.63m to 73.37m.

Lagoon cell level in Cell B was discharge over 27 days and decreased 1.24m in total, from 74.60m to 73.36m.



### Issues

Observed issues noted during this discharge period were minor in nature and include the following:

- Staffing reduction due to the departure of operational staff member.
- Discharge was started while lagoon cells were still under partial ice cover, but the receiving river was open and flowing. It was noted that full ice cover was removed from lagoon cells March 28, 2021.
- Cell A discharge start was delayed due to high TSS sampling result from March 16<sup>th</sup>, during pre-discharge samples. Resample indicated levels below 30mg/L and discharge of the cell was started on March 31, 2021.
- Minor foam observed, near outlet caused by the flow agitation at start of discharge, issue was rectified through valve operations adjustments.
- Minor mildew smell was noted during first few days of discharge while ice was present but by March 31, it was noted that smells were no longer observed.
- Flow fluctuations were noted on 3 days, zero filters were applied to flow logs to ensure more accurate daily flow volume was reported.
  - on 2 occasions flow velocity caused multiple false zero readings
  - on 1 occasion premature battery failure due to environmental temperatures caused false zero readings for short duration

