Alexandria Wastewater System

2023 Annual Report

Contents

A. System Overview

Summary of all system components and designations.

The Alexandria wastewater system is owned and operated by the Corporation of the Township of North Glengarry. The sewage system is comprised of a class 2 wastewater collection system and a class 2 continuous discharge treatment facility. The system was originally constructed in the late 1960's with various upgrades throughout the years to improve capacity and treatment.

The wastewater systems operate under 2 Environmental Compliance Approvals (ECA). ECA # 181-W601, issued in October 2023 for all municipal sewage collection systems located within the North Glengarry Township boundaries and ECA # 9873-BQ6LTR, issued in 2021 for the Alexandria Sewage Works, which outlined the proposed upgrades, current conditions and transitional monitoring requirements over a 5-year period. To date no work has been started or completed at the Lagoon system to increase design capacity.

The collection system is comprised of approximately 25.0kms of sanitary sewage collection piping and force mains of various sizes, with approximately 1585 service connections, 3 sanitary lift stations and 1 main pumping station.

The treatment system is a conventional facultative lagoon system comprised of an aeration cell, followed by coagulant addition for phosphorous removal, 3 facultative cells that run-in series towards a disinfection and dechlorination chamber, which finally discharges to and unnamed drain prior to entering the Delisle river. Sodium Hypochlorite is used to disinfect the treated wastewater, while sodium bisulfate is used to dechlorinate the effluent wastewater prior to discharge into the receiver.

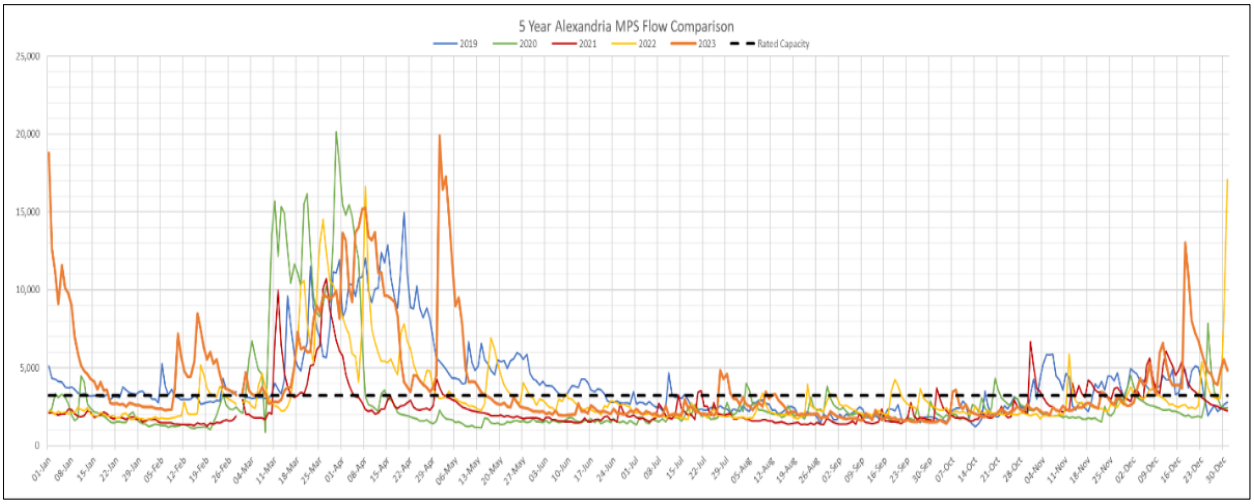
B. Performance Assessment

Summary and interpretation of all influent and imported sewage, monitoring data, and a comparison to the effluent limits outlined in condition 7, including an overview of success and adequacy of works.

During the 2023 calendar year 1,480,848 m^3 of raw untreated sewage was directed towards the Alexandria Lagoon Treatment Facility, based on the metered effluent flows from the main pumping station. This sewage is mainly comprised of residential and commercial waste, as well as a seasonal RV dumping station, which is only in service between May 15-October 15 annually. Flow trending throughout 2023 was observed to be higher than the previous year total flows, but historical trending indicated that the flows were similar to the 2019 values, see Figure 1 below.

There were no noted incidents of surface water from the Garry River system entering the wet well and no leachate was introduced into the system upstream of the main station during this reporting period. Historically the system has observed significant inflow and infiltration but has made efforts over the last few years to reduce or eliminate the infiltration through spot repairs and system CCTV inspections.

Figure 1: 5-yr Main Station Flow Comparison



Overall, the system operated well throughout 2023 and produced final effluent that met the Provincial ECA Design Objectives, Effluent Compliance Limits and Federal Wastewater Systems Effluent Limits. As an effort to review the characteristic and historical trending of the sewage concentration and treatment efficiency, 5-year sampling comparisons were tabulated below.

The imported landfill leachate monitoring only started in 2021 and sampling is completed on a monthly and quarterly frequency during hauling. As previously mentioned, no leachate was imported into the system during 2023, so no sampling was done. Results from 2021 and 2022 indicated little change to the leachate strength during the spring program.

Table 1: 5-year Imported Leachate Result Comparison (Schedule D):

Parameter	Imported Sewage Annual Average Concentration				
	2019	2020	2021	2022	2023
BOD_5	n/r	n/r	3 mg/L	3 mg/L	n/r
TSS	n/r	n/r	3 mg/L	5 mg/L	n/r
TP	n/r	n/r	0.08 mg/L	0.02 mg/L	n/r
TKN	n/r	n/r	11.6 mg/L	16.6 mg/L	n/r
Boron	n/r	n/r	0.825 mg/L	0.837 mg/L	n/r
Cobalt	n/r	n/r	0.005 mg/L	0.0006 mg/L	n/r
Magnesium	n/r	n/r	16.8 mg/L	17.2 mg/L	n/r
Manganese	n/r	n/r	0.058 mg/L	0.069 mg/L	n/r
Potassium	n/r	n/r	20.7 mg/L	18.7 mg/L	n/r
Strontium	n/r	n/r	0.740 mg/L	0.773 mg/L	n/r
Bis (2-ethylhexyl) Phthalate	n/r	n/r	< 5 µg/L	5 µg/L	n/r

The influent sewage was sampled monthly and when compared the results to previous years, the influent sewage strength is comparable, which indicates no significant changes or abnormal discharges into the collection system.

Table 2: 5-year Influent Sewage Sampling Result Comparison (Schedule D):

Parameters	Influent Sewage Annual Average Concentration				
	2019	2020	2021	2022	2023
BOD_5	222 mg/L	160 mg/L	116 mg/L	108 mg/L	90 mg/L
TSS	174 mg/L	300 mg/L	269 mg/L	306 mg/L	209 mg/L
TP	2.53 mg/L	3.33 mg/L	3.25 mg/L	3.11 mg/L	2.70 mg/L
TKN	20.65 mg/L	20.80 mg/L	20.65 mg/L	20.76 mg/L	16.94 mg/L

The aeration outfall was sampled weekly and monthly, as per the minimum requirements per parameter. When the results were compared to previous years, a significant drop in $CBOD_5$ can be noted indicating good BOD reductions and some treatment shortfalls may be noted in the nitrification treatment cycle.

Table 3: 5-year Aerated Cell Effluent Sampling Result Comparison (Schedule D):

Effluent Parameter	Aerated Cell Annual Average Concentration				
	2019	2020	2021	2022	2023
$CBOD_5$	86 mg/L	21 mg/L	16 mg/L	15 mg/L	15 mg/L
TSS	196 mg/L	70 mg/L	83 mg/L	117 mg/L	92 mg/L
TP	2.73 mg/L	1.36 mg/L	1.64 mg/L	2.41 mg/L	2.13 mg/L
Total Ammonia (N)	4.96 mg/L	9.73 mg/L	8.53 mg/L	8.62 mg/L	4.91 mg/L
Nitrite	0.09 mg/L	0.26 mg/L	0.65 mg/L	0.98 mg/L	1.11 mg/L
Nitrate	0.25 mg/L	1.97 mg/L	4.02 mg/L	2.49 mg/L	4.19 mg/L
pH	7.53	7.59	7.56	7.66	7.57
Temperature	11.4°C	11.6°C	12.7°C	11.5°C	12.5°C

The final effluent discharge was sampled and tested on a weekly frequency, as per the ECA minimum requirements. All calculated annual averages for 2023 were found to be well below the design objectives, please refer to section H and Appendix A for further discussion on 2023 results. When compared to previous results, treatment efficiencies have improved over time.

Table 4: 5-year Final Effluent Sampling Sewage Comparison (Schedule D):

Effluent Parameter	Lagoon Effluent Annual Average Concentration				
	2019	2020	2021	2022	2023
$CBOD_5$	18.9 mg/L	7.2 mg/L	3.3 mg/L	3.7 mg/L	3.8 mg/L
TSS	24.3 mg/L	9.9 mg/L	4.7 mg/L	6.5 mg/L	6.0 mg/L
TP	0.44 mg/L	0.22 mg/L	0.15 mg/L	0.19 mg/L	0.14 mg/L
Total Ammonia (N)	5.15 mg/L	6.39 mg/L	4.83 mg/L	4.79 mg/L	2.91 mg/L
TKN	9.74 mg/L	8.84 mg/L	7.15 mg/L	7.34 mg/L	4.73 mg/L
Nitrite	0.09 mg/L	0.13 mg/L	0.12 mg/L	0.15 mg/L	0.06 mg/L
Nitrate	0.94 mg/L	0.67 mg/L	0.45 mg/L	0.29 mg/L	0.43 mg/L
E. Coli *(geometric mean density)*	4.1 cfu/100mL	0 cfu/100mL	1.3 cfu/100mL	2.0 cfu/100mL	2.0 cfu/100mL
Total Chlorine Residual	0.01 mg/L	0.01 mg/L	0.00 mg/L	0.00 mg/L	0.00 mg/L
Dissolved Oxygen	7.07 mg/L	7.95 mg/L	9.16 mg/L	8.15 mg/L	8.58 mg/L
pH	7.53	7.49	7.80	7.64	7.62
Temperature	9.5°C	11.4°C	12.6°C	11.3°C	12.0°C
Un-ionized Ammonia	0.25 mg/L	0.07 mg/L	0.05 mg/L	0.06 mg/L	0.03 mg/L

C. Groundwater Monitoring

Summary and interpretation of all ground water monitoring data

A groundwater monitoring plan was prepared in 2012 by McIntosh Perry and submitted to the MOE, and as part of monitoring requirements, the Township had the 2 monitoring wells installed and developed on March 5, 2013. Background results taken on March 6, 2013 are used to compare the more recent results in order to indicate the potential impact on the surrounding environment.

Operational staff sample annually in March and the 2023 results were similar to previous findings, in that no major impacts were observed in the downstream results. There was a noted increase in upstream nitrate, but no other parameters were elevated. It should be noted the total ammonia was inadvertently left off sampling request, but historically the downstream samples have been gradually increasing since 2017. Please refer to Table 5 below for summary and Appendix D for full summary of results.

Table 5: Groundwater Monitoring Well Sampling Program:

Parameter	Monitoring Well #1		Monitoring Well #2	
	Background results (March 6, 2013)	2023 Sampling Results (March 07, 2023)	Background results (March 6, 2013)	2023 Sampling Results (March 07, 2023)
TOC	8 mg/L	6.2 mg/L	15.2 mg/L	3.3 mg/L
TP	3.8 mg/L	0.73 mg/L	0.47 mg/L	0.40 mg/L
TKN	0.83 mg/L	0.70 mg/L	1.12 mg/L	0.40 mg/L
Total Ammonia (N)	< 0.01 mg/L	n/a	0.22 mg/L	n/a
Nitrite	< 0.1 mg/L	< 0.05 mg/L	0.5 mg/L	< 0.05 mg/L
Nitrate	< 0.1 mg/L	0.05 mg/L	<0.1 mg/L	0.57 mg/L
E. coli	<2 cfu/100 mL	0 /100 mL	<2 cfu/100 mL	0/100 mL

D. Operational Problems

Description of any operating problems encountered, and corrective actions taken.

Collection System:

- Well level monitoring equipment failure due to internal relay board.
  - A secondary float system was used to maintain operations until defective parts were replaced.
- Float issues causing pump to not run as per design.
  - Cleaned and/or adjusted floats to return to normal operations.
- Pump operation issues or failures.
  - Backwash pumps due to air lock caused by performed maintenance.
  - Reset, reverse, or pull pump to remove debris from impeller and restore operations.
  - Unplanned utility power failure.
    - Hydro One repaired external issues, generator or pump installed to maintain operations until repairs completed.
  - Pump position misalignment due to defective guiderails.
    - Replace defective units and proactively replace other pump guiderails to prevent reoccurrence.

- Generator issues
  - Radiator replaced due to slow leak.
  - Breaker trip causing pump failure during power outage, reset to restore operations.
    - External contractor inspected generator to determine cause of underperformance.
    - Installed auxiliary fuel pump which was causing performance issues.
- Alarm panel failure to communicate.
  - External contractor replaced defective equipment to restore communications.

Treatment System:

- Aerator Failure
  - Replaced defective coupler and restore operations.
- Chemical dosage pump issue or loss of dosing.
  - Electrical failure due to power surge from utility power failure
    - Remove defective pump and replace it with spare unit until original pump was repaired and reinstalled.
  - Chemical leak from dosing pump.
    - switch over to back-up pump to maintain operations.
    - pump removed and repaired before reinstallation and placed back into service.
  - Pump air lock.
    - switch over chemical tank and prime all lines in order to remove air.
  - Fitting damage due to corrosion
    - change all defective equipment and material after the chemical dosing pump.
- Chemical dosage line blockage.
  - Transfer injection to spare lines and thaw affected lines to restore chemical dosing.
  - Install a new heat tracer to prevent reoccurrence.
- Unplanned utility power failure
  - Hydro One repaired external issues, generator installed to maintain chemical dosing operations until repairs completed.

E. Maintenance

Summary of all maintenance carried out on any structure, equipment, apparatus, mechanism, or thing forming part of the works.

Collection System:

- Preventative Maintenance Program.
  - schedule and forms at all stations, as required.
  - tasks completed as scheduled.
- Monthly pest control at various sites.
- Bi-annual calibration of all gas monitoring equipment.
- Annual level monitoring and flow measurement calibrations.
- Annual generator maintenance and load testing.
- Annual wet well cleaning at all stations.

Treatment System:

- Preventative Maintenance program
  - schedule and forms at all stations, as required.
  - tasks completed as scheduled.
- Replace chemical dosing lines.
  - change line diameter to prevent crystallization.

- Monthly pest control.
- Annual analyzers, level monitoring and flow measurement calibrations.

F. Effluent Quality Control and Assurance

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

All parameter sampling was performed within provincial and federal guidelines by licensed operational staff, as per internal SOP. Staff are internally trained to ensure techniques and procedures are followed and testing is performed.

An internal weekly sampling schedule with sign off, is used to communicate to all operational staff sampling requirements and timelines. All sampling requirements are reviewed annually to ensure scheduling is up to date and in-line with provincial and federal requirements. As per the ECA requirement, the sampling date was rotated from Wednesdays to Tuesdays during the 2023 reporting period.

Effluent quality control and assurance measures were undertaken by the accredited certified laboratories, Caduceon Environmental and AGAT, who are contracted to complete all sample analysis for the Township of North Glengarry.

G. Flow Measurement and Equipment Calibration

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

Annual calibrations on the detection units (pumping station level indicators and chemical tank level indicators), and flow sensing devices (magmeter, miltronics, etc.) were completed by St-Laurent Instrumentation between November and December 2023. All handheld and benchtop analyzers were calibrated by ClearTech in July 2023. No issues were noted in regard to the operation of the equipment.

H. Effluent Objectives

Description of effort made, and results achieved in meeting the effluent objectives of condition 6.

The wastewater sewage works ECA is conditional on proposed system upgrades and contains descriptions and provisions for existing and post-construction works. At this time, no construction has been started or completed, so the effluent design objectives and limits have not transitioned from the “prior to completion of construction” values found in schedule B and Schedule C.

Monthly discharge effluent monitoring showed that the effluent design objectives and limits were met and greatly exceeded during this reporting period. Table 6 shows a monthly summary of these parameters. Please refer to Appendix A for a full summary of flows, sampling quality analysis for the Alexandria Sewage Treatment Works. 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.

Table 6: Monthly Average Final Effluent Sampling Summary

	$CBOD_5$ (mg/L)	TSS (mg/L)	TP (mg/L)	Total Chlorine Residual (mg/L)	pH Min	pH Max	E. Coli (geometric mean density) (organisms/100 mL)
Concentration Limits	*30*	*40*	*0.5 mg/L*	*0.2 mg/L*	*6.0*	*9.5*	*< 200*
Concentration Objective	*25*	*25*	*0.4 mg/L*	*non-detect*	*6.5*	*8.5*	*< 150*
January	3.2	4.6	0.15	0.00	7.00	8.07	5.8
February	3.8	6.3	0.20	0.00	7.05	7.89	1.9
March	3.8	7.5	0.26	0.00	6.95	8.67	5.6
April	4.8	12.0	0.17	0.00	7.68	8.32	8.9
May	3.0	3.6	0.10	0.00	7.45	8.27	1.3
June	6.5	7.0	0.10	0.00	7.30	8.31	1.0
July	3.0	3.5	0.11	0.00	7.30	8.64	1.2
August	3.0	4.2	0.06	0.00	7.01	8.20	1.0
September	4.0	5.0	0.05	0.00	7.00	7.61	1.0
October	3.0	3.8	0.10	0.00	7.18	7.92	1.8
November	3.8	4.0	0.16	0.00	7.53	7.91	1.2
December	3.8	11.0	0.20	0.00	7.00	8.63	1.7

Quarterly monitoring included acute lethality for rainbow trout and daphnia, as per Federal WSER and Provincial ECA requirements. All samples were found to not be acutely lethal, and no additional sampling was required during this reporting period.

Table 7: Acute Lethality Testing Summary

Date	Rainbow Trout Lethality Result (%)	Comment	Daphnia Lethality Result (%)	Comment
17-Jan-2023	10	Pass	0	Pass
25-Apr-2023	0	Pass	0	Pass
18-Jul-2023	0	Pass	0	Pass
17-Oct-2023	10	Pass	0	Pass

Additional quarterly monitoring has been undertaken by the Water Works Department since 2019, due to previous adverse results consistently noted under ice cover. In response to this event, a technical memo was prepared by McIntosh Perry in consultations with Wood Environment & Infrastructure Solutions and sent to Environment Canada in June. The recommended actions included continued testing for lethality, metals, inorganic and VOC sampling quarterly until upgrades are completed and commissioned.

The summary in Table 8 below lists all results that exceeded the Provincial Water Quality Objectives. As per the technical memo, the parameters listed do not appear to cause lethality, as most results were lower than 2019 values and lethality was not observed during the testing periods. It is believed that treatment short-circuiting occurred through the aeration chamber

and intermittent aerator failures attributed to the previous exceedances. Measures have been put into place to prevent the short-circuiting until repairs can be completed.

Table 8: Additional Metal, Inorganic and VOC Elevated Results

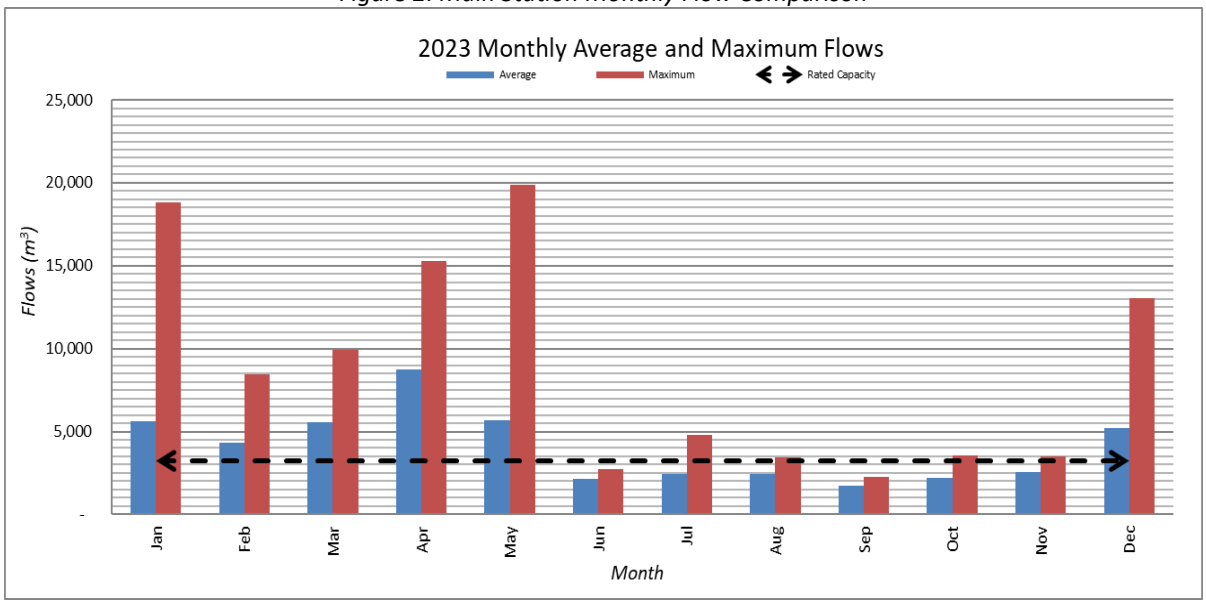
Parameter	Last Adverse		2023 Result (mg/L)				
	Date	Result	PWQO Standard	Q1	Q2	Q3	Q4
Toluene (µg/L)	28-Oct-2022	2.01	0.8	0.48	0.66	< 0.20	< 0.20
Un-Ionized Ammonia (mg/L)	25-Apr-2023	0.047	0.02	0.101	0.047	0.007	0.009
Total Phosphorus (mg/L)	04-Mar-2020	0.31	*	0.11	0.02	< 0.02	< 0.02
Dissolved Aluminum (mg/L)	22-Mar-2020	0.078	0.075 mg/L	0.031	0.042	0.018	0.015
Total Cobalt (mg/L)	17-Mar-2021	0.0014	0.0009 mg/L	< 0.0005	< 0.0005	< 0.0005	< 0.0005
Total Coper (mg/L)	2-Apr-2020	0.028	0.005 mg/L	0.003	0.002	0.001	0.002
Total Silver (mg/L)	19-Jan-2022	0.0002	0.0001 mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Total Zinc (mg/L)	19-Jan-2022	0.050	0.03 mg/L	0.029	0.028	< 0.020	< 0.020

*Interim standard at this time, evidence is insufficient to develop a firm objective general guideline established

There were no reports made in regard to floating or settleable solids or that the wastewater contained oil or any other substance that created a visible film, sheen, foam, or discolouration to the receiving waters.

Annual flow summaries indicate a calculated average daily flow of 4,057m^3/day, which represents 125% of the total rated capacity for this facility, which is out of compliance. The flows have increased 27% from the previous year and have been gradually increasing over the last 3 years, despite continued efforts to reduce infiltration and inflow. The observed maximum daily flow for the year was reported to be 19,897m^3/day, which was reported at the beginning of May, coinciding with a major rain event and the tail end of spring melt conditions. Other significant impacting factors on flows were after 4 separate large rain events outside of the spring melt. Please refer to figure 2 below and to Appendix A for a full summary of flows for the Alexandria Sewage Treatment Works.

Figure 2: Main Station Monthly Flow Comparison



I. Lagoon Cell Sludge Accumulation

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 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 in all 3 cells were measured on October 13, 2023. Based on recorded values, the sludge levels have increased 2.7% in cells A and 9.5% in cell B, but decreased 2% in Cell C. The warning triggers for total sludge volume have been exceeded in Cell B and C, which is consistent with previous years observations.

Efforts to reduce sludge levels in Cell B were restarted in 2021 by contracting Bishop Water for a multi-year Geotube project. During this reporting period no sludge removal was completed due to an excessive amount of vegetation growth within the cell berms during the planned work period, where removal would have created greater time delays and additional inhibitive cost restraints. The work plan going forward will be targeted to starting work in the spring to ensure this issue does not reoccur. Minimal amounts of dewatering were observed from the Geotubes between May and October, nonetheless the water collected from the trench was recycled back into lagoon at Cell B via small sump pump. The dewatering effluent quality was not analyzed nor was the pumped volume tracked.

Table 9: Desludging Operation Summary

Week	BDT	Volume Pumped	Total Polymer Usage	Average Polymer Dosage
		m^3	L	kg/BDT
N/A				
Total				

J. Complaints

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

There were only about a dozen received complaints from homeowners, the majority of these complaints were in regard to sewer lateral back-up. In most cases, the issues were on the homeowner's side resulting in private contracted services. In a few cases the laterals were inspected through CCTV, and services were repaired, or arrangements were made to repair by township if the problem was found to be on township side.

K. Bypass, Overflow, Spill, Abnormal Discharge Events

Summary of all bypasses, spills, or abnormal discharge event.

There were four primary overflow events reported during 2023. All events were observed in the wastewater collection system at the identified overflow point and coincided with significant rain events and equipment failures. The overflows were reported to the EOHU and SAC, and samples were collected as per requirements and reports were submitted as required. The total annual volume for overflows was estimated to be 10,353m^3, with 7,909m^3 being metered and 2,444m^3 estimated. A summary of the report submission can be found in table below, please refer to Appendix C for an overflow breakdown and report.

Table 10: Overflow Report Submission Summary

# Event	Date	Reported to	Reference Number	Location
1	05-April-2023	☒ Ministry of Health ☒ Spills Action Center	1-34P251	Alexandria Main Pumping Station
2	05-April-2023	☒ Ministry of Health ☒ Spills Action Center	1-34JV14	Bishop Pumping Station
3	01-May-2023	☒ Ministry of Health ☒ Spills Action Center	1-3FQZFB	Alexandria Main Pumping Station
4	01-May-2023	☒ Ministry of Health ☒ Spills Action Center	1-3FPH7L	Alexandria Manhole 160 (Centre St Overflow 2)

Quarterly reports for bypasses and overflows are now required to be submitted to Ministry of the Environment inspector as per the ECA.

Table 11: Quarterly Bypass and Overflow Report Submission Summary

Quarter	Month	Year	By-Pass Occur	Overflow Occur	Submitted to MECP	Report Name
1	January-March	2023	N	N	13-Apr-2023	2023-ALX WWS-Bypass and Overflow_ Q1
2	April-June	2023	N	Y	11-Jul-2023	2023-ALX WWS-Bypass and Overflow_ Q2
3	July- September	2023	N	N	12-Aug-2023	2023-ALX WWS-Bypass and Overflow_ Q3
4	October- December	2023	N	N	07-Feb-2024	2023-ALX WWS-Bypass and Overflow_ Q4

L. Other

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

EOS 2000

i. Equipment Summary

The date of installation and removal of the EOS-2000 unit within each unit

The EOS unit was not installed or operated during this reporting period, so as such there was no additional monitoring completed.

Authorized System Alterations

i. Alterations Summary

A summary of all alterations within the reporting period as authorized by the ECA, including all alterations that pose a significant drinking water threat.

There were no alterations or additions to the collection or treatment systems during this reporting period.

Efforts to Reduce System Overflows

i. Collection System Inspection, Repair and Remediation Summary

A summary of all works completed within the reporting period as authorized by the ECA, including all projects undertaken, PPCP updates and an assessment of the effectiveness of these actions.

Work to reduce infiltration and inflow continued throughout this period. The engineering firm EVB was contracted to complete an Inflow and Infiltration analysis study, including an overview of all pumping stations and their current capacities. This will assist in identifying areas of concern and help with future work planning.

Multiple CCTV inspections were completed in various areas of suspected or known infiltration, such as the northeast section, along Garry River and the intersection of St James St and Dominion St South, to determine the levels of infiltration. Contractors were hired to reline 2 sections of 600mm sanitary collection mains along the Garry River, as well as to complete spot repairs in collection

system in various areas to prevent further inflow. These repairs were completed along Kenyon ST West as identified during the CCTV work completed in 2021.

Proposed Construction of Works Update

i. Status Update

A summary of any changes or update to the schedule for the completion of the construction and commissioning operation of major process(es) / equipment groups in the Proposed Works.

Proposed works were anticipated to be constructed and commissioned within 5 years of the issuance of the current ECA (February 2021). For any delay beyond the time frame requires an application to amend the approval at a minimum of 6 months prior to ECA expiry. To date no construction work has been tendered or started at this site.

NORTH GLENGARRY WATER WORKS

WASTEWATER TREATMENT WORKS PERFORMANCE RESULTS

Municipality: ***North Glengarry*** **Year:** ***2023***

Project: ***Alexandria STP*** **Receiving Stream:** ***Delisle River***

Description: ***1 Pumping Station, 1 Aerated Cell, 3 Facultative Cells*** **Design Capacity:** ***3237 m^3/day***

Continuous Discharge with Phosphorous Removal

MONTH	Flows			Biochemical O_2 Demand			Suspended Solids			Phosphorus		
	Total Flows (m^3)	Average Daily Flow (m^3)	Maximum Daily Flow (m^3)	Average Raw $CBOD_5$ (mg/L)	Average Effluent $CBOD_5$ (mg/L)	Percent Removal (%)	Average Raw SS (mg/L)	Average Effluent SS (mg/L)	Percent Removal (%)	Average Raw TP (mg/L)	Average Effluent TP (mg/L)	Percent Removal (%)
Jan	174,545	5,630	18,817	84.0	3.2	96.2	130.0	4.6	96.5	1.73	0.15	91.2
Feb	121,512	4,340	8,471	42.0	3.8	91.1	20.0	6.3	68.8	0.65	0.20	68.8
Mar	172,704	5,571	9,918	125.0	3.8	97.0	128.0	7.5	94.1	2.96	0.26	91.1
Apr	262,673	8,756	15,285	116.0	4.8	95.9	220.0	12.0	94.5	2.21	0.17	92.5
May	175,841	5,672	19,897	85.0	3.0	96.5	230.0	3.6	98.4	2.50	0.10	95.8
Jun	64,535	2,151	2,728	34.0	6.5	80.9	82.0	7.0	91.5	1.48	0.10	93.1
Jul	76,195	2,458	4,815	139.0	3.0	97.8	380.0	3.5	99.1	4.66	0.11	97.6
Aug	75,598	2,439	3,451	134.0	3.0	97.8	292.0	4.2	98.6	4.31	0.06	98.6
Sep	52,024	1,734	2,277	61.0	4.0	93.4	98.0	5.0	94.9	1.66	0.05	97.3
Oct	67,387	2,174	3,578	52.0	3.0	94.2	250.0	3.8	98.5	2.88	0.10	96.4
Nov	76,542	2,551	3,475	173.0	3.8	97.8	590.0	4.0	99.3	6.70	0.16	97.7
Dec	161,293	5,203	13,039	35.0	3.8	89.3	86.0	11.0	87.2	0.60	0.20	67.1
Total	**1,480,848**											
Average		**4,057**		**90.0**	**3.8**	**94**	**208.8**	**6.0**	**93**	**2.70**	**0.14**	**91**
Maximum			**19,897**	**173**	**6.5**	**98**	**590.0**	**12.0**	**99**	**6.70**	**0.26**	**99**
Criteria		***3,237***			***30***			***40***			***0.50***	

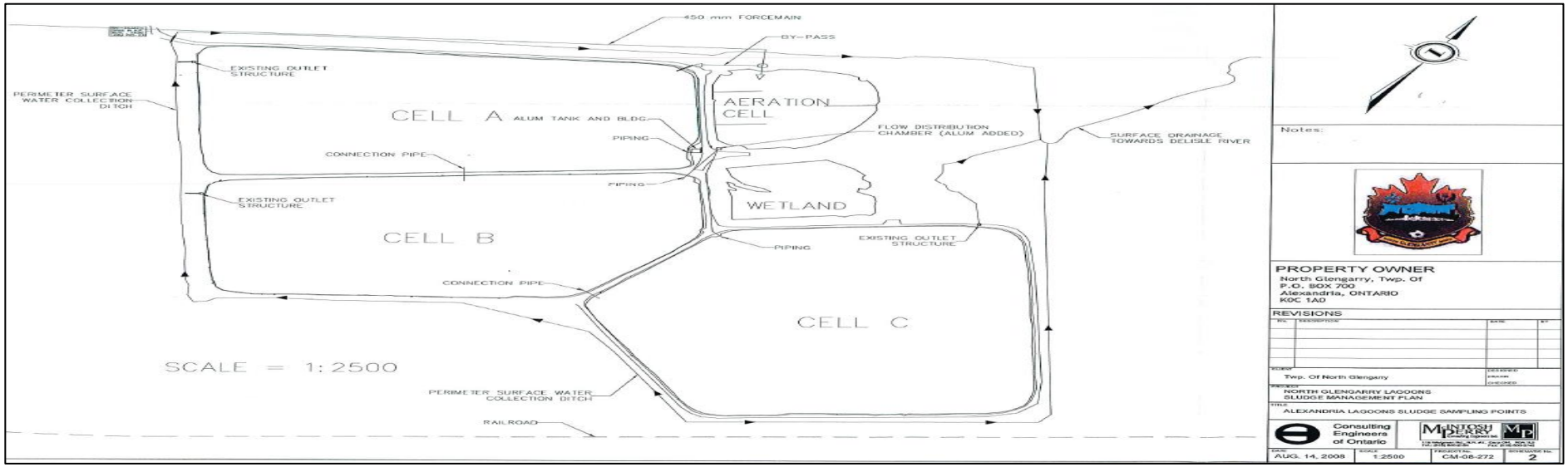
NORTH GLENGARRY WATER WORKS
WASTEWATER TREATMENT PERFORMANCE RESULTS
2023

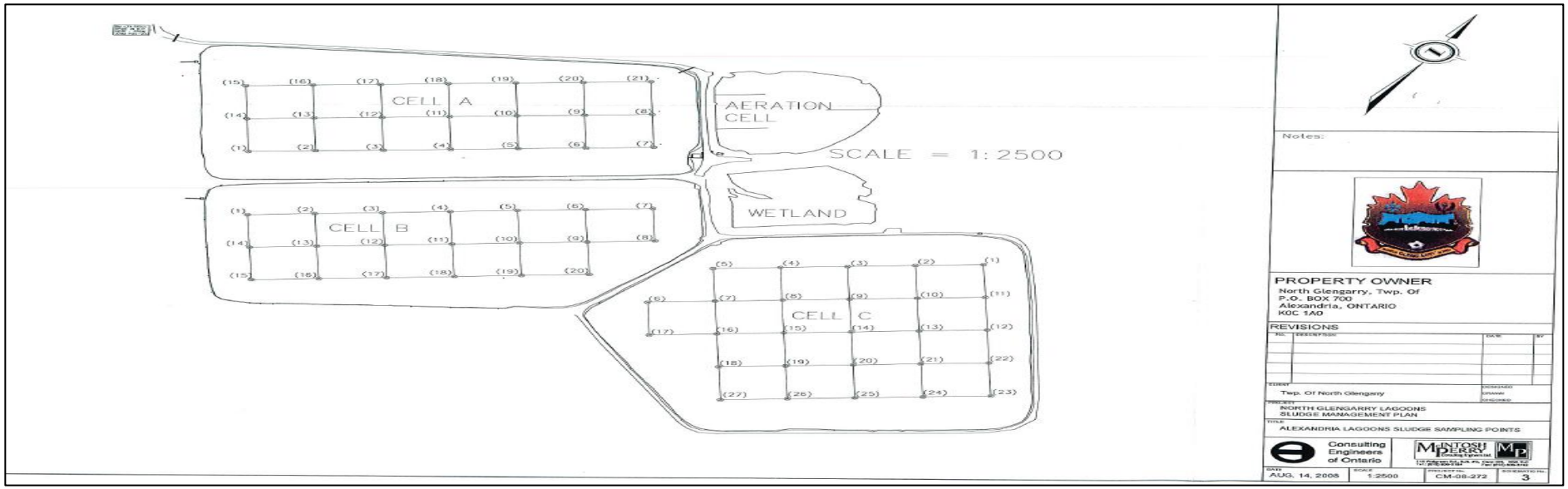
MONTH	Ammonia			TKN			Nitrite			Nitrate		
	Average Raw Ammonia (mg/L)	Average Effluent Ammonia (mg/L)	Percent Removal (%)	Average Raw TKN (mg/L)	Average Effluent TKN (mg/L)	Percent Removal (%)	Average Raw Nitrite (mg/L)	Average Effluent Nitrite (mg/L)	Percent Removal (%)	Average Raw Nitrate (mg/L)	Average Effluent Nitrate (mg/L)	Percent Removal (%)
Jan	n/a	5.79		10.00	7.96	20.4	n/a	0.11		n/a	0.8	
Feb	n/a	7.49		8.90	8.10	9.0	n/a	0.06		n/a	0.1	
Mar	n/a	7.49		17.50	13.08	25.3	n/a	0.05		n/a	0.1	
Apr	n/a	2.73		10.60	4.50	57.5	n/a	0.06		n/a	1.0	
May	n/a	0.17		13.80	1.14	91.7	n/a	0.05		n/a	0.4	
Jun	n/a	0.23		20.60	1.20	94.2	n/a	0.06		n/a	0.4	
Jul	n/a	0.38		24.90	1.75	93.0	n/a	0.06		n/a	0.3	
Aug	n/a	0.21		22.80	1.34	94.1	n/a	0.05		n/a	0.5	
Sep	n/a	0.07		19.40	1.03	94.7	n/a	0.08		n/a	0.1	
Oct	n/a	1.92		18.40	3.00	83.7	n/a	0.06		n/a	0.1	
Nov	n/a	4.57		29.40	6.80	76.9	n/a	0.06		n/a	0.5	
Dec	n/a	4.79		7.00	8.25	-17.9	n/a	0.05		n/a	0.9	
Total												
Average		2.99		16.94	4.85	60		0.06			0.43	
Maximum		7.49		29.4	13.08	95		0.11			1.01	
Criteria												

NORTH GLENGARRY WATER WORKS
WASTEWATER TREATMENT PERFORMANCE RESULTS
2023

MONTH	Hydrogen Sulphide			E. coli			pH			Temp	Cl_2
	Average Raw H_2S (mg/L)	Average Effluent H_2S (mg/L)	Percent Removal (%)	Average Raw E.coli (cts/100ml)	Average Effluent E.coli (cts/100ml)	Percent Removal (%)	Minimum Effluent pH	Average Effluent pH	Maximum Effluent pH	Average Effluent Temp (°C)	Average Effluent Cl_2 (mg/L)
Jan	n/a	0.01		n/a	5.83		7.00	8.07	7.31	4.18	0.00
Feb	n/a	0.00		n/a	1.90		7.05	7.89	7.46	5.10	0.00
Mar	n/a	0.00		n/a	5.61		6.95	8.67	7.59	3.75	0.00
Apr	n/a	0.00		n/a	8.85		7.68	8.32	7.94	8.88	0.00
May	n/a	0.00		n/a	1.32		7.45	8.27	7.94	14.02	0.00
Jun	n/a	0.00		n/a	1.00		7.30	8.31	7.97	20.70	0.00
Jul	n/a	0.00		n/a	1.19		7.30	8.64	7.92	23.88	0.00
Aug	n/a	0.00		n/a	1.00		7.01	8.20	7.53	20.76	0.00
Sep	n/a	0.00		n/a	1.00		7.00	7.61	7.36	20.03	0.00
Oct	n/a	0.00		n/a	1.82		7.18	7.92	7.51	12.12	0.00
Nov	n/a	0.00		n/a	1.19		7.53	7.91	7.71	5.28	0.00
Dec	n/a	0.00		n/a	1.68		7.00	8.63	7.81	6.23	0.00
Total											
Average		0.00			2.0		7.62	7.62	7.62	13.06	0.00
Maximum		0.01			8.9		8.68	8.68	8.68	26.80	0.00
Criteria					***200***		***6.0***	***6.5 - 8.5***	***9.5***		***0.02***

Sludge Monitoring Points Identification





Sludge Sampling Point Volume Index

Cell A- Sample Point Sludge Volume m^3																												Total Sludge Volume (m^3)	Warning Trigger	Sludge Volume %
Date	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21									
29-Oct-19	933	609	797	996	605	1391	4436	3810	1276	668	567	466	506	1018	1413	864	1008	708	878	919	1899							25766		49.1
05-Jun-20	1236	927	876	1520	1132	2309	3013	3404	709	972	668	466	770	837	1599	1173	1238	1049	1021	1240	1189							27347		52.2
28-Oct-20	670	1271	743	1127	1395	1784	3794	631	466	628	466	304	405	972	1487	864	634	655	902	1667	793							21660		41.3
11-Nov-22	787	742	1142	865	1264	2047	3710	2548	770	466	871	162	446	724	1190	1173	922	1520	1258	1560	1941							26104		49.8
13-Oct-23	933	583	1009	1520	2317	2047	3850	2322	1175	972	567	770	243	837	1562	988	1094	1389	285	1560	1523							27544		52.5

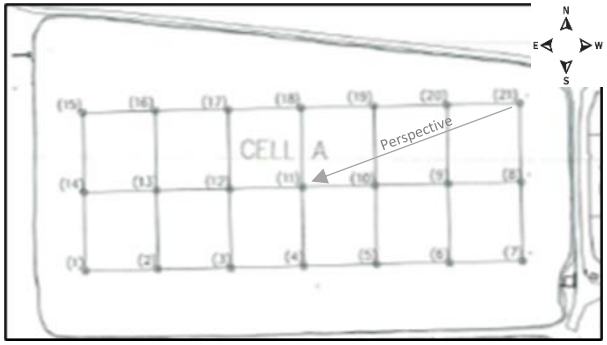
Cell B- Sample Point Sludge Volume m^3																												Total Sludge Volume (m^3)	Warning Trigger	Sludge Volume %
Date	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20										
29-Oct-19	2349	1934	2334	2892	3173	3964	5042	3458	2693	2187	1377	1013	1276	1345	1152	1631	1769	2246	2173	3176								47184	Total Sludge Volume High	92.6
04-Jun-20	2048	1792	2109	2892	4296	3271	4244	2987	1883	2491	2045	1053	749	1627	1348	1007	1691	2162	2370	2220								44286	Total Sludge Volume High	86.9
28-Oct-20	1897	2076	2419	2274	3959	4047	4244	2717	2288	1316	1114	1175	810	1236	1152	1367	2549	2303	2963	4718								46625	Total Sludge Volume High	91.5
04-Nov-22	2349	512	928	2892	4296	4518	4563	1078	1377	1377	1175	1073	567	1236	2010	1727	1509	2050	1467	1789								38493	Total Sludge Volume High	75.5
13-Oct-23	2319	1422	2897	2892	4072	4103	4084	2313	2693	2592	1377	1762	1154	1453	1642	1247	1353	1460	1044	1419								43298	Total Sludge Volume High	85.0

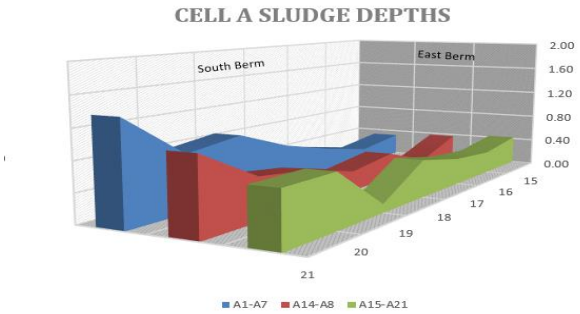
Cell C- Sample Point Sludge Volume m^3																														Total Sludge Volume (m^3)	Warning Trigger	Sludge Volume %
Date	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27			
28-Oct-19	3516	3292	3717	3542	4517	3237	2795	2086	1701	1175	2921	1469	770	668	871	1073	2433	2378	1175	1175	1478	1980	2531	1699	1510	1587	2414	57706	Total Sludge Volume High	87.2
04-Jun-20	3578	3097	4276	5424	4920	2558	1883	1235	1377	1114	1867	3910	1073	1013	1175	2592	2174	2902	972	1073	972	1767	2836	1523	1624	1751	2911	61595	Total Sludge Volume High	93.1
28-Oct-20	3361	3041	3046	3819	4248	2105	2187	1377	1276	871	1603	713	1377	466	830	1681	1181	1573	1215	972	871	702	1128	1318	1367	1176	1349	44854	Total Sludge Volume High	67.8
11-Nov-22	3516	3990	3940	4373	4248	2784	2086	1580	1883	1478	2262	1577	851	851	1377	2086	3142	2727	1175	972	972	2086	2073	1816	1054	2681	2024	59602	Total Sludge Volume High	90.1
13-Oct-23	3516	3013	3018	4373	4785	2988	1478	1073	1276	1580	1691	1793	1154	851	1154	1559	2528	2517	1175	1478	1175	2512	2683	1816	1624	1833	3657	58300	Total Sludge Volume High	88.1

Note: if a Sample Point Volume or the Total Sludge Volume is underlined, this signifies that the volume of sludge in that section is high and action might be required to obtain a uniform distribution.

Sludge Volume Profile

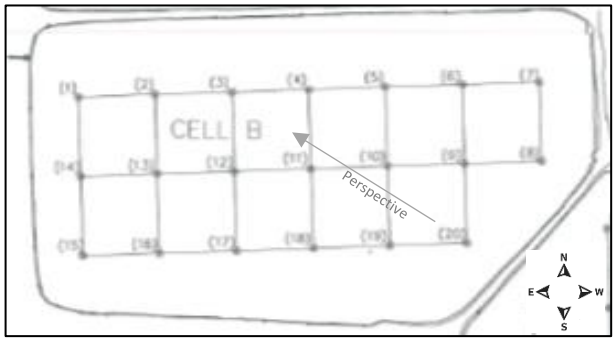
CELL A

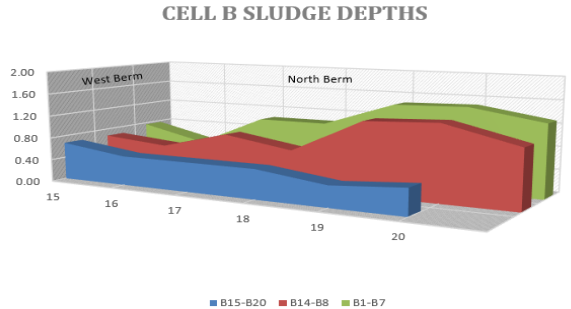




- Last depth reading: October 13, 2023.
- Cell volume calculated to be 52.5%.
- Sludge volume increased 2.7% from 2022 values.
- 6 locations exceeded trigger levels:
  - 5, 6, 7, 8, 20, 21
- Highest volume note in south-west corner of cell.

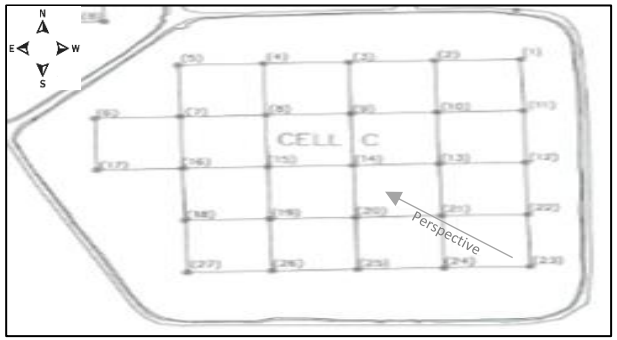
CELL B

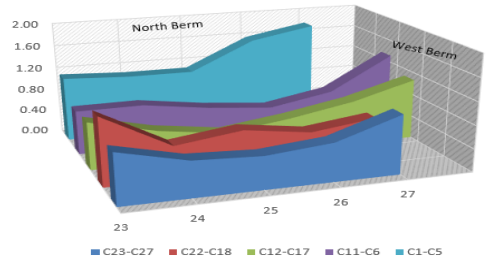




- Last depth reading: October 13, 2023.
- Cell volume calculated to be 85.0%.
- Sludge volume increased 9.5% from 2022 values.
- 12 locations exceeded trigger levels:
  - 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 14, 15
- Highest volume located in north-east corner of cell.

CELL C





- Last depth reading: October 13, 2023.
- Cell volume calculated to be 88.1%.
- Sludge volume reduced 2.0% from 2022 values.
- 20 locations exceeded trigger levels:
  - 1, 2, 3, 4, 5, 6, 7, 9, 10, 11, 12, 16, 17, 18, 20, 22, 23, 24, 26, 27
- Highest volume located in north-east corner of cell.

1.0- Provide the following information for each bypass that occurred at each sewage pumping station or treatment plant bypass location for the reporting year. Start with a new line for each event.

Facility Name: Alexandria WWTP
Report Year: 2023

Date	Location	Type (1)	Start Time	Duration	Volume	Disinfect (2)	Reason Code (3)	Sample Results			
dd-mmm-yyyy				Hrs	m^3			BOD_5 (mg/L)	SS (mg/L)	TP (mg/L)	E. Coli (mg/L)
05-Apr-2023	Bishop Pumping Station	P	17:45	53.78	2000	N	1	4.4	14.9	0.17	93000
05-Apr-2023	Alx Main Pumping Station	P	17:14	40	6023	N	1 & 3	8.1	19.9	0.29	79500
01-May-2023	Alx Main Pumping Station	P	4:35	7.91	1886	N	1	11.0	43.0	0.3	
01-May-2023	Alx Manhole 160	P	6:50	3:50	444	N	1	10.0	33.0	0.6	
05-Apr-2023	Bishop Pumping Station	P	17:45	53.78	2000	N	1	4.4	14.9	0.17	93000

Comments Area for Pumping Stations and Plant Bypasses:

Type (1)		Disinfect (2)	Reason Code (3)
P: Primary	*the discharge of raw sewage subject to no treatment*	*Y: Yes*	*1: Heavy Precipitation*
S: Secondary	*excludes grit removal and/or chlorination*	*N: No*	*2: Snow Melt*
	the discharge of sewage that has undergone solids removal at the primary clairifiers but bypassed the secondary treatment process	*U: Unknown*	*3: Equipment Failure*
			4: Equipment Maintenance
			5: Sewer Problems
			6: Power Failure
			7: Exceed Design
			8: Other

2.0- Pumping Station and Plant Bypass Monthly Summary

Facility Name: Alexandria WWTP

Month	Primary Bypass			Secondary Bypass		
	No. of Days (days)	Duration (hours)	Volume (m^3)	No. of Days (days)	Duration (hours)	Volume ($1000m^3$)
January	0			0		
February	0			0		
March	0			0		
April	2.25	93.78	8023	0		
May	0.5	14.07	2330	0		
June	0			0		
July	0			0		
August	0			0		
September	0			0		
October	0			0		
November	0			0		
December	0			0		
Total	2.75	107.9	10352.9	0	0	0

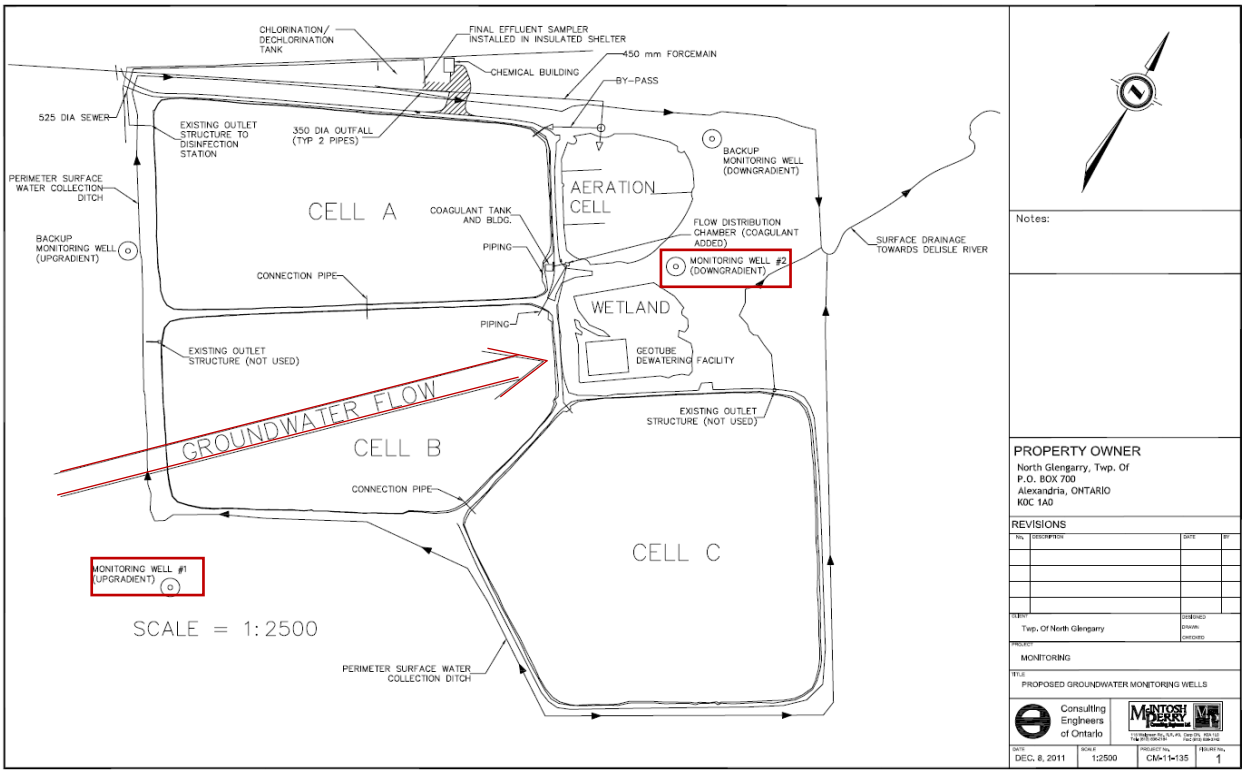
AADF: Annual Average Daily Flow

*% of AADF= ((Volume of Bypass/ADDF)/365)*100*

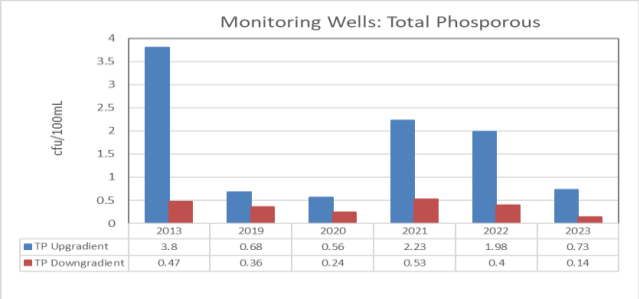
**AADF(m^3/d) = 4,057*

$$\frac{\text{Volume of Bypass as \% of AADF*}}{\text{Daily Flow}} = 0.70\%$$

Alexandria Monitoring Well Location

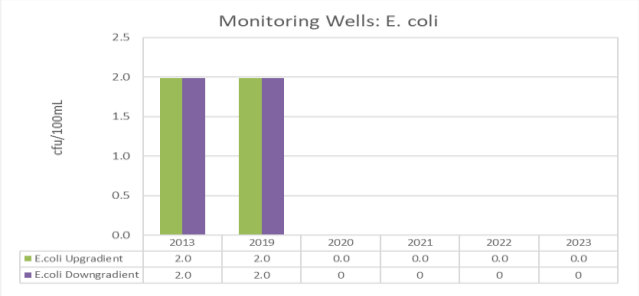


Alexandria Monitoring Sampling Results



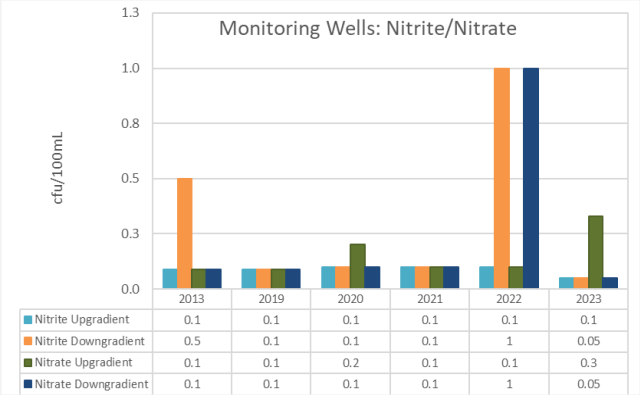
Total Phosphorous in the downgradient well was found to be consistent lower than the result from the upgradient well results, which indicates little to no impact from the lagoon system.

Please note the initial sample results from 2013 and the last 5 years are only displayed.



E. coli has not been detected in the downgradient well and the upgradient well since 2019, which demonstrates that the lagoons have no impact on surrounding areas.

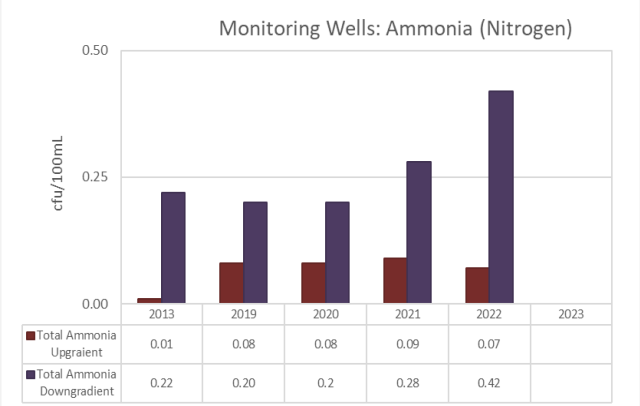
Please note results in 2019 were < 2 cfu/100mL, *(represented by a reading of 2.0)*.



	2013	2019	2020	2021	2022	2023
Nitrite Upgradient	0.1	0.1	0.1	0.1	0.1	0.1
Nitrite Downgradient	0.5	0.1	0.1	0.1	1	0.05
Nitrate Upgradient	0.1	0.1	0.2	0.1	0.1	0.3
Nitrate Downgradient	0.1	0.1	0.1	0.1	1	0.05

Nitrite/Nitrate samples have been below detection in most samples results. However, results from 2023 nitrate levels were increased, but these results were still minimal. Further testing may indicate if this parameter is impacting the surrounding areas,

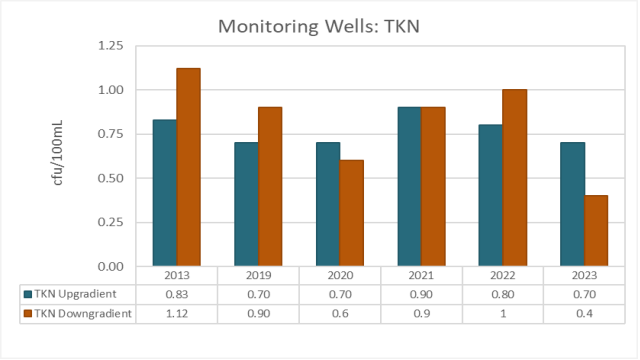
Please note although the 2022 levels appear to be increased levels were noted however these results were <1mg/L, so represented by 1.



	2013	2019	2020	2021	2022	2023
Total Ammonia Upgraient	0.01	0.08	0.08	0.09	0.07	
Total Ammonia Downgradient	0.22	0.20	0.2	0.28	0.42	

No sampling was completed in 2023, but historical trending results from the downgradient well results have been marginal in nature, but all results are higher than the upgradient samples. The sampling results indicate possible influence, but impact would be minimal based on results.

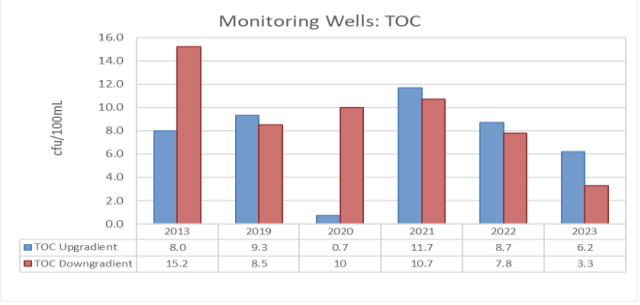
It is also worth noting surrounding area is agricultural, which may also be a source of nitrogen.



	2013	2019	2020	2021	2022	2023
TKN Upgradient	0.83	0.70	0.70	0.90	0.80	0.70
TKN Downgradient	1.12	0.90	0.6	0.9	1	0.4

As historical trending has displayed intermittent increases in both upstream and downstream samples, the TKN values from 2023 are well below the upstream samples. Overall, samples are marginal in nature.

It is also worth noting surrounding area is agricultural, which may also be a source of nitrogen.



	2013	2019	2020	2021	2022	2023
TOC Upgradient	8.0	9.3	0.7	11.7	8.7	6.2
TOC Downgradient	15.2	8.5	10	10.7	7.8	3.3

TOC sampling results were found to be lower in the downgradient well and significantly lower than the initial sample results. The annual reading appears to fluctuate over the last few years, but have been decreasing over the last 5 years.

It should be noted that all results are based on observed testing, and not from a hydrogeological standpoint.