

Township of North Glengarry

Alexandria Wastewater System

2017 Annual Report

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1. Performance Assessment

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

The Alexandria Sewage Works System is comprised of a collection system with 4 pumping stations and a lagoon treatment system, which applies coagulant for phosphorous removal and discharges continuously. The effluent sewage is also disinfected and dechlorinated prior to discharge into the receiving stream. Total system flows were higher than previously observed, which can be attributed to a significant amount of rain events during this calendar year. Other sources of influent flow included 7,414,922 L of leachate hauled from the Alexandria landfill to the Main Pumping Station between April 10 and May 19, 240m³ of raw sewage was hauled from the Bishop Station to the Alexandria Lagoon system and an unknown amount of river water, which was observed entering Main Pumping Station intermittently between April 4 and May 10, during spring snow melt and rain events.

The collection system operated well during this calendar year, with minimal issues reported. System inflow and infiltration work still on-going. Tenders for system spot repairs and lining was released near the end of 2017. Some minor CCTV work completed based on individual complaints or observed issues. Deficiencies were added to previous listing. Minor issues with grease buildup and debris entering specific stations.

In early 2017 the monthly effluent averages for CBOD₅, TSS and TP exceeded the Provincial limits at various times between January and March, once the ice cover was melted, the limits returned to normal ranges which were below all provincial and federal limits and objective levels. Other operational issues were exceedances of total chlorine monthly allowable average. Most of the instances were a result of a one-time high residual. Operational staff dealt with each incident upon discovery to ensure chemical residuals were brought into compliance. The system was operated well for the most part of 2017, and produced an effluent meeting the Federal Effluent Limits and the Provincial Environmental Compliance Approval Limits, apart from the previously mentioned issues. All times the system was out of compliance, reports were made and reported as required to the MOECC and Environment Canada.

Refer to Table 1 below for average concentrations as described above. Appendix A summarizes flows, raw influent and treated effluent results.

Table 1: Provincial and Federal Effluent Limits

Effluent Parameter	CBOD ₅	TSS	TP	Total Chlorine Residual	pH (maintained at all times)	E. Coli (geometric mean density)	Un-ionized Ammonia
	mg/L	mg/L	mg/L	mg/L		organisms/100 mL	mg/L
Provincial Monthly Average Concentration Limit	30	40	0.5	0.02	6.0-9.5	< 200	n/a
Federal Annual Average Concentration Limits	25	25	n/a	0.02	n/a	n/a	< 1.25
2017 Average Concentration	22.9	16.5	0.32	0.03	7.46	4.6	0.08

2. Groundwater Monitoring

Summary and interpretation of all ground water monitoring data

A groundwater monitoring plan was prepared by McIntosh & Perry in 2012 and submitted to the MOE, as per the report, the Township had the 2 wells installed on March 5, 2013. Samples for background counts were taken on March 6, 2013. Please find below the summary of the background samples and the samples taken in 2017. Samples are to continue to be sampled annually in early March.

The lagoons do not appear to have a significant impact on groundwater, as per sampling results. The only parameter that had a visible increase downgradient was Nitrogen, however a minor increase was visible in nitrite samples in both wells during the 2017 sampling. TKN results were only slightly higher in well 2, but were still well below the initial background results.

Table 2: Results from March 06, 2017 sampling:

Parameter	Monitoring Well #1		Monitoring Well #2	
	Background results (March 6, 2013)	2017 Sampling Results	Background results (March 6, 2013)	2017 Sampling Results
TOC	8 mg/L	9.1 mg/L	15.2 mg/L	9.5 mg/L
TP	3.8 mg/L	1.5 mg/L	0.47 mg/L	0.29 mg/L
TKN	0.83 mg/L	0.58 mg/L	1.12 mg/L	0.66 mg/L
Nitrite	< 0.1 mg/L	0.5 mg/L	0.5 mg/L	0.8 mg/L
Nitrate	< 0.1 mg/L	0.1 mg/L	<0.1 mg/L	0.2 mg/L
E. coli	<2 cfu/100 mL	0/100 mL	<2 cfu/100 mL	0/100 mL

3. Operational Problem Summary

Description of any operating problems encountered and corrective actions taken

Collection System:

- On-going infiltration and inflow of ground water into the system despite on-going work, tender for spot repair and lining released in 2017 based on CCTV inspections
- Mechanical failure at Leroux station caused raw sewage to flood dry well. Both motors were removed for inspection and repair. Spare motor installed and second motor was installed 20 days later.
- Pumping issues at Sandfield Station caused pump #1 to be sent to Ottawa for repair to damaged impeller shaft. Unit was out of service for 29 days.
- Heavy precipitation events caused various stations to by-pass, in order to prevent damage upstream of station.
- Flows into Main station were observed as by-pass outfall was submerged by creek, causing abnormally high flows through the station.
- Operational issue observed on Sandfield standby generator during outage. Faulty kill switch engagement prevented operations, station was monitored for levels and pumps as required until generator was repaired.

- Due to lack of usage and low temperatures in wet well area of the main station, pipe above pumps #1 and #4 was partially frozen. Eliminated air flow into wet well, pump thawed within 24 hours of initial discovery.
- Pumping Station monitoring system no longer operational, to determine new course of action.
- Minor to moderate issues with grease at specific stations causing issues with pump operations. (Bishop/Sandfield)

Treatment System:

- Lagoon upset visible in discharge between January and March, under ice cover. Sampling indicated an increase in CBOD5, TSS, TP and E. coli. Once ice began to dissipate, levels returned to normal ranges. This on-going trend is believed to be caused by lack of oxygen due to on-going issues with aerator units. During this period sodium hypochlorite dosages significantly increased to prevent increased bacteriological results
- ORP probe operation, units obsolete and parts no longer viable. Replacement units were shipped, but parts missing. Units were not installed by the end of 2017.
- Minor electrical issues in sampling huts. Electrical receptacle replaced.
- Replacement of minor parts on aeration equipment
- Installation of new conduit between alum building and the aeration outfall chamber due to compressed pipe and inability to replace line. Temporary line run at ground level until completed
- Chlorine and dechlor dosing stopped for 2 days due to frozen dechlor dosing lines. Temp increased and lines thawed.

4. Maintenance Summary

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

Collection System:

- Repairs completed to a few sewer laterals as a result of sewer back-ups. Majority of issues found to be on owner side
- Minor repair or replacement to the following equipment, check valve, level float, generator louvres system parts and chain blocks.
- Repair to by-pass pump due to improper operation
- Formal station specific tasks and recording forms at each site
- Pumps pulled or rotation reversed where possible at various stations due to poor flows or increased output amperage. Rags and debris found to be hindering impeller operations. See breakdown below.

Table 3: Pump Maintenance Summary

Station	Removed/Inspected			
	P1	P2	P3	P4
Leroux	1	0		
Bishop	0	0		
Sandfield	20	1		
Main Station	5	1	7	2
Reversed Impeller Rotation				
Main Station	21	22	23	0

Treatment System:

- Repair to heating system in Sodium Hypochlorite/Sodium Bisulphate storage building
- Minor repairs to pumping equipment due to leaks or faulty operation, chlorine, dechlor and coagulant
- Replacement of dosing lines from pump to outlet, coagulant, dechlor and chlorine
- Replacement to minor part for the alarm system that were no longer operational

5. 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. 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.

6. Flow Measurement Calibration

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

Annual calibrations were completed by St- Laurent Instrumentation between October 2017. Calibrations were performed on all detection units (pumping station level indicators and chemical tank level indicators), hour meters/counters and flow sensing devices (magmeter, miltronics, etc).

7. Effluent Objectives

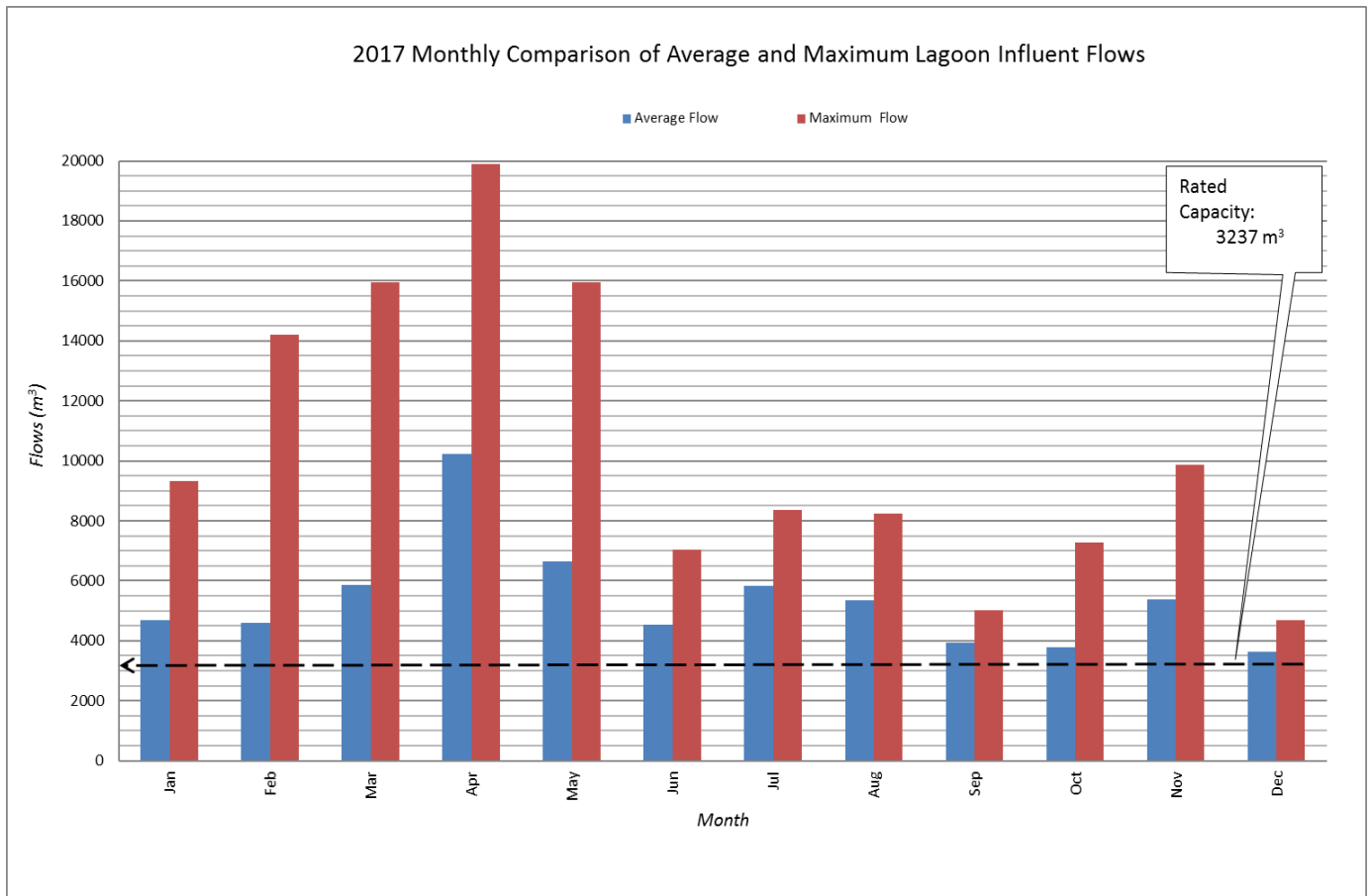
Description of effort made and results achieved in meeting the effluent objectives of condition 6

All annual parameters, except for total chlorine residual were below the ECA effluent limits, the Federal Wastewater effluent limits and met the ECA effluent design objectives. Monthly results showed exceedances of the CBOD₅ ECA limits in February and March; TSS ECA objectives in January, February and March; TP ECA limits in February and March; TP ECA objectives in January; and total chlorine residual limits in March, April, October, November and Annual Average. Issues observed from January through March are attributed to the system upset observed under ice cover. It is believed that the issues are caused by lack of oxygen which can be attributed to a defective aerator which is no longer in service. The chlorine exceedances can be attributed to multiple factors, but many of the exceeded monthly limits were caused by a single event, which was corrected once discovered. All events were reported as per requirements. Table 3 shows a summary of these results, please refer to Appendix A full summary of flows, raw and treated effluent quality analysis for the Alexandria Sewage Treatment Works.

Table 4: Annual Effluent Summary

2017 Results	Effluent Parameters						
	CBOD ₅ (mg/L)	TSS (mg/L)	TP (mg/L)	Total Chlorine Residual (mg/L)	Un-Ionized Ammonia (mg/L)	pH all times	E. Coli geometric mean density (organisms/100 mL)
Provincial Concentration Objective	25	25	0.4	non-detect	n/a	6.0 - 9.5	< 150
Provincial Concentration Limits	30	40	0.5	0.02	n/a	6.0 - 9.5	< 200
Federal Concentration Limits (Annual Avg.)	25	25	n/a	0.02	1.25		
January Average	22.5	26.3	0.42	0.01	0.01	7.00	21
February Average	77.3	39.9	0.71	0.01	0.01	6.66	3
March Average	57.6	28.9	0.52	0.12	0.10	7.25	4.8
April Average	18.2	15.5	0.32	0.08	0.03	7.45	7
May Average	5.5	19.0	0.21	0.02	0.19	8.08	4
June Average	3.0	3.8	0.10	0.01	0.02	7.67	2
July Average	3.0	3.7	0.10	0.01		7.75	2
August Average	3.0	3.0	0.14	0.01		7.74	2
September Average	3.0	3.0	0.06	0.01	0.06	7.73	2
October Average	3.0	3.0	0.18	0.05	0.15	7.71	2
November Average	3.0	4.0	0.14	0.03	0.11	7.94	2
December Average	5.8	11.8	0.32	0.01	0.12	8.20	17.6
Annual Average	22.9	16.5	0.32	0.03	0.08	7.46	4.6

The annual average daily flow for 2017 is calculated to be 5,369m³/day, and the maximum daily flow for the year was reported to be 19,890 m³/day. This represents 165.8 % of the total rated capacity for this facility, which is out of 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 Alexandria Sewage Treatment Works.



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

8. 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 put into place in 2008. The sludge levels were measured at 21 locations in Cell A, 20 locations in Cell B, and 27 locations in Cell C on two occasions in 2017, first on June 1 and finally Nov 15. Of these measurements, 4 locations in Cell A, 15 locations in Cell B, and 8 locations in Cell C were found to have elevated sludge levels and Cell B was noted to have a high total sludge volume. Overall as compared to the previous year values Cell A has decreased 3.7%, Cell B and Cell C have increased, 4.8 % and 9.4% respectively. Due to elevated sludge levels in cell B, the application of microbes was started in 2016 and it was utilized in the aeration cell during the 2017 to aid in the reduction of odor issues.

9. 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 being backing up sewer laterals. In the most cases, the issues were on the homeowner's side resulting in private contracted services. In a few cases the laterals were inspected by CCTV, and services were repaired or arrangements were made to repair by township if the problem was found to be on township side. Other common complaints were odors from the aeration cell around dusk. A microbe addition strategy was used to try to mitigate odors as much as possible, but issues was caused by hot temperatures and a lack of oxygen to system.

All other complaints were in regard to property repair from previous repairs made.

10. Bypass, Overflow, spill, abnormal discharge events

Summary of all bypass, spill or abnormal discharge event

There were 3 primary bypasses reported in 2017. Bypasses were due to snow melt and/or heavy precipitation. All bypasses were reported as soon as possible to the MOECC and Environment Canada through the Spills Action Center; also spill report forms were completed for each incident and sent to Spills Action Center and Environment Canada upon incident completion. Please refer to Bypass Summary report for full summary. Total annual volume for bypasses was 4438m³, then main station bypass is a metered event, all other events were estimated based on pipe diameter and duration.

11. 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 unit has been installed in Cell C for the duration of this reporting period. No reported issues during this reporting period. The unit was installed in cell C on May 17, 2017 and was in service for 169 days prior to being winterized. No reports of upset or treatment disruption during this time period.

ii. Monitoring

Summary of all monitoring data (pH, BOD, TSS, Ammonia, TP, Sludge depth, Dissolved Oxygen)

During this reporting season monitoring, sampling and testing were used to aid in the operation of the system. Influent flows were much higher than normal, the average daily flows exceeded the average daily limit every month during 2017. Operational staff would verify pumping station operations 3 times per week were on-site at the lagoons daily between

Monday to Friday to perform daily checks and testing. The ORP system was found not operating as per design, so the system was placed into manual and chemical adjustments were based on testing results. See Appendix A for a full report on results. As per the federal regulation, un-ionized ammonia and trout lethality testing is now completed as per requirements. Un-ionized ammonia has been added to the bi-weekly sampling schedule and acute lethality is performed annually, as all previous testing had determined that no sample collected were acutely lethal.

iii. Results Summary

An interpretation of all monitoring data (raw data, graphs, trend analysis and statistical analysis)

As per the sampling results, See Appendix A for full summary, biological oxygen demand removal rates ranged from 63% to 99% throughout 2017. Reduced treatment was observed during March and April, with all other months had greater than 80% removal rates. Suspended solids removal rates ranged from 51% to 97%. Reduced treatment was observed between January and May. June through November had greater than 90% removal rating, and December was at 75% removal. Phosphorus removal rates ranged from 44% to 93%, with reduced treatment observed in January, March and April. Rates were above 75% in February, and May through December. The majority of the decreased removal rates are observed when the system upset was visible, which can be attributed to lack of oxygen creating limited treatment under ice cover. As previously stated all un-ionized ammonia results and acute lethality testing have been well below sampling limits. The ammonia and TKN are moderately high, but without preliminary data the system cannot be evaluated for effectiveness.

iv. Recommended Actions

Recommendations regarding any changes to the monitoring program or operational changes of the EOS-2000 unit

No changes to the monitoring program or operational changes have been suggested or required.

Appendix A

NORTH GLENGARRY WATER WORKS WASTEWATER TREATMENT WORKS PERFORMANCE RESULTS

Municipality: *North Glengarry*

Year: *2017*

Project: *Alexandria STP*

Receiving Stream: *Delisle River*

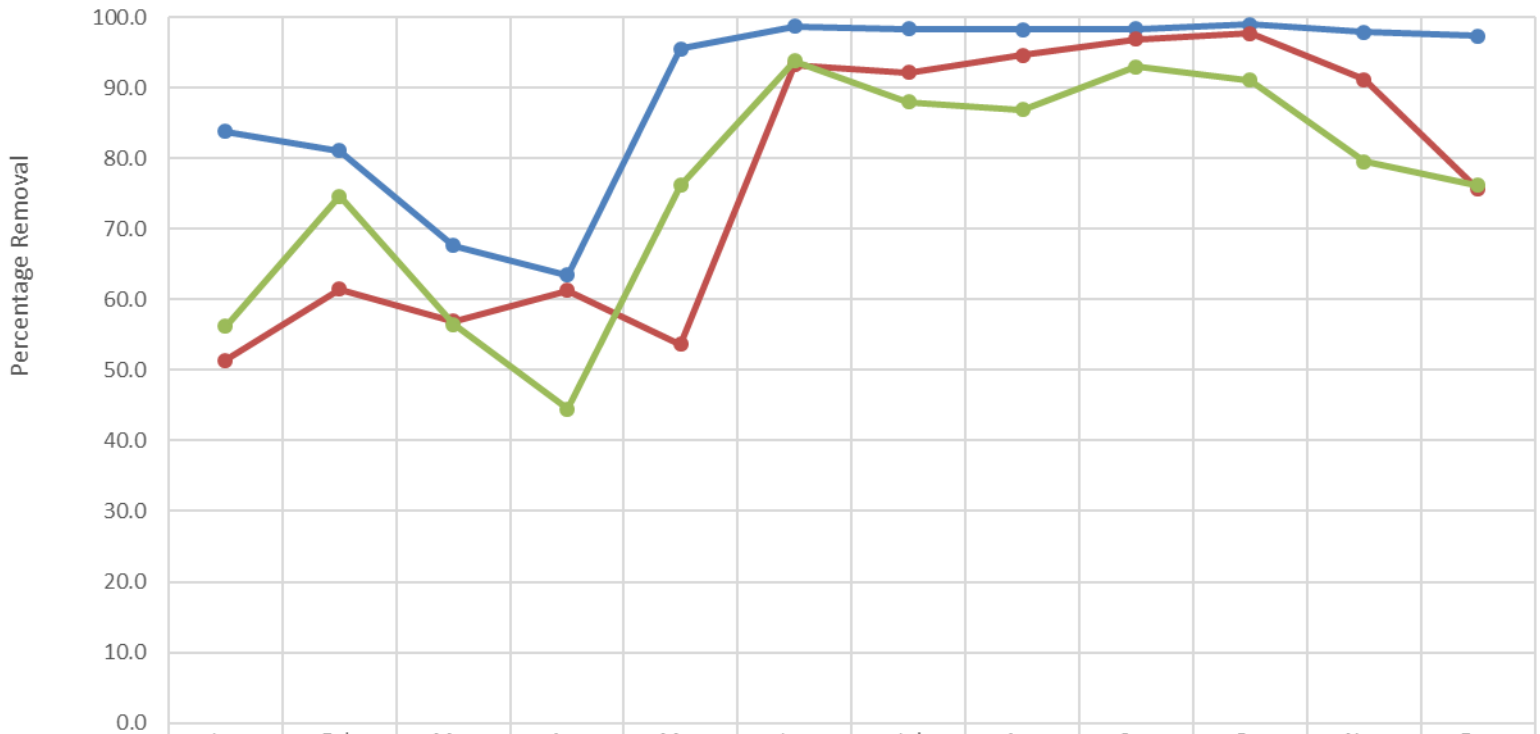
Description: *4 Pumping Station, 1 Aerated Cell, 3 Facultative Cells
Continuous Discharge with Phosphorous Removal*

Design Capacity: *3237 m³/day*

MONTH	Influent Flows			Effluent Flows			Biochemical O ₂ Demand			Suspended Solids		
	Total Flows (m ³)	Average Daily Flow (m ³)	Maximum Daily Flow (m ³)	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 %
Jan	144,302	4,655	9,337	155,880	5,028	6,224	138.7	22.5	83.8	54.0	26.3	51.4
Feb	128,762	4,599	14,196	100,370	3,585	7,329	408.5	77.3	81.1	103.5	39.9	61.5
Mar	181,905	5,868	15,959	212,740	6,863	9,104	178.0	57.6	67.7	67.0	28.9	56.9
Apr	306,933	10231	19890	316,978	10,566	13,966	50.0	18.2	63.5	40.0	15.5	61.3
May	206,110	6649	15940	181,234	5,846	11,296	124.5	5.5	95.5	41.0	19.0	53.7
Jun	136,290	4543	7034	109,806	3,660	5,443	234.5	3.0	98.7	56.0	3.8	93.2
Jul	180,394	5819	8362	132,094	4,261	4,887	178.0	3.0	98.3	48.0	3.7	92.2
Aug	166,153	5360	8233	140,398	4,529	27,296	167.0	3.0	98.2	55.3	3.0	94.6
Sep	118,199	3940	5029	67,245	2,242	3,684	178.0	3.0	98.3	96.0	3.0	96.9
Oct	117,359	3786	7290	55,818	1,801	3,122	288.0	3.0	99.0	128.0	3.0	97.7
Nov	161,047	5368	9872	131,134	4,371	5,155	139.5	3.0	97.9	45.0	4.0	91.1
Dec	112,226	3620	4681	97,503	3,145	4,066	220.0	5.8	97.3	48.5	11.8	75.6
Total	1,959,680			1,701,201								
Average		5,369			4,661		189.0	22.9	90	64.4	16.5	77
Maximum			19,890			27,296	765	131.0	99	200.0	51.0	98
Criteria		3237	3237					30			40	

MONTH	Nitrate			Hydrogen Sulphide			E. coli			pH	Temp	Cl ₂
	Average Raw Nitrate (mg/L)	Average Effluent Nitrate	Percent Removal	Average Raw H ₂ S (mg/L)	Average Effluent H ₂ S	Percent Removal	Average Raw E.coli cts/100ml	Average Effluent E.coli	Percent Removal	Average Effluent pH	Average Effluent Temp °C	Average Effluent Cl ₂ mg/L
		(mg/L)	(mg/L)		%	(mg/L)		(mg/L)	%			
Jan	n/a	0.2	n/a	n/a	0.1	n/a	n/a	20.6	n/a	7.00	3.2	0.01
Feb	n/a	0.3	n/a	n/a	0.2	n/a	n/a	3.2	n/a	6.66	3.7	0.01
Mar	n/a	0.2	n/a	n/a	0.1	n/a	n/a	4.8	n/a	7.25	4.3	0.12
Apr	n/a	0.5	n/a	n/a	0.1	n/a	n/a	6.6	n/a	7.45	8.4	0.08
May	n/a	0.7	n/a	n/a	0.0	n/a	n/a	4.0	n/a	8.08	12.8	0.02
Jun	n/a	0.6	n/a	n/a	0.0	n/a	n/a	2.0	n/a	7.67	20.2	0.01
Jul	n/a	0.5	n/a	n/a	0.0	n/a	n/a	2.0	n/a	7.75	21.5	0.01
Aug	n/a	0.5	n/a	n/a	0.0	n/a	n/a	2.0	n/a	7.74	20.8	0.01
Sep	n/a	0.6	n/a	n/a	0.0	n/a	n/a	2.0	n/a	7.73	19.5	0.01
Oct	n/a	0.5	n/a	n/a	0.0	n/a	n/a	2.0	n/a	7.71	14.4	0.05
Nov	n/a	0.6	n/a	n/a	0.0	n/a	n/a	2.5	n/a	7.94	5.0	0.03
Dec	n/a	0.4	n/a	n/a	0.1	n/a	n/a	17.6	n/a	8.20	0.7	0.01
Total												
Average		0.5			0.0			4.6		7.46	10.30	0.03
Maximum		1.5			0.4			3240.0		8.37	23.20	2.20
Criteria								200		6.0 - 9.5		0.02

Lagoon Treatment Efficiency of ECA Target Parameters



● Biochemical O2 Demand	83.8	81.1	67.7	63.5	95.5	98.7	98.3	98.2	98.3	99.0	97.9	97.3
● Suspended Solids	51.4	61.5	56.9	61.3	53.7	93.2	92.2	94.6	96.9	97.7	91.1	75.6
● Phosphorus	56.2	74.6	56.5	44.5	76.1	93.8	88.0	86.9	93.0	91.1	79.6	76.1

Facility Name: Alexandria WWTP
Report Year: 2017

2.0- Pumping Station and Plant Bypass Monthly Summary

Month	Primary Bypass			Secondary Bypass		
	No. of Days (days)	Duration (hours)	Volume (m ³)	No. of Days (days)	Duration (hours)	Volume (1000m ³)
January						
February						
March						
April	5.5	139.36	1043.5			
May	0.1	4.5	3394.5			
June						
July						
August						
September						
October						
November						
December						
Total			4438			
Volume of Bypass as % of AADF* Daily Flow			0.23			

*AADF(m³/d) = 5370
% = ((Volume of Bypass/AADF)/365)*100

Comments Area- Pumping Stations and Plant Bypasses:
*AADF(Annual Average Daily Flow) taken from 207 annual performance sheet