

# Morrisburg Wastewater System

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Waterworks # 120000168

## Annual Report

Prepared For: Municipality of South Dundas

Reporting Period of January 1<sup>st</sup> – December 31<sup>st</sup> 2022

Issued: March 9<sup>th</sup>, 2023

Revision: 0

Operating Authority:



This report has been prepared to meet the requirements of Certificate of Approval #2147-734L2K

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## 1 Revision History

Date	Rev#	Revisions	Revised By
2023-03-09	0	Annual Report Issued	Kurtis Winkenweder, OCWA

## 2 Operations and Compliance Reliability Indices

Compliance Event	# of Events
Ministry of Environment Inspections	0
Ministry of Labour Inspections	0
Non-Compliance	0
Community Complaints	1 complaint referenced in Section 11
Spills	0
Overflows	0
Bypass	0
Sewer main blockages	0

## 3 Process Description

Morrisburg's sewage collection system is a gravity fed sanitary sewage collection system. There is one pumping station which pumps wastewater from the collection system to the wastewater treatment facility.

Morrisburg's wastewater treatment plant (WWTP) is a Class II wastewater treatment system owned and operated by the Municipality of South Dundas. Raw sewage is pumped to the WWTP from the plant pumping station which is equipped with four submersible pumps. From the pumping station, wastewater passes through the inlet works, including fine screens with a screw compactor and a grit removal and disposal system. Aluminum Sulphate is added to assist in phosphorous removal. The wastewater then moves through either of two parallel Sequencing Batch Reactors (SBRs) equipped with individual aeration systems, mixers, decanters and sludge removal pumps. Effluent decanted from the SBRs is treated by UV disinfection and subsequently passes through an outfall pipe to the St. Lawrence River.

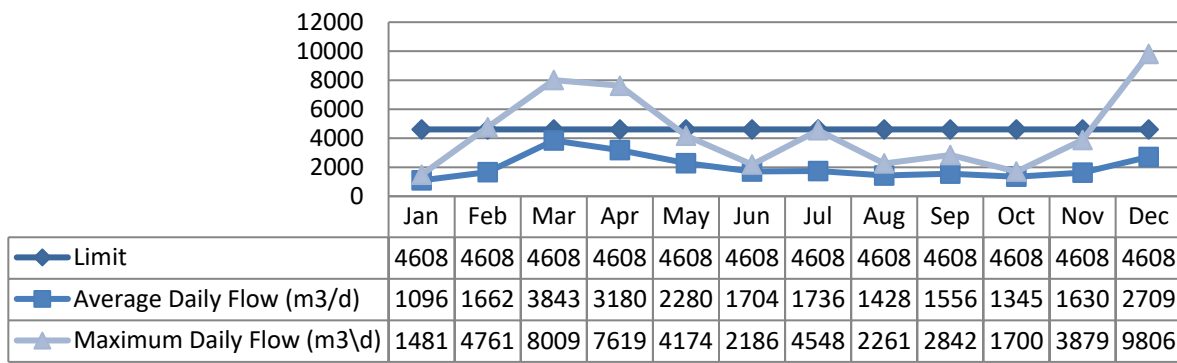
The Morrisburg WWTP can receive septage. Septage can be transferred to the influent fine screens from the onsite holding tank by two dry-pit pumps.

Sludge removed from the SBRs is transferred to a 140 m<sup>3</sup> storage tank. From the tank, the sludge enters a gravity belt thickener. The thickened sludge is then pumped to an Autothermal Thermophilic Aerobic Digestion (ATAD) system for stabilization. The digested sludge is subsequently pumped to a 1480 m<sup>3</sup> biosolids storage tank. From the storage tank, biosolids are hauled off site to be utilized as soil conditioner.

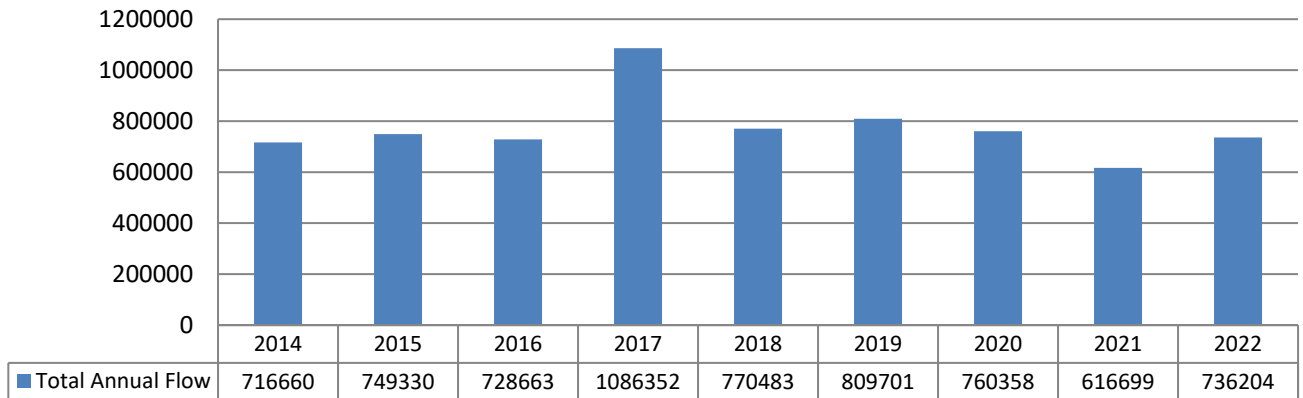
## 4 Treatment Flows

The hydraulic flows reaching the treatment facility in 2022 averaged 2,014 m<sup>3</sup>/day which represents 44% of the 4,608 m<sup>3</sup>/day design.

### 4.1 Raw Flow (m<sup>3</sup>/d)



#### 4.1.1 Annual Comparison (m<sup>3</sup>)

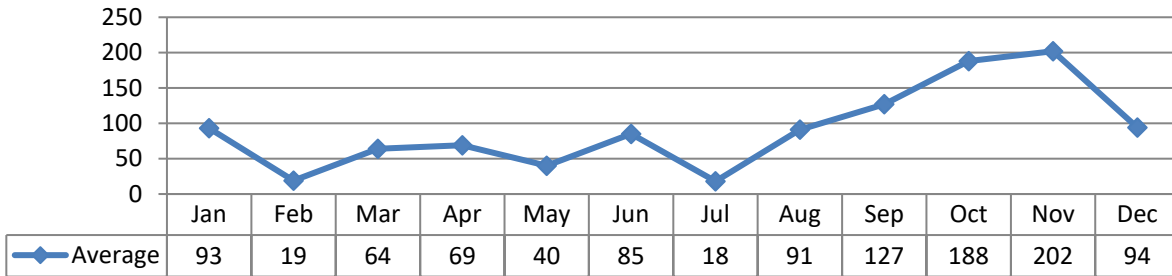


### 4.2 Effluent Flow

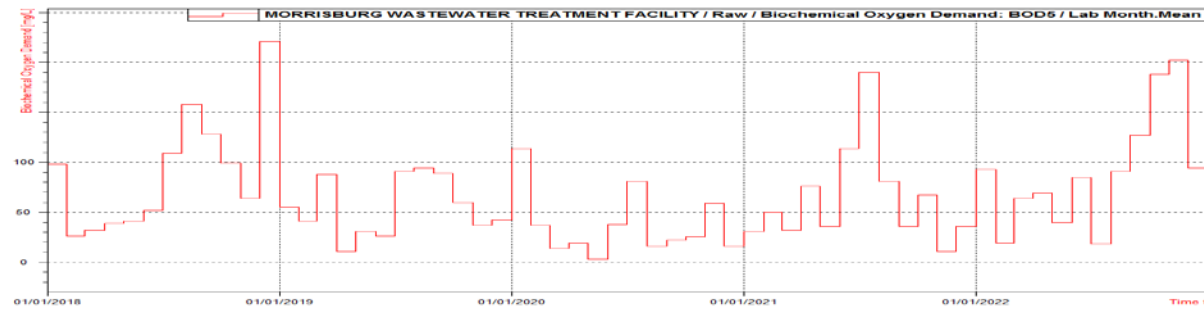
A total of 736,204 m<sup>3</sup> of effluent was discharged from Morrisburg’s WWTP in 2022.

## 5 Raw Sewage Quality

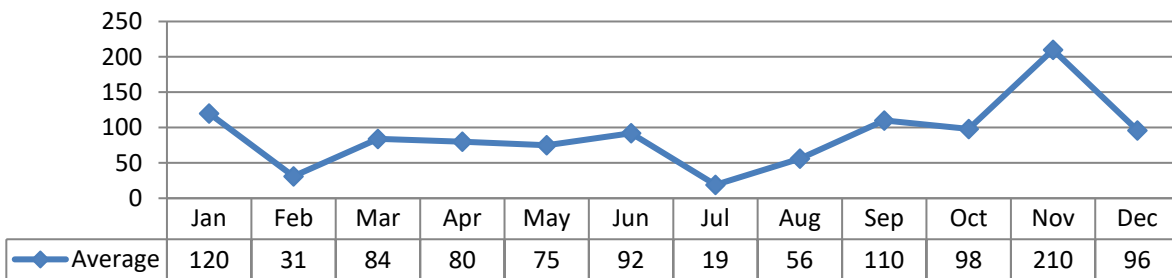
### 5.1 BOD<sub>5</sub> (mg/L)



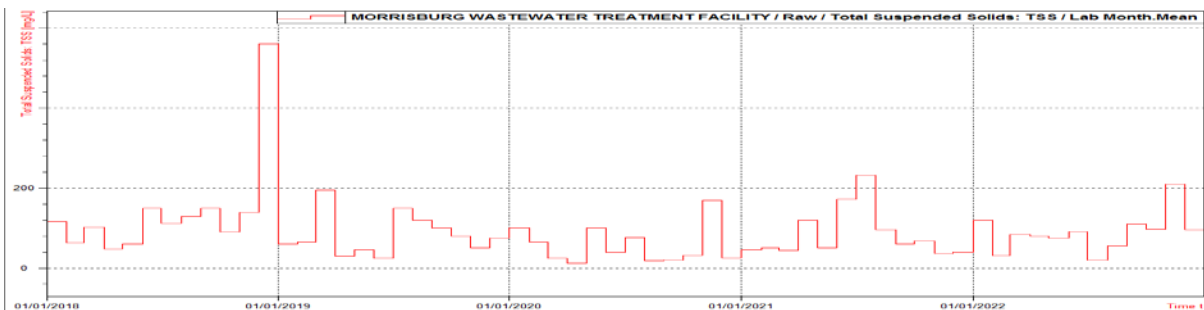
#### 5.1.1 5-year BOD<sub>5</sub>



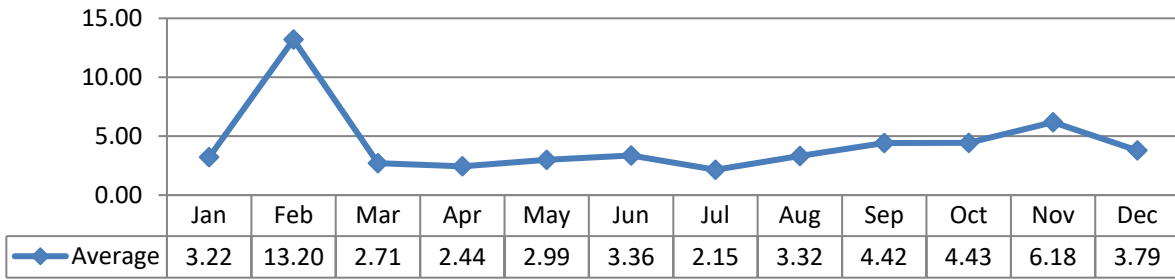
### 5.2 Total Suspended Solids (mg/L)



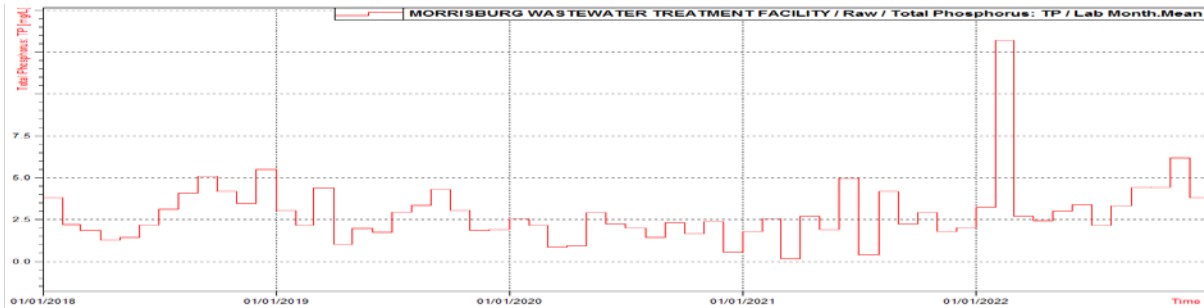
#### 5.2.1 5-year Total Suspended Solids



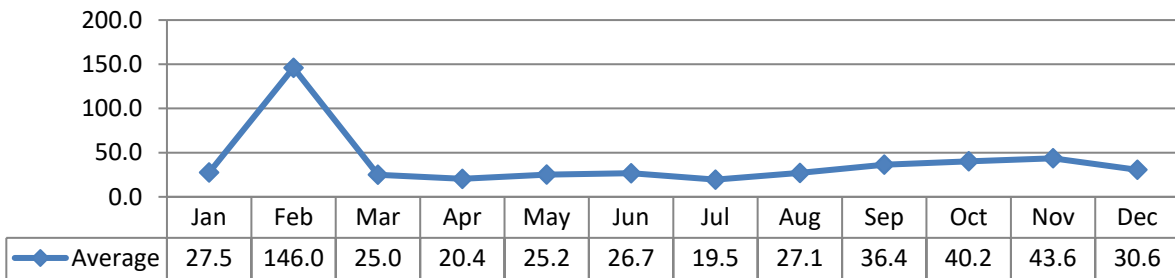
### 5.3 Total Phosphorus (mg/L)



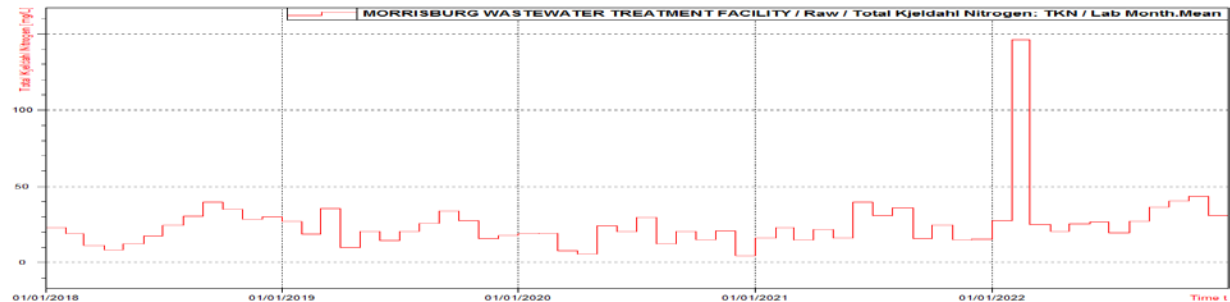
#### 5.3.1 5-year Total Phosphorus



### 5.4 Total Kjeldahl Nitrogen (mg/L)



#### 5.4.1 5-year Total Kjeldahl Nitrogen



### 5.5 Imported Waste Quality

There was no imported waste in 2022.

## 6 Effluent Quality

The monthly average concentrations of carbonaceous biochemical oxygen demand (CBOD<sub>5</sub>), total suspended solids (TSS), total phosphorus (TP) and total ammonia nitrogen (TAN) remained below the effluent objectives and limits outlined in the facility's Certificate of Approval during 2022. The geometric mean density of E. coli in the effluent also remained below the ECA limit and objective in 2022. In addition the effluent pH remained within the limits and objectives throughout the year.

Effluent results from the WWTP for 2022 are tabulated below. Additional data can be found in the Performance Assessment Reports attached in Appendix A.

### 6.1 Effluent Quality Assurance and Control Measures Taken

This system is part of the Township of South Dundas. The Township is supported by the Eastern Regional Hub of OCWA, and corporate resources. Operational Services are delivered by Town staff that live and work in the community. The systems are operated to meet compliance with applicable regulations. The system has comprehensive manuals detailing operations, maintenance, instrumentation, and emergency procedures. All procedures are treated as active documents and are updated as required. These documents are also part of OCWA's Quality & Environmental Management System.

The process is reviewed and maintained by certified operators. These operators complete in-house rounds and testing to monitor the process. All Sampling and analysis follow approved methods and protocols for sampling, analysis and recording as specified in the Ministry's Procedure F-10-1, "Procedures for Sampling and Analysis Requirements for Municipal and Private Sewage Treatment Works", the Ministry's publication, "Protocol for the Sampling and Analysis of Industrial/Municipal Wastewater" and the publication, "Standard Methods for the Examination of Water and Wastewater".

All final effluent samples collected during the reporting period to meet legislated sampling requirements are submitted to Caduceon Ottawa for analysis, with the exception of pH and temperature. Caduceon Ottawa has been deemed accredited by the Canadian Association for Laboratory Accreditation (CALA), meeting strict provincial guidelines including an extensive quality assurance/quality control program. By choosing this laboratory, South Dundas is ensuring appropriate control measures are undertaken during sample analysis. The pH and temperature parameters are analyzed in the field at the time of sample collection by certified operators, to ensure accuracy and precision of the results obtained.

South Dundas uses a data management system provided by OCWA which include:

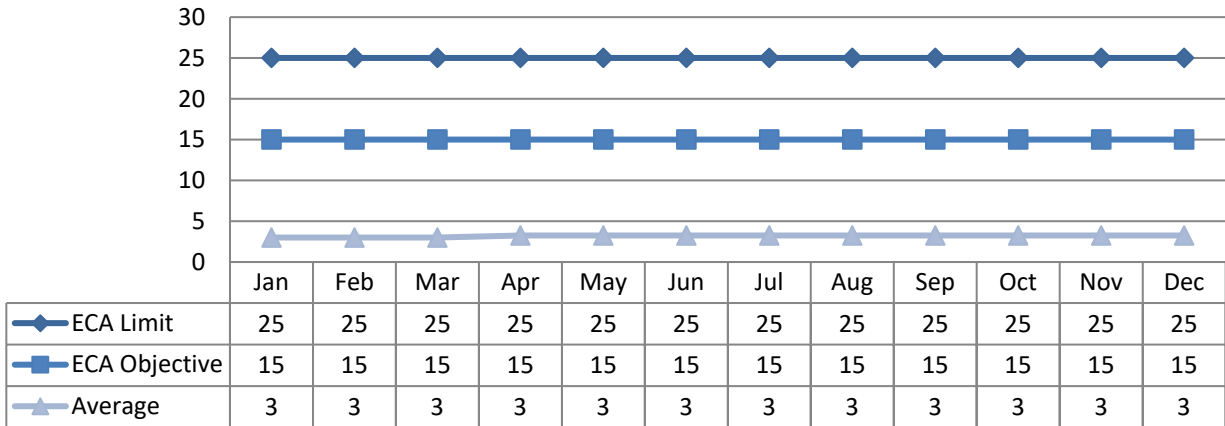
- Process Data Management (PDM)
  - This database program consolidates all operational data from a variety of sources including field data, online instrumentation, and electronic receipt of lab test results for reporting, tracking and analysis.

The operations team also has access to a network of operational compliance and process specialists to assist for emerging process issues. This aids in establishing additional control measures to ensure a quality effluent product.

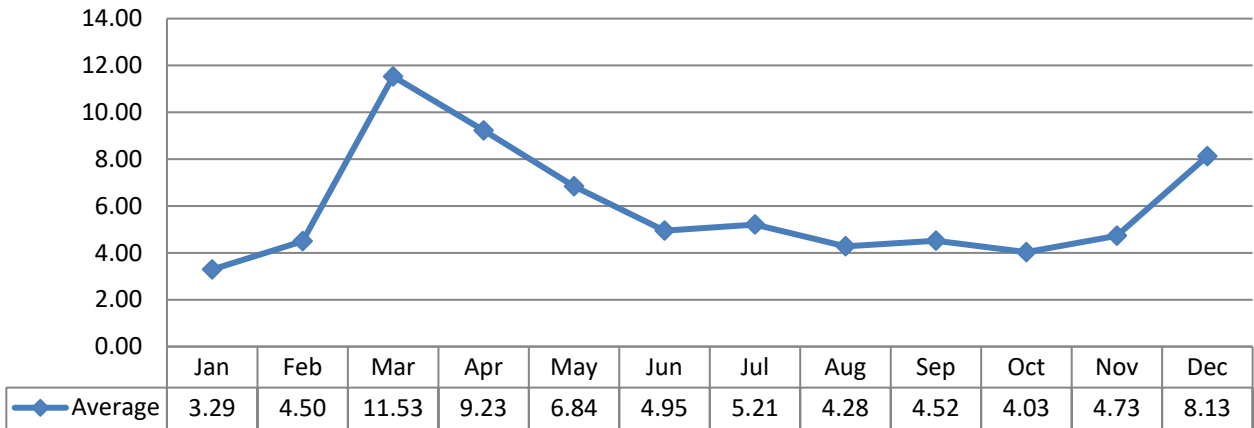
Detailed individual sample results for both raw sewage and final effluent can be requested from the operating authority.

## 6.2 CBOD5 (mg/L)

The compliance limit and objective were met in 2022.

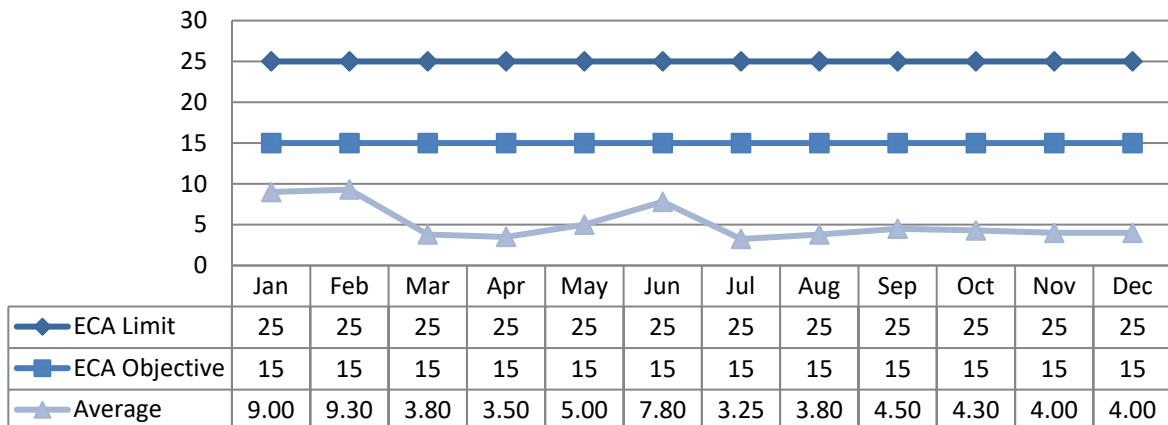


### 6.2.1 Loading (kg/d)



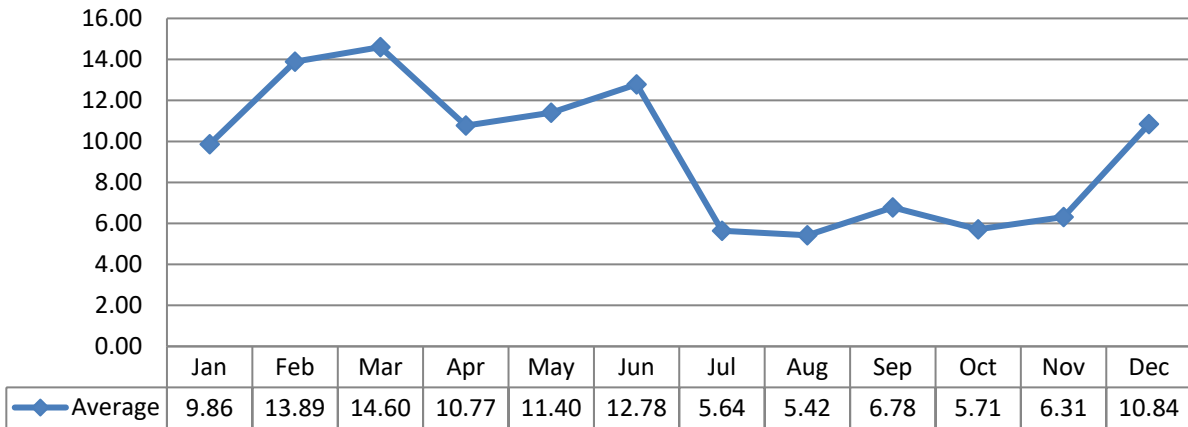
## 6.3 Total Suspended Solids (mg/L)

The compliance limit and objective were met in 2022.



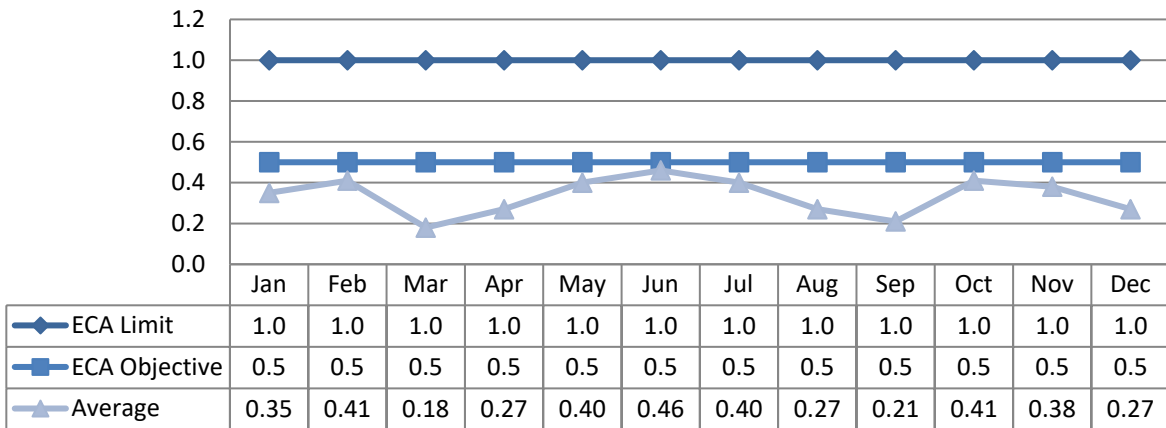


6.3.1 Loading (kg/d)

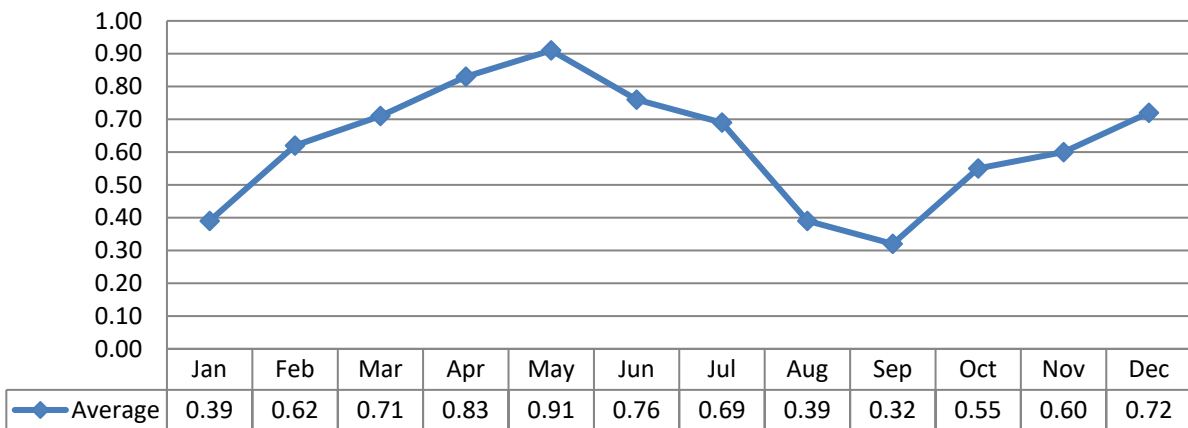


6.4 Total Phosphorus (mg/L)

The compliance limit and objective were met for 2022.



6.4.1 Loading (kg/d)

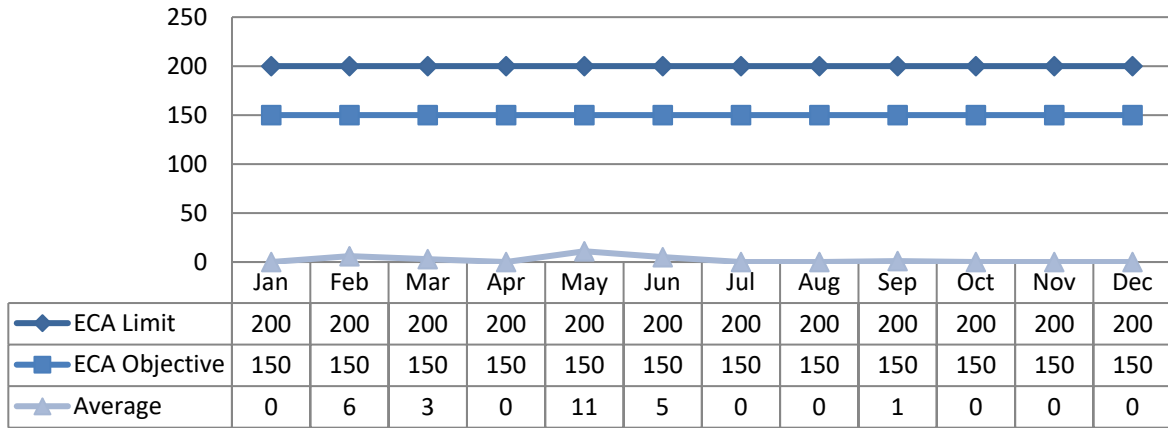




## 6.7 E-coli

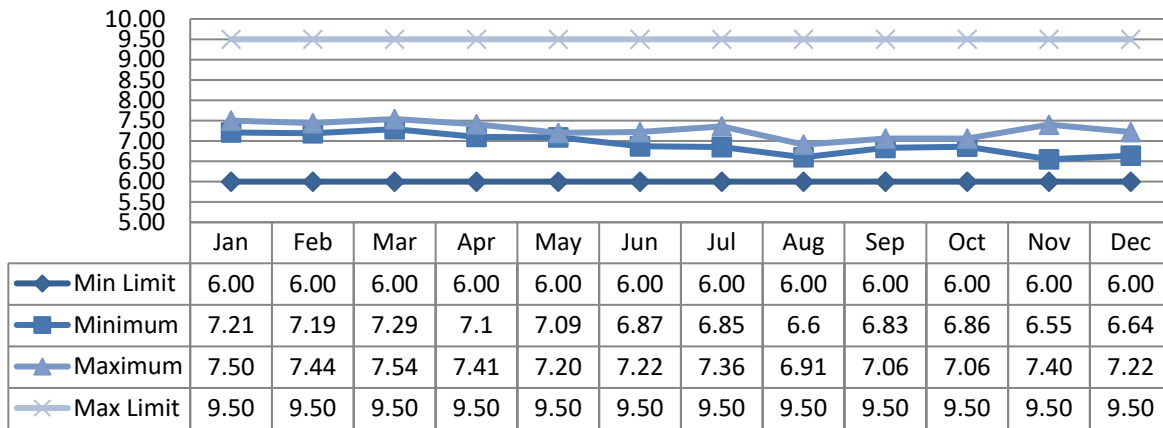
The compliance objective and limit were met in 2022.

### 6.7.1 Geometric Mean (cfu/100mL)



## 6.8 pH

The pH is to remain in the range of 6-9.5. Each instance the pH is outside of that range is reported as a non-compliance.



## 6.9 Acute Lethality

There were four (4) samples collected in 2022 and tested for acute lethality (Rainbow Trout and Daphnia Magna). This sampling is required both provincially and federally. Results are displayed as % mortality. An adverse result is a > 50% mortality rate.

The compliance limit for this parameter was met in 2022.

Date	Rainbow Trout	Daphnia Magna
01-11-22	0%	0%
04-04-22	0%	0%

Date	Rainbow Trout	Daphnia Magna
07-05-22	0%	0%
10-04-22	0%	0%

## 7 Monitoring Schedule

The 2023 Calendar can be viewed in Appendix A.

### 7.1 Deviations

Date	Details	Cause of Deviation
There were no deviations or missed samples in 2022.		

## 8 Operating Issues

There were no operating issues to report in 2022.

### 8.1 Effluent Quality Non-Compliance Summary

Date	Exceedance of	Limit	Value	Corrective Action
No objective or limit exceedances in 2022.				

### 8.2 Summary of Abnormal Sewage Discharge Events

Abnormal Discharge Events include Bypass', Overflows, Diversions and Spills of Sewage. Summary Details are included in Appendix C.

### 8.3 Spills (Other than Sewage)

Date	Location	Details	Volume (m3)	Start Date and Time	End Date and Time
No spills to report in 2022.					

## 9 Maintenance

Routine planned maintenance activities:

- Inspect, adjust and calibrate process control equipment to ensure proper operation of water distribution systems, pumps, chemical feeders, and all other equipment installed at the facilities.
- Carry out a routine maintenance program including greasing and oiling as specified in the lubrication schedule.
- Perform day-to-day maintenance duties to equipment including checking machinery and

electrical equipment when required.

- Maintain an equipment inventory
- Maintain accurate records of work conducted, activities, and achievements.

Unplanned maintenance is conducted as required.

### 9.1 Normal Maintenance and Repairs

Maintenance/Repair
<ul style="list-style-type: none"> <li>- Replaced ATAD Blower B-621</li> <li>- Rebuilt influent station pump 203</li> <li>- New drain pipe for biofilter drain line</li> <li>- Cleaned grease/solids from lift station quarterly</li> <li>- Repaired broken 2 inch copper water main coming into building with 1ft new section</li> </ul>

### 9.2 Emergency Maintenance and Repairs

Maintenance/Repair	Details
No emergency maintenance in 2022	

### 9.3 Flow Meter Calibrations and Maintenance

Location	Date of Calibration	Additional Maintenance
FIT-370 East Influent Flow Meter	June 8, 2022	N/A
FIT-380 West Influent Flow Meter	June 8, 2022	N/A

### 9.4 Authorized Alterations in Collection System

Alteration	Details	Significant Drinking Water Threat (Y/N)
No alterations to the collection system in 2022		

### 9.5 Notice of Modifications

Date	Process	Modification	Status
No modifications to the collection system in 2022			

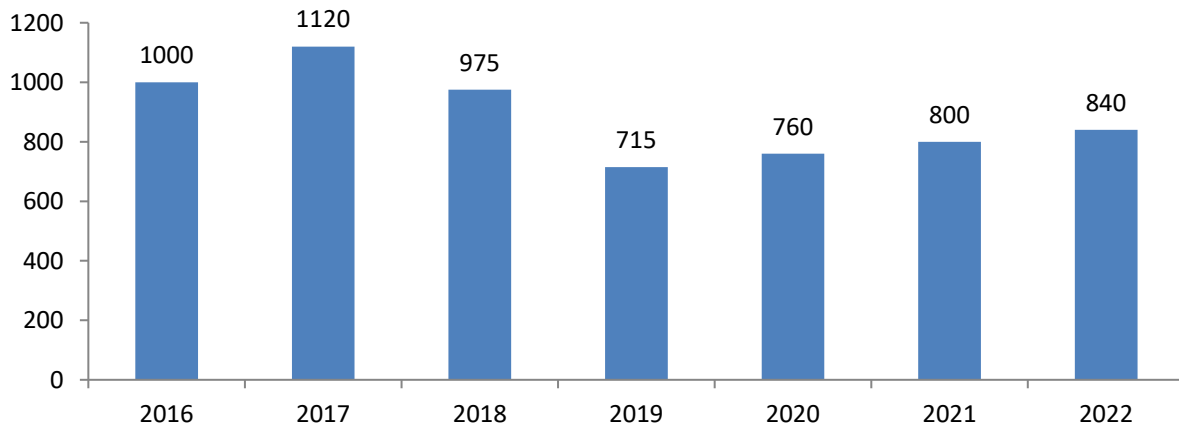
## 10 Sludge Generation

### 10.1 Sludge Disposal Summary

Date	Disposal Location	Approval Number	Total Volume (m3)
2022/10/31	Matilda, Concession 3: Lot 22 and 23	ECA# H480300	360
2022/11/01	Matilda, Concession 3: Lot 22 and 23	ECA# H480300	480

In 2022, a total of 840 m<sup>3</sup> of liquid sludge was removed from Morrisburg’s WWTP and was utilized as soil conditioner. The sludge was removed from the WWTP by GFL in October/November, NASM Plan # 21942. It is anticipated that approximately the same volume of sludge will be generated in 2023.

**10.2 Annual Comparison (m3/year)**



It is anticipated that sludge volumes will remain similar to the 2023 volumes.

**11 Summary of Complaints**

Location	Date	Nature of Complaint	Actions Taken
11 Chrysler St	10/16/22	Sewer lateral backing up	Blockage on homeowner’s side. Municipality cleaned mains in the area as a preventative measure

# Appendix A

## Appendix A - 2023 Sample Calendar

### Morrisburg WWTP Sampling Schedule - 2023

	Weekly Effluent Samples					Influent Sample	Sludge Sample	Trout & Daphnia
January								
February								
March								
April								
May								
June								
July								
August								
September								
October								
November								
December								

<b>Weekly Samples:</b> 2 GWC, 1 Bacti, 1 Phosphorus, 1 N	<b>Influent Samples:</b> 1 GWC, 1 Yellow Cap	<b>Sludge Samples:</b> 2 GWC
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Effluent Limits		
Parameters	Objectives	Limits
CBOD5	15 mg/L	25 mg/L
TSS	15 mg/L	25 mg/L
Total Phosphorus	0.5 mg/L	1 mg/L
Total	June-Sept: 5 mg/L	N/A
Ammonia	Oct-May: 7 mg/L	N/A
E.Coli	150/100 mL	200/100 mL
Trout & Daphnia	Non- Accutely Lethal	
Effluent pH	6.0 - 9.5	

# Appendix B

## Appendix B - Biosolids Quality Report

### 2022 - MORRISBURG WWTP MONTHLY AEROBIC BIOSOLIDS CONCENTRATION RATIO

	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
Ammonia	1190	1200	920	1910	2270	2120	2520	247	1510	1	1500	1480
Nitrate	1.6	1.0	1.9	3.0	1.0	1.0	1.0	1	1.7	1.0	1.0	4.8
Ammonia + Nitrate	1192	1201	922	1913	2271	2121	2521	248	1512	2	1501	1485
Total Phosphorus	823	1160	1340	1010.0	934.0	1150	892	813	1000	387	817	828
Total Solids	37900	35500	32700	34800	31600	30000	34000	38200	36700	24600	42200	26500
Aluminum	1130	1380	1080	1130	859	941	1110	1040	1070	942	1290	1020
Arsenic	0.10	0.20	0.10	0.10	0.10	0.10	0.20	0.2	0.2	0.2	0.2	0.2
Cadmium	0.03	0.03	0.03	0.03	0.0	0.03	0.03	0.03	0.04	0.03	0.04	0.0
Chromium	1.37	1.56	1.26	1.57	1.32	1.48	1.73	1.53	1.56	1.15	1.67	1.16
Cobalt	0.17	0.20	0.15	0.19	0.16	0.18	0.18	0.16	0.14	0.09	0.11	0.13
Copper	42.3	44.9	35.8	33.6	25.9	31.6	38.7	43.7	45.3	24.0	52.5	31.0
Lead	0.80	0.80	0.60	0.70	1.00	0.70	0.80	0.8	0.8	0.7	0.8	0.8
Mercury	0.034	0.025	0.025	0.023	0.027	0.022	0.042	0.024	0.019	0.008	0.018	0.018
Molybdenum	0.29	0.36	0.27	0.30	0.27	0.30	0.37	0.33	0.37	0.3	0.4	0.4
Nickel	1.52	1.76	2.73	2.44	1.79	1.53	2.78	2.32	1.91	0.7	1.6	0.8
Selenium	0.20	0.30	0.20	0.20	0.20	0.20	0.20	0.2	0.2	0.1	0.2	0.2
Zinc	17	19.3	14.50	16.0	13.0	14.8	17.8	21.1	22.6	14.1	21.5	18.3

Metals ratio = mg metals/kg solids

	Metal/Solids Ratio (Sludge)												
	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Limit
Arsenic	2.64	5.63	3.06	2.87	3.16	3.33	5.88	5.24	5.45	8.13	4.74	7.55	170
Cadmium	0.79	0.85	0.92	0.86	0.95	1.00	0.88	0.79	1.09	1.22	0.95	1.13	34
Chromium	36.1	43.9	38.5	45.1	41.8	49.3	50.9	40.1	42.5	46.7	39.6	43.8	2800
Cobalt	4.49	5.63	4.59	5.46	5.06	6.00	5.29	4.19	3.81	3.66	2.61	4.91	340
Copper	1116	1265	1095	966	820	1053	1138	1144	1234	976	1244	1170	1700
Lead	21.1	22.5	18.3	20.1	31.6	23.3	23.5	20.9	21.8	28.5	19.0	30.2	1100
Mercury	0.90	0.70	0.76	0.66	0.85	0.73	1.24	0.63	0.52	0.33	0.43	0.68	11
Molybdenum	7.65	10.14	8.26	8.62	8.54	10.00	10.88	8.64	10.08	12.20	8.53	14.34	94
Nickel	40.1	49.6	83.5	70.1	56.6	51.0	81.8	60.7	52.0	29.3	37.7	30.9	420
Selenium	5.28	8.45	6.12	5.75	6.33	6.67	5.88	5.24	5.45	4.07	4.74	7.55	34
Zinc	451	544	443	460	411	493	524	552	616	573	509	691	4200

Sludge is Acceptable	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE
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SOME ANALYSIS RESULTS EXPRESSED AS "<" (LESS THAN); HOWEVER, IN ORDER TO COMPLETE THE CALCULATION, ONLY THE NUMERIC VALUE WAS USED; THEREFORE THE AVG. CONC. IS GREATER THAN ACTUAL.



# Appendix C

## Appendix C - Details of Abnormal Sewage Discharge Events

### Event Details Summary

#### Facility Bypass

Date	Location	Details	Volume (m3)	Start Time	End Time	Duration (h)	Discharge Receiver	Disinfection Provided
No facility bypass' to report in 2022								

#### Facility Overflow

Date	Location	Details	Volume (m3)	Start Time	End Time	Duration (h)	Discharge Receiver	Disinfection Provided
No facility overflows to report in 2022								

#### Collection Overflow

There are no authorized overflow locations in this system.

#### Spills of Sewage

Date	Location	Details	Volume (m3)	Start Time	End Time	Duration (h)	Discharge Receiver	Disinfection Provided
No spills of sewage to report in 2022								

# Appendix D

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## Appendix D - Imported Sewage Sample Results

There was no septage received in 2022.

# Appendix E

## Appendix E - ECA Annual Report Requirements

Facility ECA # 2147-734L2K Section 12(6)	Section in Report
a) a summary and interpretation of all monitoring data and comparison to the effluent limits outlined in Condition 7, including an overview of success and adequacy	Section 6 – Effluent Quality
b) a description of any operating problems encountered and corrective actions taken	Section 8 – Operating Issues
c) summary of all maintenance carried out on any major structure, equipment, apparatus, mechanism or thing forming part of the Works	Section 9 - Maintenance
d) summary of any effluent quality assurance or control measures undertaken in the reporting period	Section 6 – Effluent Quality
e) summary of the calibration and maintenance carried out on all effluent monitoring equipment	Section 9.3 – Flow meter calibrations
f) description of efforts made and results achieved in meeting the Effluent Objectives of Condition 6	Section 6 – Effluent Quality
g) tabulation of the quantity of septage added to the Works for co-treatment during the reporting period	Section 4 – Treatment Flows
h) summary of chemical characterization data for samples of septage collected in accordance with Table 4 in Condition 11 during the reporting period	Appendix E
i) 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	Section 10 – Sludge Generation
j) tabulation of the quantity of groundwater pumped from the WWTP Building foundation drainage system to the storm sewer system	Appendix A - PAR
k) summary of any complaints received during the reporting period and any steps taken to address the complaints	Section 11 - Complaints
l) summary of all By-pass, overflow, spill or abnormal discharge events	Appendix D
m) any other information the District Manager requires from time to time	N/A