



STAFF REPORT

DEPARTMENT/FUNCTION: Engineering, Water & Wastewater

DEPARTMENT CHAIR: Mayor Strathearn and Council

DATE: March 20, 2019

REPORT NO: **ENG-2019-06**
2018 MIDLAND WASTEWATER ANNUAL
PERFORMANCE REPORT

RECOMMENDATION:

That Council receive report ENG-2019-06 being the 2018 Midland Wastewater Annual Performance Report; and

That Council direct staff to forward a copy of the Annual Report to the District Manager of the MOECP.

BACKGROUND:

As per the Environmental Protection Act R.S.O 1990, c.E. 19, the owner of a municipal wastewater system shall ensure that, not later than 90 days following the end of the period being reported, a report shall be prepared and submitted to the Barrie office of the Ministry of Environment Conservation and Parks (MOECP) containing, but not limited to, the information identified as required within the respective Environmental Compliance Approval (ECA).

The ECA's for Midland Wastewater require that the report include;

- a) A summary and interpretation of all monitoring data and a comparison to the effluent limits outlined in Condition 7 of the ECA, including an overview of the success and adequacy of the works;
- b) A description of any operating problems encountered and corrective measures taken;
- c) A summary of all maintenance carried out on any major structure, equipment, apparatus, mechanism or thing forming a part of the works;
- d) A summary of any effluent quality assurances or control measures undertaken in the reporting period;
- e) A summary of the calibration and maintenance carried out on all effluent monitoring equipment;
- f) A description of efforts made and results achieved in meeting the Effluent Objectives of Condition 6 of the ECA;

- g) 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;
- h) A summary of any complaints received during the reporting period and any steps taken to address the complaints;
- i) A summary of all By-pass, spill or abnormal discharge events; and
- j) a copy of all Notice of Modifications submitted to the Water Supervisor as a result of Schedule B, Section 1, with a status report on the implementation of each modification;
- k) a report summarizing all modifications completed as a result of Schedule B, Section 3; and
- l) Any other information the District Manager requires from time to time.

ANALYSIS:

The current design capacity of the Midland Wastewater Treatment Plant is 15,665 cubic metres per day. The average daily flow (ADF) for 2018 was 8,735 cubic metres or 55% of design capacity. Maximum daily flow of 23,770 cubic metres occurred during a wet weather event, whereas the peak flow allowable is 37,000 cubic metres.

The Midland Wastewater Treatment Centre continues to have effective treatment with final effluent quality being well within allowable parameters.

We believe changes to process control and a step-up of Sewer Use Monitoring and enforcement has made a marked improvement in the control of the facility's Total Ammonia and E-coli levels, as can be seen by the chart below. In 2017, these parameters were on the verge of non-compliance and today the facility is well within the ECA requirements.

The main parameters are outlined in the following table.

Parameter	MOE Limit	Final Average Effluent
Organic Loading (CBODs)	10 mg/L (monthly average)	3.43 mg/L
Suspended Solids (TSS)	10 mg/L (monthly average)	2.87 mg/L
Total Ammonia (TAN)	10mg/L Summer 15 mg/L Winter	0.88 mg/L Summer 3.96 mg/L Winter
Total Phosphorous	0.4 mg/L	0.08 mg/L
E-Coli	200 cfu/100ml	69 cfu/100ml

In 2018 there were two by-passes, for a total volume of 397 cubic metres. All occurrences were reported forthwith to the Spills Action Centre and the Medical Officer of Health. There were no by-passes as the result of mechanical or equipment failure.

Approximately 12,270 cubic metres of biosolids were generated in 2018 at the WWTC. During the winter, spring and wet periods of the year, biosolids are stored at a facility which is owned and operated by Region of Huronia Environmental Services Ltd.

CONCLUSION:

As required by the Environmental Protection Act R.S.O 1990, c.E. 19 receive for information the Midland Wastewater Operations Annual Performance Report 2018.

COUNCIL'S STRATEGIC PLAN:

The recommendations in this report are consistent with the following Council Strategic Plan Priority:

1. Accountable, Responsive & Innovative Governance
3. Safe, Sustainable, Healthy Community
 - e) Target and measure achievement of a liveable, sustainable and fully accessible community

FINANCIAL IMPACT:

None.

Prepared by: Chuck Fiddy, Manager, Water and Wastewater Operations
Reviewed by: Andy Campbell, Director of Engineering, Water & Wastewater
Reviewed by: John Skorobohacz, Chief Administrative Officer

Attachment #1 - 2018 Annual Drinking Water Summary Report

cc: J. Beauchamp, Compliance Officer



WASTEWATER

ANNUAL SUMMARY REPORT 2018



Executive Summary

The purpose of this report is to provide information to several stakeholders and to satisfy the regulatory requirements of the Amended Environmental Compliance Approval 5708-A72SPG as issued July 20, 2016

The Owner shall prepare and submit a performance report to the Water Supervisor on an annual basis, within ninety (90) days following the end of the period being reported upon. The first such report shall cover the first annual period following the commencement of operation of the Works and subsequent reports shall be submitted to cover successive annual periods following thereafter. The reports shall contain, but shall not be limited to, the following information;

- a summary and interpretation of all monitoring data and a comparison to the effluent limits outlined in Condition 7, including an overview of the success and adequacy of the Works;
- a description of any operating problems encountered, and corrective actions taken;
- a summary of all maintenance carried out on any major structure, equipment, apparatus, mechanism or thing forming part of the Works;
- a summary of any effluent quality assurance or control measures undertaken in the reporting period;
- a summary of the calibration and maintenance carried out on all effluent monitoring equipment
- a description of efforts made and results achieved in meeting the Effluent Objectives of Condition 6.
- 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 summary of any complaints received during the reporting period and any steps taken to address the complaints;
- a summary of all By-pass, spill or abnormal discharge events;
- a copy of all Notice of Modifications submitted to the Water Supervisor as a result of Schedule B, Section 1, with a status report on the implementation of each modification;
- a report summarizing all modifications completed as a result of Schedule B, Section 3; and



- any other information the Water Supervisor requires from time to time.

The Town of Midland Wastewater System is in a fit state of repair and followed best industry practices during the repair and maintenance of the system. Infrastructure review occurs regularly between Engineering and Wastewater Services to optimize priority projects and minimize common costs.

Copies of the Amended Environmental Compliance Approval 5708-A72SPG as issued July 20, 2016 are available upon request.

For more information please contact Town of Midland Water and Wastewater Services (705) 526-4268 extension 4207 or e-mail: wwtc@midland.ca.

Introduction

The Town of Midland has prepared this Performance Report for the operations conducted during the 2018 calendar year.

This Performance Report has been prepared to meet the following commitments:

- To provide the Town of Midland, as “the Owner” of the sewage works, a summary of the operation and maintenance of the wastewater treatment plant that took place during the reporting period of January 1, 2018 to December 31, 2018; and
- To comply with Condition 11 of ECA #5708-A72SPG

This Performance Report, provided to the the Town of Midland Mayor and Council, conveys information related to the performance of operations and maintenance, which aids in decision making related to system upgrades and expansion needs.

Ministry of the Environment, Conservation and Parks

The Midland Wastewater Treatment Plant is a conventional activated sludge plant owned and operated by the Town of Midland. The wastewater treatment plant was originally constructed in 1965 as a primary treatment plant. In 1980 the plant was expanded and upgraded to a secondary treatment facility. The treated effluent is discharged via a gravity outfall into Midland Bay (located on Georgian Bay). Environmental Compliance Approval (ECA) Number 5708-A72SPG was issued on July 20, 2016 and governs the operation of the facility. The ECA identifies an average day design capacity of 15,665 m³/day and a Peak Flow Rate of 37,000 m³/day.

The treatment plant and collection system are operated under the following Certificates of Classification:

Class III Wastewater Treatment Certificate #89
Class II Wastewater Collection Certificate #2074

For the reporting period covered in this report, The Corporation of the Town of Midland was defined as the Operating Authority of the Wastewater Treatment Plant and the associated collection system.

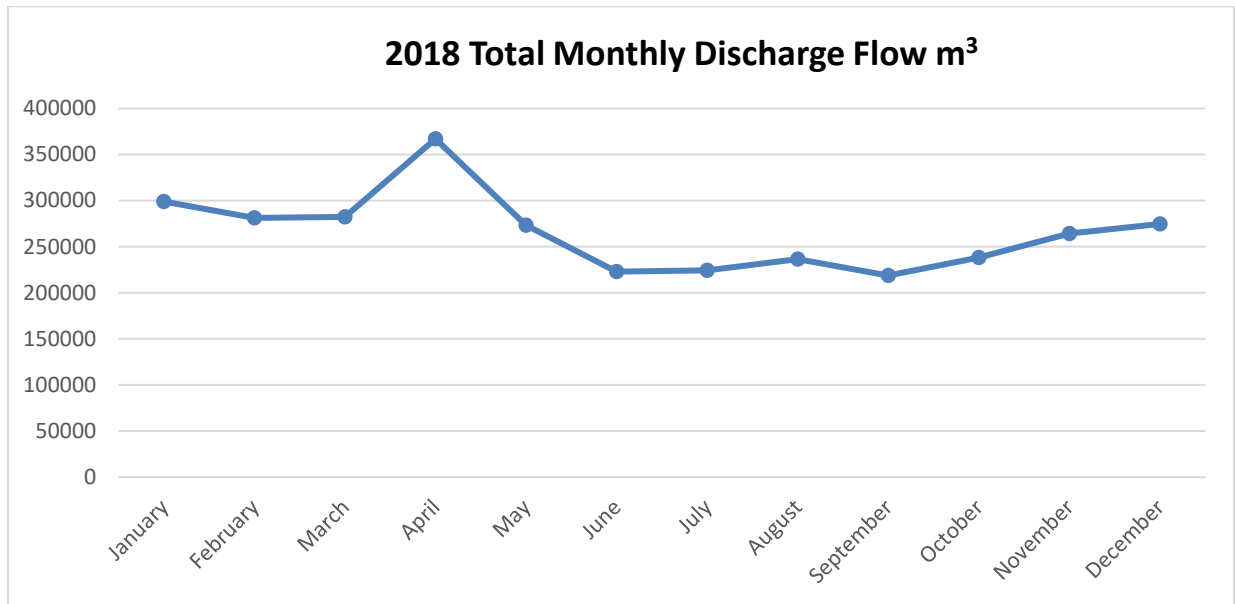
Flows

The 2018 average daily flow was 8735 m³ or 55% of plant rated capacity. The plant discharged a total of 3,183,736 m³ for the reporting period. The 2018 maximum daily flow occurred February 21 when the flow recorded was 23,770 m³. During that day the Midland area experienced 31.0 mm of rainfall.

2018 DAILY DISCHARGE FLOW m³

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Total Flow	298956	281358	282485	367112	273351	223122	224423	236475	218828	238477	264382	274768	3183736
Avg Day	9643	10048	9112	12237	8817	7437	7239	7628	7294	7692	8812	8863	8735
Max Day	17034	23770	12741	19350	11541	8508	8544	10895	7985	10201	10612	12707	23770
Min Day	7220	7401	7452	8307	7521	6898	6274	5486	6460	6884	7299	7263	5486

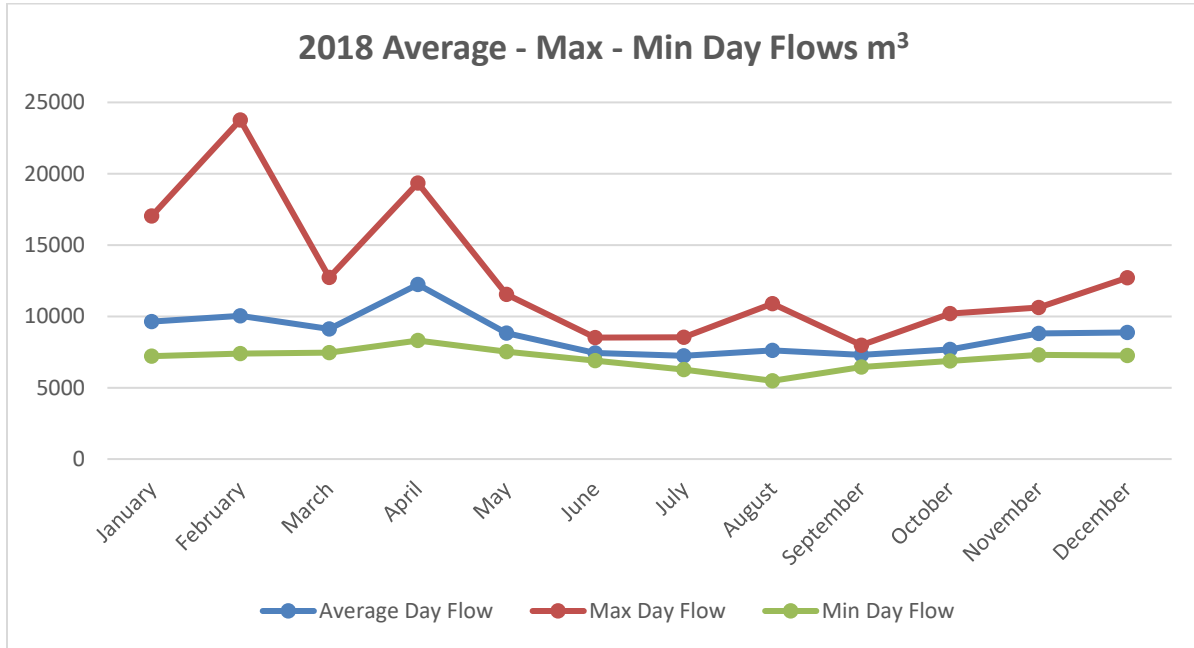
Figure 1: The graph below provides a visual display of the Total Monthly Daily Flow in m³ for 2018



The Total Monthly Discharge Flows are consistent through the year except for March to May when the Collection system is influenced by seasonal thaws and infiltration. We are currently conducting an Inflow and Infiltration Study (I&I) in efforts to reduce the unnecessary treatment of rain water and runoff during thaw seasons and storm events. Strategies identified in the I&I

study should increase the longevity of the Wastewater Collection System and Treatment Plant and delay the need for expansion.

Figure 1: The graph below provides a visual display of the Monthly Average, Max and Min Day Flows in m³ for 2018.

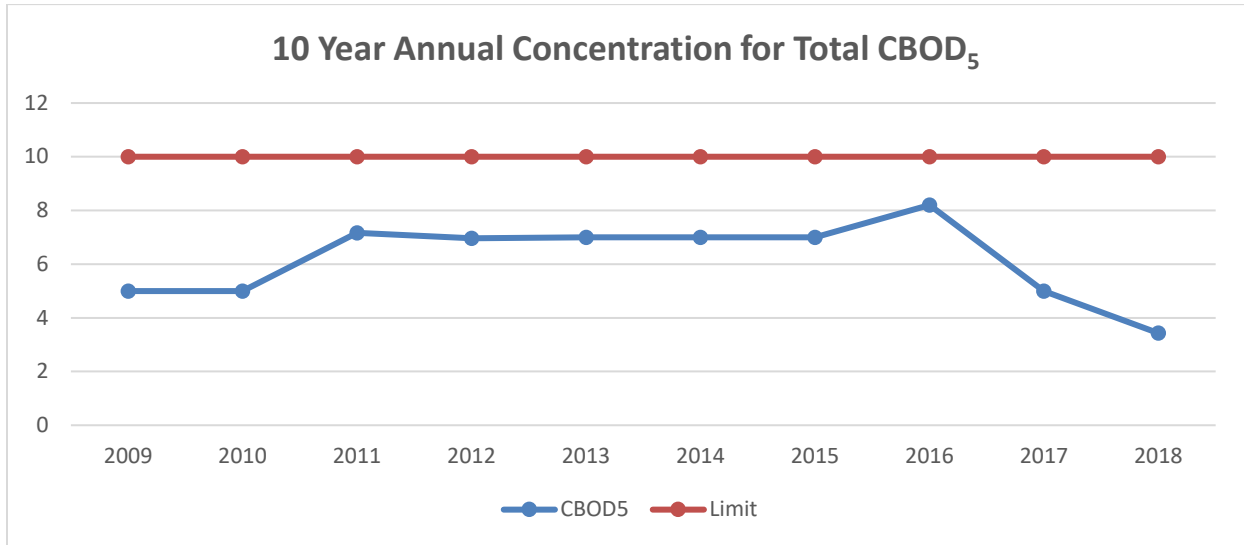


Summary and Interpretation of Monitoring Data

Summary of Monthly Average Final Effluent Concentrations

	Monthly Average CBOD5 mg/l	Monthly Average TSS mg/l	Monthly Average TAN mg/l	Monthly Average TP mg/l	Monthly Average Chlorine Residual mg/l	Geometric Mean Density E.Coli mg/l	Monthly Average pH
	Obj: 7	Obj: 5	Obj: 5	Obj: 0.3	Obj: 0.02		Obj: 6.0-9.5
	Limit: 10	Limit: 10	Limit: 10	Limit: 0.4	Limit: 0.02	Limit: 200 cfu	Limit: 6.0-9.5
January	3	4.46	3.96	0.09	0.008	554	7.71
February	6	3.47	7.99	0.09	0.009	96	7.64
March	3	2.18	11.35	0.07	0.002	2	7.72
April	3	2.51	5.55	0.07	0.005	5	7.77
May	3	2.27	4.07	0.07	0.002	114	7.63
June	3	2.27	0.55	0.06	0.002	13	7.57
July	3	3.31	0.66	0.10	0.001	16	7.54
August	3	2.49	1.45	0.09	0.002	4	7.64
September	3	2.12	0.55	0.06	0.001	4	7.66
October	4.75	3.15	0.86	0.08	0.003	14	7.60
November	3.4	3.34	0.65	0.11	0.004	4	7.71
December	3	2.81	0.77	0.07	0.002	3	7.72
Yearly Average	3.43	2.87	Sum = 0.88 Win = 3.97	0.08	0.003	69	7.66

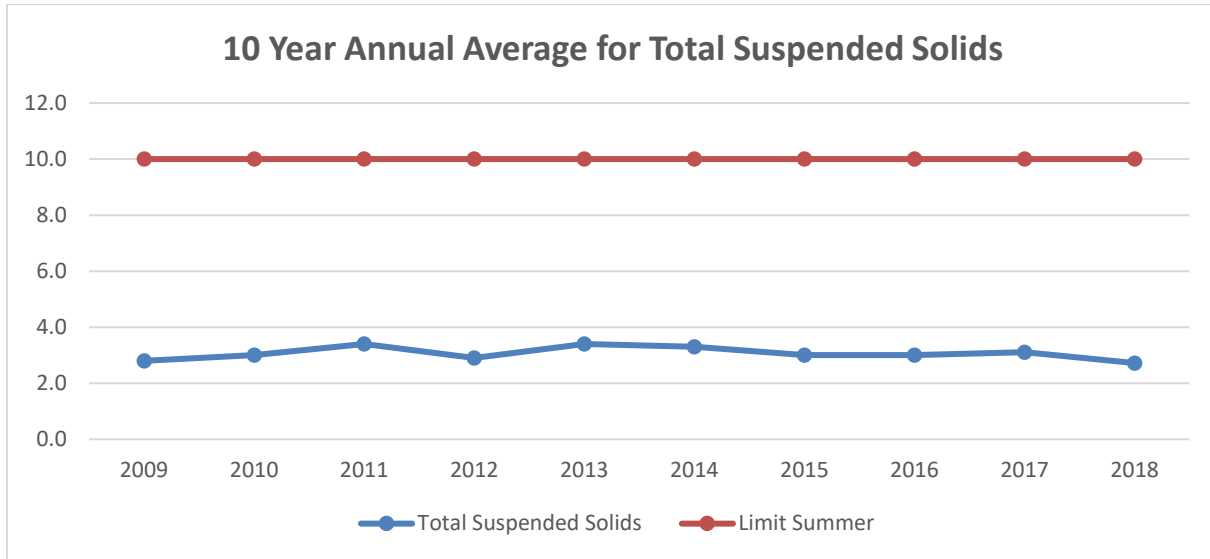
Figure 1: The following graph provides a visual display of the ten year trends of the annual average concentrations for total CBOD₅.



Total CBOD₅

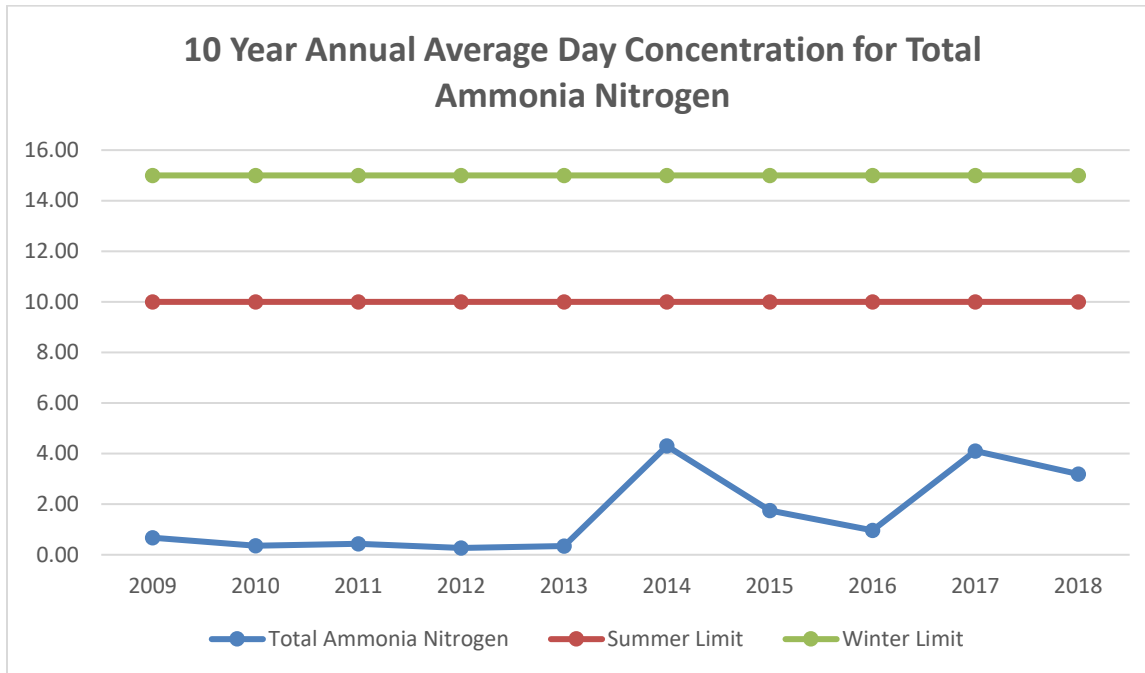
From the ECA the Monthly Average Concentration release of CBOD₅ to the environment is 10 mg/l. During the Reporting Period Midland's Monthly Average CBOD₅ was 3.43 mg/l. CBOD₅ represents the quantity of oxygen which is consumed in the course of aerobic processes of decomposition of organic materials, caused by microorganisms. The BOD therefore provides information on the impact the organic portion of the effluent will have on the oxygen level of the receiving stream, and on aquatic life of the bay

Figure 1: The following graph provides a visual display of the ten year trends of the annual average concentrations for total suspended solids.



From the ECA the Monthly Average Concentration for Total Suspended Solids (TSS) released to the environment is 10 mg/l. During the Reporting Period Midland's Monthly Average was 2.87 mg/l. TSS are **solids** in water. TSS can include a wide variety of material, such as silt, decaying plant and animal matter, and industrial wastes. High concentrations of **suspended solids** can lower water quality by absorbing light. Waters then become warmer and lessen the ability of the water to hold oxygen necessary for aquatic life

Figure 1: The following graph provides a visual display of the ten year trends of the annual average day concentration for total ammonia nitrogen.

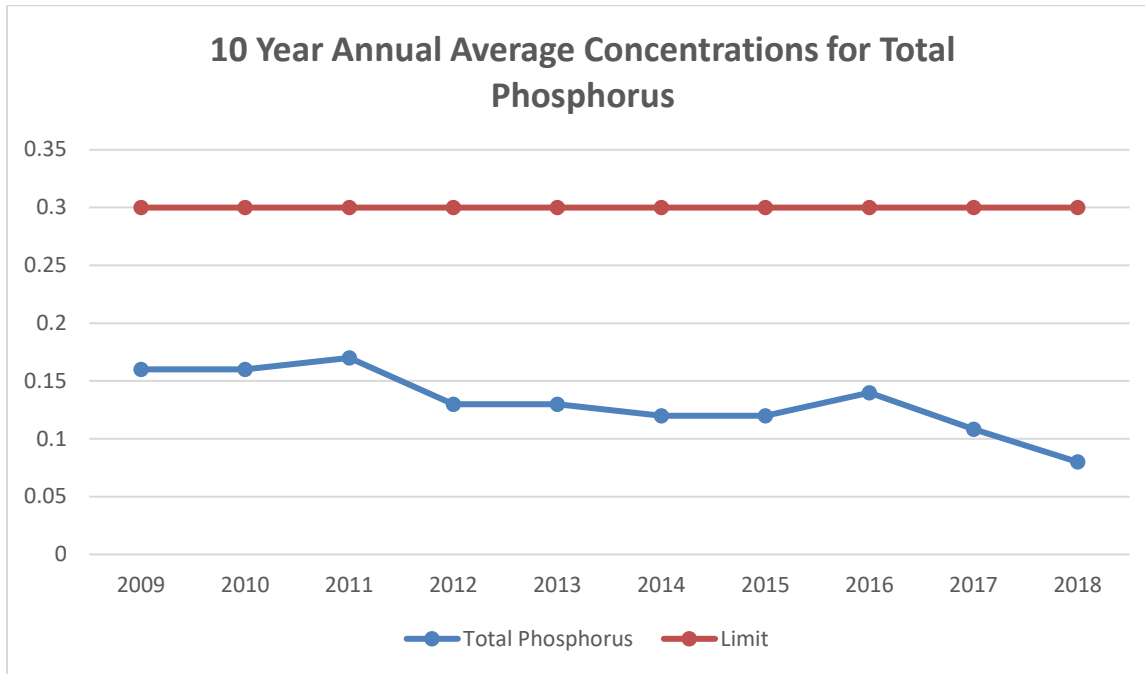


Total Ammonia is the sum of the free ammonia-nitrogen plus the amount of nitrogen from ammonia that has combined with chlorine. Ammonia pollution is a matter of increasing concern for regulatory authorities because of the serious threat it poses to the balance of sensitive habitats and to flora and fauna. Controlling ammonia discharges from wastewater treatment can make a significant contribution to reducing its environmental impact

The average concentration of Total Ammonia Nitrogen (T.A.N.) between June 1, 2018 to August 31, 2018 (Summer) was 0.88 mg/L, the ECA limit is 10 mg/L.

The average concentration of Total Ammonia Nitrogen (T.A.N.) between January 1, 2018 to May 31, 2018 and September 1, 2018 and December 31 2018 (Winter) was 3.96 mg/L, the ECA limit is 15 mg/L.

Figure 1: The following graph provides a visual display of the ten year trends of the annual average concentrations for total phosphorus.

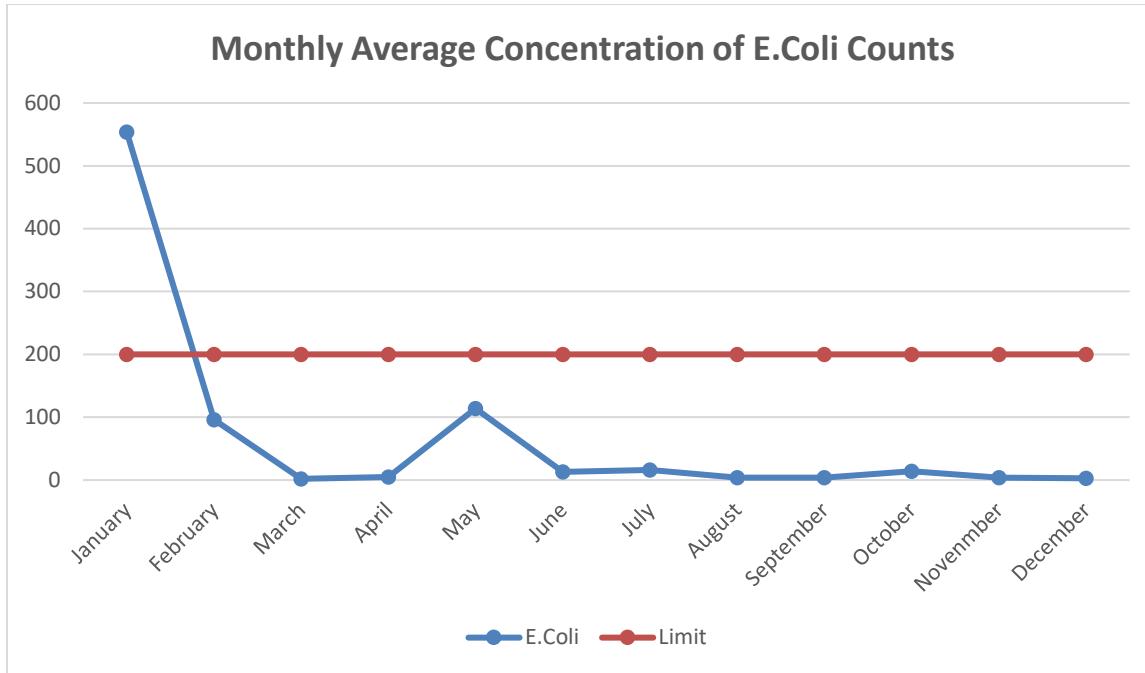


Total Phosphorus is the sum of reactive, condensed and organic phosphorous. It is an essential element for plant life, but when there is too much of it in water, it can speed up eutrophication (a reduction in dissolved oxygen in water bodies caused by an increase of mineral and organic nutrients) of rivers and lakes.

The highest average monthly total phosphorus concentration of 0.11 mg/L took place during the month of November. This concentration results in a total monthly loading for August of 29.09 kg.

The annual average concentration of 0.08 mg/L was well below the annual objective of 0.3 mg/L and also below the 0.4 mg/L monthly limit dictated by the ECA. The total annual phosphorus loading of 253.50 kg. is well below the ECA limit of 1,716 kg.

Figure 1: The following graph provides a visual display of the monthly average E-Coli Counts per 100 mL of effluent discharged from the works for 2018.



From the ECA the E.Coli, on a Monthly Geometric Mean, must be less than 200 Colony-Forming units/100 ml (CFU's) released to the environment. Midland's Annual Average e-coli count was 69.0 organisms per 100 millilitres of effluent discharged from the works, despite the elevated levels in January. Details of these occurrences are included in the Operational Challenges section.

Escherichia coli (*E. coli*) are a group of bacteria commonly found in the intestines of warm-blooded animals, including people. *E. coli* in fresh water can indicate the presence of pathogens (disease-causing organisms) from animal or human faeces. The pathogens can cause illness for anyone who ingests them.

Operational Challenges

The operational challenges experienced in 2018 was controlling the erratic fluctuations within our ECA limit for allowable discharge of E-Coli. The Ultra low range chlorine analyzer that was installed in January 2017 accurately measures chlorine residual in a very low range, confirming that dechlorination is taking place prior to discharge of the effluent to stream. This analyzer replaced the oxidation reduction potential (ORP) probe, which was inadequate. At the end of December 2017 and again in January 2018 we found mixing of the chemicals to be an issue that resulted in elevated E.Coli counts. We moved our injection points and noticed an improvement in both the control and mixing of chemicals within the chlorinating and dechlorinating stages of treatment. The review and correction of sample procedure was also completed to obtain an more representative and consistent sample of the effluent to stream.

The Total Ammonia reduction in 2017 was occasionally nearing the limits within the ECA. With the addition of some instruments and modification to our control strategy and improved oxygen control of the aeration system we were able to bring this parameter down well within the ECA requirements. Improved process control will be need to continue to achieve the Total Ammonia discharge limits as the hydraulic flow increases with growth.

NASM/Biosolids

In 2018 12,270 m³ of digested biosolids were hauled from the Town of Midland Wastewater Treatment Plant under contract L04-49844 by Region of Huronia Environmental Services (ROHES). ROHES transport the Biosolids generated to storage lagoons located New Lowell during the winter months and land apply in the summer months.

2018 Biosolids Generated and Hauled

2018	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Loads	19	23	27	18	26	30	36	28	17	20	16	31	291
Volume m³	840	1004	1134	756	1092	1,228	1512	1176	714	840	672	1302	12270

Summary of Effluent Quality Assurance and Control Measures

The Midland WWTP Operators collect samples from Raw Sewage, Primary Clarifier Effluent, Aeration Tanks, Secondary Clarifier Effluent, and Final Effluent on a regular basis throughout

the work week. Staff use standardized and accepted laboratory techniques when samples are tested for various parameters in-house for process control and effluent quality assurance. A spreadsheet is used to track in-house lab results to perform several calculations used to monitor and measure the effectiveness of the plant performance. In addition to the in-house analysis, samples are collected weekly and sent to a certified laboratory, Caduceon Environmental Laboratories. These sample results are used to determine compliance with the ECA and Ministry Regulation.

By-passess

In 2018 two plant by-passes occurred at Bay St. SPS #1 (chamber A). The contributing factors were power outage and high flows due to heavy rainfall entering the pump station wet well from combined storm/sewer mains. During a power outage no sewage is pumped from the pumping station and during a major rain event the flows become too much for the station to handle, hence, by-passing within chamber A. This is also known as a sanitary sewer overflow (SSO).

2018 BY-PASS REPORT

Date	Location	Type	Volume (m3)	Duration (Hrs.)	# Events	Rainfall (mm)
June 26 2018	Pump Station #1 - Chamber A	Plant Bypass	156	1.67	1	Power Outage
August 27 2018	Pump Station #1 - Chamber A	Plant Bypass	241	.68	1	18.8
Total			397			

NOTES:

Plant By-Pass -means any diversion of raw sewage around the treatment plant. This sewage does not undergo any treatment before it is discharged to the environment.

Secondary By-Pass or Plant Overflow - means any discharge to the environment from the Sewage Treatment Plant at a location other than the plant outfall (i.e.: storm equalization tank). This type of by-pass receives partial or primary treatment before it is discharged to the environment.

Infiltration and Inflow (I&I)

The Town of Midland is currently conducting an **infiltration and inflow (I&I)** study in order to determine magnitude of the I&I problem and, if so, the areas within the Town that would see the most return on investment for repairs. At strategic points within the sanitary system flow monitors were installed along with a rain gauge at the wastewater treatment plant. Over the 12 month flow monitoring program the data collected we were able to calculate a Dry Weather Flow and a Wet Weather Flow along with a Peaking Factor and Estimated Peak I&I. The contractor is now finalizing the report for future capital project considerations.

Calibration

All analyzers and flow meters are calibrated as per the manufacturers recommendations, a minimum of once a year. Calibration was started November 2018 and was completed in January 2019 by a third party instrumentation and controls technician. Calibration Certificates are submitted and retained electronically for each unit and devices. Below is a list of locations of units and devices and description.

Magnetic Flow Meter

Midland WWTP	Raw Sludge Flow
Midland WWTP	RAS Flow
Midland WWTP	Secondary Flow
Midland WWTP	WAS Flow
SPS # 4 Pillsbury	Wet Well Flow
SPS # 6 Vindin	Wet Well Flow
SPS # 7 Bay Port	Discharge Flow

Level Transmitter

SPS # 1 Main	Wet Well Level
Midland # 2 WWTP	Pump House Wet Well
SPS # 3 Aberdeen	Wet Well Level
SPS # 4 Pillsbury	Wet Well Level
SPS # 5 Russ Howard	Wet Well Level
SPS # 6 Vindin	Wet Well Level
SPS # 7 Bay Port	Wet Well Level
Midland WWTP	Septage Level
Midland WWTP	Storm Tank Level
Midland WWTP	Calcium Tank Level
Midland WWTP	Calcium Tank Level

Open Channel Flow

Midland WWTP Influent Flow
 A Chamber Influent Flow
 Midland WWTP Chamber B
 Midland WWTP Storm Flow
 Midland WWTP Effluent Flow

DO Probes

Midland WWTP Probe 1
 Midland WWTP Probe 2
 Midland WWTP Probe 3

Total Suspended Solids

Midland WWTP Probe 1

Summary of Maintenance Performed Throughout the Reporting Period

In addition to regular maintenancemanagement program, works were upgraded or replaced in accordance with the Capital Plan as follows.

- Replaced the Roof at Russ Howard Pump Station # 5
- Explosion Proof Receptacles and Heat Trace in Egg Shaped Digester
- Replacement of Diesel Fuel Tank 200 Bay Street
- Replacement of Effluent Strainer
- Flow meters for Chemicals, 2 Alum, 1 Chlorine and 1 Sodium thiosulphate
- Replacement of Second Pump in Storm Tank
- Booster Pump 1/1/2
- Flow meter for Dichlorination Pumps
- Programming for Dichlorination System
- Replacement of WW#4 2008 Pontiac Wave. With Mitsubishi Eclipse Electric Car

Summary of Complaints received throughout the Reporting Period

There was one complaint received by the Town of Midland municipal staff throughout the Reporting Period for the Town of Midland Wastewater Treatment Plant for odour. Details of the date and time of the occurrence was not available and it was believed to be caused by the disposal of Septic Waste.

Limited Operational Flexibility-Notice of Modifications Form



There were no Limited Operation Flexibility or Notice of Modification forms submitted throughout the Reporting Period. All upgrades/modifications have been completed in accordance with the Terms and Conditions of the ECA.

Closing Remarks

Throughout the Reporting Period the Midland WWTC operated to the best of its ability while subject to extensive construction activity, and seasonal influences. With continued construction and typical average daily flows, operations staff expect the WWTC to operate as designed over the next Reporting Period.