February 26, 2020
Municipality of West Perth
169 St. David Street
Mitchell, Ontario
N0K 1N0

ATTENTION: **Mr. Jeff Brick**
CAO
REFERENCE: **Municipality of West Perth**
2019 Annual Wastewater Report

Please find enclosed the 2019 Annual Wastewater Report for the Town of Mitchell Wastewater Treatment Plant and Collection System. The report is prepared in accordance with the criteria outlined in the Environmental Compliance Approval #6954-B6YMGQ for the reporting period of January 1, 2019 to December 31, 2019. The report also includes a brief nitrate monitoring summary as per the West Perth Nitrate and Reporting Plan.

On behalf of the municipality, a copy of this report has been sent to Mr. Stephen Dunn of the Ministry of Environment, Conservation and Parks London District Office.

Yours very truly,

Environmental Services
Municipality of West Perth

Table of Contents

A. Summary And Interpretation Of All Influent, Imported Sewage And Processed Organic Waste Monitoring Data And A Review Of The Historical Trend Of The Characteristics And Flow Rates; 3

B. Summary And Interpretation Of Final Effluent Monitoring Data; 8

C. Summary Of Deviations From The 2019 Monitoring Schedule And Reasons And A Schedule For 2020; 13

D. Summary Of Operating Issues Encountered And Corrective Actions Taken; 15

E. Summary Of Repairs And Maintenance Activities; 15

F. Summary Of Effluent Quality Assurance; 16

G. Summary Of Calibration And Maintenance Carried Out On Monitoring Equipment; 16

H. Summary Of Efforts Made To Achieve The Design Objectives; 17

I. A Tabulation Of Generated Sludge, Locations Of Sludge Disposal And Anticipated Volumes For The Next Reporting Period; 17

J. Summary Of Complaints Received, And Actions Taken To Address The Complaints; 17

K. Summary Of All Bypasses, Overflows, Spills Or Abnormal Discharge Events; 18

L. Summary Of All Notice Of Modifications To Sewage Works Completed Including A Report On Status Of Implementation Of All Modification; 18

M. Summary Of Efforts Made To Achieve Conformance With Procedure F-5-1; 18

N. Changes Or Updates To The Schedule For The Completion Of Construction And Commissioning Operation Of Major Process(Es)/Equipment Groups In The Proposed Works 18

O. Nitrogen Monitoring Summary 19

A. Summary and interpretation of all Influent, Imported Sewage and Processed Organic Waste monitoring data and a review of the historical trend of the characteristics and flow rates;

The Mitchell Wastewater Treatment Plant (MWTP) receives wastewater from residential properties, small businesses and industrial facilities through the collection system. The two largest wastewater producers are a dairy production facility and poultry processing facility. Environmental Services measures discharge volumes of both facilities independently.

The annual average influent flow to the MWTP was approximately 4.540 MLD, which represents approximately 63% of the design capacity for the treatment facility (average day design flow of 7.2 MLD). The maximum daily flow of 13.874 MLD occurred in the month of April. Both the average and maximum flows for 2019 were less than in 2018 (Average: 0.105 MLD, Maximum: 12.598 MLD).

The MWTP was able to treat the average daily flows. Peak flows were diverted and temporarily stored in the peak overflow cell and pumped back into the treatment plant when incoming flow volumes returned to normal.

The MWTP has an on-site receiving station that is designed to accept imported liquid waste. Accepted waste is pumped and metered to the MWTP during periods of low loading. There was only one source of imported waste accepted in 2019.

Table 1 shows the monthly average characteristics of waste entering the MWTP, while Table 2 shows the monthly average characteristics of the imported waste.

2019 Influent	BOD5 (mg/L)	TKN (mg/L)	Total Phosphorus (mg/L)	Total Suspended Solids (mg/L)
January	406.0	38.6	16.5	410.2
February	199.5	20.0	8.3	162.2
March	287.5	33.5	14.7	246.5
April	346.0	33.6	9.2	209.1
May	315.0	34.0	13.6	288.5
June	362.5	43.8	18.8	318.6
July	464.0	33.0	16.6	308.6
August	450.0	31.0	8.7	282.8
September	530.0	33.8	14.7	337.2
October	430.0	44.8	20.2	391.4
November	179.8	23.3	16.2	213.8
December	260.0	24.4	12.4	236.0

Table 1: Summary of 2019 influent concentrations.

2019 Imported Waste	BOD_5 (mg/L)	TKN (mg/L)	Total Phosphorus (mg/L)	Total Suspended Solids (mg/L)
January	N/A	N/A	N/A	N/A
February	N/A	N/A	N/A	N/A
March	N/A	N/A	N/A	N/A
April	N/A	N/A	N/A	N/A
May	N/A	N/A	N/A	N/A
June	N/A	N/A	N/A	N/A
July	N/A	N/A	N/A	N/A
August	N/A	N/A	N/A	N/A
September	N/A	N/A	N/A	N/A
October	N/A	N/A	N/A	N/A
November	N/A	N/A	N/A	N/A
December	797	96.7	41.3	2280

Table 2: Summary of 2019 imported waste influent characteristics

2019 Influent	Average Monthly Influent (m^3)
January	4661
February	5654
March	5785
April	6301
May	4956
June	3865
July	3364
August	3350
September	3289
October	3875
November	4953
December	4422

Table 3: The average monthly volume of all influent to the MWTP in 2019.

The following graphs display the average monthly concentrations of specified parameters of influent to the MWTP for 2018 and 2019:

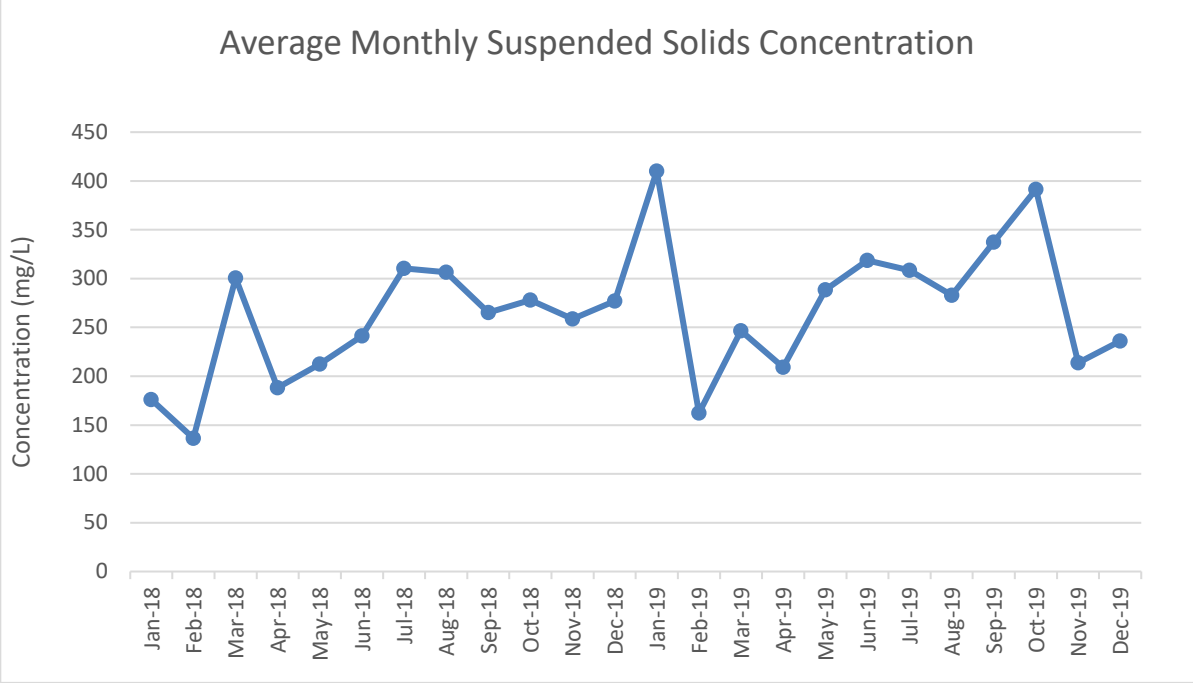

Figure 1: The historical trend of suspended solids concentration from January 2018 - December 2019.

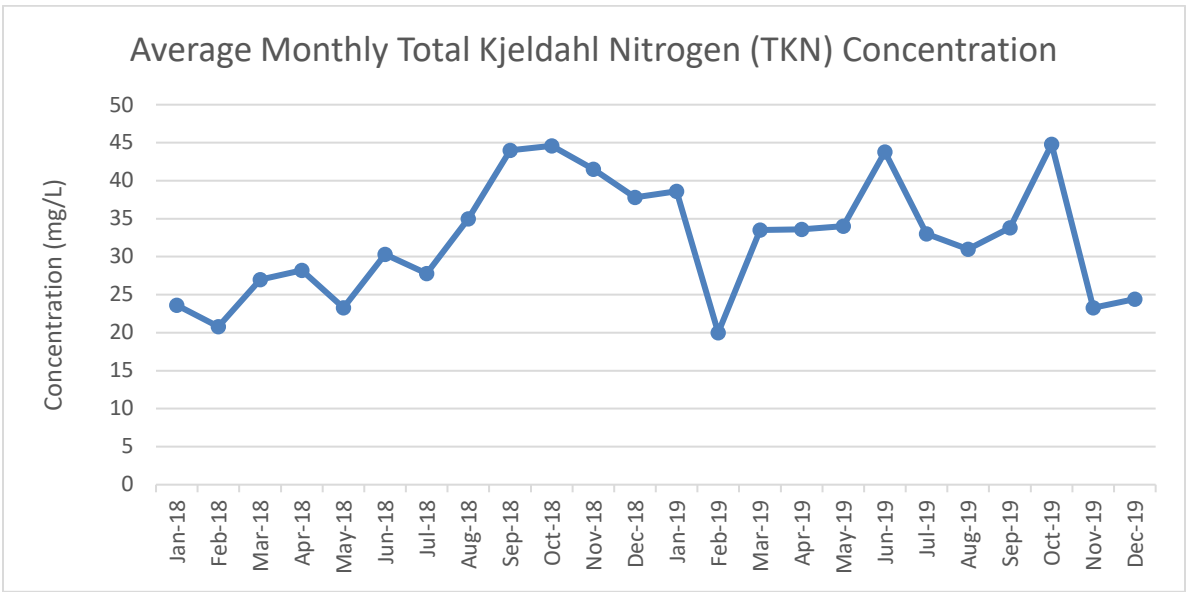

Figure 2: The historical trend of total kjeldahl nitrogen concentration from January 2018 - December 2019.

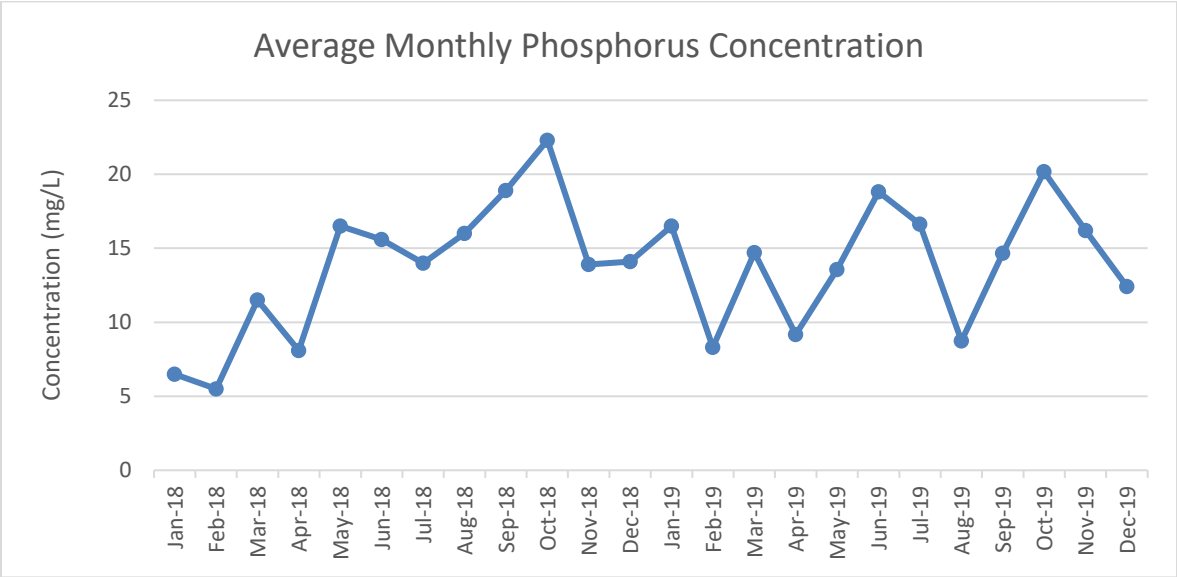

Figure 3: The historical trend of total phosphorus concentration from January 2018 - December 2019.

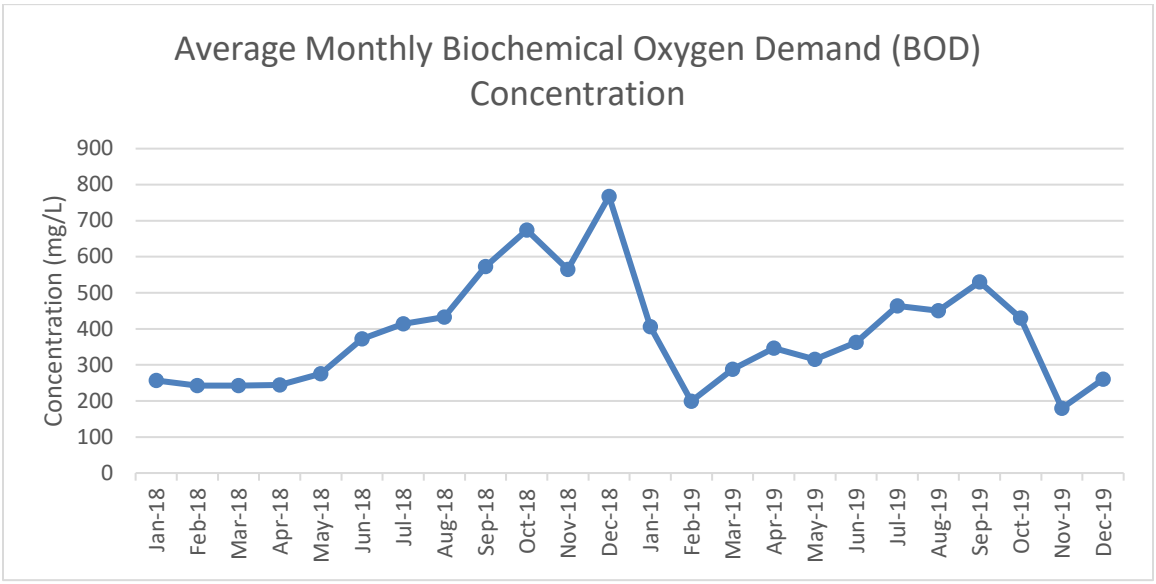

Figure 4: The historical trend of biochemical oxygen demand concentration from January 2018 - December 2019.

The following graphs show the flow rates of influent and imported waste to the MWTP in 2018 and 2019:

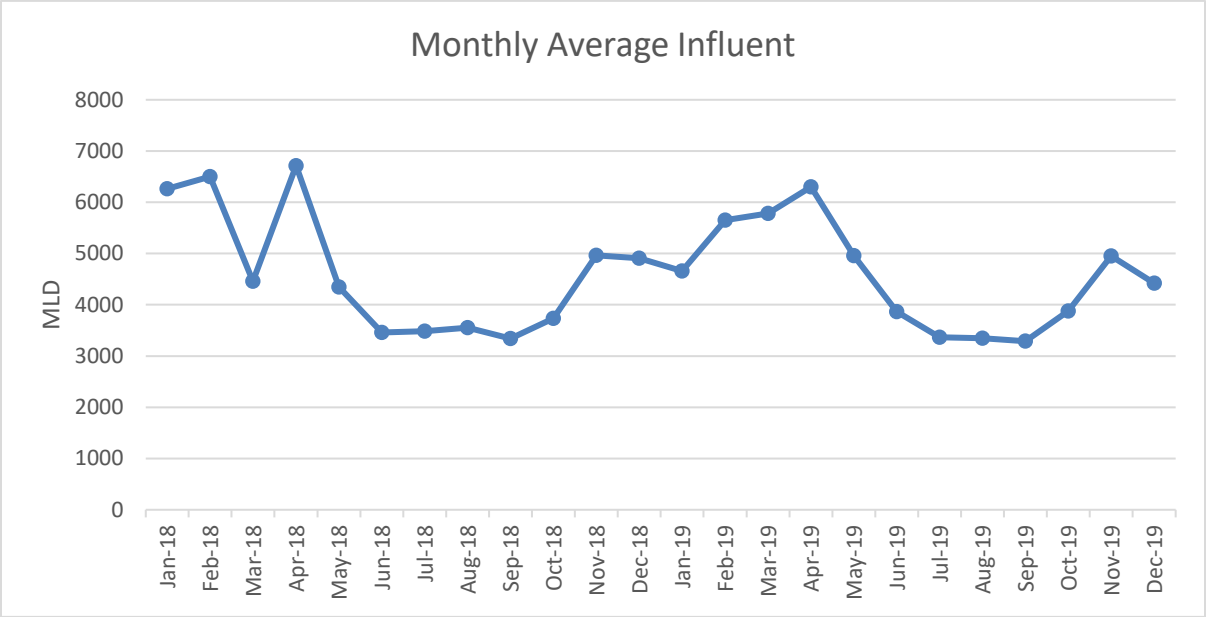

Figure 5: The historical trend of monthly average influent to the MWTP from January 2018 – December 2019.

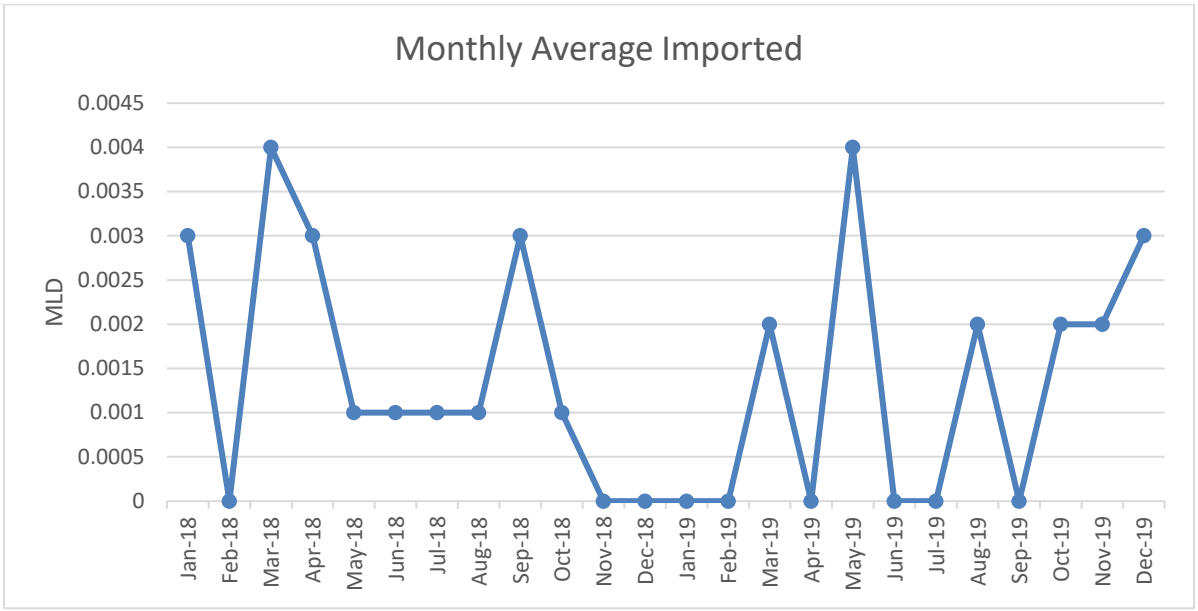

Figure 6: The historical trend of monthly average imported waste to the MWTP from January 2018 - December 2019.

B. Summary and interpretation of final effluent monitoring data;

The following tables and graphs compare the effluent concentrations in 2019 to compliance limits and design objectives stated in the Environmental Compliance Approval (ECA):

Effluent Parameter	Annual Average Concentration	Concentration Criteria Limit Dec 1 – Apr 30	Concentration Criteria Limit May 1 – Nov 30
$CBOD_5$	0.20 mg/L	15.0 mg/L	10.0 mg/L
Total Suspended Solids	3.16 mg/L	15.0 mg/L	10.0 mg/L
Total Phosphorus	0.16 mg/L	1.0 mg/L	0.5 mg/L
Total Ammonia Nitrogen	0.14 mg/L	5.0 mg/L	3.0 mg/L
E. Coli	15.0 CFU / 100 mL	200 CFU/ 100 mL using MPN Method Mar 15 to Oct 31	
pH	7.27	Between 6.0-9.5 inclusive	
Unionized Ammonia	0.001 mg/L	0.1 mg/L	

Table 4: 2019 annual average effluent concentrations compared to the design limits for specified periods.

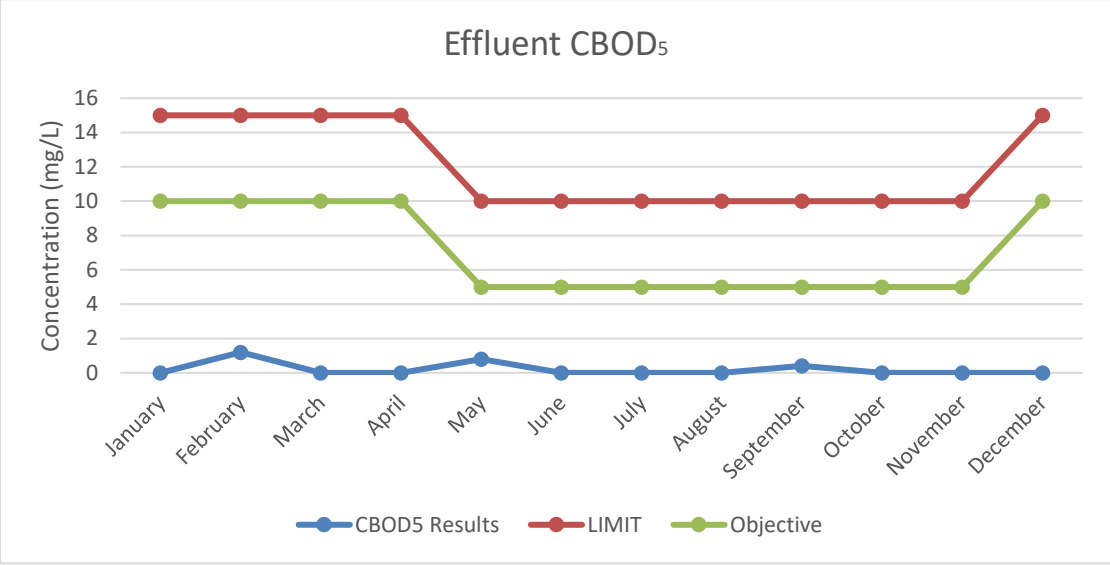

Figure 7: Comparison of the 2019 monthly average concentrations of effluent $CBOD_5$ to design objectives and compliance limits.

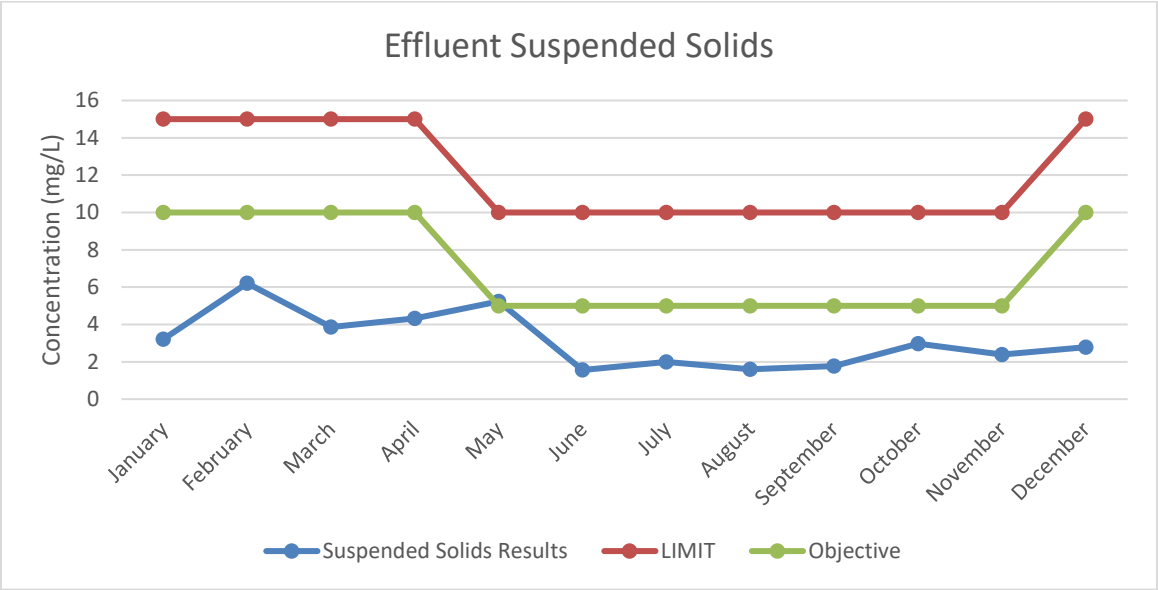

Figure 8: Comparison of the 2019 monthly average concentrations of effluent suspended solids to design objectives and compliance limits.

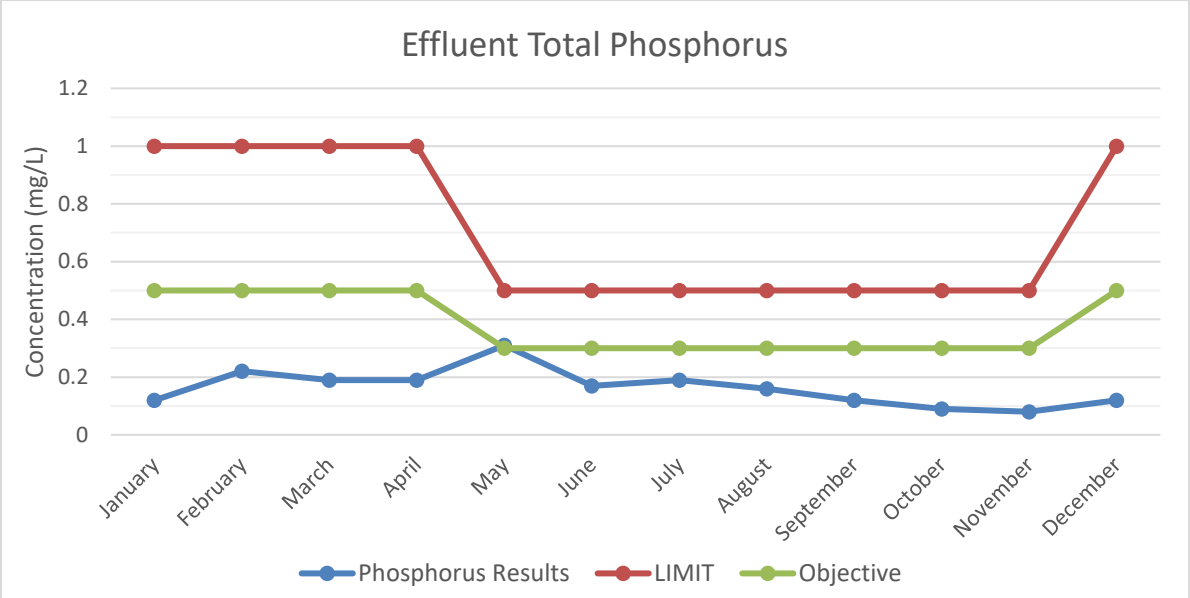

Figure 9: Comparison of the 2019 monthly average concentrations of effluent total phosphorus to design objectives and compliance limits.

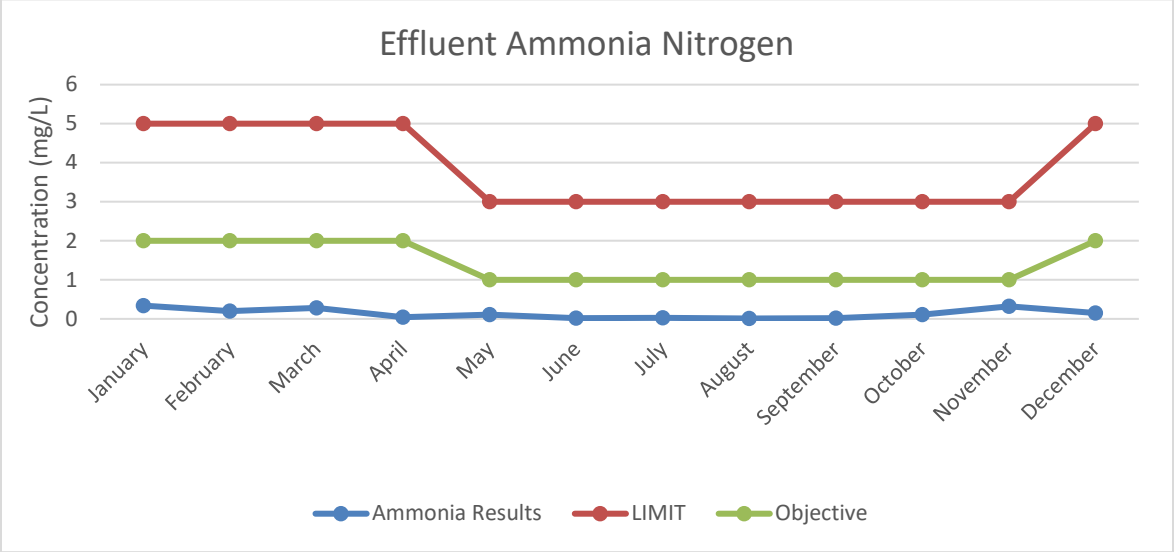

Figure 10: Comparison of the 2019 monthly average concentrations of effluent ammonia nitrogen to design objectives and compliance limits.

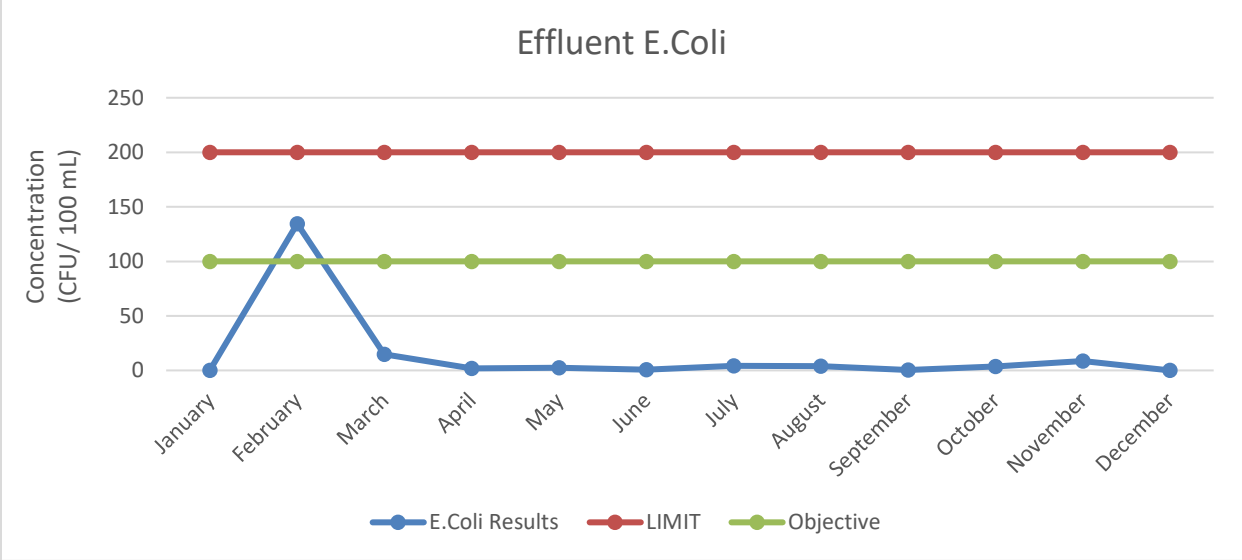

Figure 11: Comparison of the 2019 monthly average concentrations of effluent E. Coli to design objectives and compliance limits.

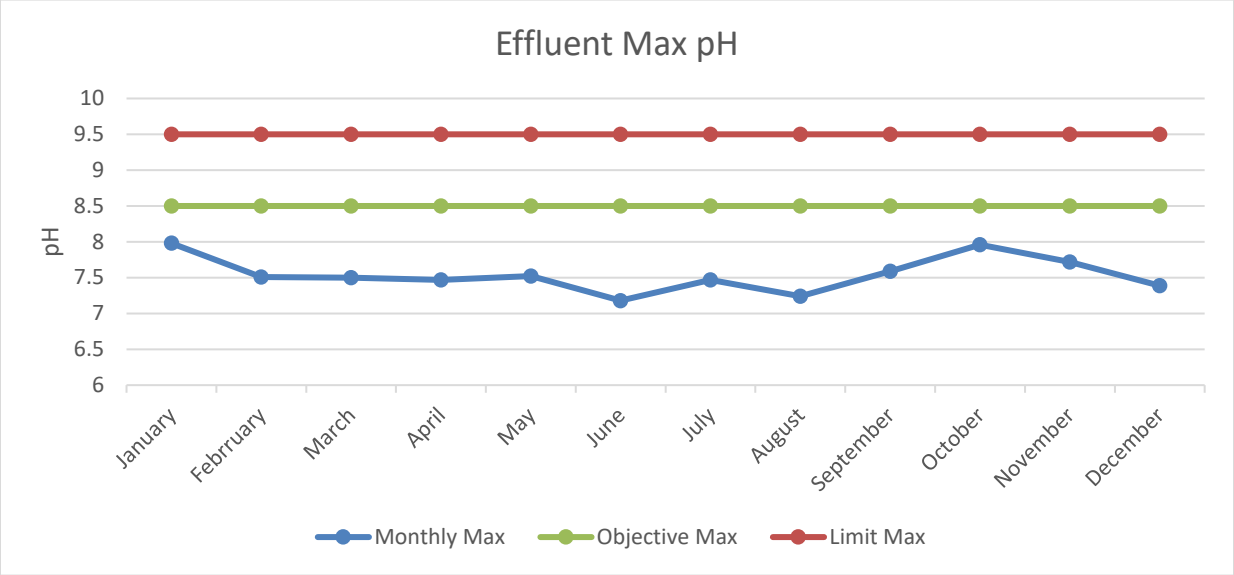

Figure 12: Comparison of the 2019 monthly maximum effluent pH to design objectives and compliance limits.

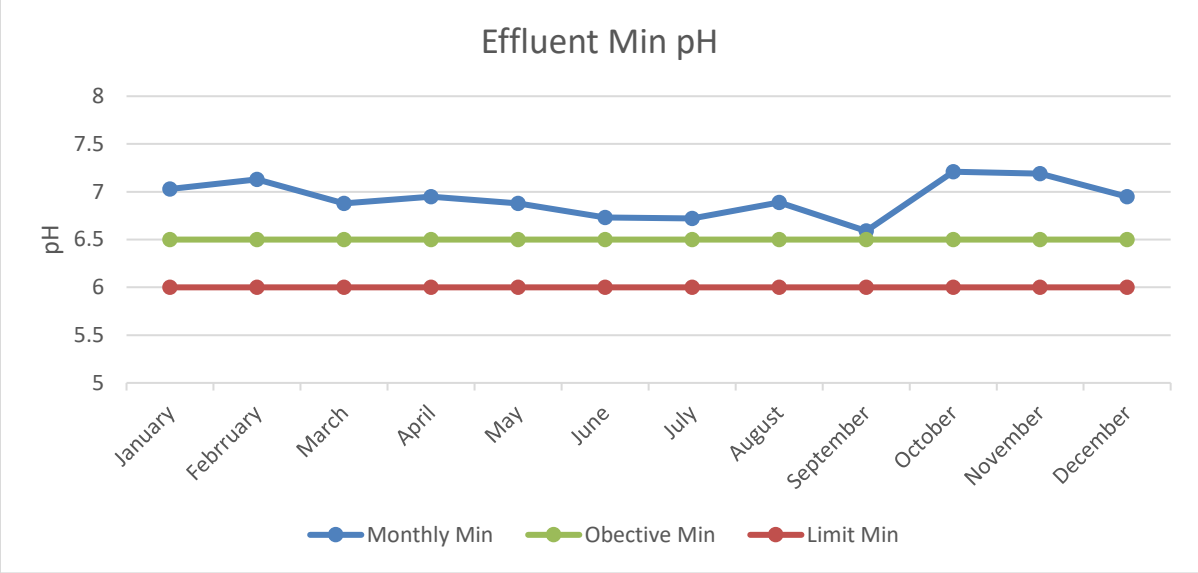

Figure 13: Comparison of the 2019 monthly minimum effluent pH to design objectives and compliance limits.

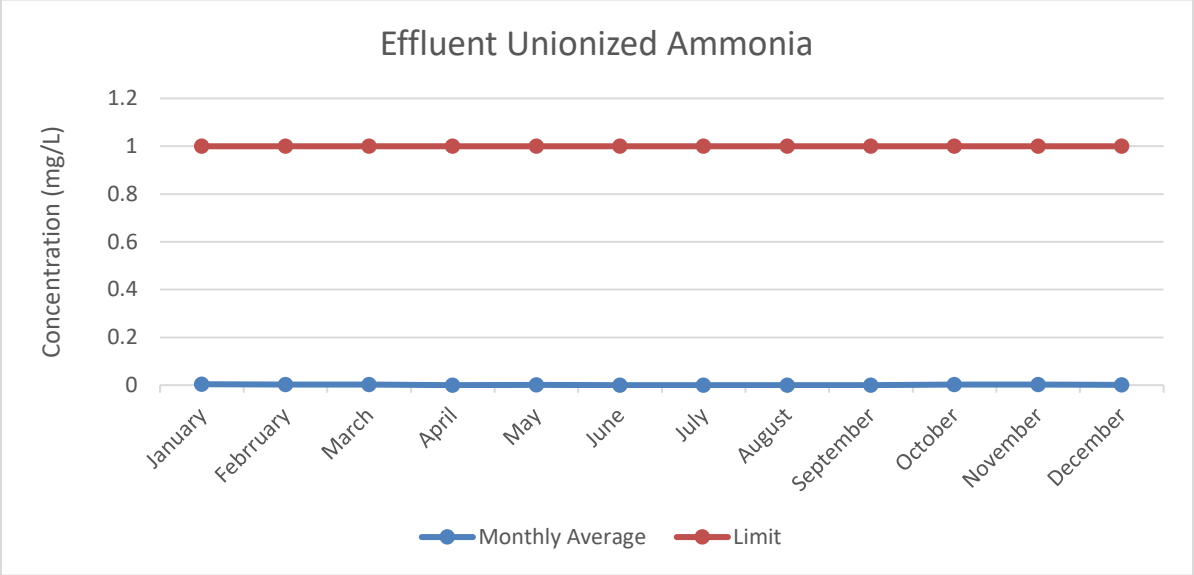

Figure 14: Comparison of the 2019 monthly average concentrations of effluent unionized ammonia to design objectives and compliance limits.

The following table shows the estimated effluent flow rates for the reporting period:

Month	Average Daily Flow (MLD)	Total Flow (ML)
January	4.482	138.950
February	5.416	151.638
March	5.395	167.250
April	5.883	176.504
May	4.798	148.736
June	3.701	111.017
July	3198	99.125
August	3.139	97.322
September	3.099	92.958
October	3.683	114.168
November	4.779	143.358
December	4.249	131.727

Table 5: Estimated effluent flow rates for *2019.*

The following table compares the annual average daily effluent loading to the limit set out by the ECA:

Effluent Parameter	Loading (kg/day)	Loading Criteria (kg/day) Dec 1 – Apr 30	Loading Criteria (kg/day) May 1 – Nov 30
$CBOD_5$	1.01	108	72
Total Suspended Solids	15.44	108	72
Total Phosphorus	0.76	7.2	3.6
Total Ammonia Nitrogen	0.67	36	21.6

Table 6: Comparison of effluent loading to limits for specified periods.

The calculated removal efficiencies achieved at the MWTP for the main effluent parameters are highlighted as follows:

- $CBOD_5$ removal efficiency was 99.94%
- Suspended solids removal efficiency was 98.89%
- Total Phosphorus removal efficiency was 98.87%

C. Summary of deviations from the 2019 monitoring schedule and reasons and a schedule for 2020;

There were deviations from the 2019 schedule. The deviations are as follows:

-Monthly sludge June 3rd taken on June 5th. Taken on June 5th to get closer to date sludge was to be hauled.

-Monthly Sludge July 2nd taken on July 8th. Due to the holiday. Sampled the next week.

-Quarterly sludge July 8th taken on July 15th. Sampled monthly sludge on July 8th, not enough bottles to do both sets of samples.

- Extra monthly sludge samples taken April 15th, April 24th and June 6th. Samples taken to ensure compliance with regulations for sludge haulage.

- Extra samples taken February 24th, and May 2nd. Extra samples taken for monitoring purposes.

Below is the Sampling Schedule for 2020:

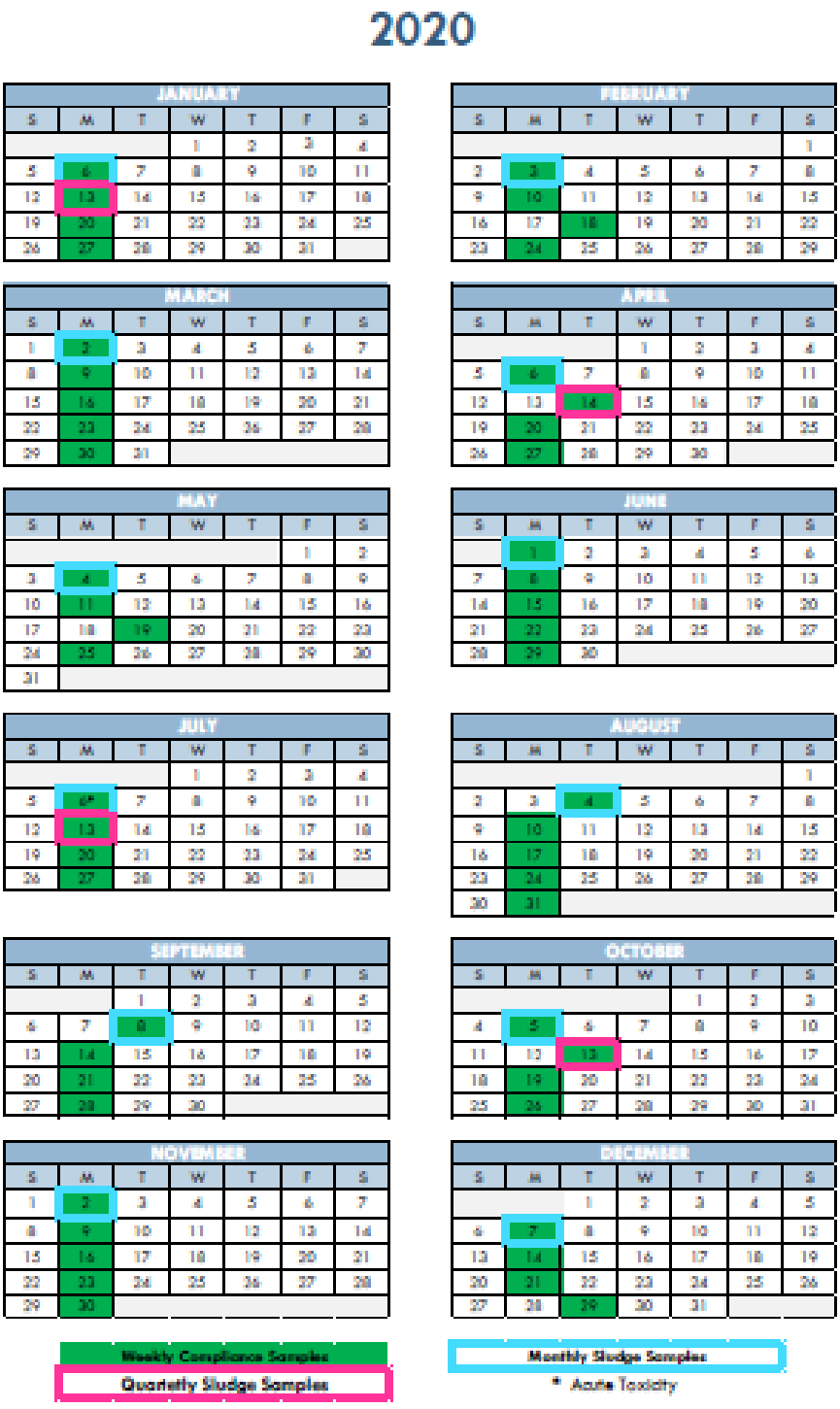

Figure 15: 2020 Sampling Schedule

D. Summary of operating issues encountered and corrective actions taken;

The drive for Clarifier 1 exceeded its torque limit and faulted out. This caused sludge to flow over the weir and into the filters. The filters plugged up with sludge which caused a filter bypass. The bypass was reported, and samples were taken accordingly. The issue was resolved, and clarifier failure alarms were implemented.

The plant encountered difficulty maintaining the final effluent design objectives during periods of heavy rainfall for the months of April and May. Final effluent objectives were exceeded for the month of May. Final effluent compliance limits were not exceeded in 2019.

The main breaker at MWTP suffered a critical fault and required replacement. The plant ran on standby power for 3 days until a new breaker was installed.

The variable frequency drive (VFD) for Return Pump 1 burned out, a new VFD has since been installed.

Herbert St SPS Pump 3 bearings wore out. The pump was pulled and sent away for repairs.

Throughout the year, influent high in biochemical oxygen demand (BOD) entered the MWTP. The elevated BOD loading made it difficult to maintain effluent quality objectives, and significantly increased the volume of biosolids produced.

E. Summary of repairs and maintenance activities;

Megamation is the computerized maintenance management system used to schedule the maintenance activities at the treatment plant and pumping stations. The operators can generate preventive maintenance and corrective work orders; as well as document work performed and issue work order history reports.

A highlight of the major maintenance carried out for 2019 is outlined below:

- The raw sewage pumps at both Hebert and James Street SPS were inspected and maintained by the operators.
- The Herbert Street SPS, James Street SPS and MTWP diesel generators received their annual service in early 2019. They were also inspected and ran monthly.
- Annual greasing and oil changes were completed on all blowers. Vibration readings are taken annually.
- All submersible pumps were inspected.
- Aerobic Digesters #1 and #2 (including the headers and piping) were cleaned, inspected and serviced by the operators in the spring and fall.
- The air lift piping on all the filter air lifts were pulled and inspected.

- The UV system was monitored daily by the operators in 2019 for proper intensity. The lenses were cleaned monthly and the bulbs were replaced as needed.
- Outside contractors inspected the gas detectors, diesel generators, chain falls, beams, flow meters and lab equipment.
- The chain for Clarifier 2 was replaced and adjusted. The master link was replaced, and the chain was adjusted for Clarifier 1.
- The electrical contractor cleaned the heat sink for VFD's at James St SPS.
- HVAC contractor repaired HVAC unit at MWTP.
- New check valves for filter return pumps at MWTP were installed.
- A new main breaker was installed at MWTP.
- Replaced plugs and control board for UV Bank 1B module 5.
- Electrical contractor repaired grit room exhaust fan.
- The pump rails were replaced for Scum Pump 2.
- The alum dosing system was flushed and inspected.

F. Summary of effluent quality assurance;

A 24hr-composite sampler that is located downstream of the UV channel is used to collect the effluent sample. A 100 mL sample is collected every 50 minutes over a 24hr period to produce a composite sample. Operation staff use this sample to perform analysis twice a week to ensure effluent quality. Once a week, samples are sent to Bureau Veritas Laboratories in Mississauga, Ontario.

Samples sent to Bureau Veritas Laboratories are delivered in coolers with enough ice packs to ensure the samples stay cool. A Chain of Custody accompanies the samples. The Chain of Custody identifies the operator that took the sample, the time the sample was taken, and what was sampled. It also communicates the desired type of analysis to be performed and ensures that only authorized persons handled the samples prior to analysis.

Bureau Veritas Laboratories is accredited by various organizations including the Ministry of Environment, Conservation and Parks and is also ISO/IEC 17025 accredited. A Certificate of Analysis is sent with each laboratory result.

G. Summary of calibration and maintenance carried out on monitoring equipment;

Copies of the calibration reports for the return activated sludge, waste activated sludge, filter backwash water and influent flow meters are filed at the MWTP Office. The flow meters are calibrated annually by a qualified third party.

Portable dissolved oxygen probes and meters are cleaned after every use. They are calibrated annually by a qualified third party.

The pH meter is calibrated once a month by operators as per manufacturer's instructions.

H. Summary of efforts made to achieve the design objectives;

In 2019 the MWTP received elevated BOD loading from local industries. To meet the objectives set out in the ECA, the concentration of dissolved oxygen was increased. The alum dosage was also increased to reduce phosphorus levels.

Operators continue to conduct maintenance on equipment. Weekly in-house process control analysis is performed to ensure that the MWTP is operating efficiently. Operational changes are made as required to meet design objectives.

I. A tabulation of generated sludge, locations of sludge disposal and anticipated volumes for the next reporting period;

In 2019, approximately 64,681m³ of sludge was generated. The MWTP produced 15,799m³ more than in 2018. The increase can be attributed to greater loading and suspended solids from local industries. Based on current loadings, we expect a similar amount of sludge generation in 2020.

Digested sludge from the MWTP and biosolids from the storage lagoon is removed by a licensed waste hauler.

Biosolids are land applied to sites approved by OMAFRA/MECP.

The summary of the biosolids applied during 2019 are as follows:

YEAR	LAND APPLICATION SITE NUMBER	SLUDGE APPLIED TO LAND/ M3
2019	NASM Plan Number 23158	4057.5
	NASM Plan Number 23158	4480.6
	NASM Plan Number 23999	3505.6
	NASM Plan Number 23999	2916.2
	NASM Plan Number 23998	1753.4

Table 7: Summary of 2019 biosolids.

J. Summary of complaints received, and actions taken to address the complaints;

There were no complaints regarding wastewater in 2019.

K. Summary of all bypasses, Overflows, spills or abnormal discharge events;

February 1, 2019 - Tertiary filter bypass; Duration - 25 minutes. Volume - 118m³.

October 31, 2019 - Tertiary filter bypass; Duration - 54 minutes. Volume - 5m³.

L. Summary of all Notice of Modifications to Sewage Works completed including a report on status of implementation of all modification;

There were no *Notice of Modifications to Sewage Works* completed in 2019.

M. Summary of efforts made to achieve conformance with Procedure F-5-1;

Operators conduct routine maintenance on equipment and weekly process control analysis to ensure that the MWTP is operating efficiently to meet design objectives.

N. Changes or updates to the schedule for the completion of construction and commissioning operation of major process(es)/equipment groups in the Proposed Works

There have been no significant changes or updates to the Proposed Works. The secondary clarifier remains in the design process.

O. Nitrogen Monitoring Summary

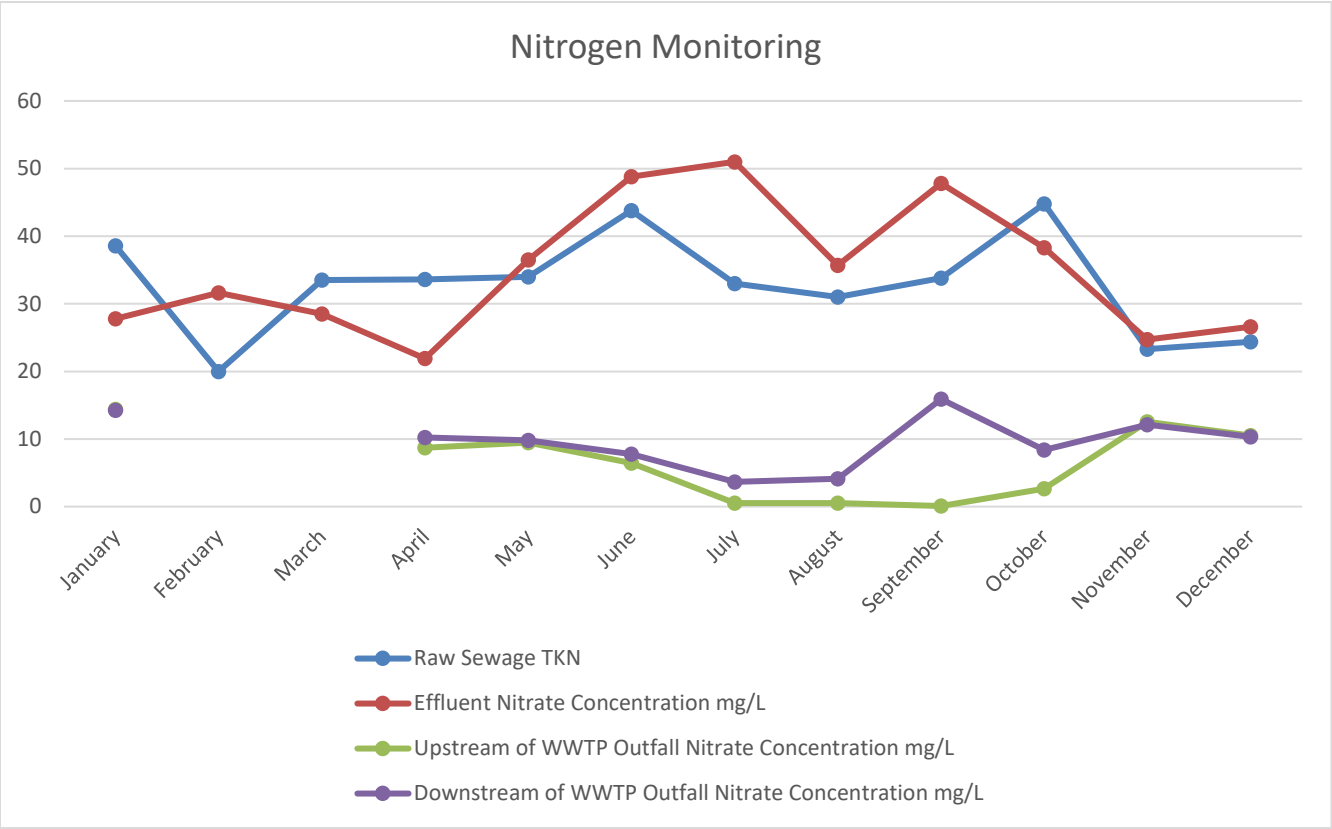

Figure 16. The historical trend of nitrate concentrations from January 2019 - December 2019.
Note: ND values were inputted as 0.09mg/L

Based on ongoing sampling results, the most significant increase of nitrate in the North Thames River occurs during the summer when stream flow is low and minimal effluent dilution is provided. Correspondingly, background nitrate levels in the North Thames River appear to reduce in the summer which in part offsets the impact of additional nitrate loadings from the MWTP during this time period.

The work plan developed by West Perth to date does not include a component for ecological impacts, if any, from higher nitrate values in the North Thames River.

We understand that high nitrate values may be linked to impacts on amphibians during the egg stage of amphibian life cycle (spring). Results to date would indicate a minimal nitrate increase during the springtime, due to higher dilution and to some degree, higher background nitrate levels in the North Thames River during the spring season.

For 2020, the work plan will continue, sampling at the West Perth Line 29 location, and that likely the Line 29 location be used to assess the net increase of nitrate levels in the North Thames River.