March 9, 2021
Municipality of West Perth
169 St. David Street
Mitchell, Ontario
N0K 1N0

ATTENTION: **Mr. Jeff Brick**
CAO
REFERENCE: **Municipality of West Perth**
2020 Annual Wastewater Report

Please find enclosed the 2020 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, 2020 to December 31, 2020. 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

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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 4.260 MLD, which represents approximately 59% of the design capacity for the treatment facility (average day design flow of 7.2 MLD). The maximum daily flow of 21.711 MLD occurred in the month of March. The average flow for 2020 was less than 2019, while the maximum flow was greater than 2019. (Average: 0.28 MLD, Maximum: 7.837 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 2020.

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

2020 Monthly Average Influent	**BOD5** (mg/L)	**TKN** (mg/L)	**Total Phosphorus** (mg/L)	**Total Suspended Solids** (mg/L)
January	215.8	21.6	13.21	198.1
February	297.5	23.8	16.92	205.0
March	163.6	17.0	11.00	144.3
April	342.5	30.0	21.53	241.0
May	260.0	26.3	18.03	186.9
June	308.0	31.4	19.41	320.9
July	375.0	39.5	17.52	256.0
August	316.0	28.4	15.53	219.7
September	507.5	41.5	20.96	341.6
October	452.5	30.8	20.57	303.2
November	654.0	49.2	16.38	371.7
December	292.5	23.8	11.78	214.2

Table 1: Summary of 2020 influent concentrations.

2020 Imported Waste	BOD_5 (mg/L)	TKN (mg/L)	Total Phosphorus (mg/L)	Total Suspended Solids (mg/L)
January	4,100	160	97	11,000
February	3,333	119	46	5,367
March	3,022	89	26	3,280
April	380	45	22	420
May	1,700	150	15	1,000
June	310	62	22	140
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	N/A	N/A	N/A	N/A

Table 2: Summary of 2020 imported waste influent characteristics.

2020 Influent	Average Monthly Influent (m^3)
January	6694
February	4107
March	6604
April	4297
May	3575
June	3603
July	3177
August	3642
September	3268
October	3575
November	3999
December	4579

Table 3: The average monthly volume of all influent to the MWTP in 2020.

The following graphs display the average monthly concentrations of specified parameters of influent to the MWTP for 2019 and 2020:

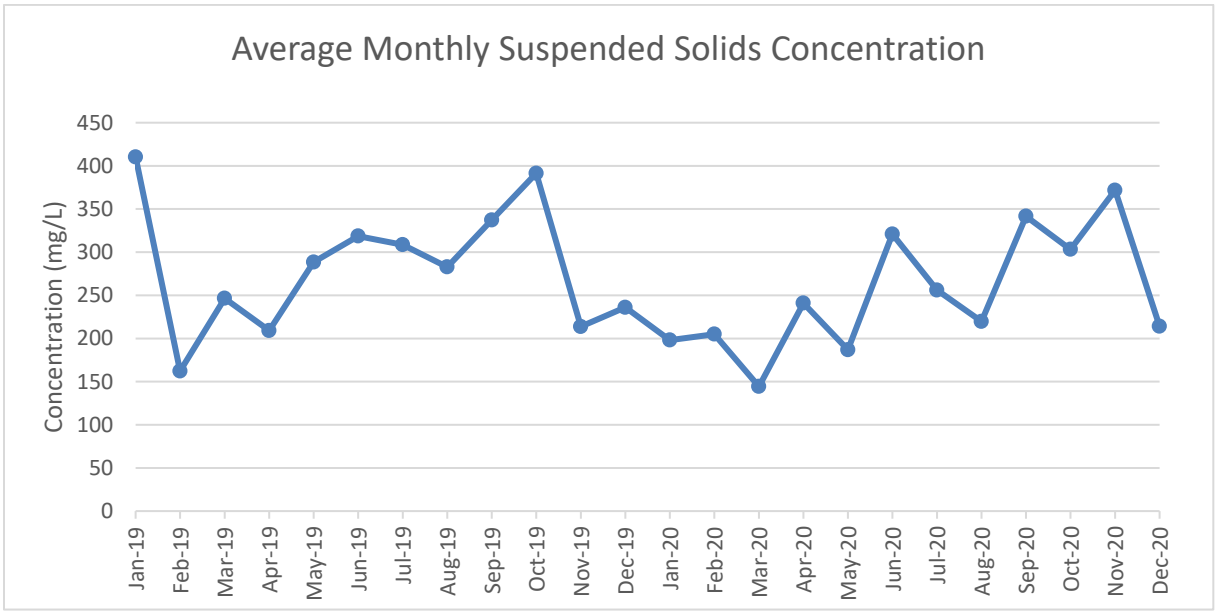

Figure 1: The historical trend of suspended solids concentration from January 2019 - December 2020.

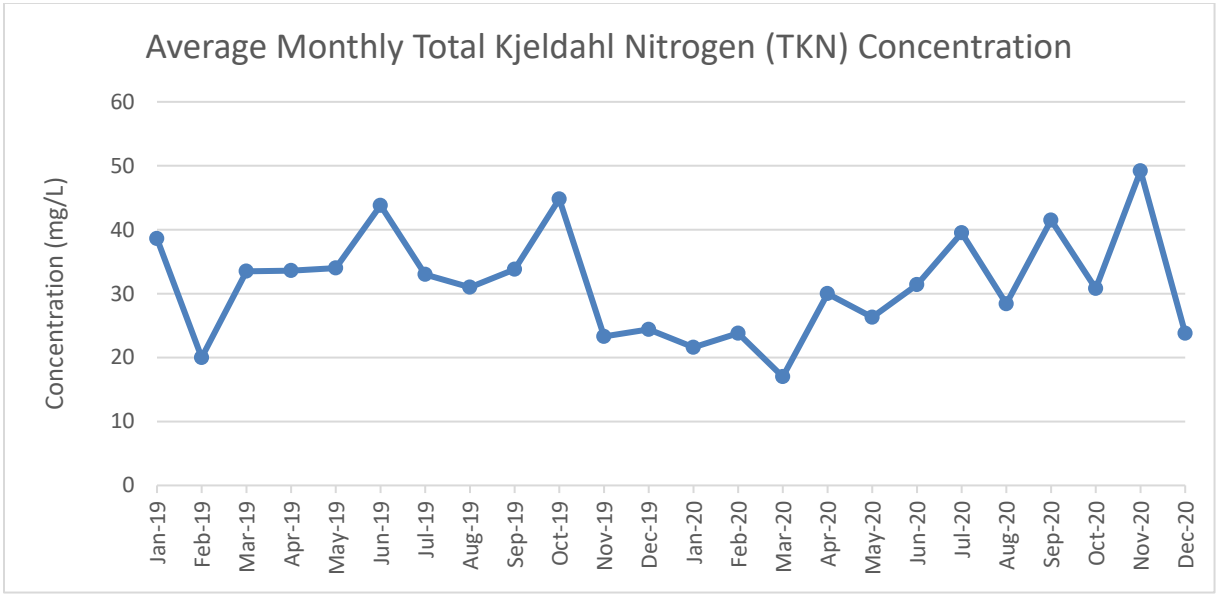

Figure 2: The historical trend of total kjeldahl nitrogen concentration from January 2019 - December 2020.

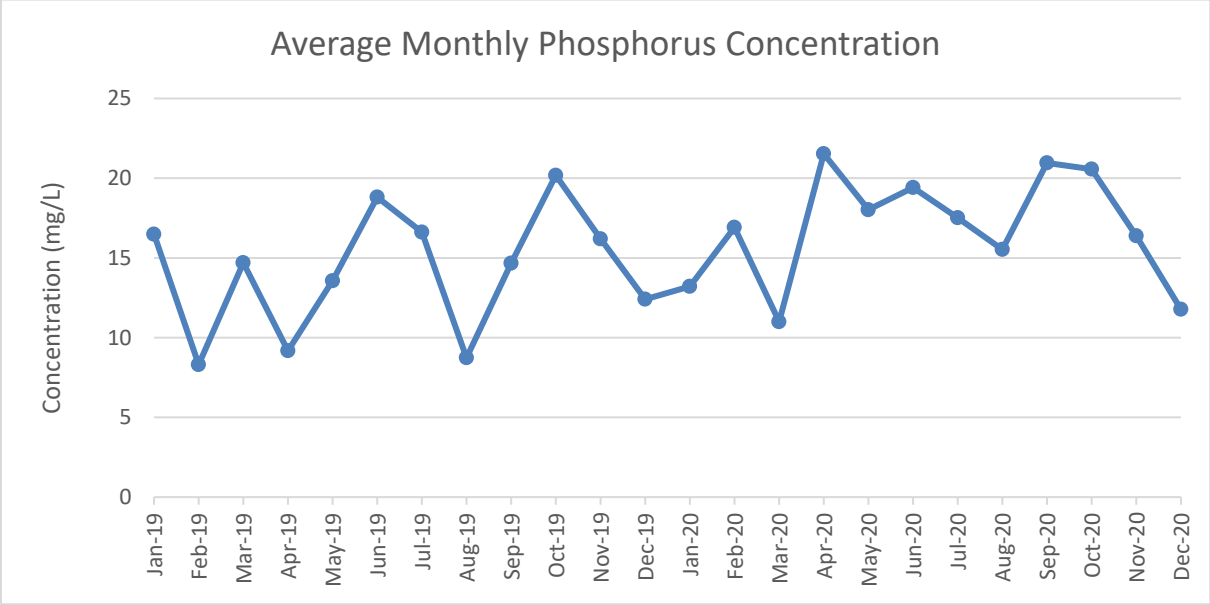

Figure 3: The historical trend of total phosphorus concentration from January 2019 - December 2020.

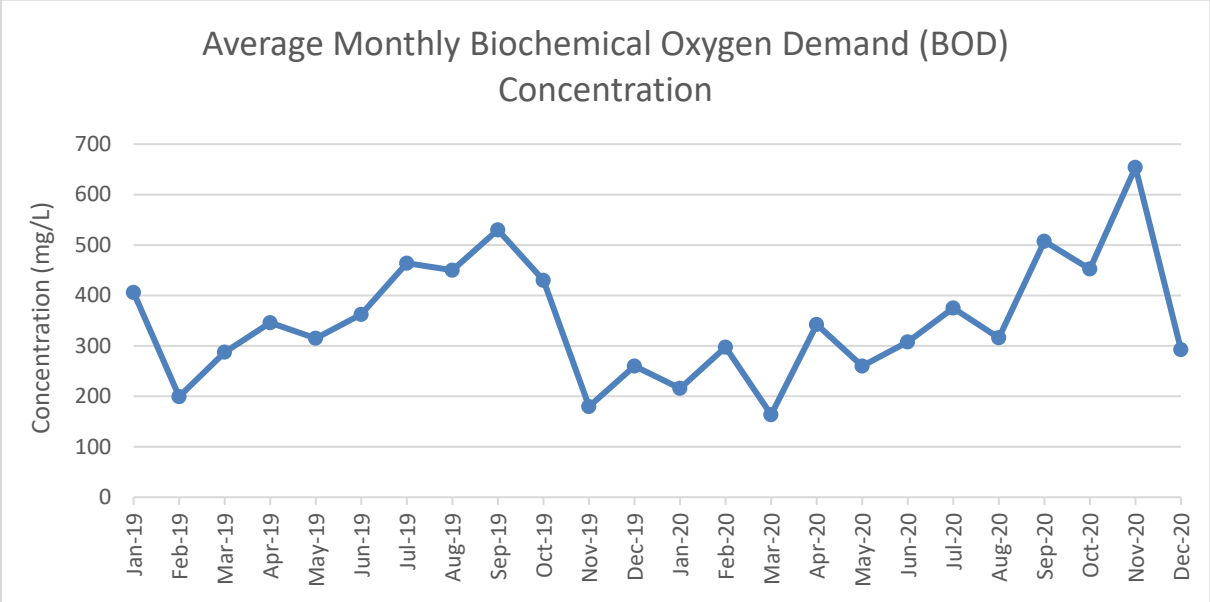

Figure 4: The historical trend of biochemical oxygen demand concentration from January 2019 - December 2020.

The following graphs show the flow rates of influent and imported waste to the MWTP in 2019 and 2020:

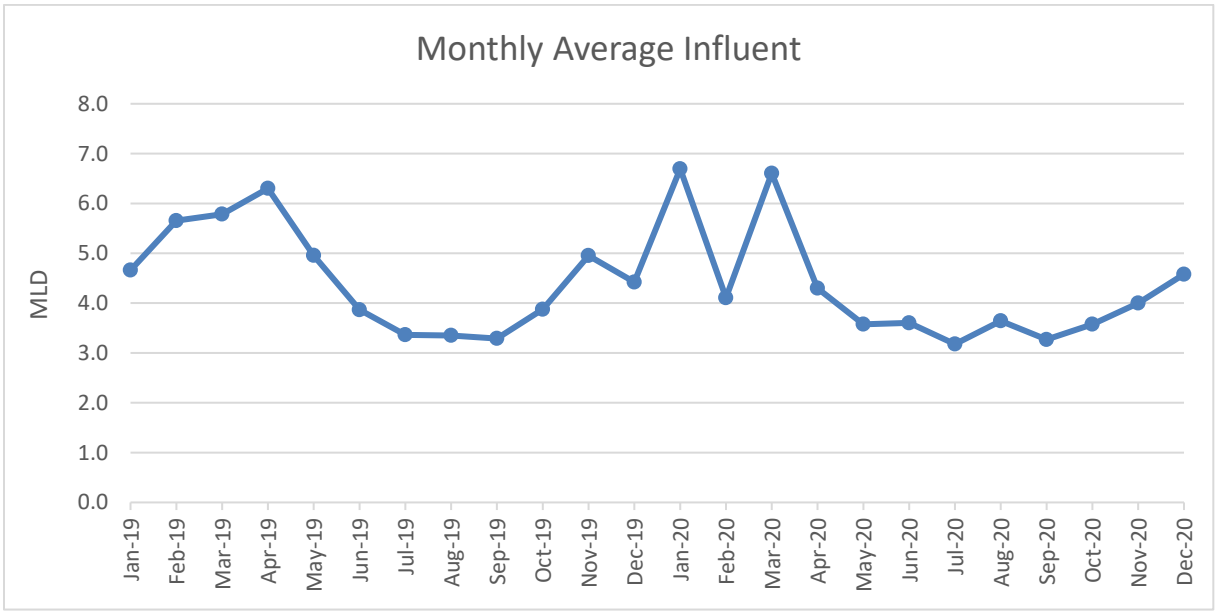

Figure 5: The historical trend of monthly average influent to the MWTP from January 2019 – December 2020.

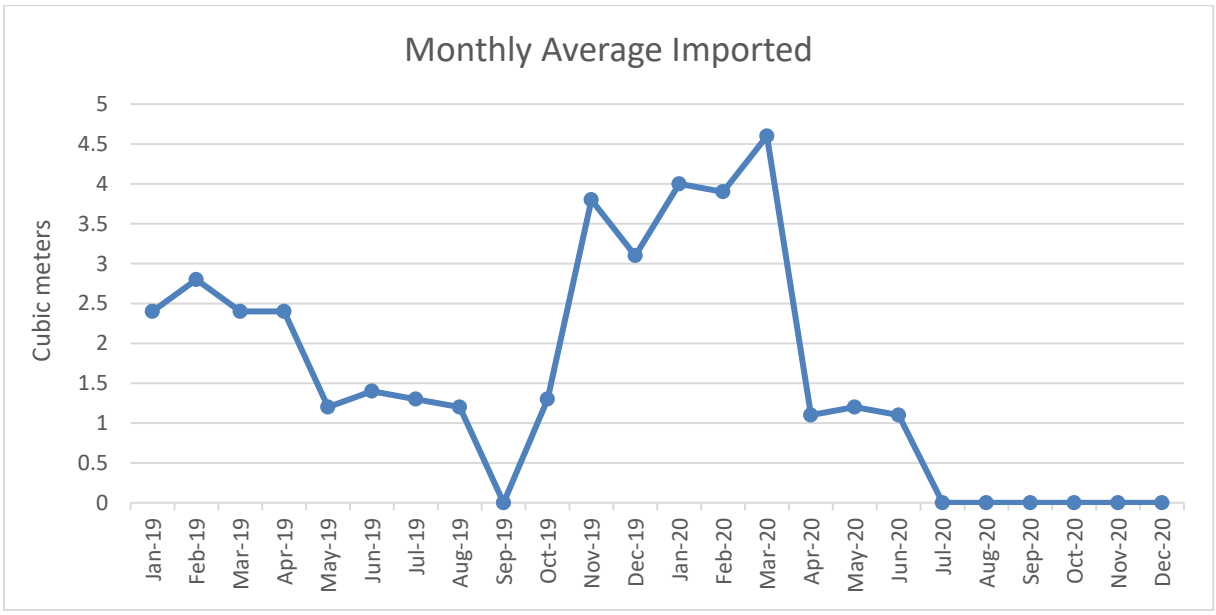

Figure 6: The historical trend of monthly average imported waste to the MWTP from January 2019 - December 2020.

B. **Summary and interpretation of final effluent monitoring data;**

The following tables and graphs compare the effluent concentrations in 2020 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
$CBOD_5$	0.29 mg/L	15.0 mg/L	10.0 mg/L
Total Suspended Solids	2.87 mg/L	15.0 mg/L	10.0 mg/L
Total Phosphorus	0.23 mg/L	1.0 mg/L	0.5 mg/L
Total Ammonia Nitrogen	0.09 mg/L	5.0 mg/L	3.0 mg/L
E. Coli	1.9 CFU / 100 mL	200 CFU/ 100 mL using MPN Method Mar 15 to Oct 31	
pH	7.37	Between 6.0-9.5 inclusive	
Unionized Ammonia	0.001 mg/L	0.1 mg/L	

Table 4: 2020 annual average effluent concentrations compared to the design limits for specified periods.

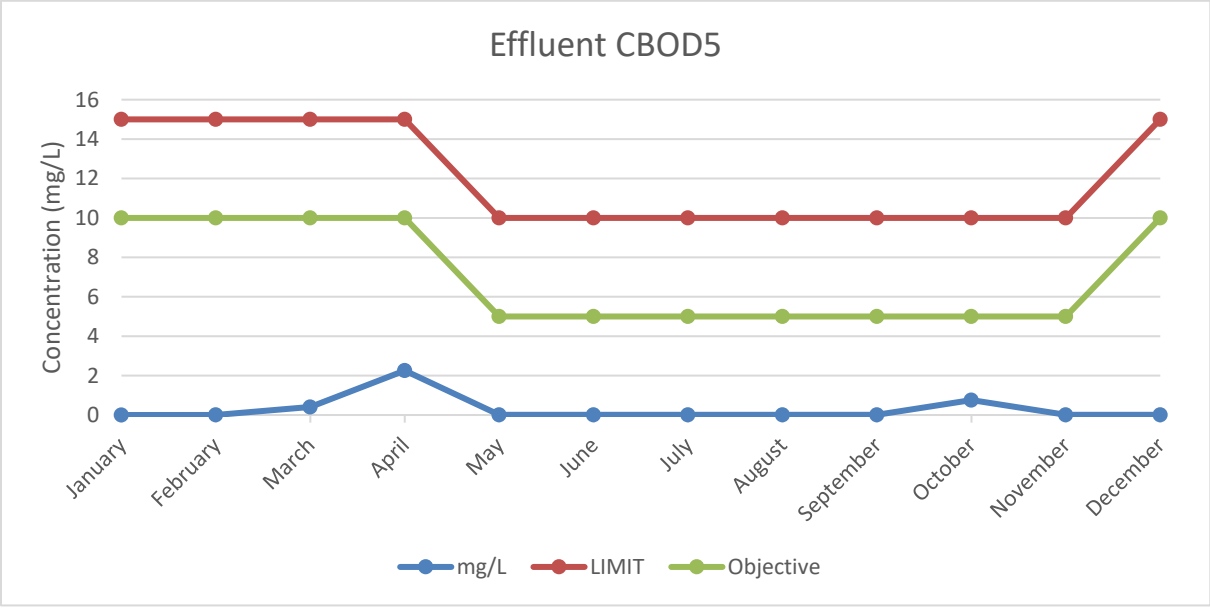

Figure 7: Comparison of the 2020 monthly average concentrations of effluent $CBOD_5$ to design objectives and compliance limits.

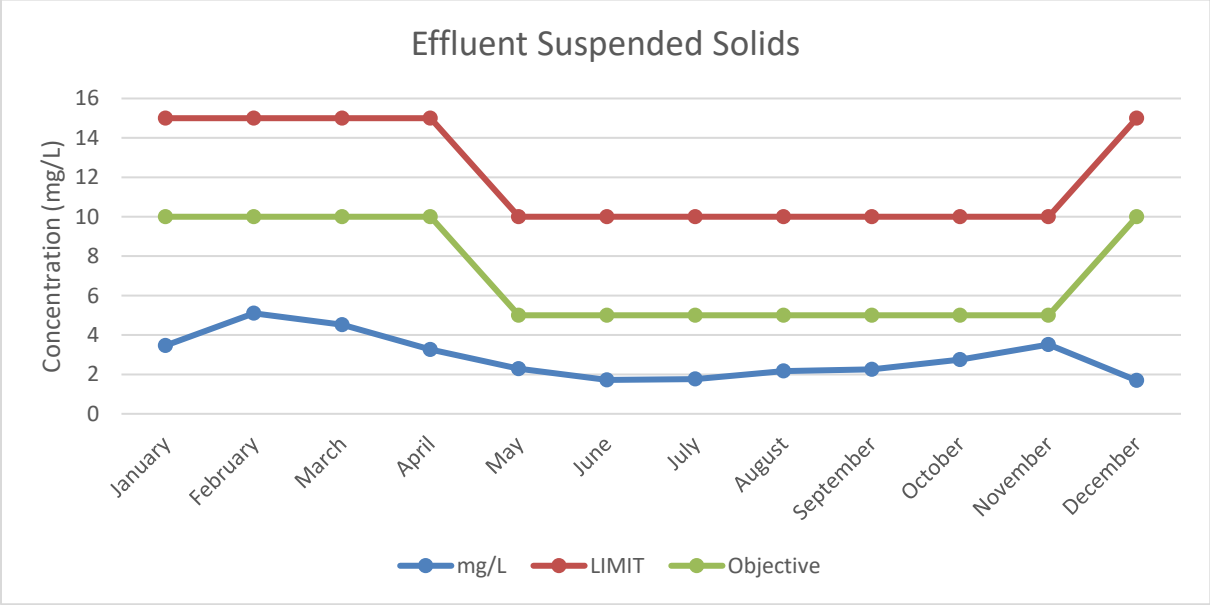

Figure 8: Comparison of the 2020 monthly average concentrations of effluent suspended solids to design objectives and compliance limits.

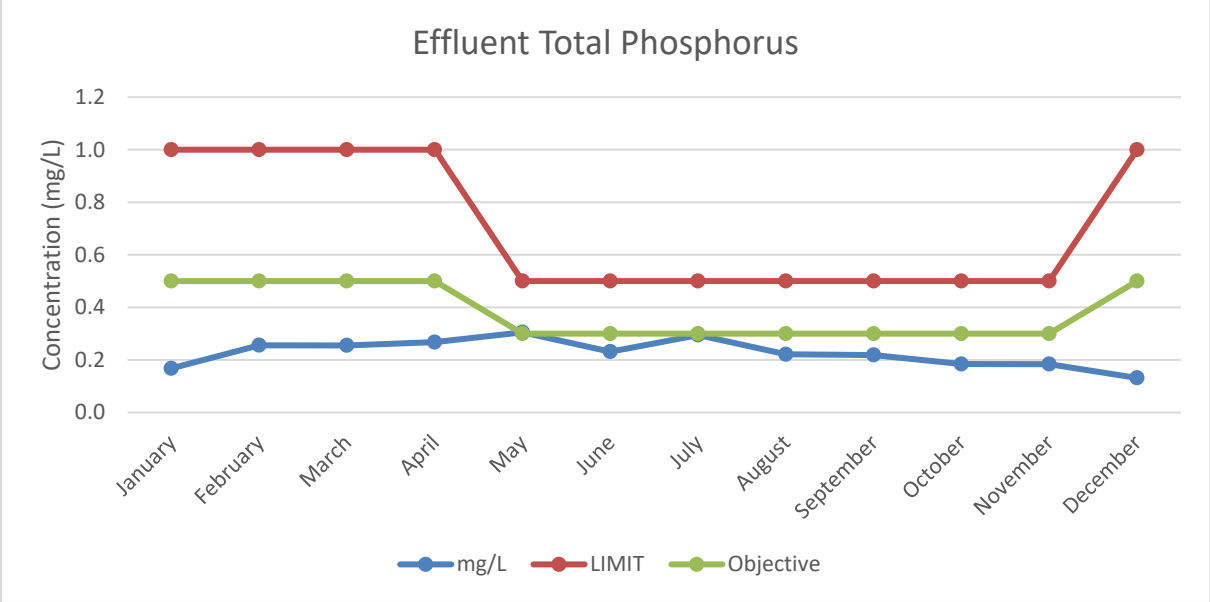

Figure 9: Comparison of the 2020 monthly average concentrations of effluent total phosphorus to design objectives and compliance limits.

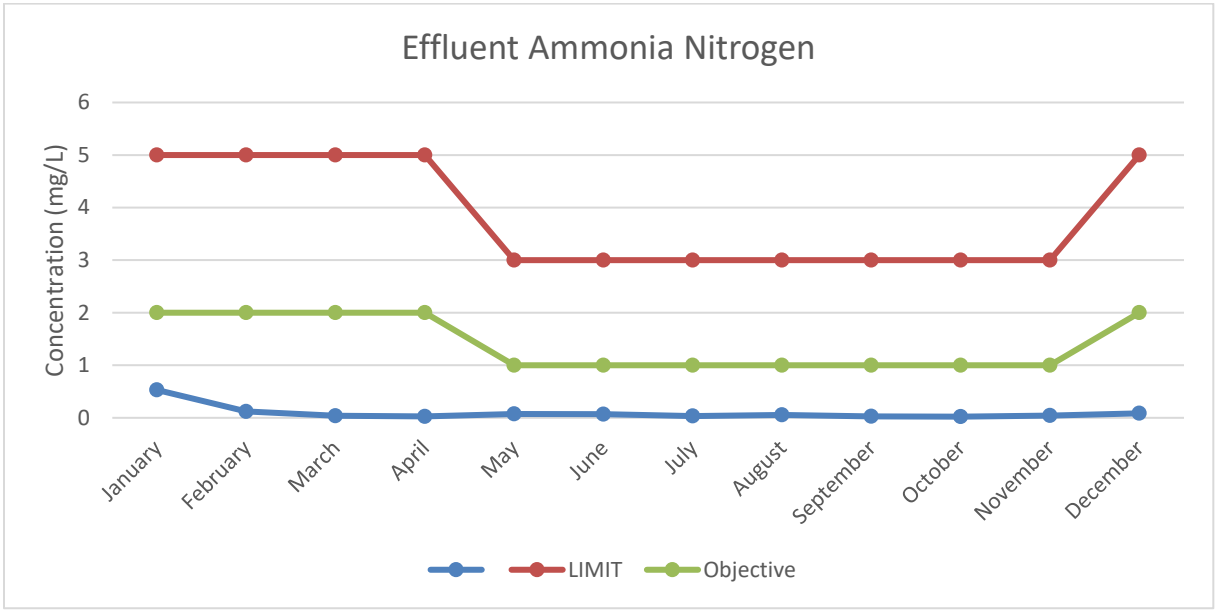

Figure 10: Comparison of the 2020 monthly average concentrations of effluent ammonia nitrogen to design objectives and compliance limits.

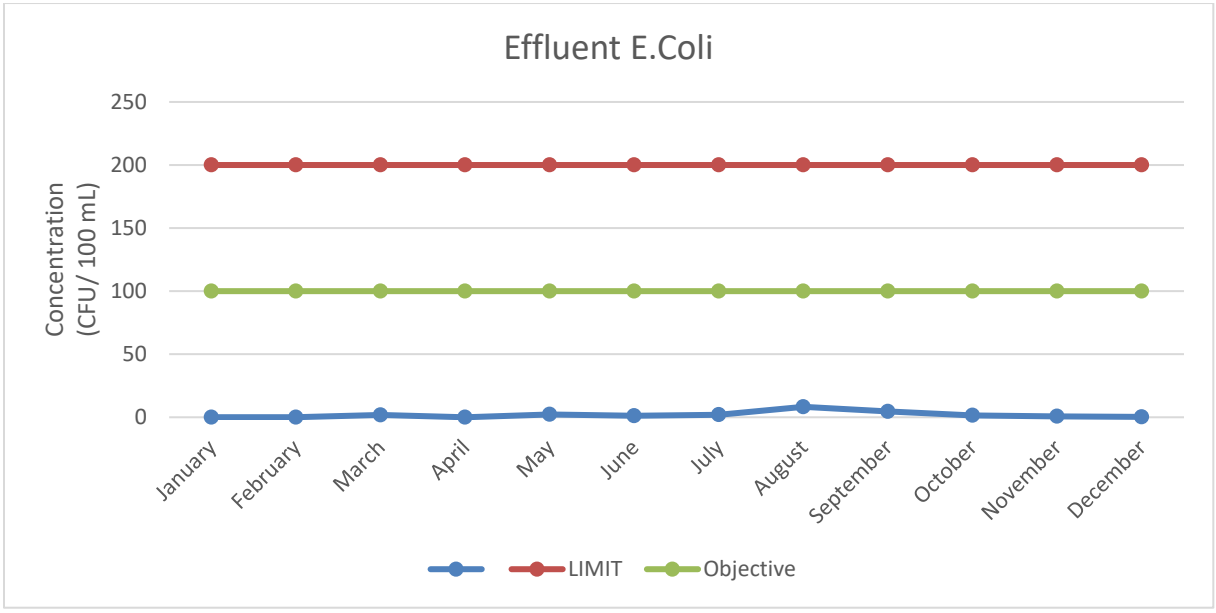

Figure 11: Comparison of the 2020 monthly average concentrations of effluent E. Coli to design objectives and compliance limits.

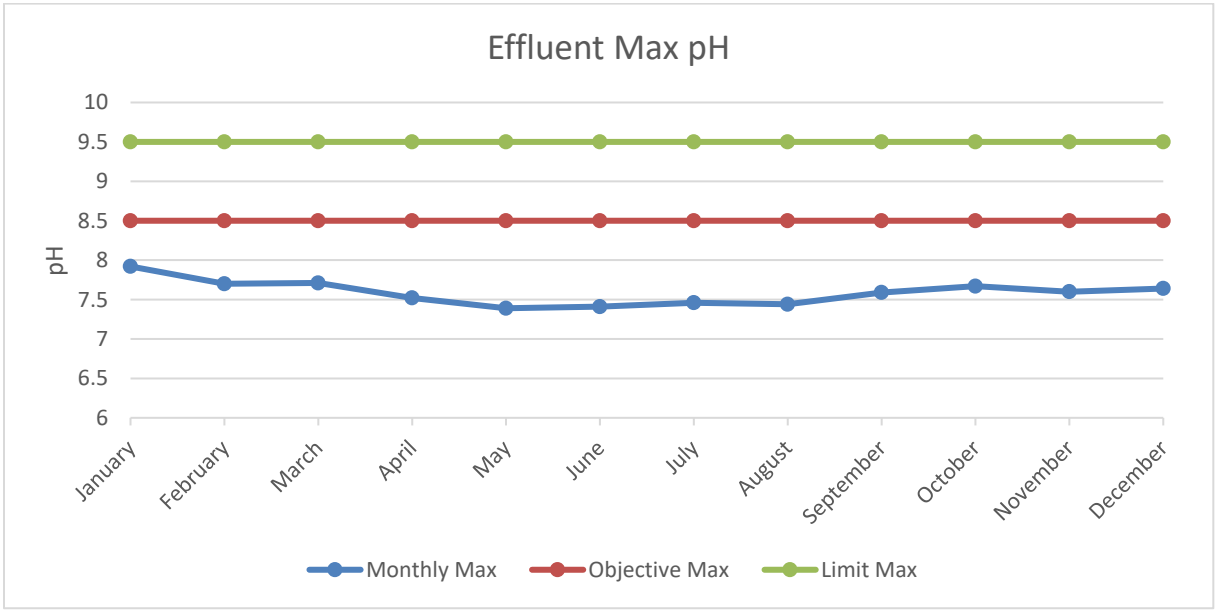

Figure 12: Comparison of the 2020 monthly maximum effluent pH to design objectives and compliance limits.

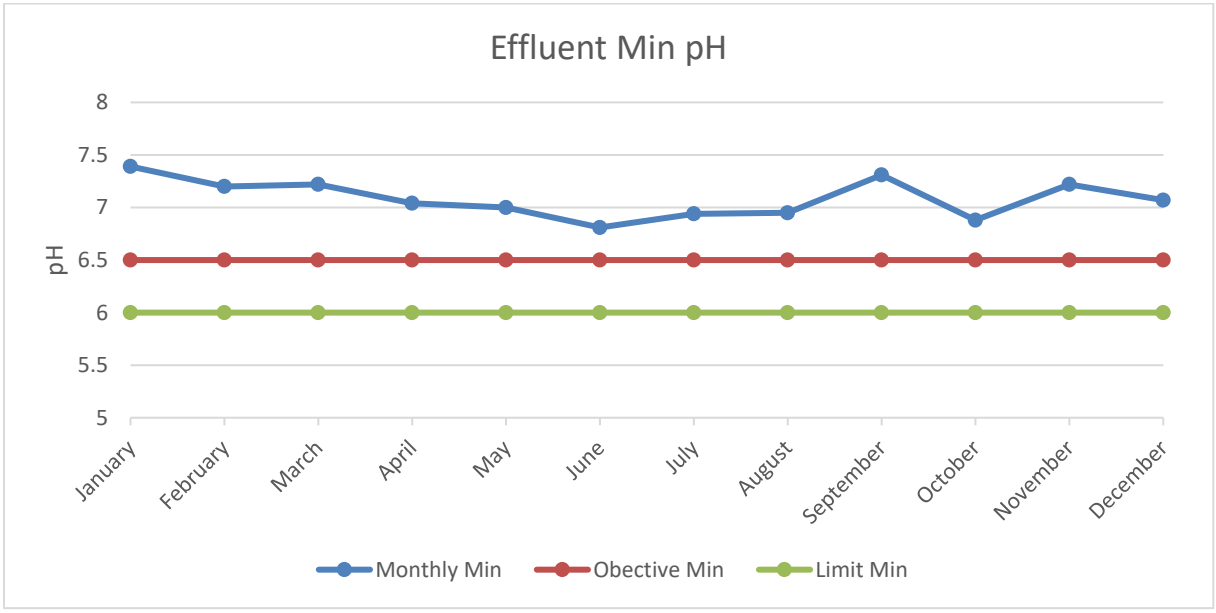

Figure 13: Comparison of the 2020 monthly minimum effluent pH to design objectives and compliance limits.

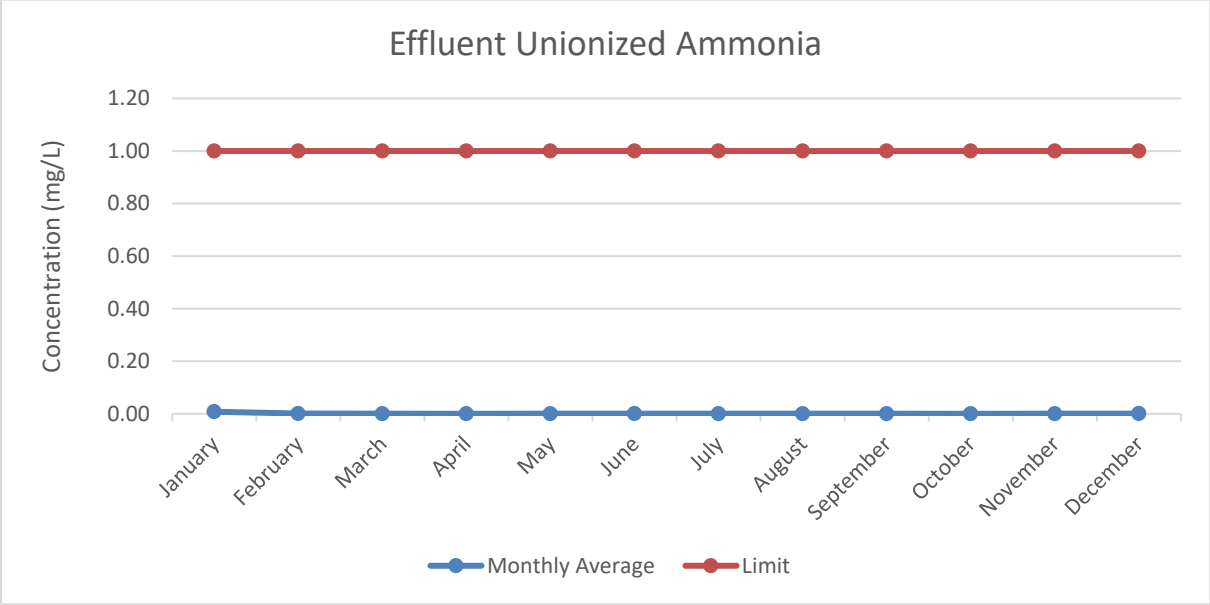

Figure 14: Comparison of the 2020 monthly average concentrations of effluent unionized ammonia to design objectives and compliance limits.

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

Month	Average Daily Flow (MLD)	Total Flow (ML)
January	5754.81	178399
February	3942.07	114320
March	6315.65	195785
April	4420.40	132612
May	3422.84	106108
June	3442.27	103268
July	3013.48	93418
August	3450.16	106955
September	3061.93	91858
October	3375.13	104629
November	3793.37	113801
December	4377.55	135704

Table 5: Estimated effluent flow rates for 2020.

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
$CBOD_5$	1.28	108	72
Total Suspended Solids	12.90	108	72
Total Phosphorus	0.95	7.2	3.6
Total Ammonia Nitrogen	0.50	36	21.6

Table 6: Comparison of 2020 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 99.92%
- Suspended solids removal efficiency was 98.85%
- Total Phosphorus removal efficiency was 98.64%

C. Summary of deviations from the 2020 monitoring schedule and reasons and a schedule for 2021;

There were deviations from the 2020 schedule. The deviations are as follows:

- Monthly sludge that was scheduled to be sampled on March 2 was postponed as sample bottles were not on site. Sample bottles were picked up from the lab and sludge was sampled on March 9.
- An additional monthly sludge sample was taken April 20 as sludge hauling was set to begin.

Below is the Sampling Schedule for 2021:

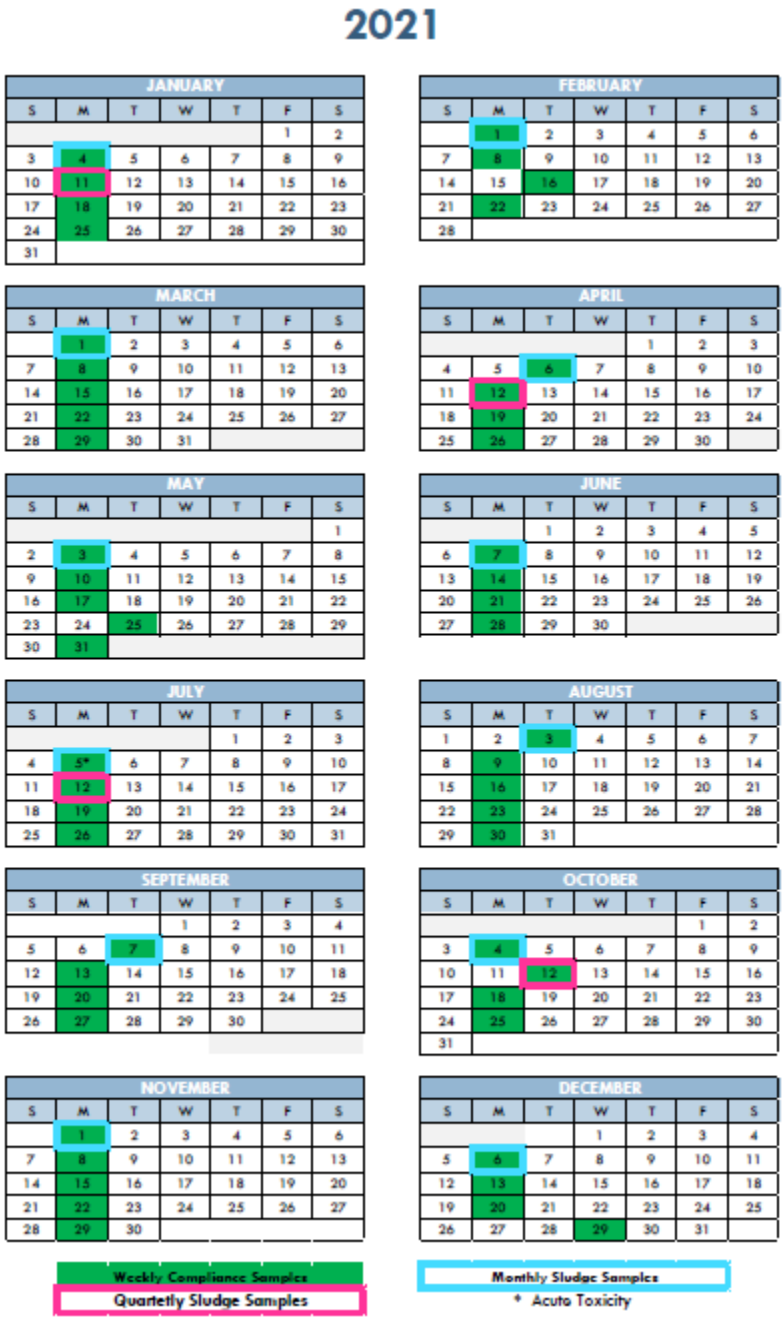

Figure 15: 2021 Sampling Schedule

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

- The diffusers in Aeration Cell 3 plugged, the cell was drained and diffusers cleaned.
- Pump 3 at Herbert St SPS faulted. The pump was pulled and repaired.
- Staff ran into some operating issues with the newly installed Turbo Blowers. The SCADA contractor reprogrammed the blowers to run when needed.
- The Herbert St SPS level transducer failed causing loss of control over pumps. Programming was changed to be able to switch from the transducer to the milltronics system. A new transducer was installed.
- Reduced flow was noticed in sand filters 4 and 5. Operators drained the filters, removed sand and unplugged the distribution radials.

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 2020 is outlined below:

- The raw sewage pumps at both Hebert and James Street SPS were inspected monthly.
- The Herbert Street SPS, James Street SPS and MTWP diesel generators received their annual service in early 2020. They were also inspected and ran monthly.
- Annual greasing and an oil change were completed on blower 4. Vibration readings are taken annually.
- Blowers 1, 2 and 3 were inspected and maintained as per manufacturers recommendations.
- Flowmeters were verified by a third party.
- 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.
- Clarifier drives and gearboxes were inspected.
- Exercised valves at MWTP, Herbert St. SPS and James St. SPS.
- The air lift piping on all the filter air lifts were pulled and inspected.
- The UV system was monitored daily in 2020 for proper intensity. The lenses were cleaned monthly and the bulbs were replaced as needed.
- Contractors inspected the gas detectors, diesel generators, chain falls, beams, flow meters and lab equipment.
- Electrical contractor replaced grit room exhaust fan.
- The alum dosing system was flushed and inspected.
- The float ball at James St. SPS was replaced, inspected all other float balls.
- Installed low level cut off float at Herbert St. SPS.
- Installed new compressor for sand filters. Rebuilt new compressor.
- Compressors serviced.

F. **Summary of effluent quality assurance;**

A 24hr-composite sampler 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 2020 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 existing blowers were replaced with new high efficiency blowers which provide a greater air capacity. 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 2020, approximately 68,029m³ of sludge was generated. The MWTP produced 3348m³ more sludge than in 2019. The increase can be attributed to greater loading and suspended solids from local industries. Based on current loadings, a similar amount of sludge generation in expected in 2021.

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 2020 are as follows:

	Land Application Site Number	Sludge Applied to Land (m^3)
2020	Submission ID: 22791 Submission ID: 22791 Submission ID: 22792 Submission ID: 22792 Submission ID: 24310 Submission ID: 24384 Submission ID: 24372	2257.4 1635.2 3965.7 2098.2 3771.3 2161.2 3758.1

Table 7: Summary of 2020 biosolids.

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

There were no complaints regarding wastewater in 2020.

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

- January 11 – 12: Overflow at James St. SPS. Heavy rainfall and snow melt created excessive flows which the collection system could not handle. Duration of 23 hours and 50 minutes. Volume of 2200m³.
- August 3: Bypass of the tertiary sand filters at MWTP. Heavy rainfall caused an inrush of influent greater than anticipated. Duration of 37 minutes. Volume of 18.5m³.

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 2020.

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 phase.

O. **Nitrogen Monitoring Summary**

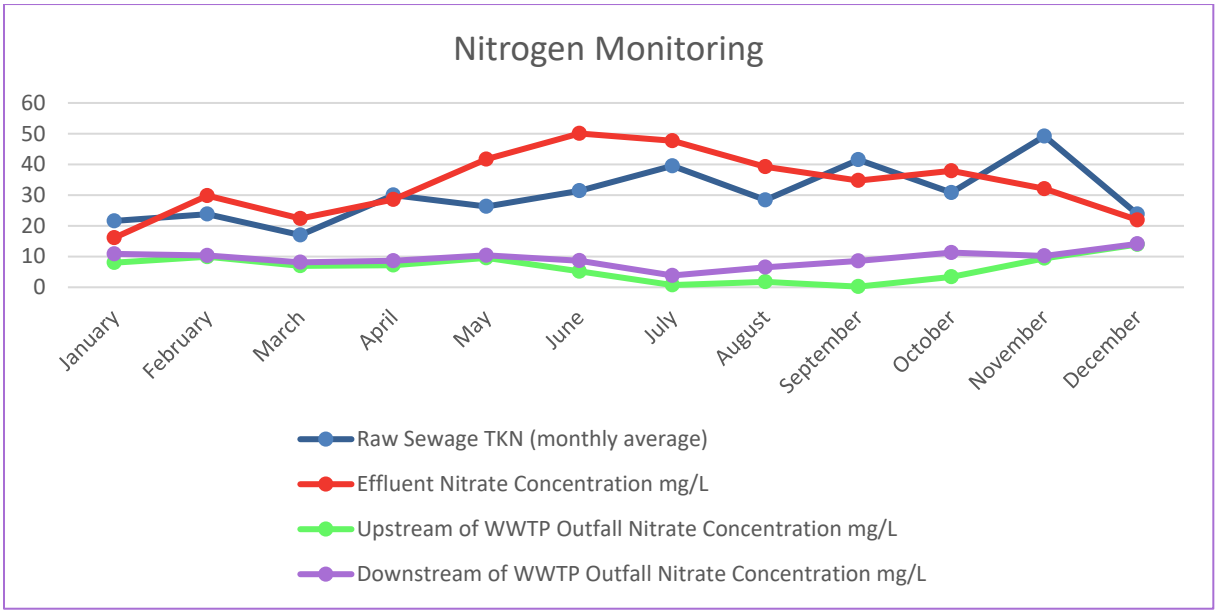

Figure 16. The historical trend of nitrate concentrations from 2020.

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 late 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 2021, the work plan will continue, sampling at the West Perth Line 29 location, and that the Line 29 location be used to assess the net increase of nitrate levels in the North Thames River.