

2023 Annual Wastewater Report

Mitchell Wastewater Treatment Plant



March 27, 2024

Municipality of West Perth
160 Wellington Street
Mitchell, Ontario
N0K 1N0

ATTENTION: **Mr. Greg Borduas**
CAO

REFERENCE: **Municipality of West Perth**
2023 Annual Wastewater Report

Please find enclosed the 2023 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, 2023 to December 31, 2023. 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. Neville Rising of the Ministry of Environment, Conservation and Parks London District Office and the District Manager.

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 (MWWTP) 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 MWWTP was approximately 5.025 MLD, which represents approximately 69.8% of the design capacity for the treatment facility (average day design flow of 7.2 MLD). The maximum daily flow of 18.230 MLD occurred in the month of April. The average daily flow was greater than 2022 and maximum daily flow was less than 2022. (Average: 0.539 MLD, Maximum: 1.006 MLD).

The MWWTP 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 MWWTP has an on-site receiving station that is designed to accept imported liquid waste. Accepted waste is pumped and metered to the MWWTP during periods of low loading. There were no sources of imported waste accepted in 2023.

Table 1 shows the monthly average characteristics of waste entering the MWWTP, Table 2 shows the monthly average characteristics of the imported waste, and Table 3 shows the average monthly influent volumes in 2023.

2023 Monthly Average Influent	BOD₅ (mg/L)	TKN (mg/L)	Total Phosphorus (mg/L)	Total Suspended Solids (mg/L)
January	232.0	27.40	9.00	210.9
February	285.0	24.50	10.30	236.6
March	101.0	13.35	4.97	129.1
April	182.5	18.75	7.36	188.2
May	246.0	22.40	8.87	243.8
June	475.0	33.00	11.55	385.8
July	354.0	26.20	9.48	234.9
August	467.5	35.75	19.16	391.9
September	362.5	25.00	12.30	288.4
October	488.0	30.60	13.67	378.6
November	351.8	24.50	13.75	288.4
December	267.5	21.25	10.48	208.5

Table 1: Summary of 2023 influent concentrations.

2023 Imported Waste Averages	BOD₅ (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	N/A	N/A	N/A	N/A

Table 2: Summary of 2023 imported waste influent characteristics.

2023 Influent	Average Monthly Influent (m³)
January	5675
February	6065
March	6757
April	6266
May	4221
June	3942
July	4463
August	4393
September	3813
October	4358
November	4674
December	5672

Table 3: The average monthly volume of all influent to the MWWTP in 2023.

The following graphs display the average monthly concentrations of specified parameters of influent to the MWWTP for 2022 and 2023:

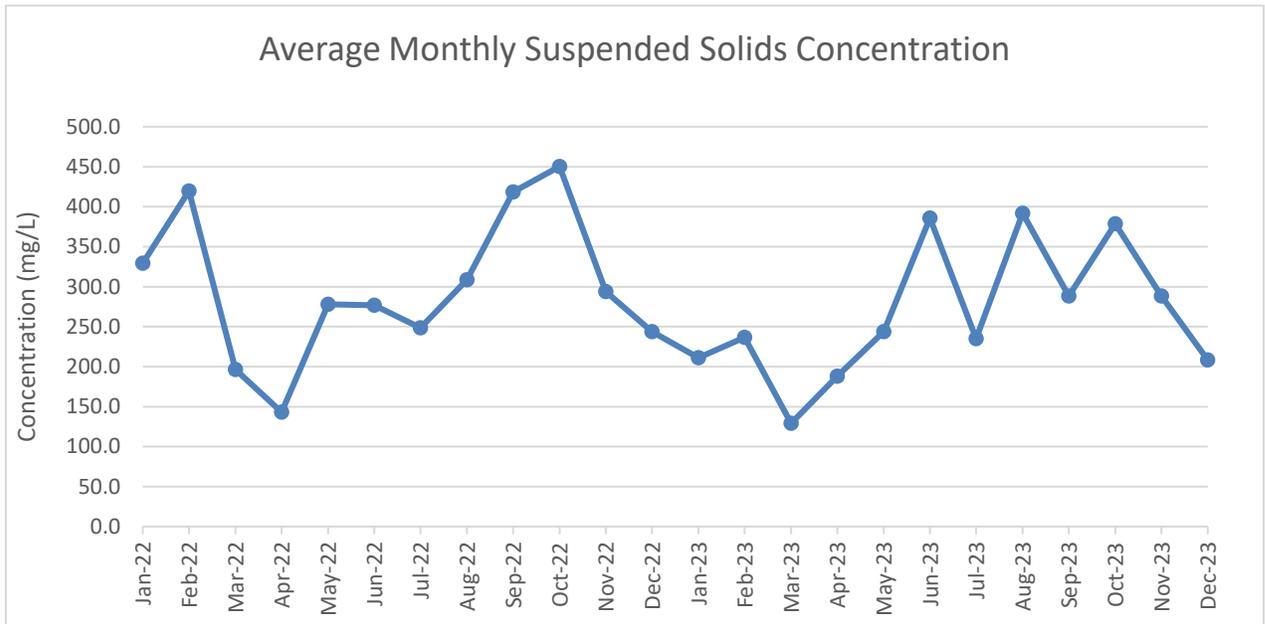


Figure 1: The historical trend of suspended solids concentration from January 2022 - December 2023.

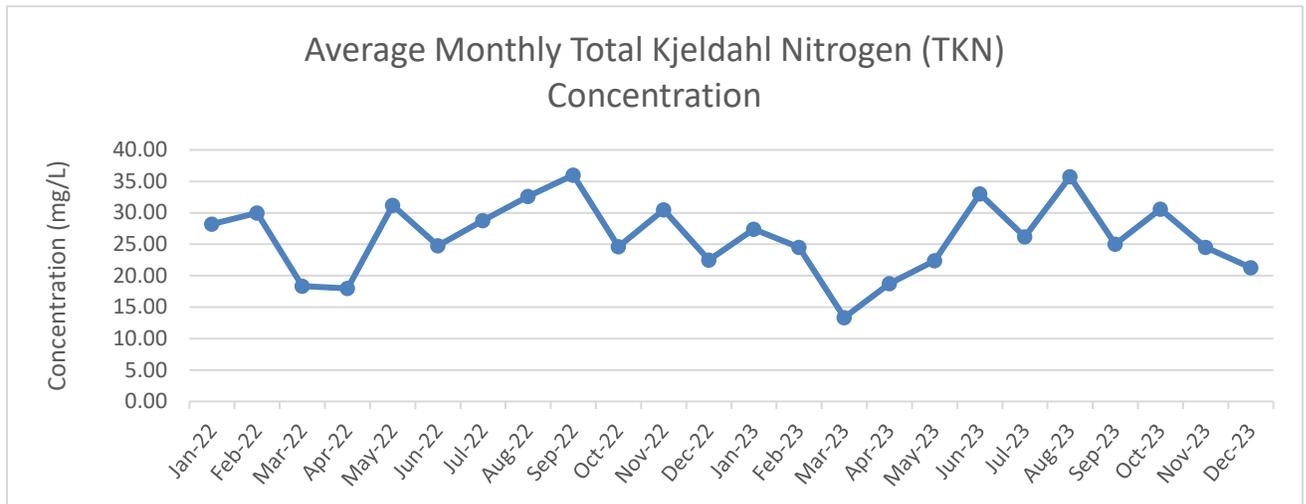


Figure 2: The historical trend of total kjeldahl nitrogen concentration from January 2022 - December 2023.

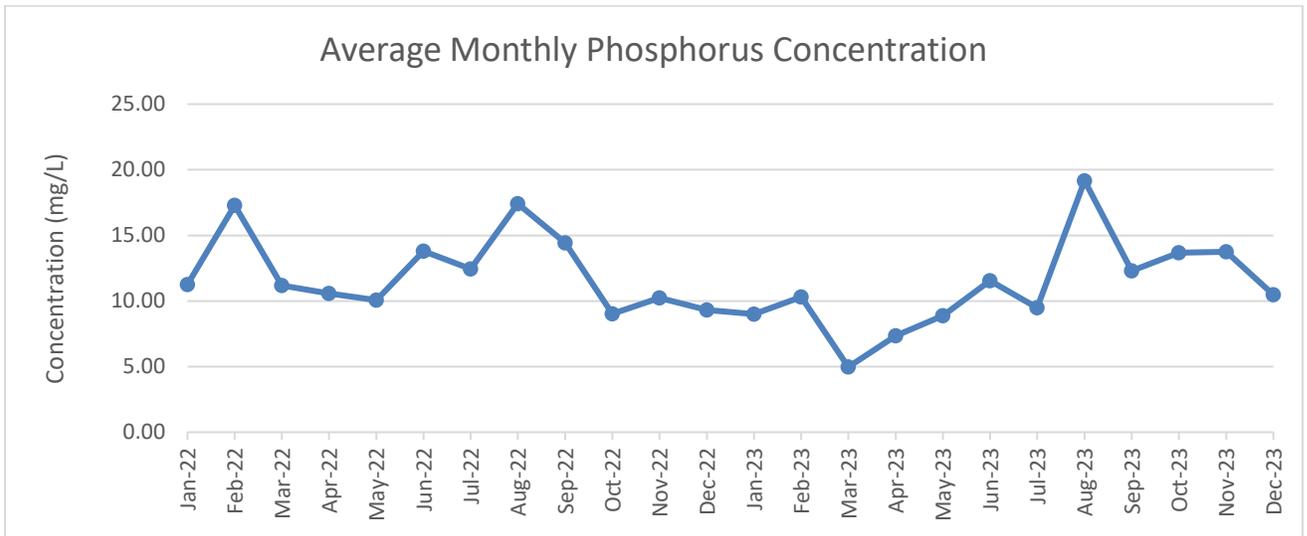


Figure 3: The historical trend of total phosphorus concentration from January 2022 - December 2023.

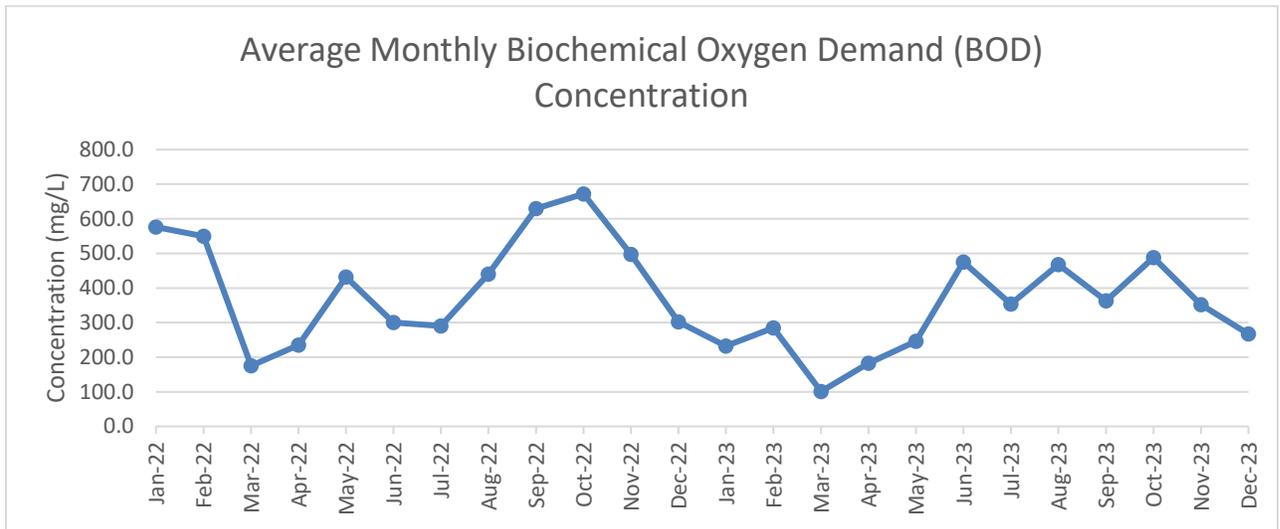


Figure 4: The historical trend of biochemical oxygen demand concentration from January 2022 - December 2023.

The following graphs show the flow rates of influent and imported waste to the MWWTP in 2022 and 2023:

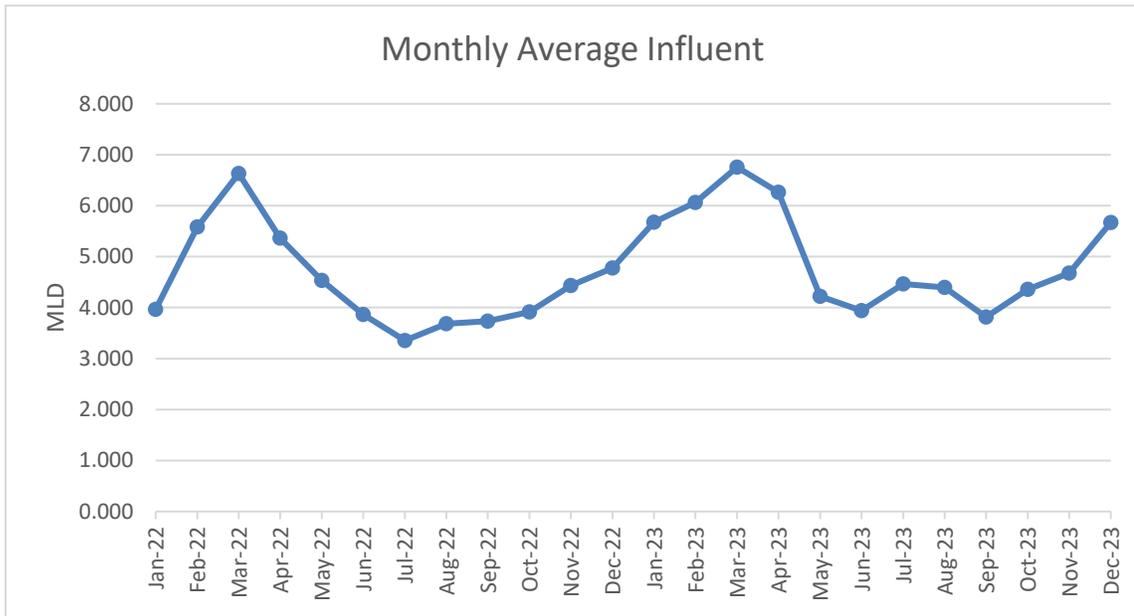


Figure 5: The historical trend of monthly average influent to the MWWTP from January 2022 – December 2023.

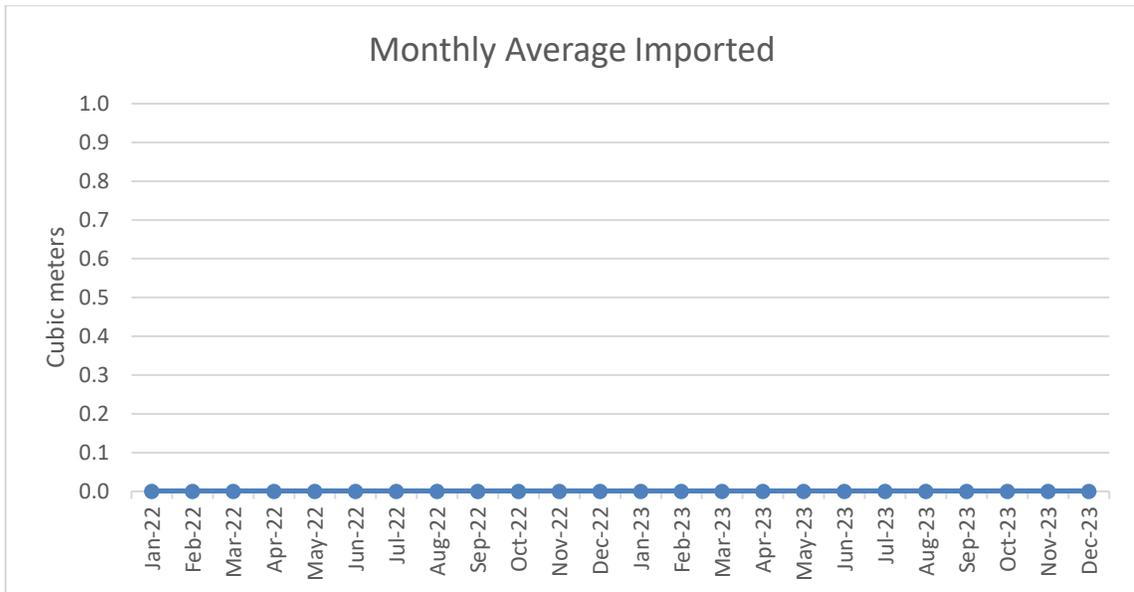


Figure 6: The historical trend of monthly average imported waste to the MWWTP from January 2022 - December 2023.

B. Summary and interpretation of final effluent monitoring data:

The following tables and graphs compare the effluent concentrations in 2023 to compliance limits and design objectives stated in the Environmental Compliance Approval (ECA):

Effluent Parameter	Annual Average Concentration	Concentration Criteria Limit	Concentration Criteria Limit
		Dec 1 – Apr 30	May 1 – Nov 30
CBOD ₅	2.12 mg/L	15.0 mg/L	10.0 mg/L
Total Suspended Solids	4.37 mg/L	15.0 mg/L	10.0 mg/L
Total Phosphorus	0.25 mg/L	1.0 mg/L	0.5 mg/L
Total Ammonia Nitrogen	0.62 mg/L	5.0 mg/L	3.0 mg/L
E. Coli	2 CFU / 100 mL	200 CFU/ 100 mL using MPN Method Mar 15 to Oct 31	
pH	7.39	Between 6.0-9.5 inclusive	
Unionized Ammonia	0.0095 mg/L	0.1 mg/L	

Table 4: 2023 annual average effluent concentrations compared to the design limits for specified periods.

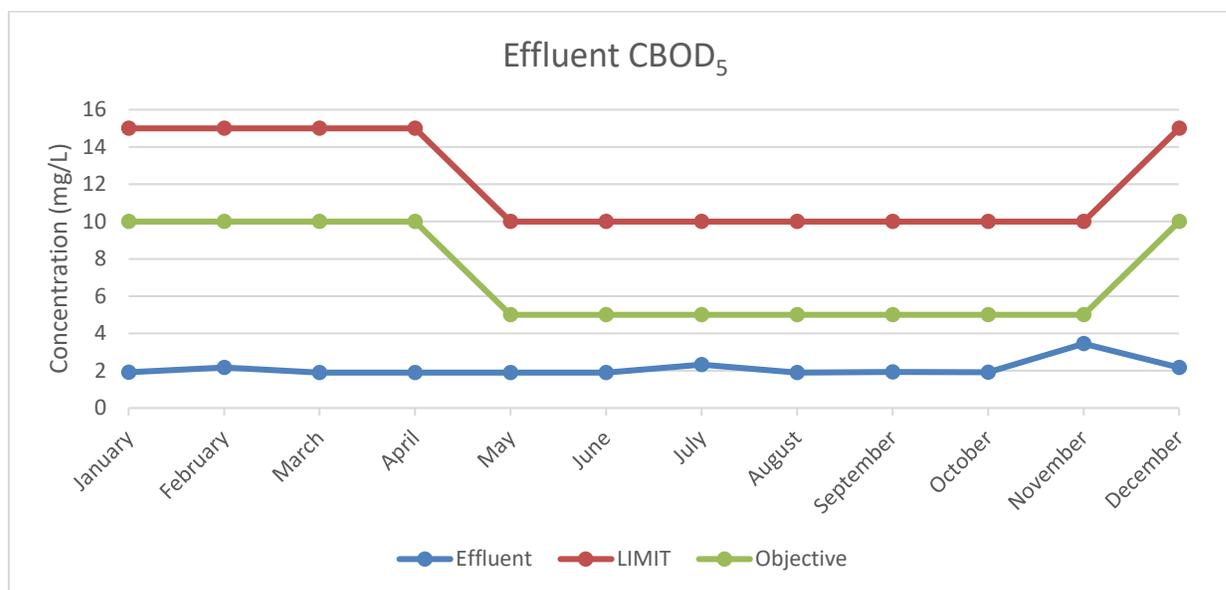


Figure 7: Comparison of the 2023 monthly average concentrations of effluent CBOD₅ to design objectives and compliance limits.

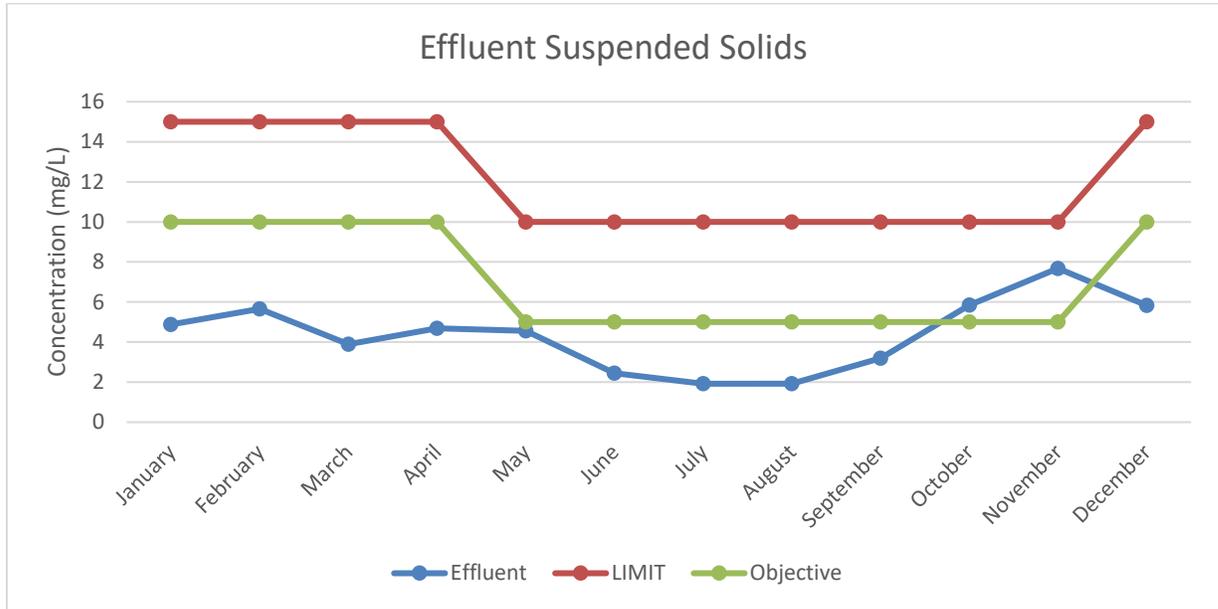


Figure 8: Comparison of the 2023 monthly average concentrations of effluent suspended solids to design objectives and compliance limits.

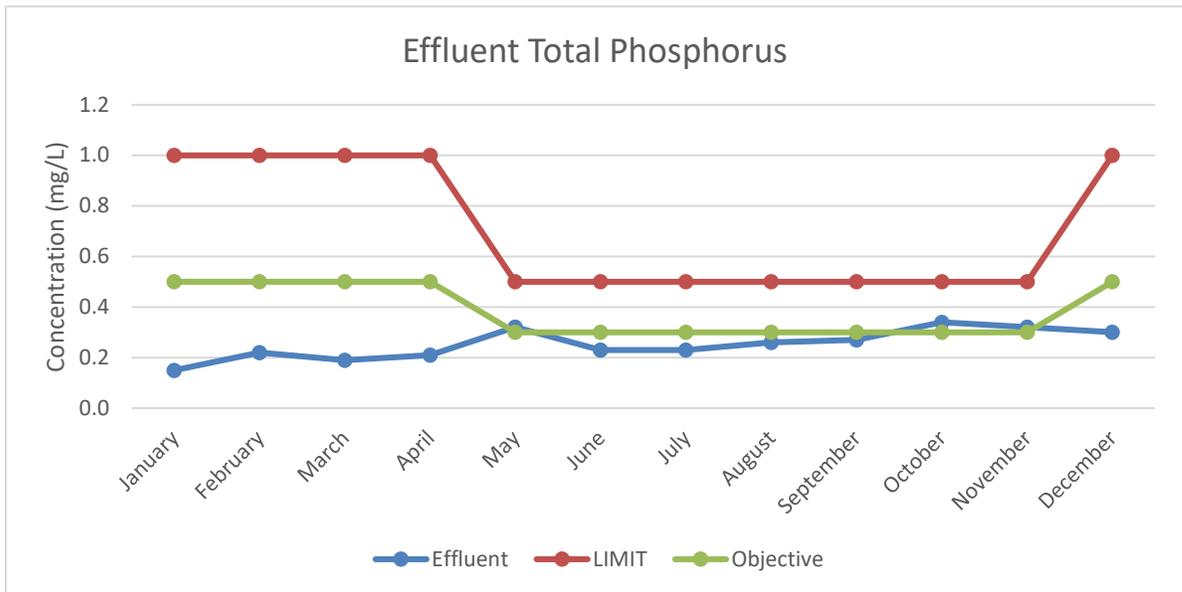


Figure 9: Comparison of the 2023 monthly average concentrations of effluent total phosphorus to design objectives and compliance limits.

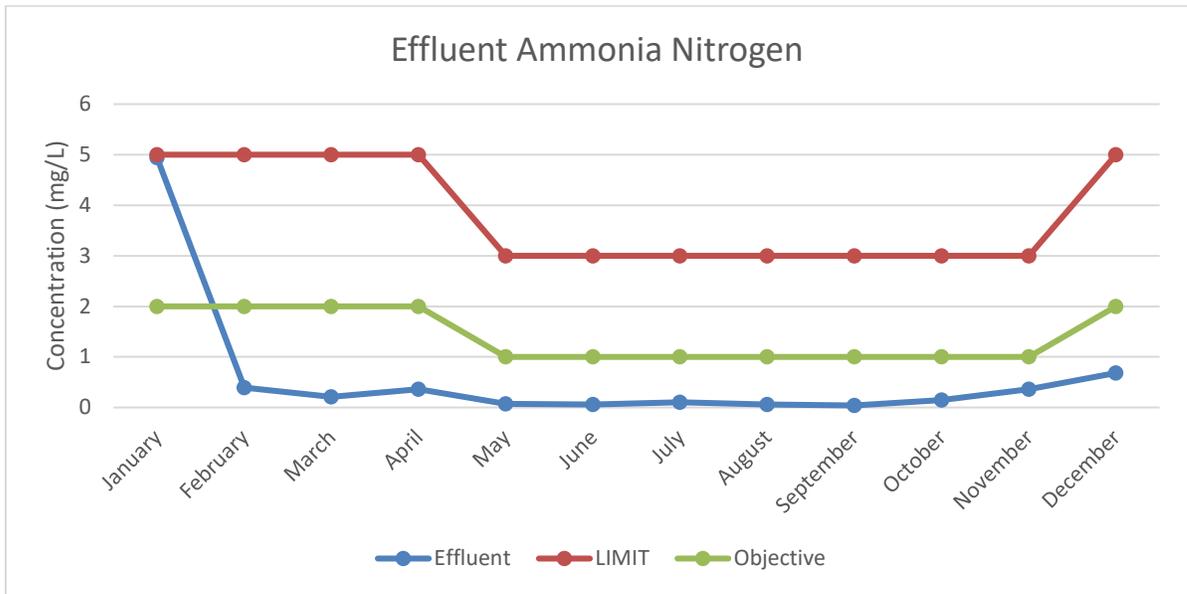


Figure 10: Comparison of the 2023 monthly average concentrations of effluent ammonia nitrogen to design objectives and compliance limits. The increased concentration in January was the result of an ammonia leak from an industrial source.

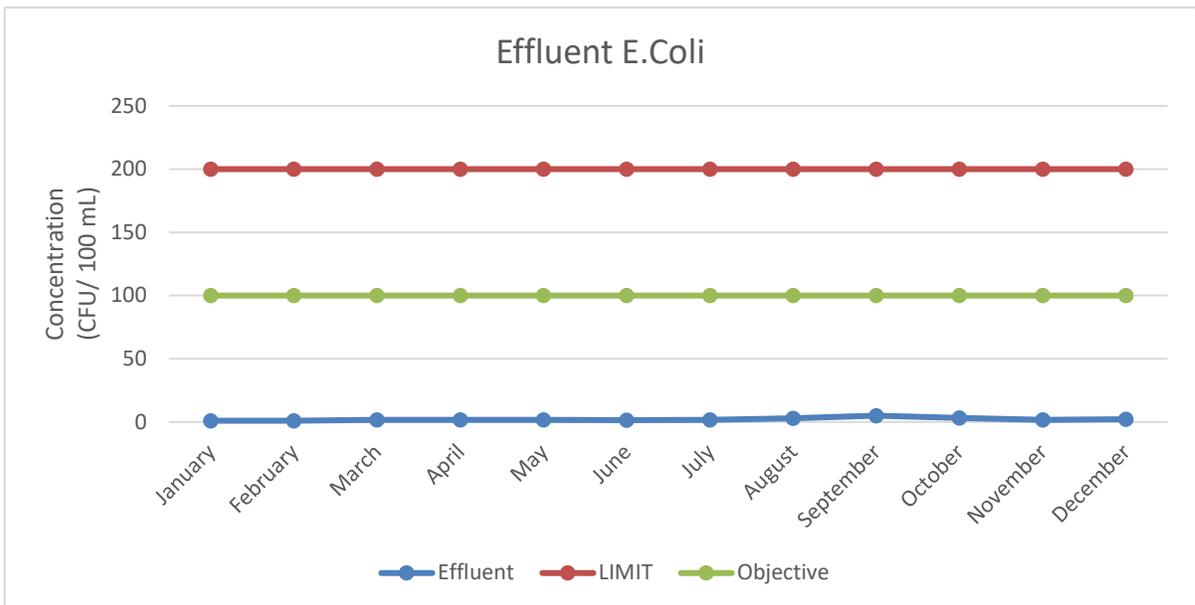


Figure 11: Comparison of the 2023 monthly average concentrations of effluent E. Coli to design objectives and compliance limits.

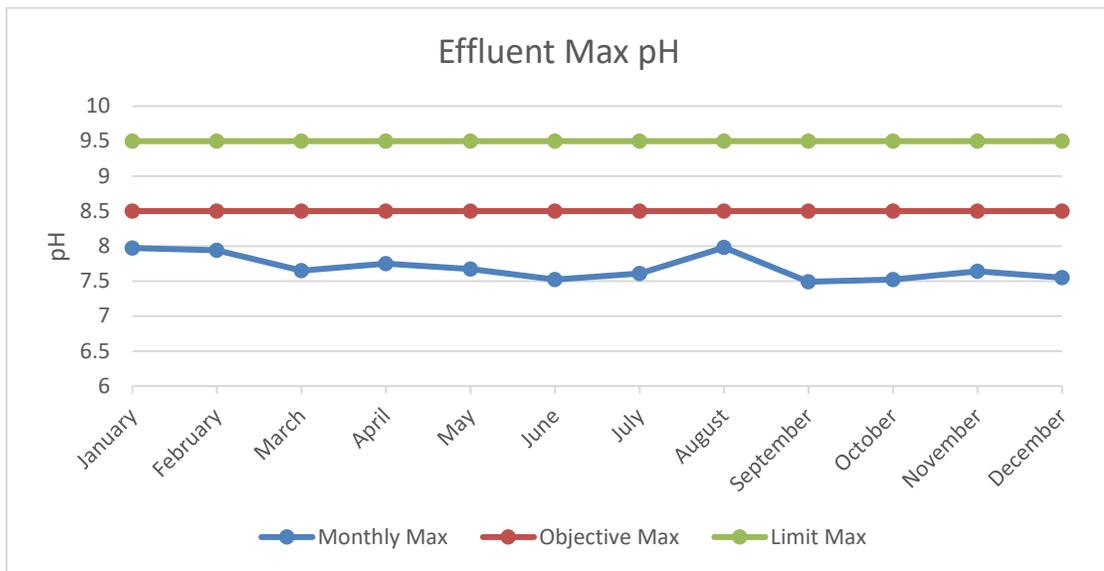


Figure 12: Comparison of the 2023 monthly maximum effluent pH to design objectives and compliance limits.

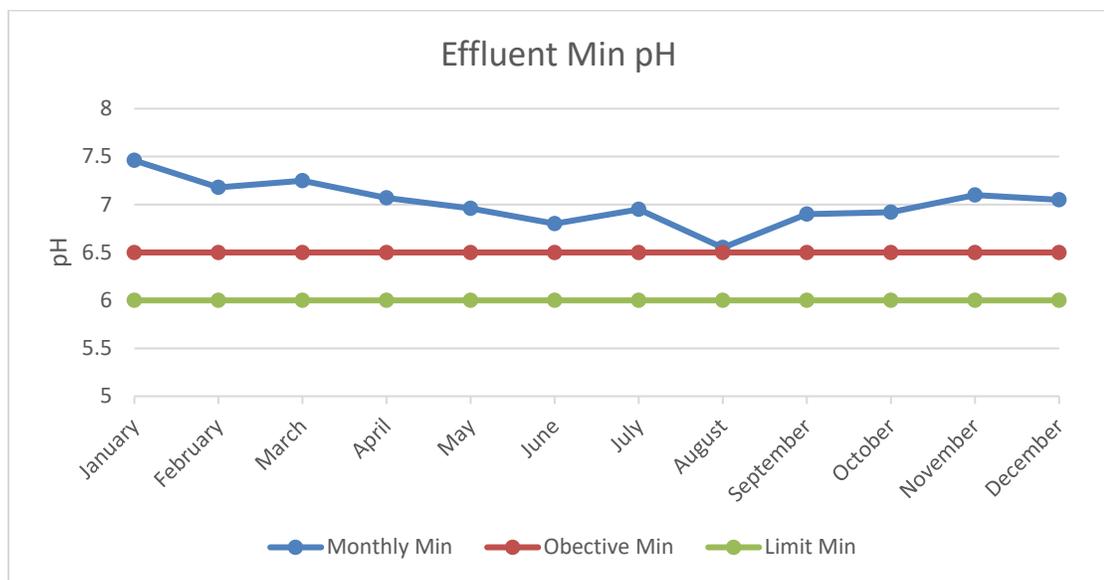


Figure 13: Comparison of the 2023 monthly minimum effluent pH to design objectives and compliance limits.

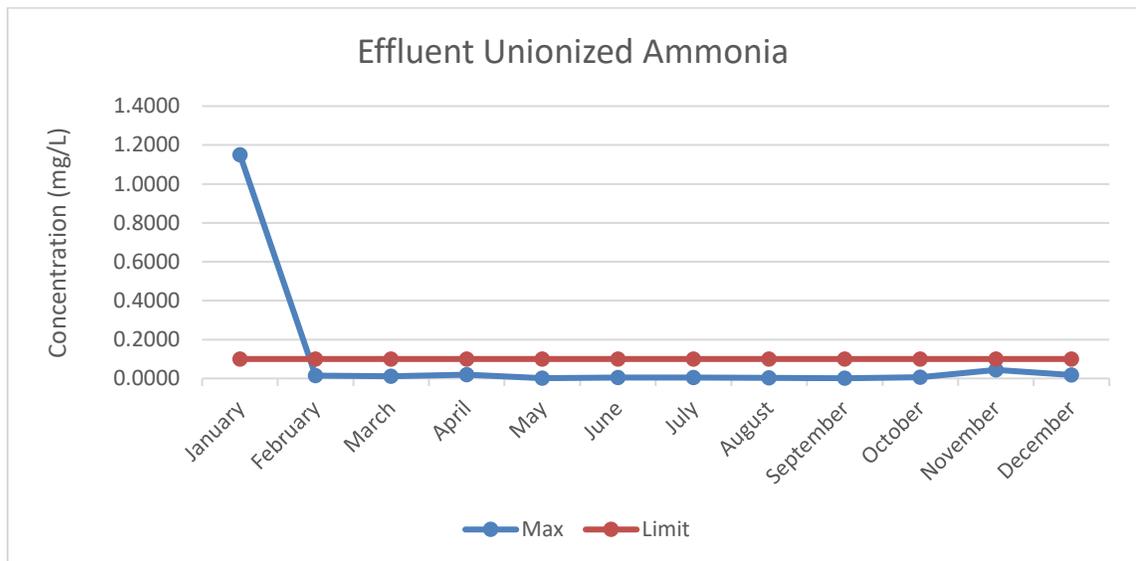


Figure 14: Comparison of the 2023 monthly max concentrations of effluent unionized ammonia to the compliance limits. The increased concentration in January was the result of an ammonia leak from an industrial source.

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

Month	Average Daily Flow (m ³)	Total Flow (m ³)
January	5475.42	169738
February	6103.96	170911
March	6676.55	206973
April	6416.12	192484
May	4502.26	139570
June	3778.23	113347
July	4305.65	133475
August	4226.19	131012
September	3635.57	109067
October	4289.29	132968
November	4759.70	142791
December	5504.94	170653

Table 5: Estimated effluent flow rates for 2023.

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	May 1 – Nov 30
CBOD₅	10.60	108	72
Total Suspended Solids	22.51	108	72
Total Phosphorus	1.25	7.2	3.6
Total Ammonia Nitrogen	3.47	36	21.6

Table 6: Comparison of 2023 effluent loading to limits for specified periods.

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

- CBOD₅ removal efficiency was 99.33%
- Suspended solids removal efficiency was 98.35%
- Total Phosphorus removal efficiency was 97.71%

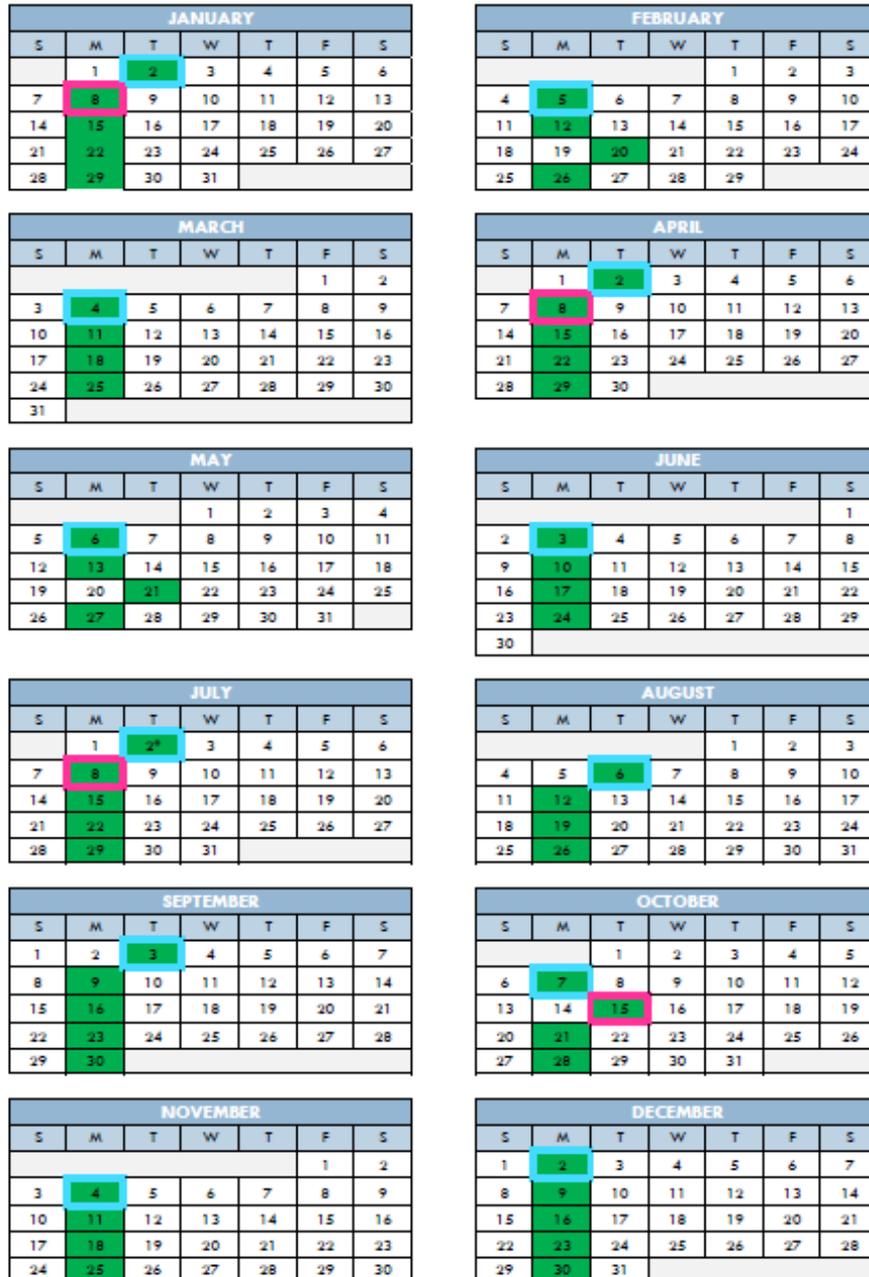
C. Summary of deviations from the 2023 monitoring schedule and reasons and a schedule for 2024;

There were deviations from the 2023 schedule. The deviation is as follows:

- Processing facility sample was not taken on February 13, 2023 as the facility was not operating. The sample was taken on February 16, 2023.
- Processing facility sample was not taken on March 6, 2023 as the facility was not operating. The sample was taken on March 7, 2023.

Below is the Sampling Schedule for 2024:

2024



Weekly Compliance Samples
Monthly Sludge Samples
Quarterly Sludge Samples
* Acute Toxicity

Figure 15: 2024 Sampling Schedule

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

- The low-level float in the wet well at Herbert St Sewage Pumping Station (SPS) was replaced following a malfunction.
- Herbert St SPS Pump 1 failed and was taken out to be rebuilt.
- The VFD for Clarifier 1 was replaced due to a failure.
- Staff encountered communication issues with the blowers at the MWWTP. The SCADA contractor extended the communication alarm delay timer to resolve the problem.
- Isolation valve in digester failed, valve was replaced.
- The Grit Vortex at MWWTP ceased operation but was successfully restored to working order by staff.
- Communication lines were hit during the servicing of a building, causing the MWWTP to lose both phone and internet. Technician was able to restore internet service and the dialer line was switched over to the office line which was not affected. Repairs were made in the proceeding days.

E. Summary of repairs and maintenance activities:

Megamation is the computerized maintenance management system used to schedule the maintenance activities at the MWWTP and SPS. 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 2023 is outlined below:

- The raw sewage pumps at both Hebert and James Street SPS were inspected monthly and maintained by operators.
- The Herbert Street SPS, James Street SPS and MWWTP diesel generators received their annual service in early 2023. They were also inspected and ran monthly.
- Annual greasing and 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 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 MWWTP, 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 by the operators. The lenses were cleaned monthly, and the bulbs were replaced as needed.

- Outside contractors inspected the gas detectors, chain falls, beams, and lab equipment.
- The alum dosing system was flushed and inspected.
- Compressors were serviced.
- Installed pressure transducers in Wet Wells at James St. SPS.
- Replaced sensor caps for D.O. sensors at MWWTP.
- Replaced bulbs, sleeves and O-rings for UV bank 1B.
- Replaced check valve for pump 1 at James St. SPS.

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. 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 sufficient ice packs to maintain a cool temperature. The samples are accompanied by a Chain of Custody document. This document identifies the operator responsible for collecting the sample, the time of collection, the type of sample and the requested analysis. The document also ensures that the samples are handled exclusively by authorized personnel before undergoing analysis.

Bureau Veritas Laboratories holds accreditations from several organizations, including the Ministry of Environment, Conservation and Parks and is also accredited under ISO/IEC 17025 standards. Each laboratory report is accompanied by a Certificate of Analysis.

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 MWWTP 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;

Operators consistently perform routine maintenance on equipment to ensure proper operation. Weekly in-house process control analysis is performed to ensure that the MWWTP operates efficiently and in a manner that meets design objectives. 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 2023, approximately 64,270m³ of sludge was generated. The MWWTP produced 1929m³ more sludge than in 2022. Based on current loadings, and anticipated influent volumes we expect a similar increase in amount of sludge generation in 2024.

Digested sludge from the MWWTP 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 2023 are as follows:

Year	Land Application Site Number	Sludge Applied to Land (m ³)
2023	Submission ID: 24384	3918
	Submission ID: 24310	4247
	Submission ID: 60805	2073

Table 7: Summary of 2023 biosolids.

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

- February 13, 2023: A plumber contacted the on-call Operator stating that two manholes on Eleanor St. were backed up due to a blockage. A third-party contractor was hired to clear the blockage using a sewer flusher.

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

- April 1, 2023: An emergency overflow took place at the James St SPS. Heavy rainfall led to a significant increase of volume in the collection system. The SPS pumps were unable to handle this surge. Consequently, the water level within the manhole rose, exerting pressure on the bolted-down lid causing a minor blowout of the mortar surrounding the risers. The incident lasted for 24 minutes, with an estimated overflow volume of 50m³.

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 2023.

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

Operators conduct routine maintenance on equipment and conduct weekly process control analysis to ensure that the MWWTP, the SPS as well as the collection system are operating efficiently to achieve conformance with Procedure F-5-1.

The MWWTP is equipped with a Peak Sewage Overflow Storage Cell that can be used to prevent exceeding peak flow capacity of the plant.

The Municipality is committed to the improvement of the collection system to eliminate bypass and overflow events. Each year, a section of sanitary sewer is replaced to decrease inflow and infiltration into the collection system. Unfortunately, this replacement wasn't feasible in 2023 due to budget constraints. However, the Municipality acknowledges the significance of adhering to the sewer replacement schedule and is committed to resuming it in 2024. The Municipality of West Perth has allocated \$270,000.00 for capital expenditures and an additional \$55,000.00 for maintenance expenditures in 2024. The focus of this year's reconstruction project will be James St. The proposed budget allocation for replacing sanitary and storm infrastructure on James St. is \$300,000.00.

Older sections of the collection system, particularly where sump pumps discharge into the sanitary system, significantly contribute to potential bypass and overflow events. These connections are eliminated during construction. The Municipality plans to implement procedures for inspecting the collection systems integrity through manhole inspections and smoke testing to identify problem areas that require attention. Additionally, the Municipality will consider the implementation of a Pollution Prevention and Control Plan.

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

The secondary clarifier remains in the design phase and the flow meter used to measure return flow from the Peak Sewage Overflow Storage Cell has not been installed yet. The upgrades to the supplementary treatment system have been completed and commissioned.

O. Nitrogen Monitoring Summary

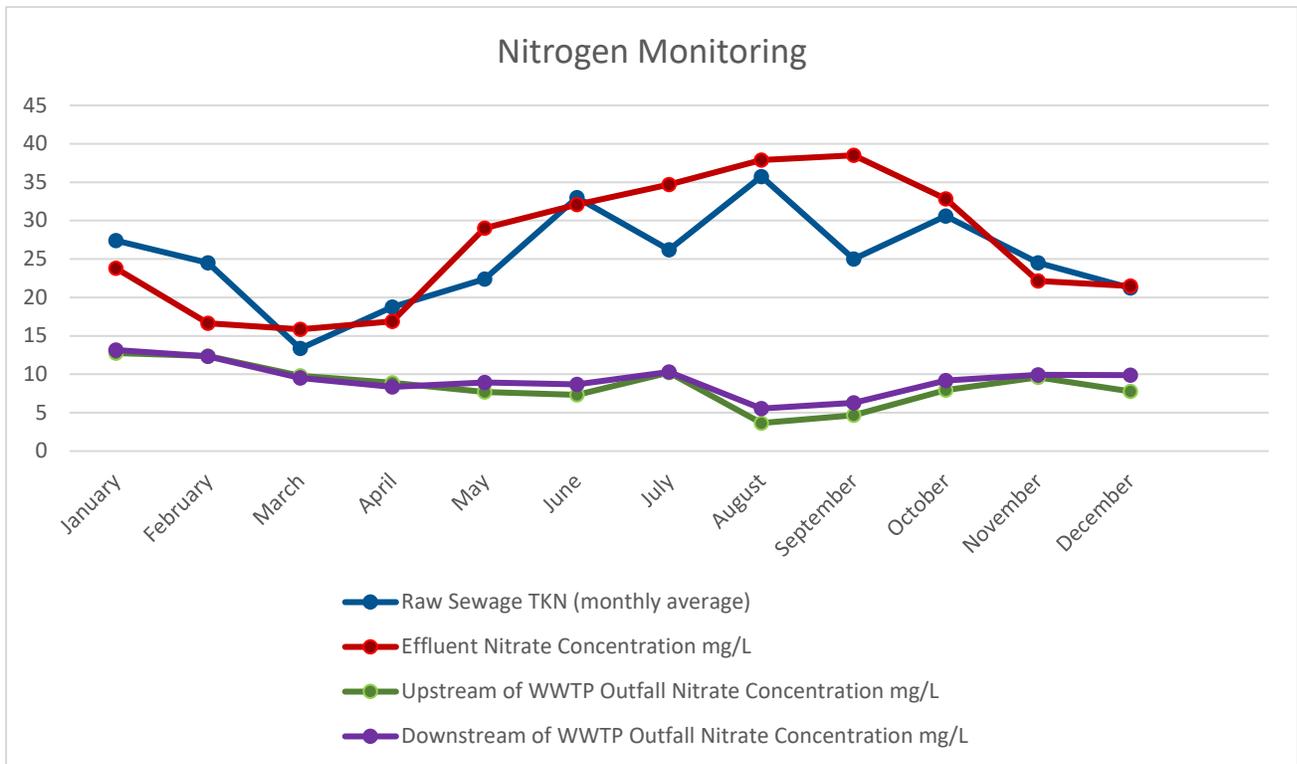


Figure 16. The historical trend of nitrate concentrations from 2023.

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 MWWTP 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 2024, the work plan will continue with sampling at the West Perth Line 29 location. This location will be used to evaluate the net increase of nitrate levels in the North Thames River

P. Annual Compliance Summary for 2023

2023	FLOWS			BIOCHEMICAL O2 DEMAND				SUSPENDED SOLIDS			PHOSPHORUS			AMMONIA		EFFLUENT				WASTE		
	Total	Avg. Day	Max Day	Avg. Raw	Avg. Load	Avg. Eff.	Avg. Load	Avg. Raw	Avg. Eff.	Avg. Load	Avg. Raw	Avg. Eff.	Avg. Load	Avg. Eff.	Avg. Load	Effluent	DO	pH	Temp			
	Flow	Flow	Flow	BOD	BOD	CBOD	CBOD	SS	SS	SS	Phos.	Phos.	Phos.	Amm	Amm	E. Coli				Volume	SS	
	ML	ML	ML	(mg/L)	(kg/day)	(mg/L)	(kg/day)	(mg/L)	(mg/L)	(kg/day)	(mg/L)	(mg/L)	(kg/day)	(mg/L)	(kg/day)	cnt/100ml	(mg/L)	(mg/l)	Deg C	m ³ /month	(mg/L)	
Jan	175,912	5,675	11,044	232.0	1,317	1.92	10.90	210.9	4.87	27.64	9.00	0.15	0.83	4.94	28.03	1.0	7.81	7.70	16.2	5,969.0	10,218	
Feb	169,829	6,065	13,152	285.0	1,729	2.18	13.19	236.6	5.65	34.27	10.30	0.22	1.35	0.39	2.39	1.0	7.79	7.50	16.4	5,378.0	11,008	
Mar	209,460	6,757	12,434	101.0	682	1.90	12.84	129.1	3.89	26.27	4.97	0.19	1.30	0.21	1.40	1.8	7.96	7.52	16.7	5,947.0	9,272	
Apr	187,988	6,266	18,230	182.5	1,144	1.90	11.91	188.2	4.69	29.37	7.36	0.21	1.30	0.36	2.28	1.6	7.66	7.39	17.8	5,562.0	8,732	
May	130,858	4,221	6,238	246.0	1,038	1.90	8.02	243.8	4.56	19.25	8.87	0.32	1.34	0.07	0.28	1.7	6.95	7.35	20.1	5,663.0	6,656	
Jun	118,266	3,942	5,364	475.0	1,873	1.90	7.49	385.8	2.44	9.61	11.55	0.23	0.91	0.06	0.25	1.4	6.41	7.23	22.6	4,919.0	7,703	
Jul	138,357	4,463	11,152	354.0	1,580	2.32	10.35	234.9	1.92	8.58	9.48	0.23	1.04	0.10	0.45	1.8	6.46	7.26	23.3	4,882.0	7,560	
Aug	136,178	4,393	6,877	467.5	2,054	1.90	8.35	391.9	1.93	8.49	19.16	0.26	1.15	0.06	0.26	3.0	6.53	7.40	22.7	5,166.0	10,301	
Sep	114,394	3,813	5,964	362.5	1,382	1.93	7.34	288.4	3.20	12.20	12.30	0.27	1.02	0.04	0.15	5.0	6.54	7.23	21.8	5,327.0	9,025	
Oct	135,097	4,358	5,298	488.0	2,127	1.92	8.37	378.6	5.85	25.49	13.67	0.34	1.48	0.15	0.66	3.3	6.81	7.32	20.1	5,047.0	11,088	
Nov	140,223	4,674	8,692	351.8	1,644	3.45	16.13	288.4	7.68	35.87	13.75	0.32	1.52	0.36	1.67	1.7	7.17	7.41	17.0	5,225.0	12,260	
Dec	175,838	5,672	10,826	267.5	1,517	2.18	12.34	208.5	5.83	33.04	10.48	0.30	1.68	0.68	3.86	2.2	6.72	7.30	16.7	5,185.0	12,119	
Total	1,832,400																				64,270.0	
Avg	152,700	5,025	9,606	318	1,507	2.12	10.60	265.4	4.37	22.51	10.91	0.25	1.25	0.62	3.47	2	7.07	7.39	19.29	5,355.8	9,662	
Max	209,460	6,757	18,230	488	2,127	3.45	16.13	391.9	7.68	35.87	19.16	0.34	1.68	4.94	28.03	5	7.96	7.70	23.32	5,969.0	12,260	
Criteria	T>5 C	5,800				< 10	72.00		< 10	72.00		< 0.5	3.60	< 3	21.60	200						
	T<5 C	5,800				< 15	108.00		< 15	108.00		< 1.0	7.20	< 5	36.00	none						
MEETS Concentration Criteria						YES	YES		YES	YES		YES	YES	YES	YES	YES						