2022 ANNUAL WASTEWATER TREATMENT SYSTEM SUMMARY REPORT

Drumbo Wastewater Treatment Plant

1. GENERAL INFORMATION

Oxford County (the County) prepares a report summarizing wastewater treatment operation and treated effluent discharge quality for every municipal wastewater treatment plant (WWTP) annually. The reports detail the latest effluent quality testing results and quantity statistics, and any non-compliance conditions that may have occurred for the previous year. They are available for review by the end of March on the County website at http://www.oxfordcounty.ca/waterwastewater or by contacting the Public Works Department.

All efforts have been made to ensure the information presented in this report is as accurate as possible.

If you have any questions or comments concerning the report, please contact the County at the address and phone number listed below or by email at wastewater@oxfordcounty.ca.

Wastewater Treatment Plant: Drumbo WWTP
Wastewater Treatment Plant Number: 120002479
Environmental Compliance Approval (ECA): 7607-BYQRYA (April 29, 2021)
Reporting Period: January 1, 2022 – December 31, 2022

Wastewater Treatment Plant Owner & Contact Information:

Oxford County Public Works Department - Wastewater Services
P.O. Box 1614
21 Reeve Street
Woodstock, ON N4S 7Y3
Telephone: 519-539-9800
Toll Free: 866-537-7778
Email: wastewater@oxfordcounty.ca

1.1 System Description

The Drumbo Sequencing Batch Reactor (SBR) WWTP is a Class II rated treatment facility as defined by Ontario Regulation (O. Reg.) 129/04, servicing the Village of Drumbo. The separate wastewater collection system includes three (3) sewage pumping stations, 6.9 kilometers of sanitary gravity sewers, and 2.7 kilometers of sanitary forcemain sewers.

The Drumbo WWTP consists of two alternating reactors, pressure filters and ultra-violet light for disinfection, with an outfall pipe to a wetland area which discharges to the Cowan Drain. The County operates the Drumbo WWTP, utilizing the staff located at the Woodstock WWTP. Biosolids are temporarily stored at the Drumbo WWTP and routinely transported to the Woodstock WWTP for digestion.

A standby generator is available to run the onsite Water Treatment Facility and the Drumbo WWTP in the event of a power failure. The wastewater system is maintained by licensed wastewater treatment system operators and licensed mechanics that operate, monitor, and maintain the treatment equipment, in accordance to the regulations, and collect samples as required by the ECA. Alarms automatically notify operators in the event of failure of critical operational requirements.

The Drumbo WWTP is located at 93 Peterson Street in Drumbo, Ontario, with the Facility description provided below.

Facility	Drumbo WWTP
Design Capacity	300 m^3/d
2022 Average Daily Flow	246 m^3/d
2022 Maximum Daily Flow	595 m^3/d
2022 Total Volume of Wastewater	89,557 m^3/year

1.2 Major Expenses

In 2022, the Drumbo WWTP had forecasted operating and maintenance expenditures of approximately $300,000.

In addition to regular operational and maintenance expenditures, Capital Improvement Projects for the Village of Drumbo were forecasted at $6,213,000 which included improvements to the wastewater collection system and the Drumbo WWTP.

Drumbo Capital Improvement Projects included:

- $6,000,000 - 2022 ($9,660,000 total) for the expansion to the Drumbo WWTP (multi-year project with the Total Forecasted Capital Expenditures)

- $80,000 for Feasibility Study
- $115,000 for Standby Power Upgrade
- $17,760 for the replacement of general operating equipment

Capital Improvement Projects for all systems included:

- $625,000 to develop Countywide SCADA Master Plan for all wastewater systems
- $150,000 to develop Countywide Wastewater Servicing Master Plan for all wastewater systems

2. SUMMARY AND INTERPRETATION OF MONITORING DATA

2.1. Effluent Quality Assurance and Control Measures

Sampling Procedure

Influent samples are taken using a 24-hour composite sampler on a monthly basis from the transfer tank. This tank receives flow from the trash tank, which holds the majority of the daily flow.

Effluent samples are taken weekly using a 24-hour composite sampler installed so as to sample during periods of flow from either of the two reactors. Samples are taken on site and tested for pH, dissolved oxygen (DO), and temperature.

Laboratory and Field Testing

Laboratory analysis is performed by SGS Lakefield Research Ltd. on all samples that are reported for compliance except for pH, DO, and temperature which are analyzed in the field.

2.2 WWTP Performance and Effluent Quality

Final Effluent Compliance Limits

Compliance limits are defined as the maximum effluent concentrations permitted for a given parameter set by the Ministry of Environment, Conservation and Parks (MECP). Compliance limits are detailed within each WWTP ECA. The limits are determined to prevent impairment to the receiving water body quality. The Owner is legally obligated to operate and maintain the treatment system to ensure the compliance limits are achieved.

In 2022, the Drumbo WWTP provided effective treatment with 750 samples out of 795 meeting compliance, or 94.3 % compliance to its regulatory limits for all effluent discharged from the WWTP.

In August, an electrical component failure (causing a chemical overdose that impeded nitrification) combined with dark coloured high-strength influent (TAN/TSS), resulted in a

non-compliance. The faulty electrical component was replaced, the SBR was reseeded with established biomass from the Woodstock WWTP, the trash tank was cleaned out and the main pumping station forcemain to the WWTP was swabbed at the beginning of September.

- The effluent monthly average concentration for Total Ammonia Nitrogen was 4.96 mg/L, which was above the ECA concentration limit of 2.7 mg/L
- The effluent monthly average waste loading for Total Ammonia Nitrogen was 0.98 kg/d, which was above the ECA concentration waste loading limit of 0.8 kg/d

In October, the WWTP again experienced incoming dark coloured high strength influent (TAN/TSS), which hindered nitrification and solids settling within the reactors. The SBR was reseeded with established biomass from both the Woodstock and Thamesford WWTPs. Several tanks on site were completely cleaned out, and additional trash tank biosolids loads were removed. The North sewage pumping station forcemain to the WWTP was swabbed, and then rerouted to the main sewage pumping station, in an attempt to minimize impacts at the WWTP.

- The effluent monthly average concentration for Total Ammonia Nitrogen was 5.98 mg/L, which was above the ECA concentration limit of 2.7 mg/L
- The effluent monthly average waste loading for Total Ammonia Nitrogen was 1.09 kg/d, which was above the ECA concentration waste loading limit of 0.8 kg/d
- The effluent monthly average concentration for Total Phosphorus was 0.49 mg/L, which was above the ECA concentration limit of 0.46 mg/L
- The effluent monthly average concentration for Total Suspended Solids was 13.3 mg/L, which was above the ECA concentration limit of 9.3 mg/L

In December, the influent entering the WWTP contained abnormally high concentrations of Total Ammonia Nitrogen. In response, staff monitoring at the WWTP was increased, additional sampling and testing was implemented, as well as the removal of additional loads of biosolids from the trash tank.

- The effluent monthly average concentration for Total Ammonia Nitrogen was 5.06 mg/L, which was above the ECA concentration limit of 4.5 mg/L

All non-compliances were reported to the Ministry of Environment, Conservation and Parks (MECP) at the time of the event.

Influent Streams and Effluent Streams

On a weekly basis, the Operator measures pH of both the influent and effluent streams. There was no single pH result for the effluent outside the discharge limit of 6 - 9.5 in 2022. Analyses results are summarized below.

Graphs of the discharge parameters versus effluent discharge limits are included in this report in Appendix A.

Influent wastewater characteristics and effluent discharge values are presented in the tables below.

Influent Wastewater Characteristics		
Parameter	**Concentration mg/L**	**Loading kg/d**
BOD_5	152	37
Total Suspended Solids	81	20
Total Phosphorus	4	1
Total Kjeldahl Nitrogen	36	9

Effluent Parameter	**Sample Frequency**	**ECA Effluent Limit (Monthly Average)** (mg/L unless otherwise indicated)	**Monthly Average Result Min-Max** (mg/L unless otherwise indicated)	**Percentage Removal**
Carbonaceous Biochemical Oxygen Demand ($CBOD_5$)	weekly	9.3	2.6 – 4.7	95.8 – 97.7
Total Suspended Solids (TSS)	weekly	9.3	3.8 – 13.3	83.6 – 95.3
Total Phosphorus (TP)	weekly	0.46	0.1 – 0.49	87.8 – 97.5
Total Ammonia Nitrogen (TAN) (May 1 to October 31)	weekly	2.7	1.1 – 5.98	--
Total Ammonia Nitrogen (TAN) (Nov. 1 to April 30)	weekly	4.5	2.9 – 5.1	--
E. coli	weekly	200 organisms/100 mL (monthly Geometric Mean Density)	2.4 – 15.0 organisms/100 mL (monthly Geometric Mean Density)	--
DO	weekly	5.0 or higher	6.5 – 8.1	--
pH any single sample	weekly	6.0 - 9.5	6.6 – 7.9	--

2.3 Final Effluent Design Objectives

Objectives are non-enforceable effluent quality values which the Owner is obligated to use best efforts to strive towards achieving on an ongoing basis. These objectives (summarized below) are to be used as a mechanism to trigger corrective action proactively, and voluntarily, before environmental impairment occurs and before the compliance limits are exceeded.

The following table presents the range of effluent discharge values vs. ECA Objectives.

Effluent Parameter	**Sample Frequency**	**Monthly Average Objective Concentration** (mg/L unless otherwise indicated)	**Monthly Average Result Min-Max** (mg/L unless otherwise indicated)
Carbonaceous Biochemical Oxygen Demand ($CBOD_5$)	weekly	4.7	2.6 – 4.7
Total Suspended Solids (TSS)	weekly	4.7	3.8 – 13.3
Total Phosphorus (TP)	weekly	0.27	0.1 – 0.49
Total Ammonia Nitrogen (TAN) (May 1 to October 31)	weekly	1.8	1.1 – 5.98
Total Ammonia Nitrogen (TAN) (Nov. 1 to April 30)	weekly	3.6	2.9 – 5.1
E. coli	weekly	150 organisms/100 mL (monthly Geometric Mean Density)	2.4 – 15.0 organisms/100 mL (monthly Geometric Mean Density)
DO	weekly	6 or higher	6.5 – 8.1
pH any single sample	weekly	6.5 - 8.5	6.6 – 7.9

The WWTP has had difficulty meeting its final effluent objectives, as the facility is at the limit of its treatment capacity. A Schedule C Class Environmental Assessment was completed in 2019, which recommended increasing the WWTP capacity from 300 m^3/day to 450 m^3/day (with a phase 2 expansion planned to increase capacity to approximately 600 m^3/day by adding two additional cassettes) by upgrading the existing SBR to a Membrane Bioreactor plant (MBR). Construction began in 2021 and is expected to be completed near the end 2023.

Exceedances of the Monthly Average Objectives in 2022, are included the following table.

Month	Parameter	Objective (mg/L)	Monthly Average Result (mg/L)
January 2022	TAN	3.6	4.01
March 2022	FLOW	300 m^3/d	361 m^3/d
April 2022	FLOW	300 m^3/d	318 m^3/d
May 2022	TAN	1.8	2.04
July 2022	TSS	4.7	6.71
July 2022	TP	0.27	0.28
August 2022	TSS	4.7	6.43
August 2022	TAN	1.8	4.96
August 2022	TP	0.27	0.36
September 2022	TSS	4.7	6.9
September 2022	TAN	1.8	2.51
September 2022	TP	0.27	0.32
October 2022	TSS	4.7	13.3
October 2022	TAN	1.8	5.98
October 2022	TP	0.27	0.49
November 2022	TSS	4.7	8.7
December 2022	TSS	4.7	7.1
December 2022	TAN	1.8	5.06

3. OVERFLOWS, BYPASSSING, UPSETS, SPILLS, AND ABNORMAL CONDITIONS

There were no overflows, bypassing, upsets, spills and abnormal conditions in 2022.

The Drumbo WWTP is nearing its rated capacity and as such achieving the treatment objectives is challenging. The County is currently undertaking construction to expand the WWTP to address the constraints.

There were no complaints in 2022.

In conformance with Procedure F-5-1, to eliminate Bypass/Overflows, a new natural gas powered generator and automatic transfer switch are planned to be installed at the main

sewage pumping station (SPS) in 2023. Additionally, generator outlets and transfer switches were installed on all the SPSs in Drumbo during 2022, to allow for portable backup power to be supplied to all stations if required.

4. MAINTENANCE OF WORKS

The operating and maintenance staff at the Drumbo WWTP conducts regularly scheduled maintenance of the plant equipment. The Drumbo WWTP utilizes a database system known as Cartegraph to issue work orders and maintain records for regular maintenance and repair at the Drumbo WWTP.

The Limited Operational Flexibility for modifications to the Drumbo WWTP was not used in 2022.

5. MONTIORING EQUIPMENT MAINTENANCE AND CALIBRATION

The calibration of flow meters is conducted yearly by Indus-Controls Inc. in accordance with the requirements of the ECA. The records are kept on-site at the Drumbo WWTP.

All other operational monitoring equipment is calibrated by staff and records are kept on-site at the Drumbo WWTP.

6. BIOSOLIDS PROGRAM

Co-thickened primary sludge is transported from the Drumbo WWTP to the Woodstock WWTP for further treatment.

Biosolids are anaerobically digested and dewatered at the Woodstock WWTP using two Alfa-Laval Centrifuges. The biosolids are then stored at the County Biosolids Centralized Storage Facility (BCSF) prior to land application. The sampling results and land application details are summarized in a separate Biosolids Annual report, available at: www.oxfordcounty.ca/Services-for-You/Water-Wastewater/Wastewater/Annual-reports.

7. INSPECTION, PILOTS, AND TRIALS

The MECP did not conduct a facility inspection of the Drumbo WWTP in 2022. The MECP inspections typically occur on a 3-year schedule.

Plant Expansion

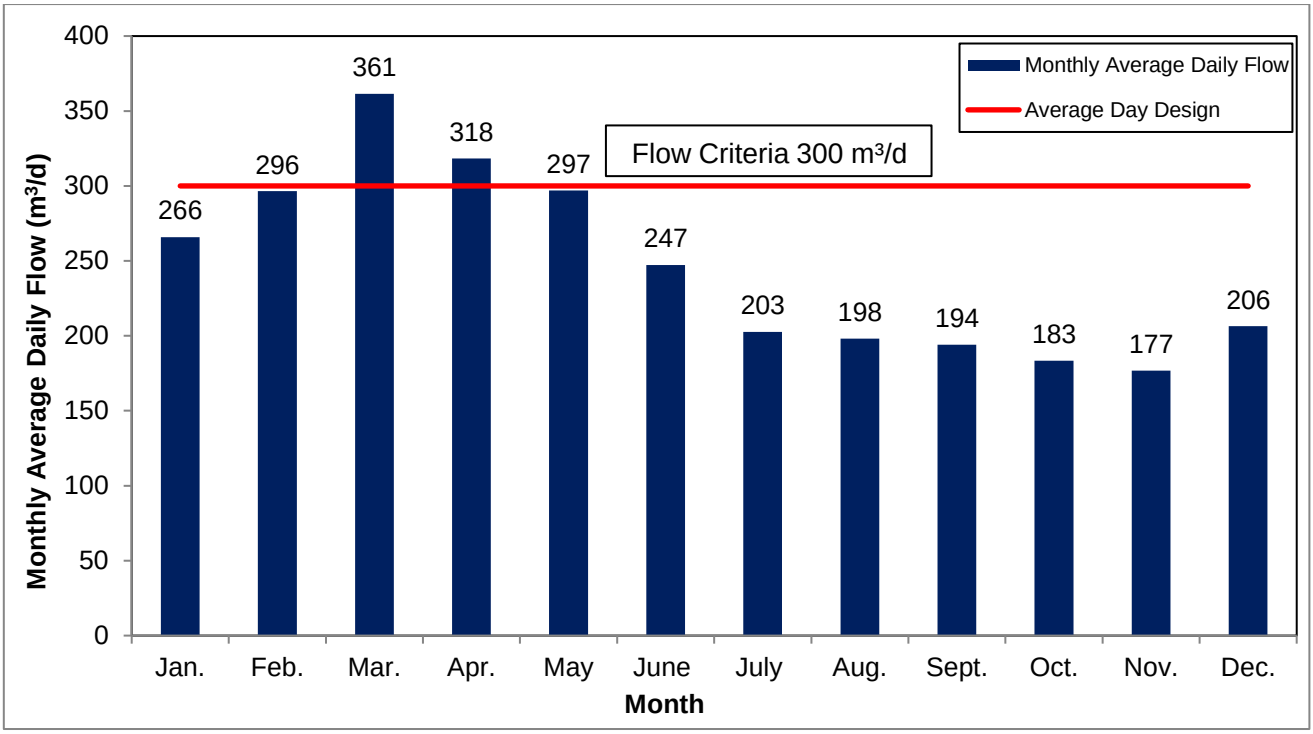
In 2021, construction began to expand the rated capacity of the Drumbo WWTP from 300 to 450 m^3/day. The upgrades include headworks, Membrane Bioreactors (MBR), disinfection equipment, and new plant backup power supply. A planned membrane cassette expansion afterwards (2024/2025), will increase the rated capacity to approximately to 600 m^3/day.

Feasibility Study

A Feasibility Study was completed in 2022, to investigate wastewater treatment potential for the Village of Drumbo. The Study developed and evaluated alternative scenarios and treatment strategies to meet future wastewater treatment servicing up to a rated capacity of 1,200 m^3/d.

APPENDIX A: GRAPHS OF 2022 DISCHARGE PARAMETERS VS. EFFLUENT DISCHARGE LIMITS

Drumbo WWTP Monthly Average Daily Flow in Cubic Meters per Day, 2022



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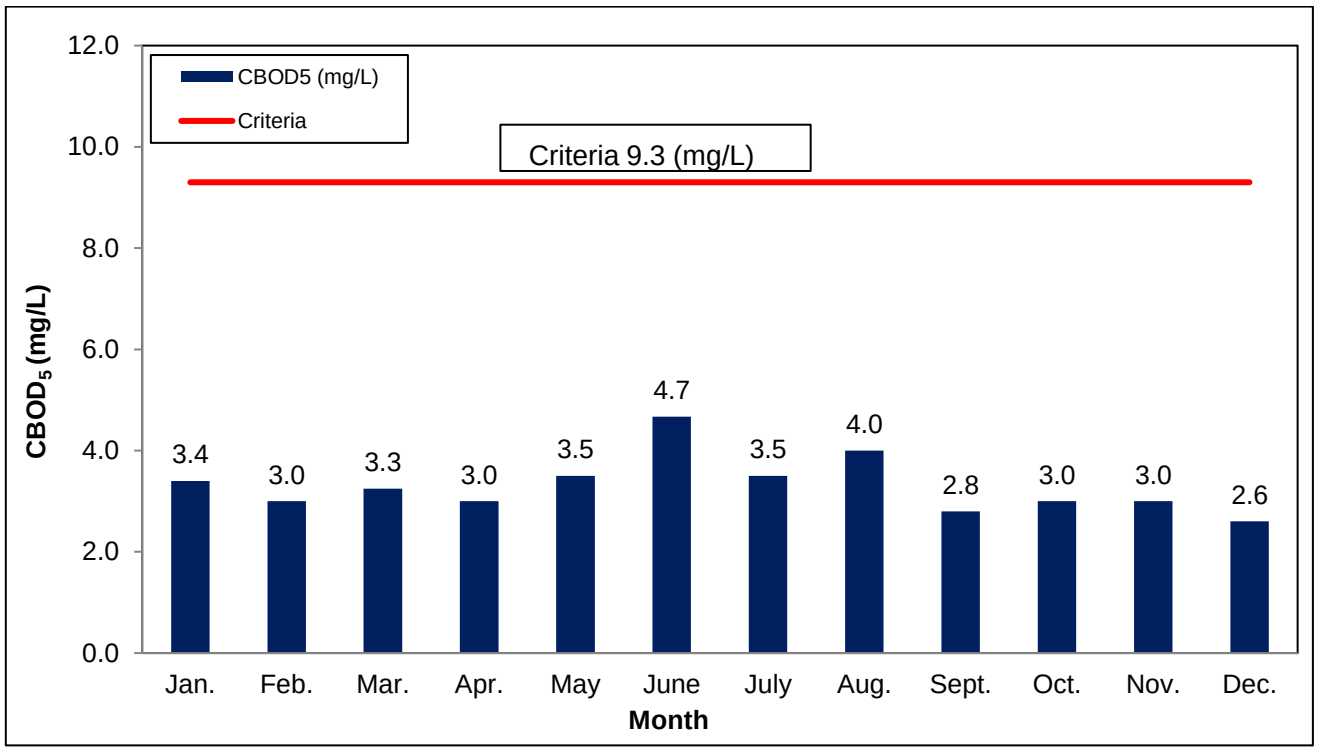
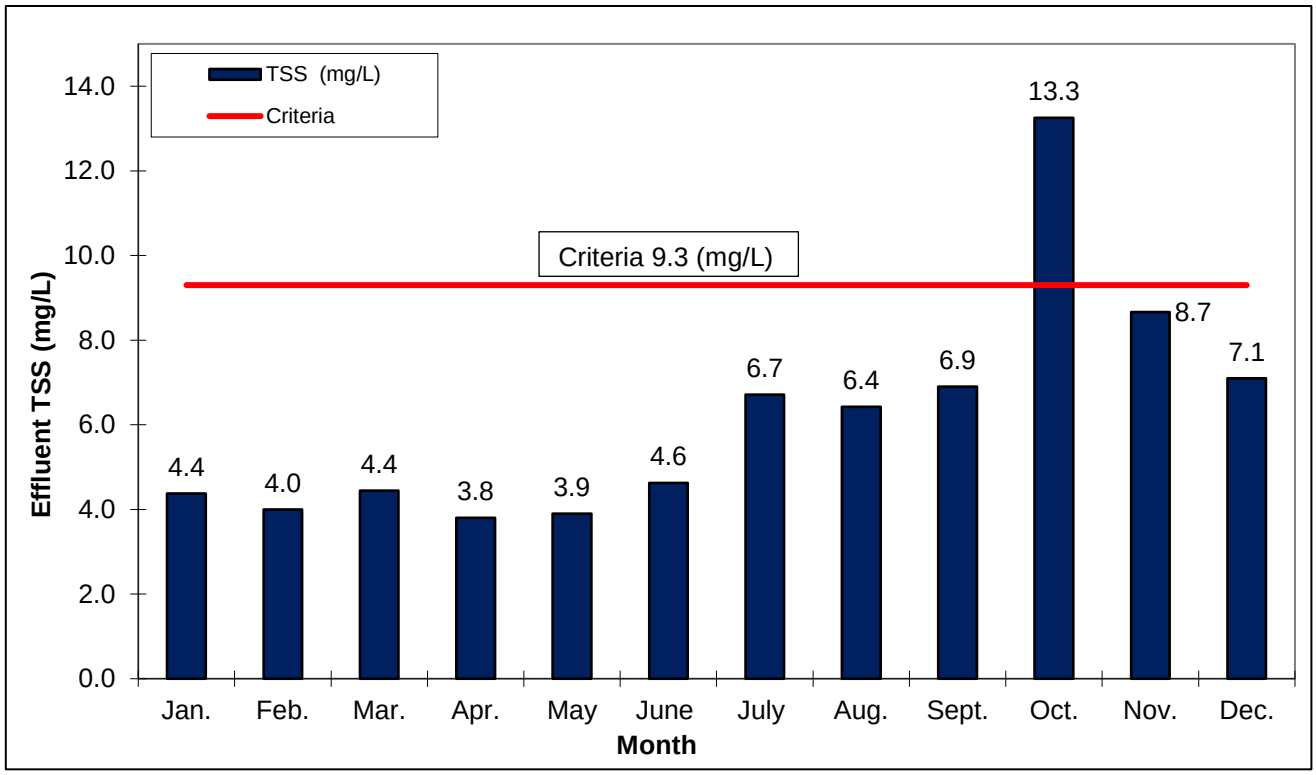
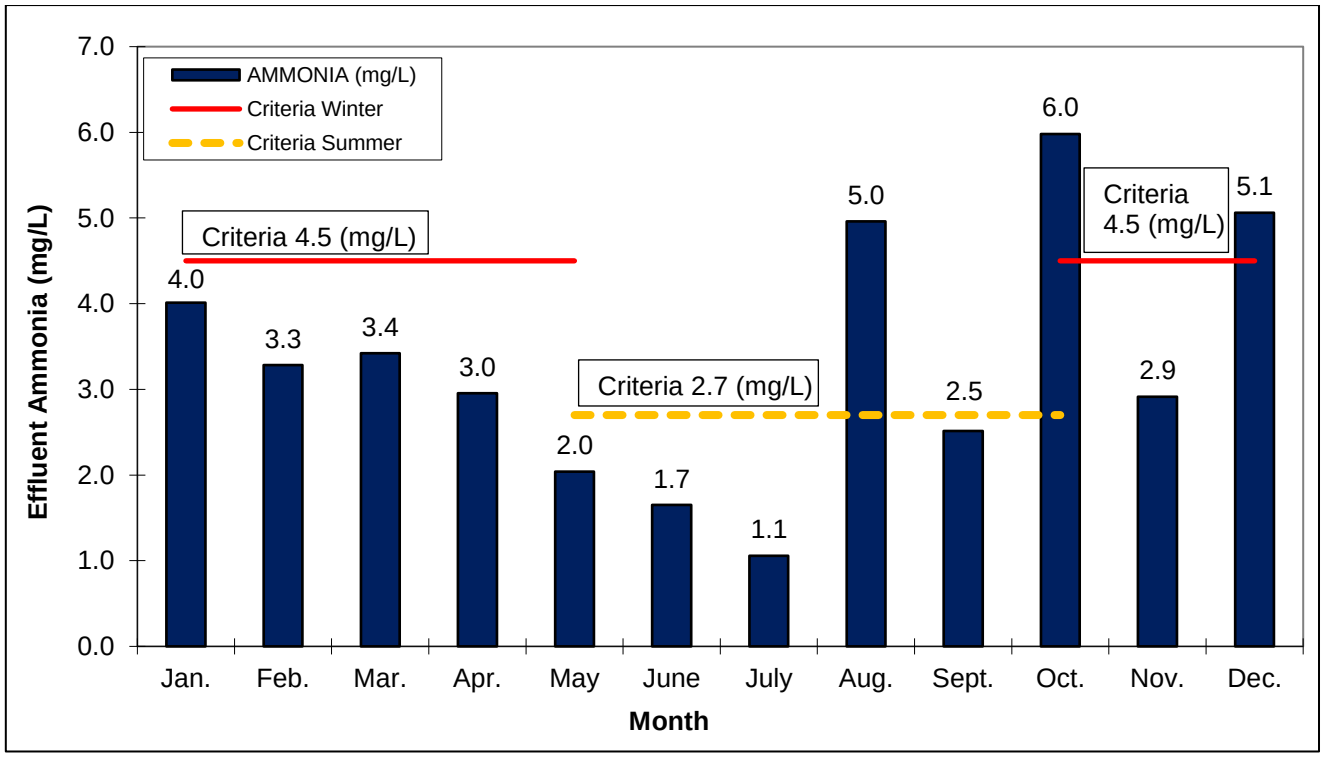
Drumbo WWTP Effluent, Monthly Average $CBOD_5$ (mg/L), 2022



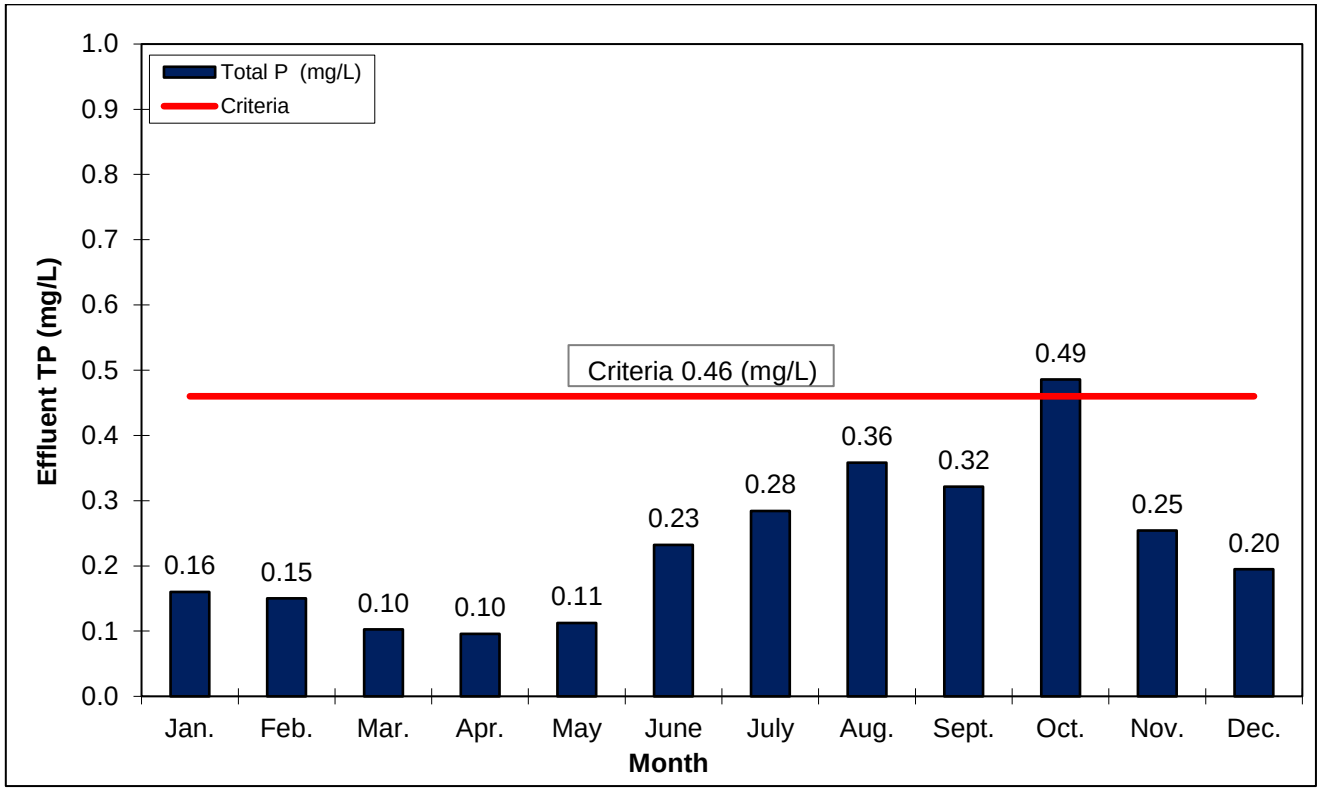
Drumbo WWTP Effluent, Monthly Average TSS (mg/L), 2022



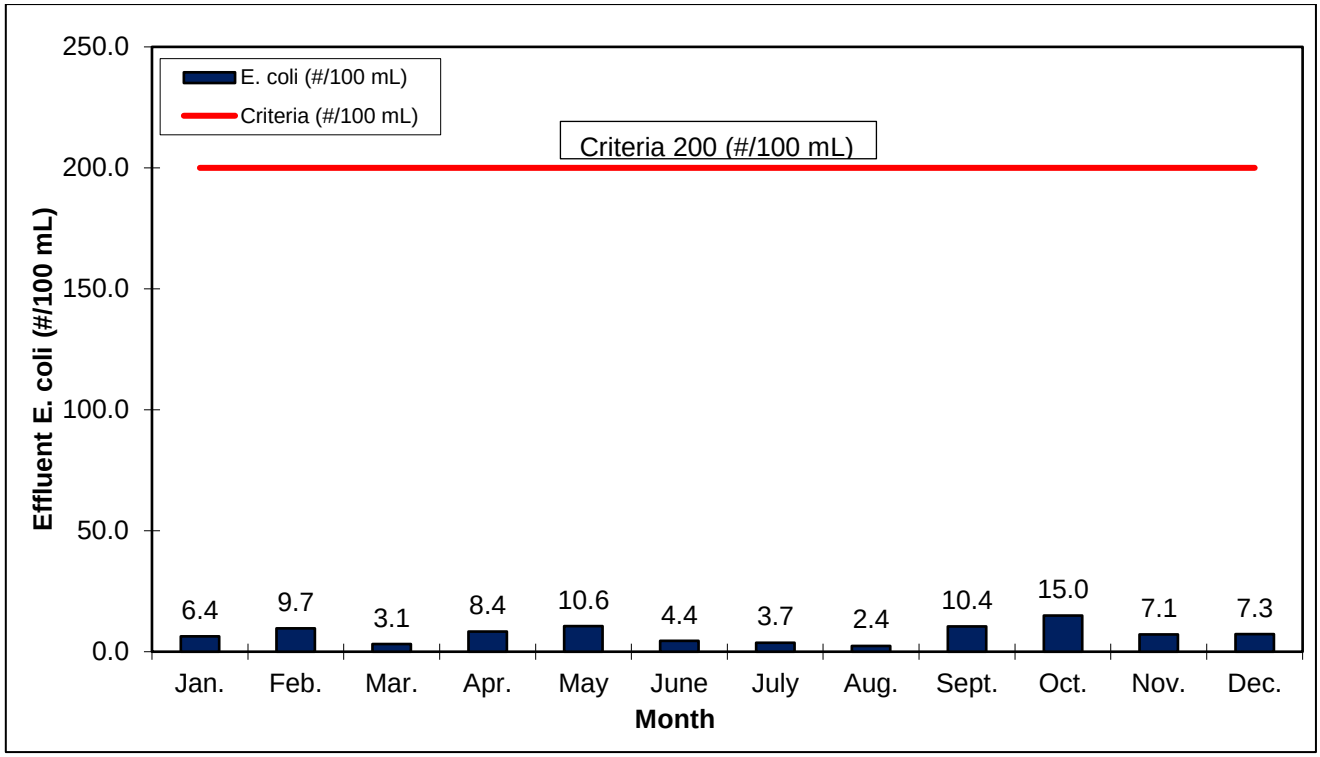
Drumbo WWTP Effluent, Monthly Average Ammonia (mg/L), 2022



Drumbo WWTP Effluent, Monthly Average Total Phosphorus (mg/L), 2022



Drumbo WWTP Effluent, Monthly Geometric Mean Density E. coli (#/100 mL), 2022



2022 ANNUAL WASTEWATER TREATMENT SYSTEM SUMMARY REPORT

Ingersoll Wastewater Treatment Plant

1. GENERAL INFORMATION

Oxford County (the County) prepares a report summarizing wastewater treatment operation and treated effluent discharge quality for every municipal wastewater treatment plant (WWTP) annually. The reports detail the latest effluent quality testing results and quantity statistics, and any non-compliance conditions that may have occurred for the previous year. They are available for review by the end of March on the County website at http://www.oxfordcounty.ca/waterwastewater or by contacting the Public Works Department.

All efforts have been made to ensure the information presented in this report is as accurate as possible.

If you have any questions or comments concerning the report, please contact the County at the address and phone number listed below or by email at wastewater@oxfordcounty.ca.

Wastewater Treatment Plant: Ingersoll WWTP
Wastewater Treatment Plant Number: 110003969
Environmental Compliance Approval (ECA): 1614-A28P9L (September 16, 2015)
Reporting Period: January 1, 2022 – December 31, 2022

Wastewater Treatment Plant Owner & Contact Information:

Oxford County Public Works Department - Wastewater Services
P.O. Box 1614
21 Reeve Street
Woodstock, ON N4S 7Y3
Telephone: 519-539-9800
Toll Free: 866-537-7778
Email: wastewater@oxfordcounty.ca

1.1 System Description

The Ingersoll WWTP is a Class IV rated treatment facility, as defined by Ontario Regulation (O.Reg.) 129/04, that provides wastewater treatment for residential, commercial, and industrial users in the Town of Ingersoll. It also provides treatment for septic tank waste, hauled waste, holding tank waste, and landfill leachate from within Oxford County. The nominally separated wastewater collection system includes five (5) sewage pumping stations, 88 kilometers of sanitary gravity sewers, 14.3 kilometers of sanitary forcemain sewers and 0.8 kilometers of sanitary low pressure sewers.

Since the completion of the WWTP upgrade in 2018, two treatment trains have been operational and have provided a treatment capacity of 12,945 m^3/d. Both trains are conventional activated sludge plants consisting of primary and secondary treatment sharing an ultraviolet light disinfection system and a single discharge point into the Thames River. The Ingersoll WWTP utilizes anaerobic digestion followed by dewatering to produce stabilized biosolids. The biosolids are then transported to dedicated offsite storage prior to beneficial reuse on agricultural land.

Standby generators are available to run the onsite Ingersoll Main Lift Station and disinfection system in the event of a power failure.

The system is maintained by licensed wastewater system operators and licensed mechanics that operate, monitor, and maintain the treatment equipment, in accordance to the regulations, and collect samples as required by the ECA. Alarms automatically notify operators in the event of failure of critical operational requirements.

The Ingersoll WWTP is located at 56 McKeand Street in Ingersoll, Ontario, with the Facility description provided below.

Facility	Ingersoll WWTP
Design Capacity	12,945 m^3/d
2022 Average Daily Flow	6,992 m^3/d
2022 Maximum Daily Flow	13,670 m^3/d
2022 Total Volume of Wastewater	2,550,884 m^3/year
2022 Total Received Hauled Waste	12,942 m^3/year (8,559 m^3/year leachate)

1.2 Major Expenses

In 2022, the Ingersoll WWTP had forecasted operating and maintenance expenditures of approximately $2,732,000.

In addition to regular operational and maintenance expenditures, Capital Improvement Projects for Ingersoll totaled $1,207,000 for improvements to the wastewater collection system and the Ingersoll WWTP.

Capital Improvement Projects included:

- $40,000 for Concession Street Sewer Project
- $120,000 for Town of Ingersoll Sewer Relining
- $980,000 for Town of Ingersoll Sewer Projects
- $39,000 for Ingersoll Fats, Oil, and Grease Co-Digestion Study
- $12,500 for facilities improvements
- $15,000 for the replacement of general operating equipment

Capital Improvement Projects for all systems included:

- $625,000 to develop Countywide SCADA Master Plan for all wastewater systems
- $150,000 to develop Countywide Wastewater Servicing Master Plan for all wastewater systems

2. SUMMARY AND INTERPRETATION OF MONITORING DATA

2.1. Effluent Quality Assurance and Control Measures

Sampling Procedure

Influent samples are collected monthly and effluent samples are collected weekly using a composite sampler over a 24-hour period. Raw sewage samples are collected at the main lift station located on-site; the sample is drawn after the lift station pumps and prior to the primary tanks of either plant. Effluent is sampled directly from the combined flow after it leaves the UV disinfection system prior to final discharge and represents the final treated effluent sample for the entire facility.

Laboratory and Field Testing

All samples that are reported for compliance purposes are analyzed at an accredited licensed laboratory except for pH, dissolved oxygen (DO), and temperature which are field collected. Laboratory analysis is performed by SGS Lakefield Research Ltd. All other in-house testing is done for process control, the results of which are not included in this report.

2.2 WWTP Performance and Effluent Quality

Final Effluent Compliance Limits

Compliance limits are defined as the maximum effluent concentrations permitted for a given parameter set by the Ministry of Environment, Conservation and Parks (MECP). Compliance limits are detailed within each WWTP ECA. The limits are determined to

prevent impairment to the receiving water body quality. The Owner is legally obligated to operate and maintain the treatment system to ensure the compliance limits are achieved.

The Ingersoll WWTP provided effective treatment in 2022 and was 100% in compliance with all its regulatory limits for all effluent discharged from the WWTP.

Influent Streams and Effluent Streams

Approximately four times a week, the Operator measures pH of both the influent and effluent streams. There was no single pH result for the effluent outside the discharge limit of 6.0 – 9.5 in 2022.

Graphs of discharge parameters versus effluent discharge limits are included in this report in Appendix A. Influent wastewater characteristics and effluent discharge values are presented in the tables below.

Influent Wastewater Characteristics		
Parameter	**Concentration mg/L**	**Loading kg/d**
BOD_5	163	1,139
Total Suspended Solids (TSS)	224	1,569
Total Phosphorus (TP)	3.7	26
Total Kjeldahl Nitrogen	22	155

Effluent Parameter	**Sample Frequency** (when discharging)	**ECA Effluent Limit (Monthly Average)** (mg/L unless otherwise indicated)	**Monthly Average Result Min-Max** (mg/L unless otherwise indicated)	**Percentage Removal**
Carbonaceous Biochemical Oxygen Demand ($CBOD_5$)	weekly	15	2.0 – 4.0	97.5 – 98.8
Total Suspended Solids (TSS)	weekly	15	5.5 – 8.2	96.3 – 97.5
Total Phosphorus (TP)	weekly	0.6	0.12 – 0.34	90.8 – 96.8
Total Ammonia Nitrogen (TAN) (May 1 to November 30)	weekly	2.0	0.1 – 0.2	----
Total Ammonia Nitrogen (TAN) (Dec. 1 to April 30)	weekly	6.0	0.1 – 0.8	--
pH any single sample	weekly	6.0 - 9.5	6.53 – 7.75	--
E. coli	weekly	200 organisms/100 mL (Monthly Geometric Mean Density)	6.2 – 62.6 organisms/100 mL (Monthly Geometric Mean Density)	--

2.3 Final Effluent Design Objectives

Final Effluent Design Objectives (objectives) are non-enforceable effluent quality values which the Owner is obligated to use best efforts to strive towards achieving on an ongoing basis. These objectives are to be used as a mechanism to trigger corrective action proactively, and voluntarily, before environmental impairment occurs and before the compliance limits are exceeded.

There were no monthly average effluent objective failures in 2022.

All single sample effluent objective failures are listed below.

The following table presents the range of effluent discharge values vs. ECA Objectives.

Effluent Parameter	**Sample Frequency**	**Monthly Average Objective Concentration** (mg/L unless otherwise indicated)	**Monthly Average Result Min-Max** (mg/L unless otherwise indicated)
Carbonaceous Biochemical Oxygen Demand ($CBOD_5$)	weekly	10	2.0 – 4.0
Total Suspended Solids (TSS)	weekly	10	5.5 – 8.2
Total Phosphorus (TP)	weekly	0.40	0.12 – 0.34
Total Ammonia Nitrogen (TAN) (May 1 to Nov. 30)	weekly	1.5	0.1 – 0.2
Total Ammonia Nitrogen (TAN) (Dec. 1 to April 30)	weekly	4.0	0.1 – 0.8
pH any single sample	weekly	6.5 - 9.0 pH	6.53 – 7.75
E. coli	weekly	100 organisms/100 mL (Monthly Geometric Mean Density)	6.2 – 62.6 organisms/100 mL (Monthly Geometric Mean

Single sample results that failed to meet effluent objectives are provided in the following table.

Date	**Parameter**	**Objective mg/L**	**Result mg/L**
February 11, 2022	E. coli	100 EC/100 mL	152
February 22, 2022	E. coli	100 EC/100 mL	108
March 1, 2022	TSS	10	12
May 25, 2022	TSS	10	11

Date	Parameter	Objective mg/L	Result mg/L
May 25, 2022	TP	0.40	0.62
September 29, 2022	E. coli	100 EC/100 mL	126
November 2, 2022	TSS	10	14

3. OVERFLOWS, BYPASSSING, UPSETS, SPILLS, AND ABNORMAL CONDITIONS

There were no overflows, bypassing, upsets, spills, or abnormal conditions in 2022.

There were no complaints in 2022.

4. MAINTENANCE OF WORKS

The operating and maintenance staff at the Ingersoll WWTP conducts regularly scheduled maintenance of the plant equipment. The Ingersoll WWTP utilizes a database known as Cartegraph to issue work orders and maintain records for regular maintenance and repair at the WWTP.

The Limited Operational Flexibility for modification to the wastewater treatment plant was used in 2022 for one project:

1. A co-digestion pilot study which commenced in 2021 was completed in 2022, to investigate the potential for full-scale implementation.

5. MONTIORING EQUIPMENT MAINTENANCE AND CALIBRATION

The calibration of flow meters is conducted annually by JBF Controls Ltd. in accordance with the requirements of the ECA. The records are kept on-site at the Ingersoll WWTP.

All other operational monitoring equipment is calibrated by staff and records are kept on-site at the Ingersoll WWTP.

6. BIOSOLIDS PROGRAM

Biosolids are anaerobically digested and dewatered at the Ingersoll WWTP using an Alfa-Laval Centrifuge. The biosolids are then stored at the County Biosolids Centralized Storage Facility (BCSF) prior to land application. The sampling results and land application details are summarized in a separate Biosolids Annual report, available at: www.oxfordcounty.ca/Services-for-You/Water-Wastewater/Wastewater/Annual-reports.

7. INSPECTION, PILOTS, AND TRIALS

The MECP did not perform an inspection of the Ingersoll WWTP in 2022. The MECP inspections typically occur on a 3-year schedule.

FOG Co-Digestion Study

A pilot study was initiated at the Ingersoll WWTP in September of 2021 concluding in July of 2022, the purpose of which was to explore the potential benefits of FOG (fats, oils, and grease) co-digestion in the Ingersoll WWTP anaerobic digester. Co-digestion of a readily available waste like FOG provides enhanced biogas production and quality. In addition, it carries the potential of revenue generation as renewable natural gas (RNG) and the environmental benefits of waste diversion from landfill. The study concluded that the FOG addition increased digester biogas production by approximately 80% along with greater volatile solids reduction through increased biological activity. The study was presented at the 2022 Water Environment Association of Ontario Canadian National Residuals and Biosolids Conference, held in September of 2022, and will be presented at the 2023 Annual Water Environment Association of Ontario (WEAO) Conference in April.

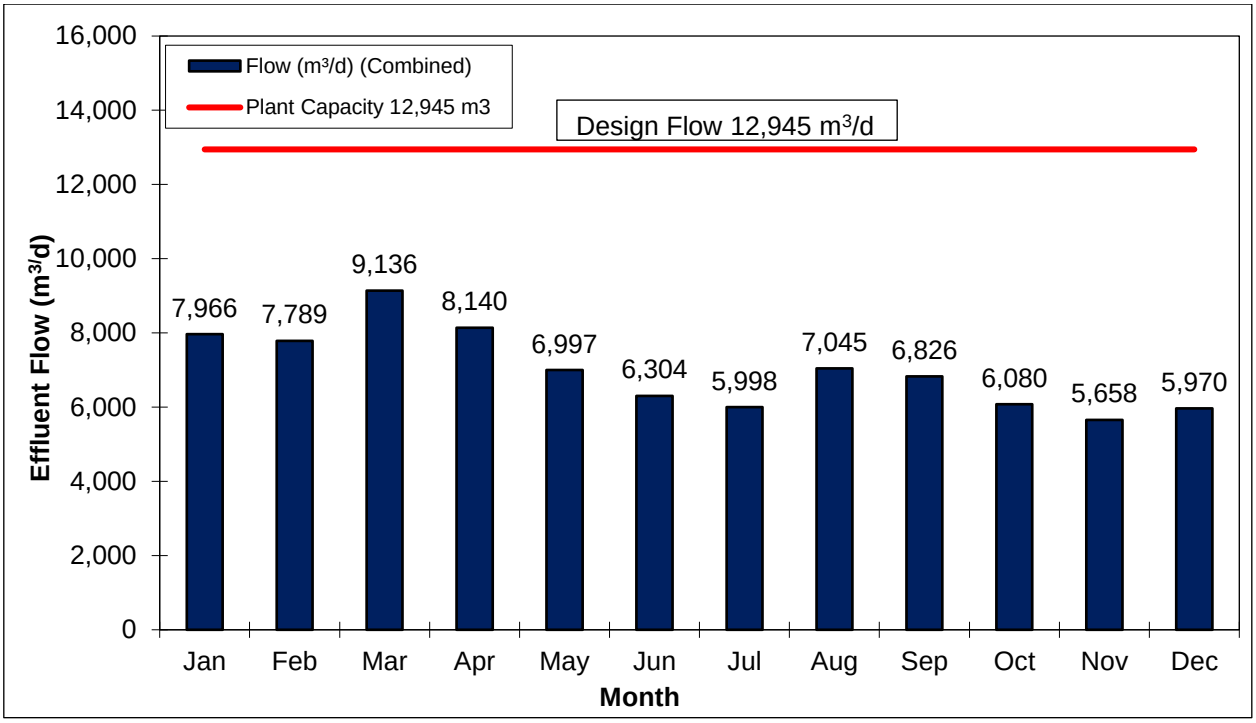
FOG co-digestion should be explored further on a larger scale to quantify the potential for renewable energy generation and waste diversion based on the following estimations:

- **Future Potential Biogas Conversion to Energy** – The current average biogas production without FOG is approximately 500 m^3/d, which based on the current trends shown by the FOG co-digestion is projected to increase by 80% at the maximum FOG loading to the digester. 80% increase from the current production translates into additional 400 m^3/d with a heat value of approximately 11 GJ/day. Biogas applications may include inputting biogas to off-site RNG pipeline or on-site WWTP utilization via combustion Combined Heat and Power (CHP) units or gas powered equipment to offset plant energy requirements.

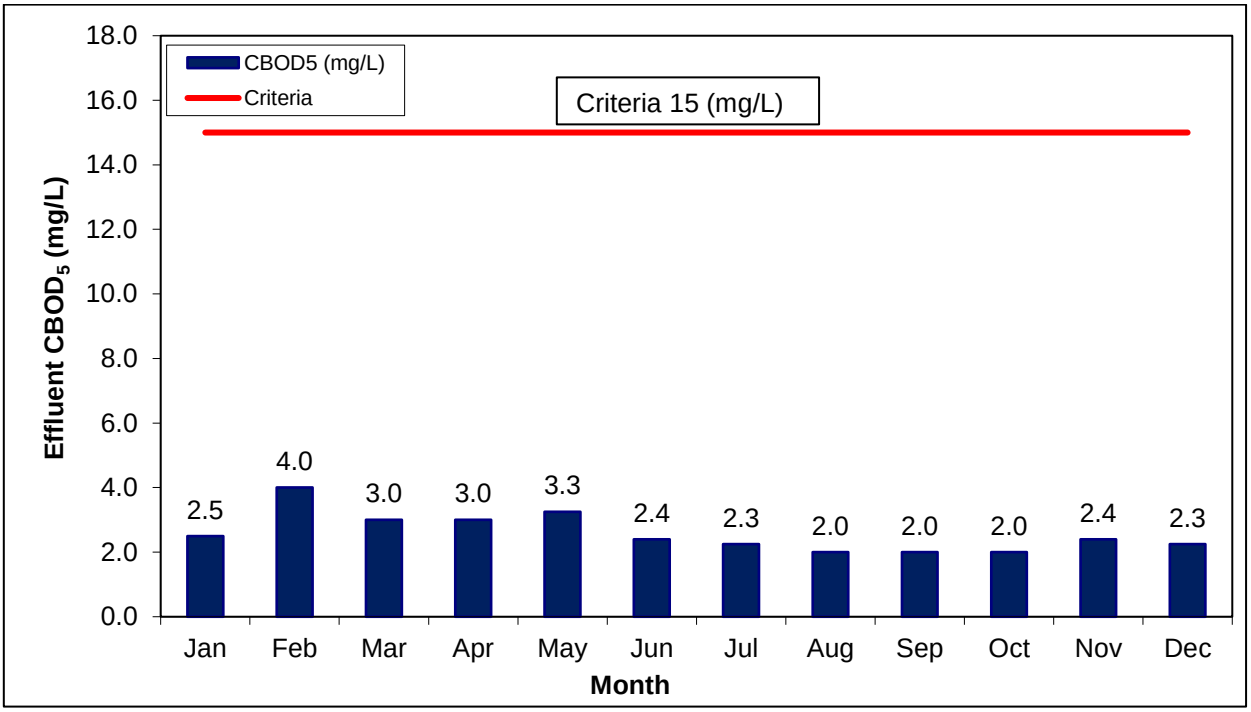
- **Future Potential GHG Emission Reduction** – FOG co-digestion is anticipated to reduce the production of dewatered biosolids by 10% (due to increased solids destruction within the anaerobic digester). This equates to reduced amount of trucking of this biosolids end-product to the Biosolids Centralized Storage Facility in Salford and an approximate reduction of 84 tCO2e of carbon dioxide emissions annually. In addition, the WWTP currently flares approximately 25% of its produced biogas (methane) production as off-gas. An opportunity exists to review the potential capture and utilization of this biogas amount which would further reduction carbon dioxide emissions by approximately 84 tCO2e of GHG per year.

APPENDIX A: GRAPHS OF 2022 DISCHARGE PARAMETERS VS. EFFLUENT DISCHARGE LIMITS

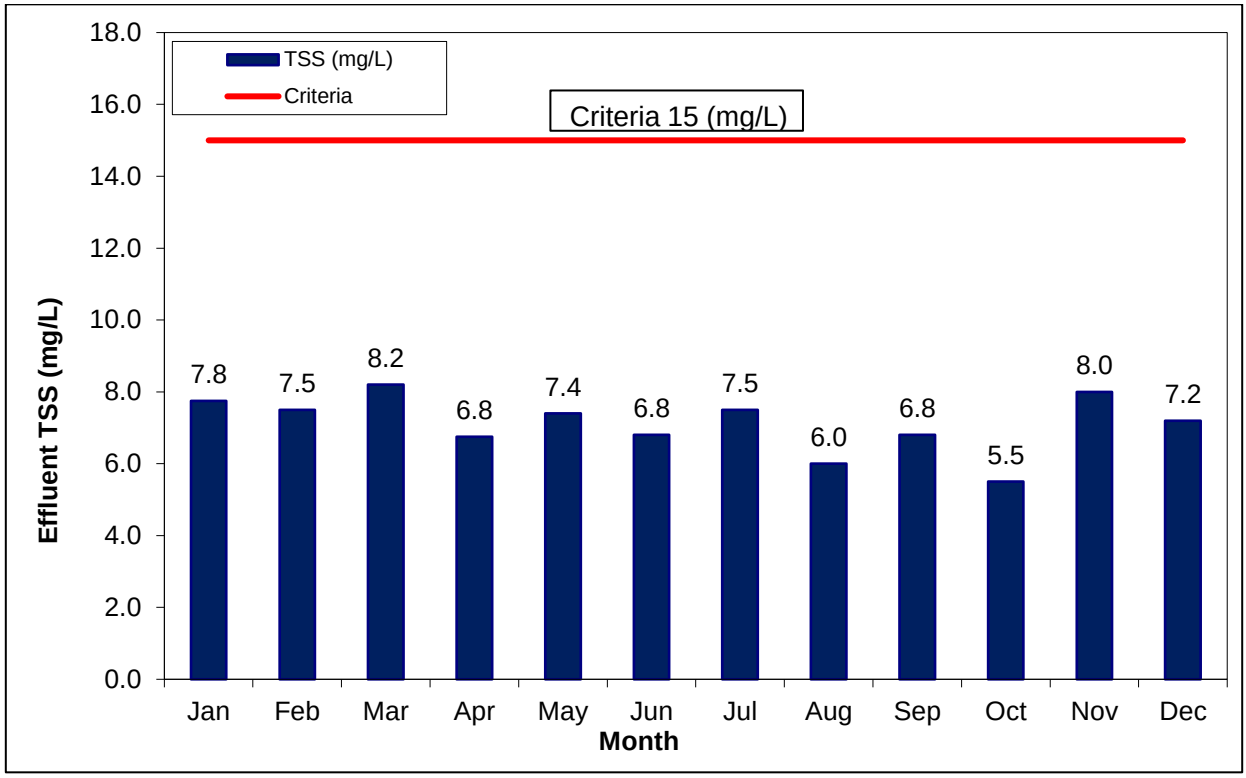
Ingersoll WWTP Monthly Average Daily Flow in Cubic Meters per Day, 2022



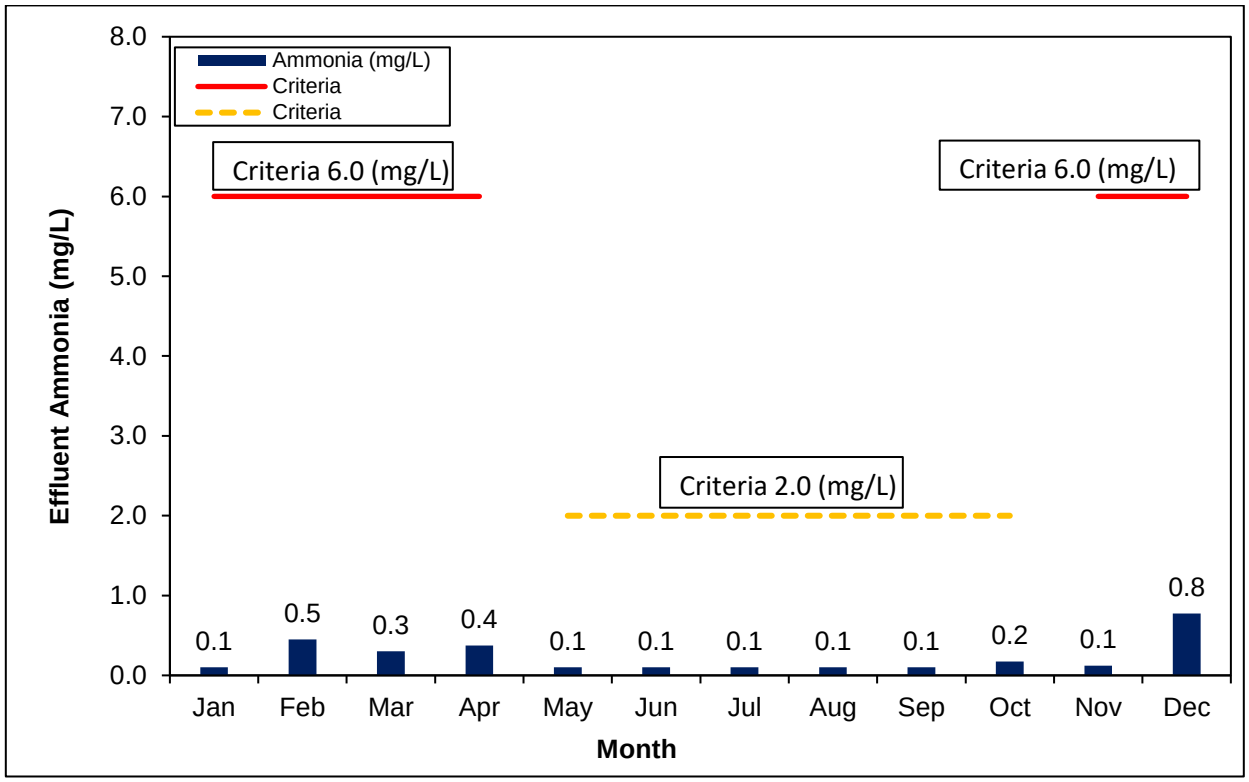
Ingersoll WWTP Effluent, Monthly Average $CBOD_5$ (mg/L), 2022



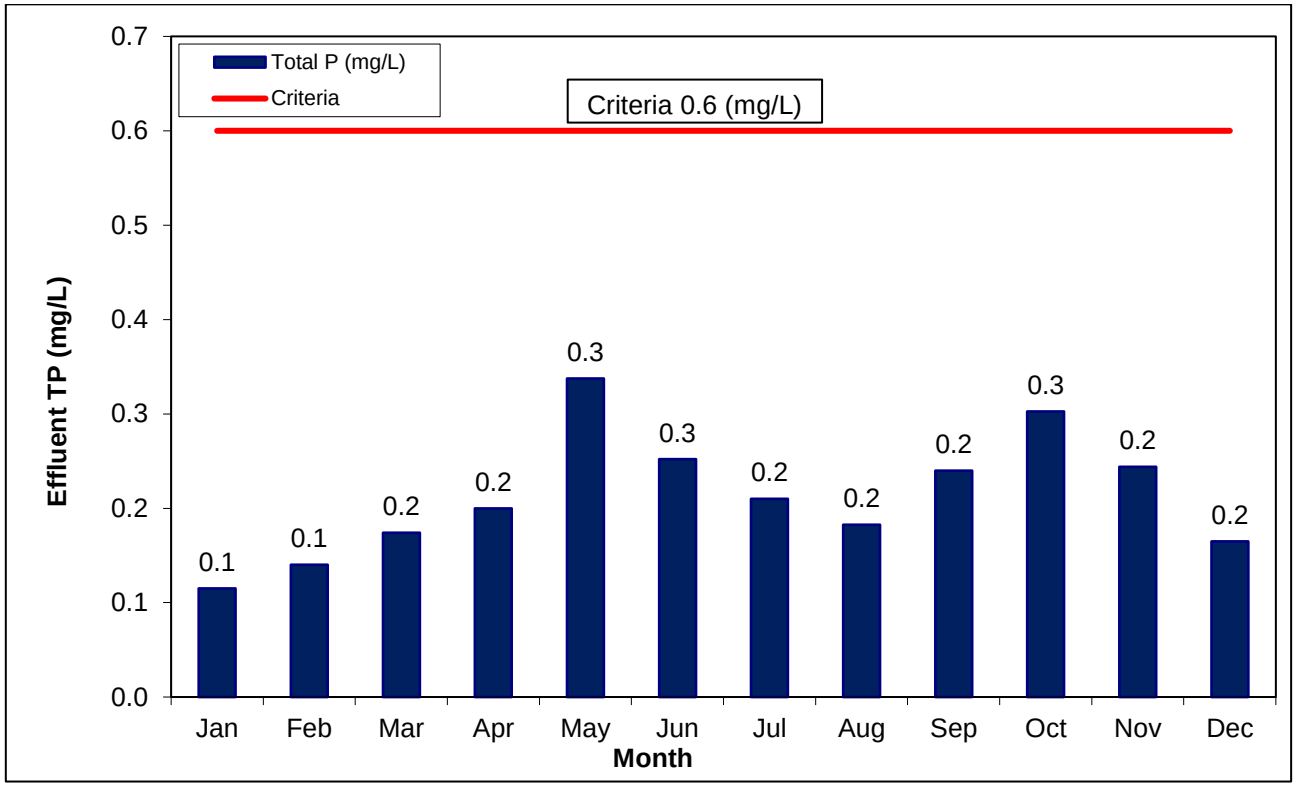
Ingersoll WWTP Effluent, Monthly Average TSS (mg/L), 2022



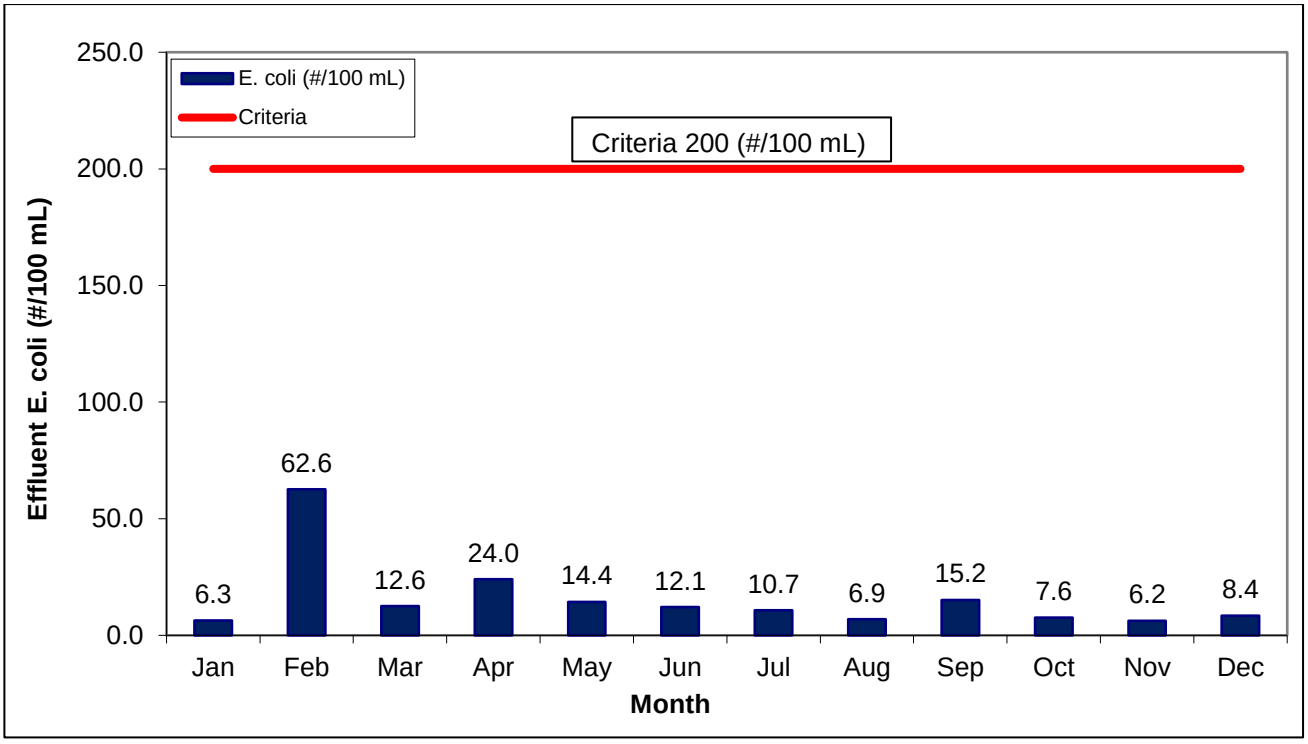
Ingersoll WWTP Effluent, Monthly Average Ammonia (mg/L), 2022



Ingersoll WWTP Effluent, Monthly Average Total Phosphorus (mg/L), 2022



Ingersoll WWTP Effluent, Monthly Geometric Mean Density E. coli (#/100 mL), 2022



2022 ANNUAL WASTEWATER TREATMENT SYSTEM SUMMARY REPORT

Mount Elgin Wastewater Treatment Plant

1. GENERAL INFORMATION

Oxford County (the County) prepares a report summarizing wastewater treatment operation and treated effluent discharge quality for every municipal wastewater treatment plant (WWTP) annually. The reports detail the latest effluent quality testing results and quantity statistics, and any non-compliance conditions that may have occurred for the previous year. They are available for review by the end of March on the County website at http://www.oxfordcounty.ca/waterwastewater or by contacting the Public Works Department.

All efforts have been made to ensure the information presented in this report is as accurate as possible.

If you have any questions or comments concerning the report, please contact the County at the address and phone number listed below or by email at wastewater@oxfordcounty.ca.

Wastewater Treatment Plant: Mount Elgin WWTP
Wastewater Treatment Plant Number: 20002870
Environmental Compliance Approval (ECA): 0611-6Q3JQL (May 25, 2006)
Reporting Period: January 1, 2022 – December 31, 2022

Wastewater Treatment Plant Owner & Contact Information:

Oxford County Public Works Department - Wastewater Services
P.O. Box 1614
21 Reeve Street
Woodstock, ON N4S 7Y3
Telephone: 519-539-9800
Toll Free: 866-537-7778
Email: wastewater@oxfordcounty.ca

1.1 System Description

The Mount Elgin WWTP consists of a central Recirculating Sand Filter (RSF) and subsurface discharge. The wastewater collection system includes 2 sewage pumping stations, 5.7 kilometers of sanitary gravity sewers, 0.2 kilometers of sanitary forcemain sewers and 1.3 kilometers of sanitary low pressure sewers. Within the wastewater collection system, individual properties are serviced by septic tanks where sewage is pretreated to remove solids and grease before discharge to a small diameter variable grade sewer. The small diameter collection mains direct the primary treated effluent to a sewage pumping station.

At the WWTP the primary treated effluent is pumped to the recirculation tanks. The influent is pumped to the recirculating sand filter and then collected and pumped to a splitter valve that allows 80% of the flow to recirculate and 20% to enter the dosing tank. From the dosing tank, treated effluent is pumped to the shallow buried trench drain field that provides for the subsurface discharge of the treated effluent. Effluent samples are collected from the dosing tank ahead of the drain field.

A standby generator is available to power the plant in case of a power failure.

The system is maintained by licensed wastewater system operators and licensed mechanics that operate, monitor, and maintain the treatment equipment, in accordance to the regulations, and collect samples as required by the ECA. Alarms automatically notify operators in the event of failure of critical operational requirements.

Facility	Mount Elgin WWTP
Design Capacity	190.5 m^3/d
2022 Average Daily Flow	88 m^3/d
2022 Maximum Daily Flow	280 m^3/d
2022 Total Volume of Wastewater	31,914 m^3/year

1.2 Major Expenses

In 2022, the Mount Elgin WWTP had forecasted operating and maintenance expenditures of approximately $221,000.

In addition to regular operational and maintenance expenditures, Capital Improvement Projects for Mount Elgin were forecasted at $244,000 for improvements to the wastewater collection system and the Mount Elgin WWTP.

Capital Improvement Projects included:

- $20,000 for servicing projects

- $219,000 for Mount Elgin WWTP expansion design work
- $5,000 for the replacement of general operating equipment

Capital Improvement Projects for all systems included:

- $625,000 to develop Countywide SCADA Master Plan for all wastewater systems
- $150,000 to develop Countywide Wastewater Servicing Master Plan for all wastewater systems

2. SUMMARY AND INTERPRETATION OF MONITORING DATA

2.1. Effluent Quality Assurance and Control Measures

Sampling Procedure

Grab samples are collected from the influent lift station every three months. Samples are tested for Carbonaceous Biochemical Oxygen Demand ($CBOD_5$), Total Suspended Solids (TSS), Total Phosphorus (TP), and Total Kjeldahl Nitrogen (TKN).

Effluent grab samples are analyzed for $CBOD_5$, TSS, TP, ammonia, TKN, nitrite, nitrate, pH, and E. coli every three months at a minimum.

Groundwater testing for nitrite, nitrate, chloride and pH are completed every three months.

Laboratory and Field Testing

All samples for parameters used to evaluate compliance are analyzed by a licensed laboratory except for pH, which is tested in the field during collection. Laboratory analysis is performed by SGS Lakefield Research Ltd. Any other information generated in-house is used in process control but is not included in this report.

2.2 WWTP Performance and Effluent Quality

Influent Streams and Effluent Streams

The Mount Elgin WWTP provided effective treatment in 2022, and was 100% compliant with all its final effluent objectives.

There are no effluent limits for the system, however, the ECA requires the County to use best efforts to operate the Mount Elgin WWTP with the objective that the concentrations of both $CBOD_5$ and Suspended Solids do not exceed 10 mg/L in the effluent ahead of the subsurface disposal system. The County is also required to collect grab samples of raw sewage, effluent ahead of the subsurface disposal system, and groundwater in monitoring wells around the Mount Elgin WWTP.

Graphs of discharge parameters versus effluent discharge limit are included in this report in Appendix A.

Influent wastewater characteristics and groundwater sampling results are presented in the tables below.

Groundwater Monitoring Well Results:

Influent Wastewater Characteristics		
Parameter	**Concentration mg/L**	**Loading kg/d**
$CBOD_5$	104	9.2
Total Suspended Solids (TSS)	55	4.8
Total Phosphorus (TP)	7.7	0.7
Total Kjeldahl Nitrogen	83	7.3

2022						
	Well 1	**Well 2**	**Well 3**	**Well 1**	**Well 2**	**Well 3**
Parameter	**March 22/22**	**March 22/22**	**March 22/22**	**June 16/22**	**June 16/22**	**June 16/22**
Well Level (meters)	3.2	3.28	3.4	1.66	2.98	2.93
Nitrite (mg/L N)	0.03	0.04	0.03	0.03	0.44	0.03
Nitrate (mg/L N)	0.06	0.56	14.9	0.06	0.44	15.3
Nitrate+Nitrite (mg/L N)	0.06	0.60	14.9	0.06	0.88	15.3
Chloride (mg/L)	29	270	170	47	230	170
pH	7.16	7.36	7.48	7.42	7.43	7.52
	Well 1	**Well 2**	**Well 3**	**Well 1**	**Well 2**	**Well 3**
Parameter	**Sept. 14/22**	**Sept. 14/22**	**Sept. 14/22**	**Dec. 7/22**	**Dec. 7/22**	**Dec. 7/22**
Well Level (meters)	1.66	2.91	3.06	2.6	2.96	2.85
Nitrite (mg/L N)	0.03	0.30	0.05	0.03	0.07	0.1
Nitrate (mg/L N)	0.06	16.4	9.26	0.07	27.1	19.1
	Well 1	**Well 2**	**Well 3**	**Well 1**	**Well 2**	**Well 3**

2022							
Parameter	**Sept. 14/22**	**Sept. 14/22**	**Sept. 14/22**		**Dec. 7/22**	**Dec. 7/22**	**Dec. 7/22**
Nitrate+Nitrite (mg/L N)	0.06	16.7	9.31		0.07	27.2	19.2
Chloride (mg/L)	25	260	220		130	300	290
pH	8.61	7.41	7.33		7.43	7.34	7.42
Well depths	3.66 m	3.96 m	3.96 m				

The County is moving forward with an update to the groundwater monitoring program at the Mount Elgin WWTP. That update is to include the addition of new monitoring wells at the site. Oxford County's Hydrogeologist has reviewed all monitoring well data, and will continue to monitor groundwater results on our behalf.

2.3 Final Effluent Design Objectives

Objectives are non-enforceable effluent quality values which the Owner is obligated to use best efforts to strive towards achieving on an ongoing basis. These objectives are to be used as a mechanism to trigger corrective action proactively, and voluntarily before environmental impairment occurs and before the compliance limits are exceeded.

All effluent discharge objectives listed in the Mount Elgin WWTP ECA were met in 2022.

The following table presents the range of effluent discharge values vs. ECA Objectives ahead of the subsurface disposal system.

Effluent Parameter	Sample Frequency	Annual Average Objective Concentration mg/L	Quarterly Results Min-Max mg/L
$CBOD_5$	quarterly	10	4.0 – 8.0
Suspended Solids	quarterly	10	3.0 – 5.5

3. OVERFLOWS, BYPASSSING, UPSETS, SPILLS, AND ABNORMAL CONDITIONS

There were no overflows, bypassing, upsets, spills, or abnormal conditions for 2022.

There were no complaints in 2022.

4. MAINTENANCE OF WORKS

The operating and maintenance staff at the Ingersoll WWTP conducts regularly scheduled maintenance of the WWTP equipment. The Mount Elgin WWTP utilizes a database system known as Cartegraph to issue work orders and maintain records for regular maintenance and repair at the WWTP.

5. MONTIORING EQUIPMENT MAINTENANCE AND CALIBRATION

The calibration of flow meters was conducted by JBF Controls Ltd. in accordance with the requirements of the Mount Elgin WWTP ECA. The records are kept on-site at the Mount Elgin WWTP.

All other operational monitoring equipment was calibrated by staff and records are kept on-site at the Mount Elgin WWTP.

6. INSPECTION, PILOTS, AND TRIALS

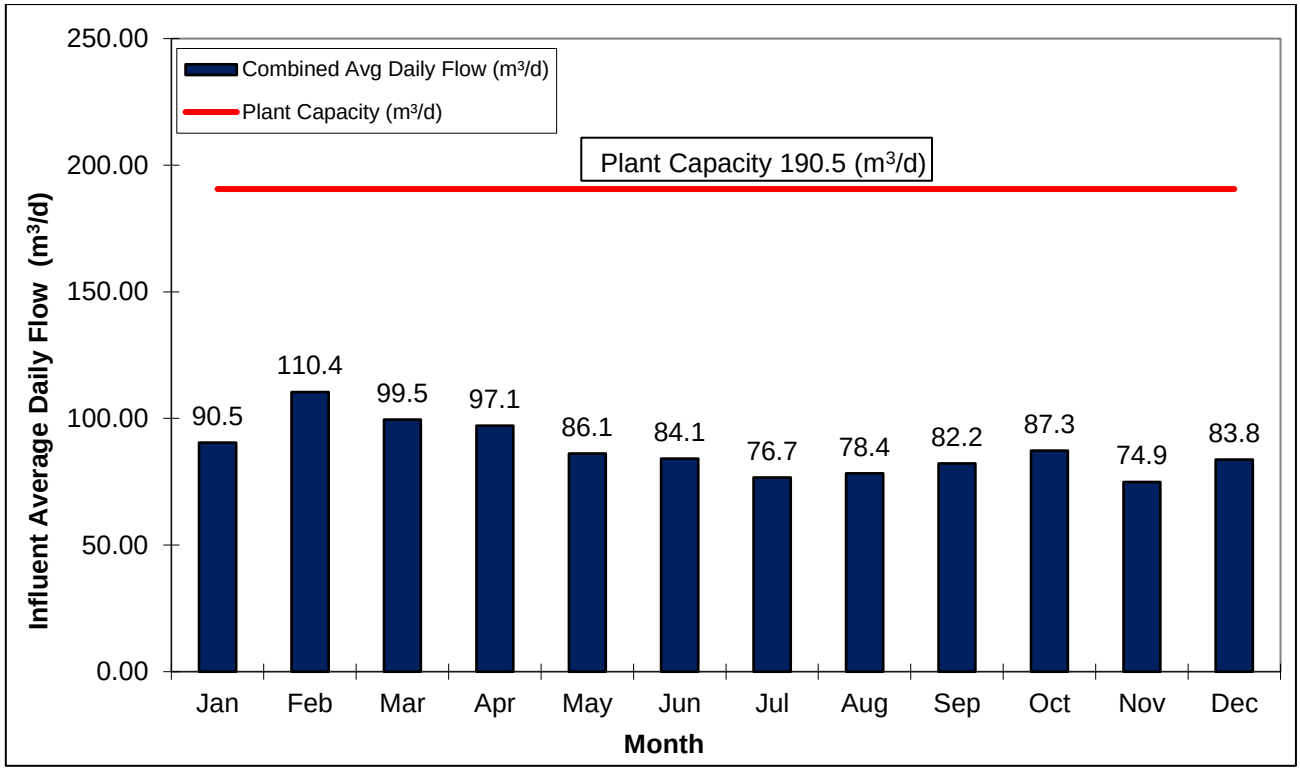
The MECP did not conduct an inspection of the Mount Elgin WWTP in 2022. MECP inspection typically occurs every three years.

WWTP Expansion

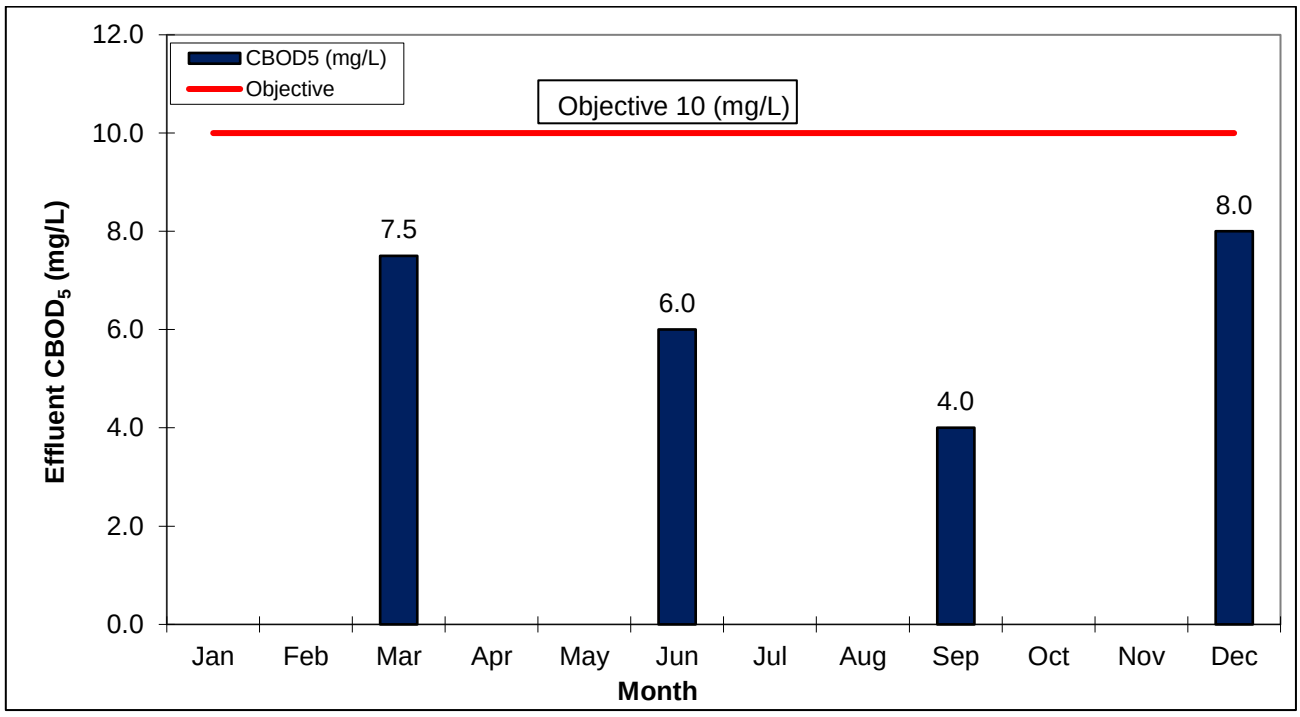
To meet the future wastewater treatment servicing needs of the community, design work commenced in 2022 for the Phase 3 and 4 expansion of the Mount Elgin WWTP, increasing the rated capacity of the system from 190.5 m^3/d to 381 m^3/d. The project includes a flow equalization tank, additional sand filters and disposal beds as well as an electrical upgrade. Construction initiation is planned for later in 2023.

APPENDIX A: GRAPHS OF 2022 DISCHARGE PARAMETERS VS. EFFLUENT DISCHARGE LIMITS

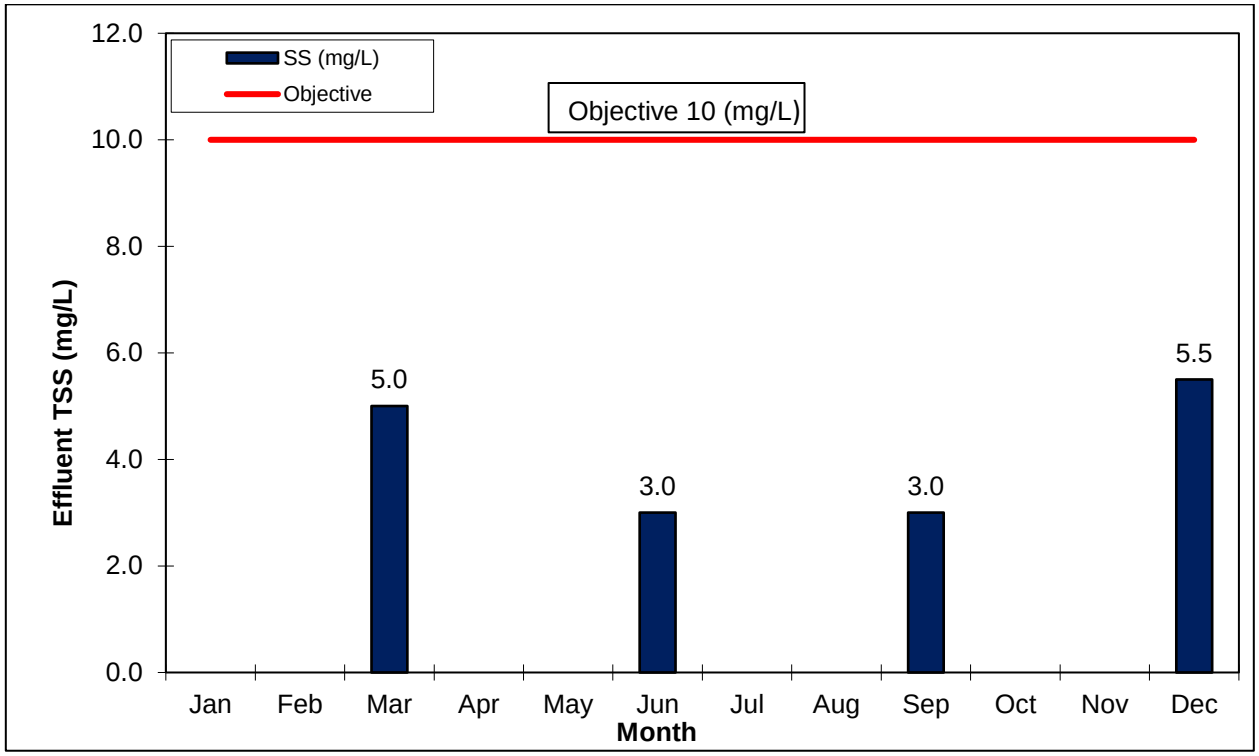
Mount Elgin WWTP Influent Monthly Average Daily Flow in Cubic Meters per Day, 2022



Mount Elgin WWTP Effluent $CBOD_5$ (mg/L), 2022



Mount Elgin WWTP Effluent TSS (mg/L), 2022



2022 ANNUAL WASTEWATER TREATMENT SYSTEM SUMMARY REPORT

Norwich Wastewater Treatment Plant

1. GENERAL INFORMATION

Oxford County (the County) prepares a report summarizing wastewater treatment operation and treated effluent discharge quality for every municipal wastewater treatment plant (WWTP) annually. The reports detail the latest effluent quality testing results and quantity statistics, and any non-compliance conditions that may have occurred for the previous year. They are available for review by the end of March on the County website at http://www.oxfordcounty.ca/waterwastewateror by contacting the Public Works Department.

All efforts have been made to ensure the information presented in this report is as accurate as possible.

If you have any questions or comments concerning the report, please contact the County at the address and phone number listed below or by email at wastewater@oxfordcounty.ca.

Wastewater Treatment Plant: Norwich WWTP
Wastewater Treatment Plant Number: 110001480
Environmental Compliance Approval (ECA): 1680-6F6QR5 (August 31, 2005)
Reporting Period: January 1, 2022 – December 31, 2022

Wastewater Treatment Plant Owner & Contact Information:

Oxford County Public Works Department - Wastewater Services
P.O. Box 1614
21 Reeve Street
Woodstock, ON N4S 7Y3
Telephone: 519-539-9800
Toll Free: 866-537-7778
Email: wastewater@oxfordcounty.ca

1.1 System Description

The Norwich WWTP is a Class I facility as defined by Ontario Regulation (O.Reg.) 129/04. The Norwich WWTP is a lagoon wastewater treatment system serving the community of Norwich. The nominally separated wastewater collection system includes 4 sewage pumping stations, 28.1 kilometers of sanitary gravity sewers, 4.5 kilometers of sanitary forcemain sewers and 0.6 kilometers of sanitary low pressure sewers. The wastewater is pumped from the collection system to a splitter box; then to either of two lagoon cells as determined by the operator. Typically the wastewater is directed to the North Cell which is operated in series with the South Cell, followed by filtering of the effluent through the sand filter beds performed for a period each day, as required. The lagoons may discharge year-round; however, the freezing period prevents discharge through the filter beds (normally December to April).

The system is maintained by licensed wastewater system operators and licensed mechanics that operate, monitor, and maintain the treatment equipment, in accordance to the regulations, and collect samples as required by the ECA. Alarms automatically notify operators in the event of failure of critical operational requirements.

The Norwich WWTP is located at Lot 7, Conc. 5, Norwich Township, Ontario, with the Facility description provided below.

Facility	Norwich WWTP
Design Capacity	1,530 m^3/d
2022 Average Daily Flow	1,017 m^3/d
2022 Maximum Daily Flow	5,194 m^3/d
2022 Total Volume of Wastewater	370,119 m^3/year

1.2 Major Expenses

In 2022, the Norwich WWTP had forecasted operating and maintenance expenditures of approximately $474,000.

In addition to regular operational and maintenance expenditures, Capital Improvement Projects for the Town of Norwich were forecasted at $1,222,000 which included improvements to the wastewater collection systems and the Norwich WWTP.

Capital Improvement Projects included:

- $120,000 for Norwich WWTP Class EA Study
- $1,050,000 for sanitary sewer replacement
- $2,500 for facilities upgrades
- $49,000 for the replacement of general operating equipment

Capital Improvement Projects for all systems included:

- $625,000 to develop Countywide SCADA Master Plan for all wastewater systems
- $150,000 to develop Countywide Wastewater Servicing Master Plan for all wastewater systems

2. SUMMARY AND INTERPRETATION OF MONITORING DATA

2.1. Effluent Quality Assurance and Control Measures

Sampling Procedure

Influent samples are taken from the WWTP influent splitter box. The sampling frequency is once per week and samples are tested for Biochemical Oxygen Demand (BOD_5), Total Suspended Solids (TSS) monthly, Total Phosphorus (TP), and Total Kjeldahl Nitrogen (TKN) weekly.

Effluent samples are taken using a 24-hour composite sampler set to take a sample every 15 minutes for the duration of the discharge period. BOD_5, TKN and TSS are sampled at least monthly. TP, ammonia, pH, and temperature samples are taken three times per week. E. coli and dissolved oxygen (DO) are tested at least weekly.

Laboratory and Field Testing

Sample results that are used to determine the WWTP compliance are analyzed at a licensed laboratory. Laboratory analysis is performed by SGS Lakefield Research Ltd. on all samples for all parameters except for pH, temperature, and DO which are tested in the field during collection. Any information generated in-house is used in process control but is not included in this report.

2.2 WWTP Performance and Effluent Quality

Final Effluent Compliance Limits

Compliance limits are defined as the maximum effluent concentrations permitted for a given parameter set by the Ministry of Environment, Conservation and Parks (MECP). Compliance limits are detailed within each WWTP ECA. The limits are determined to prevent impairment to the receiving water body quality. The Owner is legally obligated to operate and maintain the treatment system to ensure the compliance limits are achieved.

The Norwich WWTP provided effective treatment in 2022, and was 99 % in compliance with all its regulatory limits for all effluent discharged from the WWTP.

On February 17 a non-compliance event occurred, as a daily influent flow of 5,194 m^3 was recorded which exceeded the ECA peak flow limit of 5,160 m^3/d. The high flow was a result of significant precipitation and subsequent snow melt. No operational

issues resulted. All non-compliances were reported to the Ministry of Environment, Conservation and Parks (MECP) at the time of the event.

Influent Streams and Effluent Streams

The operator measures pH of both the influent and effluent streams. There was no single pH result for the effluent outside the discharge limit of 6 to 9.5 in 2022.

In 2022, chlorine was not used at the Norwich WWTP.

There were no single sample un-ionized ammonia effluent results or monthly average un-ionized ammonia effluent results above the ECA limits in 2022.

Graphs of discharge parameters versus effluent discharge limits are included in this report in Appendix A.

Influent wastewater characteristics and effluent discharge values are presented in the tables below.

Influent Wastewater Characteristics		
Parameter	**Concentration mg/L**	**Loading kg/d**
BOD_5	157	160
TSS	171	174
TP	3.3	3.4
TKN	24	24

Effluent Parameter	Sample Frequency (when discharging)	ECA Effluent Limit (Monthly Average) (mg/L unless otherwise indicated)	Monthly Average Result Min-Max (mg/L unless otherwise indicated)	Percentage Removal
Biochemical Oxygen Demand (BOD_5)	monthly	10	2.0 – 4.0	97.5 – 98.7
Total Suspended Solids (TSS)	monthly	10	2.5 – 6.0	96.5 – 98.5
Total Phosphorus (TP) (non-freezing period)*	3/week	0.5	0.16 – 0.23	93.0 – 95.2
Total Phosphorus (TP) (freezing Period)*	3/week	1	0.18 – 0.20	93.9 – 94.5
Total Ammonia Nitrogen (TAN) (non-freezing period)*	3/week	3	0.3 – 1.8	--
Total Ammonia Nitrogen (TAN) (freezing period)*	3/week	5	1.6 – 1.7	--
E. coli	weekly	200 organisms/100 mL (monthly Geometric Mean Density)	5 – 150 organisms/100 mL (monthly Geometric Mean Density)	--
Dissolved Oxygen (DO)	weekly	4.0	5.7 – 8.8	--
pH any single sample	3/week	6.0 - 9.5	7.08 – 8.15	--
Total Ammonia Nitrogen any single sample (non-freezing period)*	3/week	5.0	0.1 – 3.5	--
Total Ammonia Nitrogen any single sample (freezing period)*	3/week	8.0	0.1 – 3.7	--
Un-ionized Ammonia any single sample		0.2	0.001 – 0.012	--

* Freezing period means the period of time during which the water temperature of the receiving stream is equal to or below 5 degrees Celsius, normally from December 1 to April 30. In 2022, the temperature of the receiving stream was above 5 degrees Celsius from April 1 to November 30

2.3 Final Effluent Design Objectives

Final Effluent Design Objectives (objectives) are non-enforceable effluent quality values which the Owner is obligated to use best efforts to strive towards achieving on an ongoing basis. These objectives are to be used as a mechanism to trigger corrective action proactively, and voluntarily, before environmental impairment occurs and before the compliance limits are exceeded.

In 2022, the monthly objectives that were not met at the Norwich WWTP were:

- The monthly average concentration objective related to TSS of 5 mg/L for the month of December
- The monthly average concentration objective related to TSS loading of 11.8 kg/d for the month of December

Various operational processes are adjusted to try and meet effluent objectives. In December, recycling of the sand filter effluent was increased in an attempt to meet the effluent TSS objective concentration and loading.

The following table presents the range of effluent discharge values vs. ECA Objectives.

Effluent Parameter	**Sample Frequency** (when discharging)	**Monthly Average Objective Concentration** (mg/L unless otherwise indicated)	**Monthly Average Result Min-Max** (mg/L unless otherwise indicated)
BOD_5	monthly	5	2.0 – 4.0
TSS	monthly	5	2.5 – 6.0
TP (non-freezing period) *	3/week	0.3	0.16 – 0.23
TP (freezing period)*	3/week	0.8	0.18 – 0.20
Total Ammonia Nitrogen (non-freezing period) *	3/week	2	0.3 – 1.8
Total Ammonia Nitrogen (freezing period)*	3/week	4	1.6 – 1.7
E. coli	weekly	150 organisms/100 mL (monthly Geometric Mean Density)	5 – 150 organisms/100 mL (monthly Geometric Mean Density)
* Freezing period means the period of time during which the water temperature of the receiving stream is equal to or below 5 degrees Celsius, normally from December 1 to April 30. For 2022, the temperature of the receiving stream was above 5 degrees Celsius from April 1 to November 30.			

Effluent monthly average concentration and monthly average loading objective exceedances in 2022 included the following:

Date	**Parameter**	**Objective mg/L**	**Result mg/L**
December 2022	TSS	5	6
December 2022	TSS loading	11.8 kg/d	16.6 kg/d

3. OVERFLOWS, BYPASSSING, UPSETS, SPILLS, AND ABNORMAL CONDITIONS

On November 30, an inlet valve was left open during commissioning at the Herb Street sewage pump station (SPS) in Norwich. A precautionary spills report was submitted to the MECP detailing the event, indicating the overflow had no volume or duration as development had yet to occur in the area.

There were no additional overflows, bypasses, or spills in 2022.

There were no complaints received in 2022.

4. MAINTENANCE OF WORKS

The operating and maintenance staff at the Norwich WWTP conducts regularly scheduled maintenance of the WWTP equipment. The Norwich WWTP utilizes a database, known as Cartegraph to issue work orders and maintain records for regular maintenance and repair at the Norwich WWTP.

5. MONTIORING EQUIPMENT MAINTENANCE AND CALIBRATION

The calibration of flow meters was conducted by JBF Controls Ltd. in accordance with the requirements of the ECA. The records are kept on-site at the Norwich WWTP.

All other operational monitoring equipment is calibrated by staff and records are kept on-site at the Norwich WWTP.

6. INSPECTION, PILOTS, AND TRIALS

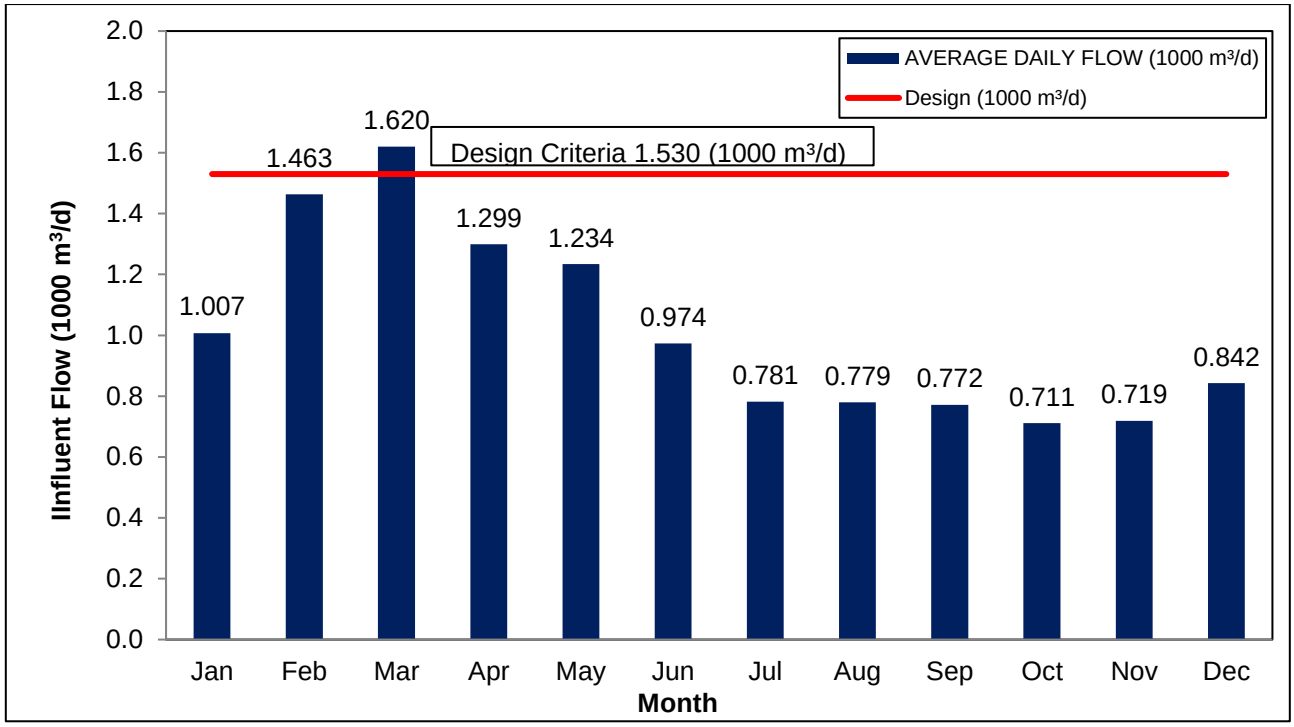
The MECP did not perform an inspection of the Norwich WWTP in 2022. The MECP inspections typically occur on a 3-year schedule.

Municipal Class Environmental Assessment Study

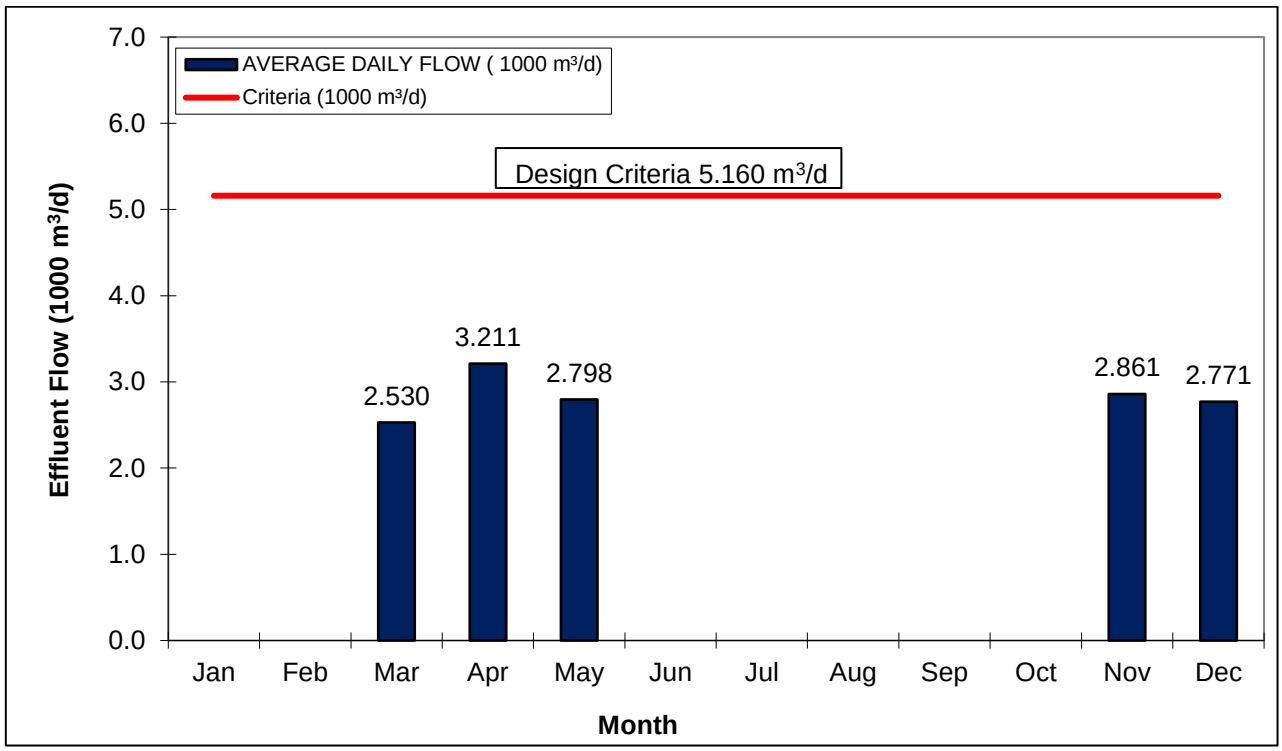
In response to approved future growth in the Township of Norwich, and associated projected increases in Norwich WWTP flow rates, the County re-initiated the Class EA Study for capacity expansion of the Norwich WWTP. The study will determine the most cost-effective, environmentally sound, and sustainable approach to expand the Norwich WWTP to meet the wastewater servicing needs of the community within the 25-year planning horizon. The study is expected to be completed in 2023.

APPENDIX A: GRAPHS OF 2022 DISCHARGE PARAMETERS VS. EFFLUENT DISCHARGE LIMITS

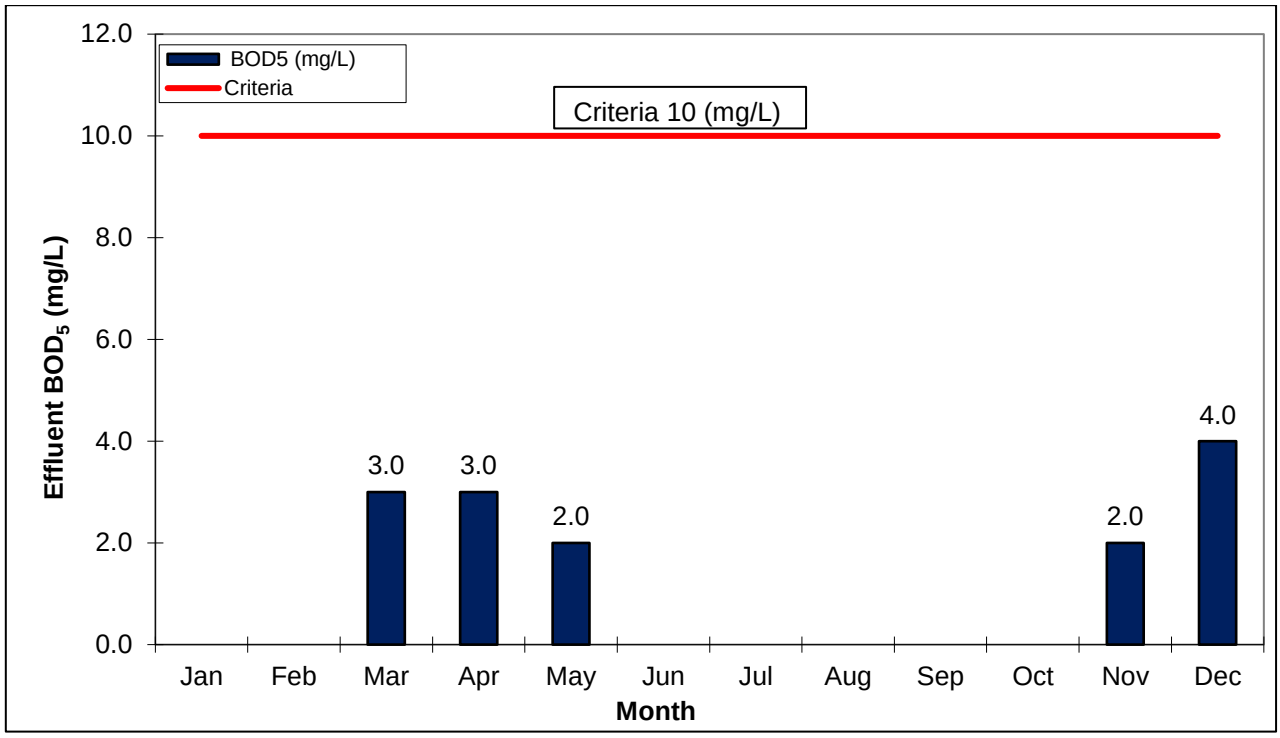
Norwich WWTP Influent, Monthly Average Daily Flow (1000 m^3/d), 2022



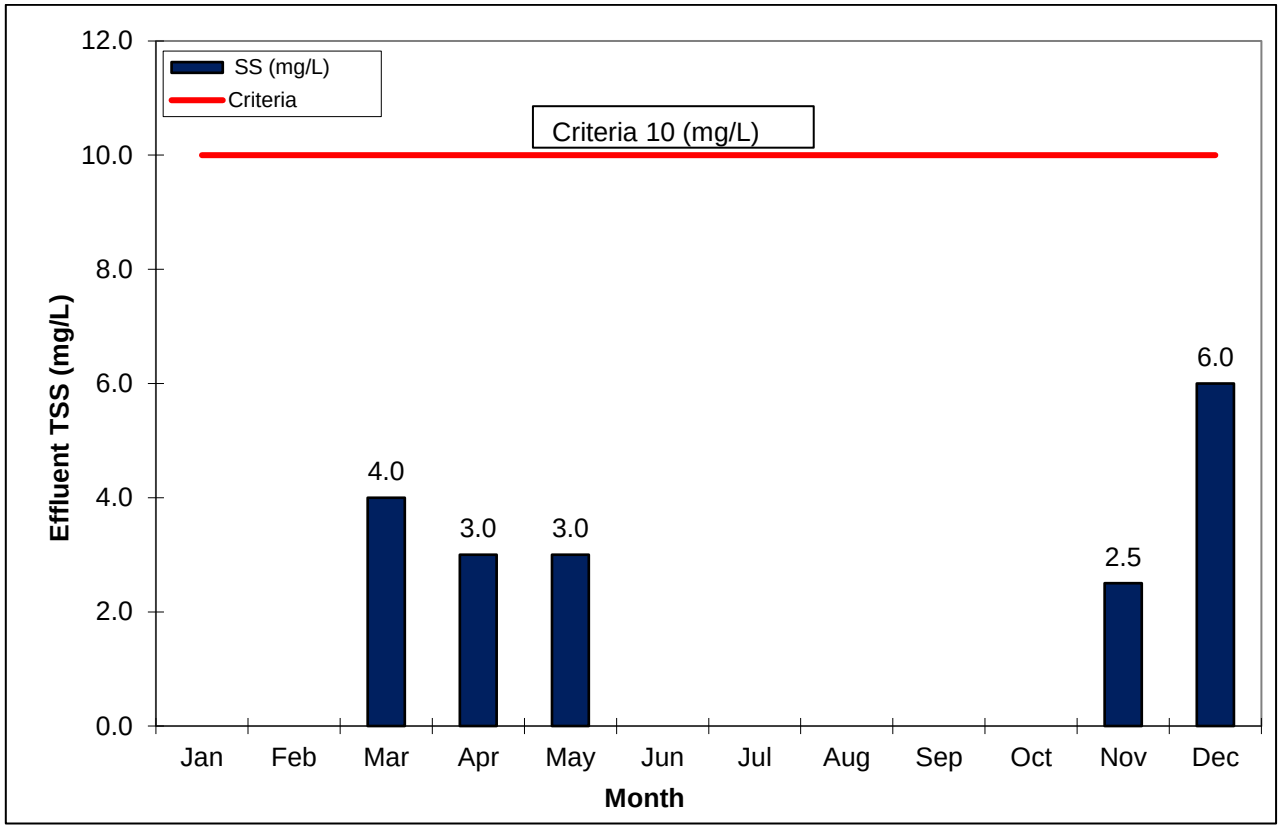
Norwich WWTP Effluent, Monthly Average Daily Flow (1000 m^3/d), 2022



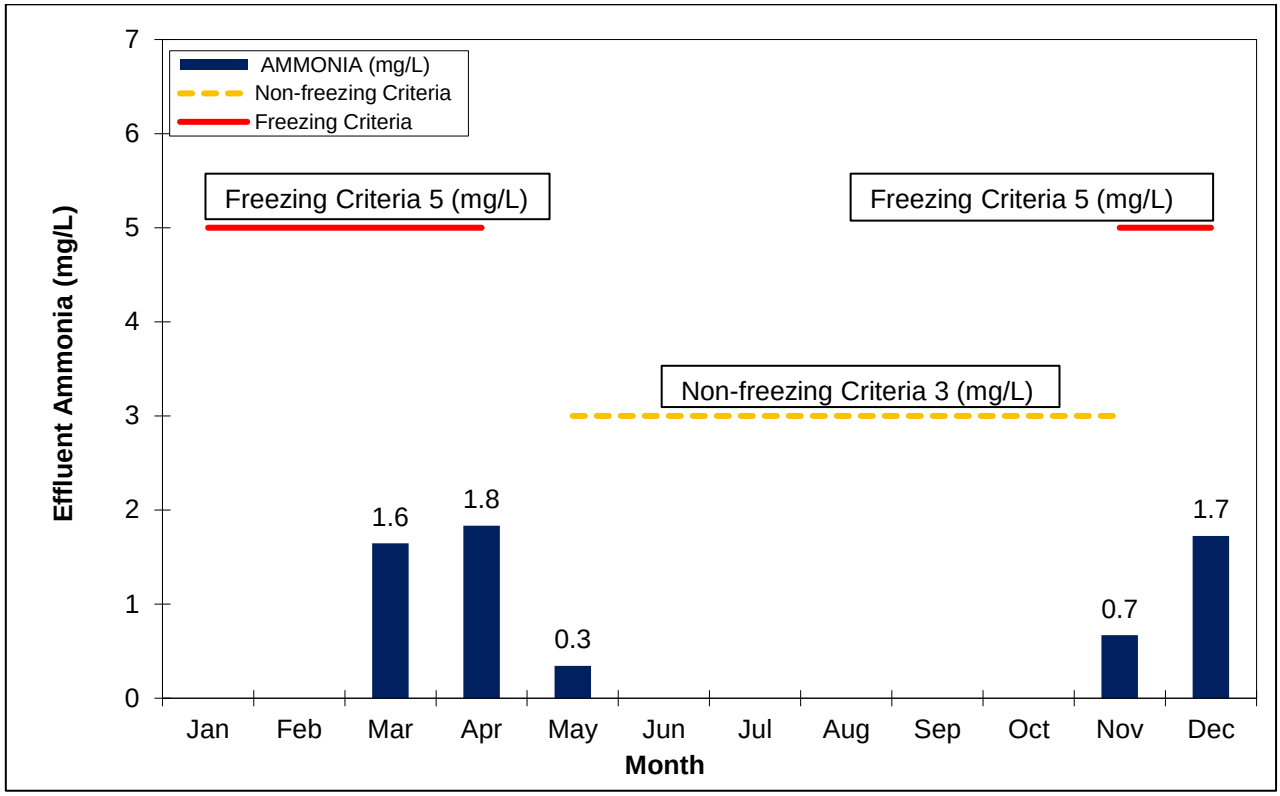
Norwich WWTP Effluent, Monthly Average BOD_5 (mg/L), 2022



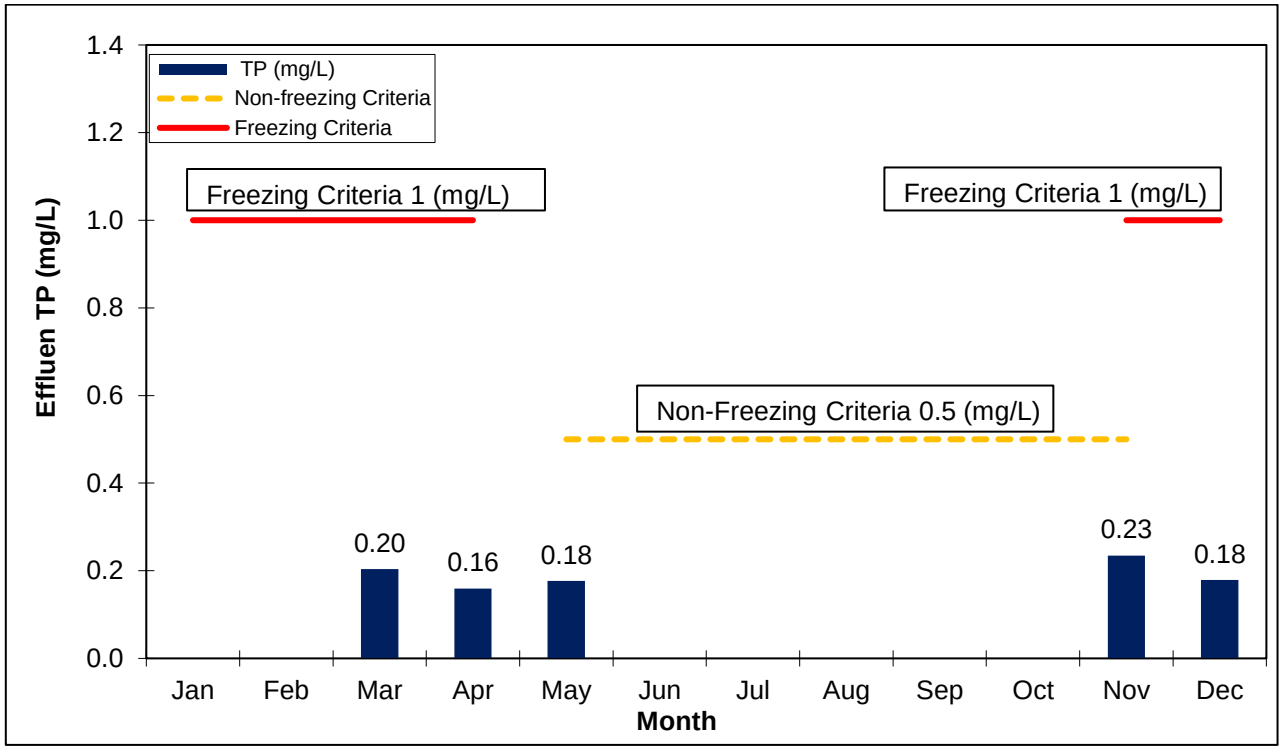
Norwich WWTP Effluent, Monthly Average TSS (mg/L), 2022



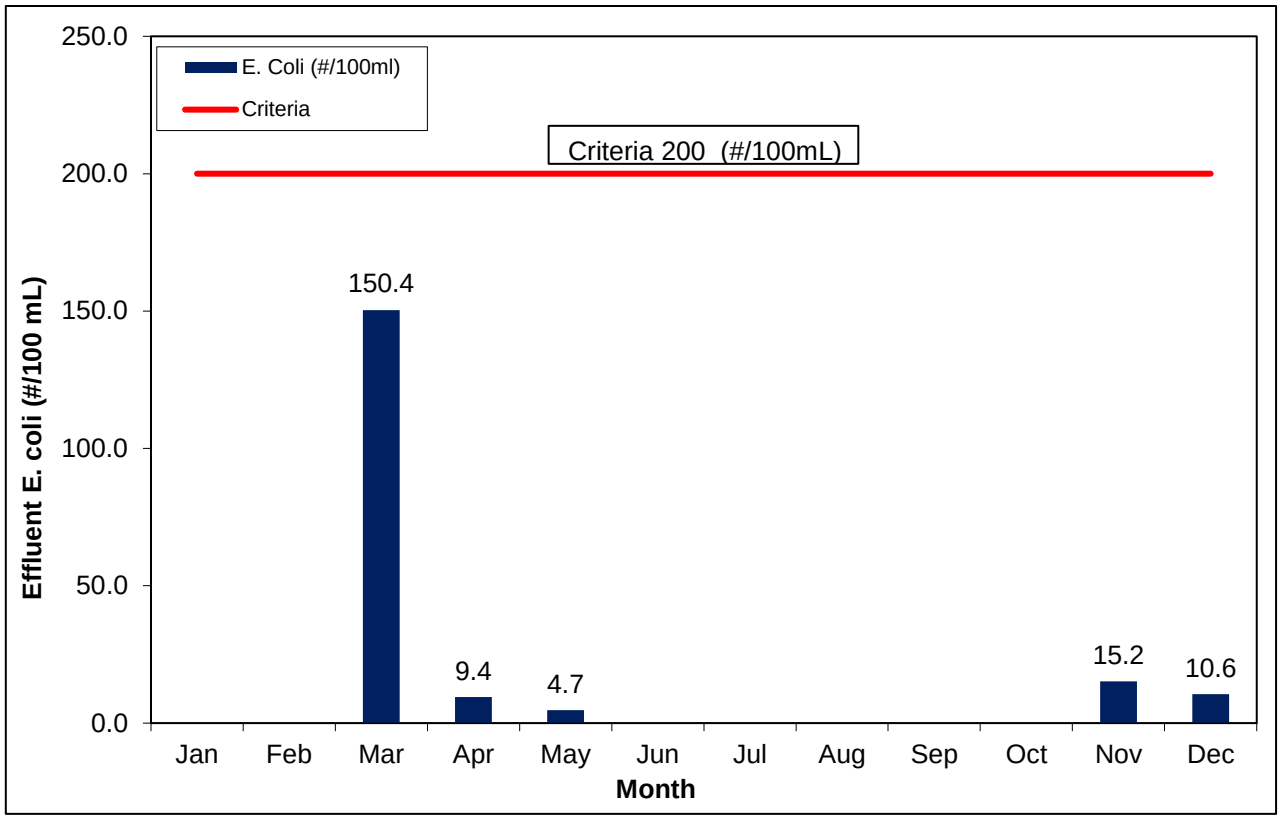
Norwich WWTP Effluent, Monthly Average Ammonia (mg/L), 2022



Norwich WWTP Effluent, Monthly Average Total Phosphorus (mg/L), 2022



Norwich WWTP Effluent, Monthly Geometric Mean Density E. coli (#/100 mL), 2022



2022 ANNUAL WASTEWATER TREATMENT SYSTEM SUMMARY REPORT

Plattsville Wastewater Treatment Plant

1. GENERAL INFORMATION

Oxford County (the County) prepares a report summarizing wastewater treatment operation and treated effluent discharge quality for every municipal wastewater treatment plant (WWTP) annually. The reports detail the latest effluent quality testing results and quantity statistics, and any non-compliance conditions that may have occurred for the previous year. They are available for review by the end of March on the County website at http://www.oxfordcounty.ca/waterwastewater or by contacting the Public Works Department.

All efforts have been made to ensure the information presented in this report is as accurate as possible.

If you have any questions or comments concerning the report, please contact the County at the address and phone number listed below or by email at wastewater@oxfordcounty.ca.

Wastewater Treatment Plant: Plattsville WWTP
Wastewater Treatment Plant Number: 110003022
Environmental Compliance Approval (ECA): 3133-7QWH4N (June 23, 2009)
Reporting Period: January 1, 2022 – December 31, 2022

Wastewater Treatment Plant Owner & Contact Information:

Oxford County Public Works Department - Wastewater Services
P.O. Box 1614
21 Reeve Street
Woodstock, ON N4S 7Y3
Telephone: 519-539-9800
Toll Free: 866-537-7778
Email: wastewater@oxfordcounty.ca

1.1 System Description

The Plattsville WWTP is a Class I facility, as defined by Ontario Regulation (O.Reg.) 129/04. The Plattsville WWTP is a lagoon wastewater treatment system serving the community of Plattsville. The nominally separated wastewater collection system includes 1 sewage pumping station, 11.9 kilometers of sanitary gravity sewers and 3.1 kilometers of sanitary forcemain sewers. Wastewater is treated at the Plattsville WWTP, which includes two aerated lagoon cells and two conventional wastewater stabilization ponds. Phosphorus removal is accomplished through the continuous dosing of aluminum sulphate into the splitter box prior to the wastewater entering the stabilization ponds and/or when required by batch dosing via a return pump pond mixing system, which can dose either cell and recirculate the contents. Treated effluent is pumped to an intermittent sand filter designed for ammonia removal prior to discharge into the Nith River.

The Plattsville WWTP is located at Lot 16, Conc. 12, Township of Blandford-Blenheim, Ontario with the Facility description provided below.

Facility	Plattsville WWTP
Design Capacity	800 m^3/d
2022 Average Daily Flow	437 m^3/d
2022 Maximum Daily Flow	802 m^3/d
2022 Total Volume of Wastewater	159,301 m^3/year

1.2 Major Expenses

In 2022, the Plattsville WWTP had forecasted operating and maintenance expenditures of approximately $627,000.

In addition to regular operational and maintenance expenditures, Capital Improvement Projects for the Village of Plattsville were forecasted at $73,000 which included improvements to the wastewater collection system and the Plattsville WWTP.

Capital Improvement Projects included:

- $10,000 for Feasibility Study
- $63,000 for the replacement of lagoon control valves

Capital Improvement Projects for all systems included:

- $625,000 to develop Countywide SCADA Master Plan for all wastewater systems

- $150,000 to develop Countywide Wastewater Servicing Master Plan for all wastewater systems

2. SUMMARY AND INTERPRETATION OF MONITORING DATA

2.1. Effluent Quality Assurance and Control Measures

Sampling Procedure

Raw influent wastewater is sampled on a monthly basis. The influent samples are analyzed for Biochemical Oxygen Demand (BOD_5), Total Suspended Solids (TSS), Total Kjeldahl Nitrogen (TKN), Total Phosphorus (TP), and pH. Effluent discharge samples are collected bi-weekly or monthly and at an interval to meet the percentage of drawdown of the lagoon cell during discharge periods as stipulated in the ECA. Effluent samples are analyzed for $CBOD_5$, TSS, Total Ammonia Nitrogen, TP, E. coli, temperature and pH.

Laboratory and Field Testing

All samples that are reported for compliance purposes are analyzed by a licensed laboratory except for pH, dissolved oxygen (DO), and temperature which are field collected. Laboratory analysis is performed by SGS Lakefield Research Ltd. All other in-house testing is done for process control, the results of which are not included in this report.

Groundwater Testing

The ECA requires that an annual groundwater sample be collected and tested for Total Organic Carbon (TOC), TP, TKN, Nitrite and Nitrate.

Four samples were collected in 2022 and are referred to as the shallow well samples and deep well samples:

PLATTSVILLE WWTP GROUNDWATER SAMPLING								
Date	**Apr 5/22**	**Apr 5/22**	**Apr 20/22**	**Apr 20/22**	**Nov 15/22**	**Nov 15/22**	**Nov 30/22**	**Nov 30/22**
Depth of Sample	**Shallow**	**Deep**	**Shallow**	**Deep**	**Shallow**	**Deep**	**Shallow**	**Deep**
Parameter								
TOC (mg/L)	2	< 1	3	1	1	< 1	1	1
Total P (mg/L)	< 0.03	1.32	< 0.03	1.31	< 0.03	0.16	0.03	0.05
TKN (mg/L N)	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	0.5

PLATTSVILLE WWTP GROUNDWATER SAMPLING								
Date	**Apr 5/22**	**Apr 5/22**	**Apr 20/22**	**Apr 20/22**	**Nov 15/22**	**Nov 15/22**	**Nov 30/22**	**Nov 30/22**
Ammonia (mg/L)	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Nitrite (mg/L)	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Nitrate (mg/L)	0.41	< 0.06	0.42	< 0.06	0.42	< 0.06	0.36	< 0.06
Nitrate + Nitrite (mg/L N)	0.41	< 0.06	0.42	< 0.06	0.42	< 0.06	0.36	< 0.06
Chloride (mg/L)	5	24	5	21	6	24	7	25

Oxford County's Hydrogeologist has reviewed all monitoring well data, and will continue to monitor groundwater results on our behalf and has no concerns at this time.

2.2 WWTP Performance and Effluent Quality

Final Effluent Compliance Limits

Compliance limits are defined as the maximum effluent concentrations permitted for a given parameter set by the Ministry of Environment, Conservation and Parks (MECP). Compliance limits are detailed within each WWTP ECA. The limits are determined to prevent impairment to the receiving water body quality. The Owner is legally obligated to operate and maintain the treatment system to ensure the compliance limits are achieved.

In 2022, the Plattsville WWTP provided effective treatment, with 146 samples out of 151 meeting compliance or 96.7 % compliance to its regulatory limits for all effluent discharge to the Nith River.

In November, increased effluent TSS was observed due to excessively high winds near the end of the discharge period, when the level of the discharging lagoon was low. The strong winds agitated the low pond level liquid, and caused previously settled solids to become entrained in the WWTP effluent. As a result the following ECA non-compliance occurred.

- The effluent monthly average concentration for TSS was 11.6 mg/L, with an ECA concentration limit of 10.0 mg/L

The non-compliance was reported to the MECP at the time.

On a bi-weekly basis (as a minimum) the operator measures pH of the effluent stream during discharge. There was no single pH result for the effluent outside the discharge limit of 6 - 9.5 in 2022.

Chlorine was not used at the Plattsville WWTP in 2022.

During discharge, the receiving stream temperature was <12 degrees Celsius from April 1st to May 6th, and again from November 14th to November 30th. During discharge, the receiving stream temperature was >12 degrees Celsius from May 9th to May 26th.

Graphs of discharge parameters versus effluent discharge limits are included in this report in Appendix A.

Influent wastewater characteristics and effluent discharge values are presented in the tables below.

Influent Wastewater Characteristics		
Parameter	**Concentration mg/L**	**Loading kg/d**
BOD_5	242	106
TSS	225	98
TP	5.9	2.6
TKN	65.1	28

Effluent Parameter	**Sample Frequency** (when discharging)	**ECA Effluent Limit (Monthly Average)** (mg/L unless otherwise indicated)	**Monthly Average Result Min-Max** (mg/L unless otherwise indicated)	**Percentage Removal**
$CBOD_5$	weekly	10	2.0 – 3.4	98.6 – 99.2
TSS	weekly	10	4.2 – 11.6	94.8 – 98.1
TP	weekly	0.5	0.03	99.5
Total Ammonia Nitrogen (when receiving stream >12 degrees Celsius)	weekly	2	0.1 – 0.3	99.5 – 99.8
Total Ammonia Nitrogen (when receiving stream < or = to 12 degrees Celsius)	weekly	5	0.1 – 1.3	97.7 – 99.8
E. coli	weekly	200 organisms/100mL(monthly Geometric Mean Density)	2 – 6 organisms/100 mL (monthly Geometric Mean Density)	--
pH any single sample	weekly	6.0-9.5	6.8 – 8.0	--

2.3 Final Effluent Design Objectives

Final Effluent Design Objectives (objectives) are non-enforceable effluent quality values which the Owner is obligated to use best efforts to strive towards achieving on an

ongoing basis. These objectives are to be used as a mechanism to trigger corrective action proactively, and voluntarily before environmental impairment occurs and before the compliance limits are exceeded.

There was one monthly average objective exceedance related to TSS. Several single sample effluent objective exceedances occurred in 2022. These results are summarized in the tables below.

Achieving the effluent objective for TSS was difficult in 2022, due to algae blooms that formed in the waste stabilization ponds and environmental factors. Operational strategies planned in 2023 to reduce the TSS effluent concentrations include recirculating waste stabilization pond one prior to transferring into waste stabilization pond two and monitoring future weather forecasts when the discharge lagoon level is low, and pausing the discharge if high winds are expected.

The following table presents the range of effluent discharge values vs. ECA Objectives.

Effluent Parameter	**Sample Frequency** (when discharging)	**Monthly Average Objective Concentration** (milligram per liter unless otherwise indicated)	**Monthly Average Result Min-Max** (milligram per liter unless otherwise indicated)
$CBOD_5$	weekly	5	2.0 – 3.4
TSS	weekly	5	4.2 – 11.6
TP	weekly	0.3	0.03
Total Ammonia Nitrogen (when receiving stream >12 degrees Celsius)	weekly	1	0.1 – 0.3
Total Ammonia Nitrogen (when receiving stream < or = to 12 degrees Celsius)	weekly	3	0.1 – 1.3
E. coli	weekly	150 organisms/100 mL (monthly Geometric Mean Density)	2 – 6 organisms/100 mL (monthly Geometric Mean Density)

Plattsville effluent single sample concentrations that exceeded the objective in 2022 included the following:

Date	Parameter	Objective mg/L (unless otherwise specified)	Result mg/L (unless otherwise specified)
April 1, 2022	TSS	5	11
April 11, 2022	TSS	5	6
May 3, 2022	TSS	5	6
May 9, 2022	TSS	5	8
May 17, 2022	TSS	5	6
November 14, 2022	TSS	5	7
November 16, 2022	TSS	5	13
November 18, 2022	TSS	5	10
November 19, 2022	TSS	5	8
November 22, 2022	TSS	5	14
November 25, 2022	TSS	5	13
November 30, 2022	TSS	5	16

Plattsville effluent monthly average concentrations that exceeded the objective in 2022 included the following:

Month	Parameter	Objective (mg/L)	Monthly Average Result (mg/L)
November 2022	TSS	5	11.6

3. OVERFLOWS, BYPASSSING, UPSETS, SPILLS, AND ABNORMAL CONDITIONS

There were no overflows, bypassing, upsets, spills, and abnormal conditions from the Plattsville WWTP in 2022.

On May 12, an odour complaint was received from a local resident. This compliant coincided with a shutdown of the aeration system in aerated cell #1 for the installation of new aeration diffusers. To aide in reducing odours, calcium nitrate was added as a supplementary chemical oxygen source. Staff returned on May 13 and found the new diffusers had significantly increased dissolved oxygen concentrations and reduced odours. On May 14, normal odour conditions were reported by staff at the WWTP.

There were no additional complaints in 2022.

4. MAINTENANCE OF WORKS

The operating and maintenance staff at the Plattsville WWTP conducts regularly scheduled maintenance of the plant equipment. The Plattsville WWTP utilizes a database known as Cartegraph to issue work orders and maintain records for regular maintenance and repair at the Plattsville WWTP.

5. MONTIORING EQUIPMENT MAINTENANCE AND CALIBRATION

The calibration of flow meters is conducted yearly by Indus-Controls Inc. in accordance with the requirements of the ECA. The records are kept on-site at the Plattsville WWTP.

The operational monitoring equipment calibration records are kept on-site at the Plattsville WWTP.

6. INSPECTION, PILOTS, AND TRIALS

The MECP did not perform an inspection of the Plattsville WWTP in 2022. In general, an MECP inspection occurs every three 3years.

Capital Improvement Projects and Energy Optimization

Various capital improvements were also completed at the Plattsville WWTP in 2022, which will result in notable energy and cost savings. The replacement of older diffusers in aeration cell 2 with more efficient units is anticipated to realize the following results:

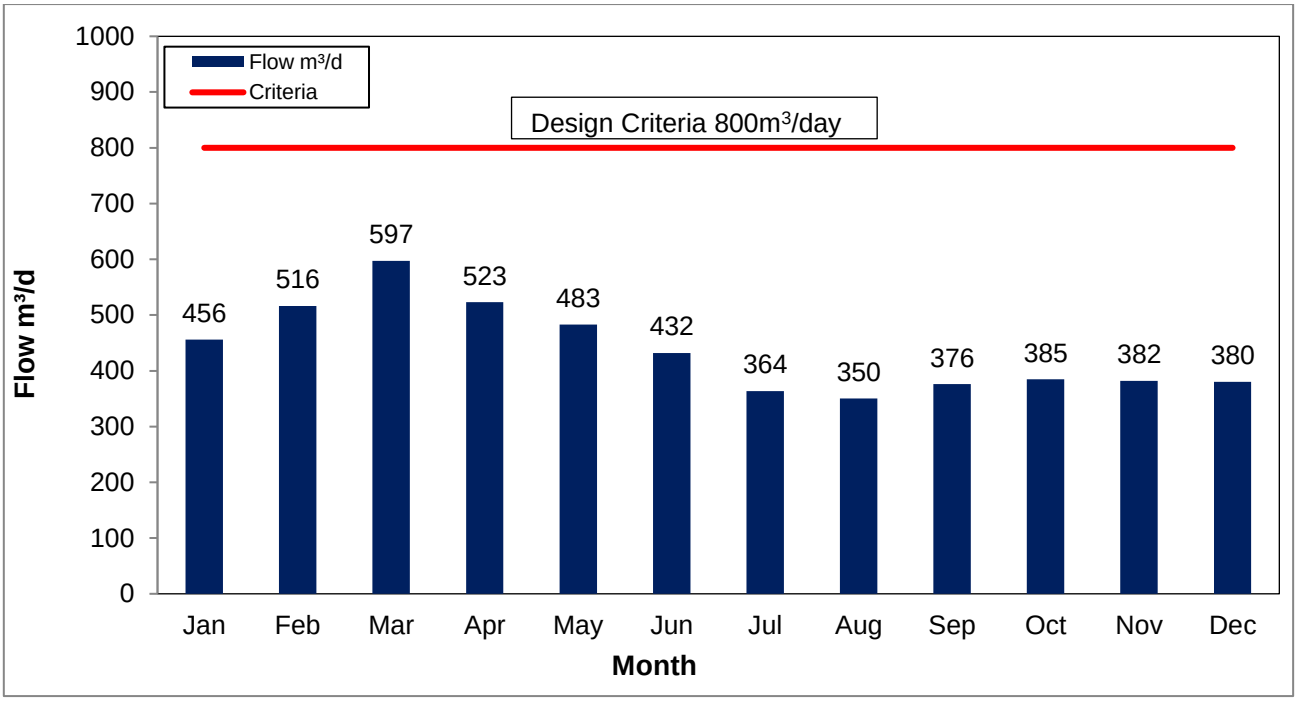
- **Future Potential Energy Demand Reduction** – These capital upgrades are anticipated to achieve an annual electrical consumption avoidance of approximately 31,135 kWh which will reduce costs (~ $5,100 annually) associated with consumption of energy from the electrical grid or fossil fuel generated power.
- **Future Potential GHG Emission Reduction** - The annual electrical avoidance noted above relates to an equivalent carbon dioxide gas emission reduction of approximately 1.2 tCO_2e per year.

Microplastic Study

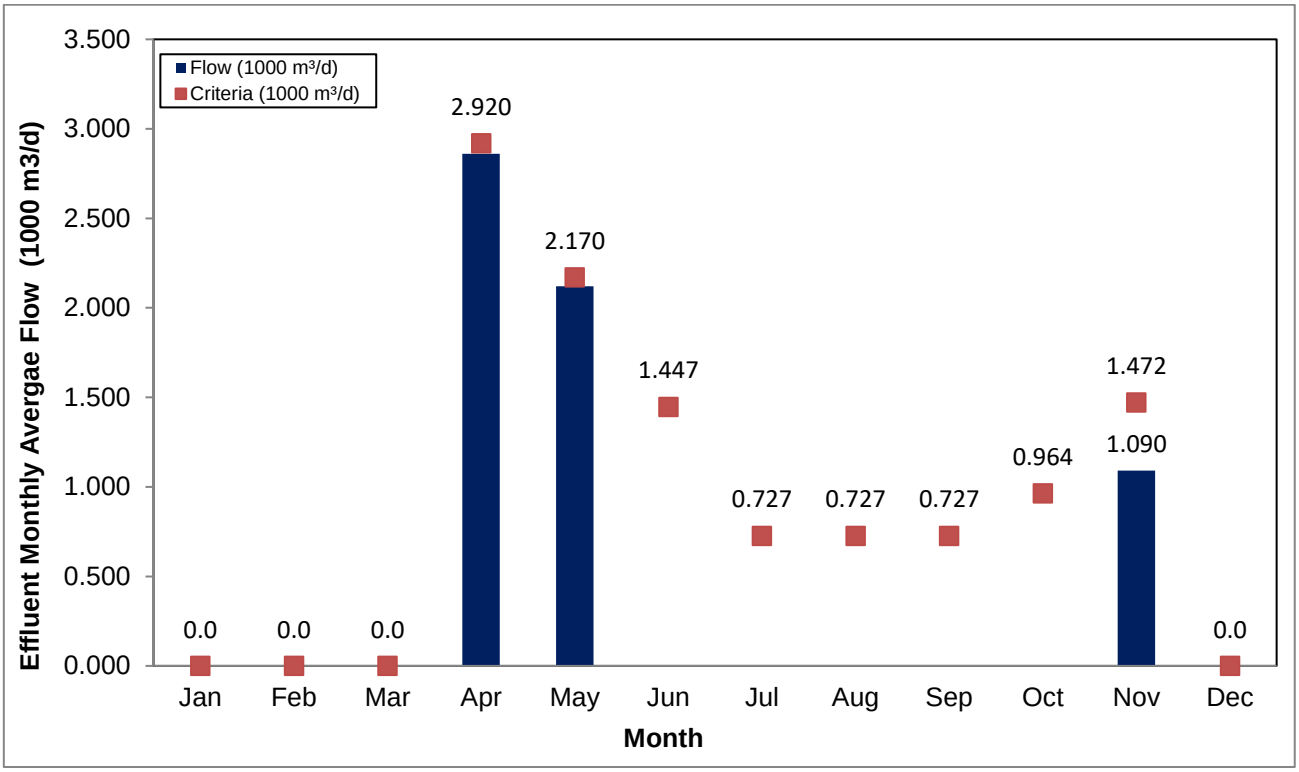
In 2022, the Plattsville WWTP participated in a Study by Environment Canada and the University of Guelph. The multi-year Study is to explore the effects of microplastic on aquatic ecosystems, examining WWTP influent, effluent and biosolids.

APPENDIX A: GRAPHS OF 2022 DISCHARGE PARAMETERS VS. EFFLUENT DISCHARGE LIMITS

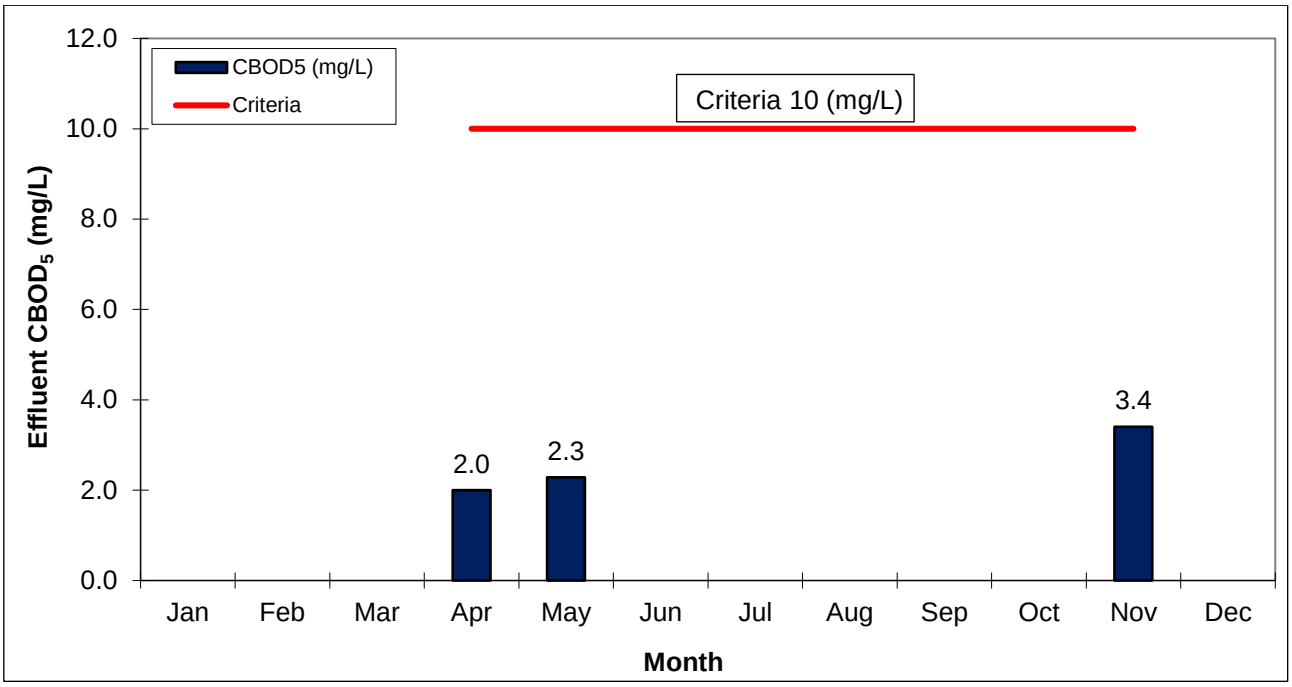
Plattsville WWTP Influent, Monthly Average Daily Flow in Cubic Meters per Day, 2022



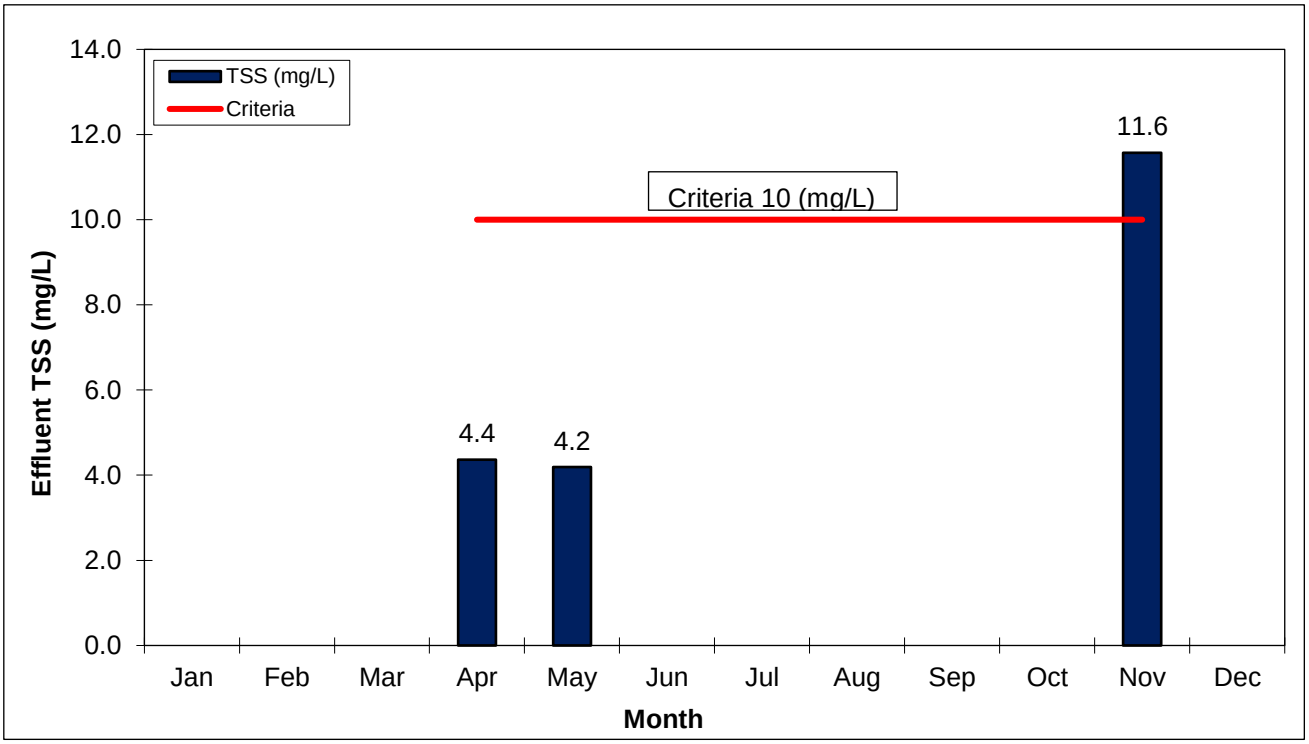
Plattsville WWTP Effluent, Monthly Average Daily Flow (1000 m³), 2022



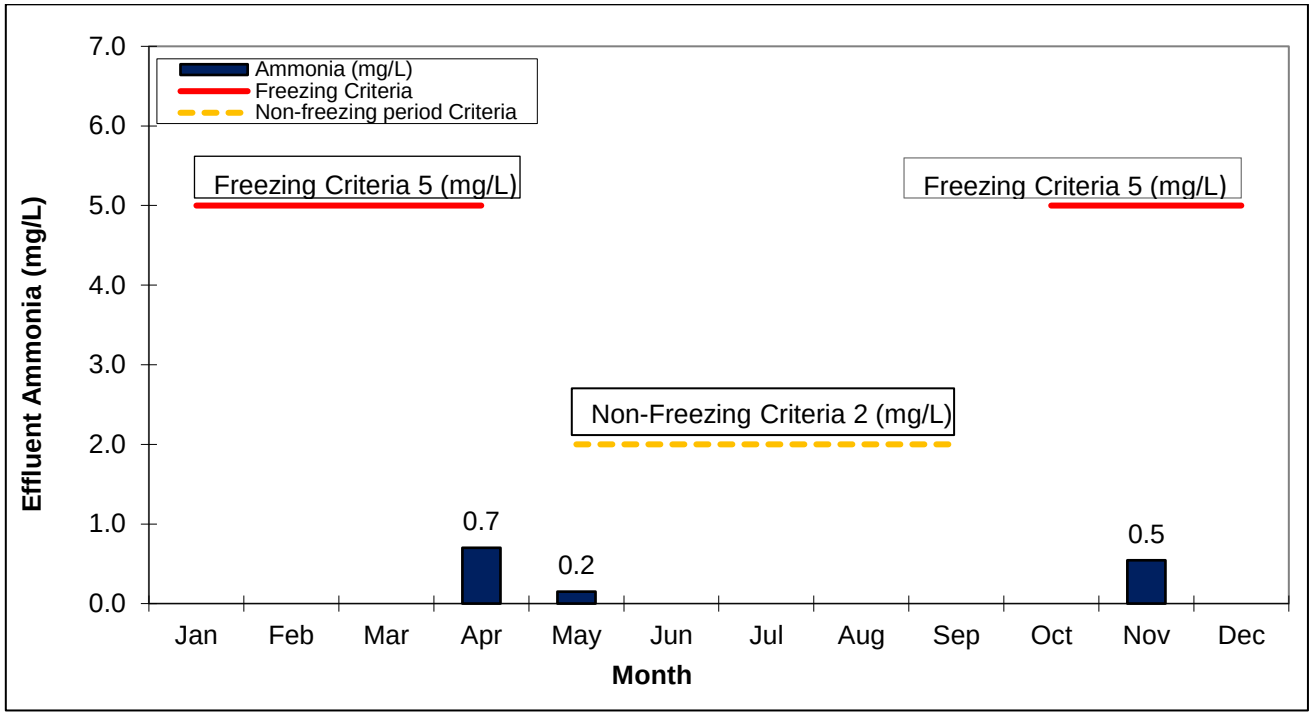
Plattsville WWTP Effluent, Monthly Average $CBOD_5$ (mg/L), 2022



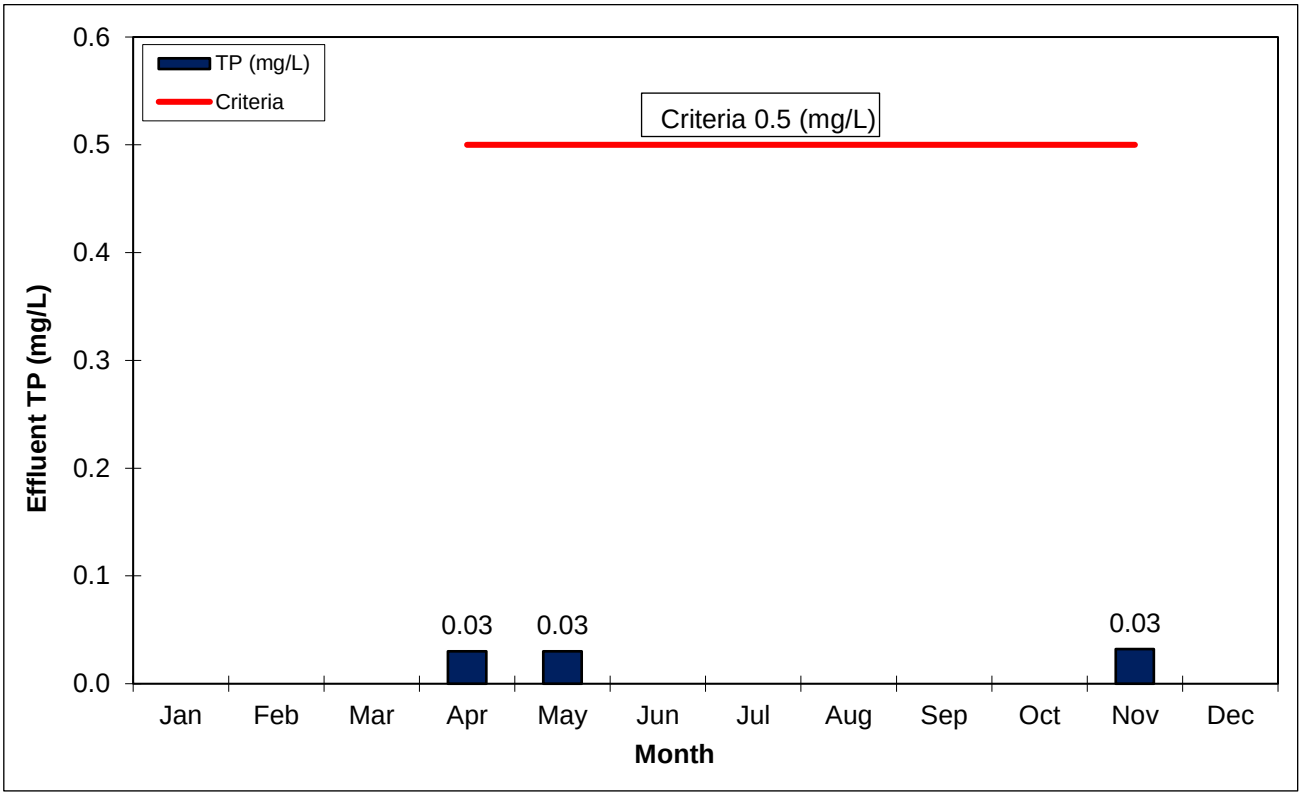
Plattsville WWTP Effluent, Monthly Average TSS (mg/L), 2022



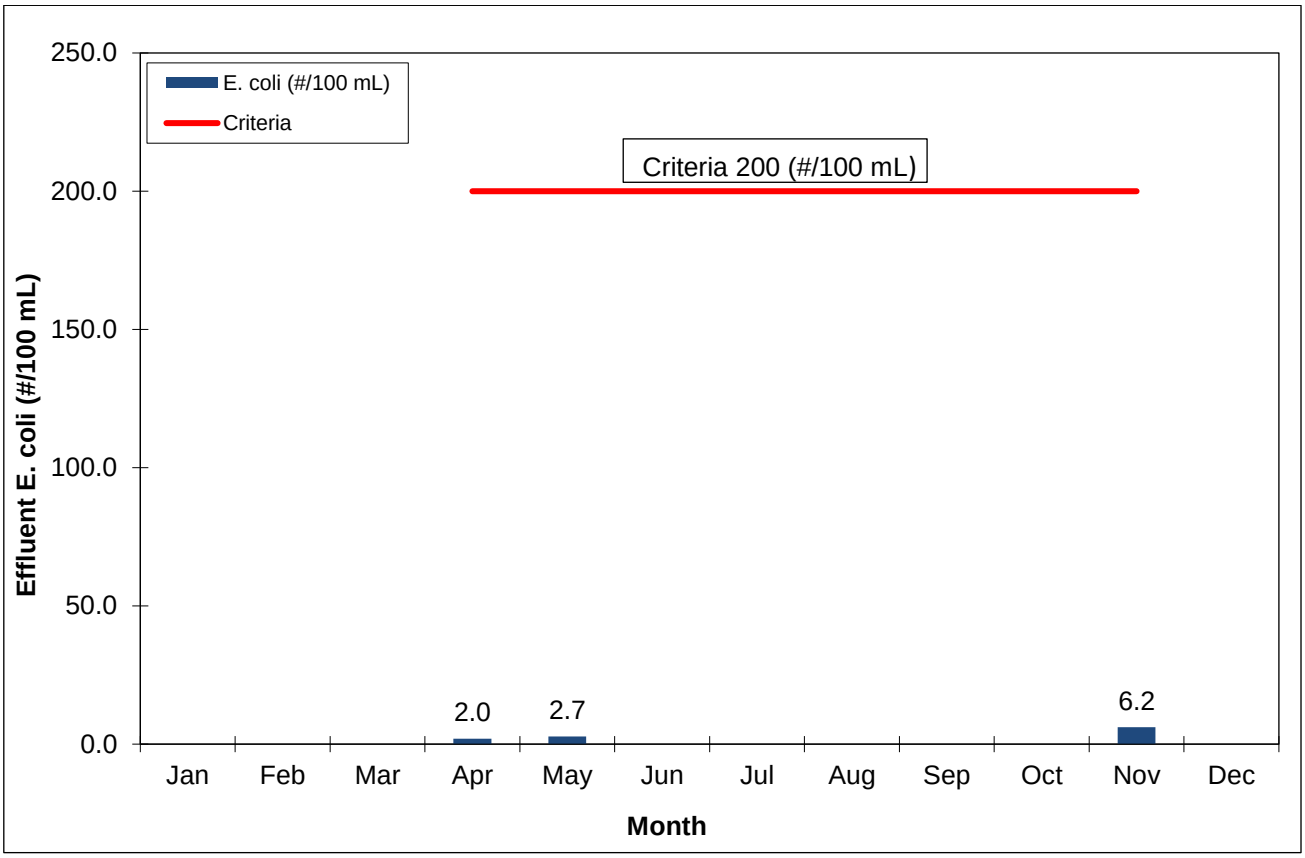
Plattsville WWTP Effluent, Monthly Average Ammonia (mg/L), 2022



Plattsville WWTP Effluent, Monthly Average Total Phosphorus (mg/L), 2022



Plattsville WWTP Effluent, Monthly Geometric Mean Density E. coli (#/100 mL), 2022



2022 ANNUAL WASTEWATER TREATMENT SYSTEM SUMMARY REPORT

Tavistock Wastewater Treatment Plant

1. GENERAL INFORMATION

Oxford County (the County) prepares a report summarizing wastewater treatment operation and treated effluent discharge quality for every municipal wastewater treatment plant (WWTP) annually. The reports detail the latest effluent quality testing results and quantity statistics, and any non-compliance conditions that may have occurred for the previous year. They are available for review by the end of March on the County website at http://www.oxfordcounty.ca/waterwastewater or by contacting the Public Works Department.

All efforts have been made to ensure the information presented in this report is as accurate as possible.

If you have any questions or comments concerning the report, please contact the County at the address and phone number listed below or by email at wastewater@oxfordcounty.ca.

Wastewater Treatment Plant: Tavistock WWTP
Wastewater Treatment Plant Number: 110000720
Environmental Compliance Approval (ECA): 0095-CBJQUJ (March 17, 2022)
Reporting Period: January 1, 2022 – December 31, 2022

Wastewater Treatment Plant Owner & Contact Information:

Oxford County Public Works Department - Wastewater Services
P.O. Box 1614
21 Reeve Street
Woodstock, ON N4S 7Y3
Telephone: 519-539-9800
Toll Free: 866-537-7778
Email: wastewater@oxfordcounty.ca

1.1 System Description

The Tavistock WWTP is a Class I facility, as defined by Ontario Regulation (O.Reg.) 129/04. The Tavistock WWTP is a lagoon wastewater treatment system serving the Village of Tavistock. The separate wastewater collection system includes three sewage pumping stations (SPS), 23.5 kilometers of sanitary gravity sewers, 2 kilometers of sanitary forcemain sewers and 0.2 kilometers of sanitary low pressure sewers. The Tavistock WWTP consists of three aerated lagoon cells, one polishing pond and an Intermittent Sand Filter (ISF). Cell 1 is equipped with Ares aerators, cell 2 and 3 are equipped with Mat Aerators, and there are an additional six 15 HP aspirating surface aerators in Cell 1 to provide the necessary dissolved oxygen for the lagoons.

There is also the provision for continuous aluminum sulphate addition for phosphorus removal. The wastewater is dosed with aluminum sulphate as it enters Cell 1 and as it enters Cell 2.

Effluent from Cell 1 overflows to Cell 2, then into Cell 3 and/or Cell 4 where it is pumped through the filter beds and/or stored prior to discharge.

The WWTP is located at 381 William Street, Tavistock, Ontario. The Facility description is provided below.

Facility	Tavistock WWTP
Design Capacity	2,935 m^3/d
2022 Average Daily Flow	1,869 m^3/d
2022 Maximum Daily Flow	2,845 m^3/d
2022 Total Volume of Wastewater	682,083 m^3/year

1.2 Major Expenses

In 2022, the Tavistock WWTP had forecasted operating and maintenance expenditures of approximately $1,647,000.

In addition to regular operational and maintenance expenditures, Capital Improvement Projects for Village of Tavistock totaled $293,000 which included improvements to the wastewater collection systems and the Tavistock WWTP.

Capital Improvement Projects included:

- $120,500 for Williams Street sewage pumping station Class EA
- $111,000 for sanitary sewer replacement
- $61,000 for the replacement of general operating equipment

Capital Improvement Projects for all systems included:

- $625,000 to develop Countywide SCADA Master Plan for all wastewater systems
- $150,000 to develop Countywide Wastewater Servicing Master Plan for all wastewater systems

2. SUMMARY AND INTERPRETATION OF MONITORING DATA

2.1. Effluent Quality Assurance and Control Measures

Sampling Procedure

Raw sewage is sampled a minimum of once monthly for Biochemical Oxygen Demand (BOD_5), Total Suspended Solids (TSS), Total Kjeldahl Nitrogen (TKN), Total Phosphorus (TP), pH, and temperature. Automatic composite samplers are used to collect raw sewage samples from Chamber 3 as the flow enters Cell 1. Automated composite samples are also taken at the same time from a large food processor in Tavistock. The company can discharge significant loadings to the Tavistock WWTP and is subject to a surcharge agreement with the County.

Grab samples of final effluent are taken weekly during effluent discharge and tested for $CBOD_5$, TSS, TP, pH, temperature, dissolved oxygen (DO), nitrate nitrogen, nitrite nitrogen, ammonia nitrogen and un-ionized ammonia.

Laboratory and Field Testing

A licensed laboratory is used to evaluate all samples that are taken for compliance purposes with the exception of pH, temperature, and DO which are measured in the field. SGS Lakefield Research Ltd. performs all laboratory analyses. All other in-house testing is done for process control, the results of which are not included in this report.

2.2 WWTP Performance and Effluent Quality

Final Effluent Compliance Limits

Compliance limits are defined as the maximum effluent concentrations permitted for a given parameter set by the Ministry of Environment, Conservation and Parks (MECP). Compliance limits are detailed within each WWTP ECA. The limits are determined to prevent impairment to the receiving water body quality. The Owner is legally obligated to operate and maintain the treatment system to ensure the compliance limits are achieved.

The Tavistock WWTP provided effective treatment in 2022, and was 100% in compliance with all its regulatory limits for all effluent discharged from the WWTP.

Influent Streams and Effluent Streams

On a weekly basis (minimum), the operator measures the pH of the effluent stream when discharging. There was no single pH result for the effluent outside the discharge limit of 6 – 9.5 in 2022.

Graphs of discharge parameters versus effluent discharge limits are included in this report in Appendix A.

Influent wastewater characteristics and effluent discharge values are presented in the tables below.

Influent Wastewater Characteristics		
Parameter	**Concentration mg/L**	**Loading kg/d**
$CBOD_5$	731	1,367
TSS	532	995
TP	17	31
TKN	59	111

Effluent Parameter	**Sample Frequency** (when discharging)	**ECA Effluent Limit (Monthly Average)** (mg/L unless otherwise indicated)	**Monthly Average Result Min-Max** (mg/L unless otherwise indicated)	**Percentage Removal**
$CBOD_5$	weekly	15	2.0 – 3.7	99.5 - 99.7
TSS	weekly	15	2.6 – 4.8	99.1 - 99.5
TP (May-Nov.)	weekly	0.5	0.1 – 0.2	98.8 – 99.4
TP (Dec.-Apr.)	weekly	0.8	0.1 – 0.2	98.8 – 99.4
Total Ammonia Nitrogen (January)	weekly	7.0	1.5	-
Total Ammonia Nitrogen (February)	weekly	10.0	4.0	-
Total Ammonia Nitrogen (March)	weekly	8.5	3.7	-

Effluent Parameter	Sample Frequency (when discharging)	ECA Effluent Limit (Monthly Average) (mg/L unless otherwise indicated)	Monthly Average Result Min-Max (mg/L unless otherwise indicated)	Percentage Removal
Total Ammonia Nitrogen (April)	weekly	8.0	1.8	-
Total Ammonia Nitrogen (May-Nov.)	weekly	1.0	0.1- 0.5	-
Total Ammonia Nitrogen (December)	weekly	3.0	0.5	-
pH any single sample	weekly	6.0 - 9.5	6.8 – 8.4 pH	-

2.3 Final Effluent Design Objectives

Final Effluent Design Objectives (objectives) are non-enforceable effluent quality values which the Owner is obligated to use best efforts to strive towards achieving on an ongoing basis. These objectives are to be used as a mechanism to trigger corrective action proactively, and voluntarily, before environmental impairment occurs and before the compliance limits are exceeded.

All effluent discharge objectives listed in the ECA were met at the Tavistock WWTP in 2022, with the exception of the single samples listed in the table below.

The following table presents the range of effluent discharge values vs. ECA Objectives.

Effluent Parameter	Sample Frequency (when discharging)	Monthly Average Objective Concentration (mg/L)	Monthly Average Result Min-Max (mg/L)
$CBOD_5$	weekly	10	2.0 – 3.7
TSS	weekly	10	2.6 – 4.8
TP (May-Nov.)	weekly	0.3	0.1 – 0.2
TP (Dec.-Apr.)	weekly	0.5	0.1 – 0.2
Total Ammonia Nitrogen (January)	weekly	6.0	1.5

Effluent Parameter	Sample Frequency (when discharging)	Monthly Average Objective Concentration (mg/L)	Monthly Average Result Min-Max (mg/L)
Total Ammonia Nitrogen (February)	weekly	9.0	4.0
Total Ammonia Nitrogen (March)	weekly	7.5	3.7
Total Ammonia Nitrogen (April)	weekly	7.0	1.8
Total Ammonia Nitrogen (May-Nov.)	weekly	0.8	0.1- 0.5
Total Ammonia Nitrogen (December)	weekly	1.5	0.5
pH any single sample	weekly	6.5 - 9.0	6.8 – 8.4 pH

Tavistock WWTP effluent single samples that did not meet effluent objective concentrations in 2022 include the following:

Date	Parameter	Objective (mg/L)	Result (mg/L)
April 20, 2022	TSS	10	11
May 25, 2022	TAN	0.8	1
June 15, 2022	TAN	0.8	1

3. OVERFLOWS, BYPASSSING, UPSETS, SPILLS, AND ABNORMAL CONDITIONS

On February 22, 2022 students at the Tavistock Public School were evacuated due to the presence of a foul odour. The Staff that were on site earlier that day, at the WWTP and collections pump stations, reported normal operations and no odour. Staff were redeployed after becoming aware of the odour issue, and found everything operating normally. Manholes were inspected near the school and no issues were noted.

Several odour complaints were reported between August 15th and September 29th, by a local resident. Increased plant operations and testing was initiated (weekends) to try and locate the source of any odours. Lagoon dissolved oxygen concentrations, nitrates and sulphide concentrations were normal, and staff could not detect any odours while

onsite. All WWTP equipment was functioning properly. As a precautionary measure, calcium nitrate was dosed to cell #1, to supply chemically bound oxygen if required.

On January 24, 2022 there was an overflow from the Tavistock Williams Street sewage pump station. A level sensor failed, and the backup float control failed to start the pump, causing a rise in the wet well and wastewater overflow of 35 m^3 lasting 37 minutes in duration. The overflow was reported at the time to the Spills Action Center and MECP. Repairs were performed on the level equipment in the wet well.

There were no additional overflows, bypasses, upsets, or spills from the Tavistock WWTP in 2022.

Several projects were undertaken in 2022 to eliminate Bypass/Overflows in conformance with Procedure F-5-1:

- Sanitary lateral pipe repairs were completed on John Street in 2022, to reduce inflow and infiltration into the wastewater collection network
- A manhole structure on John Street was repaired to correct a runoff ponding issue
- A portion of the Williams Street sanitary forcemain was replaced and upsized (to 300 mm) through the Southridge Estates development
- Continued into 2023, Williams Street sewage pump station Class EA and conceptual design work

4. MAINTENANCE OF WORKS

The operating and maintenance staff at the Tavistock WWTP conducts regularly scheduled maintenance of the WWTP equipment. The WWTP utilizes a database system known as Cartegraph to issue work orders and maintain records for regular maintenance and repair at the WWTP.

The Limited Operational Flexibility for modification to the Tavistock WWTP was not used in 2022.

5. MONTIORING EQUIPMENT MAINTENANCE AND CALIBRATION

The calibration of flow meters is conducted yearly by Indus-Controls Inc. in accordance with the requirements of the ECA. The records are kept on-site at the WWTP.

All other operational monitoring equipment calibration records are kept on-site at the Tavistock WWTP.

6. INSPECTION, PILOTS, AND TRIALS

The MECP did not conduct an inspection of the Tavistock WWTP in 2022. The MECP inspections typically occur on a 3-year schedule.

The Ministry of Environment and Climate Change Canada conducted an inspection of the Tavistock Wastewater Treatment Plant at the OCAB on August 11, 2022. The County voluntarily provided operational documentation for the 2017 – 2021 reporting years. The results of the inspection concluded, as part of the Fisheries Act, the County was to conduct Acute Lethality Testing on effluent meeting or exceeding an average daily effluent flow volume of 2500m^3/d (this volume occurred in 2019 and 2021).

As a result of the inspection, the County agreed to perform Acute Lethality Testing in the minimum sampling frequency (3 samples) in the remainder of the 2022 reporting year and in future years when required. In addition to Acute Lethality Testing, the County was to review and update administrative information in the Environment Canada Reporting Information System.

The County provided the results of the Acute Lethality Testing and has updated the Reporting Information System, The Ministry of Environment and Climate Change Canada required no further action by the County.

The results of the Acute Lethality Testing are as follows;

Date	Test Organisms	Remaining Organisms	Lethality
August 11, 2022	10	10	0.0%
October 12, 2022	10	10	0.0%
December 19, 2022	10	10	0.0%

WWTP Capacity Re-rating

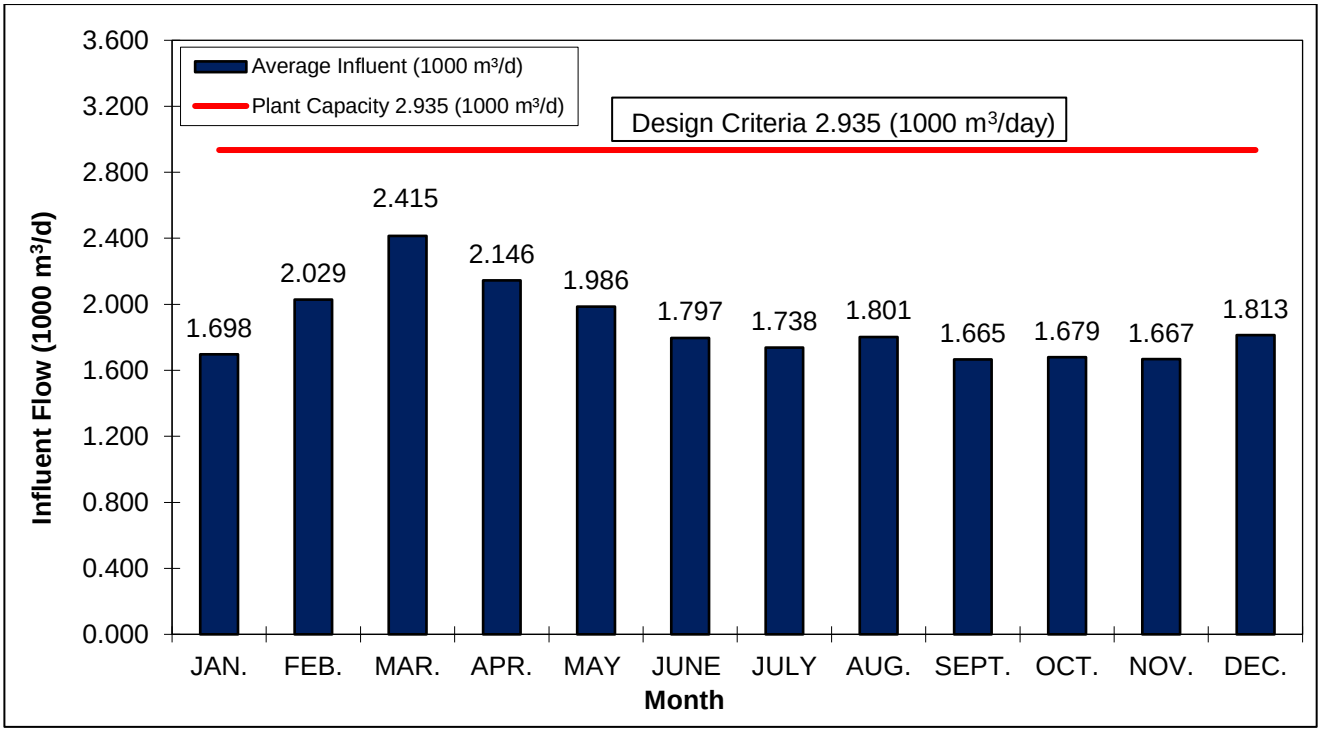
An application to increase the rated capacity of the Tavistock WWTP was submitted to the MECP in 2021 based on strong historical performance, recent aeration upgrades to enhance treatment, and alignment with the rated capacity of the Tavistock water system. The re-rating was approved by the MECP in March of 2022, increasing the WWTP rated capacity from 2,525 m^3/day to 2,935 m^3/day.

Municipal Class Environmental Assessment Study

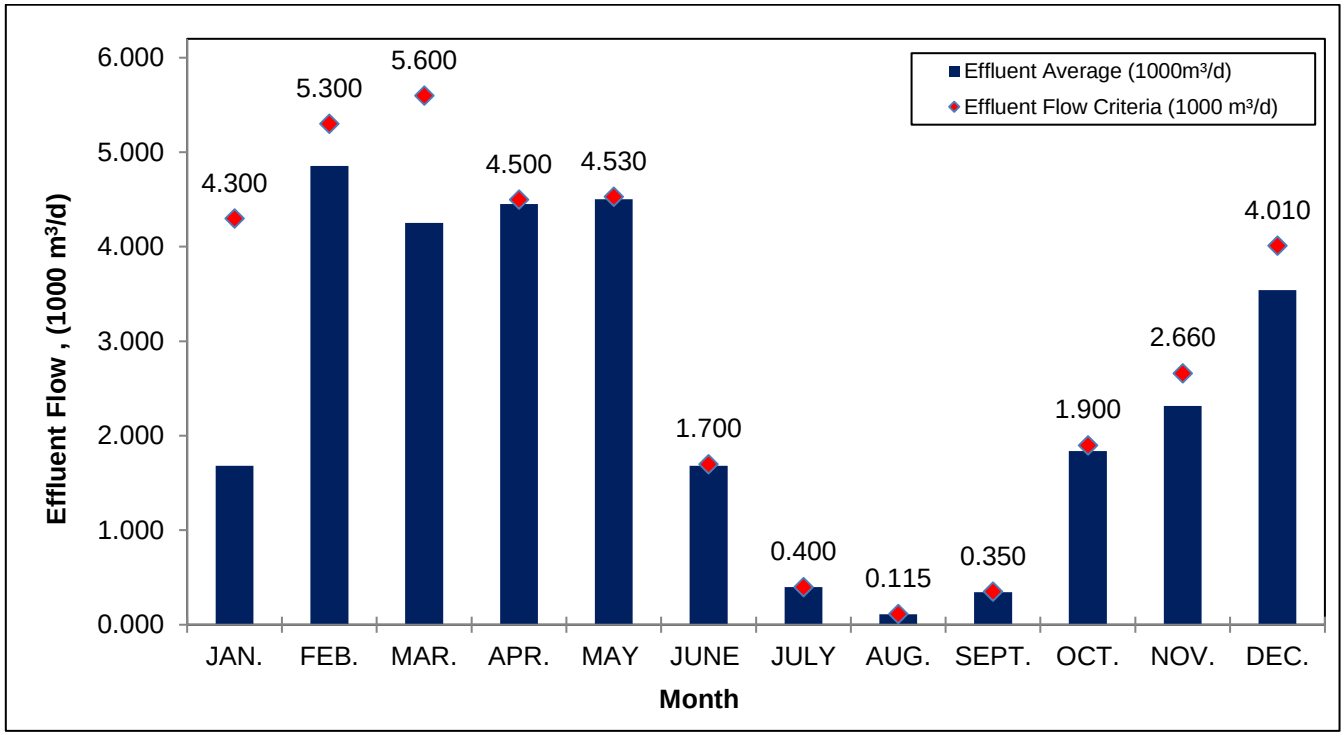
In response to future growth in the Village of Tavistock, and associated projected increases in Tavistock WWTP flow rates, the County will initiate a Class EA Study for capacity expansion of the Tavistock WWTP in 2023. The study will determine the most cost-effective, environmentally sound, and sustainable approach to expand the Tavistock WWTP to meet the wastewater servicing needs of the community. The study is expected to be completed in 2024.

APPENDIX A: GRAPHS OF 2022 DISCHARGE PARAMETERS VS. EFFLUENT DISCHARGE LIMITS

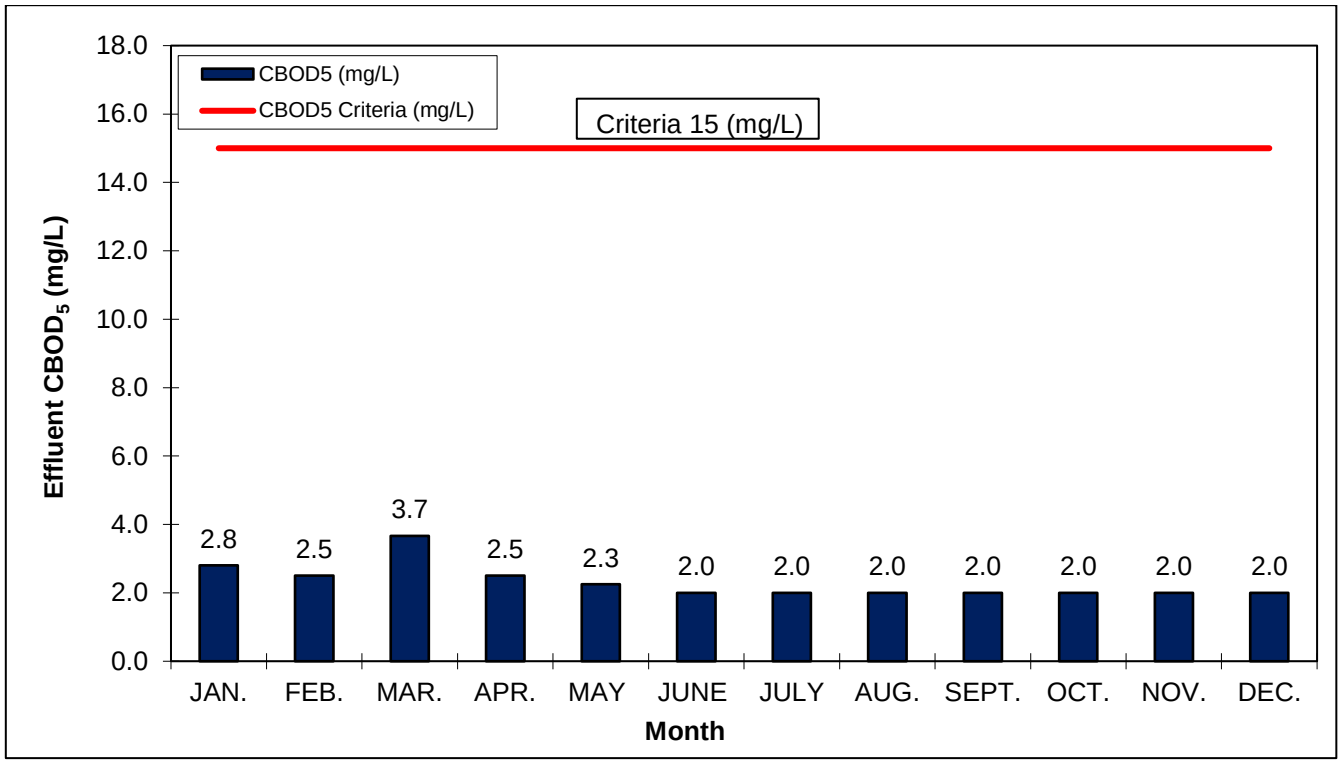
Tavistock WWTP Influent, Monthly Average Daily Flow (1000 m^3/d), 2022



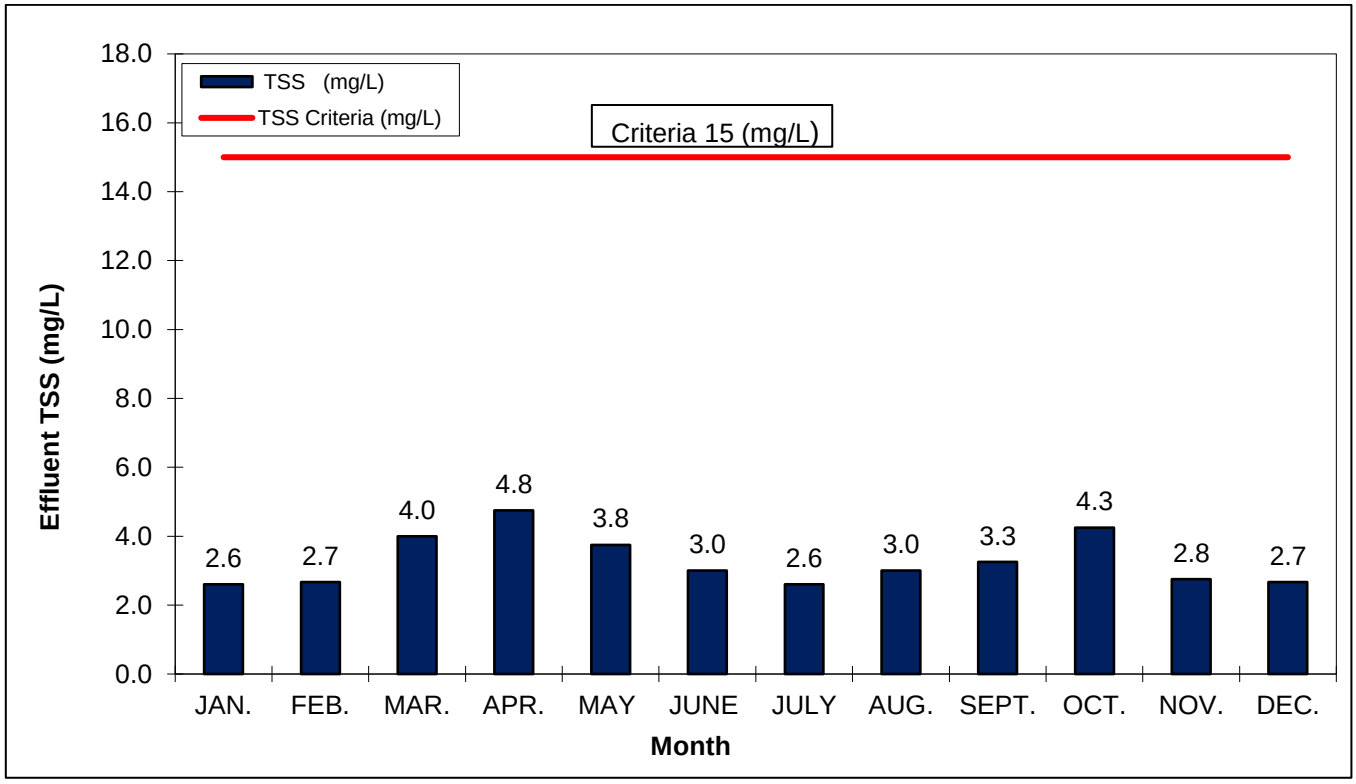
Tavistock WWTP Effluent, Monthly Average Daily Flow (1000 m^3), 2022



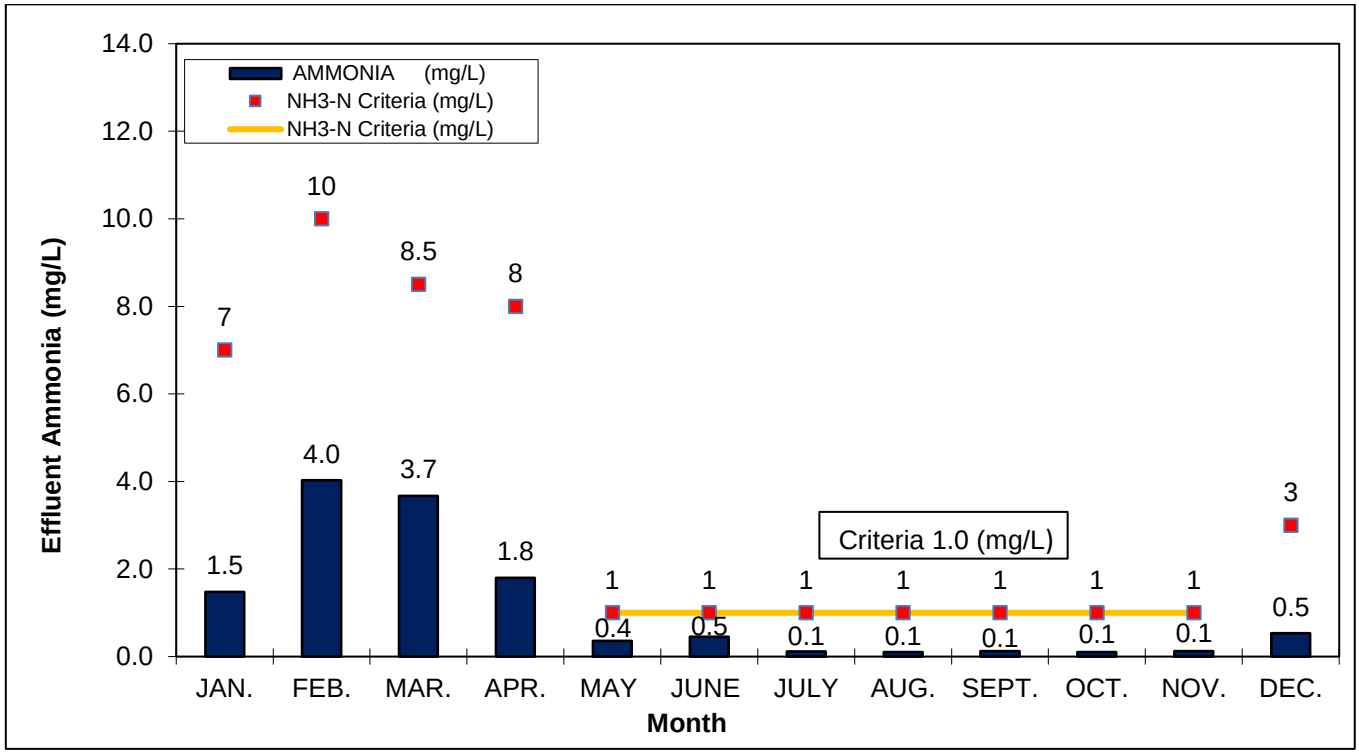
Tavistock WWTP Effluent, Monthly Average $CBOD_5$ (mg/L), 2022



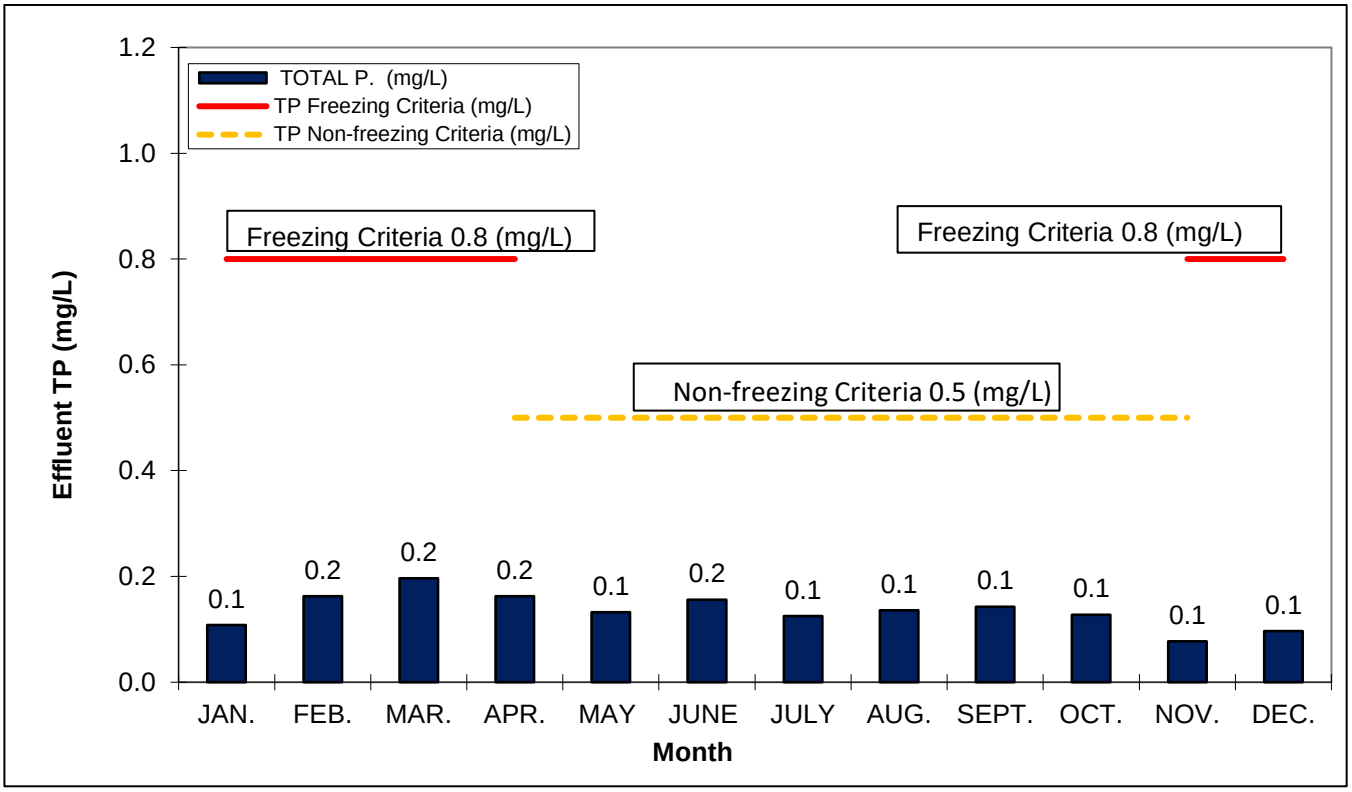
Tavistock WWTP Effluent, Monthly Average TSS (mg/L), 2022



Tavistock WWTP Effluent, Monthly Average Ammonia (mg/L), 2022



Tavistock WWTP Effluent, Monthly Average Total Phosphorus (mg/L), 2022



2022 ANNUAL WASTEWATER TREATMENT SYSTEM SUMMARY REPORT

Thamesford Wastewater Treatment Plant

1. GENERAL INFORMATION

Oxford County (the County) prepares a report summarizing wastewater treatment operation and treated effluent discharge quality for every municipal wastewater treatment plant (WWTP) annually. The reports detail the latest effluent quality testing results and quantity statistics, and any non-compliance conditions that may have occurred for the previous year. They are available for review by the end of March on the County website at http://www.oxfordcounty.ca/waterwastewater or by contacting the Public Works Department.

All efforts have been made to ensure the information presented in this report is as accurate as possible.

If you have any questions or comments concerning the report, please contact the County at the address and phone number listed below or by email at wastewater@oxfordcounty.ca.

Wastewater Treatment Plant: Thamesford WWTP
Wastewater Treatment Plant Number: 120002601
Environmental Compliance Approval (ECA): 7320-AUQM53 (June 4, 2018)
Reporting Period: January 1, 2022 – December 31, 2022

Wastewater Treatment Plant Owner & Contact Information:

Oxford County Public Works Department - Wastewater Services
P.O. Box 1614
21 Reeve Street
Woodstock, ON N4S 7Y3
Telephone: 519-539-9800
Toll Free: 866-537-7778
Email: wastewater@oxfordcounty.ca

1.1 System Description

The Thamesford WWTP is a Class II rated treatment facility, as defined by Ontario Regulation (O.Reg.) 129/04, which provides wastewater treatment for the Village of Thamesford. The Thamesford WWTP is an extended air activated sludge plant equipped with tertiary sand filters. The nominally separated wastewater collection system includes 4 sewage pumping stations (SPS), 18.7 kilometers of sanitary gravity sewers, 1 kilometer of sanitary forcemain sewers and 0.6 kilometers of sanitary low pressure sewers.

The incoming wastewater is screened and then treated in the extended aeration system. From there the flow enters into a secondary clarifier where the settled activated sludge is either returned or wasted and the supernatant flows to a sand filter, prior to disinfection and direct discharge to the Middle Thames River. Wasted biosolids are processed/stabilized in the aerobic digester, and routinely transported to the Ingersoll WWTP for dewatering.

For purposes of calculating loading to the Middle Thames River, the treated effluent flow is measured at the Parshall flume located after the stilling well just before discharge to the re-aeration chamber and the Middle Thames River. The flow readings used to apportion the loading to the plant is from two meters: one on each lift station. The influent and all other meters are calibrated annually.

A standby generator is available to run the onsite lift stations and a blower in the event of a power failure. The system is maintained by licensed wastewater system operators and licensed mechanics that operate, monitor, and maintain the treatment equipment, in accordance to the regulations, and collect samples as required by the ECA. Alarms automatically notify operators in the event of failure of critical operational requirements.

The Thamesford WWTP is located at 10 Middleton Street, Thamesford, Ontario, with the Facility description provided below.

Facility	Thamesford WWTP
Design Capacity	2,500 m^3/d
2022 Average Daily Flow	525 m^3/d
2022 Maximum Daily Flow	859 m^3/d
2022 Total Volume of Wastewater	191,557 m^3/year

1.2 Major Expenses

In 2022, the Thamesford WWTP had forecasted operating and maintenance expenditures of approximately $669,000.

In addition to regular operational and maintenance expenditures, Capital Improvement Projects for the Village of Thamesford were forecasted at $410,000 which included improvements to the wastewater collection system and the Thamesford WWTP.

Capital Improvement Projects included:

- $150,000 for design of a headworks, screening and aeration upgrade
- $163,000 for facilities upgrades
- $97,000 for the replacement of general operating equipment

Capital Improvement Projects for all systems included:

- $625,000 to develop Countywide SCADA Master Plan for all wastewater systems
- $150,000 to develop Countywide Wastewater Servicing Master Plan for all wastewater systems

SUMMARY AND INTERPRETATION OF MONITORING DATA

2.1. Effluent Quality Assurance and Control Measures

Sampling Procedure

Influent samples are taken from sampling ports located in-line after the influent pumps. A 24-hour composite sampler is taking an influent sample every 15 minutes for a 24-hour period concurrent with effluent sampling.

In 2022, effluent samples were taken using a 24-hour composite sampler set to take a sample every 15 minutes for 24 hours. Samples were drawn from a stilling well prior to the Parshall flume immediately before the discharge. Total residual chlorine (TRC) samples are taken from the stilling well prior to the Parshall flume. The stilling well follows the chlorination and de-chlorination chambers. The pH of the final effluent composite sample is also measured.

Following the Parshall flume, effluent flows through a discharge pipe and drops approximately 0.75 m into a discharge well, where dissolved oxygen (DO) samples are taken. This discharge well aerates the effluent prior to discharge to the River, as reflected in the DO sample results.

Laboratory and Field Testing

A licensed laboratory is used for analysis of any results used for determination of compliance except for TRC, DO, temperature and pH which are tested in the field. SGS Lakefield Research Ltd. performs all laboratory analyses. All other information generated in-house is used for process control, the results of which are not included in this report.

2.2 WWTP Performance and Effluent Quality

Final Effluent Compliance Limits

Compliance limits are defined as the maximum effluent concentrations permitted for a given parameter set by the Ministry of Environment, Conservation and Parks (MECP). Compliance limits are detailed within each WWTP ECA. The limits are determined to prevent impairment to the receiving water body quality. The Owner is legally obligated to operate and maintain the treatment system to ensure the compliance limits are achieved.

The Thamesford WWTP provided effective treatment in 2022, and was 100% in compliance with all its regulatory limits for all effluent discharged from the WWTP.

Influent Streams and Effluent Streams

There was no single laboratory pH result for the effluent outside the discharge limit of 6 - 9.5 in 2022.

Staff tests TRC in the treated effluent several times per week; well in excess of the required weekly testing frequency. In 2022, the monthly average results at all times met the Monthly Average TRC limit of 0.02 mg/L or less and, therefore, were in compliance.

The Thamesford WWTP met all its effluent loading limits required within the ECA.

Graphs of discharge parameters versus effluent discharge limits are included in this report in Appendix A.

Influent wastewater characteristics and effluent discharge values are presented in the tables below.

Influent Wastewater Characteristics		
Parameter	**Concentration mg/L**	**Loading kg/d**
BOD_5	210	110
Total Suspended Solids (TSS)	262	138
Total Phosphorus (TP)	5.5	3
Total Kjeldahl Nitrogen (TKN)	50.4	26
Oil and Grease	34	18

Effluent Parameter	Sample Frequency	ECA Effluent Limit (Monthly Average) (mg/L unless otherwise indicated)	Monthly Average Result Min-Max (mg/L otherwise indicated)	Percentage Removal
$CBOD_5$ (May 01 to November 30)	weekly	10	2.0 – 2.8	98.7 – 99.0
$CBOD_5$ (December 01 to April 30)	weekly	15	2.0 – 5.0	97.6 – 99.0
TSS (May 01 to November 30)	weekly	10	2.5 – 6.5	97.5 – 99.0
TSS (December 01 to April 30)	weekly	15	3.1 – 7.3	97.2 – 98.8
TP (May 01 to November 30)	weekly	0.20	0.03 – 0.1	98.2 – 99.4
TP (December 01 to April 30)	weekly	0.50	0.04 – 0.08	98.5 – 99.3
Total Ammonia Nitrogen (May 1 to November 30)	weekly	2.0	0.1 – 0.2	--
Total Ammonia Nitrogen (Dec. 1 to April 30)	weekly	5.0	0.1 – 2.3	--
Total Residual Chlorine	weekly	0.02	0.00	--
E. coli	weekly	200 organisms/100 mL (monthly Geometric Mean Density)	2 – 16 organisms/100 mL (monthly Geometric Mean Density)	--
pH any single sample	weekly	6.0 - 9.5	6.40 – 7.54	--
Dissolved Oxygen	weekly	5 and above	6.92 – 8	--

2.3 Final Effluent Design Objectives

Final Effluent Design Objectives (objectives) are non-enforceable effluent quality values which the Owner is obligated to use best efforts to strive towards achieving on an ongoing basis. These objectives are used as a mechanism to trigger corrective action proactively, and voluntarily, before environmental impairment occurs and before the compliance limits are exceeded.

All effluent discharge objectives listed in the WWTP ECA were met with the exception of the single sample and monthly average effluent objective exceedances that are summarized below.

The WWTP experienced difficulty meeting the TSS objective during the months of February and March as a hole was found in one of the WWTPs sand filters. The filter was taken off line, emptied and repaired. Later in the year (November) the filter was again taken out of service to perform an additional repair, leading to increased TSS concentrations in the WWTP effluent. The higher TSS concentrations, also caused above objective concentrations on several single sample TP results during these repairs.

The following table presents the range of effluent discharge values vs. ECA Objectives.

Effluent Parameter	**Sample Frequency**	**Monthly Average Objective Concentration** (mg/L unless otherwise indicated)	**Monthly Average Result Min-Max** (mg/L unless otherwise indicated)
CBOD5	weekly	5	2.0 – 5.0
TSS	weekly	5	2.5 – 7.3
TP	weekly	0.10	0.03 – 0.1
Total Ammonia Nitrogen (May 1 to November 30)	weekly	1.2	0.1 – 0.2
Total Ammonia Nitrogen (Dec. 1 to April 30)	weekly	4.0	0.1 – 2.3
Total Residual Chlorine	weekly	non-detect	0.00
E. coli (May 1 – October 31)	weekly	200 organisms/100 mL (monthly Geometric Mean Density)	2 – 16 organisms/100 mL (monthly Geometric Mean Density)
pH any single sample	weekly	6.5 – 8.5	6.40 – 7.54
Dissolved Oxygen	weekly	6	6.92 – 8

Thamesford effluent single samples that did not meet effluent objective concentrations in 2022 included the following:

Date	Parameter	Objective (mg/L)	Result (mg/L)
January 27, 2022	TSS	5	7
February 3, 2022	TSS	5	6
February 10, 2022	TSS	5	12
February 16, 2022	TSS	5	6
February 17, 2022	TSS	5	7
February 24, 2022	$CBOD_5$	5	14
March 3, 2022	TSS	5	6
March 10, 2022	TSS	5	8
March 17, 2022	TSS	5	10
March 17, 2022	TP	0.1	0.14
March 24, 2022	TSS	5	7
March 24, 2022	TAN	4	5
March 30, 2022	TSS	5	6
March 31, 2022	TSS	5	7
April 5, 2022	TSS	5	8
May 19, 2022	TSS	5	6
June 23, 2022	TSS	5	6
June 30, 2022	TSS	5	6
October 26, 2022	pH	6.5 – 8.5	6.4
November 3, 2022	TSS	5	7
November 17, 2022	TSS	5	8
November 17, 2022	TP	0.1	0.13
November 24, 2022	TSS	5	9
November 24, 2022	TP	0.1	0.21

Thamesford effluent monthly average concentrations that did not meet effluent monthly average objective concentrations in 2022 are listed in the following table:

Date	Parameter	Objective mg/L	Result mg/L
Feb. 2022	TSS	5	7.2
March 2022	TSS	5	7.3
Nov. 2022	TSS	5	6.5

3. OVERFLOWS, BYPASSSING, UPSETS, SPILLS, AND ABNORMAL CONDITIONS

There were no overflows, bypassing, upsets, spills, or abnormal conditions at the Thamesford WWTP in 2022.

There was an odour complaint reported November 23, 2022 by a neighbouring resident. Staff inspected the WWTP, and confirmed all equipment was operating properly, and could not detect any odours at the WWTP. Dissolved oxygen concentrations within the aeration tank were well above minimum requirements and are monitored 24 hours per day by the Supervisory Control and Data Acquisition (SCADA) computer for emergency alarm response by staff. Staff have now started to record local weather conditions. This may aide in determining sources of nuisance odours in the future. In addition, the removal of liquid biosolids has been scheduled between the hours of 9 am and 11 am, when required, to limit any potential odour generation caused by the removal of this material.

There were no additional complaints received in 2022.

There were no projects undertaken in 2022 or forecasted to be completed in 2023 to eliminate Bypass/Overflows in conformance with Procedure F-5-1.

4. MAINTENANCE OF WORKS

The operating and maintenance staff at the Thamesford WWTP conducts regularly scheduled maintenance of the WWTP equipment. The WWTP utilizes a database known as Cartegraph, to issue work orders and maintain records for regular maintenance and repair at the Thamesford WWTP.

The Limited Operational Flexibility for modifications to the Thamesford WWTP was not used in 2022.

5. MONTIORING EQUIPMENT MAINTENANCE AND CALIBRATION

The calibration of flow meters is conducted by JBF Controls Ltd. in accordance with the requirements of the ECA. The records are kept on-site at the Thamesford WWTP.

All other operational monitoring equipment is calibrated by staff and records are kept on-site at the Thamesford WWTP.

6. BIOSOLIDS PROGRAM

Thickened and partially aerobically digested liquid biosolids are transported to the Ingersoll WWTP for further treatment.

Biosolids are anaerobically digested and dewatered at the Ingersoll WWTP using an Alfa-Laval Centrifuge. The biosolids are then stored at the Oxford County Biosolids Centralized Storage Facility (BCSF) prior to land application. The sampling results and land application details are summarized in a separate Biosolids Annual report, available at www.oxfordcounty.ca/Services-for-You/Water-Wastewater/Wastewater/Annual-reports.

7. INSPECTION, PILOTS, AND TRIALS

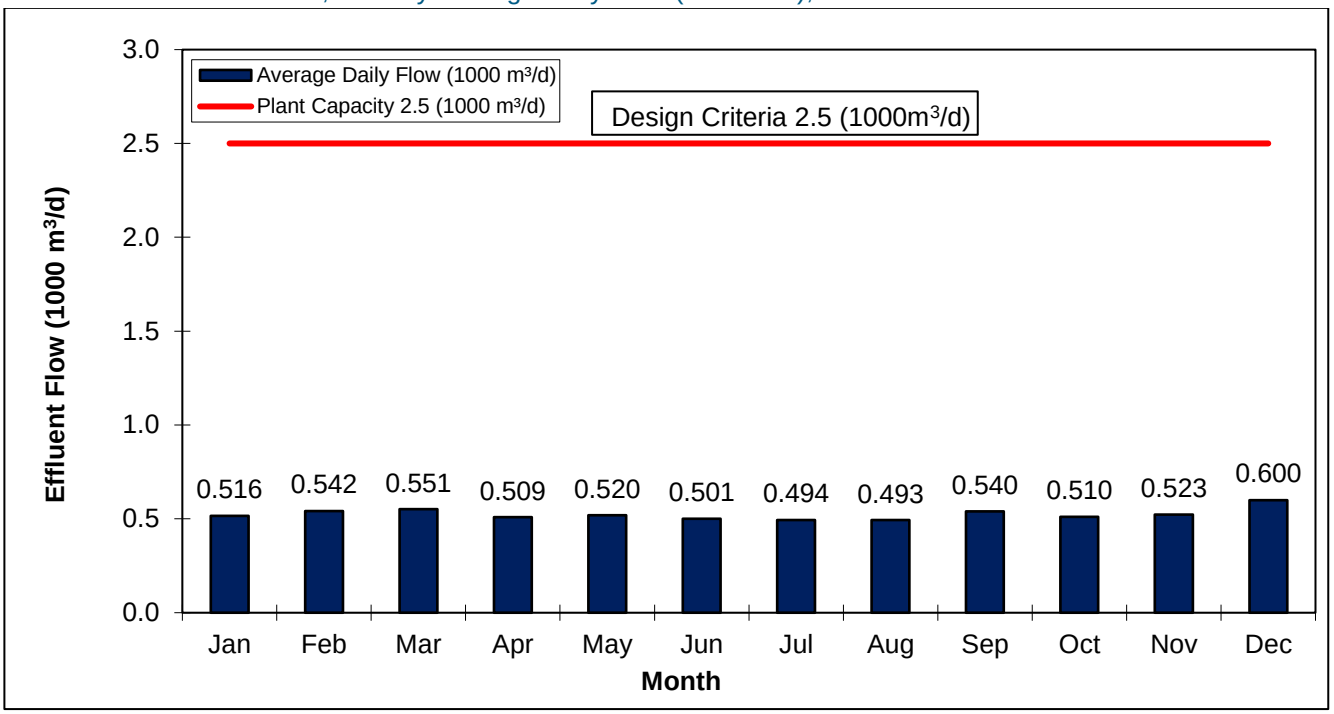
The MECP did not conduct an inspection of the Thamesford WWTP in 2022. The MECP inspections typically occur on a 3-year schedule.

WWTP Headworks and Aeration Upgrade

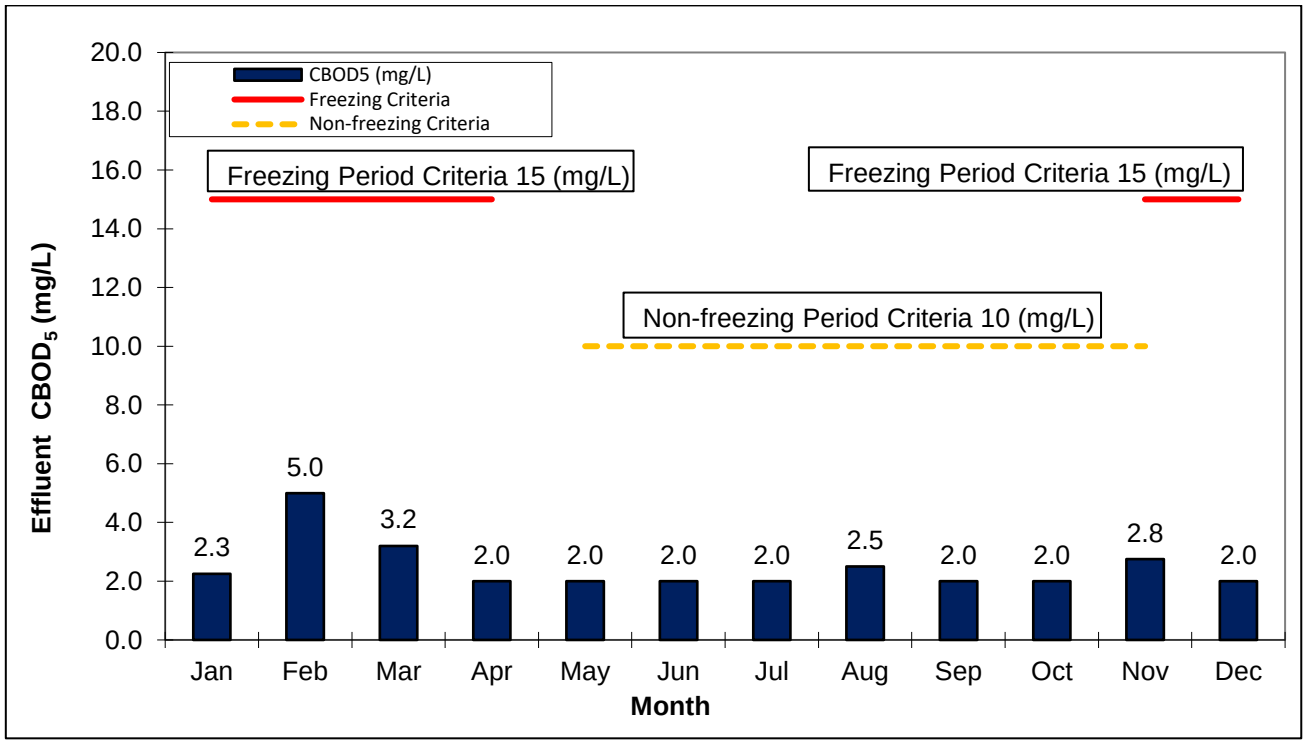
Design work continues into 2023 for the Thamesford WWTP Headworks and Aeration Upgrade to improve Thamesford WWTP performance and reduce operational challenges. Improvements include a new headworks facility with fine screening and grit removal, and the replacement of all aeration course bubble diffusers to fine bubble diffusers to improve oxygen transfer rate efficiency and reduce power consumption. Construction is planned for 2024.

APPENDIX A: GRAPHS OF 2022 DISCHARGE PARAMETERS VS. EFFLUENT DISCHARGE LIMITS

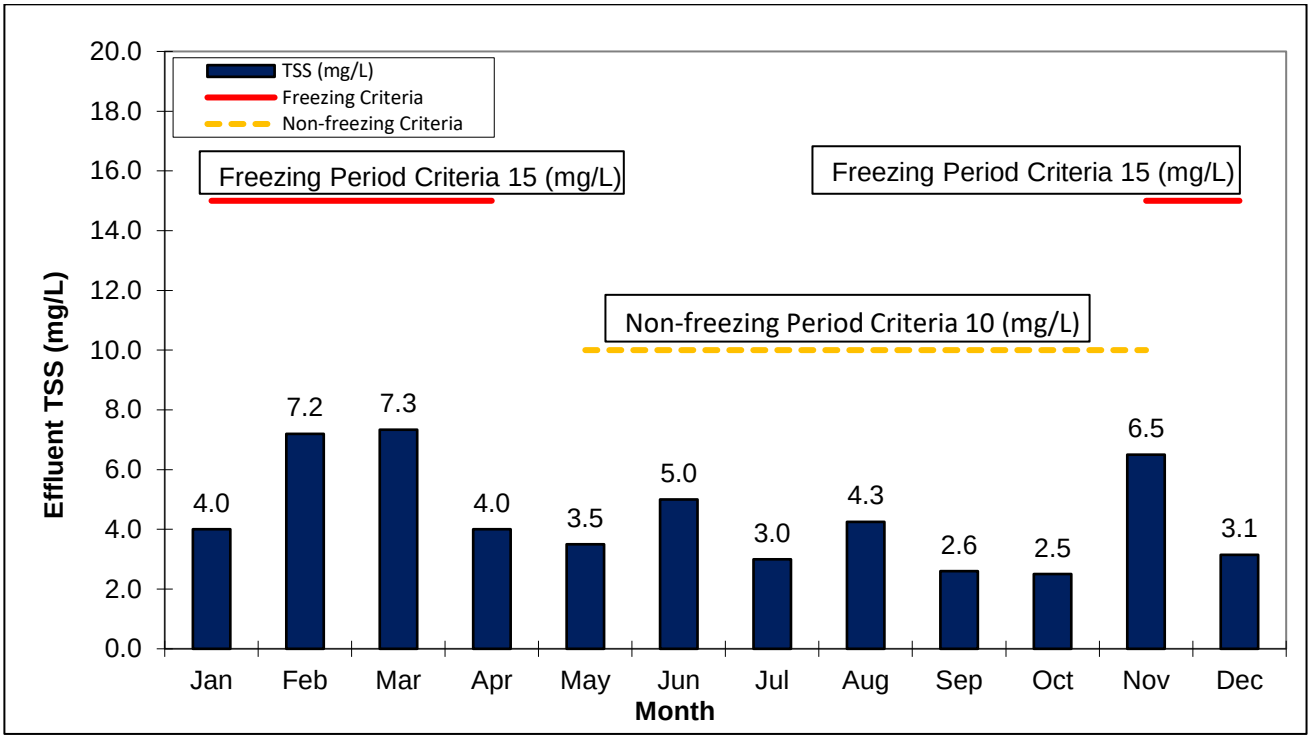
Thamesford WWTP Effluent, Monthly Average Daily Flow (1000m^3/d), 2022



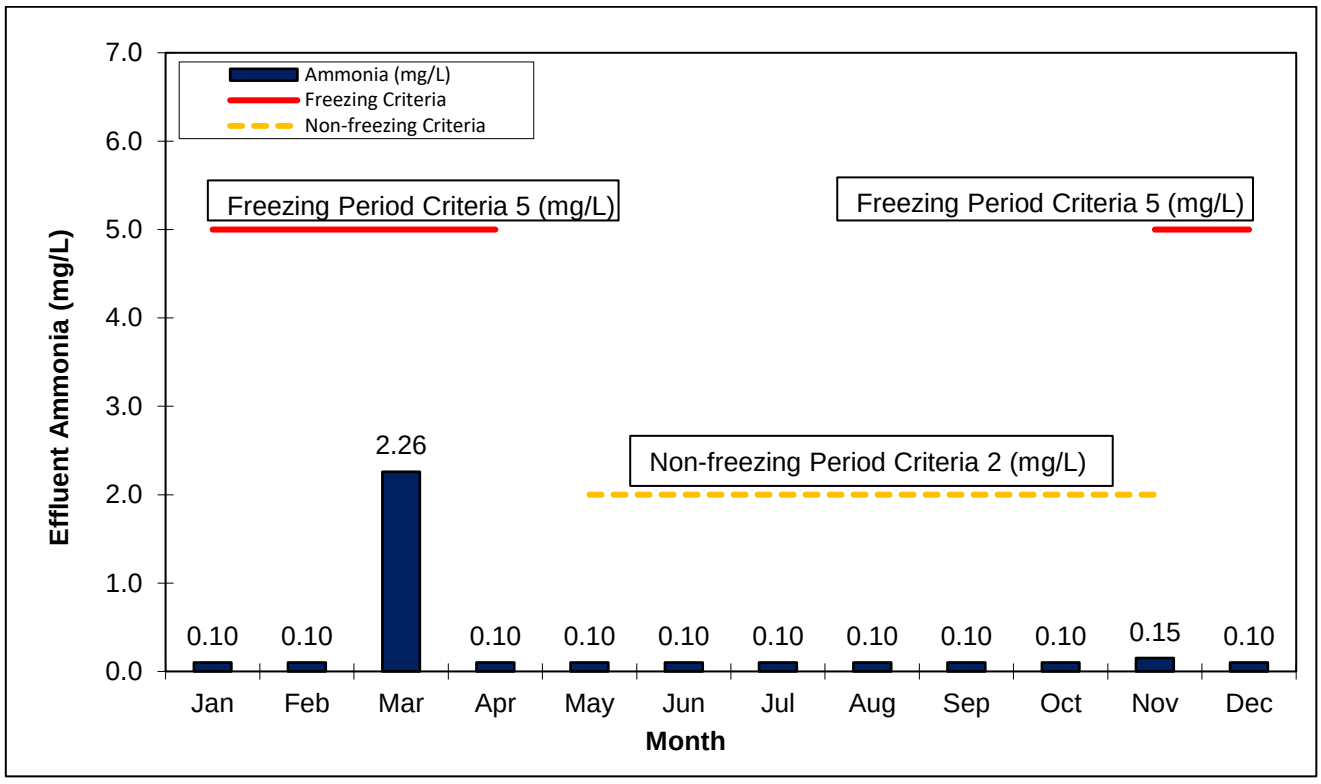
Thamesford WWTP Effluent, Monthly Average $CBOD_5$ (mg/L), 2022



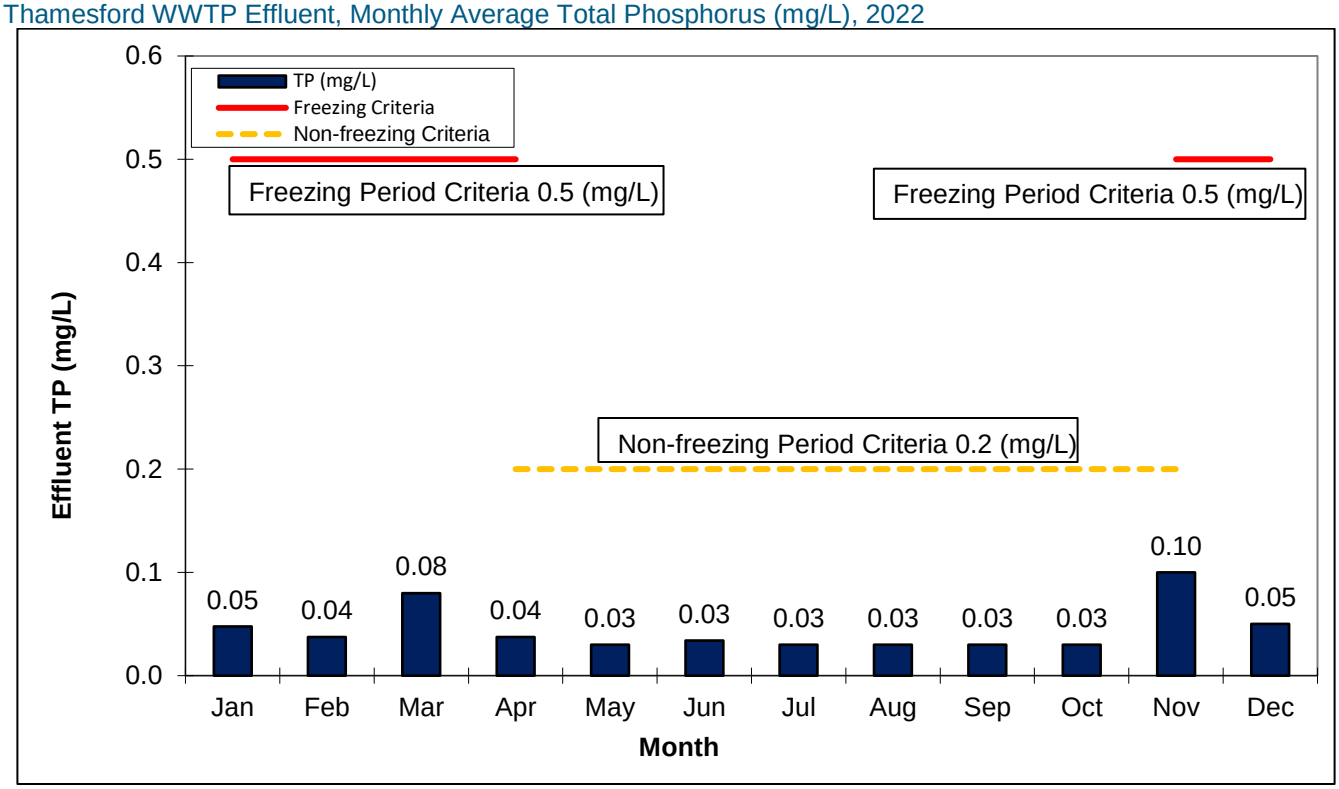
Thamesford WWTP Effluent, Monthly Average TSS (mg/L), 2022



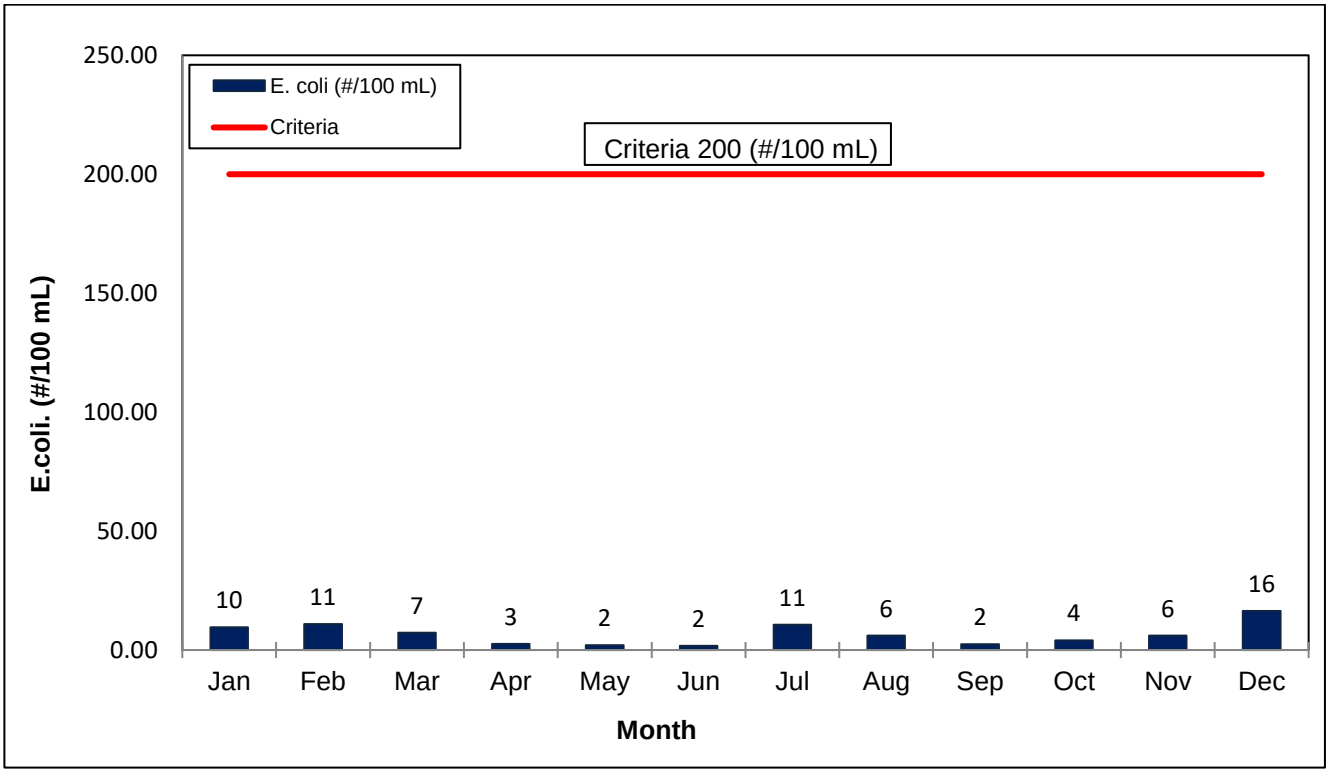
Thamesford WWTP Effluent, Monthly Average Ammonia (mg/L), 2022



Thamesford WWTP Effluent, Monthly Average Total Phosphorus (mg/L), 2022



Thamesford WWTP Effluent, Monthly Geometric Mean Density E.coli (#/100 mL), 2022



2022 ANNUAL WASTEWATER TREATMENT SYSTEM SUMMARY REPORT

Tillsonburg Wastewater Treatment Plant

1. GENERAL INFORMATION

Oxford County (the County) prepares a report summarizing wastewater treatment operation and treated effluent discharge quality for every municipal wastewater treatment plant (WWTP) annually. The reports detail the latest effluent quality testing results and quantity statistics, and any non-compliance conditions that may have occurred for the previous year. They are available for review by the end of March on the County website at http://www.oxfordcounty.ca/waterwastewater or by contacting the Public Works Department.

All efforts have been made to ensure the information presented in this report is as accurate as possible.

If you have any questions or comments concerning the report, please contact the County at the address and phone number listed below or by email at wastewater@oxfordcounty.ca.

Wastewater Treatment Plant: Tillsonburg WWTP
Wastewater Treatment Plant Number: 110000757
Environmental Compliance Approval (ECA): 6451-BW5LNN (February 12, 2021)
Reporting Period: January 1, 2022 – December 31, 2022

Wastewater Treatment Plant Owner & Contact Information:

Oxford County Public Works Department - Wastewater Services
P.O. Box 1614
21 Reeve Street
Woodstock, ON N4S 7Y3
Telephone: 519-539-9800
Toll Free: 866-537-7778
Email: wastewater@oxfordcounty.ca

1.1 System Description

The Tillsonburg WWTP is a Class III facility, as defined by Ontario Regulation (O.Reg.) 129/04, which provides wastewater treatment for residential, commercial, and industrial users in the Town of Tillsonburg. The separated wastewater collection system includes 3 sewage pumping stations (SPS), 122.3 kilometers of sanitary gravity sewers, and 2.4 kilometers of sanitary forcemain sewers. The Tillsonburg WWTP is a conventional activated sludge plant consisting of primary and secondary treatment, with an outfall pipe to the Big Otter Creek.

A standby generator is available to run the main influent pump station (John Pound Road lift station) in the event of a power failure. The system is maintained by licensed wastewater system operators and licensed mechanics that operate, monitor, and maintain the treatment equipment, in accordance to the regulations, and collect samples as required by the ECA. Alarms automatically notify operators in the event of failure of critical operational requirements.

The WWTP plant is located in Coronation Park in Tillsonburg, Ontario. The Facility description is provided below.

Facility	Tillsonburg WWTP
Design Capacity	8,180 m^3/d
2022 Average Daily Flow	5,905 m^3/d
2022 Maximum Daily Flow	13,400 m^3/d
2022 Total Volume of Wastewater	2,153,223 m^3/year

1.2 Major Expenses

In 2022, the Tillsonburg WWTP had forecasted operating and maintenance expenditures of approximately $2,567,000.

In addition to regular operational and maintenance expenditures, Capital Improvement Projects for the Town of Tillsonburg were forecasted at $10,748,000 which included improvements to the wastewater collection system and the Tillsonburg WWTP.

Tillsonburg WWTP Capital Improvement Projects included:

- $9,700,000 2022 ($17,664,928 total) for Phase 1 Upgrade of the Tillsonburg WWTP (multiyear project)
- $65,000 for Cranberry Road extension sewer work
- $8,000 for Stoney Creek sanitary maintenance
- $897,000 for Town projects
- $14,000 for Linear R/R CR project

- $64,000 for the replacement of general operating equipment

Capital Improvement Projects for all systems included:

- $625,000 to develop Countywide SCADA Master Plan for all wastewater systems
- $150,000 to develop Countywide Wastewater Servicing Master Plan for all wastewater systems

2. SUMMARY AND INTERPRETATION OF MONITORING DATA

2.1. Effluent Quality Assurance and Control Measures

Sampling Procedure

Raw sewage samples are collected where the influent streams combine before entering the sewage works. A composite sampler collects samples over a 24-hour duration on a bi-weekly basis.

The final effluent 24-hour composite sample is collected on a weekly basis after secondary treatment and disinfection, and prior to the effluent discharge to Big Otter Creek.

Laboratory and Field Testing

Laboratory analysis is performed by SGS Lakefield Research Ltd. on all samples that are reported for compliance except for pH, dissolved oxygen (DO), and temperature which are field collected. All other in-house testing is done for process control, the results of which are not included in this report.

2.2 WWTP Performance and Effluent Quality

Final Effluent Compliance Limits

Compliance limits are defined as the maximum effluent concentrations permitted for a given parameter set by the Ministry of Environment, Conservation and Parks (MECP). Compliance limits are detailed within each WWTP ECA. The limits are determined to prevent impairment to the receiving water body quality. The Owner is legally obligated to operate and maintain the treatment system to ensure the compliance limits are achieved.

The Tillsonburg WWTP provided effective treatment in 2022 with 568 samples out of 578 meeting compliance, or 98.3 % compliance to its regulatory limits for all effluent discharged from the WWTP.

In November a non-compliance occurred, the WWTP experienced frequent occurrences of large amounts of oil mixed within the influent. The oil inhibited the plant microbiology and caused poor settling within the secondary clarifiers, and eventually a carryover of solids in the effluent.

- The effluent monthly average concentration for Total Suspended Solids was 25.2 mg/L, which was above the ECA concentration limit of 25 mg/L

To react to this TSS concentration exceedance, several actions were taken. Staff collected samples of the oil, and documented occurrences in the WWTP logbook. The WWTP was re-seeded with healthy activated sludge from neighbouring WWTPs. Polymer dosing to the secondary clarifier was increased, to aide with settling. Adjustments to the aeration return rates and wasting rates were made to optimize the population of bacteria within the aeration tanks. Much of the oil was physically removed by vac-truck and taken for disposal at neighbouring WWTPs. Staff conducted daily microscopic analysis to monitor the health of the activated sludge process. Weekly team meetings were held to discuss and review the plant conditions.

Additionally, Oxford County's Sewer Use Enforcement team commenced continuous video surveillance of the influent sewer at the WWTP to determine the entry time and sewer trunk location where the material was coming from. The Oxford County Communications Department created posts to the various County social media platforms in an effort to raise awareness of the problem. In 2023, a letter was sent to large Industrial, Commercial and Institutional (ICI) users in the Town, discussing these events and the resulting impacts at the WWTP, and the parameters of Oxford County's Modernized Sewer Use By-law. Continued surveillance and tracking of events is ongoing at the WWTP.

All non-compliances were reported to the Ministry of Environment, Conservation and Parks (MECP) at the time of the event.

Influent Streams and Effluent Streams

On a bi-weekly basis, the operator measures pH of the influent stream and on a weekly basis, measures pH of the effluent stream. There was no single pH result for the effluent outside the discharge limit of 6 - 9.5 in 2022.

Graphs of discharge parameters versus effluent discharge limits are included in this report in Appendix A.

Influent wastewater characteristics and effluent discharge values are presented in the tables below.

Influent Wastewater Characteristics		
Parameter	**Concentration mg/L**	**Loading kg/d**
$CBOD_5$	259	1,529
Total Suspended Solids (TSS)	288	1,700
Total Phosphorus (TP)	4.7	28
Total Kjeldahl Nitrogen	37.7	223

Annual Average Effluent Daily Loadings	Annual Average Concentration (mg/L)	Annual Average Daily Effluent Flow (1000 m³/d)	Result (kg/d)	Limit (kg/d)
$CBOD_5$	6.2	5.905	37	206
TSS	15.1	5.905	88	206
TP	0.36	5.905	2	8.2

Effluent Parameter	Sample Frequency	ECA Effluent Limit (Monthly Average) (mg/L unless otherwise indicated)	Monthly Average Result Min-Max (mg/L unless otherwise indicated)	Percentage Removal
$CBOD_5$	weekly	25	2.3 – 17.0	93.4 – 99.1
TSS	weekly	25	7.5 – 25.2	91.3 – 97.4
TP	weekly	1	0.22 – 0.62	86.8 – 95.3
E. coli (May 1 – October 31)	weekly	200 organisms/100 mL (monthly Geometric Mean Density)	5.5 – 135.5 organisms/100 mL (monthly Geometric Mean Density)	--
pH any single sample	weekly	6.0 - 9.5	6.82– 8.16	--

2.3 Final Effluent Design Objectives

Final Effluent Design Objectives (objectives) are non-enforceable effluent quality values which the Owner is obligated to use best efforts to strive towards achieving on an ongoing basis. These objectives are to be used as a mechanism to trigger corrective action proactively, and voluntarily before environmental impairment occurs and before the compliance limits are exceeded.

There were some objectives that were not met at the Tillsonburg WWTP in 2022, namely:

- The monthly average concentration objective for TSS of 15 mg/L for the months of January, April, October and November
- The monthly average concentration objective for $CBOD_5$ of 15 mg/L for the month of January

- Several single sample objective exceedances occurred throughout 2022 and are listed below

During the months of January, April, October and November the WWTP experienced frequent occurrences of oil within the influent waste stream. Oil inhibited the WWTP microbiology and caused poor settling within the secondary clarifiers, and eventually caused a carryover of solids into the WWTP effluent. To react to these TSS objective concentration exceedances, actions were taken to reduce impacts on the WWTP such as: re-seeding the aeration with healthy activated sludge from neighbouring WWTPs, increasing chemical dosing to assist in settling, changing the aeration return rates and wasting rates to maintain adequate bacteria populations, physically removing any oil from the surface of the primary clarifiers, daily microscopic analysis of the mixed liquor, video surveillance of the influent sewer at the WWTP, and Oxford County social media posts on the issue.

The following table presents the range of effluent discharge values vs. ECA Objectives.

Effluent Parameter	**Sample Frequency**	**Monthly Average Objective Concentration** (mg/L unless otherwise indicated)	**Monthly Average Result Min-Max** (mg/L unless otherwise indicated)
$CBOD_5$	weekly	15	2.3 – 17.0
TSS	weekly	15	7.5 – 25.2
TP	weekly	0.8	0.22 – 0.62
E. coli (May 1 – Oct. 31)	weekly	150 organisms/100 mL (monthly Geometric Mean Density)	5.5 – 135.5 organisms/100 mL (monthly Geometric Mean Density)
pH any single sample	weekly	6.5 - 8.0	6.82– 8.16

Monthly average effluent concentrations that failed to meet monthly average objective limits are provided in the following table.

Month	**Parameter**	**Monthly Average Objective Concentration mg/L**	**Result mg/L**
January 2022	$CBOD_5$	15	17.0
January 2022	TSS	15	23.5
April 2022	TSS	15	17.3
October 2022	TSS	15	22.5
November 2022	TSS	15	25.2

Single sample results that failed to meet effluent objectives are provided in the following table.

Date	Parameter	Objective mg/L	Result mg/L
January 4, 2022	$CBOD_5$	15.0	28.0
January 4, 2022	TSS	15.0	40.0
January 4, 2022	TP	0.8	0.88
January 11, 2022	$CBOD_5$	15.0	18.0
January 11, 2022	TSS	15.0	25.0
April 5, 2022	TSS	15.0	24.0
April 12, 2022	$CBOD_5$	15.0	16.0
April 12, 2022	TSS	15.0	42.0
April 19, 2022	TSS	15.0	20.0
April 26, 2022	TSS	15.0	21.0
May 3, 2022	TSS	15.0	16.0
June 7, 2022	E. coli	150 (#/100 mL)	1,200 (#/100 mL)
June 28, 2022	TSS	15.0	21.0
August 2, 2022	TSS	15.0	24.0
August 30, 2022	TSS	15.0	24.0
October 18, 2022	TSS	15.0	25.0
October 25, 2022	TSS	15.0	51.0
October 25, 2022	E. coli	150 (#/100 mL)	360 (#/100 mL)
November 8, 2022	TSS	15.0	59.0
November 15, 2022	$CBOD_5$	15.0	23.0
November 15, 2022	TSS	15.0	109.0
November 15, 2022	TP	0.8	1.66
November 20, 2022	TSS	15.0	17.0
November 22, 2022	TSS	15.0	61.0
November 22, 2022	TP	0.8	0.95
November 23, 2022	TSS	15.0	17.0

Date	Parameter	Objective mg/L	Result mg/L
December 6, 2022	TSS	15.0	20.0
December 13, 2022	TSS	15.0	22.0

3. OVERFLOWS, BYPASSSING, UPSETS, SPILLS, AND ABNORMAL CONDITIONS

There were no overflows, bypassing, upsets, spills and abnormal conditions in 2022.

The Town of Tillsonburg completed several projects in 2022 to help eliminate Bypass/Overflows in conformance with Procedure F-5-1:

- Reconstruction of Lindsay Street, main priority was the failing mainline sanitary sewers with broken clay pipe. Along with the project included the complete reconstruction of the pavement structure including new barrier curb and gutter, sidewalks, the installation of new storm sewers and catch basins, and watermain replacement
- Reconstruction of Frances Street, main priority was the failing mainline sanitary sewers with broken maintenance holes. Along with the project included the complete reconstruction of the pavement structure including new barrier curb and gutter, sidewalks, the installation of new storm sewers and catch basins, and watermain replacement
- Completion of sanitary manhole inspection for phase 2 (remaining 50% of the Town) this project included an operation and maintenance plan
- Continue of the Stoney Creek Trunk Main sewer maintenance plan. This project includes 8 locations where the sanitary sewer is exposed or has less than 0.3m of cover. The goal is creek restoration to project both the creek and the sanitary sewer

4. MAINTENANCE OF WORKS

The operating and maintenance staff at the Tillsonburg WWTP conducts regularly scheduled maintenance of the WWTP equipment. The WWTP utilizes a database known as Cartegraph, to issue work orders and maintain records for regular maintenance and repair at the WWTP.

The Limited Operational Flexibility for modifications to the Tillsonburg WWTP was not used in 2022.

5. MONTIORING EQUIPMENT MAINTENANCE AND CALIBRATION

The calibration of flow meters is conducted yearly by JBF Controls Ltd. in accordance with the requirements of the ECA. The records are kept on-site at the Tillsonburg WWTP.

All other operational monitoring equipment is calibrated by staff and records are kept on-site at the Tillsonburg WWTP.

6. BIOSOLIDS PROGRAM

Biosolids are aerobically digested and dewatered at the Tillsonburg WWTP using an Alfa-Laval Centrifuge. The biosolids are then stored at the County Biosolids Centralized Storage Facility (BCSF) prior to land application. The sampling results and land application details are summarized in a separate Biosolids Annual report, available at: www.oxfordcounty.ca/Services-for-You/Water-Wastewater/Wastewater/Annual-reports.

7. INSPECTION, PILOTS, AND TRIALS

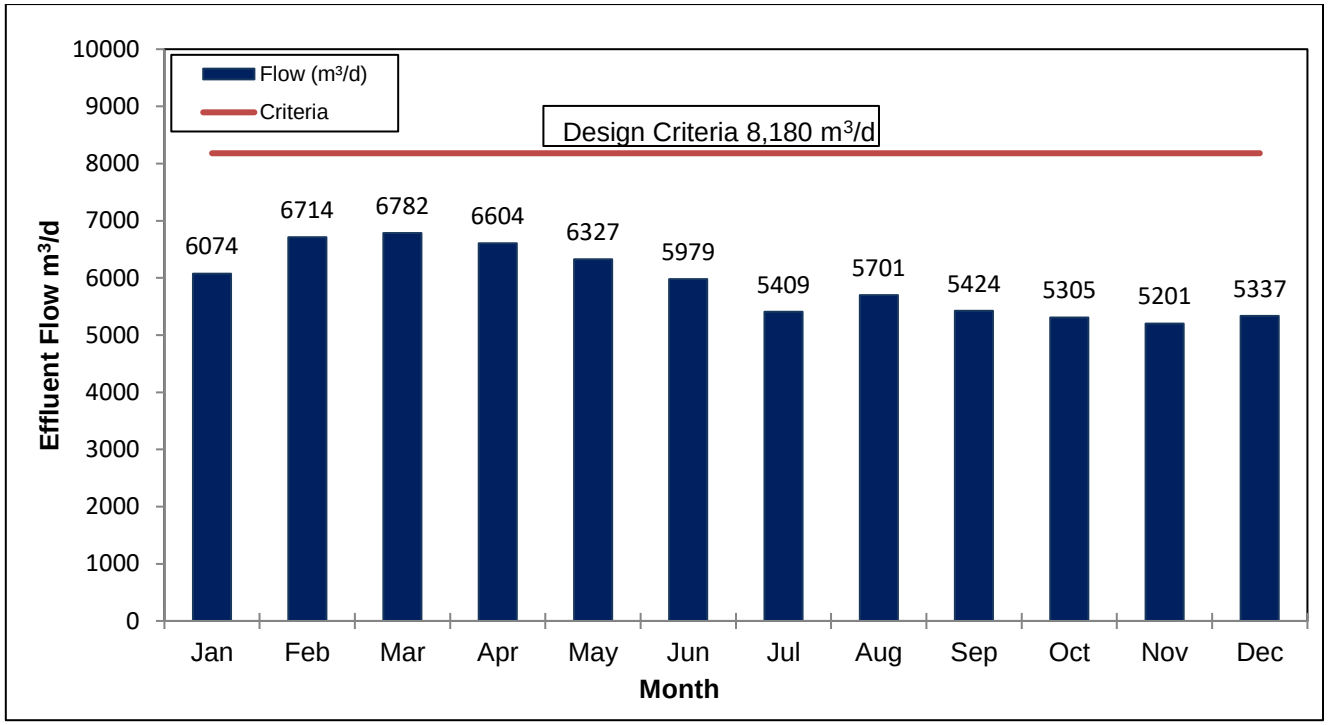
The MECP did not perform an inspection of the Tillsonburg WWTP in 2022. The MECP inspections typically occur on a 3-year schedule.

WWTP Upgrade

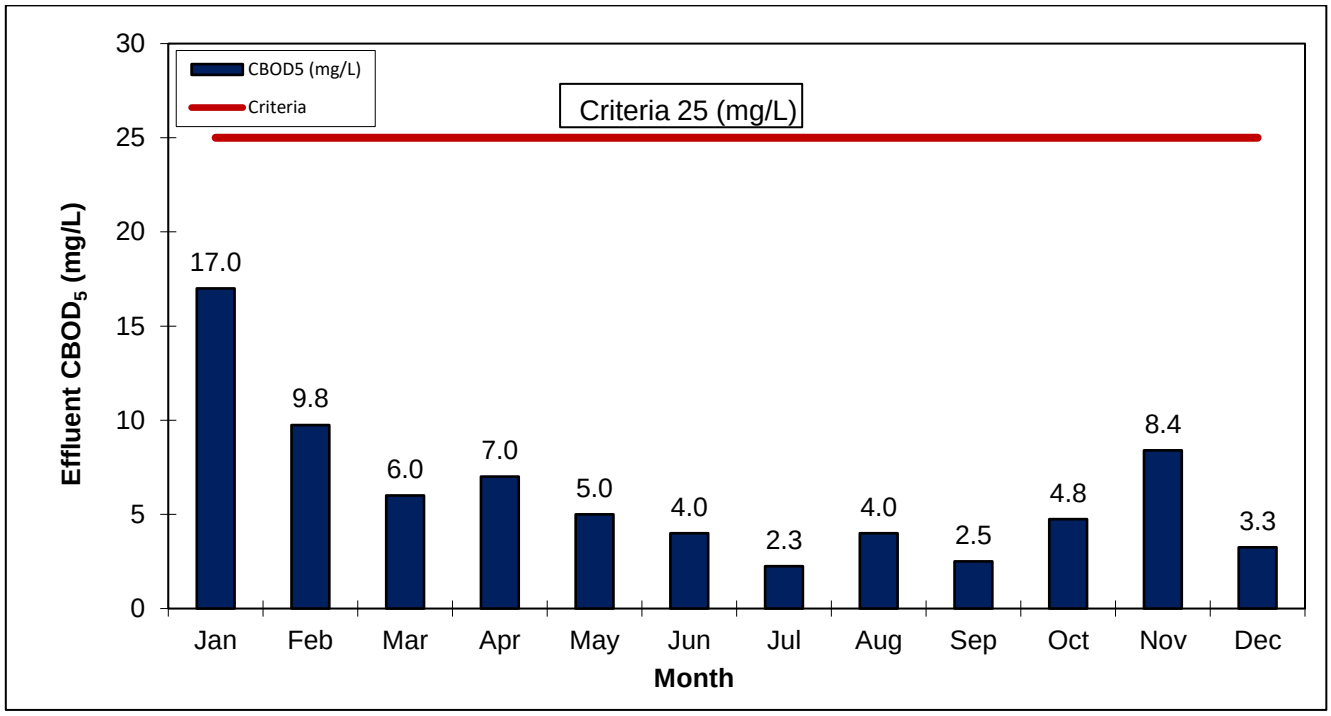
Construction of the upgrades to the Tillsonburg WWTP began in 2021. Upgrades to headworks, primary and secondary clarification, waste thickening and blowers are being completed. The upgrade will address bottlenecks in the treatment process and WWTP performance. Construction is expected to be completed in December of 2023.

APPENDIX A: GRAPHS OF 2022 DISCHARGE PARAMETERS VS. EFFLUENT DISCHARGE LIMITS

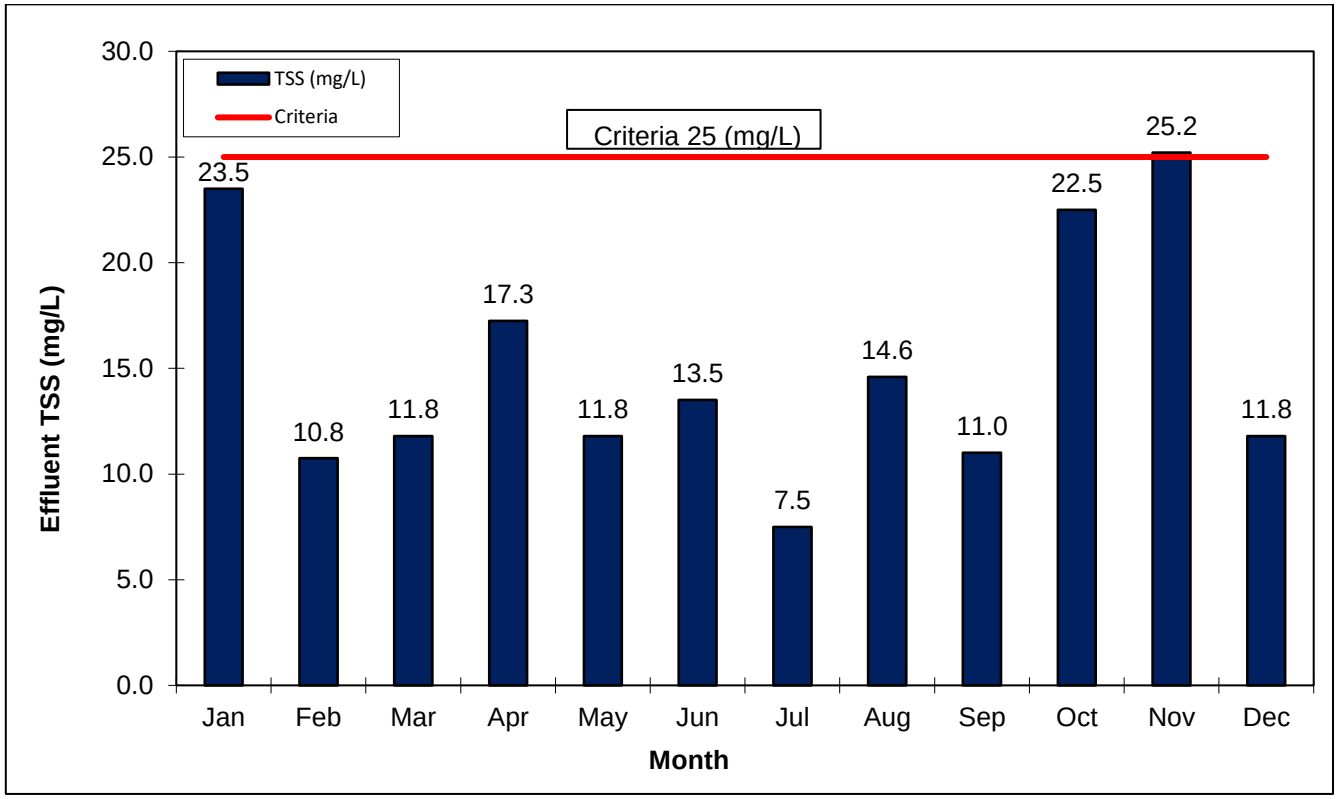
Tillsonburg WWTP Effluent, Monthly Average Daily Flow in Cubic Meters per Day, 2022



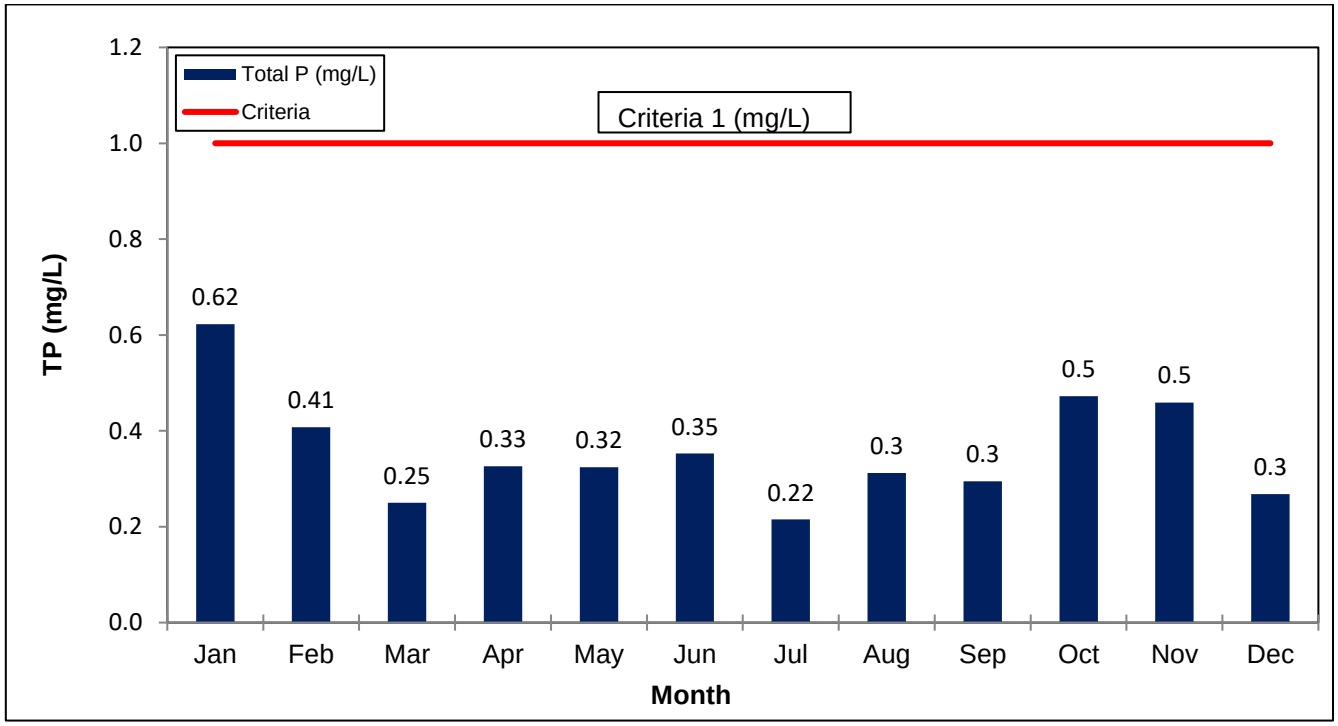
Tillsonburg WWTP Effluent, Monthly Average $CBOD_5$ (mg/L), 2022



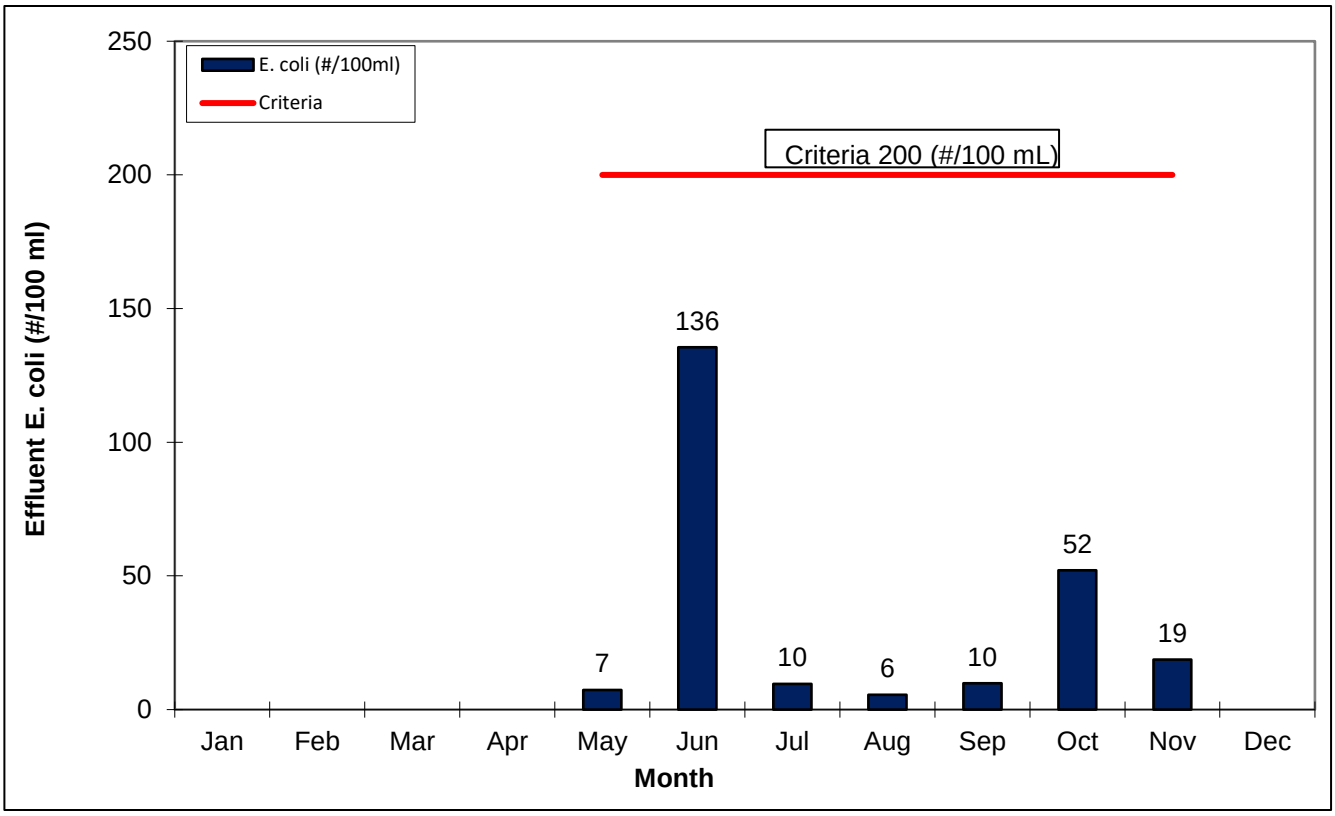
Tillsonburg WWTP Effluent, Monthly Average TSS (mg/L), 2022



Tillsonburg WWTP Effluent, Monthly Average Total Phosphorus (mg/L), 2022



Tillsonburg WWTP Effluent, Monthly Geometric Mean Density E. coli (#/100 mL), 2022



2022 ANNUAL WASTEWATER TREATMENT SYSTEM SUMMARY REPORT

Woodstock Wastewater Treatment Plant

1. GENERAL INFORMATION

Oxford County (the County) prepares a report summarizing wastewater treatment operation and treated effluent discharge quality for every municipal wastewater treatment plant (WWTP) annually. The reports detail the latest effluent quality testing results and quantity statistics, and any non-compliance conditions that may have occurred for the previous year. They are available for review by the end of March on the County website at http://www.oxfordcounty.ca/waterwastewater or by contacting the Public Works Department.

All efforts have been made to ensure the information presented in this report is as accurate as possible.

If you have any questions or comments concerning the report, please contact the County at the address and phone number listed below or by email at wastewater@oxfordcounty.ca.

Wastewater Treatment Plant: Woodstock WWTP
Wastewater Treatment Plant Number: 120000685
Environmental Compliance Approval (ECA): 5950-7XQKXS (December 18, 2009)
Reporting Period: January 1, 2022 – December 31, 2022

Wastewater Treatment Plant Owner & Contact Information:

Oxford County Public Works Department - Wastewater Services
P.O. Box 1614
21 Reeve Street
Woodstock, ON N4S 7Y3
Telephone: 519-539-9800
Toll Free: 866-537-7778
Email: wastewater@oxfordcounty.ca

1.1 System Description

The Woodstock WWTP is a Class IV rated treatment facility, as defined by Ontario Regulation (O.Reg.) 129/04, which provides wastewater treatment for residential, commercial, and industrial users in the City of Woodstock and for the communities of Embro and Innerkip. It also provides treatment for septic tank waste, hauled waste, and holding tank waste from within Oxford County. The Woodstock nominally separated wastewater collection system includes 5 sewage pump stations (SPS), 274 kilometers of sanitary gravity sewers, 3.4 kilometers of sanitary forcemain sewers and 1.4 kilometers of sanitary low pressure sewers. The Embro and Innerkip wastewater collection systems together include 7 sewage pump stations, 19.5 kilometers of sanitary gravity sewers, 22.5 kilometers of sanitary forcemain sewers and 0.9 kilometers of sanitary low pressure sewers.

The Woodstock WWTP is a conventional activated sludge system consisting of primary and secondary treatment, with an outfall pipe to the Thames River.

A standby generator is available to run the entire Woodstock WWTP and onsite Thames Valley Lift Station in the event of a power failure. A secondary backup generator is available and dedicated to Thames Valley Lift Station in case of an emergency. The wastewater system is maintained by licensed wastewater treatment system operators and licensed mechanics that operate, monitor, and maintain the treatment equipment, in accordance to the regulations, and collect samples as required by the ECA. Alarms automatically notify operators in the event of failure of critical operational requirements.

The Woodstock WWTP is located at 195 Admiral Street in Woodstock, Ontario, with the Facility description provided below.

Facility	Woodstock WWTP
Design Capacity	33,000 m^3/d
Design Capacity (Peak Flow)	66,000 m^3/d
2022 Average Daily Flow	20,364 m^3/d
2022 Maximum Daily Flow	67,799 m^3/d
2022 Total Volume of Wastewater	* 7,419,200 m^3/year
2022 Total Received Hauled Waste	26,266 m^3/year (9,877 m^3/year leachate)

* Included in this total is 186,645 m^3/year from the Embro & Innerkip wastewater collection systems

1.2 Major Expenses

In 2022, the Woodstock WWTP had forecasted operating and maintenance expenditures of approximately $5,561,000.

In 2022, Embro and Innerkip wastewater collection systems had forecasted operating and maintenance expenditures of approximately $964,000.

In addition to regular operational and maintenance expenditures, Capital Improvement Projects for Woodstock totaled $6,469,000 for improvements to the wastewater collection system (included Embro and Innerkip) and the Woodstock WWTP.

Capital Improvement Projects included:

- $23,000 Jack Poole Trunk Sewer
- $1,738,000 for City projects
- $135,000 for the Lansdowne sewage pumping station
- $150,000 for sanitary sewer oversizing
- $100,000 Woodstock North Trunk I&I Study
- $420,000 Woodstock Linear R/R CR Project
- $3,362,500 for the Pattullo Industrial Park SPS &Servicing
- $30,000 Innerkip Odour Control
- $277,000 for facilities upgrades
- $233,000 for the replacement of general operating equipment

Capital Improvement Projects for all systems included:

- $625,000 to develop Countywide SCADA Master Plan for all wastewater systems
- $150,000 to develop Countywide Wastewater Servicing Master Plan for all wastewater systems

2. SUMMARY AND INTERPRETATION OF MONITORING DATA

2.1. Effluent Quality Assurance and Control Measures

Sampling Procedure

Wastewater samples are collected on a weekly basis. Raw sewage samples are collected where the sewer trunks combine before entering the sewage works. An automatic composite sampler collects samples over a 24-hour period. Following primary treatment, a second 24-hour composite sample is collected. A third and final effluent 24-hour composite sample is collected following secondary treatment, disinfection and de-chlorination prior to the effluent discharge to the Thames River.

Laboratory and Field Testing

Laboratory analysis is performed by SGS Lakefield Research Ltd. on all samples that are reported for compliance except for pH, dissolved oxygen (DO), and temperature which are field collected. All other in-house testing is done for process control, the results of which are not included in this report.

2.2 WWTP Performance and Effluent Quality

Final Effluent Compliance Limits

Compliance limits are defined as the maximum effluent concentrations permitted for a given parameter set by the Ministry of Environment, Conservation and Parks (MECP). Compliance limits are detailed within each WWTP ECA. The limits are determined to prevent impairment to the receiving water body quality. The Owner is legally obligated to operate and maintain the treatment system to ensure the compliance limits are achieved.

The Woodstock WWTP provided effective treatment in 2022 with 782 samples out of 787 meeting compliance, or 99.4 % compliance to its regulatory limits for all effluent discharged from the WWTP.

On June 15th at 9:10 pm a brief power interruption occurred at the Woodstock WWTP and the sodium bisulphite pump used for dechlorination did not restart, nor did the backup pump. Staff found the pump off the following morning and restarted, re-establishing dechlorination at 7:30 am on June 16th. The pump and controls were looked at by a technician but the condition could not be repeated. A procedure was drafted for staff to follow for this type of event, including collecting samples, testing and checking the river at the WWTP outfall.

- The effluent Total Residual Chlorine was 0.90 mg/L, which was above the ECA concentration limit of <0.05 mg/L

On August 6th at 9:19 pm a power interruption occurred at the Woodstock WWTP and the sodium bisulphite pump used for dechlorination did not restart, nor did the backup pump. Staff found the pump off at 10:08 pm, while responding to another WWTP alarm, and re-established dechlorination. A technician investigated, and installed alarms and redundant programming on the pumps meant to ensure one pump would always remain active.

- The effluent Total Residual Chlorine was 0.85 mg/L, which was above the ECA concentration limit of <0.05 mg/L

All non-compliances were reported to the Ministry of Environment, Conservation and Parks (MECP) at the time of the event.

Influent Streams and Effluent Streams

On a weekly basis (minimum), an operator measures pH of both the influent and effluent streams. There was no single pH result for the effluent outside the discharge limit of 6 - 9.5 in 2022. The results are shown in the table below.

Operators test Total Residual Chlorine (TRC) in the treated effluent on a daily basis. This exceeds the minimum regulated testing frequency of once per week. TRC results

are reported as monthly or annual averages, which should not exceed 0.05 mg/L or 0.02 mg/L respectively. In 2022, the monthly average results at all times met the Monthly Average TRC limit and were less than 0.05 mg/L. On two occasions in 2022, the TRC exceeded the limit of less than 0.05 mg/L. The Federal Government's P2 target for TRC of 0.02 mg/L was not met in 2022, a result of the two events where the dechlorination equipment faulted.

Graphs of discharge parameters versus effluent discharge limits are included in this report in Appendix A.

Influent wastewater characteristics and effluent discharge values are presented in the tables below.

Influent Wastewater Characteristics		
Parameter	**Concentration mg/L**	**Loading kg/d**
$CBOD_5$	116	2,362
Total Suspended Solids (TSS)	180	3,666
Total Phosphorus (TP)	3	61
Total Kjeldahl Nitrogen	27	550

Effluent Parameter	**Sample Frequency**	**ECA Effluent Limit (Monthly Average)** (milligram per liter unless otherwise indicated)	**Monthly Average Result Min. - Max.** (milligram per liter unless otherwise indicated)	**Percentage Removal**
$CBOD_5$ (May 01 to November 30)	weekly	15	2.0 – 3.8	96.7 – 98.3
$CBOD_5$ (December 01 to April 30)	weekly	20	2.8 – 6.4	94.5 – 97.6
TSS	weekly	15	3.2 – 6.7	96.3 – 98.2
TP	weekly	0.75	0.25 – 0.37	87.7 – 91.7
Total Ammonia Nitrogen (May 1 to November 30)	weekly	3	0.1 – 0.7	96.8 – 99.5
Total Ammonia Nitrogen (Dec. 1 to April 30)	weekly	5.0	0.3 – 1.1	94.9 – 98.6

Effluent Parameter	Sample Frequency	ECA Effluent Limit (Monthly Average) (milligram per liter unless otherwise indicated)	Monthly Average Result Min. - Max. (milligram per liter unless otherwise indicated)	Percentage Removal
TRC (May 1-October 31)	weekly	<0.05	0.01 – 0.90	--
E. coli (May 1 – October 31)	weekly	200 organisms/100 mL (monthly Geometric Mean Density)	7.7 – 74.4 organisms/100 mL (monthly Geometric Mean Density)	--
pH any single sample	weekly	6.0 - 9.5	6.6 – 8.0	--

2.3 Final Effluent Design Objectives

Final Effluent Design Objectives (objectives) are non-enforceable effluent quality values which the Owner is obligated to use best efforts to strive towards achieving on an ongoing basis. These objectives are to be used as a mechanism to trigger corrective action proactively, and voluntarily before environmental impairment occurs and before the compliance limits are exceeded.

All effluent discharge objectives listed in the WWTP ECA were mainly met at the Woodstock WWTP in 2022, with the eight exceptions summarized below.

The following table presents the range of effluent discharge values and the comparable ECA Objectives.

Effluent Parameter	Sample Frequency	Monthly Average ECA Objective Concentration (milligram per liter unless otherwise indicated)	Monthly Average Result Min-Max (milligram per liter unless otherwise indicated)
$CBOD_5$	weekly	12	2.0 – 6.4
TSS	weekly	12	3.2 – 6.7
TP	weekly	0.5	0.25 – 0.37
Total Ammonia Nitrogen (May 1 to November 30)	weekly	2.0	0.1 – 0.7
Total Ammonia Nitrogen (Dec. 1 to April 30)	weekly	3.0	0.3 – 1.1

Effluent Parameter	Sample Frequency	Monthly Average ECA Objective Concentration (milligram per liter unless otherwise indicated)	Monthly Average Result Min-Max (milligram per liter unless otherwise indicated)
E. coli (May 1 – October 31)	weekly	200 organisms/100 mL (monthly Geometric Mean Density)	7.7 – 74.4 organisms/100 mL (monthly Geometric Mean Density)
pH any single sample	weekly	6.0 - 8.5	6.6 – 8.0

Woodstock effluent single samples that did not meet effluent objective concentrations in 2022 included the following:

Date	Parameter	Objective mg/L	Result mg/L
January 18, 2022	TSS	12	18
March 1, 2022	TAN	3.0	4.6
May 3, 2022	E. coli	200 organisms/100 mL (monthly Geometric Mean Density)	560
May 10, 2022	TAN	2.0	3.0
June 15, 2022	TRC	<0.05	0.90
July 7, 2022	TAN	2.0	13.0
August 6, 2022	TRC	<0.05	0.85
September 20, 2022	E. coli	200 organisms/100 mL (monthly Geometric Mean Density)	1,200

3. OVERFLOWS, BYPASSSING, UPSETS, SPILLS, AND ABNORMAL CONDITIONS

On April 5, 2022 a wastewater contractor was offloading sewage pumping station cleanout material at the Woodstock WWTP. The truck discharge hose became disconnected causing a spill, the driver quickly shut the discharge valve. Approximately 700 litres of raw sewage material spilled on to the pavement, and approximately 450 litres of material made its way into the Thames River via a storm water drain. Booms were placed in the river and the contractor flushed/ vac-trucked the storm water catch basin and piping, material around the exit of the storm water pipe at the river bank was collected

and the pavement was cleaned. Samples were collected and sent to an independent lab for analysis. The following day the Contractor was back onsite to inspect for any additional clean up and to remove the booms from the Thames River. As a result of this spill, all vac-truck contractors will be offloading at another location within the plant, with grading towards the headworks, and further from the storm water catch basin. Additional spills kits and signage were added to reduce the chances of spills from entering a storm water catch basin.

The event was reported to the MECP at the time it occurred.

There were no additional overflows, bypassing, upsets, spills, or abnormal conditions at the Woodstock WWTP in 2022.

4. MAINTENANCE OF WORKS

The operating and maintenance staff at the Woodstock WWTP conduct regularly scheduled maintenance of the WWTP equipment. The WWTP utilizes a database known as Cartegraph to issue work orders and maintain records for regular maintenance and repair at the WWTP.

5. MONTIORING EQUIPMENT MAINTENANCE AND CALIBRATION

The calibration of flow meters is conducted by Indus-Controls Inc. in accordance with the requirements of the ECA. The records are kept on-site at the Woodstock WWTP.

All other operational monitoring equipment is calibrated by staff and records are kept on-site at the WWTP.

6. BIOSOLIDS PROGRAM

Biosolids are anaerobically digested and dewatered at the Woodstock WWTP using two Alfa-Laval Centrifuges. The biosolids are then stored at the County Biosolids Centralized Storage Facility (BCSF) prior to land application. The sampling results and land application details are summarized in a separate Biosolids Annual report, available at: www.oxfordcounty.ca/Services-for-You/Water-Wastewater/Wastewater/Annual-reports.

7. INSPECTION, PILOTS, AND TRIALS

The MECP did not perform an inspection of the WWTP in 2022. The MECP inspections typically occur on a 3-year schedule.

COVID-19 Study: Ontario Wastewater Surveillance Initiative

In 2022, the Woodstock WWTP continued participation in the Wastewater Surveillance Initiative. The study has been funded by a $12 million Provincial investment, and includes the collaboration of 13 institutions, 34 Public Health Units and 117 Communities. The study captures more than 75 percent of Ontario's population, and involves the detection of the COVID-19 virus in wastewater samples. This provides

Public Health Units with another tool to aide in tracing infection. The Woodstock WWTP collects influent samples three times per week, which are tested by Western University, in London, Ontario. The results are provided to Southwestern Public Health, to help track the spread of the virus.

North Trunk Sewer Inflow and Infiltration Investigation

A study was initiated in the fall of 2021, to locate and reduce inflow and infiltration (I&I) within the City of Woodstock North Trunk Sewer catchment area. The County is actively pursuing ways of being sustainable, and have identified the older sections of the collection system are significant contributors of I&I. Reductions to I&I flow allow for increased sanitary sewer capacity within the existing wastewater system. This supports future development while minimizing or deferring future infrastructure capital upgrades and energy requirements of the downstream wastewater treatment plant. The study will complete a detailed investigation of areas exhibiting higher I&I responses and conduct minor repairs. The resulting recommendations will serve as the basis for decision making of how to reduce/manage excessive wet weather flows from both public and private sources in order to improve sewer capacity and reduce the impacts on the WWTP. The study is to be completed in 2023.

Digester Cleanout, Inspection and Mixing System Repair

A primary anaerobic digester was cleaned out at the Woodstock WWTP in 2022, typically this type of work occurs every 10 years. This allowed for a structural visual condition assessment to be completed by an engineering consultant, which determined the digester to be in good condition with no rehabilitation work to the structure required. Digestion treatment capacity was restored as well as a refurbishment of the gas mixing system was completed, to optimize the digestion process and biogas production. The digester was brought back online in January of 2023. Initial results indicate biogas production volumes has increased by approximately 300 percent when compared to the January 2022 biogas production volume.

Biogas Utilization Study

As part of the County's Renewable Energy Action Plan (2022-2032) and consistent with the 100 % Renewable Energy Plan (2018), a Preliminary Engineering Study (PES) was completed at the Woodstock WWTP in 2022, looking at opportunities to more efficiently use biogas produced at the WWTP to significantly reduce greenhouse gas (GHG) emissions, energy consumption and operational costs. The PES evaluated several options and concluded that Internal Combustion Combined Heat and Power (CHP) was the preferred option. A CHP system is capable of the cogenerating of on-site heat and power, where the generated electricity would be used at the WWTP to offset internal electrical consumption and generated thermal energy would be directed to the WWTP radiant heating system to provide both process and building heat as follows:

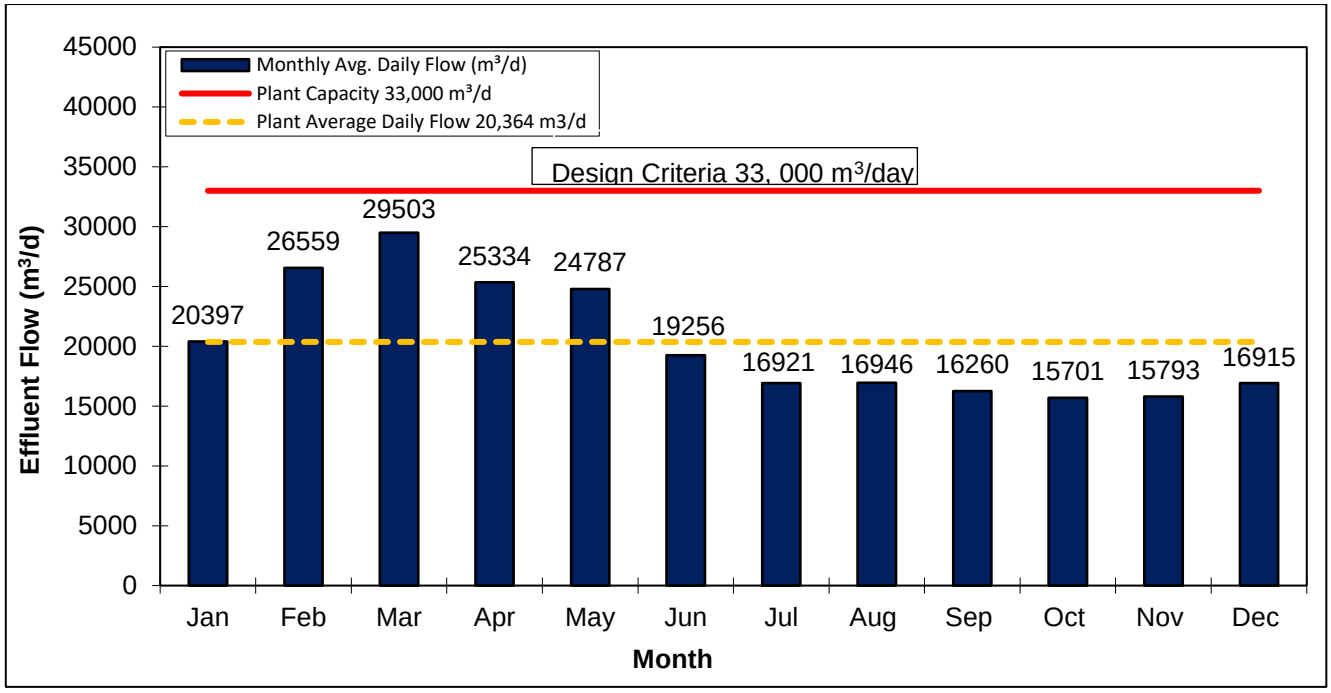
- **Future Potential Biogas Conversion to Energy** – The CHP is expected to produce approximately 1,248,000 kWh/year of new electrical and thermal renewable energy generation which can be utilized on-site and reduce costs associated with consumption of energy from the electrical grid or fossil fuel generated power.

- **Future Potential GHG Emission Reduction** – Optimization of WWTP biogas production for on-site plant utilization is anticipated to reduce carbon dioxide emissions by approximately 91 tCO2e/year.

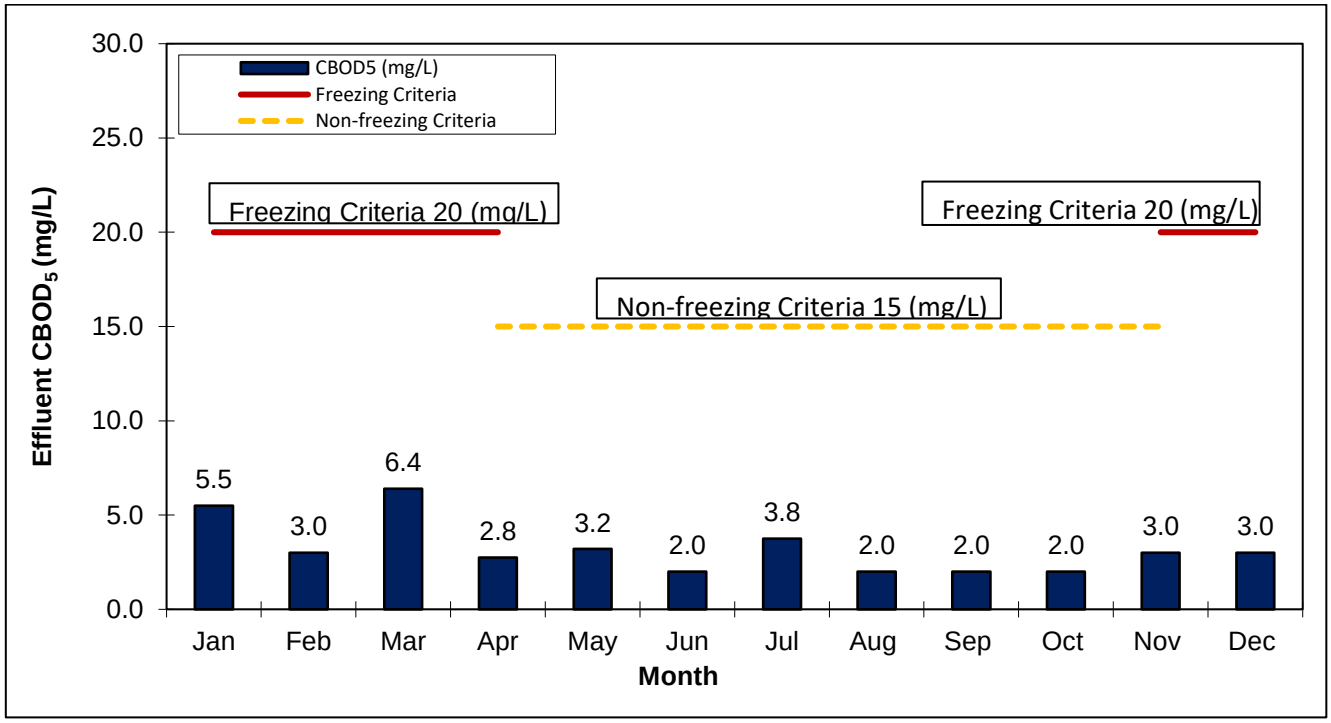
As per the County's 2022 Renewable Energy Action Plan (REAP) multi-year implementation plan, the design work for this CHP system will begin in 2023 with implementation planned for 2024.

APPENDIX A: GRAPHS OF 2022 DISCHARGE PARAMETERS VS. EFFLUENT DISCHARGE LIMITS

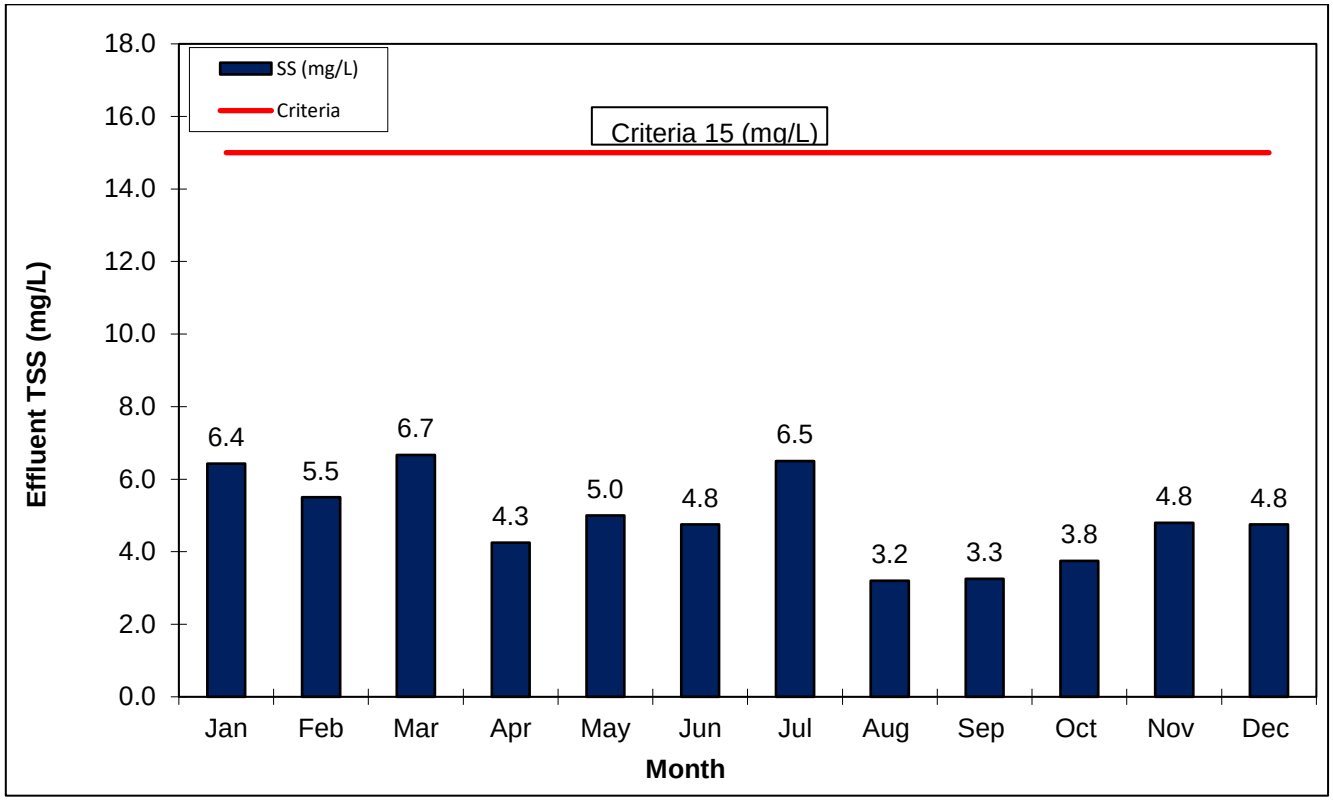
Woodstock WWTP Effluent, Monthly Average Daily Flow in Cubic Meters per Day, 2022



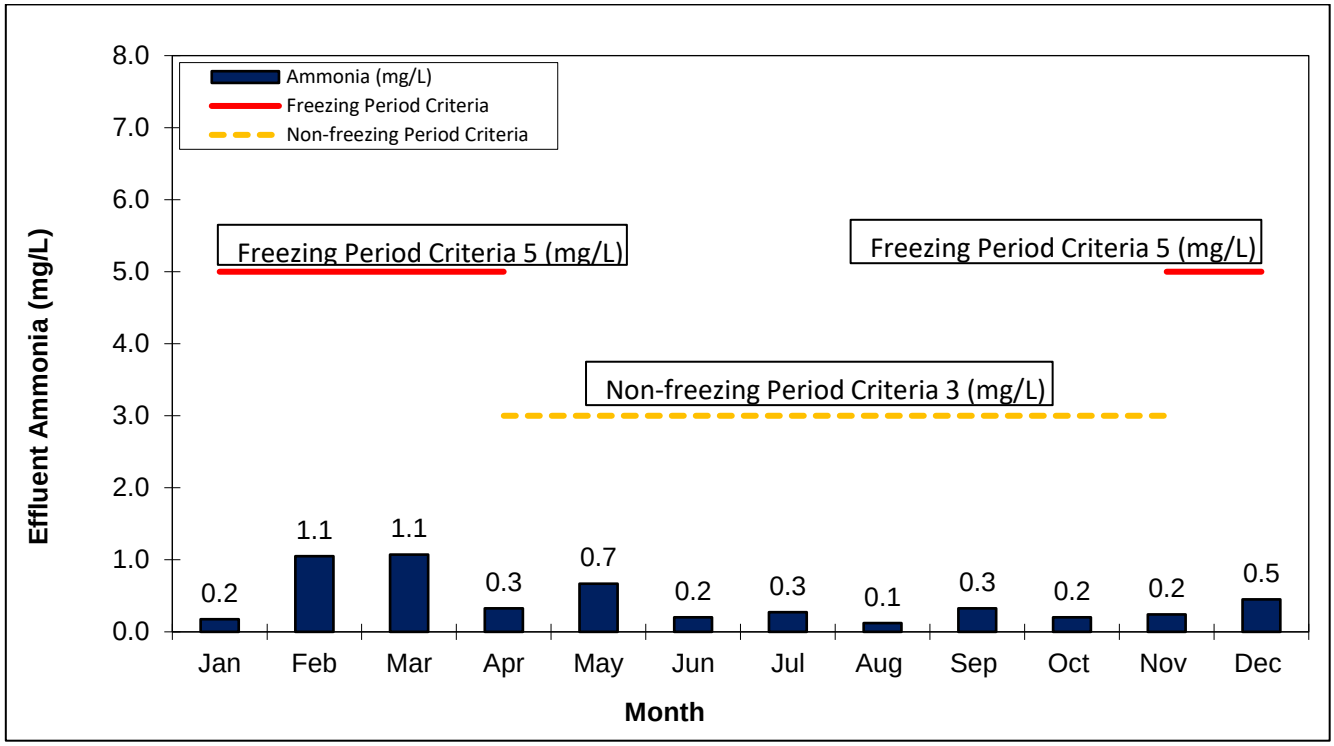
Woodstock WWTP Effluent, Monthly Average $CBOD_5$ (mg/L), 2022



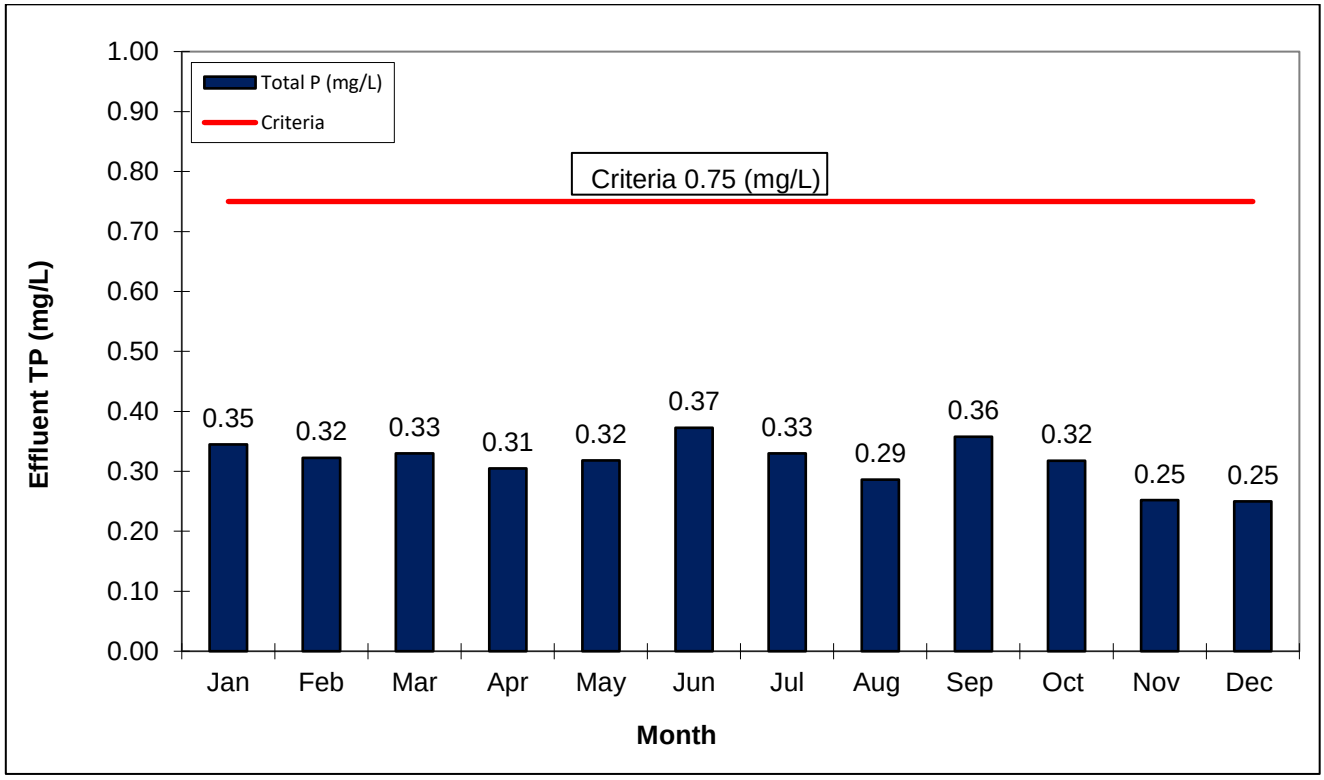
Woodstock WWTP Effluent, Monthly Average TSS (mg/L), 2022



Woodstock WWTP Effluent, Monthly Average Ammonia (mg/L), 2022



Woodstock WWTP Effluent, Monthly Average Total Phosphorus (mg/L), 2022



Woodstock WWTP Effluent, Monthly Geometric Mean Density E. coli (#/100 mL), 2022