



2023 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, 2023 – December 31, 2023

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 three (3) sewage pumping stations (SPS), 125.6 kilometers of sanitary gravity sewers, and 2.8 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 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 with 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, Tillsonburg, Ontario. The Facility description is provided below.

Facility	Tillsonburg WWTP
Design Capacity	8,180 m ³ /d
2023 Average Daily Flow	5,999 m ³ /d
2023 Maximum Daily Flow	11,567 m ³ /d
2023 Total Volume of Wastewater	2,190,144 m ³ /year

1.2 Major Expenses

In 2023, the Tillsonburg WWTP had forecasted operating and maintenance expenditures of approximately \$2,636,000.

In addition to regular operational and maintenance expenditures, Capital Improvement Projects for the Town of Tillsonburg were forecasted at \$6,852,000 which included improvements to the wastewater collection system and the Tillsonburg WWTP.

Tillsonburg WWTP Capital Improvement Projects included:

- \$6,100,000 2023 (\$17,664,928 total) for Phase 1 Upgrade of the Tillsonburg WWTP (multiyear project)
- \$539,000 for Town projects
- \$107,000 for the replacement of general operating equipment
- \$65,000 for the Cranberry Road Sewer Extension
- \$41,000 for facilities projects

Capital Improvement Projects for all systems included:

- \$1,799,000 to develop Countywide SCADA Master Plan for all wastewater systems
- \$70,000 to develop Countywide Wastewater Servicing Master Plan for all wastewater systems
- \$38,000 for Development Charges Technical Study

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 2023, with 575 samples out of 587 meeting compliance, or 98% compliance to its regulatory limits for all effluent discharged from the WWTP.

In March, a non-compliance occurred as the WWTP had experienced frequent issues where large quantities of oil entered the WWTP from the wastewater collections network. The oil inhibited the plant microbiology and caused poor settling within the secondary clarifiers, and eventually a carryover of solids in the effluent.

- The Total Suspended Solids Monthly Average Effluent Concentration was 28.7 mg/L, which was above the ECA Total Suspended Solids Monthly Average Effluent Concentration Limit of 25 mg/L

To react to these oil events, several actions were taken. Staff documented the events, took photographs and collected samples. The oil was removed from the tanks and pumped into anaerobic digesters at neighbouring WWTPs. Polymer was dosed into the secondary clarifiers to aid in solids settling. Activated sludge pump rates were adjusted to concentrate the aeration biomass. Flow balancing of the secondary clarifiers were adjusted daily to equalize solids blankets. Staff performed microscopic observation of the aeration biomass each day, to assess bacteria health and watch for filamentous growth. Progress and recovery was discussed at weekly WWTP optimization meetings.

The Oxford County Sewer Use By-law Compliance Officers were notified of each incident. In order to further address and identify potential sources of fats, oil and grease (FOG) in the Tillsonburg wastewater collections system, the Sewer Use By-law Compliance Officers have monitored the gravity influent sewer into the WWTP by video surveillance. Documentation of tracking timing, description and volume of the oil was recorded, looking for patterns that may help identify a source. The Sewer Use By-law Compliance Officers systematically surveyed manholes throughout the wastewater collections network, working outwards from the WWTP, in order to assess for potential areas where FOG build up was present, with targeted outreach anticipated for ICI customers in areas where build up was noted. Only one identified instance of FOG build-up (local restaurant) was found within the wastewater collection network. In early 2023, the Sewer Use By-law Compliance Officers delivered targeted handouts and education to over 30 industries in Tillsonburg that could be potential sources of mineral oil.

On August 9, 2023, an unexpected delay experienced by the courier company, contracted for sample transport by the external laboratory, resulted in an effluent E. coli sample arriving at the laboratory past the 48 hour hold time required for E. coli analysis. The sample was unable to be tested. The external laboratory informed the County that the sample was past the hold time the following week. This resulted in a failure to adhere to the weekly ECA Final Effluent Monitoring Program frequency for E. coli sampling.

All non-compliances were reported to the 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 2023.

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 (annual average)		
Parameter	Concentration (mg/L)	Loading (kg/d)
CBOD ₅	227	1,359
Total Suspended Solids	266	1,595
Total Phosphorus	4.4	26
Total Kjeldahl Nitrogen	31	187

Annual Average Effluent Daily Loadings	Annual Average Concentration (mg/L)	Annual Average Daily Effluent Flow (1000 m ³ /d)	Result (kg/d)	Limit (kg/d)
CBOD ₅	4.5	5.999	27	206
TSS	11.4	5.999	68	206
TP	0.36	5.999	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	2.0 – 10.7	95.3 – 99.1
TSS	weekly	25	5.3 – 28.7	89.2 – 98.0
TP	weekly	1	0.19 – 0.51	88.4 – 95.7
E. coli (May 1 – October 31)	weekly	200 colonies/100 mL (monthly Geometric Mean Density)	3.1 – 185.4 colonies/100 mL (monthly Geometric Mean Density)	--
pH any single sample	weekly	6.0 – 9.5	6.40 – 7.96	--

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 2023, namely:

- The Monthly Average Effluent Concentration Objective for TSS of 15 mg/L for the months of February and March;
- The Monthly Geometric Mean Density Objective for E. coli of 150 colonies/100 mL for the month of May; and
- Several single sample objective exceedances occurred throughout 2023 and are listed below.

The failure to meet the Monthly Average Effluent Concentration Objective for TSS was due to the frequent occurrence of oil in the influent. Oil inhibited the WWTP microbiology and caused poor settling and eventually caused a carryover of solids into the WWTP effluent. To react to these TSS Objective exceedances polymer was dosed to assist settling, aeration return rates and wasting rates were adjusted to maintain adequate bacteria populations, oil was removed from the surface of the primary clarifiers, daily microscopic analysis of the plant biomass was completed, video surveillance of the influent sewer at the WWTP was captured, and handouts discussing the issue were delivered to local industries.

The failure to meet the Monthly Geometric Mean Density Objective for E. coli was due to several small oil events in May as well as two faults on the aeration blowers on May 16, 2023. Poor settling resulted in a carrier of TSS, causing an abnormally high E. coli result on May 17, 2023.

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	2.0 – 10.7
TSS	weekly	15	5.3 – 28.7
TP	weekly	0.8	0.19 – 0.51
E. coli (May 1 – Oct. 31)	weekly	150 colonies/100 mL (monthly Geometric Mean Density)	3.1 – 185.4 colonies/100 mL (monthly Geometric Mean Density)
pH any single sample	weekly	6.5 – 8.0	6.40 – 7.96

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 unless otherwise indicated)	Result (mg/L unless otherwise indicated)
February 2023	TSS	15	22.5
March 2023	TSS	15	28.7
May 2023	E. coli	150 colonies/100 mL (monthly Geometric Mean Density)	185.4 colonies/100 mL (monthly Geometric Mean Density)

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

Date	Parameter	Objective (mg/L unless otherwise indicated)	Result (mg/L unless otherwise indicated)
February 1, 2023	TSS	15.0	20.0
February 8, 2023	TSS	15.0	73.0
February 8, 2023	CBOD ₅	15.0	20.0
February 8, 2023	TP	0.8	1.0
February 9, 2023	pH	6.5 – 8.0	6.4
February 15, 2023	TSS	15.0	16.0
February 22, 2023	CBOD ₅	15.0	17.0
February 22, 2023	TSS	15.0	41.0
March 1, 2023	TSS	15.0	66.0
March 1, 2023	CBOD ₅	15.0	21.0
March 1, 2023	TP	0.8	0.94
March 7, 2023	TSS	15.0	16.0
March 8, 2023	TSS	15.0	21.0
March 22, 2023	TSS	15.0	16.0
March 29, 2023	TSS	15.0	108.0
March 29, 2023	TP	0.8	1.38
April 12, 2023	TSS	15.0	17.0
May 17, 2023	TSS	15.0	39.0
May 17, 2023	CBOD ₅	15.0	20.0
May 17, 2023	E. coli	150 colonies/100 mL	3,800 colonies/100 mL
May 17, 2023	TP	0.8	1.74
July 12, 2023	TSS	15.0	31.0
July 12, 2023	TP	0.8	0.82
August 9, 2023	E. coli	150 colonies/100 mL	210 colonies/100 mL
August 16, 2023	E. coli	150 colonies/100 mL	4,500 colonies/100 mL
September 13, 2023	E. coli	150 colonies/100 mL	260 colonies/100 mL

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

On July 29, 2023, heavy rainfall over a short duration (24 hour rain gauge measurement of 70 mm precipitation, the majority in a two hour window the morning of the overflow) resulted in high flows received at the John Pound Road Sewage Pumping Station (SPS), and alerted the On-call Wastewater Operator of the SPS overflow. The operator monitored the SPS equipment to ensure all station pumps were running. Approximately

2,000 m³ of liquid overflowed the SPS to Big Otter Creek. The spill began at 9:40 am and was finished at 1:30 pm. Samples were collected for analysis, and there were no visible signs of the spill along Big Otter Creek.

The overflow was reported to the Spills Action Center and MECP at the time of occurrence.

Ongoing Phase 1 upgrades and the planned Phase 2 capacity expansion of the Tillsonburg WWTP, in combination with the implementation of a new Inflow and Infiltration (I&I) Reduction Program, will aim to reduce future overflow events.

There were no additional overflows, bypassing, upsets, spills, complaints or abnormal conditions in 2023.

The Town of Tillsonburg completed two projects in 2023 to help eliminate Bypass/Overflows in conformance with Procedure F-5-1:

- Urbanized Young Street cross-section along with storm collection system (north of Hwy 3); and
- At Townline Road, an infiltration/perforated pipe was installed (from the train tracks to the intersection of Bell Mill Side Road)

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 2023.

5. MONITORING 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

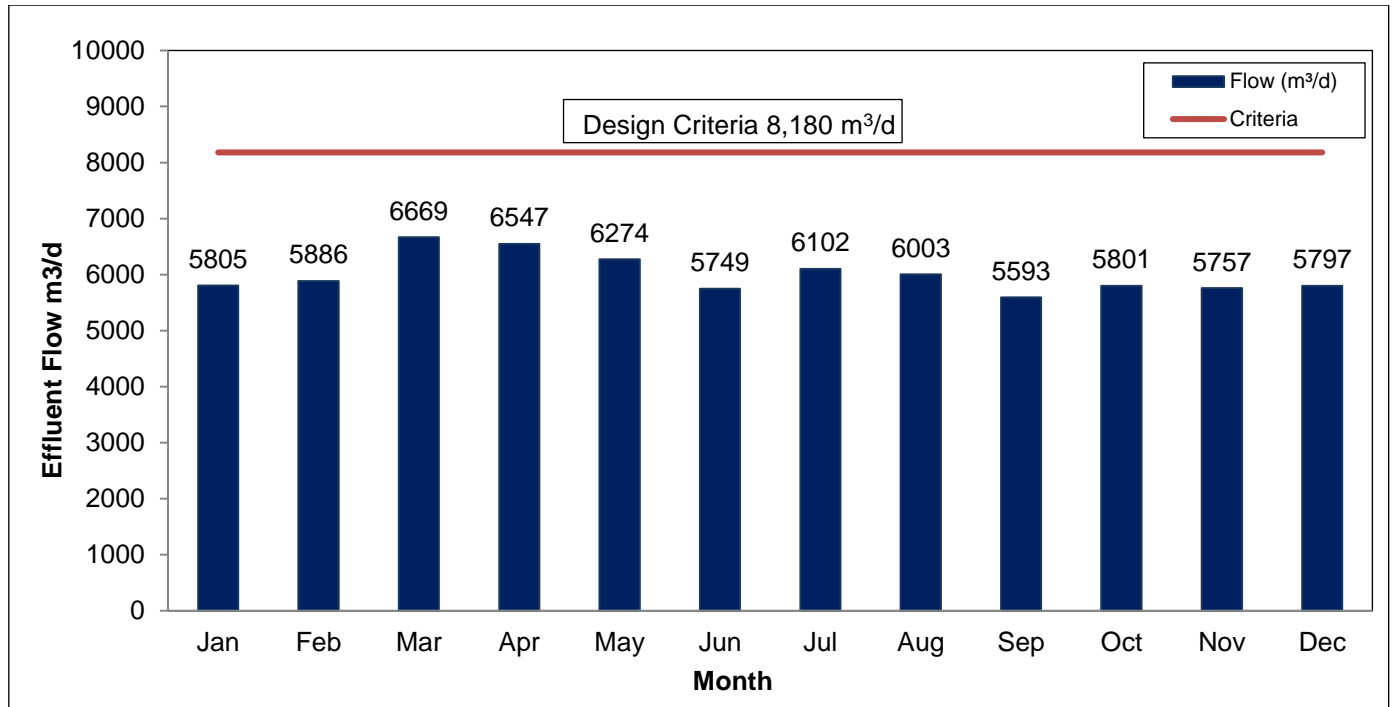
The MECP did not perform an inspection of the Tillsonburg WWTP in 2023. The MECP inspections typically occur on a three-year schedule.

WWTP Upgrade

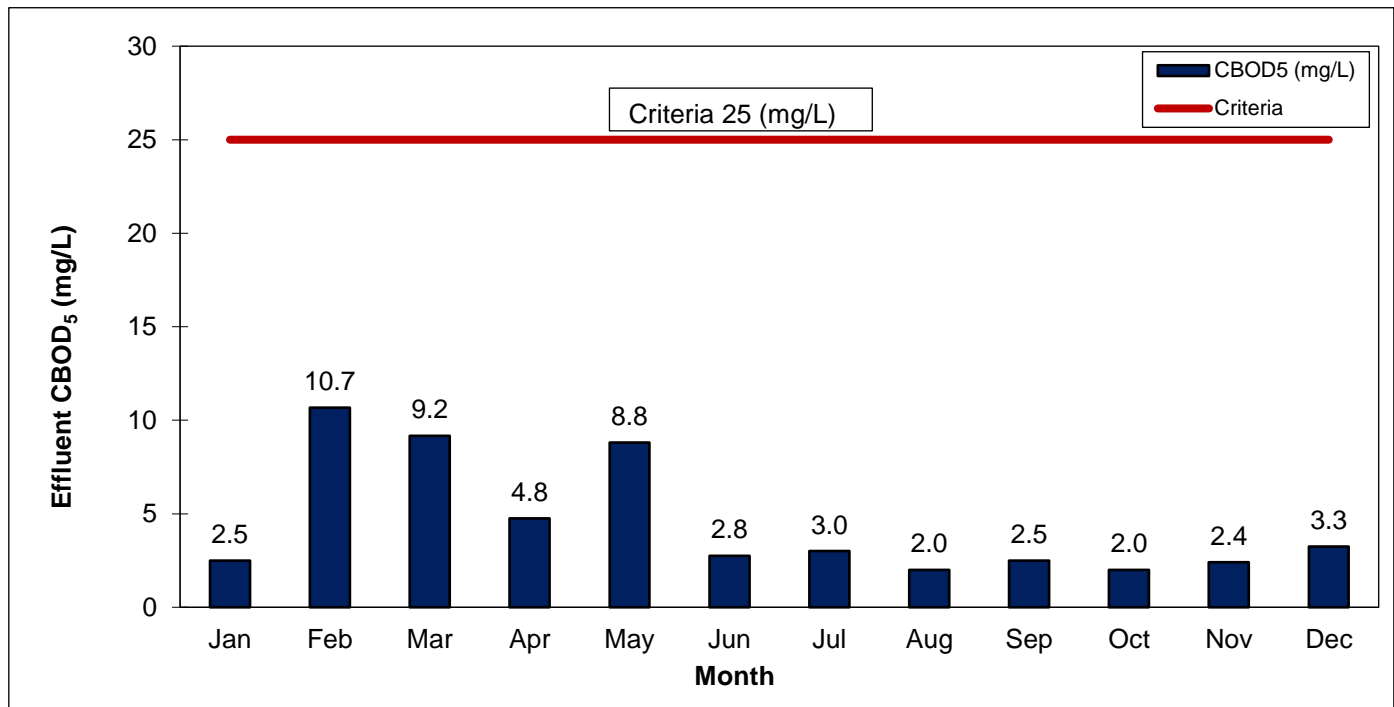
Phase 1 construction upgrades to the Tillsonburg WWTP began in 2021. Upgrades to headworks, primary and secondary clarification, waste thickening, blower and various piping and control upgrades are being completed. The upgrades will strategically address WWTP system bottlenecks to improve operational performance, plant resiliency and servicing capacity. Construction is expected to be completed later this year.

APPENDIX A: GRAPHS OF 2023 DISCHARGE PARAMETERS VS. EFFLUENT DISCHARGE LIMITS

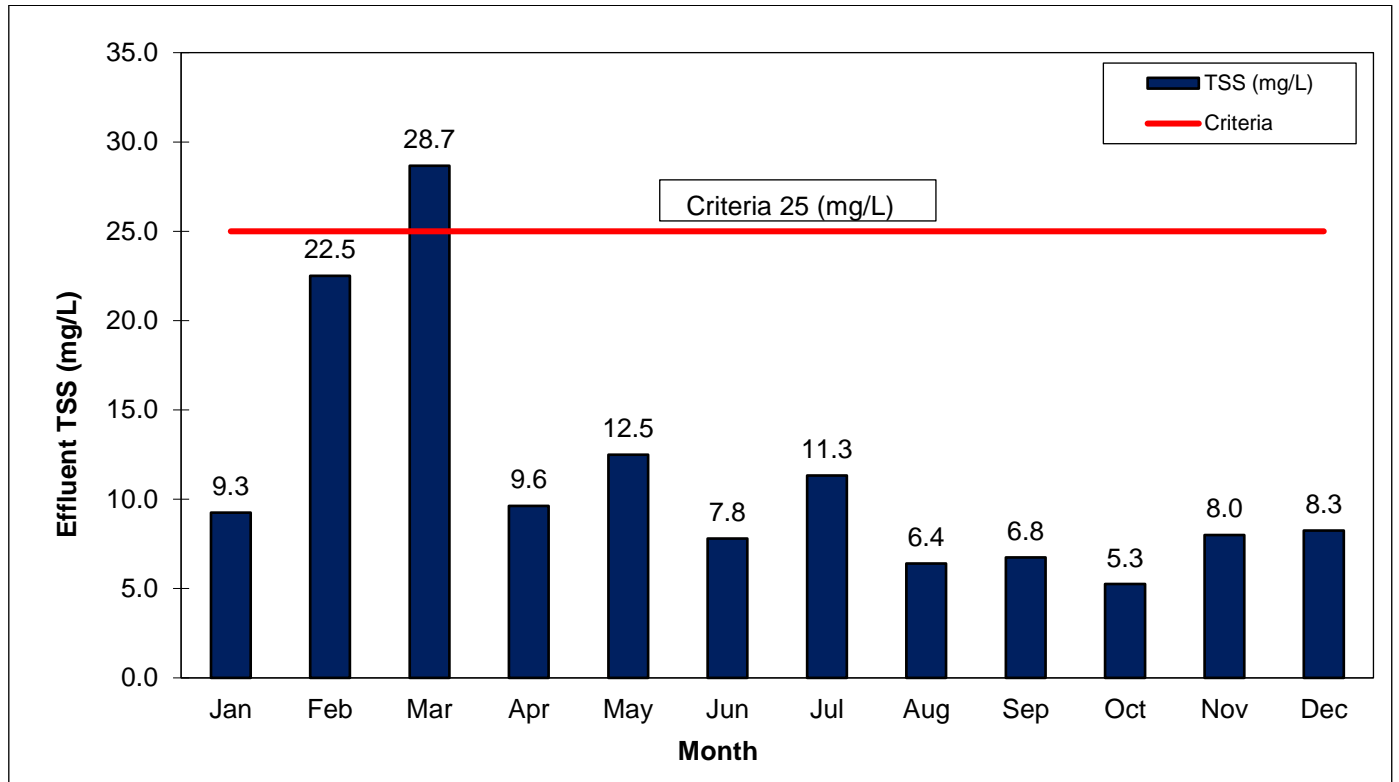
Tillsonburg WWTP Effluent, Monthly Average Daily Flow in Cubic Meters per Day, 2023



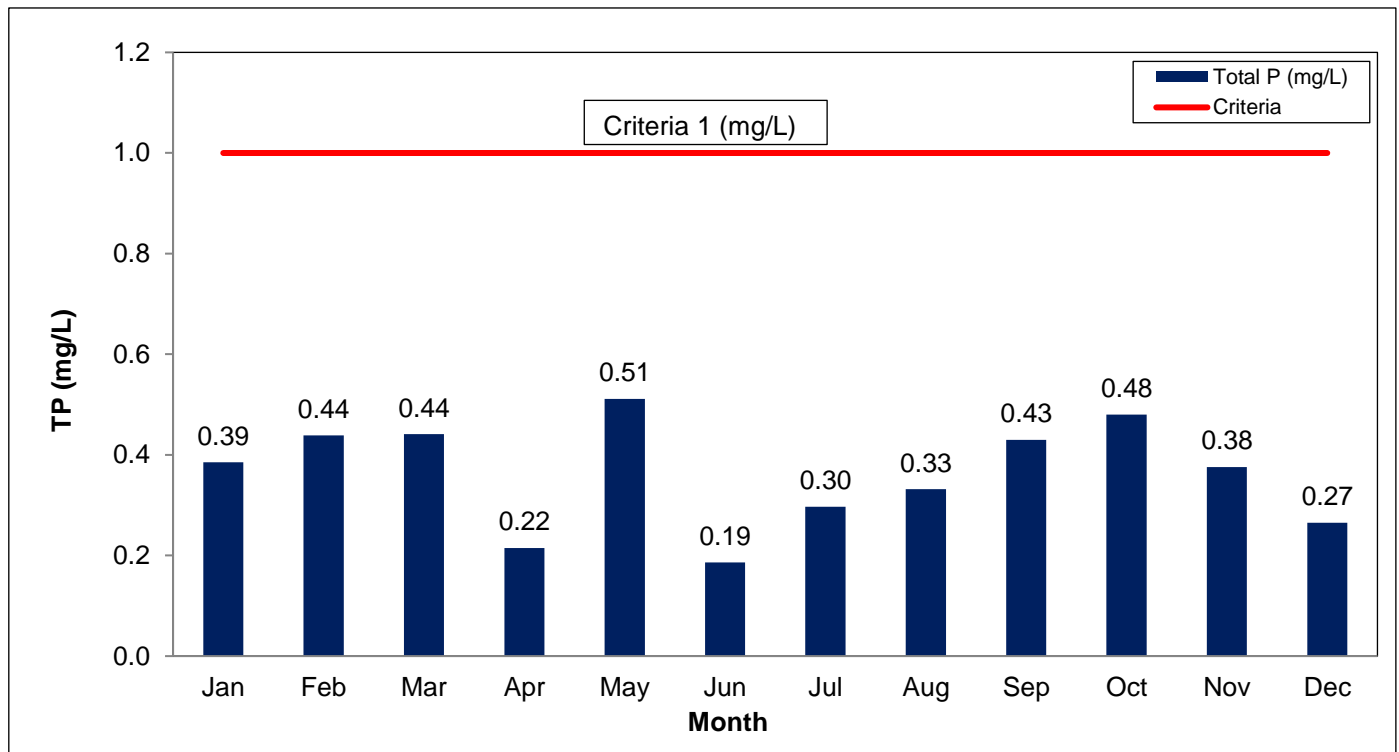
Tillsonburg WWTP Effluent, Monthly Average CBOD₅ (mg/L), 2023



Tillsonburg WWTP Effluent, Monthly Average TSS (mg/L), 2023



Tillsonburg WWTP Effluent, Monthly Average Total Phosphorus (mg/L), 2023



Tillsonburg WWTP Effluent, Monthly Geometric Mean Density E. coli (colonies/100 mL), 2023

