

# 2024 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 report details 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](mailto:wastewater@oxfordcounty.ca).

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|---|-------------------------------------|
| <b>Wastewater Treatment Plant:</b>              | Tillsonburg WWTP                    |
| <b>Wastewater Treatment Plant Number:</b>       | 110000757                           |
| <b>Environmental Compliance Approval (ECA):</b> | 6451-BW5LNN (February 12, 2021)     |
| <b>Reporting Period:</b>                        | January 1, 2024 – December 31, 2024 |

#### **Wastewater Treatment Plant Owner & Contact Information:**

Oxford County Public Works Department - Wastewater Services  
P.O. Box 1614  
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Woodstock, ON N4S 7Y3  
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## 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), 126.6 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 SPS) 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:

|  |                                |
|--|--------------------------------|
| <b>Facility</b>                        | Tillsonburg WWTP               |
| <b>Design Capacity</b>                 | 8,180 m <sup>3</sup> /d        |
| <b>2024 Average Daily Flow</b>         | 6,306 m <sup>3</sup> /d        |
| <b>2024 Maximum Daily Flow</b>         | 14,213 m <sup>3</sup> /d       |
| <b>2024 Total Volume of Wastewater</b> | 2,308,311 m <sup>3</sup> /year |

## 1.2 Major Expenses

In 2024, the Tillsonburg WWTP had forecasted operating and maintenance expenditures of approximately \$2,869,000.

Planning for major wastewater system expenses is included within Oxford County's Wastewater Services Master Plan and managed according to our Asset Management and Capital Replacement Program. In addition to regular operational and maintenance expenditures, notable Capital Improvement Projects for the Town of Tillsonburg were forecasted at approximately \$2,998,000, which included improvements to the wastewater collection system and the Tillsonburg WWTP.

Notable Tillsonburg Capital Improvement Projects included:

- \$2,506,000 for Phase 1 Upgrade of the Tillsonburg WWTP;
- \$330,000 for Town projects; and
- \$162,000 for the replacement of general operating equipment.

Capital Improvement Projects for all systems included:

- \$427,000 to develop Countywide SCADA 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 collected and analyzed in the field. 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 2024, with 561 samples out of 570 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 an unidentified process upset, which negatively impacted aeration microorganisms resulting in poor settling in the secondary clarifier and significant foam accumulation within the aeration reactors:

- The Total Suspended Solids Monthly Average Effluent Concentration was 28.2 mg/L, which was above the ECA Total Suspended Solids Monthly Average Effluent Concentration Limit of 25 mg/L

Several corrective actions were taken to improve the plant microbiology and settling performance. Oxford County's Sewer Use Bylaw Officers were contacted and reviewed all recent industrial sampling results from local industries within the wastewater sewershed. Seed loads of healthy activated sludge were brought in from a neighbouring WWTP to help with microorganism repopulation. Operations staff increased the return activated sludge pumping rate and decreased the daily wasted activated sludge volume. Polymer was added to the secondary clarifiers to aid with settling while defoamer was added to the aeration reactors to reduce foam accumulation. Operations adjusted the flow split into the secondary clarifiers to equalize the settled sludge blankets. Operations performed daily microscopic analysis of the activated sludge and progress/recovery was discussed at all weekly WWTP optimization meetings.

In December, a non-compliance occurred relating to the monitoring frequency of final effluent Carbonaceous Biochemical Oxygen Demand (CBOD<sub>5</sub>). Operations staff had mistakenly modified the master copy of the WWTP external laboratory chain of custody document, inadvertently removing CBOD<sub>5</sub> from the list of tested effluent parameters. This resulted in a failure to adhere to the ECA weekly Final Effluent Monitoring Program frequency for CBOD<sub>5</sub>.

Operations staff were notified of the error and reminded of the monitoring program requirements for the WWTP. All chain of custody documents were reviewed, and it was verified that all required parameters were present. All sampling parameters have now been password protected to prevent accidental edits. If any extra sampling is undertaken, in addition to the requirement listed in the ECA, operations staff will create a new chain of custody document instead of modifying the master copy.

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 6.0 - 9.5 in 2024.

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:

| <b>Influent Wastewater Characteristics (annual average)</b> |                             |                       |
|---|-----------------------------|-----------------------|
| <b>Parameter</b>  | <b>Concentration (mg/L)</b> | <b>Loading (kg/d)</b> |
| CBOD <sub>5</sub>   | 282                         | 1,780                 |
| Total Suspended Solids                                      | 332                         | 2,096                 |
| Total Phosphorus  | 5.7                         | 36                    |
| Total Kjeldahl Nitrogen                                     | 41                          | 255                   |

| <b>Annual Average Effluent Daily Loadings</b>               | <b>Annual Average Concentration (mg/L)</b> | <b>Annual Average Daily Effluent Flow (1000 m<sup>3</sup>/d)</b> | <b>Result (kg/d)</b> | <b>Limit (kg/d)</b> |
|---|--|--|----------------------|---------------------|
| Carbonaceous Biochemical Oxygen Demand (CBOD <sub>5</sub> ) | 5.95                                       | 6.306  | 38                   | 206                 |
| Total Suspended Solids (TSS)                                | 11.04                                      | 6.306  | 69                   | 206                 |
| Total Phosphorus (TP)                                       | 0.43                                       | 6.306  | 3                    | 8.2                 |

| <b>Effluent Parameter</b>    | <b>Sample Frequency</b> | <b>ECA Effluent Limit (Monthly Average)</b><br>(mg/L unless otherwise indicated) | <b>Monthly Average Result Min-Max</b><br>(mg/L unless otherwise indicated) | <b>Percentage Removal</b> |
|------------------------------|-------------------------|--|--|---------------------------|
| CBOD <sub>5</sub>            | weekly                  | 25.0   | 3.4 – 10.3   | 96.3 – 98.8               |
| TSS                          | weekly                  | 25.0   | 6.0 – 28.2   | 91.5 – 98.2               |
| TP                           | weekly                  | 1.0  | 0.18 – 0.73  | 87.2 – 96.8               |
| E. coli (May 1 – October 31) | weekly                  | 200 colonies/100 mL<br>(monthly Geometric Mean Density)                          | 2.4 – 33.9 colonies/100 mL<br>(monthly Geometric Mean Density)             | --                        |
| pH (any single sample)       | weekly                  | 6.0 – 9.5  | 6.5 – 7.62   | --                        |

### 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 2024, namely:

- The Monthly Average Effluent Concentration Objective for TSS of 15 mg/L for the months of March and December; and
- Several single sample objective exceedances occurred throughout 2024 (found in the table below).

The failure to meet the Monthly Average Effluent Concentration Objective for TSS in March was a result of the WWTP microbiology being impacted by an unknown cause. Higher order indicator organisms within the activated sludge had suddenly died off, secondary clarifier settling performance deteriorated and a dark foam accumulated on the aeration tanks. In response settling aids were dosed, recycling rates were adjusted to maintain adequate bacteria populations, daily microscopic analysis of the plant biomass was completed, industrial samples were analyzed and seed loads of healthy activated sludge were brought in from a neighbouring WWTP.

The failure to meet the Monthly Average Effluent Concentration Objective for TSS in December was a result of a process upset caused by the testing and commissioning of new equipment as part of the Phase 1 Construction upgrade. Contractors mistakenly left a pump in operation, which recycled a substantial amount of effluent water back through the WWTP, resulting in a washout of the biomass in the aeration reactors. Operations decreased the waste activated sludge volumes and increased the return activated sludge pumping rate. Additionally, truck loads of healthy activated sludge were brought in from a neighbouring WWTP to increase the biomass concentration.

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

| <b>Effluent Parameter</b>    | <b>Sample Frequency</b> | <b>Monthly Average Objective Concentration (mg/L unless otherwise indicated)</b> | <b>Monthly Average Result Min-Max (mg/L unless otherwise indicated)</b> |
|------------------------------|-------------------------|--|---|
| CBOD <sub>5</sub>            | weekly                  | 15.0   | 3.4 – 10.3  |
| TSS                          | weekly                  | 15.0   | 6.0 – 28.2  |
| TP                           | weekly                  | 0.8  | 0.18 – 0.73   |
| E. coli (May 1 – October 31) | weekly                  | 150 colonies/100 mL (monthly Geometric Mean Density)                             | 2.4 – 33.9 colonies/100 mL (monthly Geometric Mean Density)             |
| pH (any single sample)       | weekly                  | 6.5 – 8.0  | 6.5 – 7.62  |

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

| <b>Month</b>  | <b>Parameter</b> | <b>Monthly Average Objective Concentration (mg/L unless otherwise indicated)</b> | <b>Result (mg/L unless otherwise indicated)</b> |
|---------------|------------------|--|---|
| March 2024    | TSS              | 15.0   | 28.2  |
| December 2024 | TSS              | 15.0   | 17.2  |

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

| <b>Date</b>       | <b>Parameter</b>  | <b>Objective (mg/L unless otherwise indicated)</b> | <b>Result (mg/L unless otherwise indicated)</b> |
|-------------------|-------------------|--|---|
| February 20, 2024 | TSS               | 15.0   | 23.0  |
| March 12, 2024    | TSS               | 15.0   | 17.0  |
| March 23, 2024    | TSS               | 15.0   | 26.0  |
| March 26, 2024    | CBOD <sub>5</sub> | 15.0   | 21.0  |
| March 26, 2024    | TSS               | 15.0   | 74.0  |
| March 26, 2024    | TP                | 0.8  | 1.19  |
| April 30, 2024    | TSS               | 15.0   | 26.0  |
| May 7, 2024       | TSS               | 15.0   | 28.0  |
| May 21, 2024      | CBOD <sub>5</sub> | 15.0   | 18.0  |
| May 21, 2024      | TSS               | 15.0   | 57.0  |
| June 4, 2024      | E. coli           | 150 colonies/100 mL                                | 460 colonies/100 mL                             |
| July 17, 2024     | E. coli           | 150 colonies/100 mL                                | 480 colonies/100 mL                             |
| November 5, 2024  | TSS               | 15.0   | 22.0  |
| December 12, 2024 | TSS               | 15.0   | 16.0  |
| December 17, 2024 | TSS               | 15.0   | 27.0  |
| December 17, 2024 | TP                | 0.8  | 0.89  |
| December 23, 2024 | TSS               | 15.0   | 19.0  |

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

On November 13, 2024, an estimated 960 litres of wastewater was spilled from the gravity sewer feeding into the WWTP. The inlet sewer is constructed of corrugated steel which had corroded over time, creating weakened points within the pipe. With the new WWTP headworks building being brought online, there was a slight increase to the level of liquid within the sewer, which spilled out from these corrosion points. In response, the area was sandbagged to contain the liquid, WWTP screens were put into continuous operation to keep the liquid level low enough to prevent subsequent spilling, standing wastewater was cleaned up and the damaged section of sewer was excavated and replaced on November 18.

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

There were no additional overflows, bypassing, upsets, spills, complaints, or abnormal conditions in 2024.

One project was undertaken in 2024 to eliminate Bypass/Overflow events (in conformance with MECP Procedure F-5-1, meant to ensure all wastewater receives at minimum secondary treatment or greater, as the normal standard of treatment). As part of the Tillsonburg WWTP Phase 1 upgrades, Oxford County has installed a new 150 kW generator and automatic transfer switch at the John Pound Road SPS. This equipment will supply backup power when required, reducing the risk of overflows associated with power interruptions. No projects have been planned for 2025.

### **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 used in 2024 for the replacement of the standby power system (generator/transfer switch) at the John Pound Road SPS.

### **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/reports-and-policies](http://www.oxfordcounty.ca/services-for-you/water-wastewater/wastewater/reports-and-policies).

### **7. INSPECTION, PILOTS, AND TRIALS**

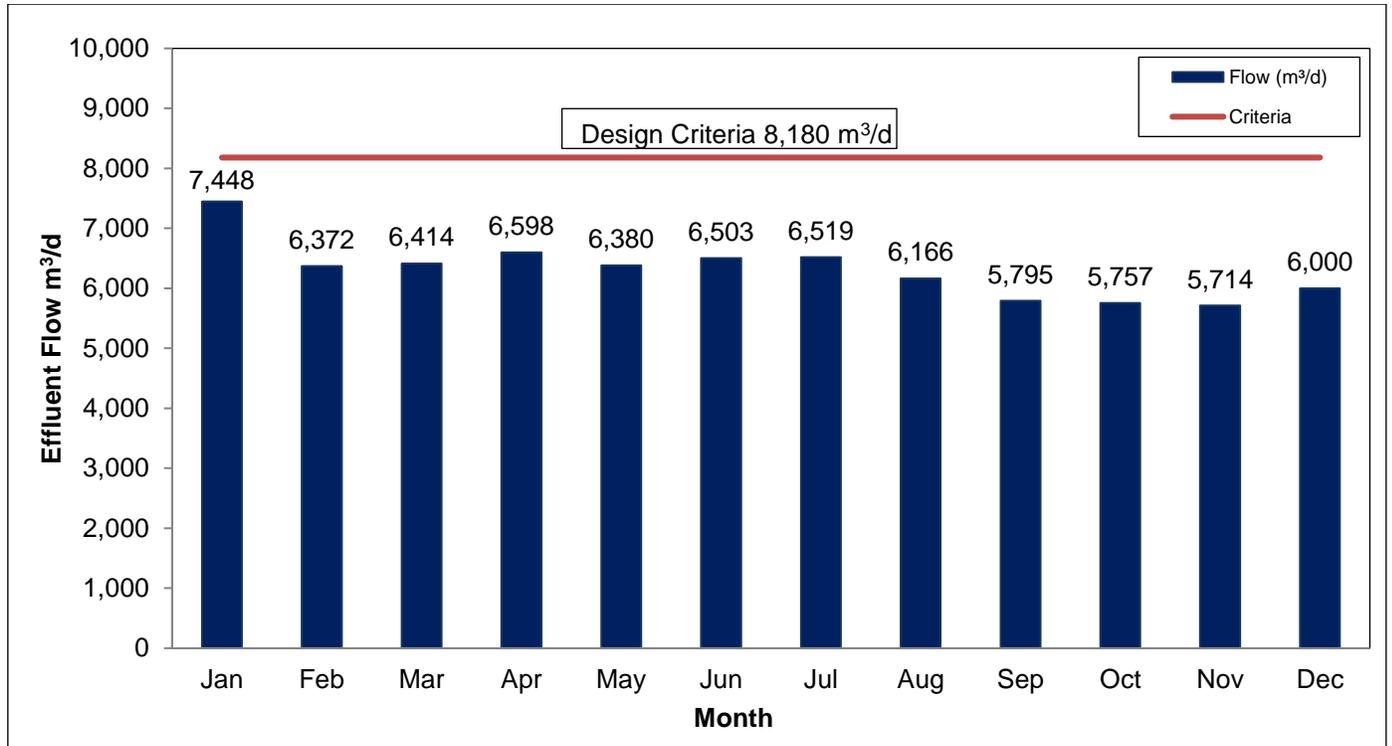
The MECP did not perform an inspection of the Tillsonburg WWTP in 2024. The MECP inspections typically occur on a three-year schedule.

## ***WWTP Upgrade***

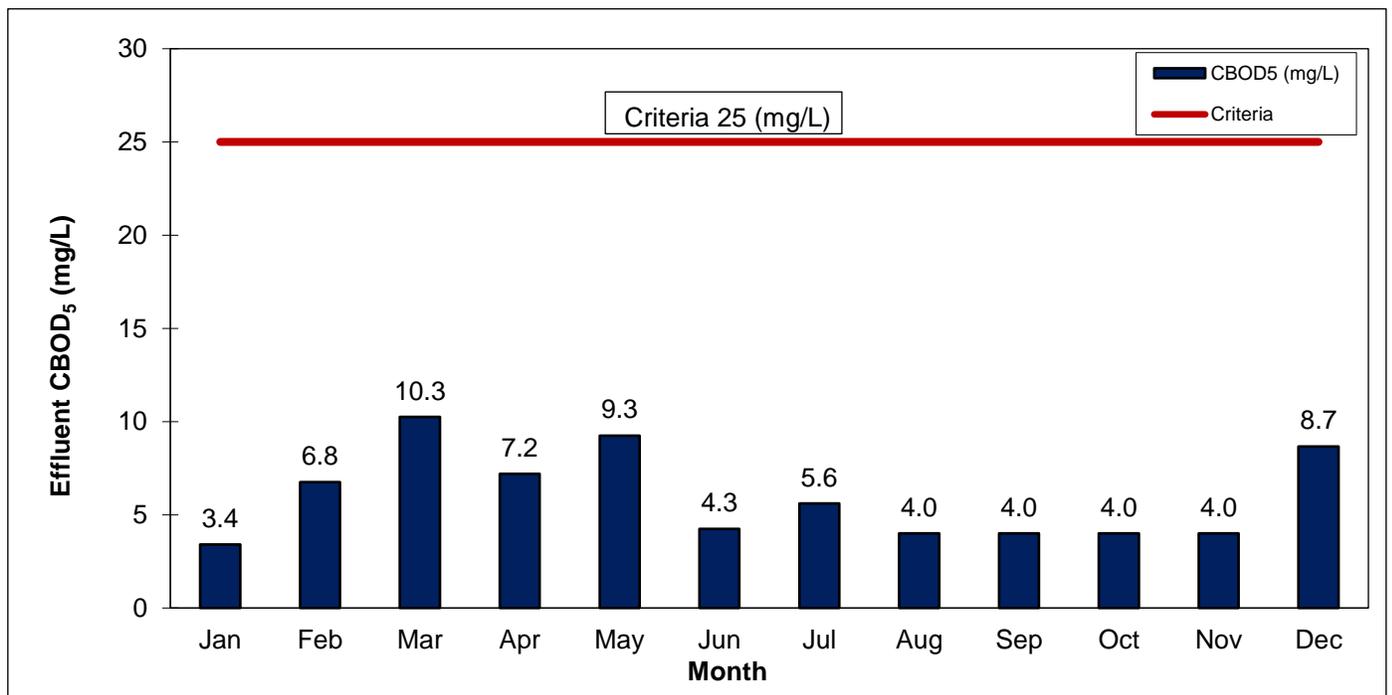
Phase 1 construction upgrades to the Tillsonburg WWTP began in 2021. Upgrades to headworks, primary and secondary clarification, waste thickening, backup power generation, blower and various piping and control upgrades are almost complete. The upgrades will strategically address WWTP system bottlenecks to improve operational performance, plant resiliency and servicing capacity.

## APPENDIX A: GRAPHS OF 2024 DISCHARGE PARAMETERS VS. EFFLUENT DISCHARGE LIMITS

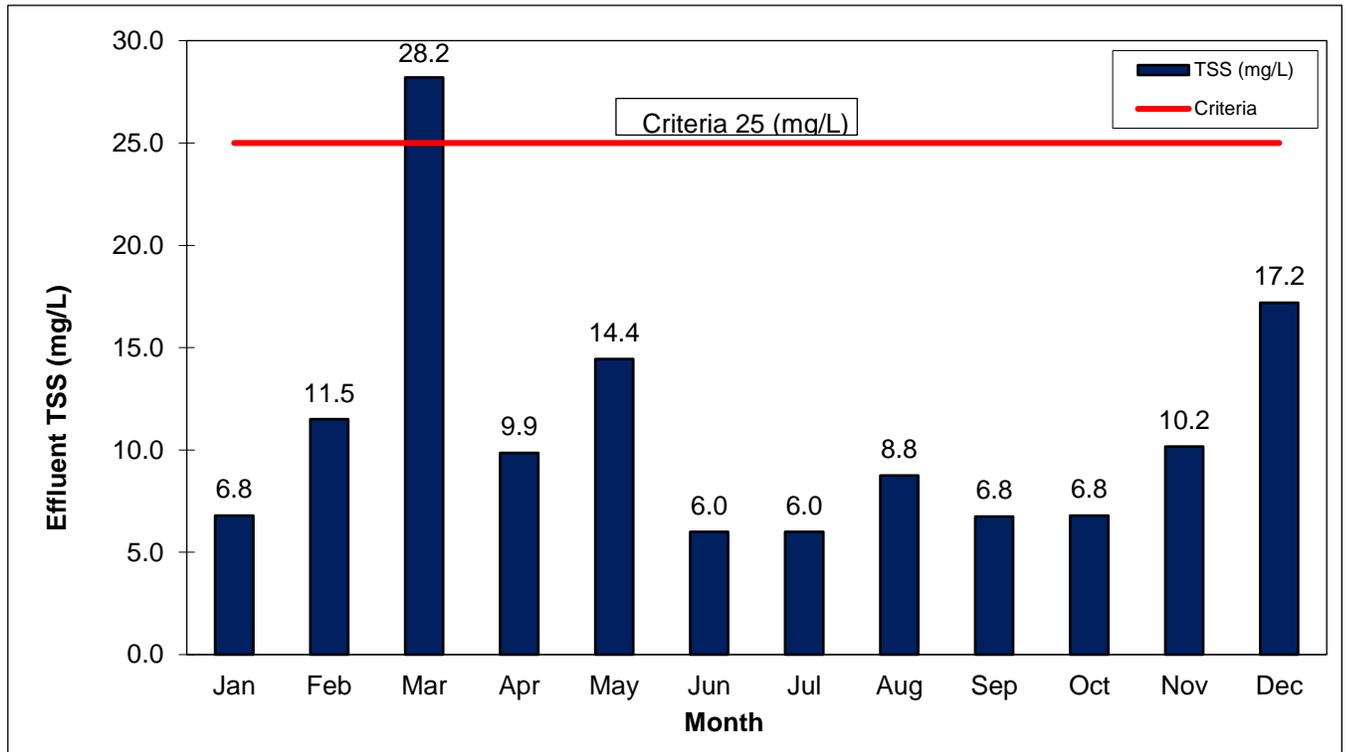
Tillsonburg WWTP Effluent, Monthly Average Daily Flow in Cubic Meters per Day, 2024



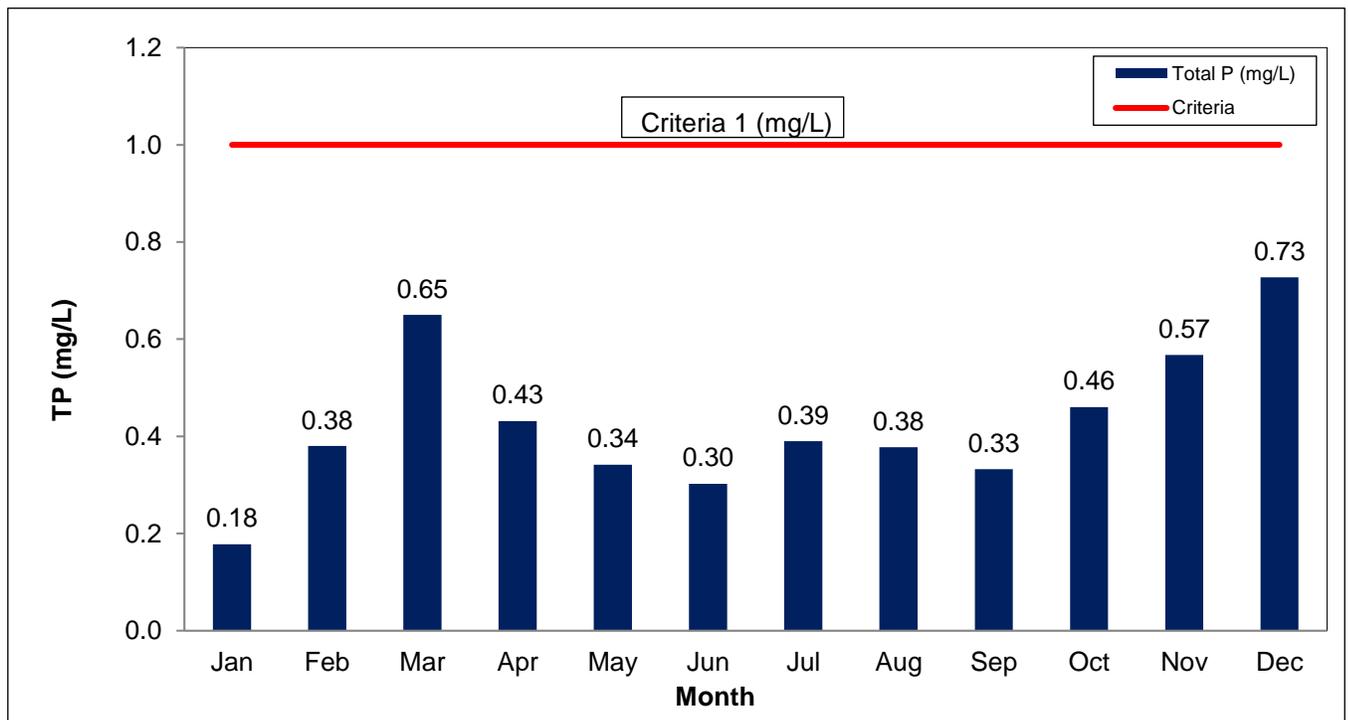
Tillsonburg WWTP Effluent, Monthly Average CBOD<sub>5</sub> (mg/L), 2024



Tillsonburg WWTP Effluent, Monthly Average TSS (mg/L), 2024



Tillsonburg WWTP Effluent, Monthly Average TAN (mg/L), 2024



Tillsonburg WWTP Effluent, Monthly Geometric Mean Density E. coli (colonies/100 mL), 2024

