# 2024 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.

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|---|---|
| **Wastewater Treatment Plant:** | Thamesford WWTP |
| **Wastewater Treatment Plant Number:** | 120002601 |
| **Environmental Compliance Approval (ECA):** | 7320-AUQM53 (June 4, 2018) |
| **Reporting Period:** | January 1, 2024 – December 31, 2024 |

**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

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## 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 four (4) sewage pumping stations (SPS), 18.6 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 or Woodstock 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 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 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 |
| **2024 Average Daily Flow** | 610 $m^3$/d |
| **2024 Maximum Daily Flow** | 1,369 $m^3$/d |
| **2024 Total Volume of Wastewater** | 223,249 $m^3$/year |

## 1.2 Major Expenses

In 2024, the Thamesford WWTP had forecasted operating and maintenance expenditures of approximately $774,000.

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 Village of Thamesford were forecasted at approximately $320,000, which included improvements to the wastewater collection system and the Thamesford WWTP.

Notable Thamesford Capital Improvement Projects included:

- $320,000 for design of a headworks, screening and aeration upgrade

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*

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

In 2024, effluent samples were taken using a 24-hour composite sampler set to take a sample every 15 minutes for 24 hours (weekly, at minimum). 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 2024 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 6.0 - 9.5 in 2024.

Staff test TRC in the treated effluent several times per week; well in excess of the required weekly testing frequency. All results met the single sample TRC limit of 0.02 mg/L or less in 2024.

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 (annual average)** | | |
|---|---|---|
| **Parameter** | **Concentration (mg/L)** | **Loading (kg/d)** |
| $BOD_5$ | 205 | 125 |
| Total Suspended Solids | 211 | 129 |
| Total Phosphorus | 4.6 | 3 |
| Total Kjeldahl Nitrogen | 44.3 | 27 |
| Oil and Grease | 31 | 19 |

| **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** |
|---|---|---|---|---|
| Carbonaceous Biochemical Oxygen Demand ($CBOD_5$) (May 1 to November 30) | weekly | 10.0 | 4.0 | 98.0 |
| Carbonaceous Biochemical Oxygen Demand ($CBOD_5$) (December 1 to April 30) | weekly | 15.0 | 2.8 – 4.4 | 97.9 – 98.6 |
| Total Suspended Solids (TSS) (May 1 to November 30) | weekly | 10.0 | 2.4 – 4.3 | 98.0 – 98.9 |
| Total Suspended Solids (TSS) (December 1 to April 30) | weekly | 15.0 | 3.0 – 12.5 | 94.1 – 98.6 |
| Total Phosphorus (TP) (May 1 to November 30) | weekly | 0.20 | 0.03 – 0.06 | 98.7 – 99.3 |
| Total Phosphorus (TP) (December 1 to April 30) | weekly | 0.50 | 0.05 – 0.27 | 94.1 – 98.9 |
| Total Ammonia Nitrogen (TAN) (May 1 to November 30) | weekly | 2.0 | 0.1 – 0.12 | -- |

| 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 |
|---|---|---|---|---|
| Total Ammonia Nitrogen (TAN) (December 1 to April 30) | weekly | 5.0 | 0.1 – 0.23 | -- |
| Total Residual Chlorine (any single sample) | weekly | 0.02 | 0.00 – 0.01 | -- |
| E. coli | weekly | 200 colonies/100 mL (monthly Geometric Mean Density) | 1.7 – 37.6 colonies/100 mL (monthly Geometric Mean Density) | -- |
| pH (any single sample) | weekly | 6.0 – 9.5 | 6.76 – 8.1 | -- |
| Dissolved Oxygen (any single sample) | weekly | 5 and above | 5.8 – 9.23 | -- |

## 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 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 | 5.0 | 2.8 – 4.4 |
| TSS | weekly | 5.0 | 2.4 – 12.5 |
| TP | weekly | 0.10 | 0.03 – 0.27 |
| TAN (May 1 to November 30) | weekly | 1.2 | 0.1 – 0.12 |

| Effluent Parameter | Sample Frequency | Monthly Average Objective Concentration (mg/L unless otherwise indicated) | Monthly Average Result Min-Max (mg/L unless otherwise indicated) |
|---|---|---|---|
| TAN (December 1 to April 30) | weekly | 4.0 | 0.1 – 0.23 |
| Total Residual Chlorine (any single sample) | weekly | non-detect | 0.00 – 0.01 |
| E. coli | weekly | 200 colonies/100 mL (monthly Geometric Mean Density) | 1.7 – 37.6 colonies/100 mL (monthly Geometric Mean Density) |
| pH (any single sample) | weekly | 6.5 – 8.5 | 6.76 – 8.1 |
| Dissolved Oxygen (any single sample) | weekly | 6.0 | 5.8 – 9.23 |

The WWTP experienced difficulty meeting the TSS and TP objective during the month of April. Colder temperatures and an infiltration issue impacted the WWTPs performance. In response, return and waste activate sludge pumping rates were adjusted and additional testing was performed. Repairs were completed to eliminate the infiltration issue.

Thamesford effluent single samples that did not meet effluent objective concentrations in 2024 included the following:

| Date | Parameter | Objective (mg/L) | Result (mg/L) |
|---|---|---|---|
| January 10, 2024 | TP | 0.1 | 0.14 |
| January 10, 2024 | E. coli | 200 colonies/100 mL (monthly Geometric Mean Density) | 274 |
| February 14, 2024 | $CBOD_5$ | 5.0 | 6.0 |
| February 21, 2024 | TSS | 5.0 | 7.0 |
| March 6, 2024 | TSS | 5.0 | 7.0 |
| April 3, 2024 | TSS | 5.0 | 9.0 |
| April 3, 2024 | TP | 0.1 | 0.11 |
| April 10, 2024 | TSS | 5.0 | 10.0 |
| April 10, 2024 | TP | 0.1 | 0.26 |
| April 17, 2024 | TSS | 5.0 | 16.0 |
| April 17, 2024 | TP | 0.1 | 0.4 |

| Date | Parameter | Objective (mg/L) | Result (mg/L) |
|---|---|---|---|
| April 22, 2024 | TSS | 5.0 | 13.0 |
| April 23, 2024 | TSS | 5.0 | 14.0 |
| April 24, 2024 | TSS | 5.0 | 13.0 |
| April 24, 2024 | TP | 0.1 | 0.29 |
| April 25, 2024 | TSS | 5.0 | 13.0 |
| April 26, 2024 | TSS | 5.0 | 12.0 |
| May 1, 2024 | TSS | 5.0 | 9.0 |
| September 26, 2024 | TRC | non-detect | 0.01 |
| October 3, 2024 | TRC | non-detect | 0.01 |
| October 8, 2024 | TRC | non-detect | 0.01 |
| December 30, 2024 | $CBOD_5$ | 5.0 | 6.0 |
| December 30, 2024 | TSS | 5.0 | 9.0 |
| December 30, 2024 | TP | 0.1 | 0.11 |
| December 30, 2024 | DO | 6.0 | 5.8 |
| December 30, 2024 | E. coli | 200 colonies/100 mL (monthly Geometric Mean Density) | 1,560 |

Thamesford effluent monthly average concentrations that did not meet effluent monthly average objective concentrations in 2024 is listed in the following table:

| Date | Parameter | Objective (mg/L) | Result (mg/L) |
|---|---|---|---|
| April 2024 | TSS | 5.0 | 12.5 |
| April 2024 | TP | 0.1 | 0.27 |

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

There were no overflows, bypassing, upsets, spills or abnormal conditions at the Thamesford WWTP in 2024.

There were no complaints in 2024.

There were two projects completed 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). An unused gravity sewer was plugged off and a repair was made in the onsite WWTP sewage pumping station wet well. Combined, both

repairs significantly reduced the infiltration entering the WWTP. No projects have been planned for 2025.

## 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 2024.

## 5. MONITORING 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 or Woodstock WWTP for further treatment.

Biosolids are anaerobically digested and dewatered at the Ingersoll or Woodstock WWTP using Alfa-Laval Centrifuges. 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/reports-and-policies.

## 7. INSPECTION, PILOTS, AND TRIALS

The MECP conducted an inspection of the Thamesford WWTP on February 8, 2024. The inspection covered the period of January 1, 2021, to December 31, 2023.

The results of the inspection concluded that there were two non-compliance issues:

- NC-1: The sewage works was not in compliance with the effluent total chlorine residual concentration limits or criteria during the review period. **Required Actions:** The Municipality shall operate and maintain the Sewage Treatment Plant such that compliance limits for the Final Effluent parameters listed in Schedule C of ECA No. 7320-AUQM53 are met.
- NC-2: The sewage works was not in compliance with the effluent total ammonia/total ammonia-nitrogen concentration limits or criteria during the review period. **Required Actions:** The Municipality shall operate and maintain the Sewage Treatment Plant such that compliance limits for the Final Effluent parameters listed in Schedule C of ECA No. 7320-AUQM53 are met.

The inspection report provided six recommendations:

- R-1: The sewage works was not in conformance with the effluent total suspended solids concentration and/or loading objectives listed in the ECA or an Order during the review period**. Required Actions:** The Municipality shall undertake everything practicable to

operate the Sewage Treatment Plant in accordance with the Final Effluent parameters design objectives listed in Schedule B of ECA No. 7320-AUQM53.

- R-2: The sewage works was not in conformance with the effluent total phosphorous concentration and/or loading objectives listed in by the ECA or an Order during the review period. **Required Actions:** The Municipality shall undertake everything practicable to operate the Sewage Treatment Plant in accordance with the Final Effluent parameters design objectives listed in Schedule B of ECA No. 7320-AUQM53.
- R-3: The sewage works was not in conformance with the effluent total chlorine residual concentration objective listed in the ECA or an Order during the review period. **Required Actions:** The Municipality shall undertake everything practicable to operate the Sewage Treatment Plant in accordance with the Final Effluent parameters design objectives listed in Schedule B of ECA No. 7320-AUQM53.
- R-4: The sewage works was not in conformance with the effluent total ammonia/total ammonia-nitrogen concentration/loading objectives listed in the ECA or an Order during the review period. **Required Actions:** The Municipality shall undertake everything practicable to operate the Sewage Treatment Plant in accordance with the Final Effluent parameters design objectives listed in Schedule B of ECA No. 7320-AUQM53.
- R-5: The sewage works was not in conformance with the effluent pH objectives listed in the ECA or an Order during the review period. **Required Actions:** The Municipality shall undertake everything practicable to operate the Sewage Treatment Plant in accordance with the Final Effluent parameters design objectives listed in Schedule B of ECA No. 7320-AUQM53.
- R-6: The following best management practice issue (s) were identified. During the site visit, no spill kits were observed near both of the chemical loading and storage locations at the facility. **Required Actions:** Spill kits were installed in the noted locations on February 14, 2023.

### *WWTP Headworks and Aeration Upgrade*

Construction is planned to start later this year to undertake upgrades to the WWTP Headworks and an Aeration Upgrade to improve plant performance and reduce operational challenges. Improvements include a new headworks facility with fine screening and grit removal, and the replacement of the plug flow reactor process train aeration course bubble diffusers with fine bubble diffusers to improve the oxygen transfer rate efficiency and reduce power consumption.

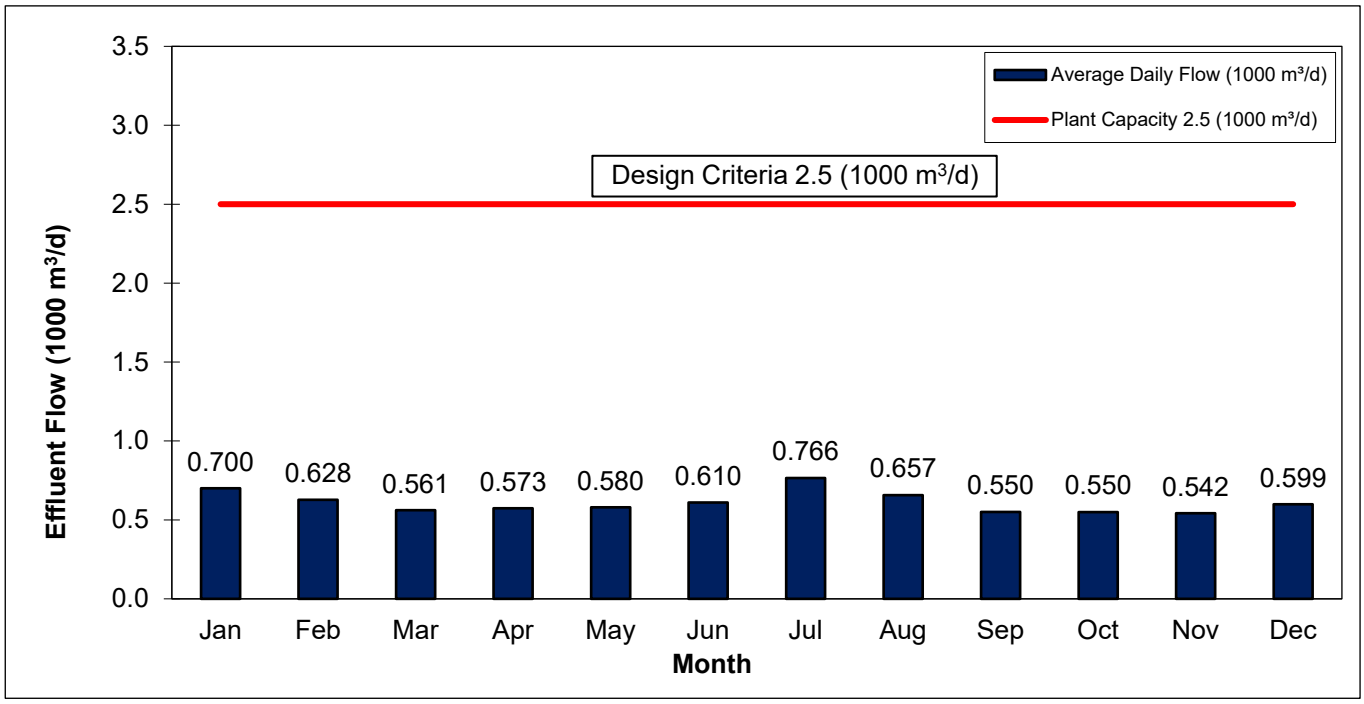
### *WWTP Supervisory Control and Data Acquisition (SCADA) Upgrade Completed*

The Thamesford WWTP was the pilot Site (December 2023) for implementation of the new County-wide SCADA network developed through the County's SCADA Master Plan. The insights and lessons learned from the Thamesford WWTP installation are being applied to other sites as they transition to a County-wide SCADA system in the coming years.

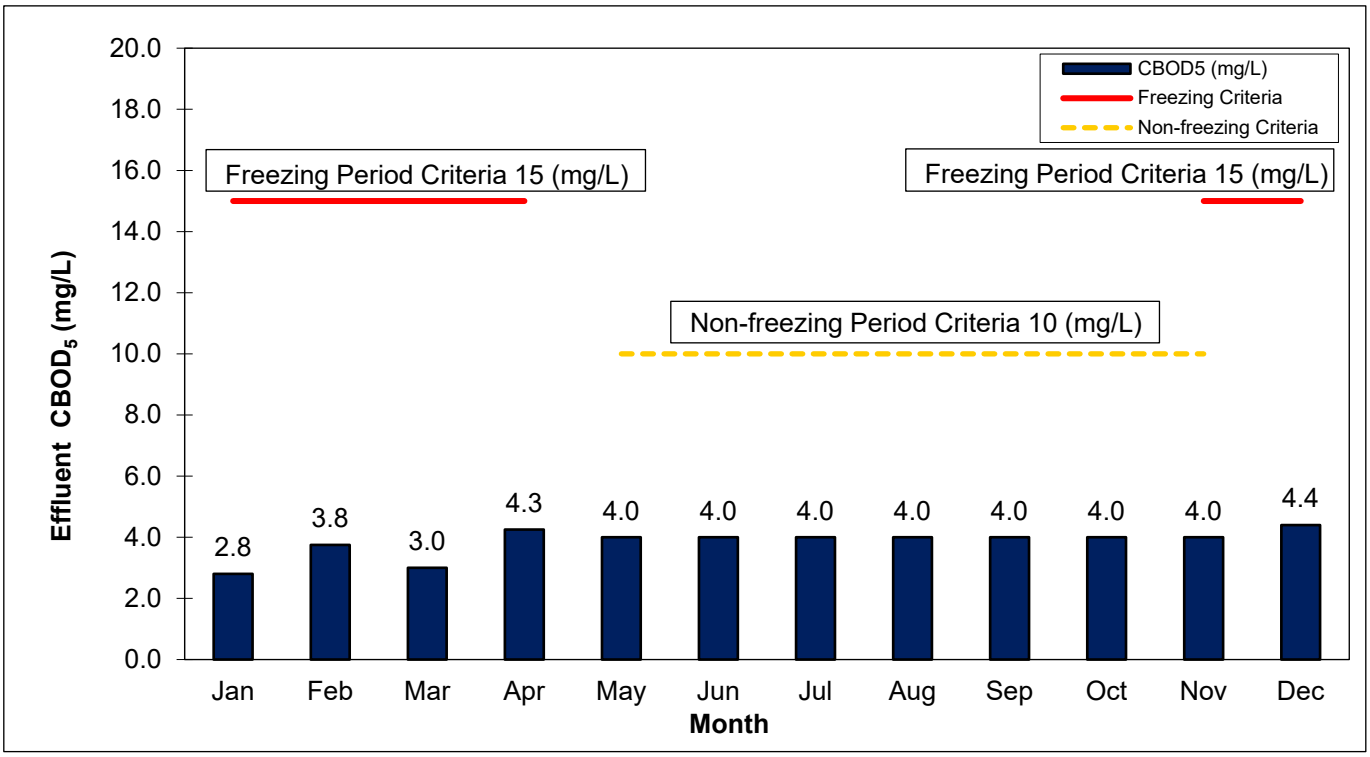
The County's 10-year SCADA Master Plan will enhance operations by: (1) replacing and standardizing aging/obsolete hardware and software SCADA systems to increase network reliability, (2) allowing for inter-connection of remote water/wastewater sites to reduce travel time and manual operator intervention, (3) improving cyber-security and (4) improving data collection, storage and reporting.

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

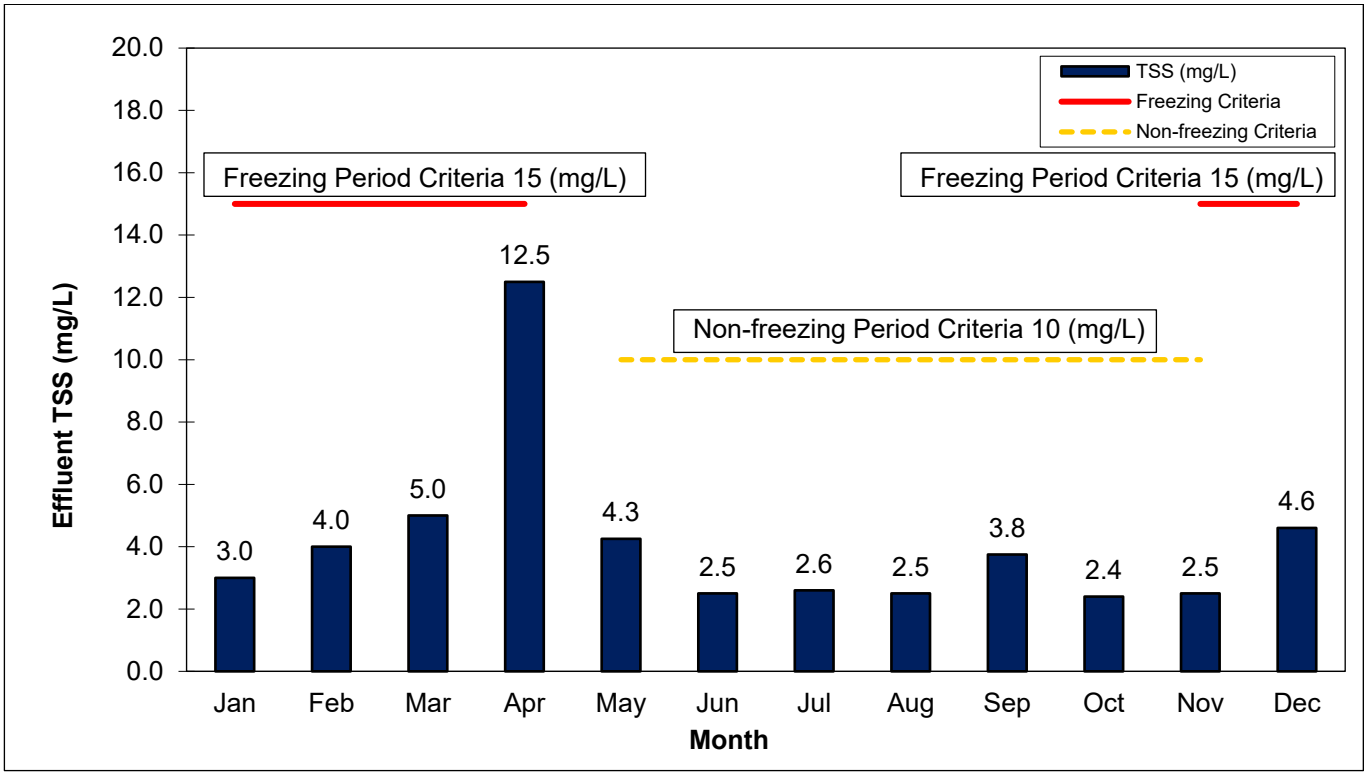
Thamesford WWTP Effluent, Monthly Average Daily Flow (1000m$^3$/d), 2024



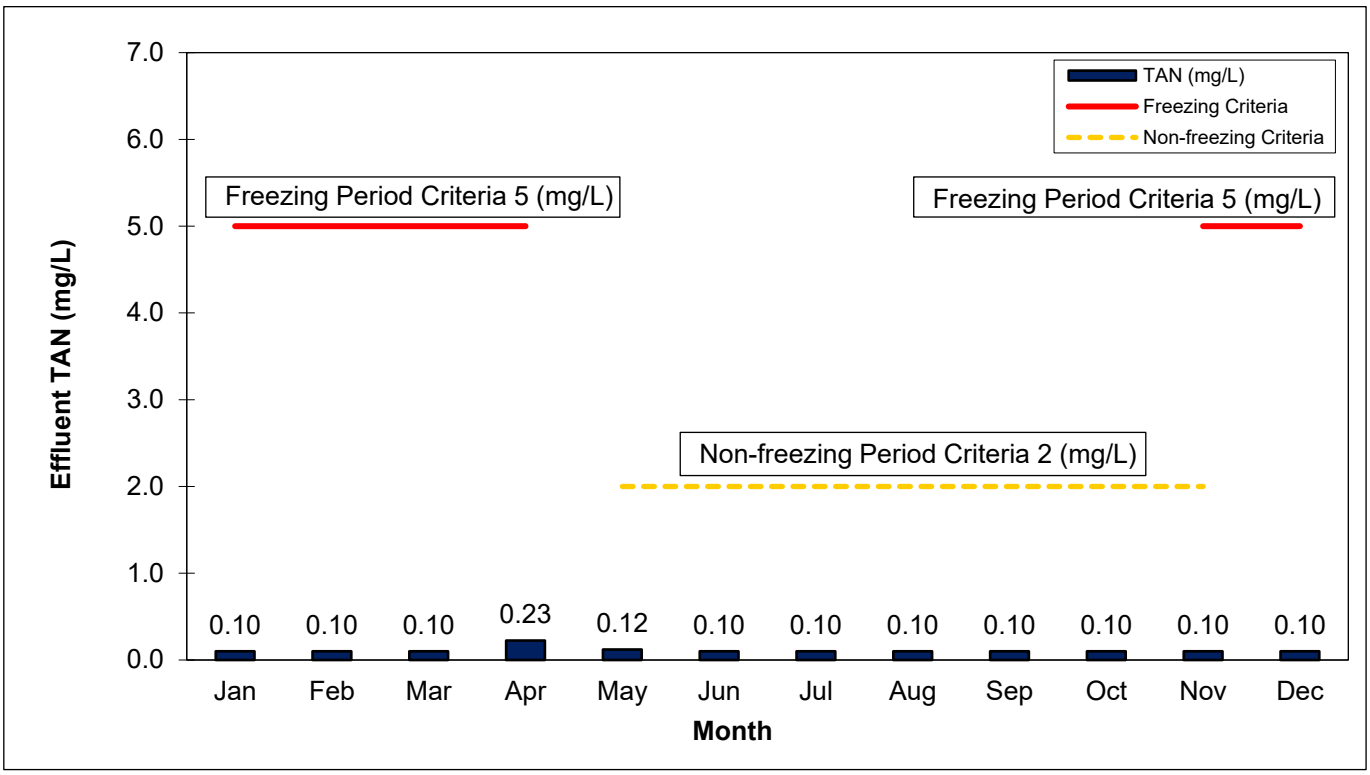

Thamesford WWTP Effluent, Monthly Average $CBOD_5$ (mg/L), 2024



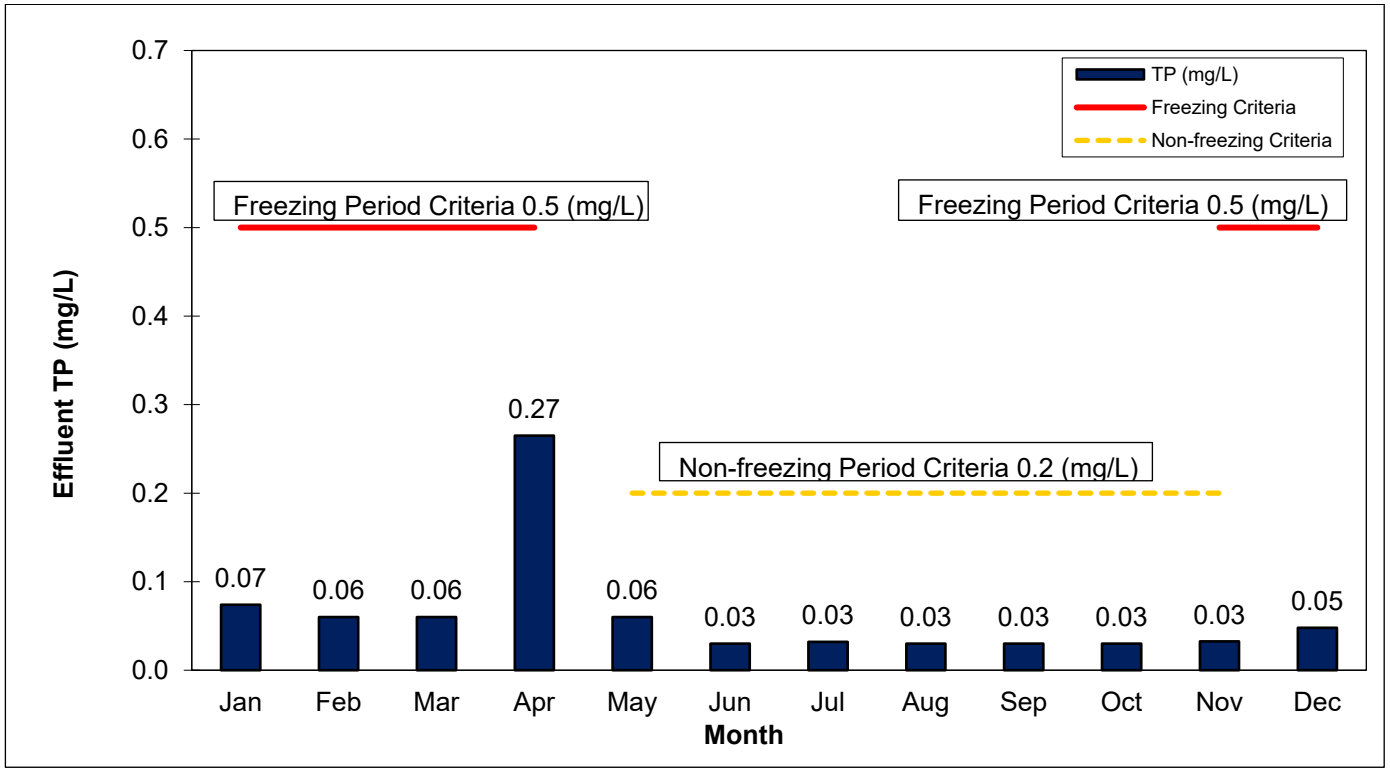
Thamesford WWTP Effluent, Monthly Average TSS (mg/L), 2024




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



Thamesford WWTP Effluent, Monthly Average TP (mg/L), 2024




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