



2023 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, 2023 – December 31, 2023

Wastewater Treatment Plant Owner & Contact Information:

Oxford County Public Works Department - Wastewater Services
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Woodstock, ON N4S 7Y3
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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), 18.7 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 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
2023 Average Daily Flow	591 m ³ /d
2023 Maximum Daily Flow	1,894 m ³ /d
2023 Total Volume of Wastewater	215,033 m ³ /year

1.2 Major Expenses

In 2023, the Thamesford WWTP had forecasted operating and maintenance expenditures of approximately \$708,000.

In addition to regular operational and maintenance expenditures, Capital Improvement Projects for the Village of Thamesford were forecasted at \$427,000 which included improvements to the wastewater collection system and the Thamesford WWTP.

Capital Improvement Projects included:

- \$265,000 for design of a headworks, screening and aeration upgrade
- \$134,000 for facilities upgrades
- \$27,000 for the replacement of general operating equipment

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

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 2023, 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 2023, with 931 samples out of 933 meeting compliance, or 99% compliance to its regulatory limits for all effluent discharged from the WWTP.

On May 15, 2023, during routine repairs to a chlorine pump, the sodium bisulphite pump duty was accidentally switched. The chemical valves into this sodium bisulphite pump were in the closed position. No sodium bisulphite was added until discovery at 9:00 am the following day, when the Total Residual Chlorine (TRC) in the effluent was measured at 1.17 mg/L with an ECA TRC single sample limit of 0.02 mg/L. The Operator investigated, corrected the issue, and the effluent was compliant when retested at 11:00 am (TRC = 0.00 mg/L). The issue was reviewed at the weekly operations meeting, resulting in new labeling on the chemical pumps-selector switches and a new sign posted at the pump asking to verify chemical valves are open when changing pump duties.

All non-compliances were reported to the MECP at the time of the event.

Influent Streams and Effluent Streams

There was no single laboratory pH result for the effluent outside the discharge limit of 6 - 9.5 in 2023.

Staff tests TRC in the treated effluent several times per week; well in excess of the required weekly testing frequency. With the exception of May 16, 2023 (as noted above), all results met the single sample TRC limit of 0.02 mg/L or less in 2023.

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	228	135
Total Suspended Solids	247	146
Total Phosphorus	5.3	3.1
Total Kjeldahl Nitrogen	47.8	28.2
Oil and Grease	31	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 – 3.0	98.7 – 99.1
CBOD ₅ (December 01 to April 30)	weekly	15	2.0 – 3.5	98.5 – 99.1
TSS (May 01 to November 30)	weekly	10	2.0 – 5.0	98.0 – 99.2
TSS (December 01 to April 30)	weekly	15	2.0 – 7.9	96.8 – 99.2
TP (May 01 to November 30)	weekly	0.20	0.03 – 0.05	99.1 – 99.4
TP (December 01 to April 30)	weekly	0.50	0.04 – 0.14	97.4 – 99.2
Total Ammonia Nitrogen (May 1 to November 30)	weekly	2.0	0.1 – 0.3	--
Total Ammonia Nitrogen (Dec. 1 to April 30)	weekly	5.0	0.1 – 0.5	--
Total Residual Chlorine any single sample	weekly	0.02	0.00 – 1.17	--

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
E. coli	weekly	200 colonies/100 mL (monthly Geometric Mean Density)	2 – 39 colonies/100 mL (monthly Geometric Mean Density)	--
pH any single sample	weekly	6.0 – 9.5	6.53 – 8.28	--
Dissolved Oxygen any single sample	weekly	5 and above	6.17 – 8.97	--

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.

In February, a partially plugged alum pump with resulting insufficient chemical dosing caused effluent TP concentrations to increase. The pump was replaced at the beginning of March.

The WWTP experienced difficulty meeting the TSS objective during the months of March and April, as there were adjustments made to the biomass concentration. There was an unintentional reduction in biomass followed by re-seeding from another Oxford County WWTP. The WWTP was in recovery, with high influent flows and a drop in operating temperatures that impacted the daily process control.

A closed valve on a chemical pump not opened after a maintenance repair, resulted in the TRC objective not being met on May 16, 2023. New labeling and signage was installed to prevent reoccurrence.

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	2.0 – 3.5
TSS	weekly	5	2.0 – 7.9
TP	weekly	0.10	0.03 – 0.14
Total Ammonia Nitrogen (May 1 to November 30)	weekly	1.2	0.1 – 0.3
Total Ammonia Nitrogen (Dec. 1 to April 30)	weekly	4.0	0.1 – 0.5
Total Residual Chlorine any single sample	weekly	non-detect	0.00 – 1.17
E. coli (May 1 – October 31)	weekly	200 colonies/100 mL (monthly Geometric Mean Density)	2 – 39 colonies/100 mL (monthly Geometric Mean Density)
pH any single sample	weekly	6.5 – 8.5	6.53 – 8.28
Dissolved Oxygen any single sample	weekly	6	6.17 – 8.97

Thamesford effluent single samples that did not meet effluent objective concentrations in 2023 included the following:

Date	Parameter	Objective (mg/L)	Result (mg/L)
January 4, 2023	TSS	5	6
February 21, 2023	TP	0.1	0.16
February 28, 2023	TSS	5	9
February 28, 2023	TP	0.1	0.22
March 7, 2023	TSS	5	14

Date	Parameter	Objective (mg/L)	Result (mg/L)
March 14, 2023	TSS	5	10
March 20, 2023	TSS	5	6
March 21, 2023	TSS	5	9
March 22, 2023	TSS	5	6
March 29, 2023	TSS	5	6
March 30, 2023	TSS	5	8
April 11, 2023	TSS	5	6
April 18, 2023	TSS	5	6
April 25, 2023	TSS	5	6
April 27, 2023	TSS	5	8
May 9, 2023	TSS	5	9
May 16, 2023	TRC	Non-Detect	1.17
August 15, 2023	TSS	5	6
November 21, 2023	TSS	5	7

The Thamesford effluent monthly average concentration that did not meet effluent monthly average objective concentration in 2023 is listed in the following table:

Date	Parameter	Objective (mg/L)	Result (mg/L)
February 2023	TP	0.1	0.14

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

There were no overflows, bypassing, upsets, spills, complaints or abnormal conditions at the Thamesford WWTP in 2023.

There were no projects undertaken in 2023 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 2023.

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 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 2023. The MECP inspections typically occur on a three-year schedule.

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.

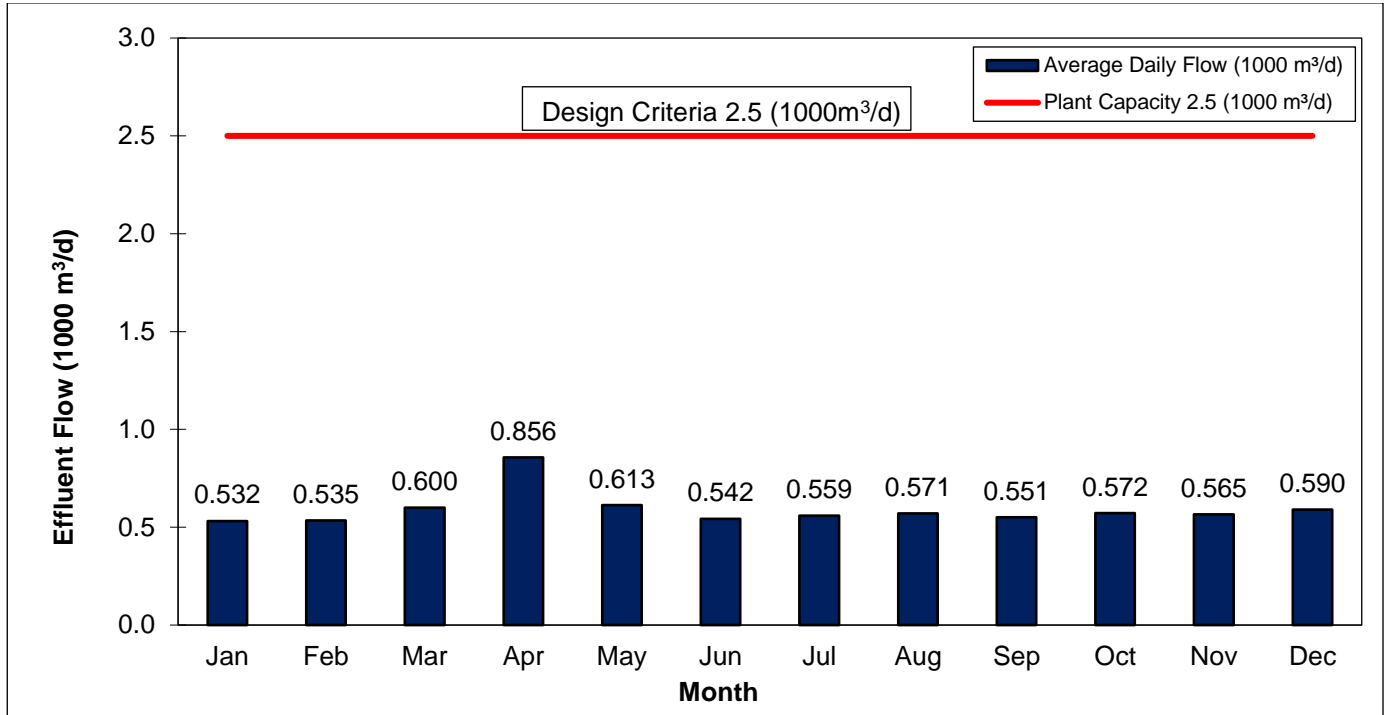
WWTP Supervisory Control and Data Acquisition (SCADA) Upgrade

The Thamesford WWTP was the pilot Site for implementation of the new County-wide SCADA network developed through the County's SCADA Master Plan (December 2023). Insights and lessons learned from the Thamesford WWTP installation will be applied to all other sites as they transition to the County-wide SCADA system over the next few years

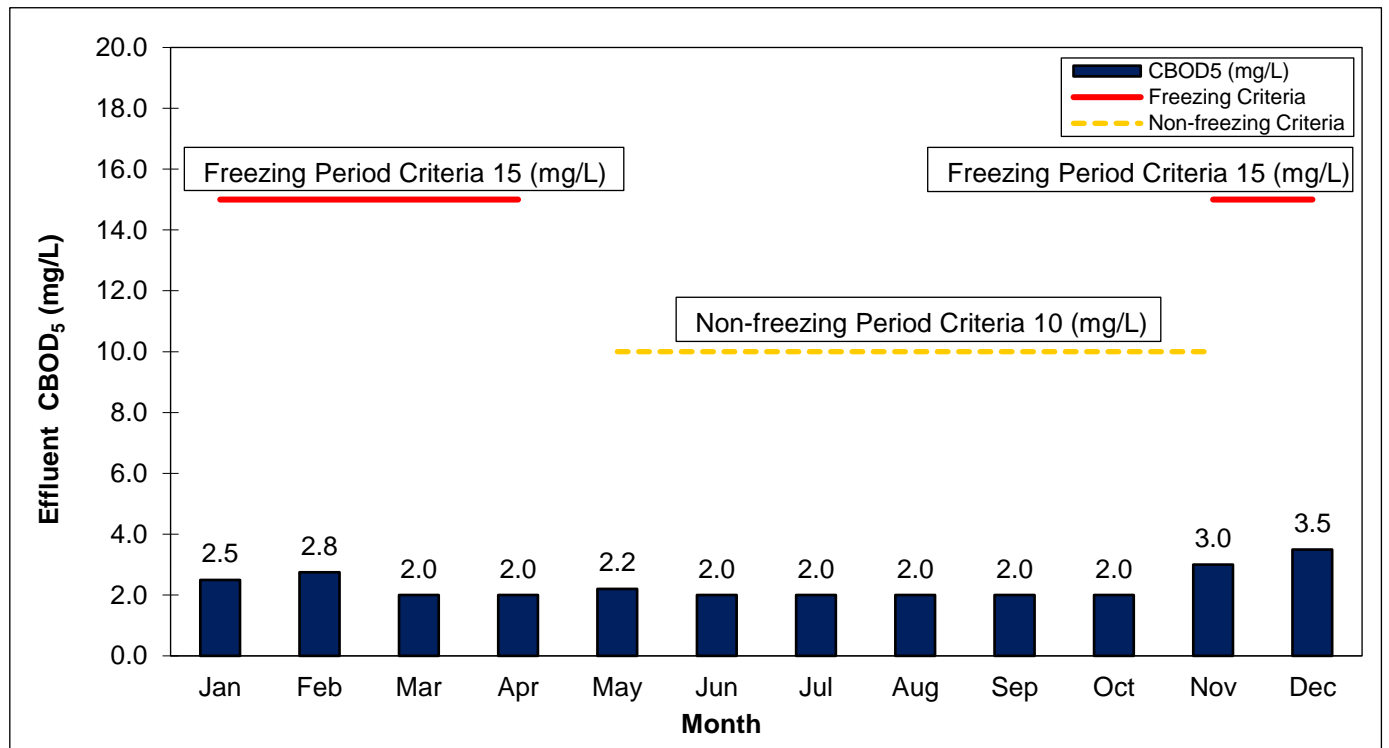
The County's 10 year SCADA Master Plan will enhance operations by: (1) replacing and standardizing aging/obsolete hardware and software SCADA systems to increase network reliability, (2) allowing for inter-connection of remote water/wastewater sites to reduce travel time and manual operator intervention,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

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

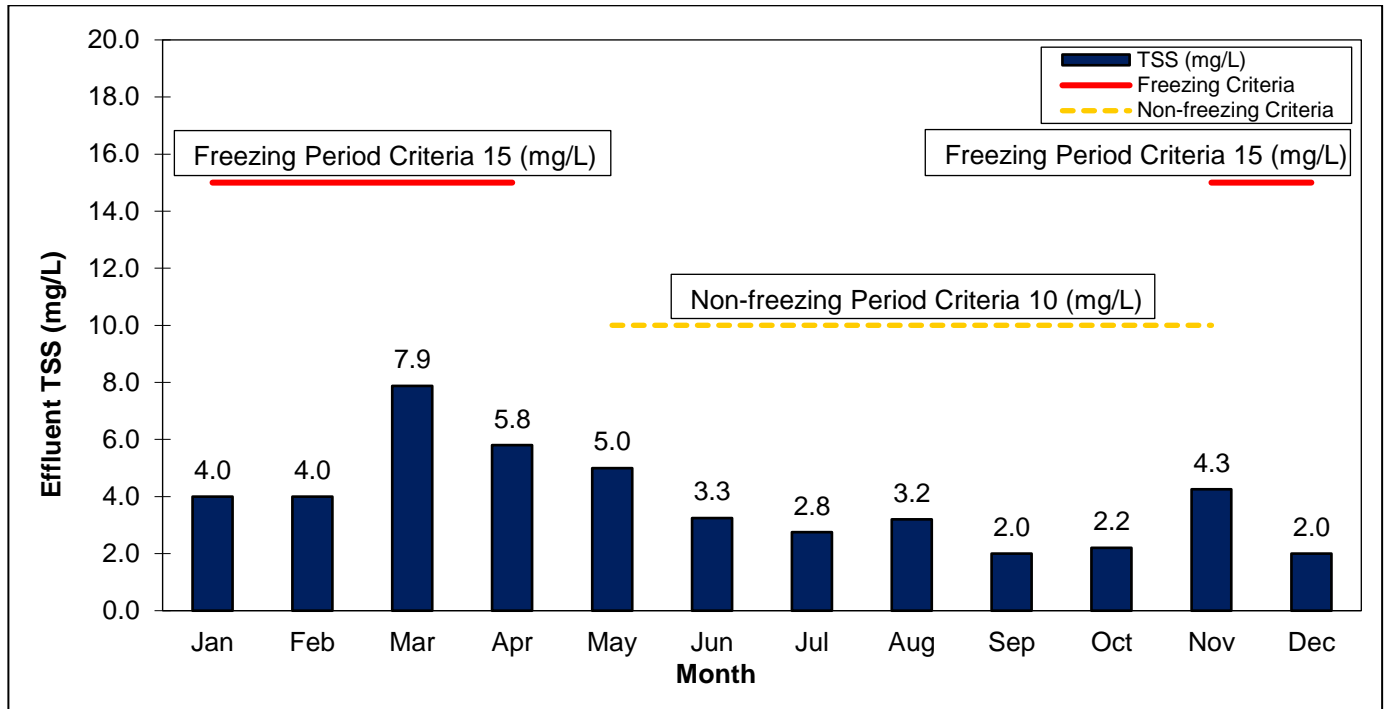
Thamesford WWTP Effluent, Monthly Average Daily Flow (1000m³/d), 2023



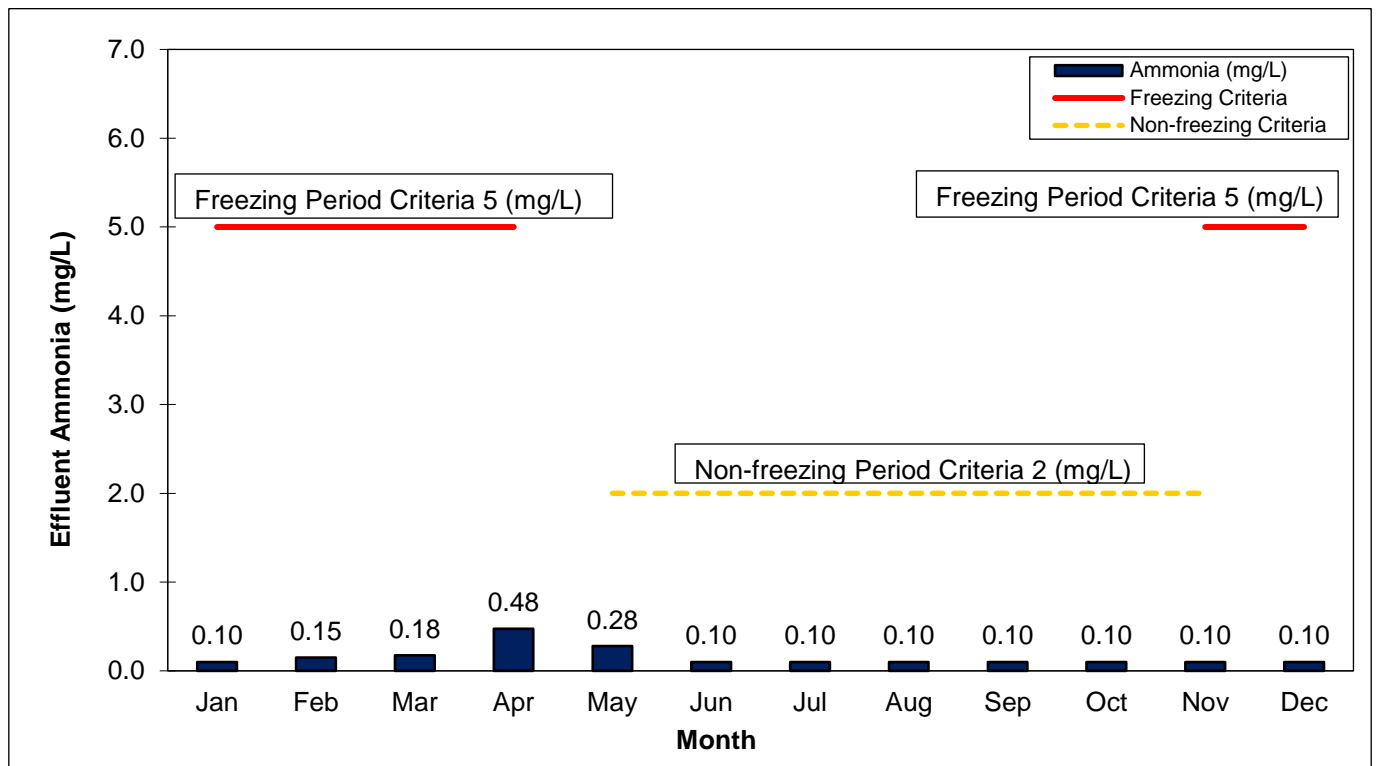
Thamesford WWTP Effluent, Monthly Average CBOD₅ (mg/L), 2023



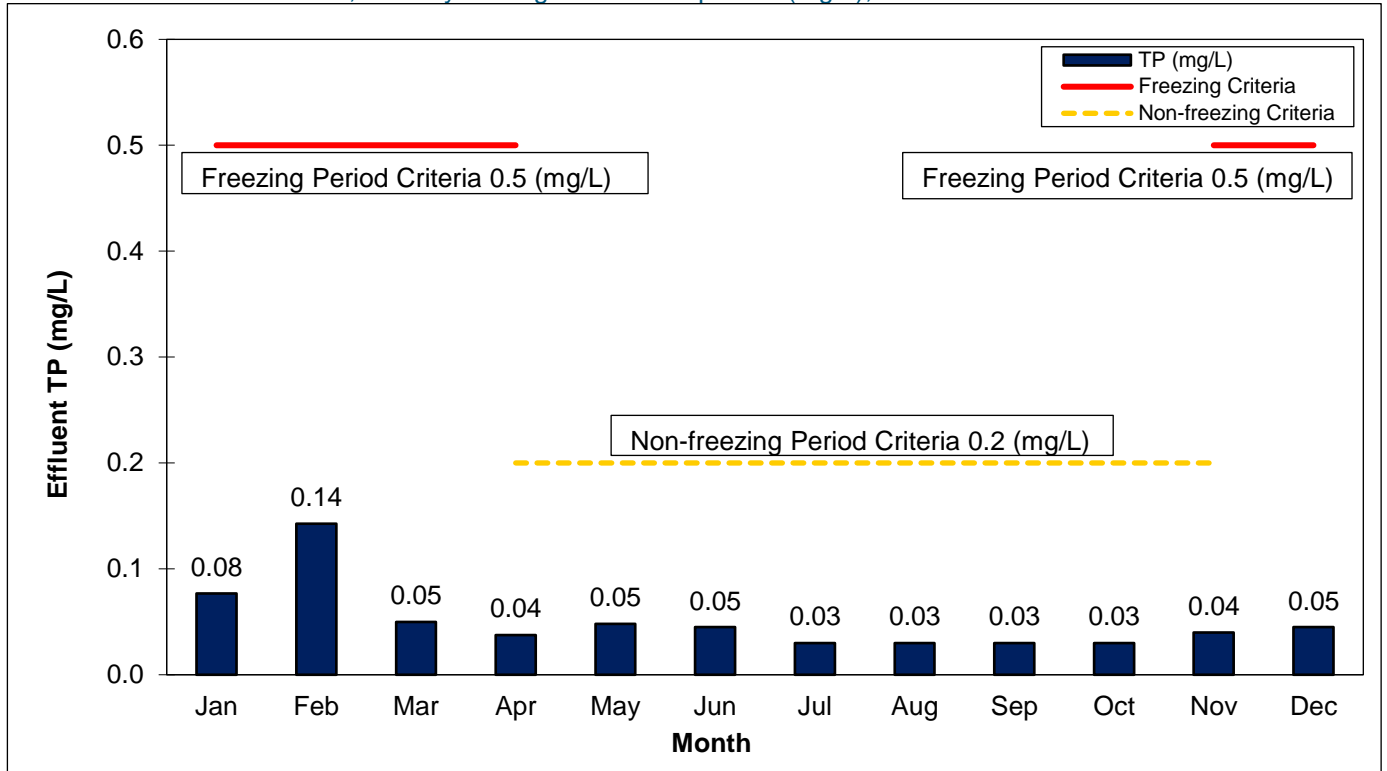
Thamesford WWTP Effluent, Monthly Average TSS (mg/L), 2023



Thamesford WWTP Effluent, Monthly Average Ammonia (mg/L), 2023



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



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

