2021 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 www.oxfordcounty.ca/Services-for-You/Water-Wastewater/Wastewater/Annual-reports 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 publicworks@oxfordcounty.ca.

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

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 station, 6.7 kilometers of sanitary gravity sewers, and 2.1 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
2021 Average Daily Flow	274 m^3/d
2021 Maximum Daily Flow	515 m^3/d
2021 Total Volume of Wastewater	100,177 m^3/year

1.2. Major Expenses

In 2021, the Drumbo WWTP had forecasted operating and maintenance expenditures of approximately $229,000.

In addition to regular operational and maintenance expenditures, Capital Improvement Projects for the Village of Drumbo were forecasted at $4,830,000 which included improvements to the wastewater collection system and the Drumbo WWTP.

Drumbo Capital Improvement Projects included:

- $4,750,000 - 2021 ($9,660,000 total) for the expansion to the Drumbo WWTP (multi-year project with the Total Forecasted Capital Expenditures)
- $20,000 Feasibility Study
- $20,000 Standby Power Upgrade
- $9,160 for general operating equipment

Capital Improvement Projects for all systems included:

- $720,000 to develop Countywide SCADA Master Plan for all water/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 2021, the Drumbo WWTP provided effective treatment with 755 samples out of 790 meeting compliance, or 96 % compliance to its regulatory limits for all effluent discharged from the WWTP.

In late July, a blower motor failed causing decreased oxygen concentrations in the aeration, resulting in a non-compliance for Total Ammonia Nitrogen. A stand by blower was put into duty, while repairs were completed on the faulty unit.

- The effluent monthly average concentration for Total Ammonia Nitrogen was 3.43 mg/L, which was above the ECA concentration limit of 2.7 mg/L

In August, the Drumbo WWTP was still recovering from the nitrification issues experienced from the previous month. On August 17th, a break in the aeration piping was discovered. This reduction of oxygen supply to the aeration reactors, further stressed the nitrification recovery and caused poor settling. Both aeration reactors were pumped down and re-seeded with activated sludge from the Woodstock WWTP. The aeration piping was repaired and staffing levels increased to stabilize operations.

- The effluent monthly average concentration for Total Ammonia Nitrogen was 3.85 mg/L, with an ECA concentration limit of 2.7 mg/L. The monthly average daily effluent loading concentration for Total Ammonia Nitrogen was 0.86 kg/day, with an ECA concentration limit of 0.8 kg/day.
- The effluent monthly average concentration for Total Suspended Solids was 10.0 mg/L, with an ECA concentration limit of 9.3 mg/L.

In October, heavy precipitation caused flows to exceed the rated capacity of the plant for approximately half of the month. This resulted in solids carryover into the plant effluent. Vacuum trucks were used to temporarily reduce the influent volume entering the plant during peak flow periods. The plant is currently under construction, to increase the rated capacity of the plant from 300 m3/day to 450 m3/day.

- The effluent monthly average concentration for Total Suspended Solids was 20.4 mg/L, with an ECA concentration limit of 9.3 mg/L.
- The monthly average daily effluent loading concentration for Total Suspended Solids was 6.6 kg/day, which exceeded the ECA concentration limit of 2.8 kg/day.

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 2021. 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.

Drumbo WWTP Influent Wastewater Characteristics		
Parameter	**Concentration mg/L**	**Loading kg/d**
BOD_5	114	31
Total Suspended Solids	82	23
Total Phosphorus	3	1
Total Kjeldahl Nitrogen	31	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	2.0 – 5.2	94.1 – 97.8
Total Suspended Solids (TSS)	weekly	9.3	3.3 – 20.4	75.1 – 96.0
Total Phosphorus (TP)	weekly	0.46	0.1 – 0.38	87.3 – 96.7
Total Ammonia Nitrogen (TAN) (May 1 to October 31)	weekly	2.7	1.2 – 3.9	--
Total Ammonia Nitrogen (TAN) (Nov. 1 to April 30)	weekly	4.5	2.2 – 4.0	--
E. coli	weekly	200 organisms/100 mL (monthly Geometric Mean Density)	2.0 – 15.8 organisms/100 mL (monthly Geometric Mean Density)	--
DO	weekly	5.0 or higher	6.3 – 7.9	--
pH any single sample	weekly	6.0 - 9.5	6.9 – 8.0	--

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	2.0 – 5.2
Total Suspended Solids (TSS)	weekly	4.7	3.3 – 20.4
Total Phosphorus (TP)	weekly	0.27	0.1 – 0.38
Total Ammonia Nitrogen (TAN) (May 1 to October 31)	weekly	1.8	1.2 – 3.9
Total Ammonia Nitrogen (TAN) (Nov. 1 to April 30)	weekly	3.6	2.2 – 4.0
E. coli	weekly	150 organisms/100 mL (monthly Geometric Mean Density)	2.0 – 15.8 organisms/100 mL (monthly Geometric Mean Density)
DO	weekly	6 or higher	6.3 – 7.9
pH any single sample	weekly	6.5 - 8.5	6.9 – 8.0

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 potential to increase to 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 in the spring of 2023.

Exceedances of the Monthly Average Objectives in 2021, are included the following table.

Month	Parameter	Objective (mg/L)	Monthly Average Result (mg/L)
January 2021	TSS	4.7	6.4
February 2021	$CBOD_5$	4.7	5.2
March 2021	TAN	3.6	4
April 2021	FLOW	300 m^3/d	306 m^3/d
May 2021	TSS	4.7	5.3
May 2021	TAN	1.8	2.1
June 2021	TSS	4.7	4.8
June 2021	TP	0.27	0.30
July 2021	TSS	4.7	5.3
July 2021	TAN	1.8	3.4
August 2021	TSS	4.7	10
August 2021	TAN	1.8	3.9
August 2021	TP	0.27	0.38
September 2021	TSS	4.7	7.3
October 2021	$CBOD_5$	4.7	4.8
October 2021	TSS	4.7	20.4
October 2021	TP	0.27	0.29
October 2021	FLOW	300 m^3/d	324
November 2021	TSS	4.7	7
December 2021	FLOW	300 m^3/d	345

Drumbo effluent single samples that did not meet effluent objective concentrations in 2021 included the following:

Month	Parameter	Objective mg/L	Result mg/L
June 17, 2021	Dissolved Oxygen	6	5.2

Dissolved oxygen concentration is monitored to protect the quality of the receiving body. In the case of dissolved oxygen, the objective set is a minimum value to achieve. The lower observed dissolved oxygen result occurred when testing the effluent while cleaning the disinfection system, and was not representative of typical discharged effluent.

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

There were no overflows, bypassing, upsets, spills and abnormal conditions in 2021.

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 2021.

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 in 2022.

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 2021.

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 conducted a facility inspection of the Drumbo WWTP in 2021. The MECP inspections typically occur on a 3-year schedule.

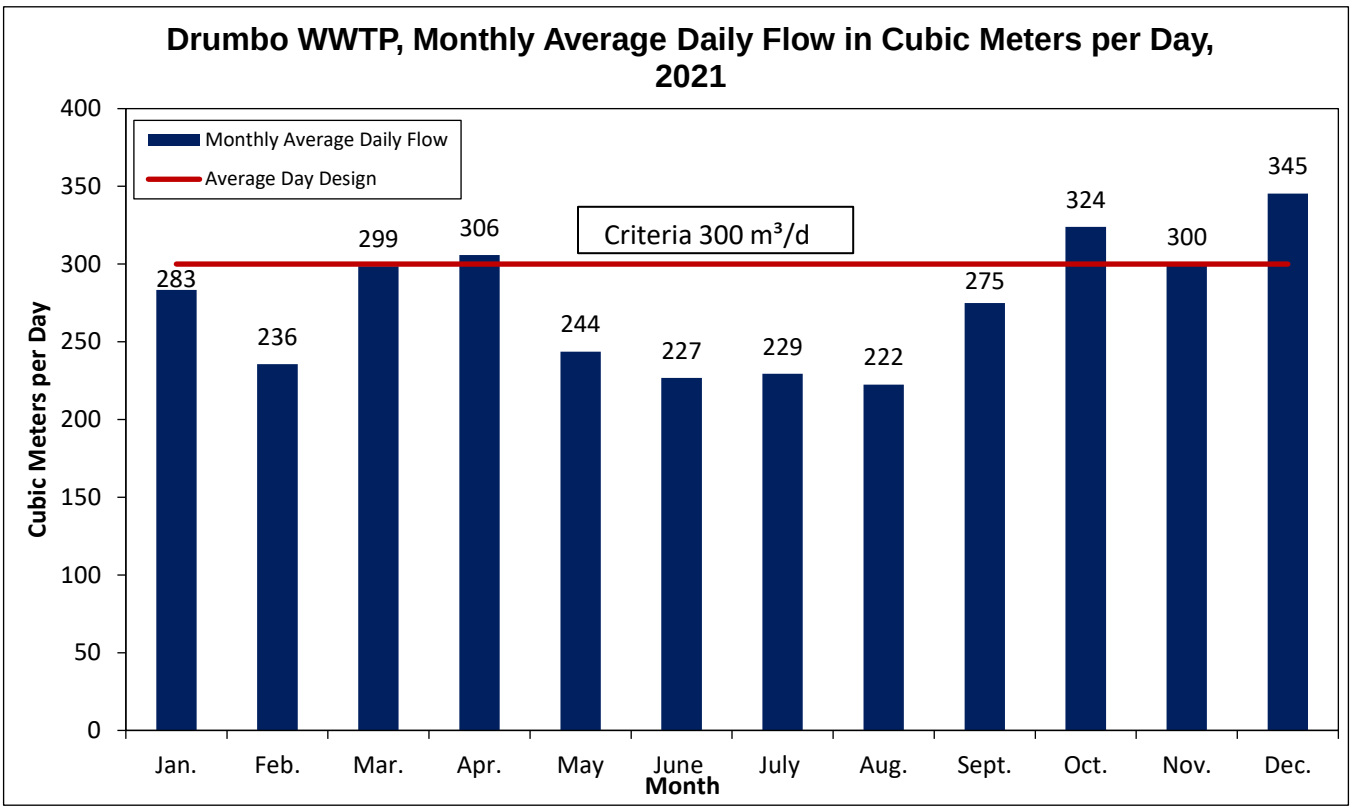
Plant Expansion

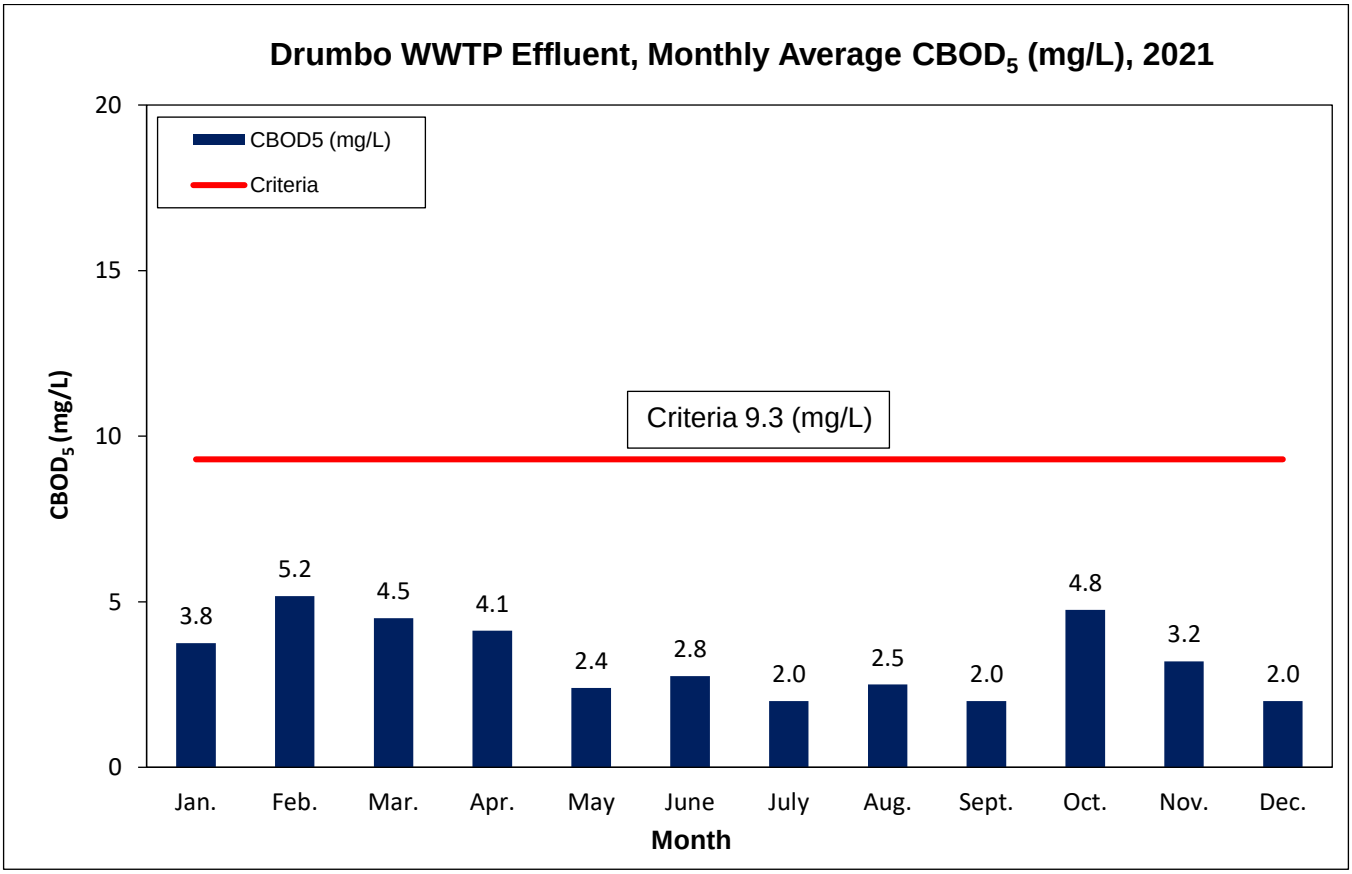
In 2021, construction began to expand the rated capacity of the Drumbo WWTP from 300 to 450 m^3/day. The upgrades include headworks, Membrane Bioreactors (MBR), disinfection equipment, and new plant backup power supply.

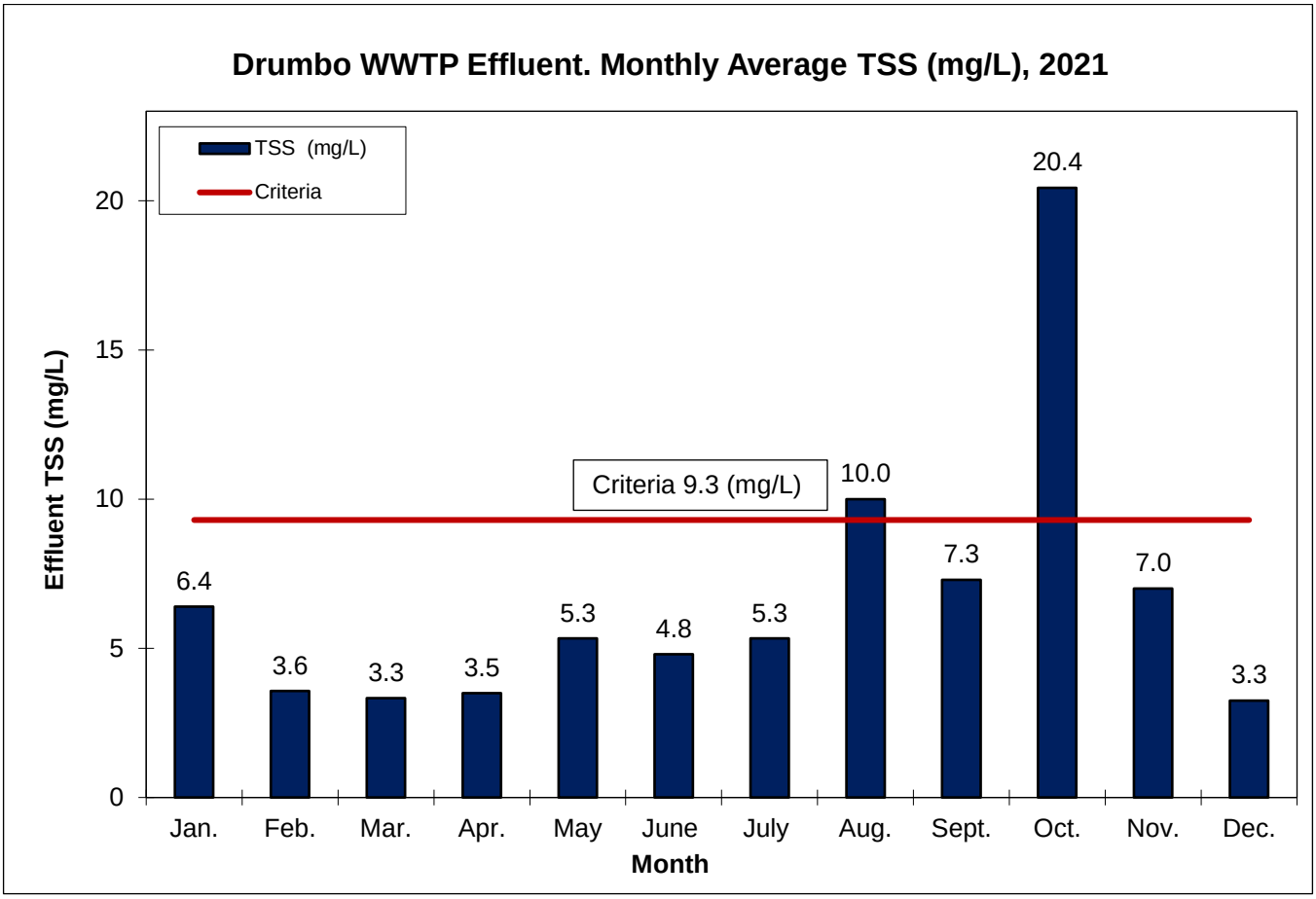
Feasibility Study

In 2021, a Feasibility Study commenced to investigate wastewater treatment potential for the Village of Drumbo. This Feasibility Study will help to develop and plan alternative scenarios and treatment strategies to meet future wastewater treatment servicing. The anticipation completion date is 2022.

APPENDIX A: GRAPHS OF 2021 DISCHARGE PARAMETERS VS. EFFLUENT DISCHARGE LIMITS






Drumbo WWTP Effluent. Monthly Average TSS (mg/L), 2021
TSS (mg/L)
Criteria
Criteria 9.3 (mg/L)
Effluent TSS (mg/L)
0
5
10
15
20
6.4
3.6
3.3
3.5
5.3
4.8
5.3
10.0
7.3
20.4
7.0
3.3
Jan.
Feb.
Mar.
Apr.
May
June
July
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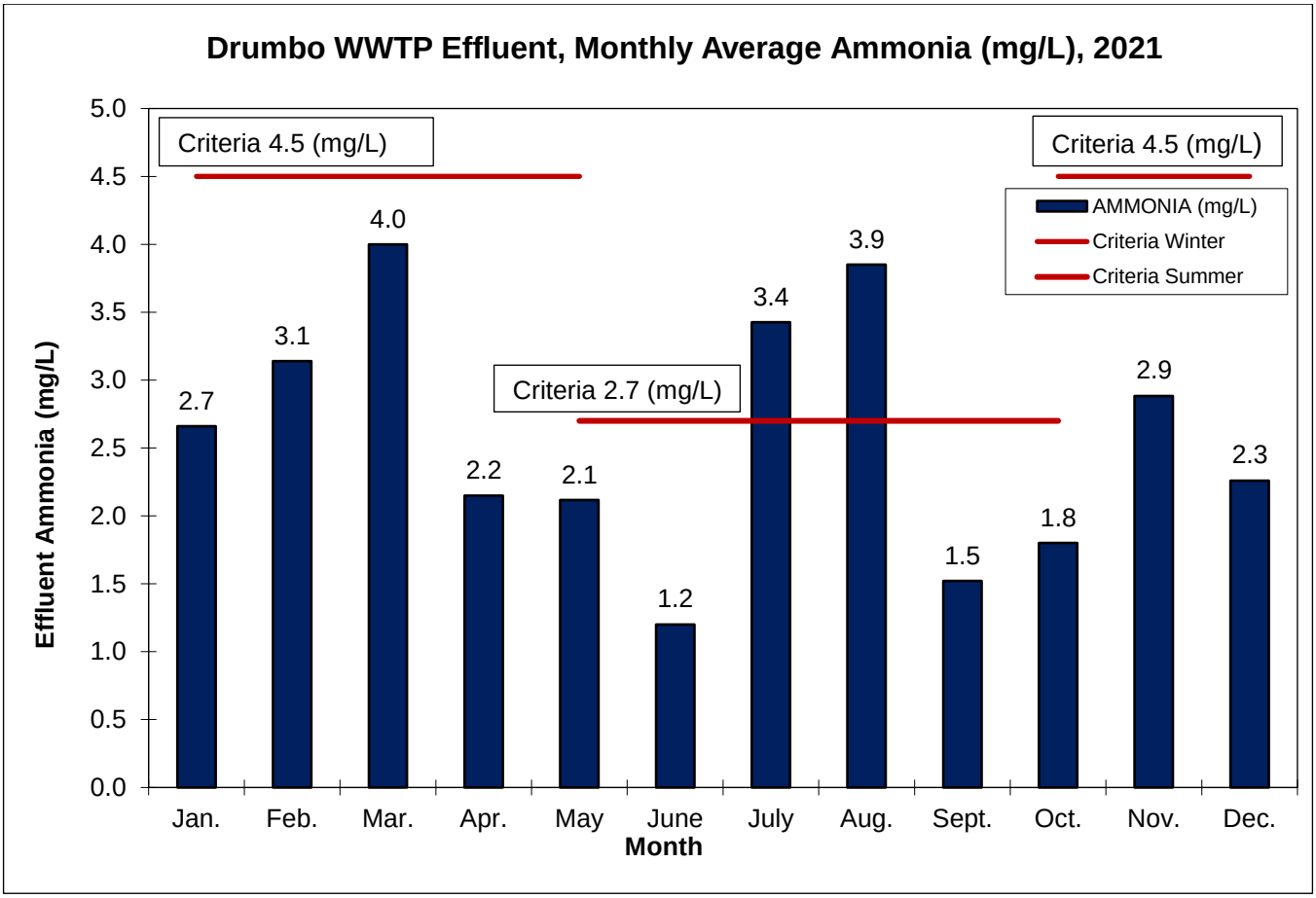
Oct.
Nov.
Dec.
Month


Drumbo WWTP Effluent, Monthly Average Ammonia (mg/L), 2021
Criteria 4.5 (mg/L)
Criteria 4.5 (mg/L)
AMMONIA (mg/L)
Criteria Winter
Criteria Summer
Criteria 2.7 (mg/L)
Effluent Ammonia (mg/L)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
4.5
5.0
2.7
3.1
4.0
2.2
2.1
1.2
3.4
3.9
1.5
1.8
2.9
2.3
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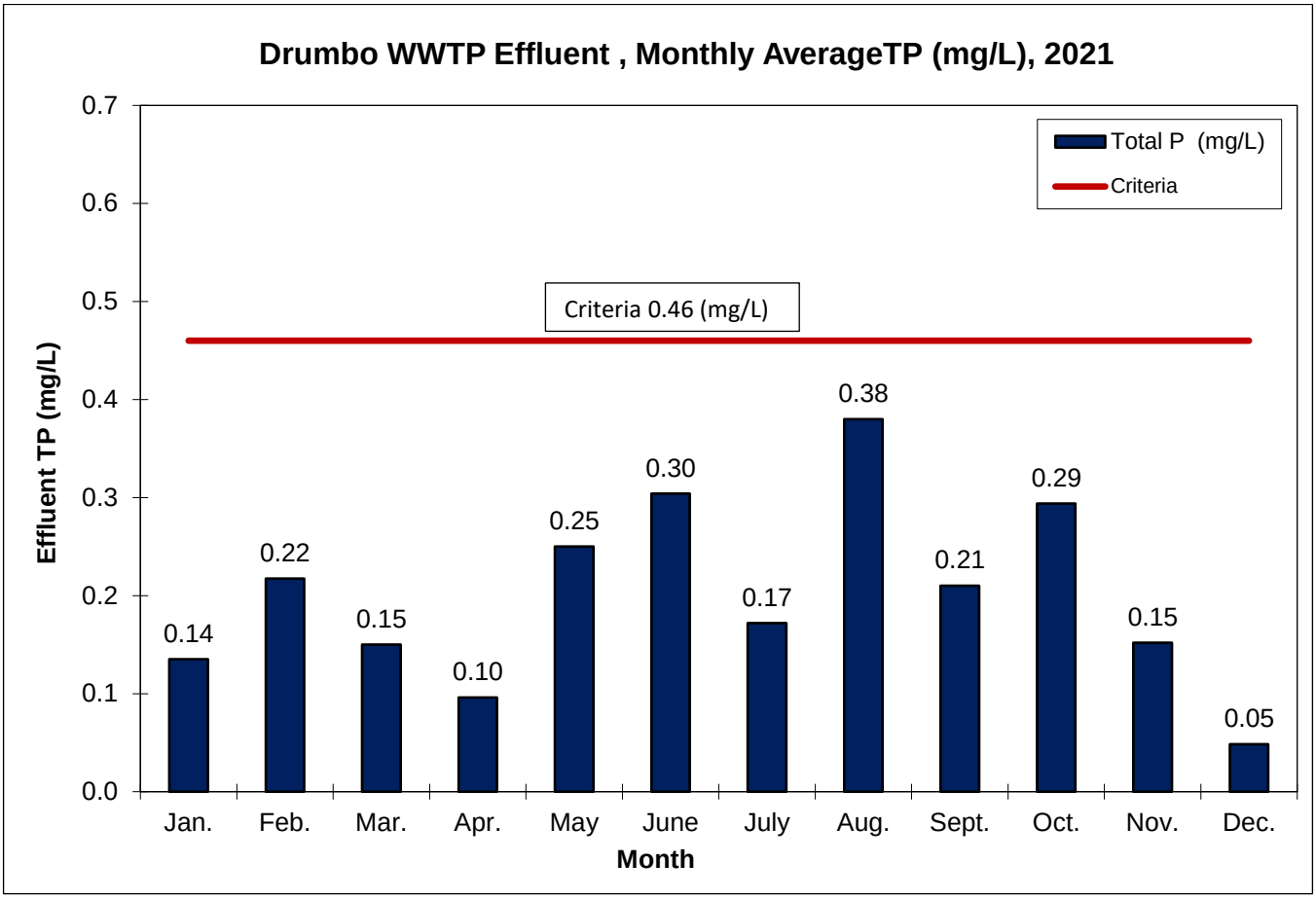
Month


Drumbo WWTP Effluent , Monthly AverageTP (mg/L), 2021
Total P (mg/L)
Criteria
Criteria 0.46 (mg/L)
Effluent TP (mg/L)
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
0.14
0.22
0.15
0.10
0.25
0.30
0.17
0.38
0.21
0.29
0.15
0.05
Jan.
Feb.
Mar.
Apr.
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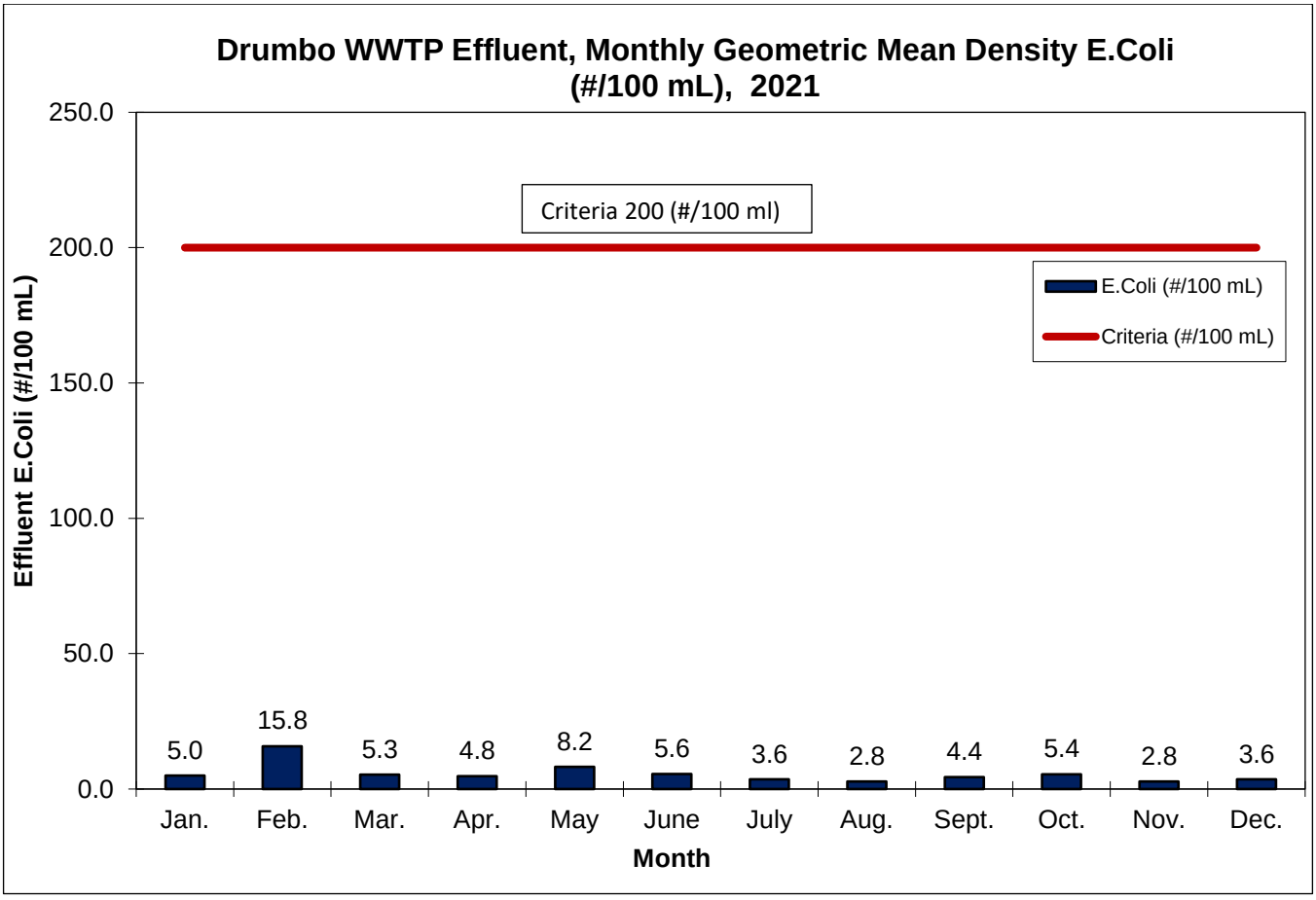
Nov.
Dec.
Month


Drumbo WWTP Effluent, Monthly Geometric Mean Density E.Coli (#/100 mL), 2021
Criteria 200 (#/100 ml)
E.Coli (#/100 mL)
Criteria (#/100 mL)
Effluent E.Coli (#/100 mL)
250.0
200.0
150.0
100.0
50.0
0.0
5.0
15.8
5.3
4.8
8.2
5.6
3.6
2.8
4.4
5.4
2.8
3.6
Jan.
Feb.
Mar.
Apr.
May
June
July
Aug.
Sept.
Oct.
Nov.
Dec.
Month

2021 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, 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 www.oxfordcounty.ca/Services-for-You/Water-Wastewater/Wastewater/Annual-reports 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 publicworks@oxfordcounty.ca.

Wastewater Treatment Plant:	Ingersoll WWTP
Wastewater Treatment Plant Number:	110000356
Environmental Compliance Approval (ECA)	1614-A28P9L (September 16, 2015)
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: publicworks@oxfordcounty.ca
Reporting Period:	January 1, 2021 – December 31, 2021

1.1. System Description

The Ingersoll WWTP is a Class IV rated treatment facility, as defined by Ontario Regulation (O.Reg.) 129/04, that provided 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, 86.4 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.

A standby generator is available to run the onsite Ingersoll Main 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 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
2021 Average Daily Flow	8,481 m^3/d
2021 Maximum Daily Flow	18,479 m^3/d
2021 Total Volume of Wastewater	3,099,652 m^3/year
2021 Total Received Hauled Waste	23,929 m^3/year (19,629 m^3/year leachate)

1.2. Major Expenses

In 2021, the Ingersoll WWTP had forecasted operating and maintenance expenditures of approximately $2,555,000.

In addition to regular operational and maintenance expenditures, Capital Improvement Projects for Ingersoll totaled $1,036,000 for improvements to the wastewater collection system and the Ingersoll WWTP.

Capital Improvement Projects included:

- $200,000 for Town of Ingersoll Sewer Relining
- $628,000 for Town of Ingersoll Sewer Projects
- $80,000 for Ingersoll Fats, Oil, and Grease Co-Digestion Study
- $68,000 for general operating equipment

Capital Improvement Projects for all systems included:

- $720,000 to develop Countywide SCADA Master Plan for all water/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 2021 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 2021.

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	149	1,259
Total Suspended Solids (TSS)	196	1,661
Total Phosphorus (TP)	3.2	27
Total Kjeldahl Nitrogen	24	205

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	15	2.0 – 4.3	97.1 – 98.7
Total Suspended Solids (TSS)	weekly	15	5.3 – 12.0	93.9 – 97.3
Total Phosphorus (TP)	weekly	0.6	0.16 – 0.31	90.3 – 95.0
Total Ammonia Nitrogen (TAN) (May 1 to November 30)	weekly	2.0	0.1 – 0.3	N/A
Total Ammonia Nitrogen (TAN) (Dec. 1 to April 30)	weekly	6.0	0.1 – 0.7	N/A
pH any single sample	weekly	6.0 - 9.5	6.44 – 8.01	N/A
E. coli	weekly	200 organisms/100 mL (Monthly Geometric Mean Density)	2.6 – 27.4 organisms/100 mL (Monthly Geometric Mean Density)	N/A

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 effluent objective failures in 2021. The effluent total suspended solids increased as a result of broken sludge collector chain in a secondary clarifier. After the repair was completed, the effluent total suspended solids concentration decreased.

- The monthly average effluent concentration objective of 10 mg/L for effluent total suspended solids was exceeded during the month of May (result of 12 mg/L).

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 – 4.3
Total Suspended Solids (TSS)	weekly	10	5.3 – 12.0
Total Phosphorus (TP)	weekly	0.40	0.16 – 0.31
Total Ammonia Nitrogen (TAN) (May 1 to November 30)	weekly	1.5	0.1 – 0.3
Total Ammonia Nitrogen (TAN) (Dec. 1 to April 30)	weekly	4.0	0.1 – 0.7
pH any single sample	weekly	6.5 - 9.0 pH	6.44 – 8.01
E. coli	weekly	100 organisms/100 mL (Monthly Geometric Mean Density)	2.6 – 27.4 organisms/100 mL (Monthly Geometric Mean Density)

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

Month	**Parameter**	**Objective mg/L**	**Result mg/L**
May 2021	TSS	10	12

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

Date	**Parameter**	**Objective mg/L**	**Result mg/L**
March 2, 2021	TSS	10	14
March 2, 2021	TP	0.4	0.41
April 14, 2021	E. coli	100 EC/100 mL	240
May 18, 2021	pH	6.5 – 9 pH	6.44
May 19, 2021	TSS	10	23
May 26, 2021	TSS	10	12

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

An overflow occurred on June 28, 2021 at the Ingersoll WWTP. The cause was a large rainfall that occurred in a very short duration which rapidly increased the volume of water in the wastewater collection system. This caused approximately 98 m^3 of wastewater to exit the collection system through the overflow pipe just prior to the headworks of the Ingersoll WWTP. Operations ran all lift station pumps manually at maximum speed in attempts to reduce the bypass volume. The event was reported to the MECP at the time it occurred.

There were no other overflows, bypassing, upsets, spills, or abnormal conditions in 2021.

There were no complaints in 2021.

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 2021 for two projects:

1. An inline grinder was added to the anaerobic digester sludge recirculation pipeline, to reduce pump fouling and ensure adequate mixing for biosolids stabilization.
2. A co-digestion pilot study commenced in 2021, to investigate the potential for full-scale implementation.

5. MONTIORING EQUIPMENT MAINTENANCE AND CALIBRATION

The calibration of flow meters is conducted annually by Indus-Controls Inc. 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 2021. The MECP inspections typically occur on a 3-year schedule.

FOG Co-Digestion Study

A pilot study was initiated at the Ingersoll WWTP in the fall of 2021, the purpose of which is 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 project is to be completed in 2022, and will determine if this concept would be viable for full scale implementation.

Capital Improvement Projects and Energy Optimization

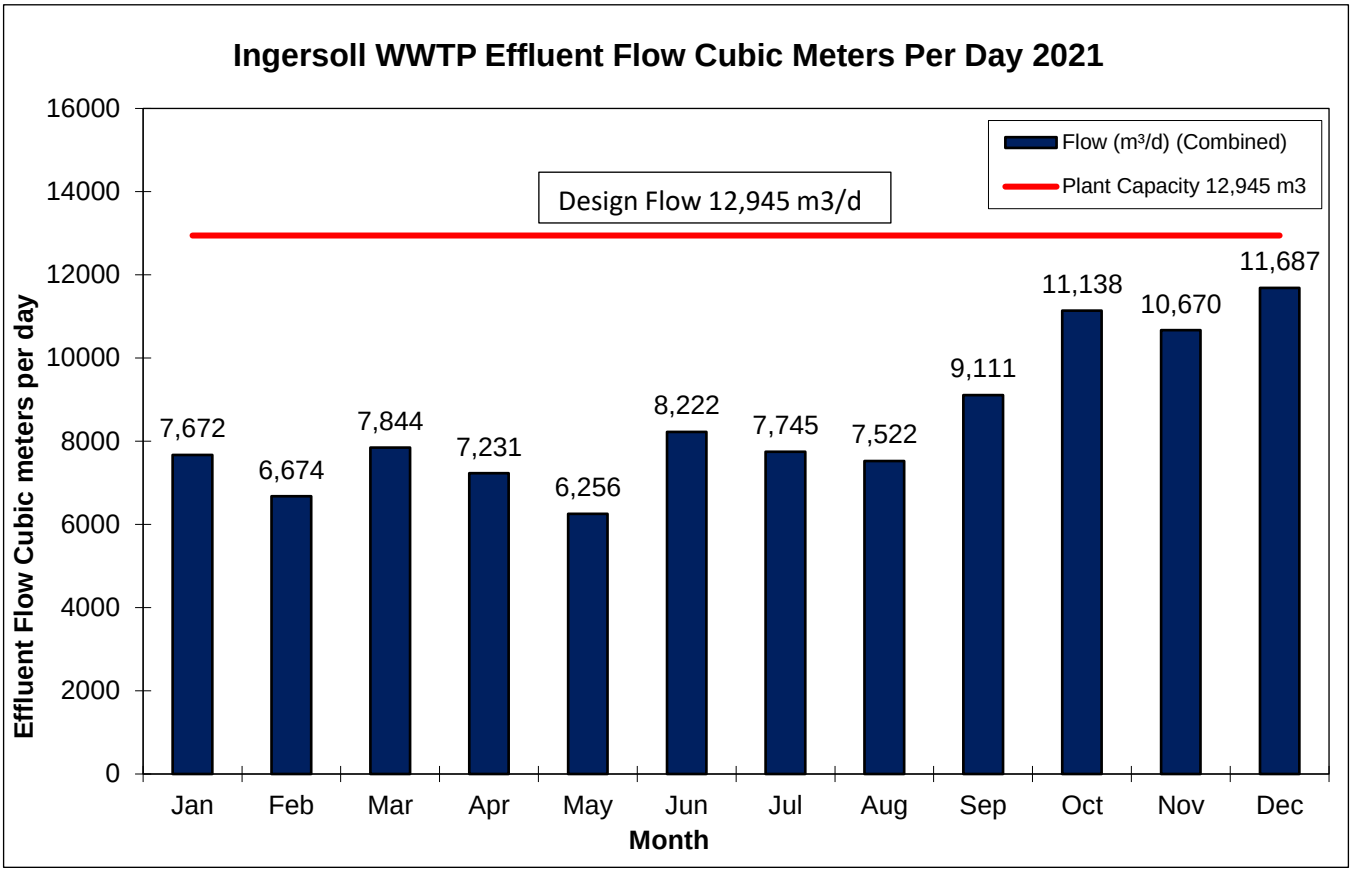
Various Capital Improvement Projects were completed at the Ingersoll WWTP in 2021, which will result in significant energy and cost savings.

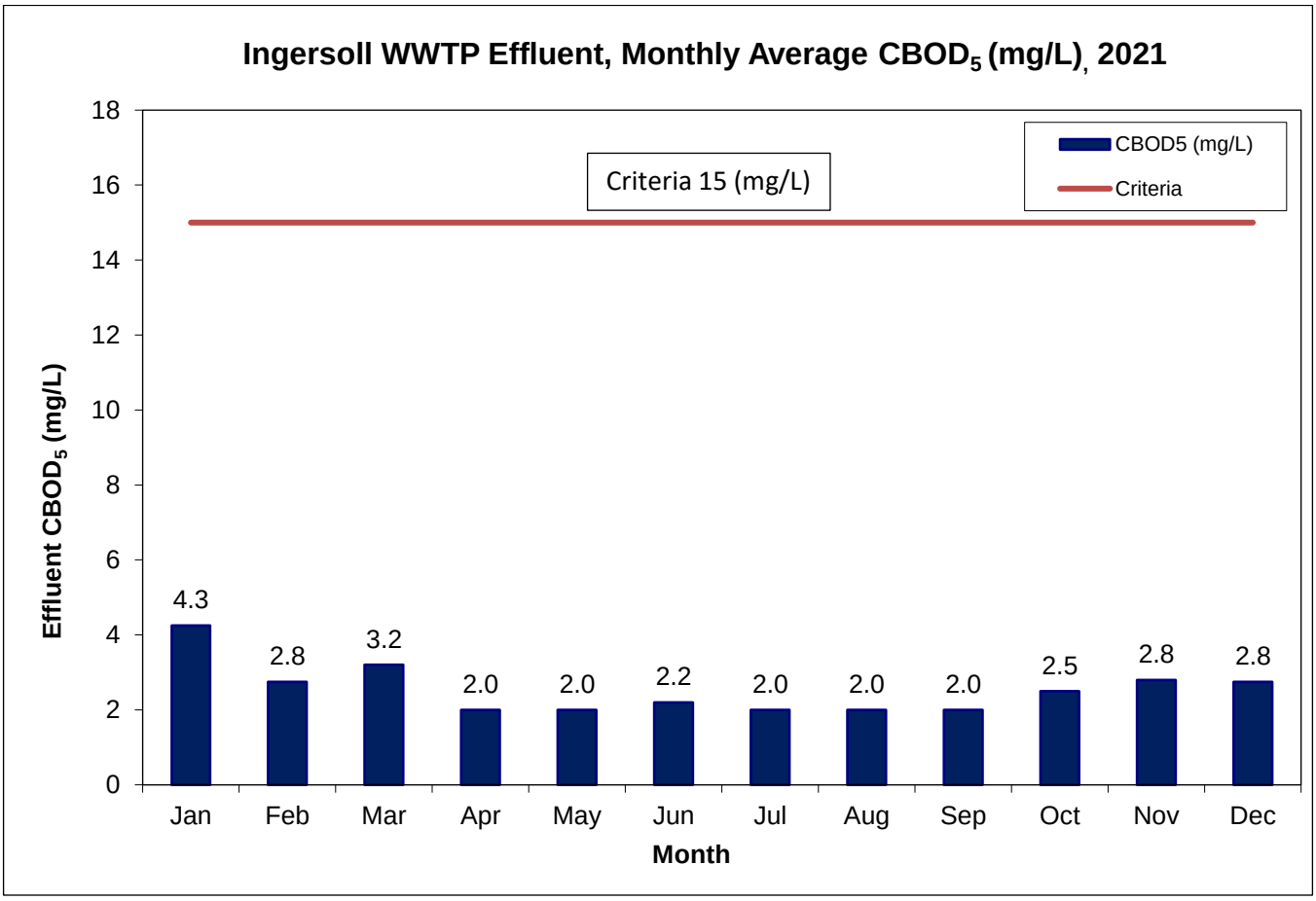
Equipment Replacement - The replacement of older equipment with more efficient units will realize an annual electrical avoidance of 55,714 kWh (equivalent greenhouse gas emission reduction of approximately 2.2 Tonne CO_2e per year). The 2021 upgrades will avoid an additional $8,914 in yearly energy costs.

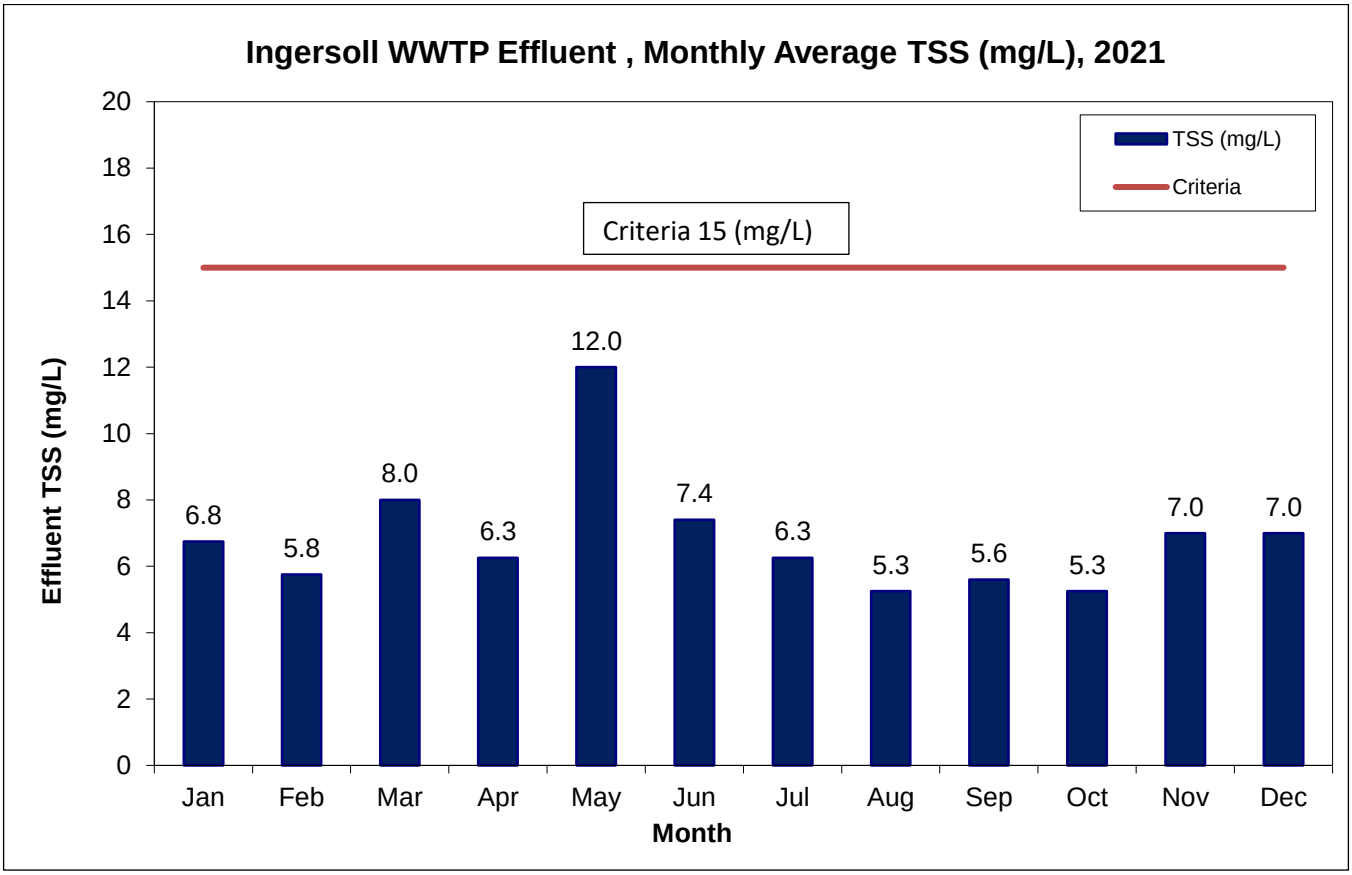
Future Potential Revenue from Biogas – The current average biogas production without FOG is approximately 500 m^3/d, which based on the current trends shown by the FOG co-digestion is projected to increase by 80% at the maximum FOG loading to the digester. 80% increase from the current production translates into additional 400 m^3/d with a heat value of approximately 11 GJ/day, which based on the current rate of $21/GJ, would convert to $231/d of revenue if fed into the RNG grid directly, or $200/d after accounting the cost of gas cleaning by the RNG companies. This translates into an annual revenue of $73,000 based on biogas, which is likely to increase further as the currently flared biogas will be injected to the grid as well.

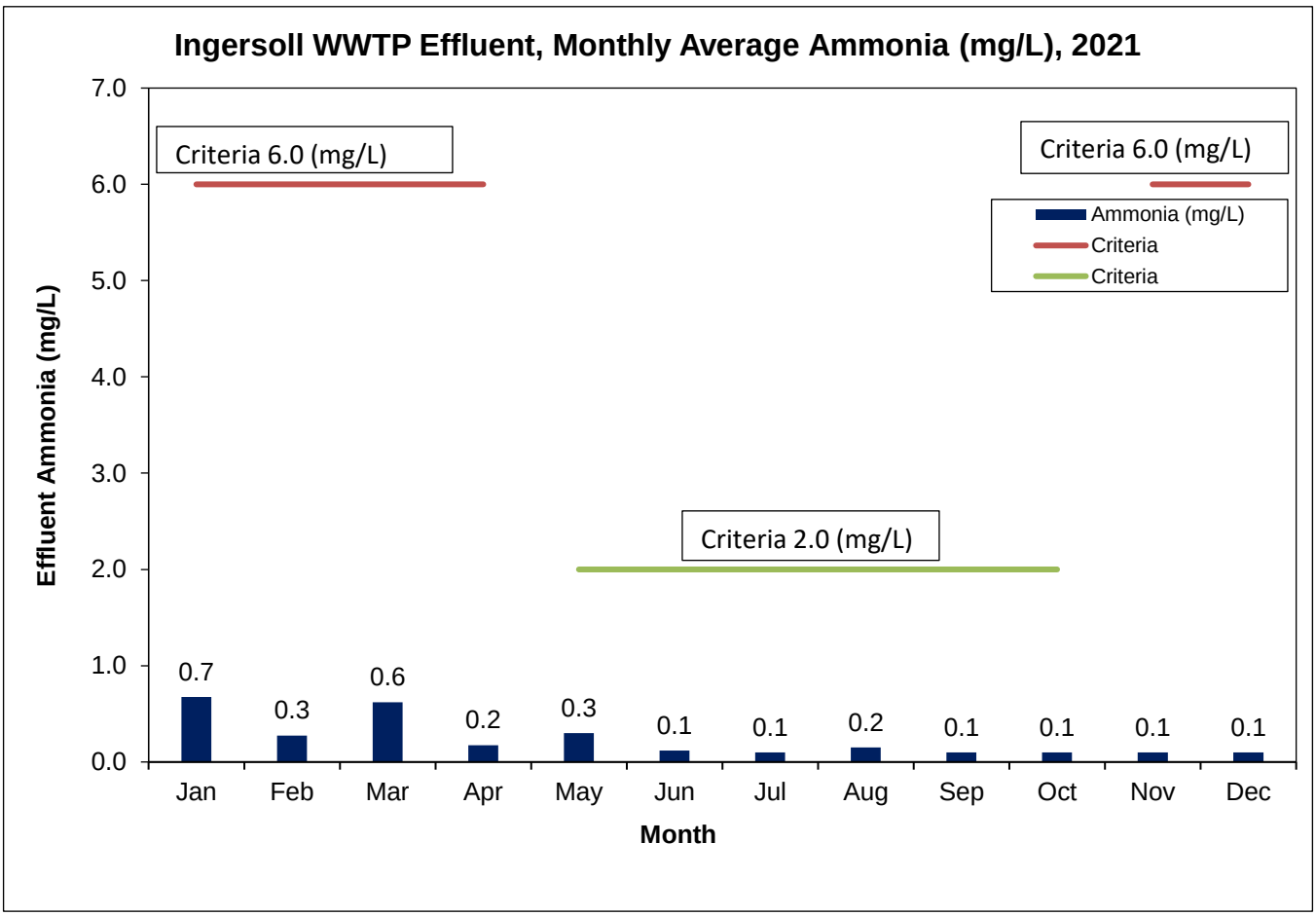
Future Potential GHG Emission Reduction – Approximately 25% of the current methane production being flared at the plant. This flaring generates approximately 84 tons per annum, which will be saved via injection of this extra biogas to the grid. In addition, with an anticipated reduction of 10% in the biosolids due to increased solids destruction in the digester, an equal amount to the above is expected to be saved due to reduced hauling of biosolids to the Biosolids Centralized Storage Facility in Salford. As such implementation of FOG co-digestion is projected to lower the carbon emissions by 168- tons-CO_2/annum.

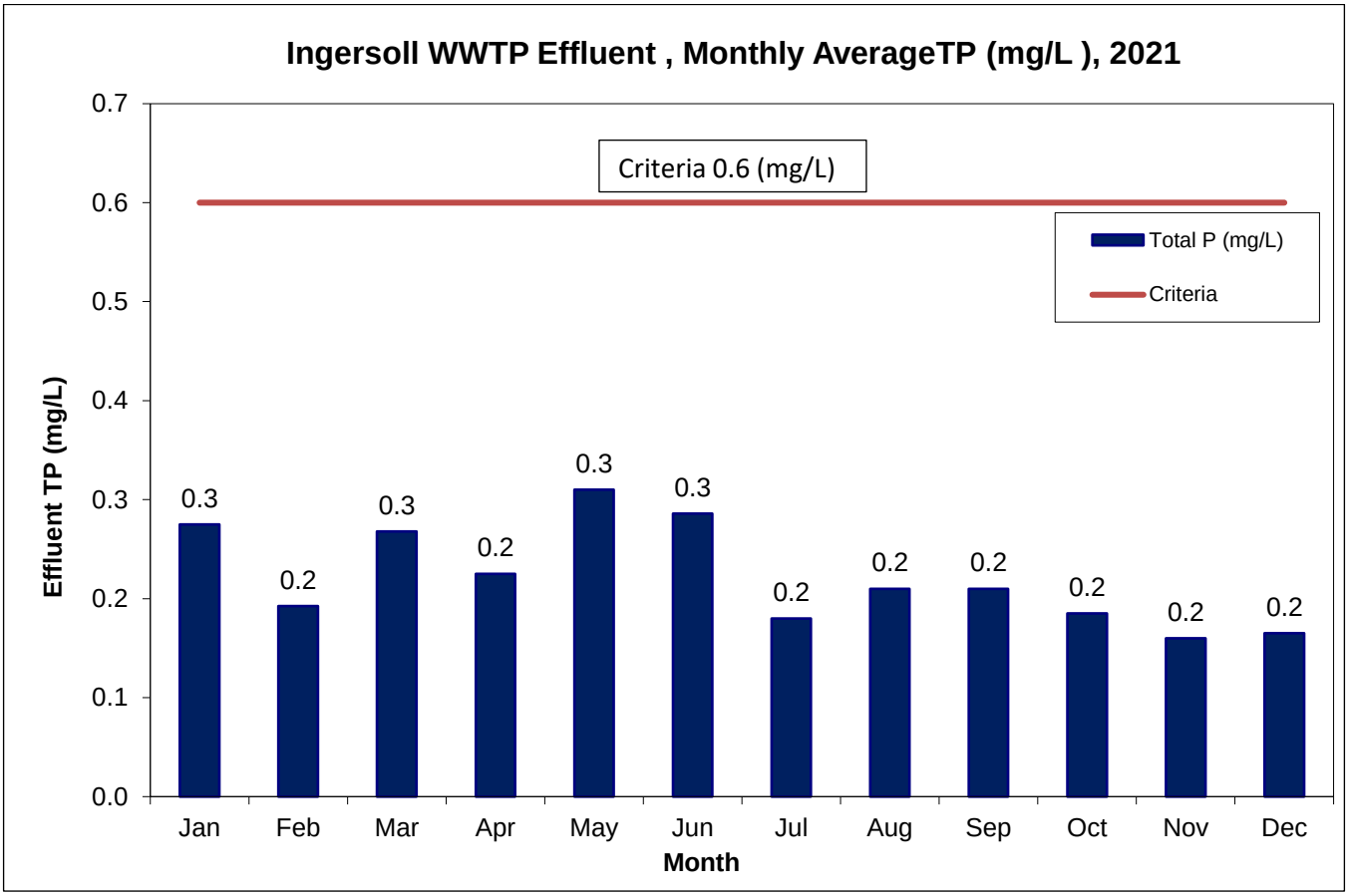
APPENDIX A: GRAPHS OF 2021 DISCHARGE PARAMETERS VS. EFFLUENT DISCHARGE LIMITS






Ingersoll WWTP Effluent , Monthly Average TSS (mg/L), 2021
Effluent TSS (mg/L)
Month
TSS (mg/L)
Criteria
Criteria 15 (mg/L)
Jan 6.8
Feb 5.8
Mar 8.0
Apr 6.3
May 12.0
Jun 7.4
Jul 6.3
Aug 5.3
Sep 5.6
Oct 5.3
Nov 7.0
Dec 7.0


Ingersoll WWTP Effluent, Monthly Average Ammonia (mg/L), 2021
Effluent Ammonia (mg/L)
Month
Criteria 6.0 (mg/L)
Criteria 6.0 (mg/L)
Criteria 2.0 (mg/L)
Ammonia (mg/L)
Criteria
Criteria
Jan 0.7
Feb 0.3
Mar 0.6
Apr 0.2
May 0.3
Jun 0.1
Jul 0.1
Aug 0.2
Sep 0.1
Oct 0.1
Nov 0.1
Dec 0.1


Ingersoll WWTP Effluent , Monthly AverageTP (mg/L), 2021
Criteria 0.6 (mg/L)
Total P (mg/L)
Criteria
Effluent TP (mg/L)
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
0.3
0.2
0.3
0.2
0.3
0.3
0.2
0.2
0.2
0.2
0.2
Jan
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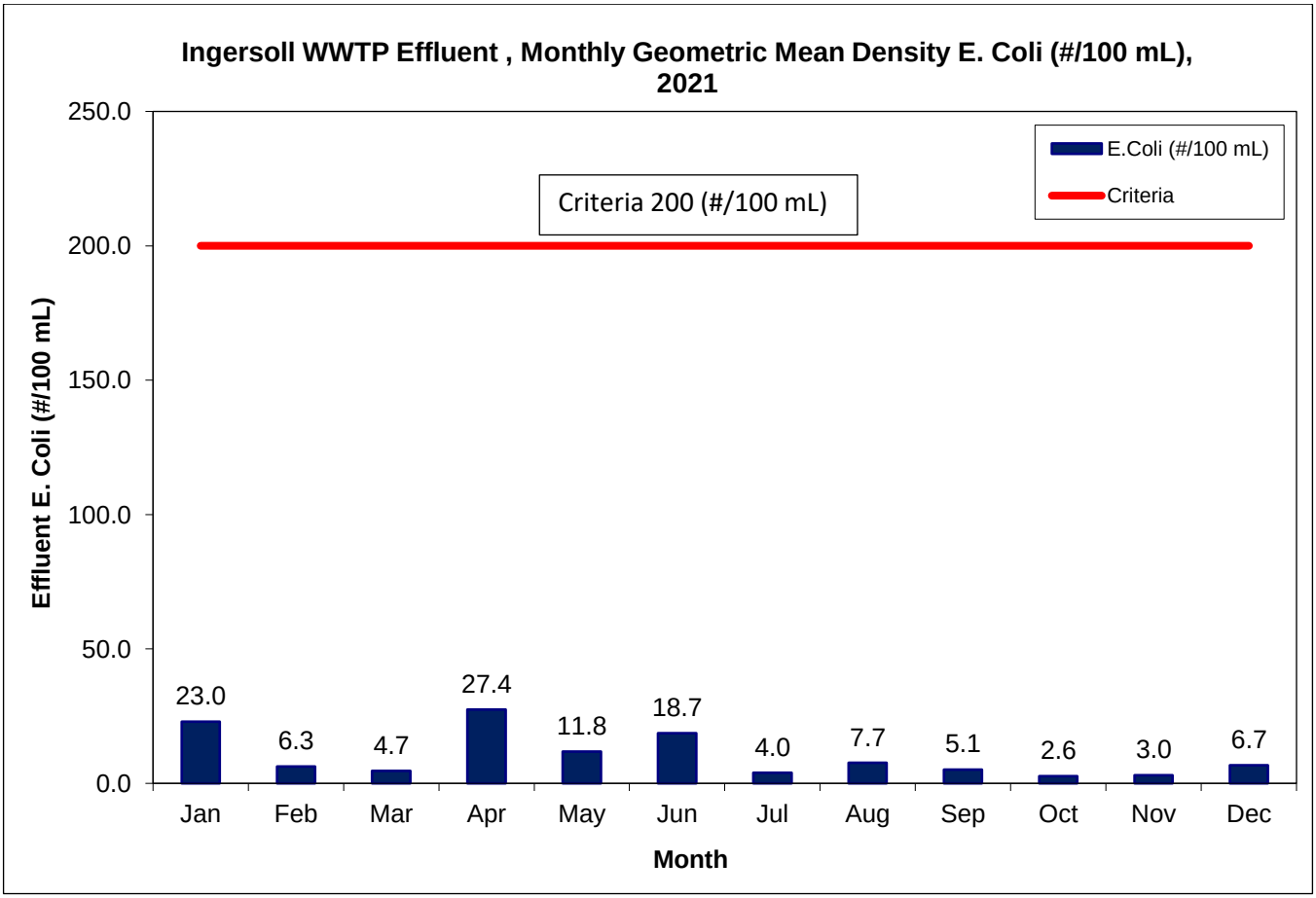

Ingersoll WWTP Effluent , Monthly Geometric Mean Density E. Coli (#/100 mL), 2021
Criteria 200 (#/100 mL)
E.Coli (#/100 mL)
Criteria
Effluent E. Coli (#/100 mL)
250.0
200.0
150.0
100.0
50.0
0.0
23.0
6.3
4.7
27.4
11.8
18.7
4.0
7.7
5.1
2.6
3.0
6.7
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Month

2021 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, 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 www.oxfordcounty.ca/Services-for-You/Water-Wastewater/Wastewater/Annual-reports 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 publicworks@oxfordcounty.ca.

Wastewater Treatment Plant:	Mount Elgin WWTP
Wastewater Treatment Plant Number:	20002870
Environmental Compliance Approval (ECA)	0611-6Q3JQL (May 25, 2006)
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: publicworks@oxfordcounty.ca
Reporting Period:	January 1, 2021 – December 31, 2021

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
2021 Average Daily Flow	81 m^3/d
2021 Maximum Daily Flow	222 m^3/d
2021 Total Volume of Wastewater	29,756 m^3/year

1.2. Major Expenses

In 2021, the Mount Elgin WWTP had forecasted operating and maintenance expenditures of approximately $223,000.

In addition to regular operational and maintenance expenditures, Capital Improvement Projects for Mount Elgin were forecasted at $167,000 for improvements to the wastewater collection system and the Mount Elgin WWTP.

Capital Improvement Projects included:

- $50,000 for servicing projects
  $10,000 for general operating equipment

Capital Improvement Projects for all systems included:

- $720,000 to develop Countywide SCADA Master Plan for all water/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 nitrites, nitrates, 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 2021, 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.

Influent Wastewater Characteristics		
Parameter	**Concentration mg/L**	**Loading kg/d**
$CBOD_5$	136	11.0
Total Suspended Solids	51	4.1
Total Phosphorus	7.3	0.6
Total Kjeldahl Nitrogen	75	6.1

Groundwater Monitoring Well Results:

	2021					
	Well 1	**Well 2**	**Well 3**	**Well 1**	**Well 2**	**Well 3**
Parameter	**March 10/21**	**March 10/21**	**March 10/21**	**April 27/21**	**April 27/21**	**April 27/21**
Well Level (meters)	3.28	3.37	3.52	3.05	3.09	3.24
Nitrite (mg/L N)	< 0.03	0.29	0.05	< 0.03	0.11	0.05
Nitrate (mg/L N)	< 0.06	12.6	11.1	< 0.06	8.02	15.7
Nitrate+Nitrite (mg/L N)	< 0.06	12.9	11.2	< 0.06	8.13	15.8
pH	7.13	7.15	7.38	7.16	7.20	7.51
	Well 1	**Well 2**	**Well 3**	**Well 1**	**Well 2**	**Well 3**
Parameter	**July 8/21**	**July 8/21**	**July 8/21**	**Oct 21/21**	**Oct 21/21**	**Oct 21/21**
Well Level (meters)	3.28	3.37	3.52	3.19	3.26	3.33
Nitrite (mg/L N)	< 0.03	0.41	0.09	< 0.03	< 0.03	0.08
Nitrate (mg/L N)	< 0.06	14.7	16.5	< 0.06	3.75	15.0
Nitrate+Nitrite (mg/L N)	< 0.06	15.1	16.6	< 0.06	3.75	15.1
pH	7.45	7.17	7.59	7.37	7.32	7.61
Well depths	3.66 m	3.96 m	3.96 m			

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.

2.3. 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 2021.

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	3.0 – 3.5
Suspended Solids	quarterly	10	3.5 – 6.0

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

There were no overflows, bypassing, upsets, spills, or abnormal conditions for 2021.

There were no complaints in 2021.

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

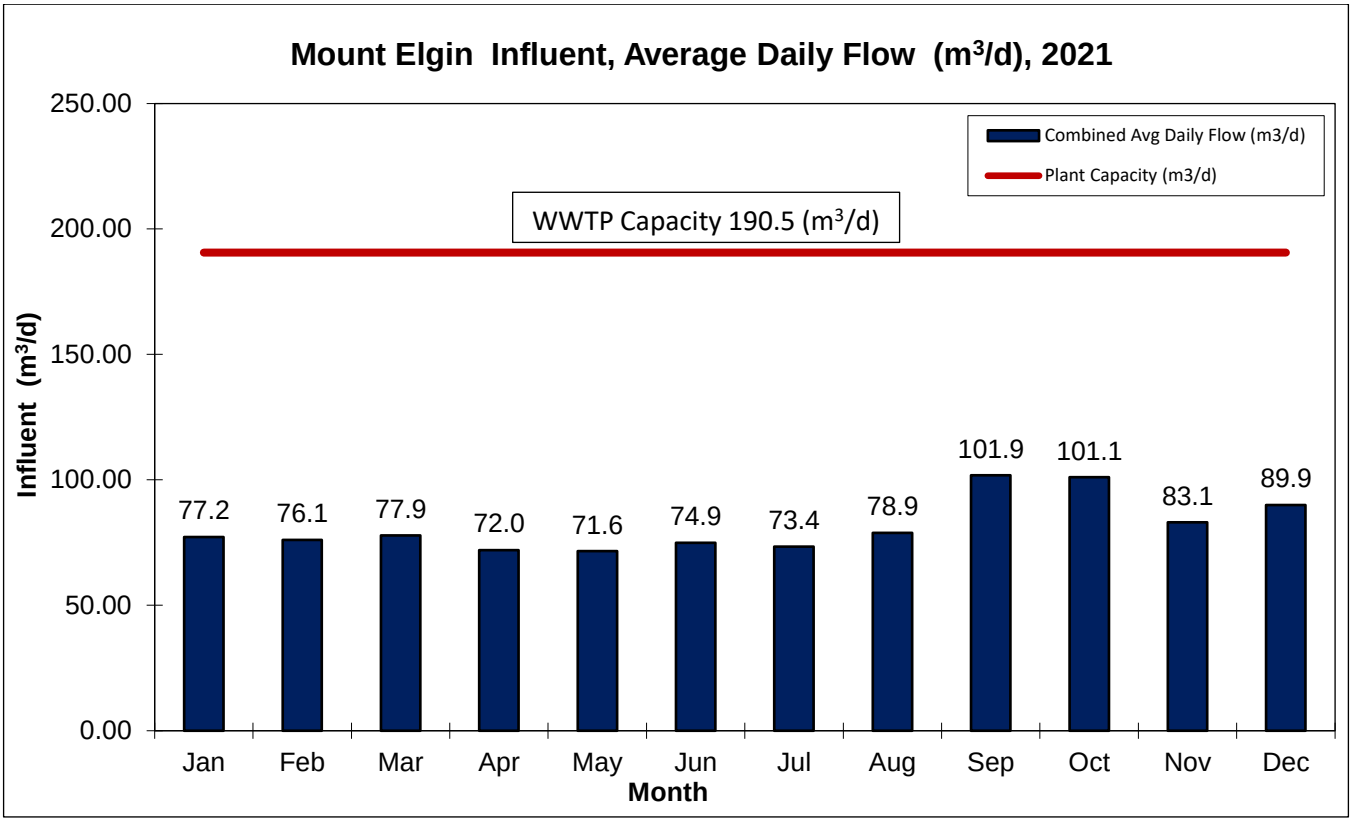
The calibration of flow meters was conducted by Indus-Controls Inc. in accordance with the requirements of the Mount Elgin WWTP ECA. The records are kept on-site at the Mount Elgin WWTP.

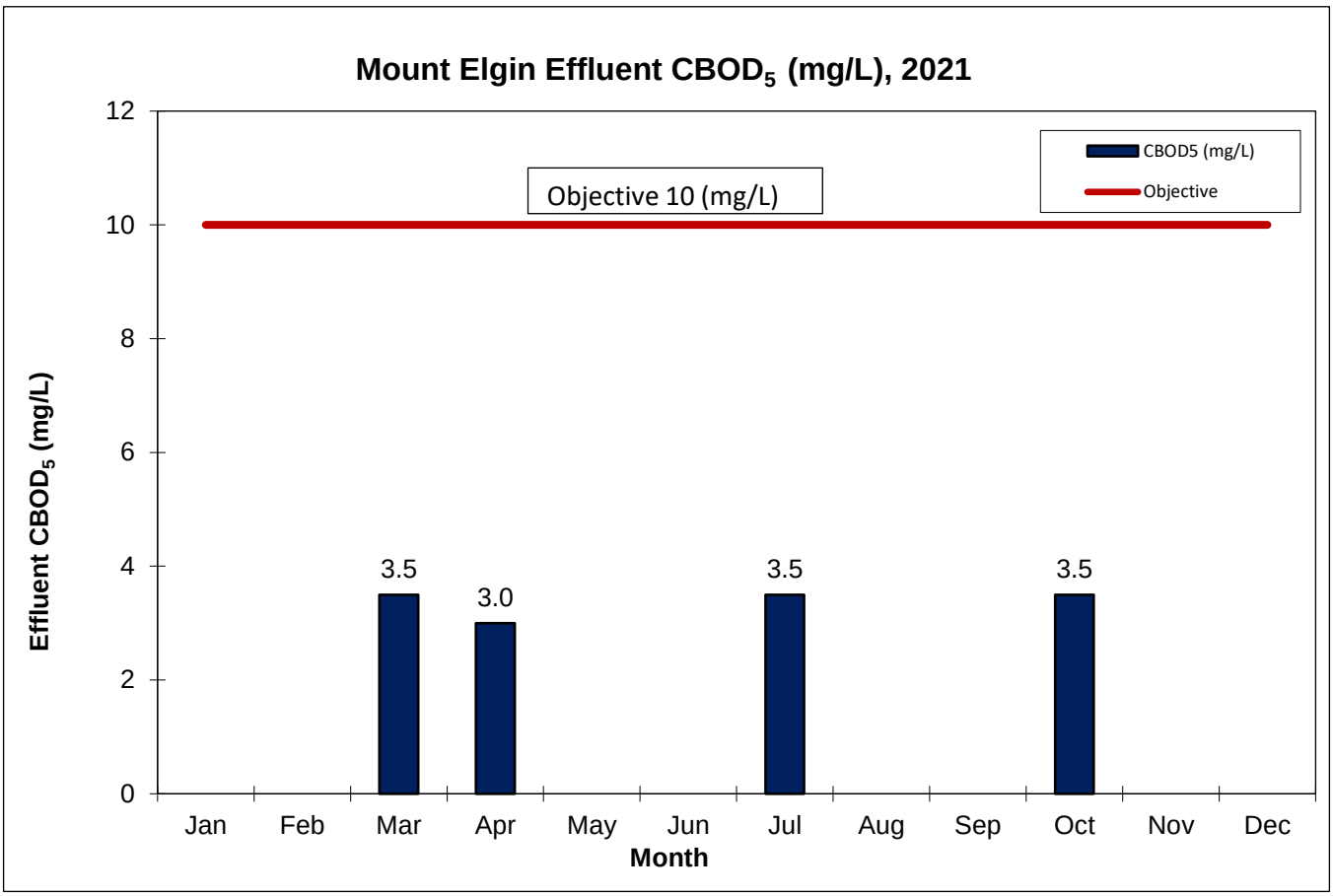
All other operational monitoring equipment was calibrated by staff and records are kept on-site at the Mount Elgin WWTP.

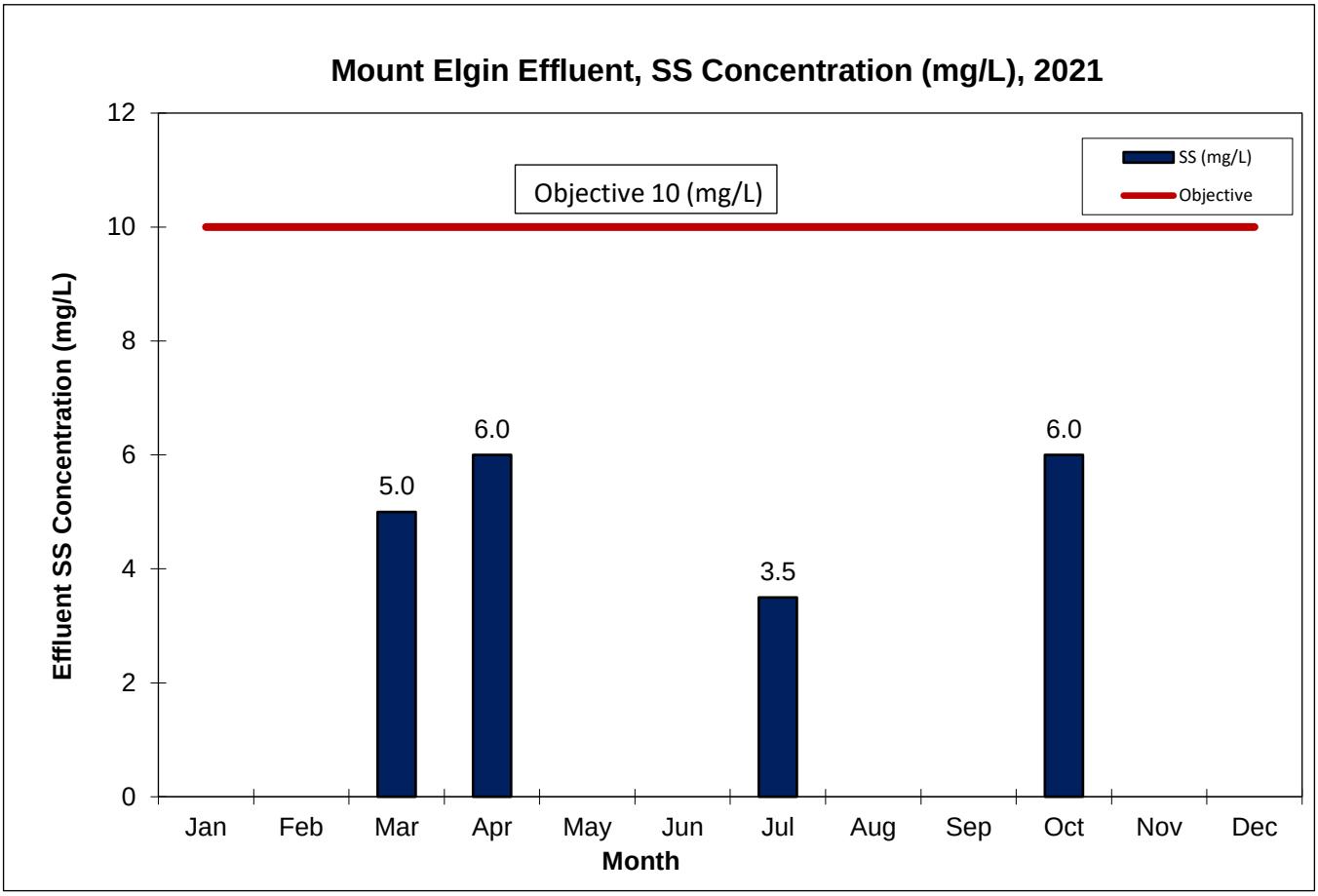
6. INSPECTION, PILOTS, AND TRIALS

The MECP did not conduct an inspection of the Mount Elgin WWTP in 2021. MECP inspection typically occur every three years.

APPENDIX A: GRAPHS OF 2021 DISCHARGE PARAMETERS VS. EFFLUENT DISCHARGE LIMITS






Mount Elgin Effluent, SS Concentration (mg/L), 2021
Effluent SS Concentration (mg/L)
12
10
8
6
4
2
0
Objective 10 (mg/L)
SS (mg/L)
Objective
5.0
6.0
3.5
6.0
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Month

2021 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 www.oxfordcounty.ca/Services-for-You/Water-Wastewater/Wastewater/Annual-reports 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 publicworks@oxfordcounty.ca.

Wastewater Treatment Plant:	Norwich WWTP
Wastewater Treatment Plant Number:	110001480
Environmental Compliance Approval (ECA)	1680-6F6QR5 (August 31, 2005)
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: publicworks@oxfordcounty.ca
Reporting Period:	January 1, 2021 – December 31, 2021

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 3 sewage pumping stations, 27.1 kilometers of sanitary gravity sewers, 4.3 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
2021 Average Daily Flow	1,145 m^3/d
2021 Maximum Daily Flow	3,767 m^3/d
2021 Total Volume of Wastewater	418,895 m^3/year

1.2. Major Expenses

In 2021, the Norwich WWTP had forecasted operating and maintenance expenditures of approximately $495,000.

In addition to regular operational and maintenance expenditures, Capital Improvement Projects for the Town of Norwich were forecasted at $209,000 which included improvements to the wastewater collection systems and the Norwich WWTP.

Capital Improvement Projects included:

- $115,000 Norwich WWTP Class EA Study
- $30,000 Sanitary sewer replacement
- $55,000 of general operating equipment

Capital Improvement Projects for all systems included:

- $720,000 to develop Countywide SCADA Master Plan for all water/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 and TSS are sampled at least monthly. TP, ammonia, TKN, 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 2021, and was 100% in compliance with all its regulatory limits for all effluent discharged from the WWTP.

Influent Streams and Effluent Streams

The operators 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 2021.

In 2021, 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 2021.

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	174	199
TSS	181	207
TP	3.7	4.2
TKN	30	34

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**
BOD_5	monthly	10	2.0 – 4.0	97.7 – 98.9
TSS	monthly	10	2.0 – 6.5	96.4 – 98.9
TP (non-freezing period)*	3/week	0.5	0.20 – 0.48	87.0 – 94.5
TP (freezing Period)*	3/week	1	0.14	96.2
Total Ammonia Nitrogen (non-freezing period)*	3/week	3	0.1 – 0.9	--
Total Ammonia Nitrogen (freezing period)*	3/week	5	0.22	--
E. coli	weekly	200 organisms/100 mL (monthly Geometric Mean Density)	16 – 124 organisms/100 mL (monthly Geometric Mean Density)	--
DO	weekly	4.0	5.3 – 11.4	--
pH any single sample	3/week	6.0 - 9.5	7.07 – 8.01	--
Total Ammonia Nitrogen any single sample (non-freezing period)*	3/week	5.0	0.1 – 2.1	--

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 any single sample (freezing period)*	3/week	8.0	0.1 – 0.6	--
Un-ionized Ammonia any single sample		0.2	0.001 – 0.011	--
* 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 2021, 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 2021, the monthly objectives that were not met at the Norwich WWTP were:

- The monthly average concentration objective failures related to TP of 0.3 mg/L for the months of April, May, June and October.
- The monthly average concentration objective related to TSS of 5 mg/L for the month of December
- The monthly average concentration objective related to TP loading of 0.7 kg/d for the month of May
- The monthly average concentration objective related to TSS loading of 11.8 kg/d for the month of December

Various operational processes were adjusted to try and meet effluent objectives. The aluminum sulphate dosage was increased several times during the year in response to higher TP effluent concentrations observed in the spring, resulting in a gradual decrease in effluent TP concentration. The discharging pond was isolated as a result of increasing TSS concentrations in December.

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	2.0 – 6.5
TP (non-freezing period) *	3/week	0.3	0.20 – 0.48
TP (freezing period)*	3/week	0.8	0.14
Total Ammonia Nitrogen (non-freezing period) *	3/week	2	0.1 – 0.9
Total Ammonia Nitrogen (freezing period)*	3/week	4	0.22
E. coli	weekly	150 organisms/100 mL (monthly Geometric Mean Density)	16 – 124 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 2021, 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 2021 included the following:

Date	Parameter	Objective mg/L	Result mg/L
April 2021	TP	0.3	0.36
May 2021	TP	0.3	0.48
May 2021	TP loading	0.7 kg/d	1.0 kg/d
June 2021	TP	0.3	0.40
Oct. 2021	TP	0.3	0.34
Dec. 2021	TSS	5	6.5
Dec. 2021	TSS loading	11.8 kg/d	18.1 kg/d

3. Overflows, Bypassing, Upsets, Spills, and Abnormal Conditions

There were no overflows, bypasses, or spills in 2021.

There were no complaints received in 2021.

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. Monitoring Equipment Maintenance and Calibration

The calibration of flow meters was conducted by Indus-Controls Inc. 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.

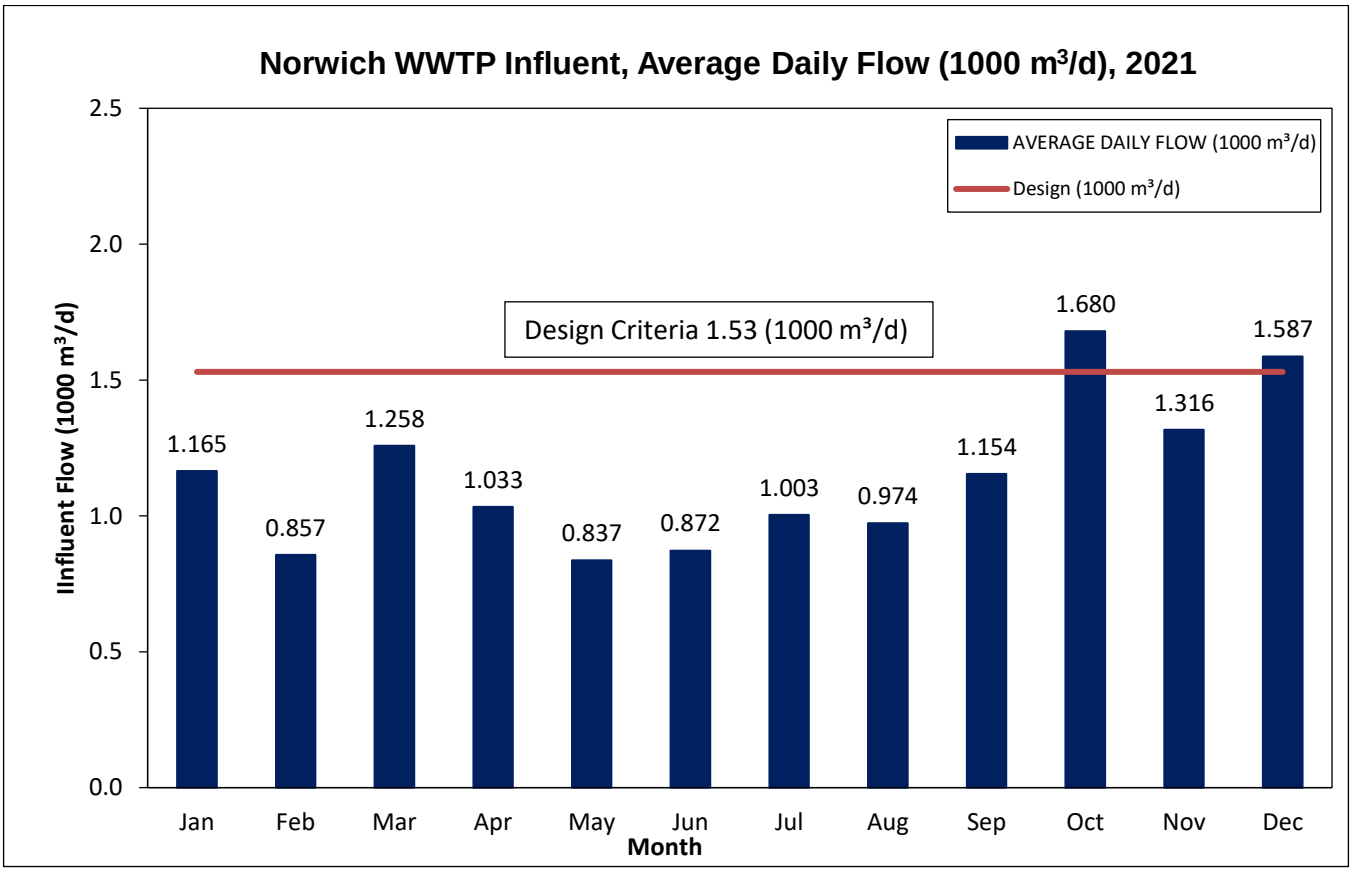
6. Audits, Pilots, and Trials

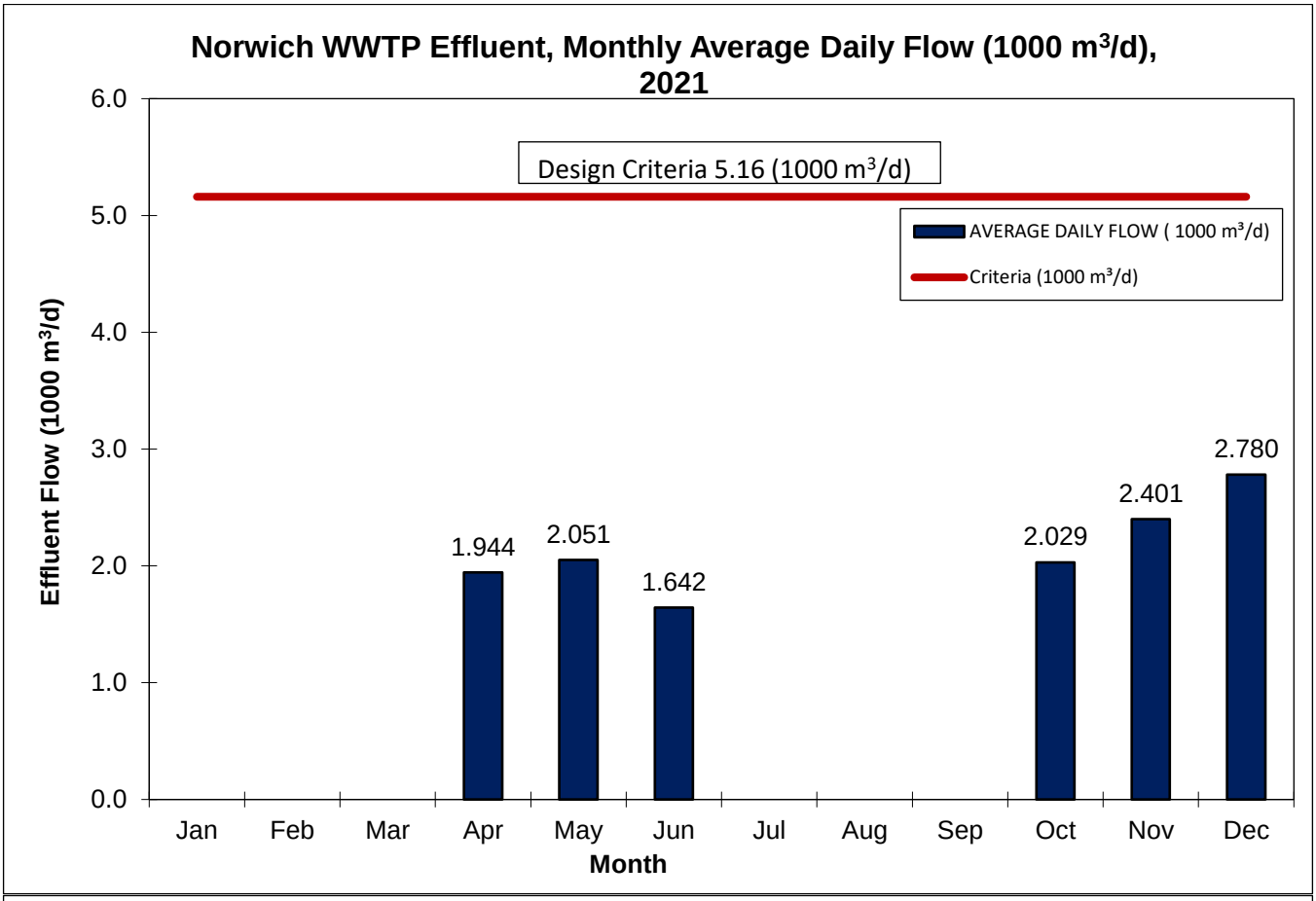
The MECP did not perform an inspection of the Norwich WWTP in 2021. The MECP inspections typically occur on a 3-year schedule.

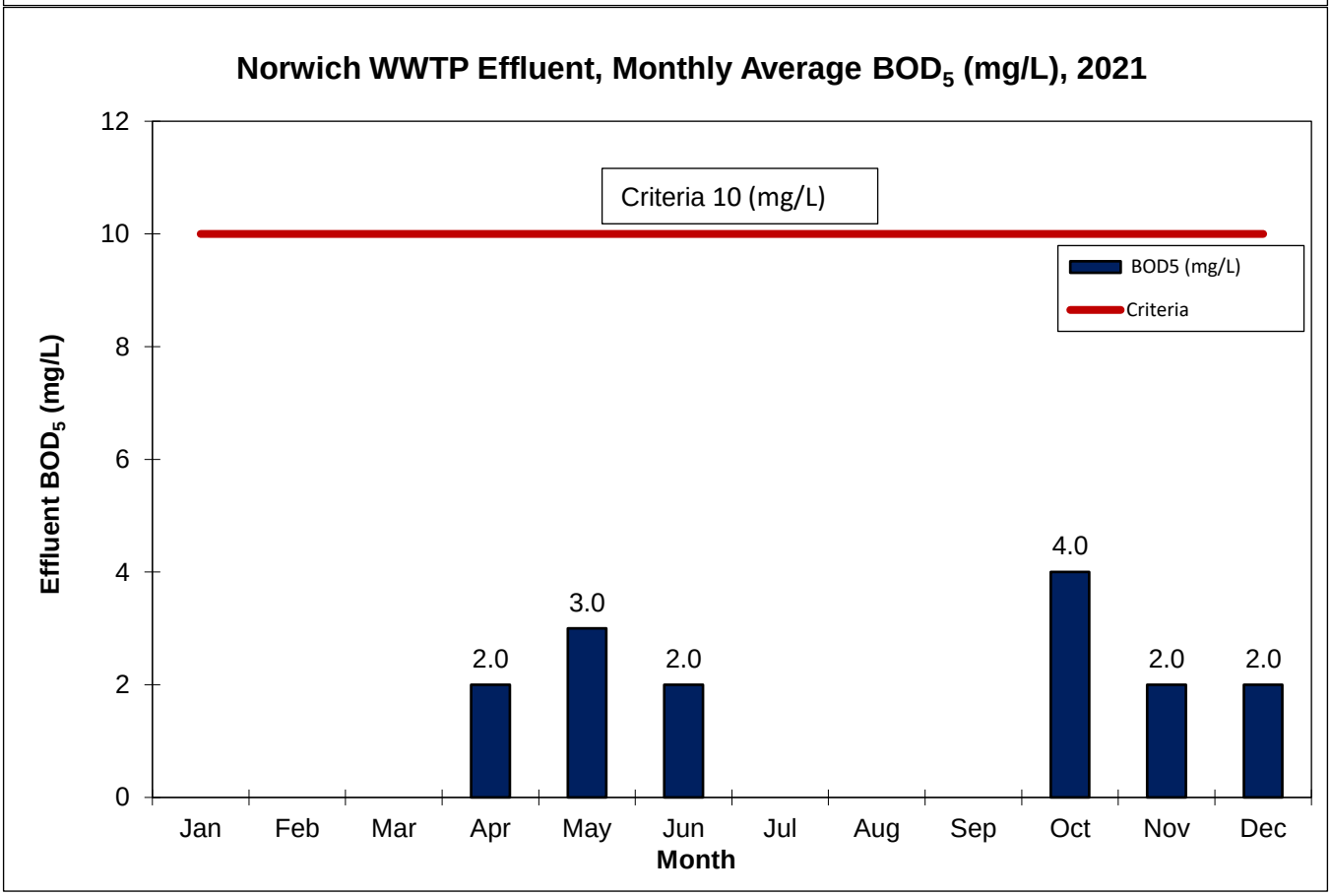
Municipal Class Environmental Assessment Study

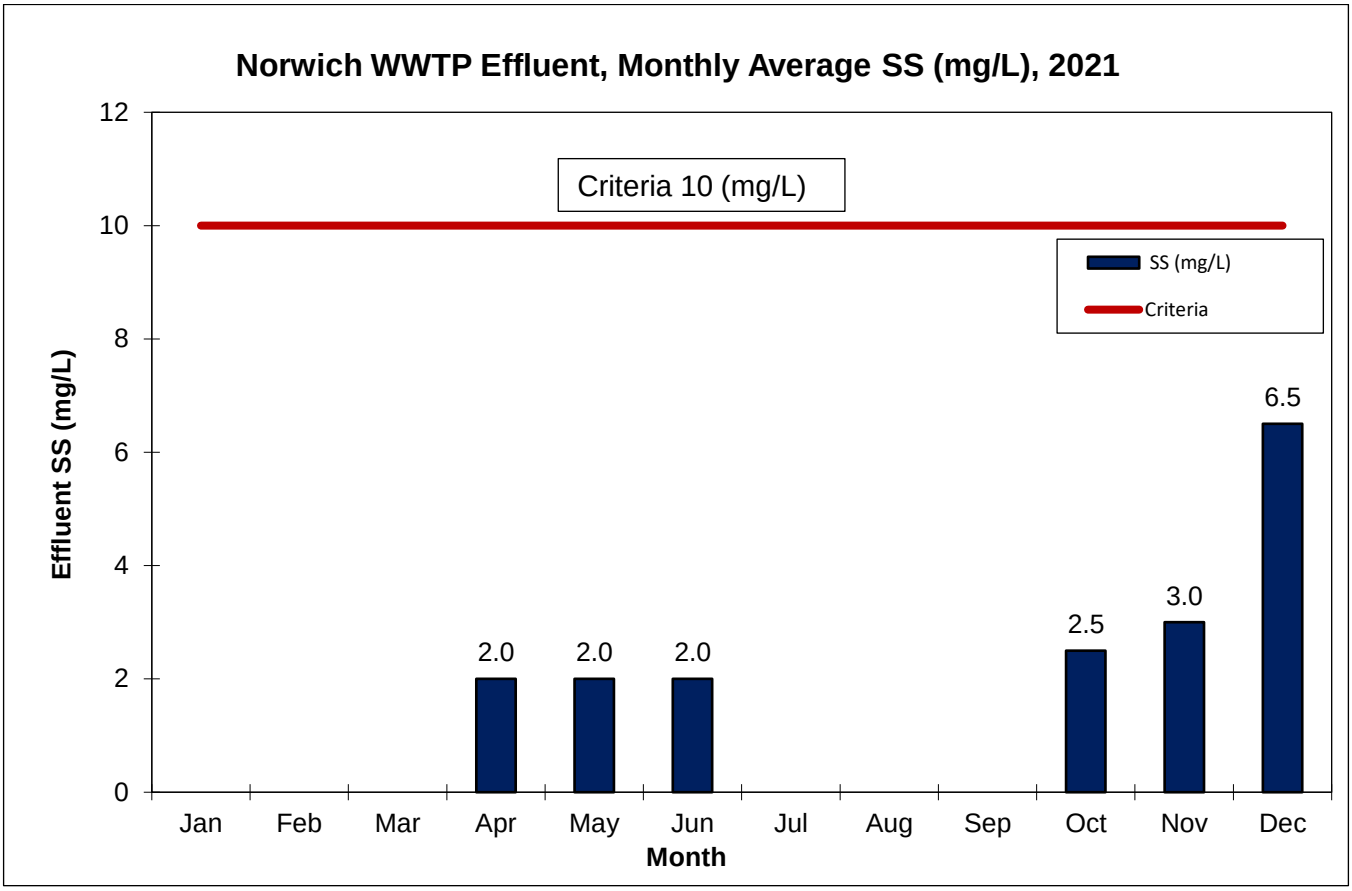
In response to approved future growth in the Township of Norwich, and associated projected increases in Norwich WWTP flow rates, the County has re-initiated the Class EA Study for capacity expansion of the Norwich WWTP. The study will determine the most cost-effective, environmentally sound, and sustainable 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.

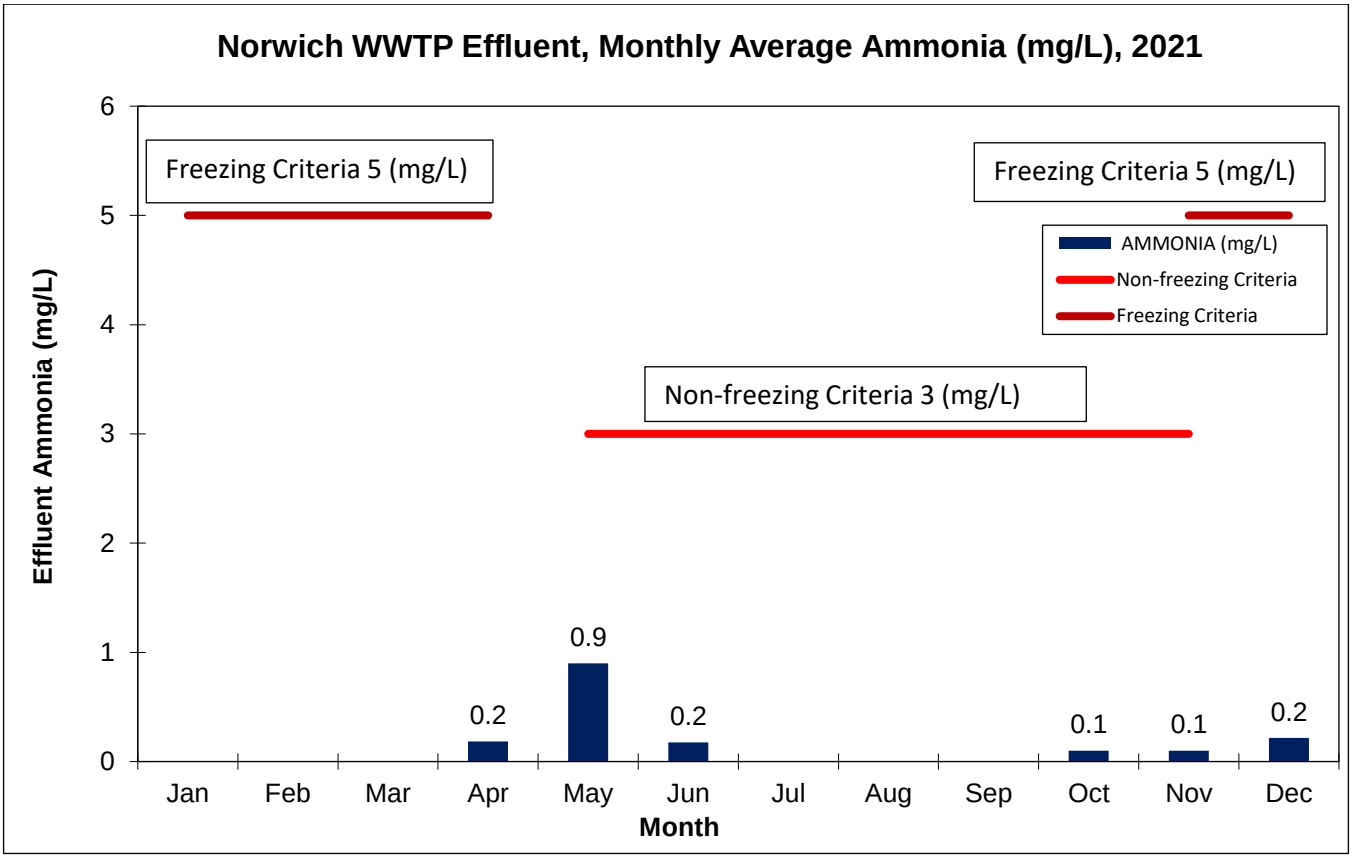
APPENDIX A: GRAPHS OF 2021 DISCHARGE PARAMETERS VS. EFFLUENT DISCHARGE LIMITS

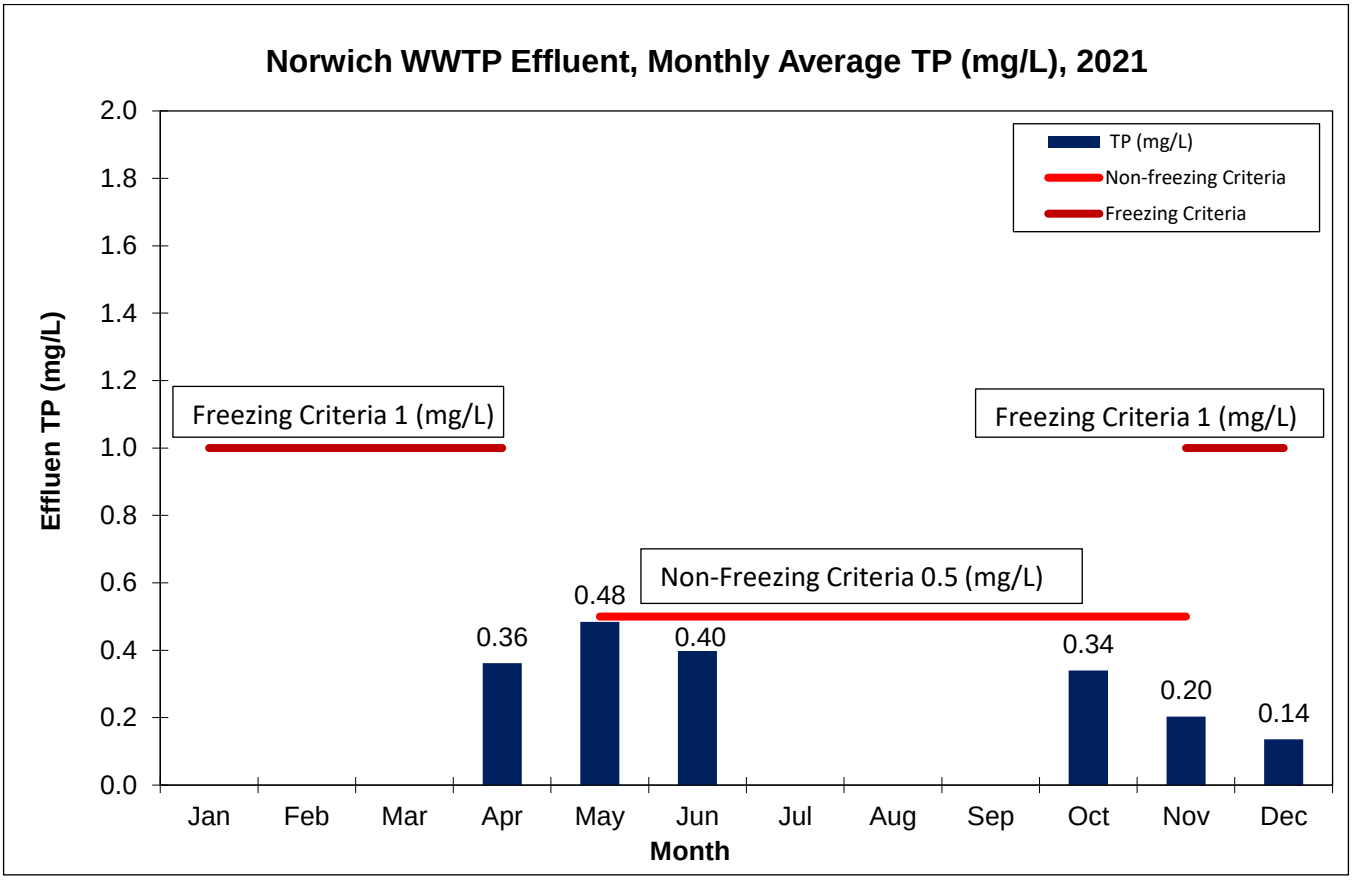


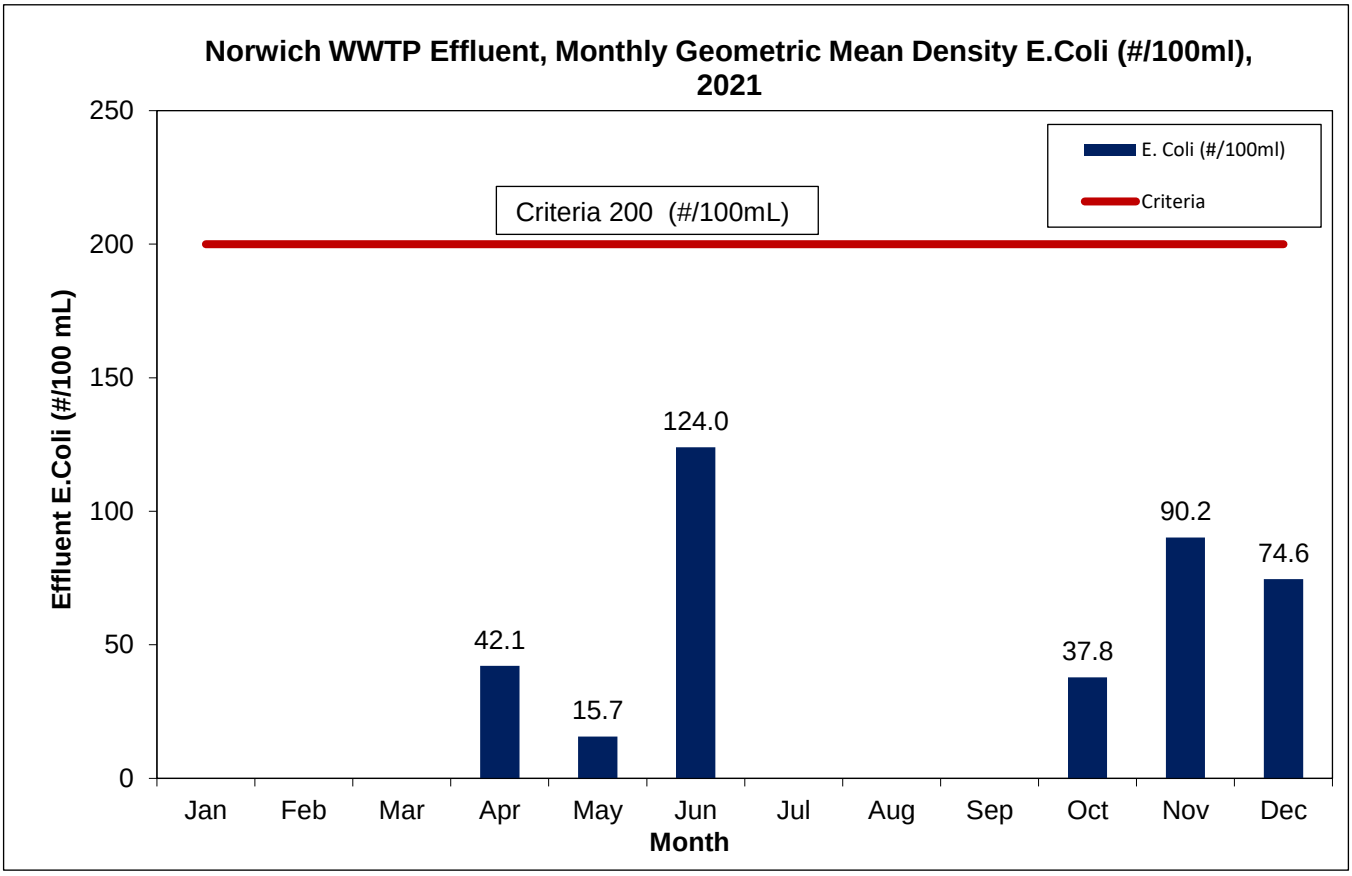

Norwich WWTP Effluent, Monthly Average Daily Flow (1000 m³/d), 2021
Design Criteria 5.16 (1000 m³/d)
AVERAGE DAILY FLOW (1000 m³/d)
Criteria (1000 m³/d)
Effluent Flow (1000 m³/d)
6.0
5.0
4.0
3.0
2.0
1.0
0.0
1.944
2.051
1.642
2.029
2.401
2.780
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Month


Norwich WWTP Effluent, Monthly Average BOD5 (mg/L), 2021
Criteria 10 (mg/L)
BOD5 (mg/L)
Criteria
Effluent BOD5 (mg/L)
12
10
8
6
4
2
0
2.0
3.0
2.0
4.0
2.0
2.0
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Month


Norwich WWTP Effluent, Monthly Average SS (mg/L), 2021
Effluent SS (mg/L)
Month
Criteria 10 (mg/L)
SS (mg/L)
Criteria
2.0
2.0
2.0
2.5
3.0
6.5
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec


Norwich WWTP Effluent, Monthly Average Ammonia (mg/L), 2021
Effluent Ammonia (mg/L)
Month
Freezing Criteria 5 (mg/L)
Freezing Criteria 5 (mg/L)
AMMONIA (mg/L)
Non-freezing Criteria
Freezing Criteria
Non-freezing Criteria 3 (mg/L)
0.2
0.9
0.2
0.1
0.1
0.2
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec


Norwich WWTP Effluent, Monthly Average TP (mg/L), 2021
Effluen TP (mg/L)
2.0
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
TP (mg/L)
Non-freezing Criteria
Freezing Criteria
Freezing Criteria 1 (mg/L)
Freezing Criteria 1 (mg/L)
Non-Freezing Criteria 0.5 (mg/L)
0.36
0.48
0.40
0.34
0.20
0.14
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Month


Norwich WWTP Effluent, Monthly Geometric Mean Density E.Coli (#/100ml), 2021
Effluent E.Coli (#/100 mL)
250
200
150
100
50
0
E. Coli (#/100ml)
Criteria
Criteria 200 (#/100mL)
42.1
15.7
124.0
37.8
90.2
74.6
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Month

2021 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, 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 www.oxfordcounty.ca/Services-for-You/Water-Wastewater/Wastewater/Annual-reports 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 publicworks@oxfordcounty.ca.

Wastewater Treatment Plant:	Plattsville WWTP
Wastewater Treatment Plant Number:	110003022
Environmental Compliance Approval (ECA)	3133-7QWH4N (June 23, 2009)
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: publicworks@oxfordcounty.ca
Reporting Period:	January 1, 2021 – December 31, 2021

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
2021 Average Daily Flow	457 m^3/d
2021 Maximum Daily Flow	929 m^3/d
2021 Total Volume of Wastewater	166,944 m^3/year

1.2. Major Expenses

In 2021, the Plattsville WWTP had forecasted operating and maintenance expenditures of approximately $600,000.

In addition to regular operational and maintenance expenditures, Capital Improvement Projects for the Village of Plattsville were forecasted at $52,000 which included improvements to the wastewater collection system and the Plattsville WWTP.

Capital Improvement Projects included:

- $21,000 for Feasibility Study
- $31,000 for the replacement of general operating equipment

Capital Improvement Projects for all systems included:

- $720,000 to develop Countywide SCADA Master Plan for all water/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 2021 and are referred to as the shallow well sample and deep well sample:

PLATTSVILLE WWTP GROUNDWATER SAMPLING								
	May 10/21	**May 10/21**	**May 25/21**	**May 25/21**	**Oct 13/21**	**Oct 13/21**	**Oct 27/21**	**Oct 27/21**
Depth of Sample	**Shallow**	**Deep**	**Shallow**	**Deep**	**Shallow**	**Deep**	**Shallow**	**Deep**
Parameter								
TOC (mg/L)	2	< 1	< 1	< 1	2	< 1	2	< 1
Total P (mg/L)	0.05	1.01	<0.03	0.37	0.37	0.17	< 0.03	0.09
TKN (mg/L N)	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
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)	0.51	< 0.06	0.50	< 0.06	0.50	< 0.06	0.48	< 0.06
Nitrate + Nitrite (mg/L N)	0.51	< 0.06	0.50	< 0.06	0.50	< 0.06	0.48	< 0.06
Chloride (mg/L)	3	19	3	20	4	24	5	24

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 & 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 2021, the Plattsville WWTP provided effective treatment, with 151 samples out of 159 meeting compliance or 95 % compliance to its regulatory limits for all effluent discharge to the Nith River.

A non-compliance event occurred in October, as increased effluent TSS were observed due to excessively high amounts of algae in waste stabilization pond #2. Waste stabilization pond #2 was dosed with higher volumes of aluminum sulphate, to aide in coagulation and solids settling within the pond. In the future, waste stabilization pond #1 will also be recirculated prior to transferring any liquid into waste stabilization pond #2, in an attempt to reduce any occurrence of algae blooms.

- The effluent monthly average concentration for TSS was 11.4 mg/L, with an ECA concentration limit of 10.0 mg/L. The monthly average daily effluent loading concentration for TSS was 10.85 kg/day, with an ECA concentration limit of 9.64 kg/day.

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 streams during discharge. There was no single pH result for the effluent outside the discharge limit of 6 - 9.5 in 2021.

Chlorine was not used at the Plattsville WWTP in 2021.

During discharge, the receiving stream temperature was <12 degrees Celsius from May 10th to May 13th, and again from October 25th to November 29th. During discharge, the receiving stream temperature was >12 degrees Celsius from May 14th to June 25th, and again from October 8th to October 24th.

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	156	71
TSS	205	94
TP	4.6	2.1
TKN	48.9	22.3

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	10	2.3 – 2.8	98.2 – 98.5
TSS	weekly	10	5.2 – 11.1	94.6 – 97.5
TP	weekly	0.5	0.03 – 0.05	98.9 - 99.3
Total Ammonia Nitrogen (when receiving stream >12 degrees Celsius)	weekly	2	0.1 – 1.2	97.2 – 99.8
Total Ammonia Nitrogen (when receiving stream < or = to 12 degrees Celsius)	weekly	5	0.1 – 2.7	93.8 – 99.8
E. coli	weekly	200 organisms/100 mL (monthly Geometric Mean Density)	2 – 107 organisms/100 mL (monthly Geometric Mean Density)	--
pH any single sample	weekly	6.0-9.5	6.7 – 7.7	--

2.3. Effluent 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 4 monthly average objective exceedances related to TSS, and one monthly average exceedance related to Total Ammonia Nitrogen. Several single sample effluent objective exceedances occurred in 2021. These results are summarized in the tables below.

Achieving the effluent objective for TSS was difficult in 2021, due to algae blooms that formed in the waste stabilization ponds. Operational strategies planned in 2022 to reduce the TSS effluent concentrations include recirculating waste stabilization pond one prior to transferring into waste stabilization two and the planned replacement of the fine bubble diffusers in aerated cell two. The diffusers in aerated cell one were replaced in June of 2021.

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

Effluent Parameter	Sample Frequency	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	2.3 – 2.8
TSS	weekly	5	5.2 – 11.1
TP	weekly	0.3	0.03 – 0.05
Total Ammonia Nitrogen (when receiving stream >12 degrees Celsius)	weekly	1	0.1 – 1.2
Total Ammonia Nitrogen (when receiving stream < or = to 12 degrees Celsius)	weekly	3	0.1 – 2.7
E. coli	weekly	150 organisms/100 mL (monthly Geometric Mean Density)	2 – 107 organisms/100 mL (monthly Geometric Mean Density))

Plattsville effluent single sample concentrations that exceeded the objective in 2021 included the following:

Date	Parameter	Objective mg/L *(unless otherwise specified)*	Result mg/L *(unless otherwise specified)*
May 10, 2021	TSS	5	6
May 13, 2021	TSS	5	9
May 19, 2021	TSS	5	6
June 1, 2021	TSS	5	6
June 1, 2021	TAN	1	1.2
June 8, 2021	TSS	5	8
June 16, 2021	TSS	5	6
June 17, 2021	TSS	5	6
October 12, 2021	TSS	5	11
October 13, 2021	TSS	5	9
October 20, 2021	TSS	5	14
October 27, 2021	TSS	5	8
October 28, 2021	TSS	5	11
October 29, 2021	TSS	5	16
October 29, 2021	E. coli	150 (#/100 mL)	216 (#/100 mL)
October 30, 2021	TSS	5	11
October 31, 2021	TSS	5	11
November 4, 2021	TSS	5	9
November 10, 2021	TSS	5	9
November 11, 2021	TSS	5	10
November 17, 2021	TSS	5	6
November 18, 2021	TSS	5	8
November 22, 2021	TSS	5	7
November 29, 2021	TSS	5	19

Plattsville effluent monthly average concentrations that exceeded the objective in 2021 included the following:

Month	Parameter	Objective (mg/L)	Monthly Average Result (mg/L)
May 2021	TSS	5	6.2
May 2021	TAN	1	1.1
June 2021	TSS	5	5.2
October 2021	TSS	5	11.1
November 2021	TSS	5	9.7

3. Overflows, Bypassing, Upsets, Spills, and Abnormal Conditions

There were no overflows, bypassing, upsets, spills, and abnormal conditions from the Plattsville WWTP in 2021.

There were no complaints in 2021.

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. Monitoring 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. Audits, Pilots, and Trials

The MECP did not perform an inspection of the Plattsville WWTP in 2021. In general, an MECP inspection occurs every three 3years.

Expansion Feasibility Study

A Feasibility Study looking into the potential for future wastewater treatment expansion was completed in 2021. The study looked to address treatment optimization and technologies that would assist with operational issues, while adding additional future capacity, and will be used to further inform future expansions at the Plattsville WWTP.

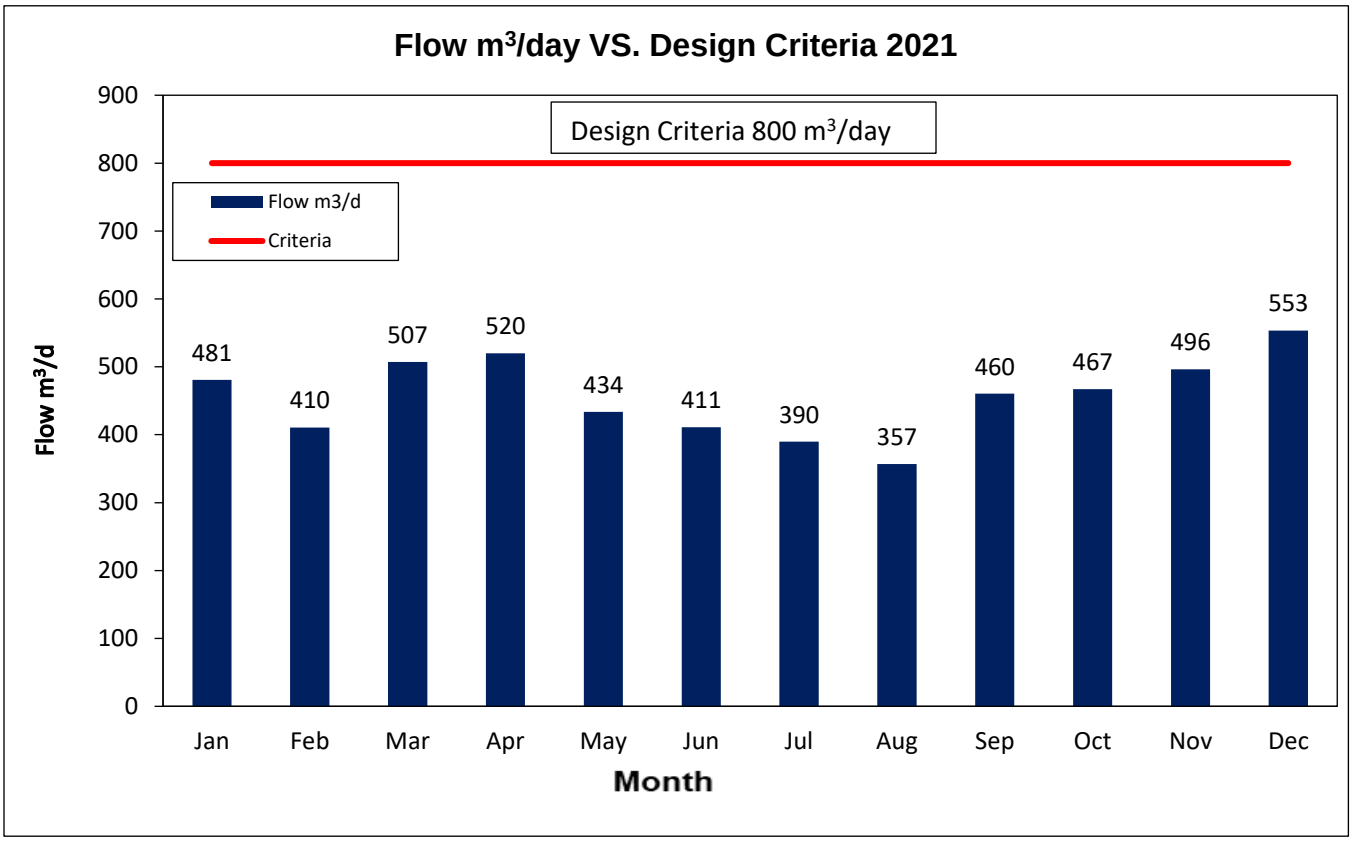
WWTP Recognition

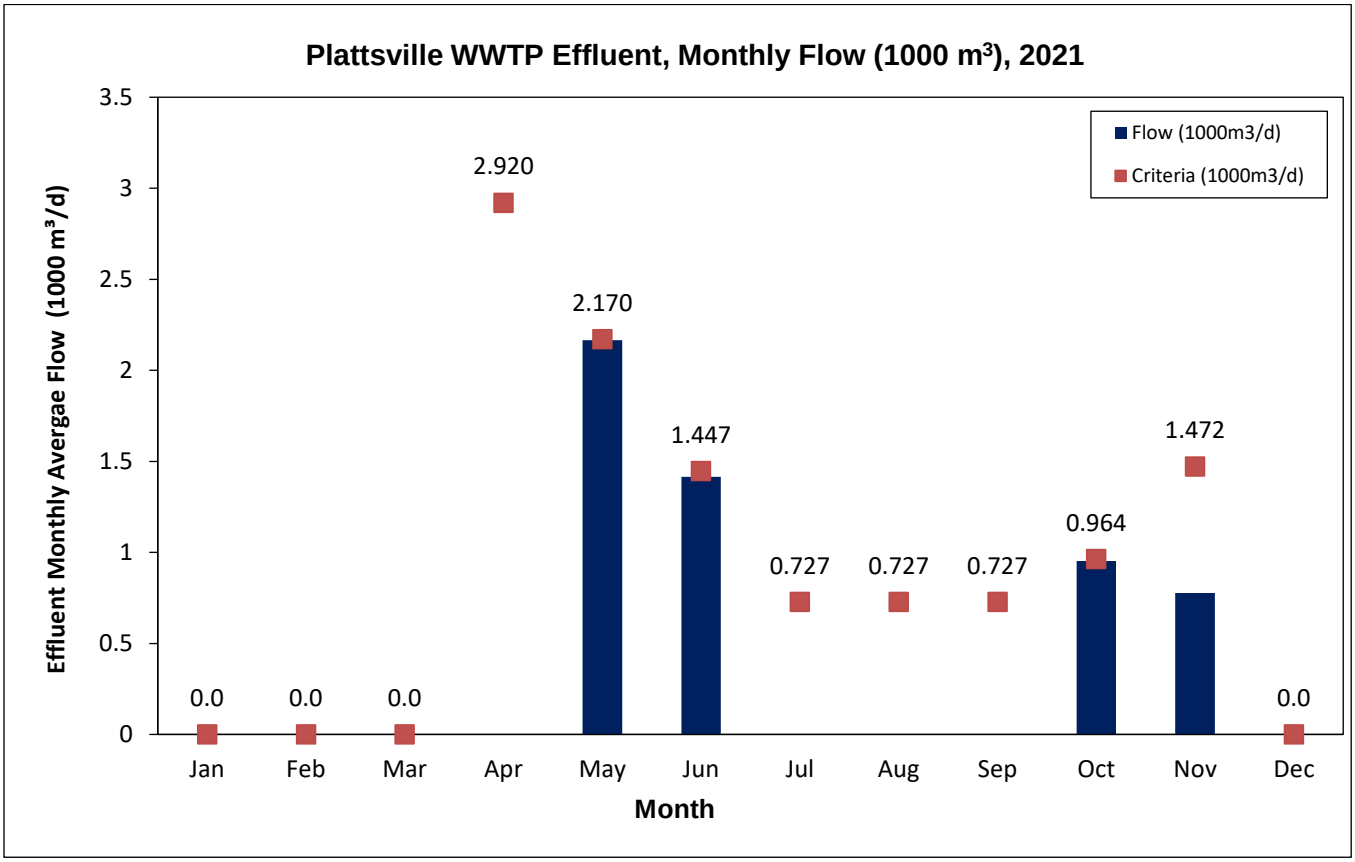
The Plattsville WWTP received Silver level recognition from the Grand River Conservation Authority Watershed-Wide Optimization Program (GRWWOP), for the 2020 year. The GRWWOP aims to improve the water quality of the Grand River and has developed a recognition program for wastewater treatment facilities in the watershed. The wastewater plants must meet specific criteria to be eligible, which include: compliance with all ECA effluent limits, meeting monthly average voluntary targets for Total Ammonia Nitrogen and TP, and the successful completion of a water balance for the lagoon system.

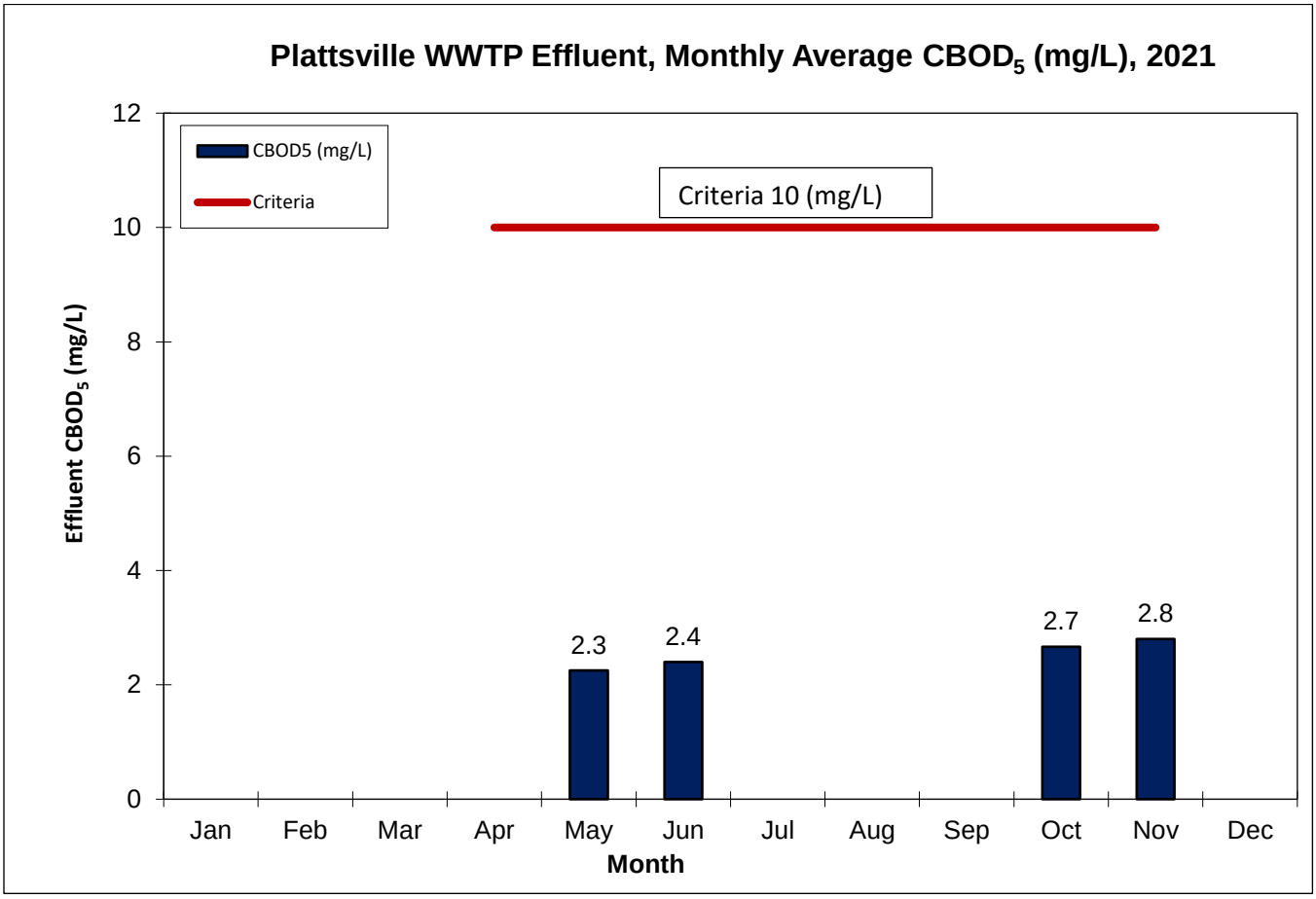
Capital Improvement Projects and Energy Optimization

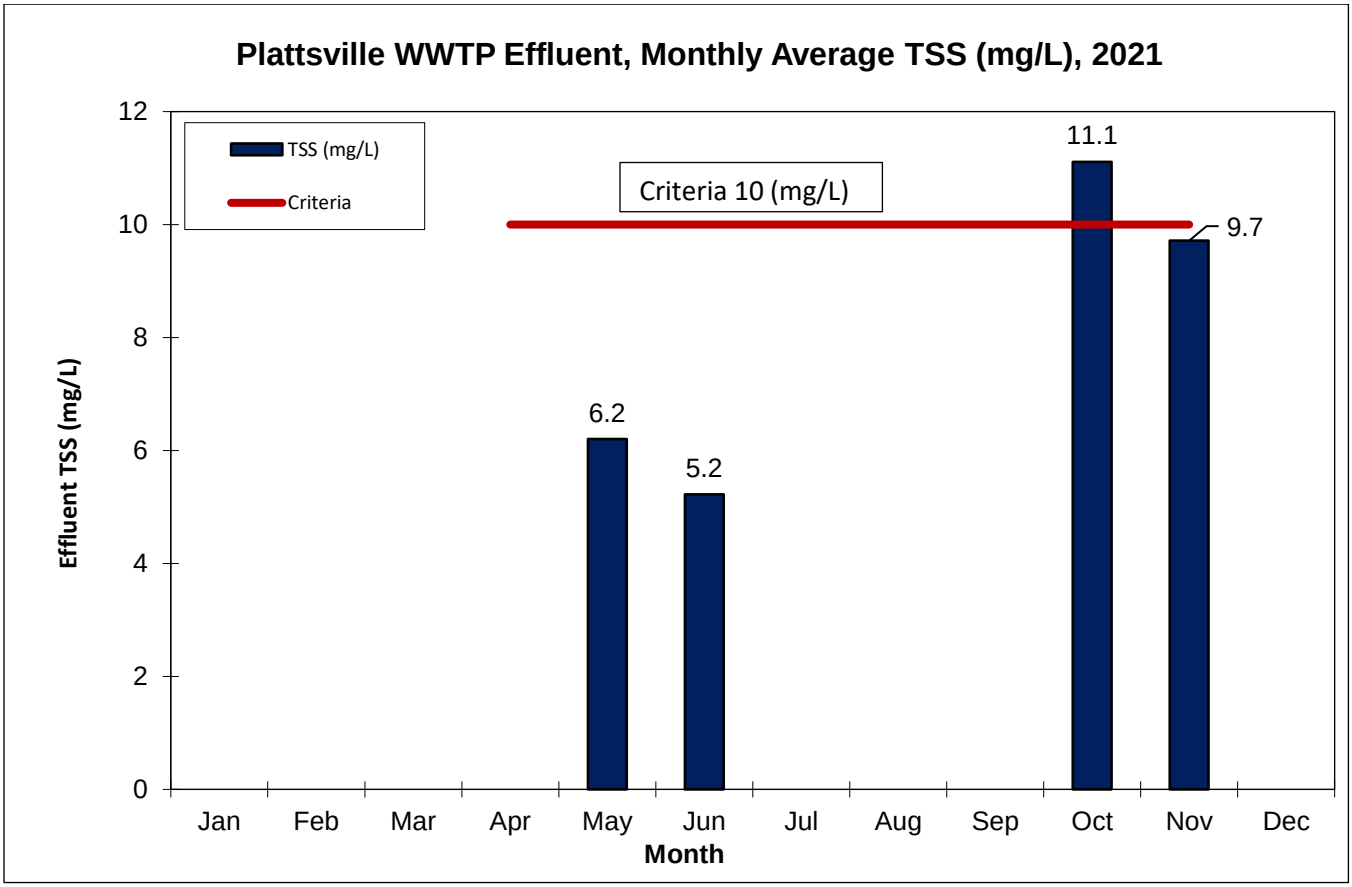
Various Capital Improvement Projects were completed at the Plattsville WWTP in 2021, which will result in significant energy and cost savings. The replacement of older equipment with more efficient units will realize an annual electrical avoidance of 31,135 kWh (equivalent greenhouse gas emission reduction of approximately 1.2 Tonne CO_2e per year). The 2021 upgrades will avoid an additional $4,982 in yearly energy costs.

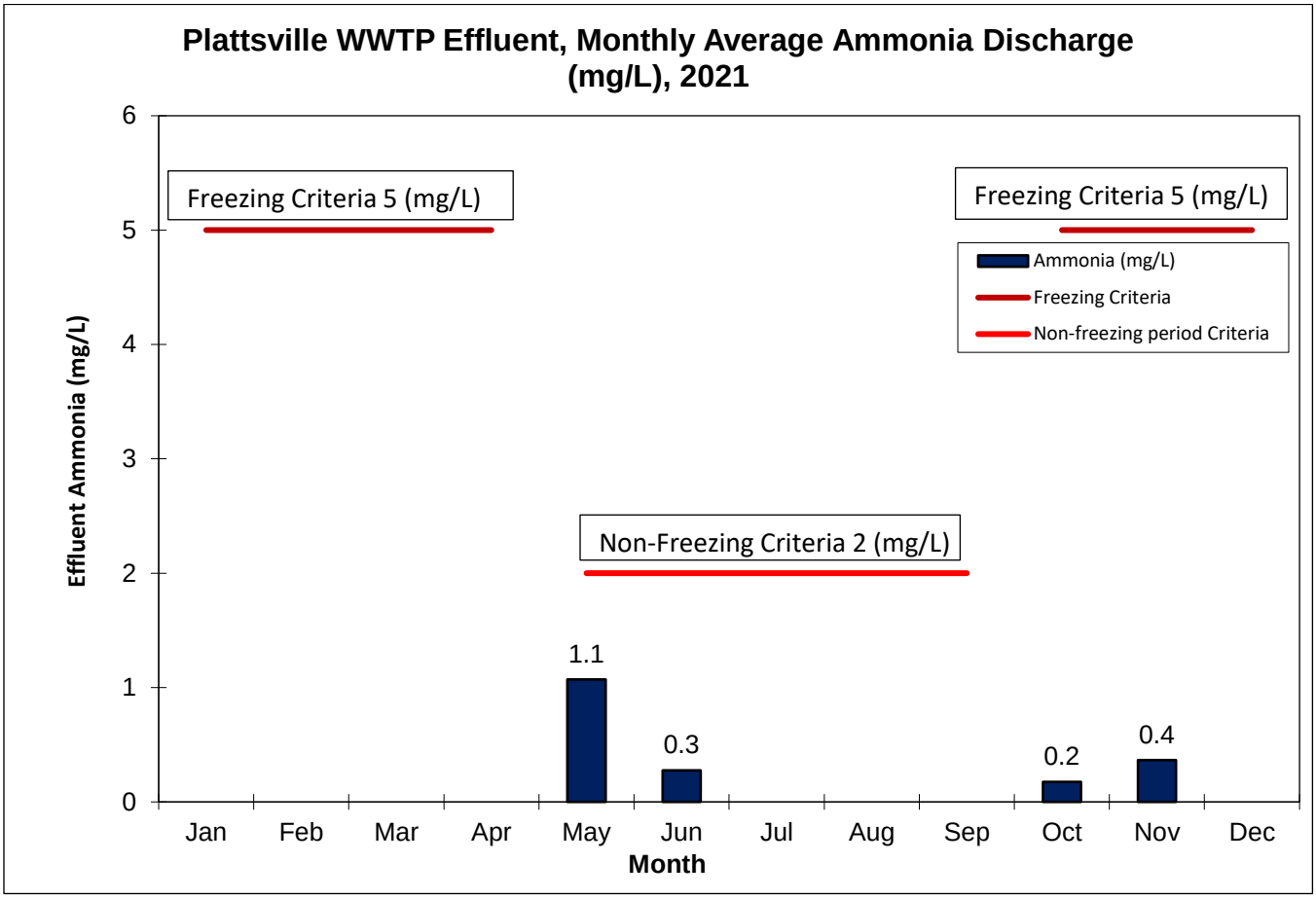
APPENDIX A: GRAPHS OF 2021 DISCHARGE PARAMETERS VS. EFFLUENT DISCHARGE LIMITS

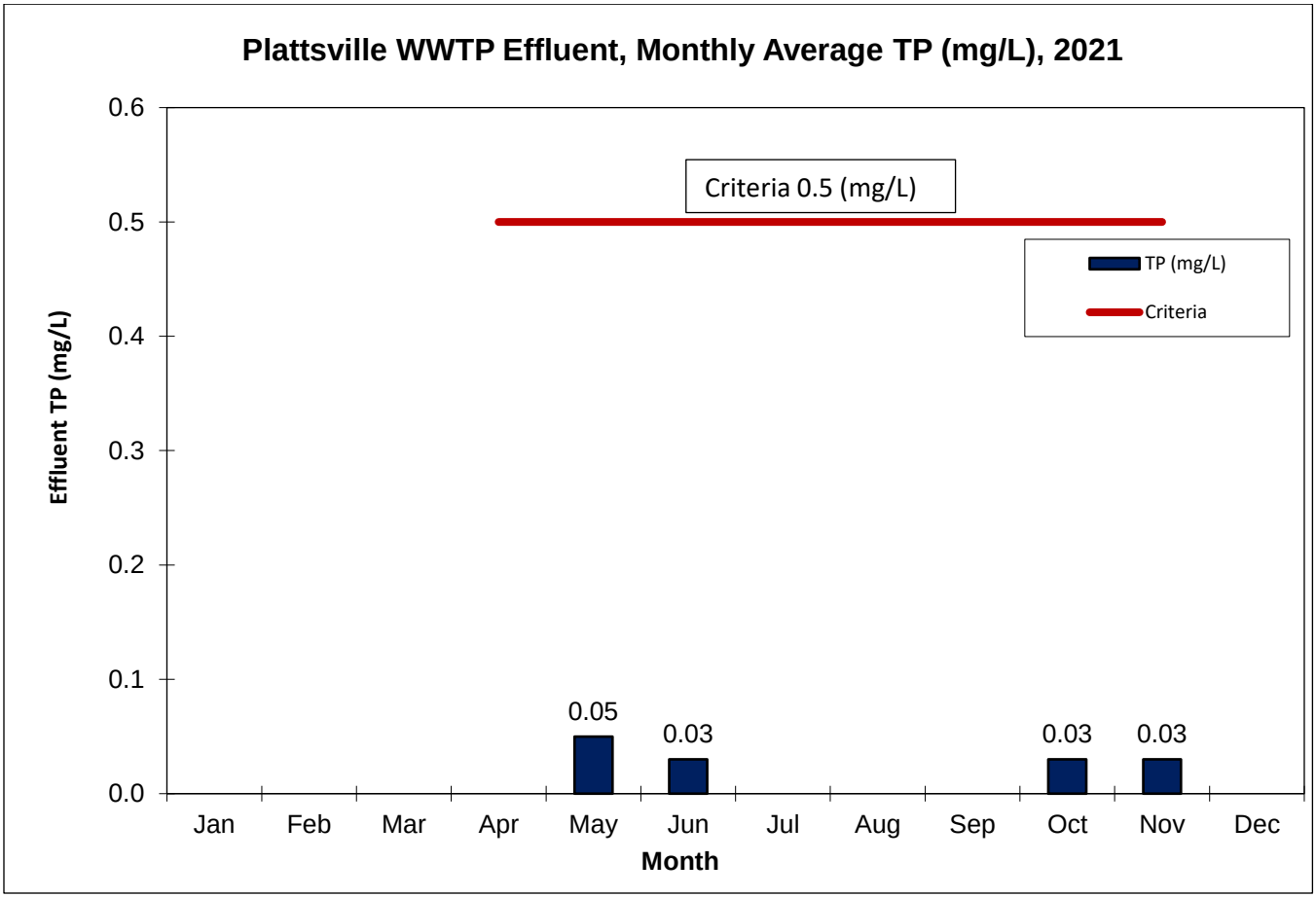


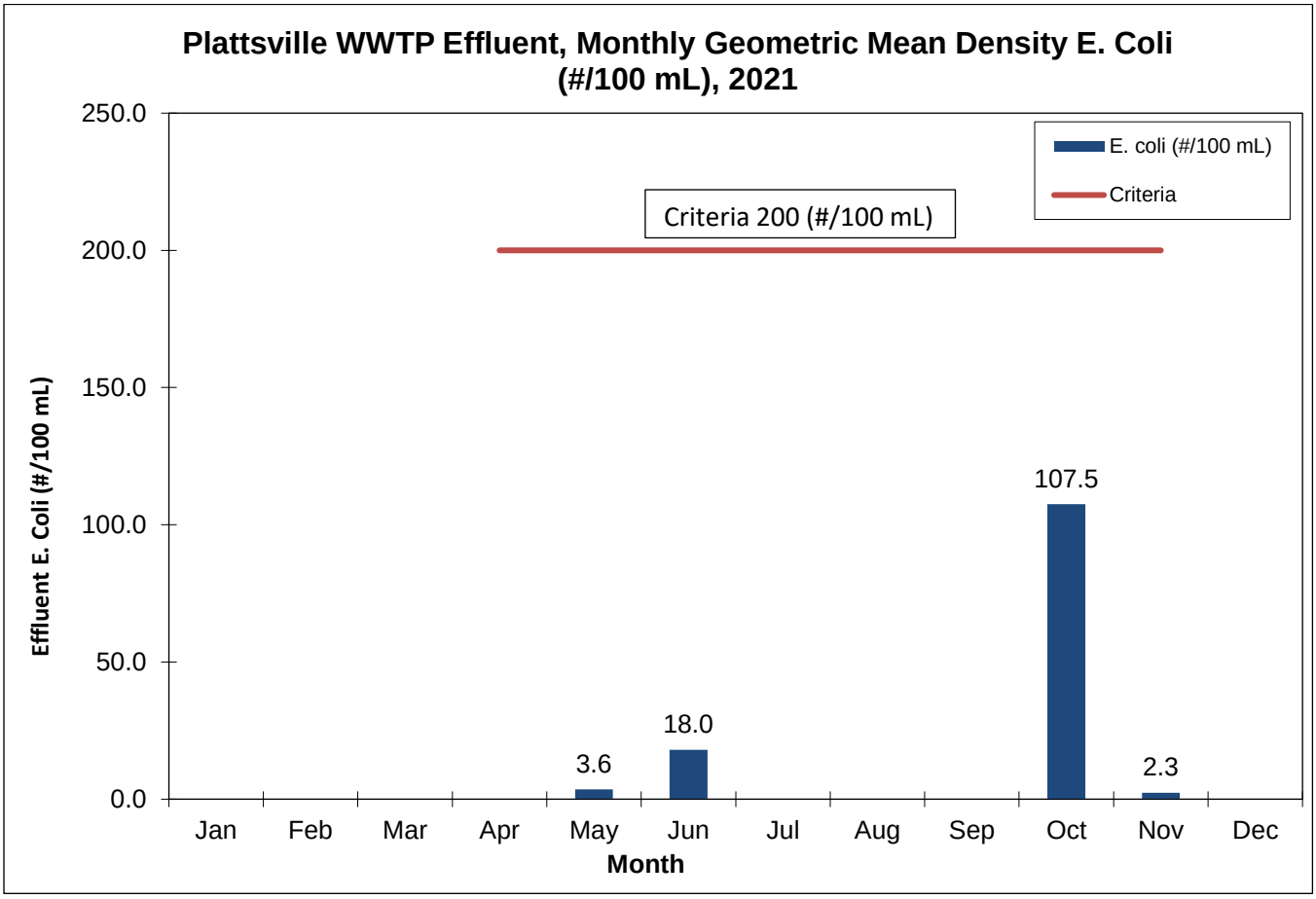



Plattsville WWTP Effluent, Monthly Average CBOD5 (mg/L), 2021
CBOD5 (mg/L)
Criteria
Criteria 10 (mg/L)
Effluent CBOD5 (mg/L)
12
10
8
6
4
2
0
2.3
2.4
2.7
2.8
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Month


Plattsville WWTP Effluent, Monthly Average TSS (mg/L), 2021
TSS (mg/L)
Criteria
Criteria 10 (mg/L)
Effluent TSS (mg/L)
12
10
8
6
4
2
0
6.2
5.2
11.1
9.7
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Month


Plattsville WWTP Effluent, Monthly Average Ammonia Discharge (mg/L), 2021
Effluent Ammonia (mg/L)
6
5
4
3
2
1
0
Freezing Criteria 5 (mg/L)
Freezing Criteria 5 (mg/L)
Non-Freezing Criteria 2 (mg/L)
Ammonia (mg/L)
Freezing Criteria
Non-freezing period Criteria
1.1
0.3
0.2
0.4
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Month


Plattsville WWTP Effluent, Monthly Average TP (mg/L), 2021
Effluent TP (mg/L)
0.6
0.5
0.4
0.3
0.2
0.1
0.0
Criteria 0.5 (mg/L)
TP (mg/L)
Criteria
0.05
0.03
0.03
0.03
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Month


Plattsville WWTP Effluent, Monthly Geometric Mean Density E. Coli (#/100 mL), 2021
250.0
200.0
150.0
100.0
50.0
0.0
Effluent E. Coli (#/100 mL)
E. coli (#/100 mL)
Criteria
Criteria 200 (#/100 mL)
3.6
18.0
107.5
2.3
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Month

2021 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, 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 www.oxfordcounty.ca/Services-for-You/Water-Wastewater/Wastewater/Annual-reports 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 publicworks@oxfordcounty.ca.

Wastewater Treatment Plant:	Tavistock WWTP
Wastewater Treatment Plant Number:	110000720
Environmental Compliance Approval (ECA)	4450-BF9NE6 (March 5, 2020)
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: publicworks@oxfordcounty.ca
Reporting Period:	January 1, 2021 – December 31, 2021

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 nominally separated wastewater collection system includes three sewage pumping stations (SPS), 22.5 kilometers of sanitary gravity sewers, 1.9 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	2,525 m^3/d
2021 Average Daily Flow	2,060 m^3/d
2021 Maximum Daily Flow	9,736 m^3/d
2021 Total Volume of Wastewater	752,367 m^3/year

1.2. Major Expenses

In 2021, the Tavistock WWTP had forecasted operating and maintenance expenditures of approximately $1,434,000.

In addition to regular operational and maintenance expenditures, Capital Improvement Projects for Village of Tavistock totaled $100,000 which included improvements to the wastewater collection systems and the Tavistock WWTP.

Capital Improvement Projects included:

- $10,500 for facilities improvements
- $ 7,500 ECA re-rating
- $47,000 for the replacement of general operating equipment

Capital Improvement Projects for all systems included:

- $720,000 to develop Countywide SCADA Master Plan for all water/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 2021, 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 2021.

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**
$CBOD_5$	582	1,198
TSS	456	940
TP	15	32
TKN	44	91

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	15	2.0 – 3.2	99.5 - 99.7
TSS	weekly	15	2.4 – 5.8	98.5 - 99.6
TP (May-Nov.)	weekly	0.5	0.1 – 0.2	98.7 – 99.3
TP (Dec.-Apr.)	weekly	0.8	0.1 – 0.2	98.7 – 99.3
Total Ammonia Nitrogen (January)	weekly	7.0	-	-
Total Ammonia Nitrogen (February)	weekly	10.0	-	-
Total Ammonia Nitrogen (March)	weekly	8.5	-	-
Total Ammonia Nitrogen (April)	weekly	8.0	0.4	-
Total Ammonia Nitrogen (May-Nov.)	weekly	1.0	0.1- 0.79	-
Total Ammonia Nitrogen (December)	weekly	3.0	0.97	-
pH any single sample	weekly	6.0 - 9.5	6.8 – 8.5 pH	-

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 ECA were met at the Tavistock WWTP in 2021, with the exception 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	Monthly Average Objective Concentration (mg/L)	Monthly Average Result Min-Max (mg/L)
$CBOD_5$	weekly	10	2.0 – 3.2
TSS	weekly	10	2.4 – 5.8
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	-
Total Ammonia Nitrogen (February)	weekly	9.0	-
Total Ammonia Nitrogen (March)	weekly	7.5	-
Total Ammonia Nitrogen (April)	weekly	7.0	0.4
Total Ammonia Nitrogen (May-Nov.)	weekly	0.8	0.1- 0.79
Total Ammonia Nitrogen (December)	weekly	1.5	0.97
pH any single sample	weekly	6.5 - 9.0	6.8 – 8.5

Tavistock WWTP effluent single samples that did not meet effluent objective concentrations in 2021 included the following:

Date	Parameter	Objective (mg/L)	Result (mg/L)
May 13, 2021	TAN	0.8	2.2
June 17, 2021	TSS	10	12
August 12, 2021	TSS	10	14
November 4, 2021	TAN	0.8	1.2
November 25, 2021	TAN	0.8	1.2
December 2, 2021	TAN	0.8	2.4
December 16, 2021	TAN	0.8	3.3

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

On January 27, 2021 there was a leak discovered from an air release on the forcemain that connects the William Street SPS to the Tavistock WWTP. It was estimated that approximately 70 m^3 of wastewater was released over the previous day. The hole in the air release valve was plugged the same day in order to stop the leak. The event was reported to the MECP at the time of the event.

An odour complaint was received on February 26, 2021. In response, staff visited the plant, found adequate dissolved oxygen concentrations in the ponds, and tested no traceable amounts of dissolved sulfides. As a precaution, the influent waste stream was split into cell one and two, to reduce the organic loading on cell one. Air valves were adjusted to ensure proper air distribution within the lagoons. A load of calcium nitrate was delivered on Saturday February 27, 2021. The calcium nitrate was dosed into cell one to provide an additional oxygen source to bacteria. The influent remained split into both cells for approximately one month, to further ensure proper biological activity within the ponds.

On July 13, 2021 a noise complaint was received regarding the Tavistock WWTP. Staff went out to investigate and could not detect any loud or abnormal noise. The following day, staff returned with a sound meter to investigate sound levels. Sound was observed to be 50- 51 decibels at the lagoon fence line, 42-45 decibels on the buffer land between the facility and surrounding subdivision, and 37.1 decibels within the surrounding subdivision. Sound levels were found to be within the acceptable range.

There were no additional overflows, bypasses, upsets, or spills from the Tavistock WWTP in 2021.

There were no projects undertaken in 2021 to eliminate Bypass/Overflows in conformance with Procedure F-5-1. Sewage pipe repairs are planned on John Street in 2022.

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 2021.

5. MONTIORING EQUIPMENT MAINTENANCE AND CALIBRATION

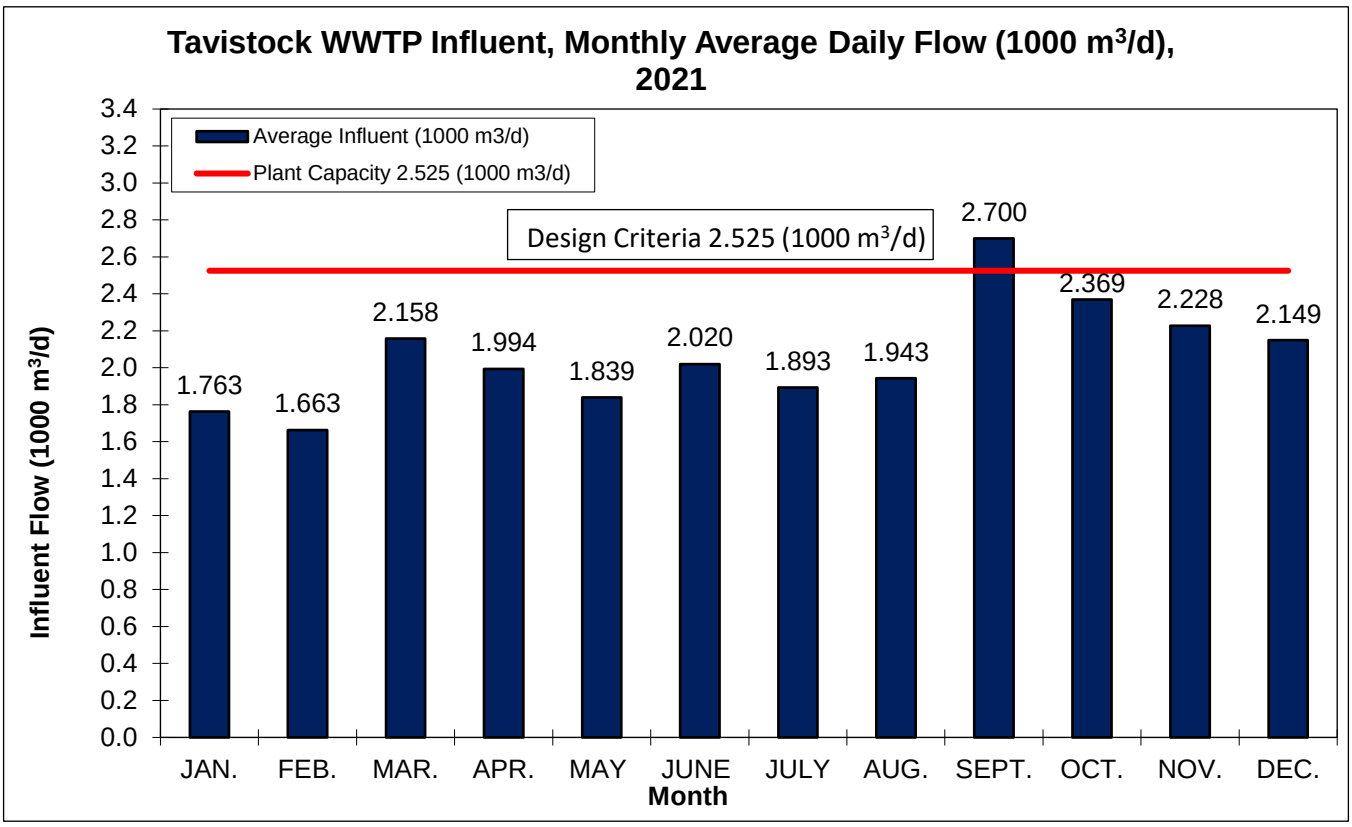
The calibration of flow meters is conducted yearly by Indus-Controls Inc. in accordance with the requirements of the ECA. The records are kept on-site at the WWTP.

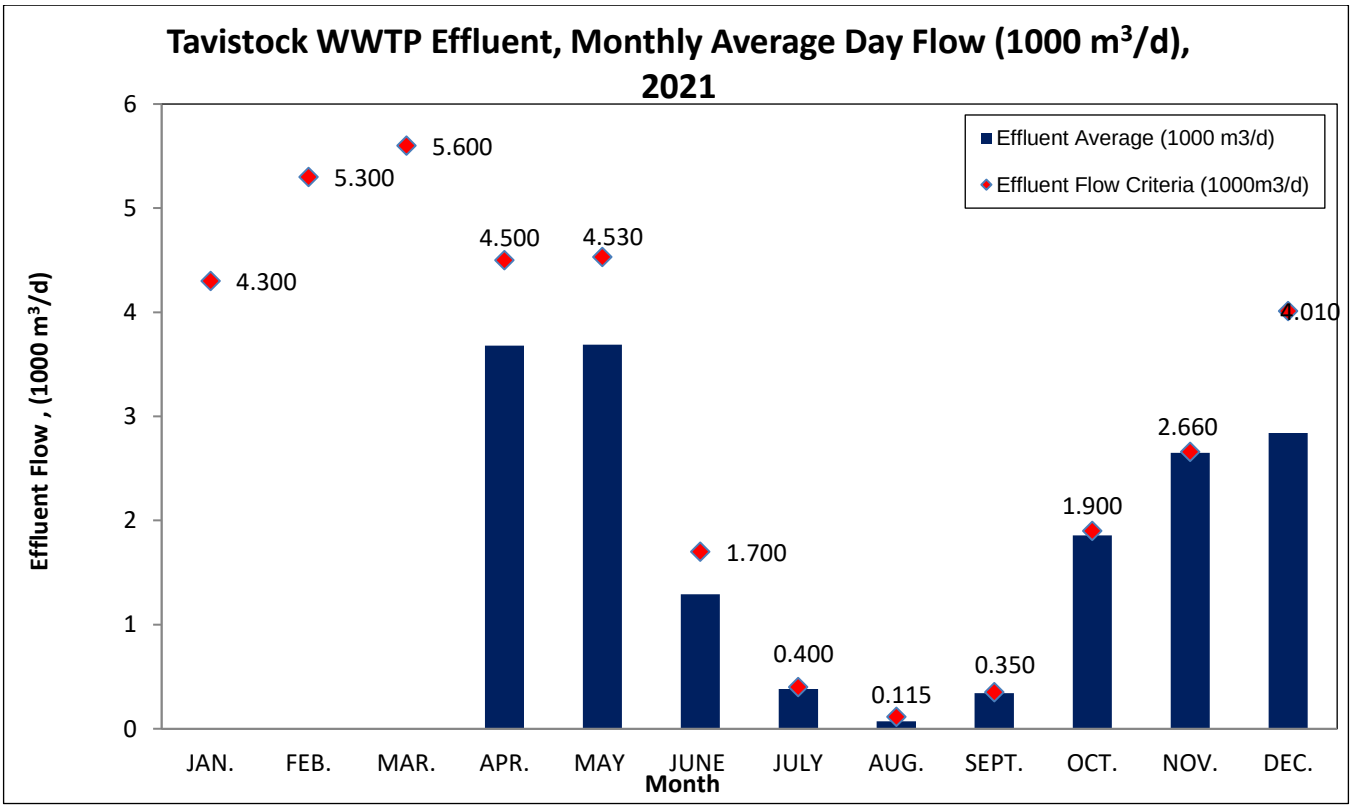
All other operational monitoring equipment calibration records are kept on-site at the Tavistock WWTP.

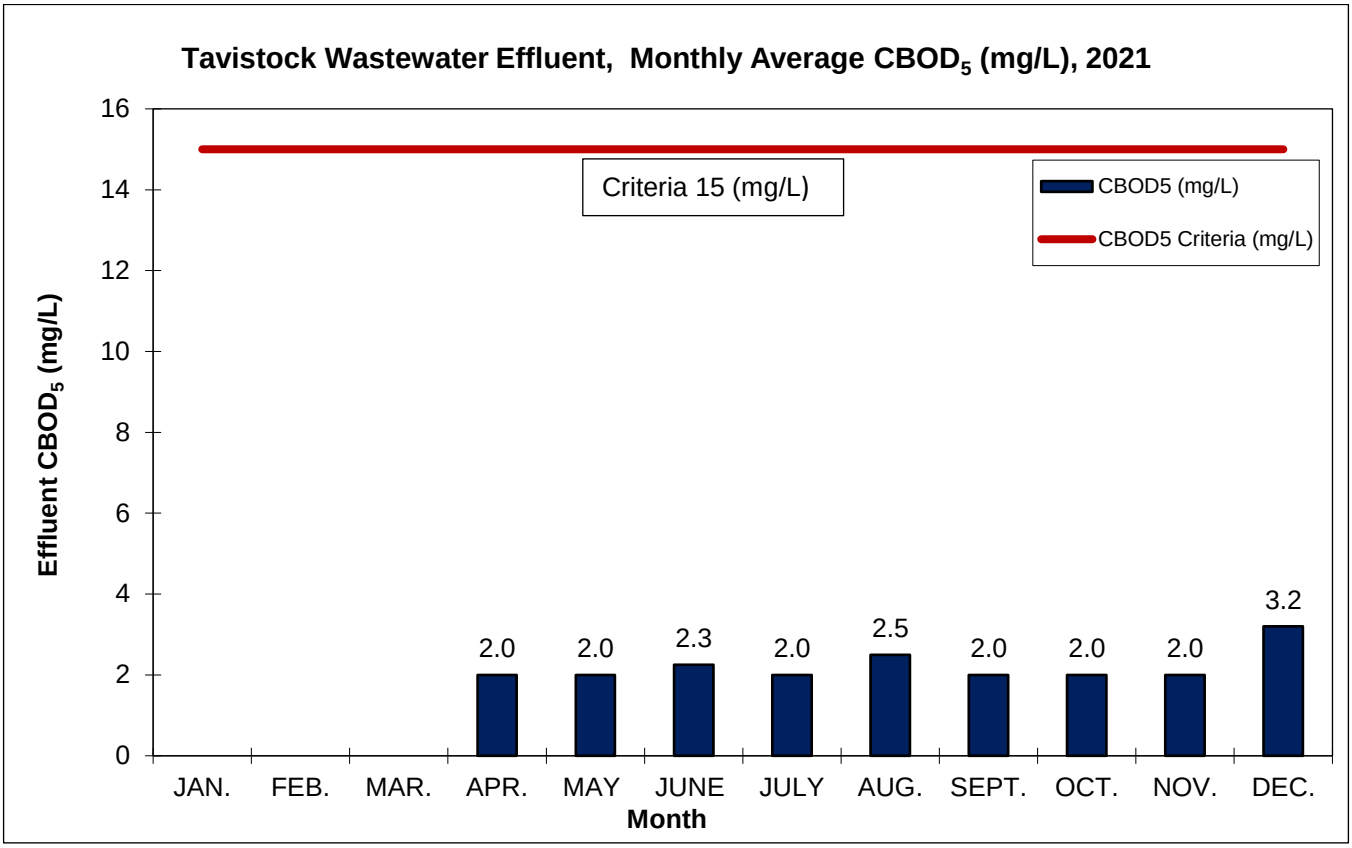
6. INSPECTION, PILOTS, AND TRIALS

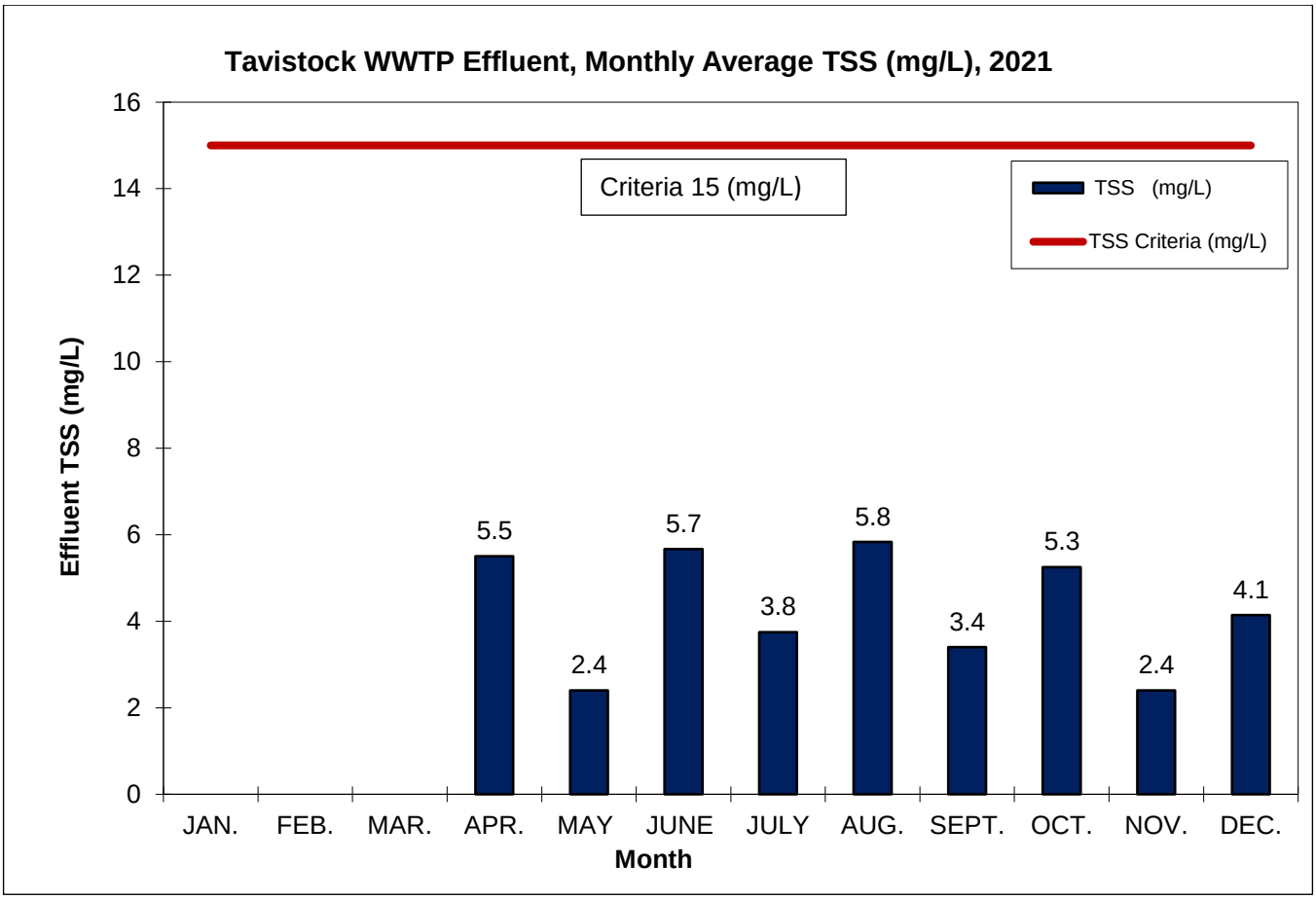
The MECP did not conduct an inspection of the Tavistock WWTP in 2021. The MECP inspections typically occur on a 3-year schedule.

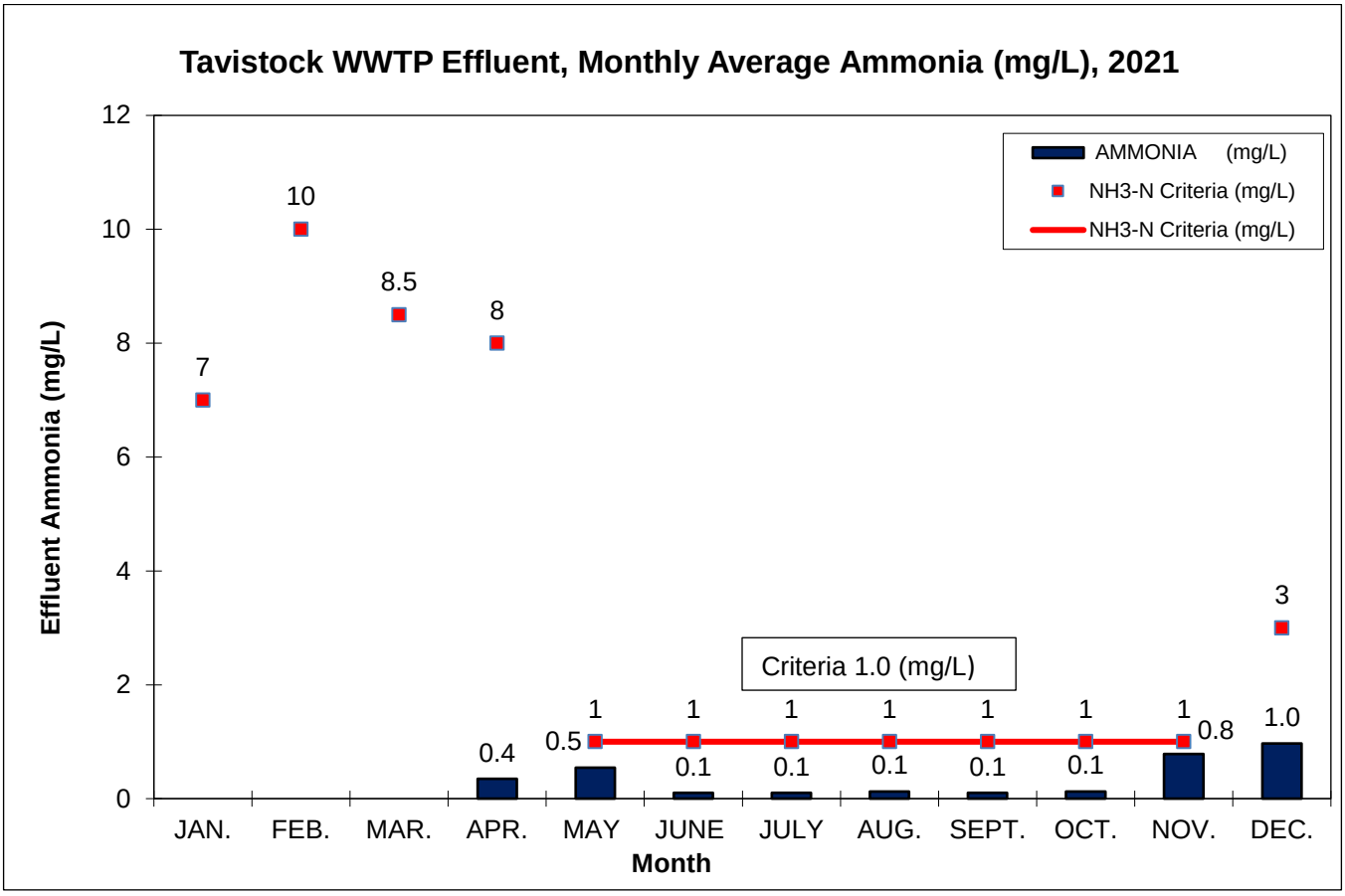
APPENDIX A: GRAPHS OF 2021 DISCHARGE PARAMETERS VS. EFFLUENT DISCHARGE LIMITS

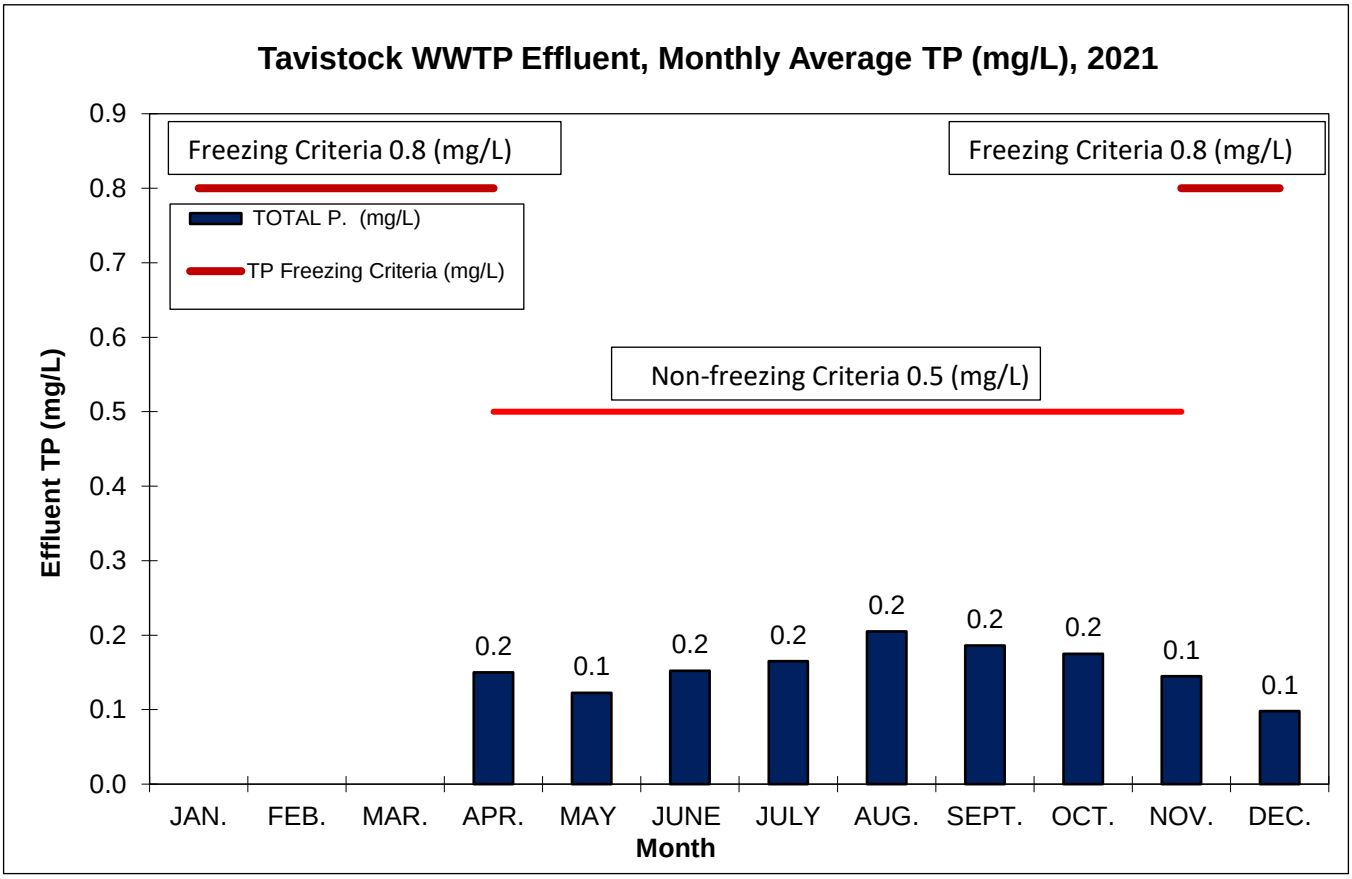





Tavistock Wastewater Effluent, Monthly Average CBOD5 (mg/L), 2021
Effluent CBOD5 (mg/L)
16
14
12
10
8
6
4
2
0
Criteria 15 (mg/L)
CBOD5 (mg/L)
CBOD5 Criteria (mg/L)
2.0
2.0
2.3
2.0
2.5
2.0
2.0
2.0
3.2
JAN.
FEB.
MAR.
APR.
MAY
JUNE
JULY
AUG.
SEPT.
OCT.
NOV.
DEC.
Month


Tavistock WWTP Effluent, Monthly Average TSS (mg/L), 2021
Effluent TSS (mg/L)
16
14
12
10
8
6
4
2
0
Criteria 15 (mg/L)
TSS (mg/L)
TSS Criteria (mg/L)
5.5
2.4
5.7
3.8
5.8
3.4
5.3
2.4
4.1
JAN.
FEB.
MAR.
APR.
MAY
JUNE
JULY
AUG.
SEPT.
OCT.
NOV.
DEC.
Month


Tavistock WWTP Effluent, Monthly Average Ammonia (mg/L), 2021
Effluent Ammonia (mg/L)
AMMONIA (mg/L)
NH3-N Criteria (mg/L)
NH3-N Criteria (mg/L)
Criteria 1.0 (mg/L)
JAN. FEB. MAR. APR. MAY JUNE JULY AUG. SEPT. OCT. NOV. DEC.
Month


Tavistock WWTP Effluent, Monthly Average TP (mg/L), 2021
Effluent TP (mg/L)
Freezing Criteria 0.8 (mg/L)
Freezing Criteria 0.8 (mg/L)
TOTAL P. (mg/L)
TP Freezing Criteria (mg/L)
Non-freezing Criteria 0.5 (mg/L)
JAN. FEB. MAR. APR. MAY JUNE JULY AUG. SEPT. OCT. NOV. DEC.
Month

2021 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, 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 www.oxfordcounty.ca/Services-for-You/Water-Wastewater/Wastewater/Annual-reports 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 publicworks@oxfordcounty.ca.

Wastewater Treatment Plant:	Thamesford WWTP
Wastewater Treatment Plant Number:	120002601
Environmental Compliance Approval (ECA)	7320-AUQM53 (June 4, 2018)
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: publicworks@oxfordcounty.ca
Reporting Period:	January 1, 2021 – December 31, 2021

1.1. System Description

The Thamesford WWTP is a Class II rated treatment facility, as defined by Ontario Regulation (O.Reg.) 129/04, that 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), 17.9 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
2021 Average Daily Flow	517 m^3/d
2021 Maximum Daily Flow	812 m^3/d
2021 Total Volume of Wastewater	188,676 m^3/year

1.2. Major Expenses

In 2021, the Thamesford WWTP had forecasted operating and maintenance expenditures of approximately $582,000.

In addition to regular operational and maintenance expenditures, Capital Improvement Projects for the Village of Thamesford were forecasted at $115,000 which included improvements to the wastewater collection system and the Thamesford WWTP.

Capital Improvement Projects included:

- $40,000 for Thamesford WWTP Facility Upgrades
- $82,000 for the replacement of general operating equipment

Capital Improvement Projects for all systems included:

- $720,000 to develop Countywide SCADA Master Plan for all water/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. A 24-hour composite sampler is taking an influent sample every 15 minutes for a 24-hour period concurrent with effluent sampling.

In 2021, 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 in process control, the results of which are not included in this report.

2.2. Plant 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 2021, with 946 samples out of 957 samples meeting compliance, or 99 % compliance to its regulatory limits for all effluent discharged.

The WWTP experienced operational challenges during the months of February and March due to colder ambient temperatures and the presence of filamentous bacteria. These conditions led to poor settling and decreased nitrification. The aeration mixing pump also became plugged with rags and failed, resulting in poor oxygen transfer and inefficient mixing.

- For the month of February, the effluent average monthly concentration for total ammonia nitrogen was 7.54 mg/L, which exceeded the compliance concentration limit for effluent average monthly total ammonia nitrogen of 5.0 mg/L.
- For the month of March, the effluent average monthly concentration for total ammonia nitrogen was 7.77 mg/L, which exceeded the compliance concentration limit for effluent average monthly total ammonia nitrogen of 5.0 mg/L.

In response, the aeration solids concentration were increased by wasting reductions and the addition of seed aeration sludge from the Woodstock WWTP and Ingersoll WWTP. Staff increased the blower output to provide more DO to the aeration tank and the chemical addition of sodium hydroxide was increased to bring up the alkalinity concentration required for proper nitrification. The aeration tank mixing pump was replaced with a standby unit. An online DO probe and a nitrate/ammonia sensor were installed to give advance notice of future nitrifications issues. In addition, a consultant was retained to conduct an assessment of the treatment process. The resulting recommendations will inform design work on screening and aeration upgrades in 2022.

The MECP was informed at the time of the non-compliances at the time of the events.

Influent Streams and Effluent Streams

There was no single laboratory pH result for the effluent outside the discharge limit of 6 - 9.5 in 2021.

Staff tests TRC in the treated effluent several times per week; well in excess of the required weekly testing frequency. In 2021, 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	235	121
Total Suspended Solids (TSS)	259	134
Total Phosphorus (TP)	5.5	3
Total Kjeldahl Nitrogen (TKN)	52.3	27
Oil and Grease	41	21

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 – 2.2	99.1 – 99.2
$CBOD_5$ (December 01 to April 30)	weekly	15	2.6 – 3.5	98.5 – 98.9
TSS (May 01 to November 30)	weekly	10	2.8 – 6.9	97.3 – 98.9
TSS (December 01 to April 30)	weekly	15	3.8 – 11.8	95.4 – 98.7
TP (May 01 to November 30)	weekly	0.20	0.03 – 0.09	98.4 – 99.5
TP (December 01 to April 30)	weekly	0.50	0.04 – 0.17	96.9 – 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 – 7.8	--
Total Chlorine Residual	weekly	0.02	0.00	--
E. coli	weekly	200 organisms/100 mL (monthly Geometric Mean Density)	2 – 38 organisms/100 mL (monthly Geometric Mean Density)	--
pH any single sample	weekly	6.0 - 9.5	6.72 – 7.53	--
Dissolved Oxygen	weekly	5 and above	6.9 – 8.9	--

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 during the months of February and March when colder temperatures, and a filamentous bacteria outbreak hindered nitrification. The aeration mixing equipment became plugged with debris and failed, resulting in increased effluent total ammonia nitrogen concentration. Operations made process changes and brought in seed sludge from surrounding wastewater treatment plants to re-establish nitrification. The mixing equipment was replaced, and additional sensors were installed to give advanced notice of nitrification issues.

Effluent TSS concentrations increased from late winter into spring as the WWTP recovered from an outbreak of filamentous bacteria and nitrification issues. Aeration solids concentration were increased for several months to cultivate a healthy population of nitrifying bacteria, after a loss of nitrification in February. The increase in effluent TP concentrations was a result of the increased effluent suspended solids observed during the same period. In November, an issue occurred with the tertiary sand filter which temporarily increased effluent TSS concentrations. The standby sand filter was put online, so that repairs could be completed.

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	2.8 – 11.8
TP	weekly	0.10	0.03 – 0.17
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 – 7.8
Total Chlorine Residual	weekly	non-detect	0.00
E. coli (May 1 – October 31)	weekly	200 organisms/100 mL (monthly Geometric Mean Density)	2 – 38 organisms/100 mL (monthly Geometric Mean Density)
pH any single sample	weekly	6.5 – 8.5	6.72 – 7.53
Dissolved Oxygen	weekly	6	6.9 – 8.9

Thamesford effluent single samples that did not meet effluent objective concentrations in 2021 included the following:

Date	Parameter	Objective (mg/L)	Result (mg/L)
February 3, 2021	TSS	5	9
February 10, 2021	Ammonia	4	6.5
February 17, 2021	TSS	5	10
February 17, 2021	TP	0.1	0.16
February 17, 2021	Ammonia	4	18.4
February 24, 2021	TSS	5	8
February 24, 2021	Ammonia	4	6.8
February 26, 2021	Ammonia	4	6.4
February 27, 2021	Ammonia	4	6.4
February 28, 2021	Ammonia	4	7
March 3, 2021	TSS	5	9
March 3, 2021	Ammonia	4	11.6
March 10, 2021	TSS	5	6
March 10, 2021	Ammonia	4	21.2
March 17, 2021	TSS	5	10
March 17, 2021	Ammonia	4	11.4
March 24, 2021	TSS	5	10
March 24, 2021	TP	0.1	0.11
March 31, 2021	TSS	5	10
March 31, 2021	Ammonia	4	8.4
April 7, 2021	TSS	5	11
April 7, 2021	TP	0.1	0.13
April 7, 2021	Ammonia	4	9.1
April 14, 2021	TSS	5	11
April 14, 2021	TP	0.1	0.16
April 21, 2021	TSS	5	13
April 21, 2021	TP	0.1	0.15
April 28, 2021	TSS	5	12

Date	Parameter	Objective (mg/L)	Result (mg/L)
April 28, 2021	TP	0.1	0.24
May 1, 2021	TSS	5	9
May 2, 2021	TSS	5	9
May 3, 2021	TSS	5	10
May 4, 2021	TSS	5	7
May 15, 2021	TSS	5	7
May 26, 2021	TSS	5	8
November 10, 2021	TSS	5	7
November 24, 2021	TSS	5	8
November 29, 2021	TSS	5	6
December 1, 2021	TSS	5	6
December 22, 2021	TSS	5	6

Thamesford effluent monthly average concentrations that did not meet effluent monthly average objective concentrations in 2021 are listed in the following table:

Month	Parameter	Monthly Avg. Objective (mg/L)	Result (mg/L)
February 2021	TSS	5	8.0
February 2021	TP	0.1	0.11
February 2021	Ammonia	4	7.5
March 2021	TSS	5	9.0
March 2021	Ammonia	4	7.8
April 2021	TSS	5	11.8
April 2021	TP	0.1	0.17
May 2021	TSS	5	6.9
November 2021	TSS	5	6.0

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

There were no overflows, bypassing, upsets, spills, or abnormal conditions at the Thamesford WWTP in 2021.

There were no projects undertaken in 2021 or forecasted to be completed in 2021 to eliminate Bypass/Overflows in conformance with Procedure F-5-1.

There were no complaints received in 2021.

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 2021.

5. MONTIORING EQUIPMENT MAINTENANCE AND CALIBRATION

The calibration of flow meters is conducted Indus-Controls Inc. 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 secondary sludge is 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.

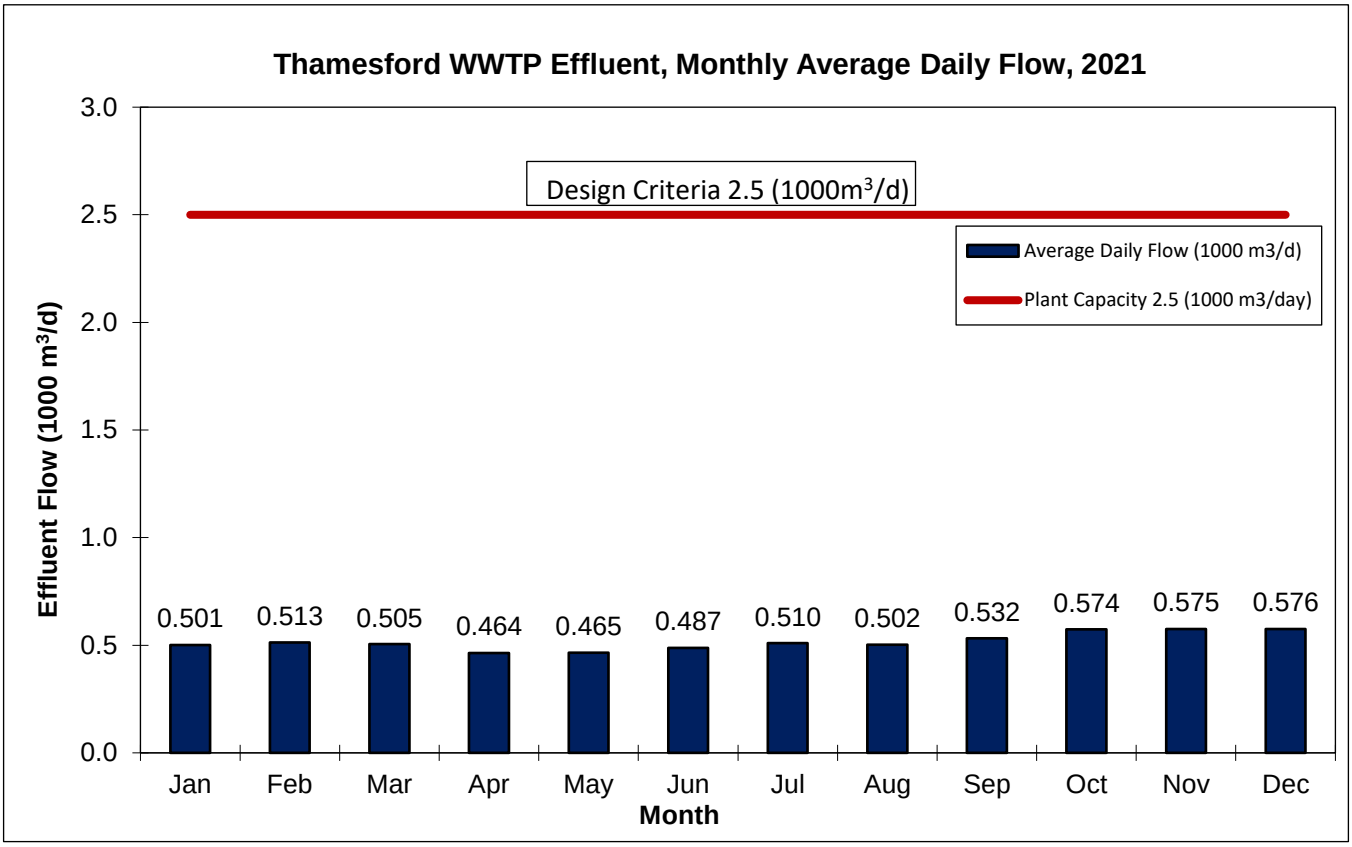
7. INSPECTION, PILOTS, AND TRIALS

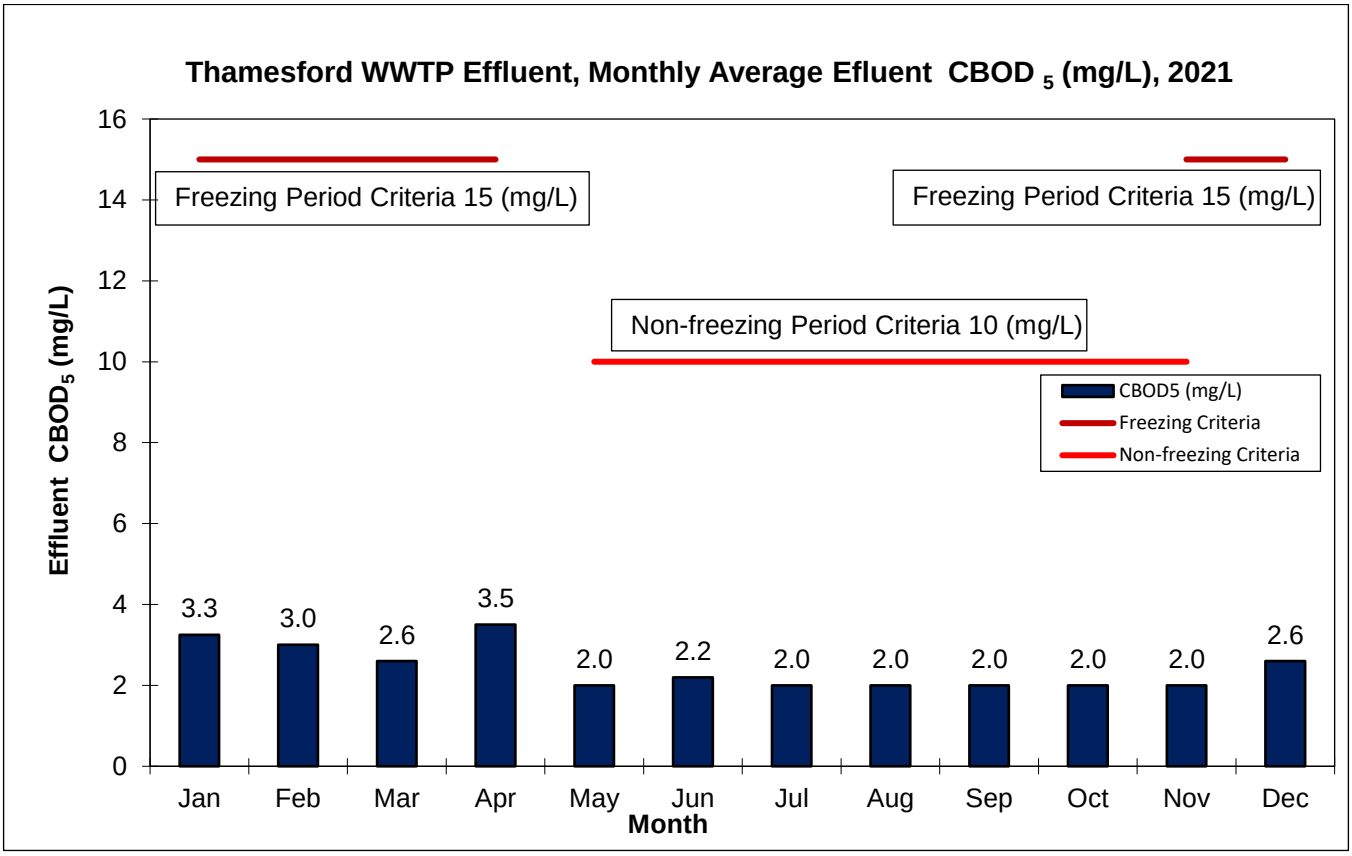
The MECP did not conduct an inspection of the Thamesford WWTP in 2021. The MECP inspections typically occur on a 3-year schedule.

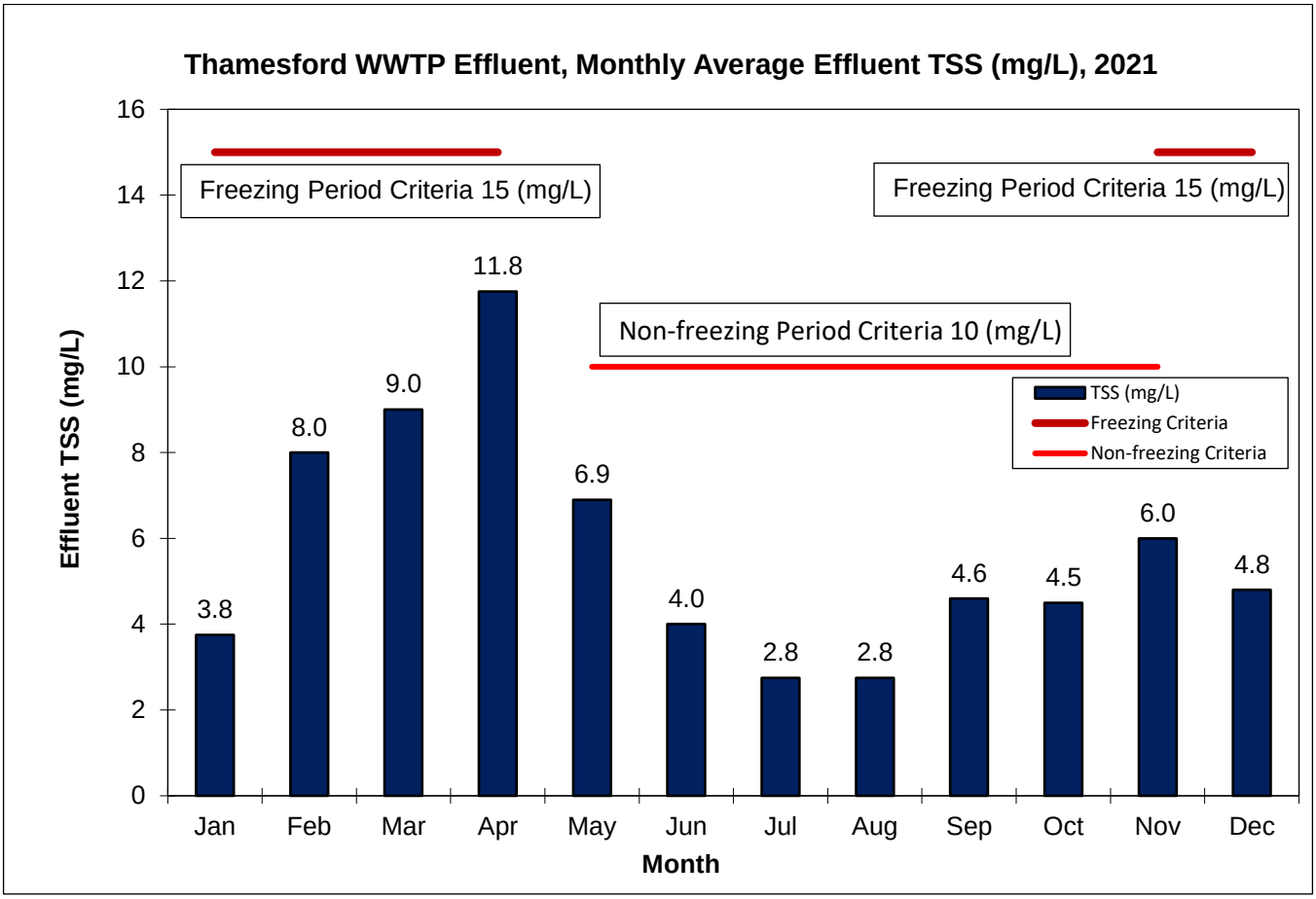
Treatment Assessment and Conceptual Design Report

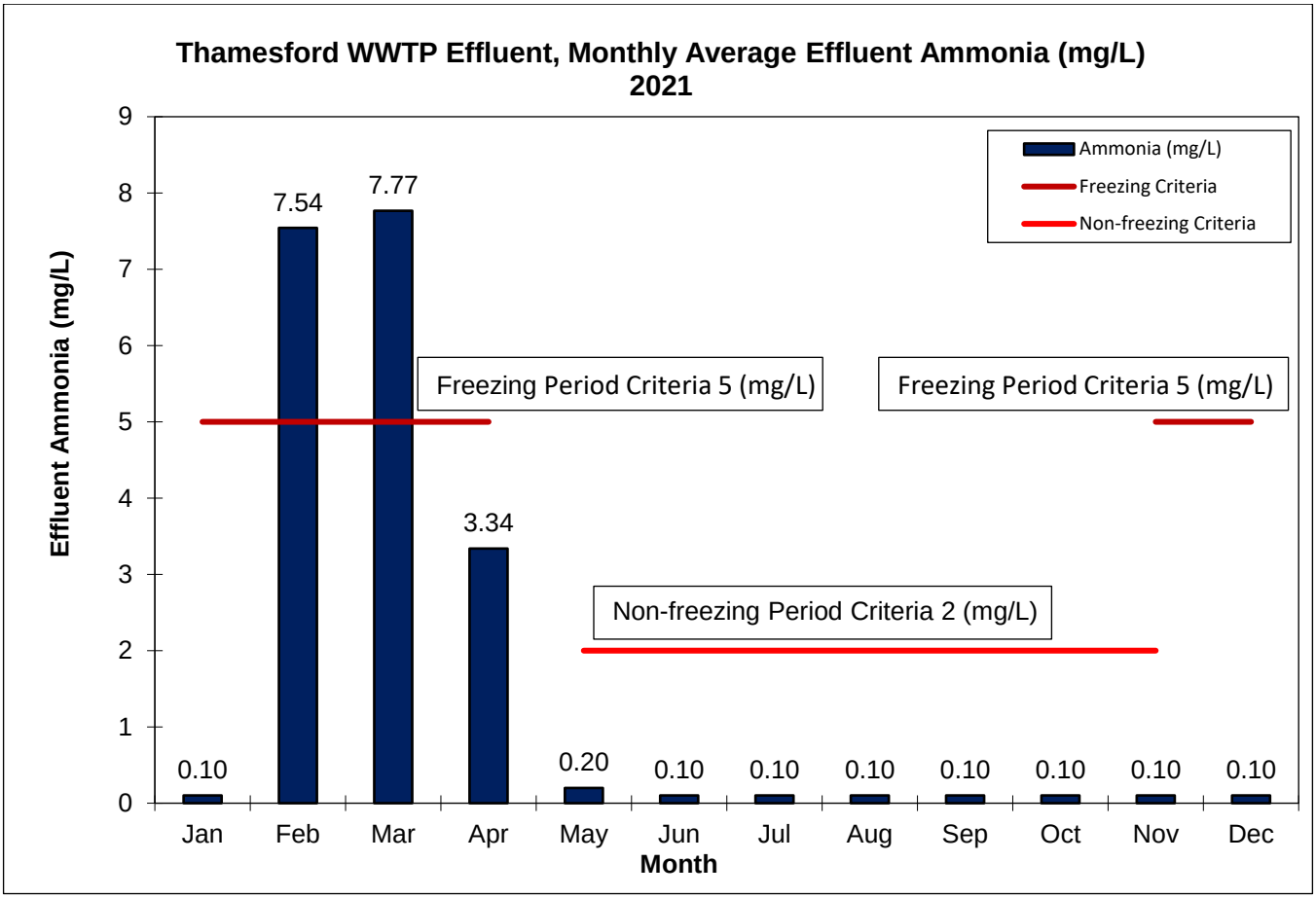
In response to recent operational challenges, a consultant was retained to investigate opportunities to improve Thamesford WWTP performance. The report suggested equipment upgrades for the current aeration system, and the work is in the process of being completed. Additionally, the Conceptual Design Report recommended larger process upgrades that will be used to inform design work planned in 2022.

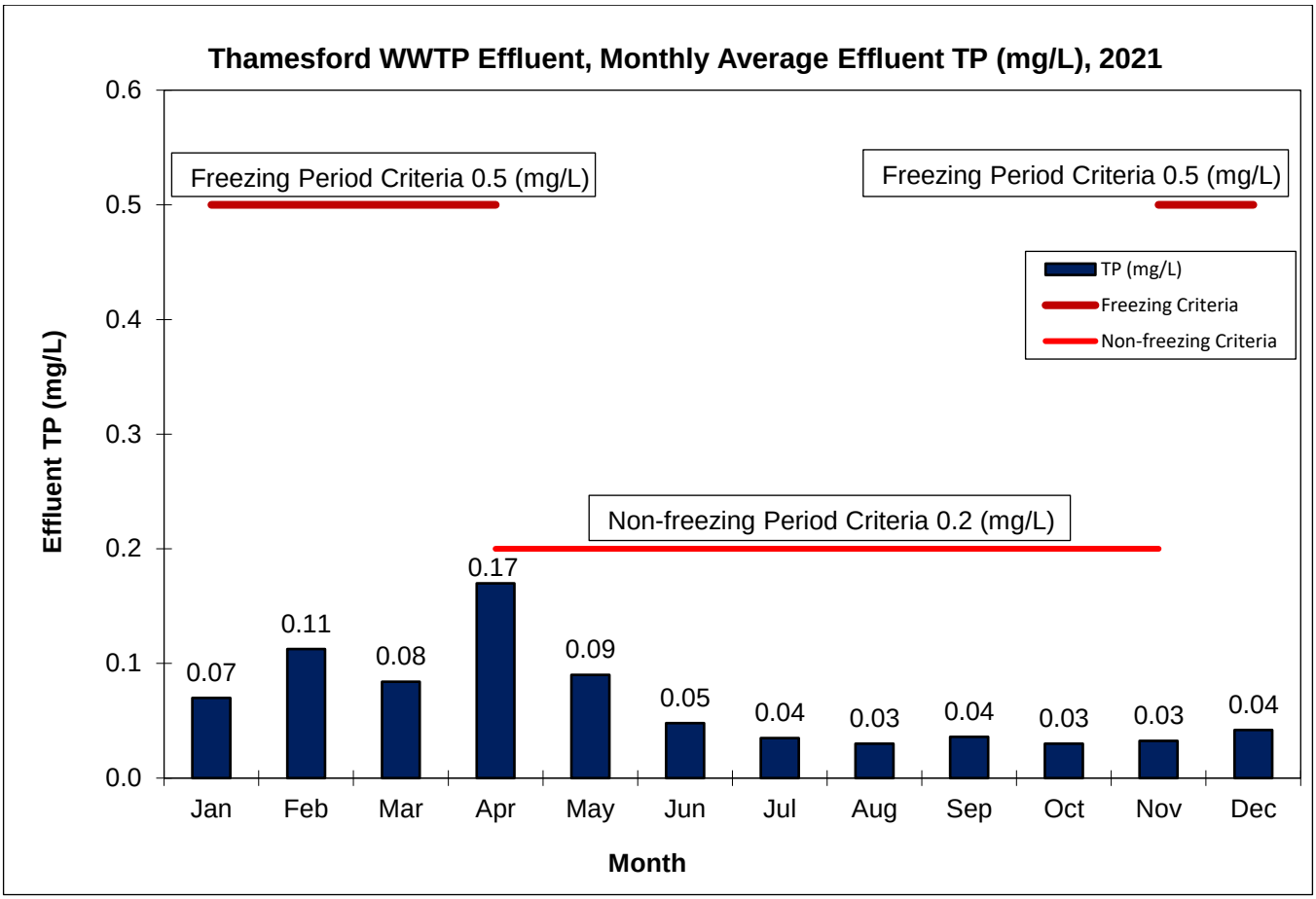
APPENDIX A: GRAPHS OF 2021 DISCHARGE PARAMETERS VS. EFFLUENT DISCHARGE LIMITS

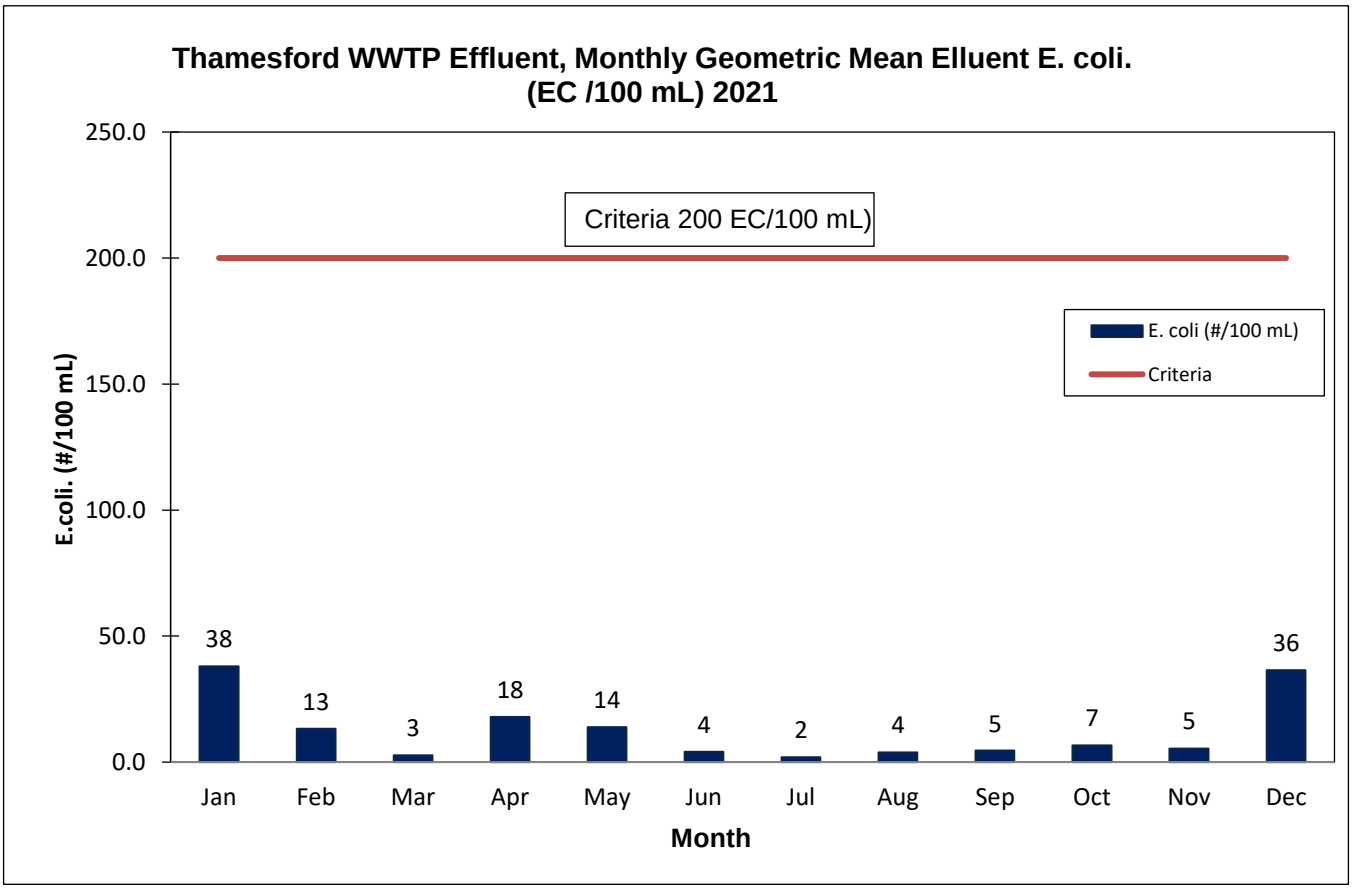





Thamesford WWTP Effluent, Monthly Average Effluent TSS (mg/L), 2021
Effluent TSS (mg/L)
Month
Freezing Period Criteria 15 (mg/L)
Freezing Period Criteria 15 (mg/L)
Non-freezing Period Criteria 10 (mg/L)
TSS (mg/L)
Freezing Criteria
Non-freezing Criteria
3.8
8.0
9.0
11.8
6.9
4.0
2.8
2.8
4.6
4.5
6.0
4.8
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec


Thamesford WWTP Effluent, Monthly Average Effluent Ammonia (mg/L)
2021
Effluent Ammonia (mg/L)
Month
Ammonia (mg/L)
Freezing Criteria
Non-freezing Criteria
Freezing Period Criteria 5 (mg/L)
Freezing Period Criteria 5 (mg/L)
Non-freezing Period Criteria 2 (mg/L)
0.10
7.54
7.77
3.34
0.20
0.10
0.10
0.10
0.10
0.10
0.10
0.10
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec


Thamesford WWTP Effluent, Monthly Average Effluent TP (mg/L), 2021
Effluent TP (mg/L)
0.6
0.5
0.4
0.3
0.2
0.1
0.0
Freezing Period Criteria 0.5 (mg/L)
Freezing Period Criteria 0.5 (mg/L)
Non-freezing Period Criteria 0.2 (mg/L)
TP (mg/L)
Freezing Criteria
Non-freezing Criteria
0.07
0.11
0.08
0.17
0.09
0.05
0.04
0.03
0.04
0.03
0.03
0.04
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Month


Thamesford WWTP Effluent, Monthly Geometric Mean Elluent E. coli.
(EC /100 mL) 2021
E.coli. (#/100 mL)
250.0
200.0
150.0
100.0
50.0
0.0
Criteria 200 EC/100 mL)
E. coli (#/100 mL)
Criteria
38
13
3
18
14
4
2
4
5
7
5
36
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Month

2021 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 www.oxfordcounty.ca/Services-for-You/Water-Wastewater/Wastewater/Annual-reports 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 publicworks@oxfordcounty.ca.

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

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), 119.1 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
2021 Average Daily Flow	5,949 m^3/d
2021 Maximum Daily Flow	11,223 m^3/d
2021 Total Volume of Wastewater	2,173,313 m^3/year

1.2. Major Expenses

In 2021, the Tillsonburg WWTP had forecasted operating and maintenance expenditures of approximately $2,450,000.

In addition to regular operational and maintenance expenditures, Capital Improvement Projects for the Town of Tillsonburg were forecasted at $7,660,000 which included improvements to the wastewater collection system and the Tillsonburg WWTP.

Tillsonburg WWTP Capital Improvement Projects included:

- $6,895,361 2021 ($17,664,928 total) for Phase 1 Upgrade of the Tillsonburg WWTP (multiyear project)
- $180,000 for Stoney Creek Sanitary Forcemain
- $80,000 for the replacement of general operating equipment

Capital Improvement Projects for all systems included:

- $720,000 to develop Countywide SCADA Master Plan for all water/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. Plant 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 2021, and was 100% in compliance with all its regulatory limits for all effluent discharged from the WWTP.

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 2021.

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**
$CBOD_5$	242	1,440
Total Suspended Solids (TSS)	306	1,822
Total Phosphorus (TP)	5.1	30
Total Kjeldahl Nitrogen	36.2	215

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**
$CBOD_5$	weekly	25	2.0 – 11.8	95.1 – 99.2
TSS	weekly	25	7.8 – 21.2	93.1 – 97.5
TP	weekly	1	0.3 – 0.6	88.2 – 94.1
E. coli (May 1 – October 31)	weekly	200 organisms/100 mL (monthly Geometric Mean Density)	4.9 – 56.8 organisms/100 mL (monthly Geometric Mean Density)	--
pH any single sample	weekly	6.0 - 9.5	6.68 – 8.23	--

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)**
$CBOD_5$	5.4	5.949	32	206
TSS	13.62	5.949	81	206
TP	0.43	5.949	3	8.2

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 2021, namely:

- The monthly average concentration objective for TSS of 15 mg/L for the months of January, June, November and December.
- Several single sample objective exceedances occurred throughout 2021 and are listed below.

During the months of January, June, November and December the WWTP experienced higher concentrations of effluent TSS. To react to these objective exceedances, the polymer dosing to the secondary clarifier was increased, to aide with settling. Additionally, centrifuge dewatering operations were increased to make room in the digesters for increased raw sludge loading and wasting from the secondary clarifier.

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

Effluent Parameter	**Sample Frequency**	**Monthly Average Objective Concentration** (milligram per liter unless otherwise indicated)	**Monthly Average Result Min-Max** (milligram per liter unless otherwise indicated)
$CBOD_5$	weekly	15	2.0 – 11.8
TSS	weekly	15	7.8 – 21.2
TP	weekly	0.8	0.3 – 0.6
E. coli (May 1 – October 31)	weekly	150 organisms/100 mL (monthly Geometric Mean Density)	4.9 – 56.8 organisms/100 mL (monthly Geometric Mean Density)
pH any single sample	weekly	6.5 - 8.0	6.68 – 8.23

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 2021	TSS	15	15.8
June 2021	TSS	15	16.9
November 2021	TSS	15	17.5
December 2021	TSS	15	21.2

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

Date	**Parameter**	**Objective mg/L**	**Result mg/L**
January 6, 2021	TSS	15.0	17
January 20, 2021	TSS	15.0	17
January 27, 2021	TSS	15.0	16
February 17, 2021	CBOD	15.0	19
March 17, 2021	TSS	15.0	16
May 5, 2021	Phosphorus	0.8	0.85
June 2, 2021	TSS	15.0	29
June 9, 2021	TSS	15.0	31
June 16, 2021	TSS	15.0	25
August 18, 2021	TSS	15.0	18
September 1, 2021	TSS	15.0	19
September 8, 2021	TSS	15.0	18
September 22, 2021	E. coli	150 (#/100 mL)	196 (#/100 mL)
September 22, 2021	TSS	15.0	22
November 3, 2021	TSS	15.0	26

Date	Parameter	Objective mg/L	Result mg/L
November 10, 2021	TSS	15.0	19
November 24, 2021	TSS	15.0	31
December 15, 2021	TSS	15.0	33
December 22, 2021	TSS	15.0	23
December 29, 2021	TSS	15.0	50

In striving to meet the effluent objectives, operations staff have monitored the pH variations at the plant, adjusted return activated sludge rates, mixed liquor suspended solids concentrations, and waste activated sludge quantities. Biosolids dewatering was increased to ensure digestion capacity and the WWTP was re-seeded with micro-organisms as required to retain treatment capability.

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

An odour complaint was received after hours, on the evening of May 5th, 2021. The odour was noticed on Townline Road, in Tillsonburg. Upon receipt of the complaint, staff investigated potential odour sources around the WWTP, and on Townline Road. No abnormal odours were detected.

The Town of Tillsonburg has completed several projects in 2021 to help eliminate Bypass/Overflows in conformance with Procedure F-5-1:

- Rolling Meadows Reconstruction Phase 1 (Tanager Drive/Falcon Road/Canary Street): The project involves the complete reconstruction of the pavement structure including new barrier curb and gutter, sidewalks, the installation of new storm sewers and catch basins along Tanager, new watermain and service laterals, new sanitary sewers along Tanager and sanitary sewer repairs along Falcon.
- Rolling Meadows Reconstruction Phase 2 (Owl Drive/Woodcock Drive): The project involves the complete reconstruction of the pavement structure including new barrier curb and gutter, sidewalks, the installation of new storm sewers and catch basins and repairs to the sanitary sewer and watermain
- Concession Street project: The project involves the installation of new watermain infrastructure complete with curb and gutter, boulevard sidewalks, and full pavement rehabilitation. One sewer creek crossing was repaired.
- The Town has started a project to complete three dimensional scanning of all sanitary manholes, with approximately fifty percent completion in 2021. The remaining manholes are to be scanned in 2022.

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 2021.

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 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 2021. The MECP inspections typically occur on a 3-year schedule.

Optimization Study

The County completed a WWTP Optimization Study with the MECP innovations branch, which began in the spring of 2020. The Study involved the implementation of Total Mass Control to monitor solids inventory, enhance the nitrification process, and phosphorus reduction strategies. This work is part of Performance Based Training, that aides operators in the understanding of techniques and concepts to optimize WWTP performance.

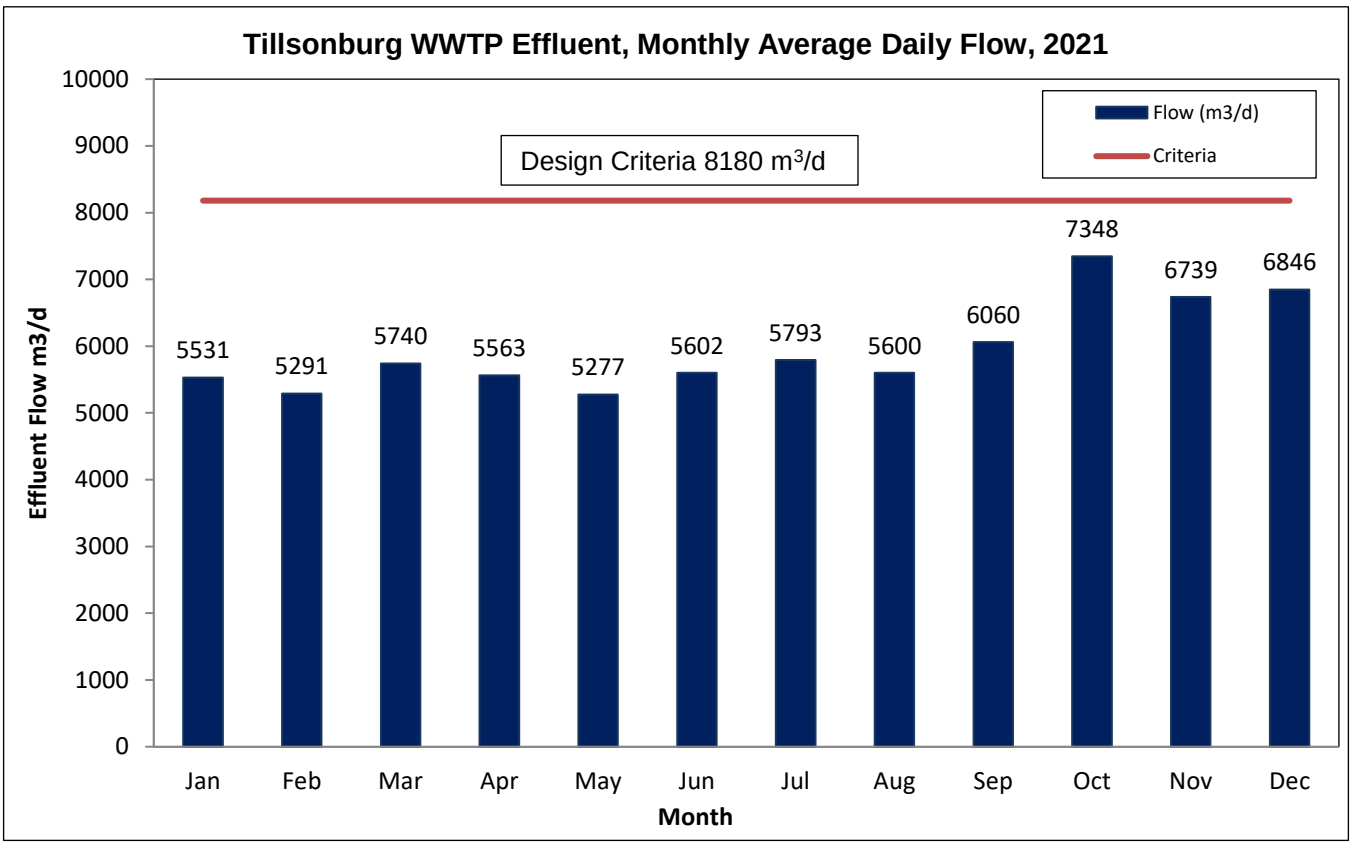
Digester Cleanout

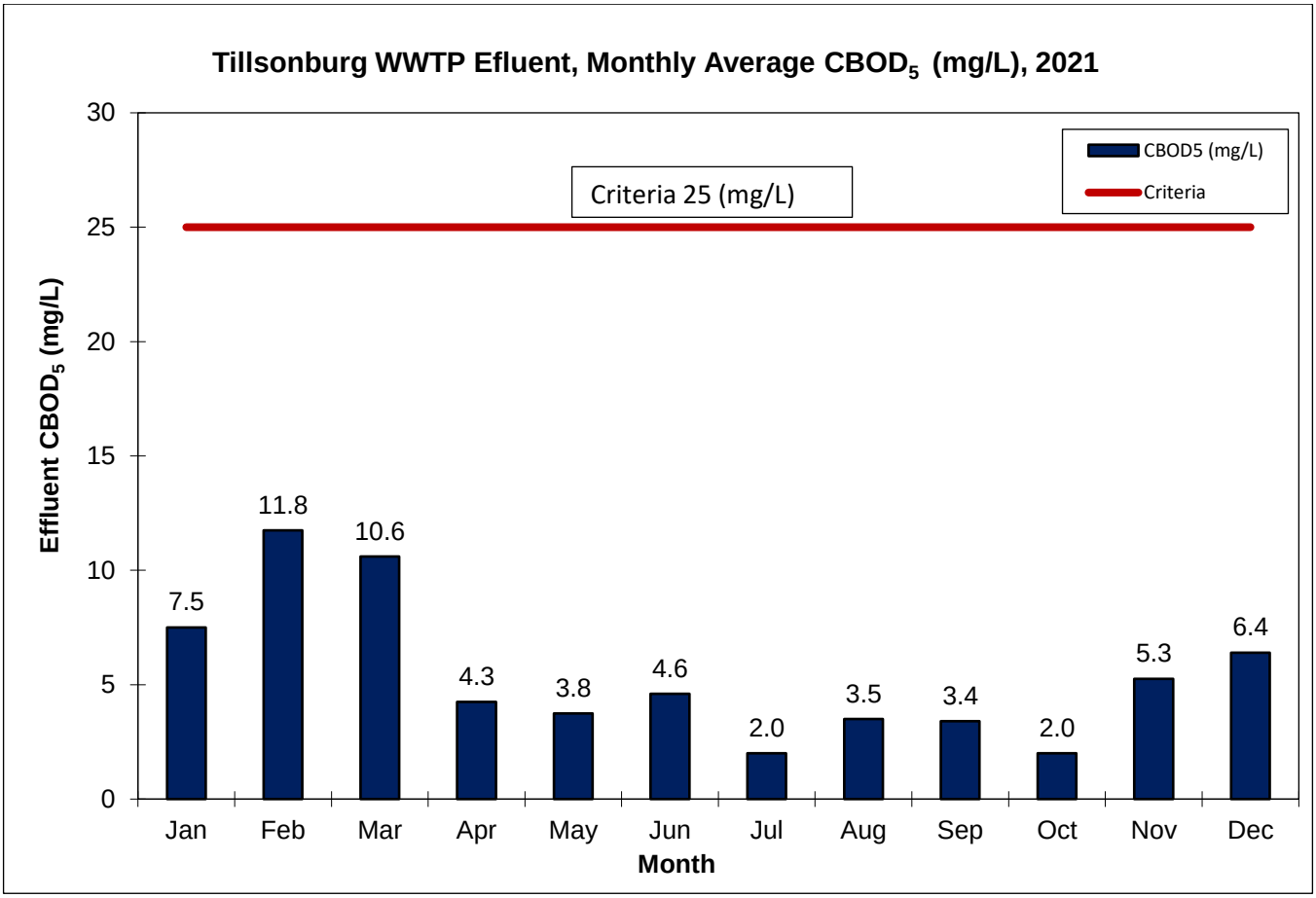
Digester 3 was cleaned out during spring of 2021. This was part of a departmental long term biosolids monitoring plan aimed at optimizing the capacity and equipment of the aerated digesters at the Tillsonburg WWTP.

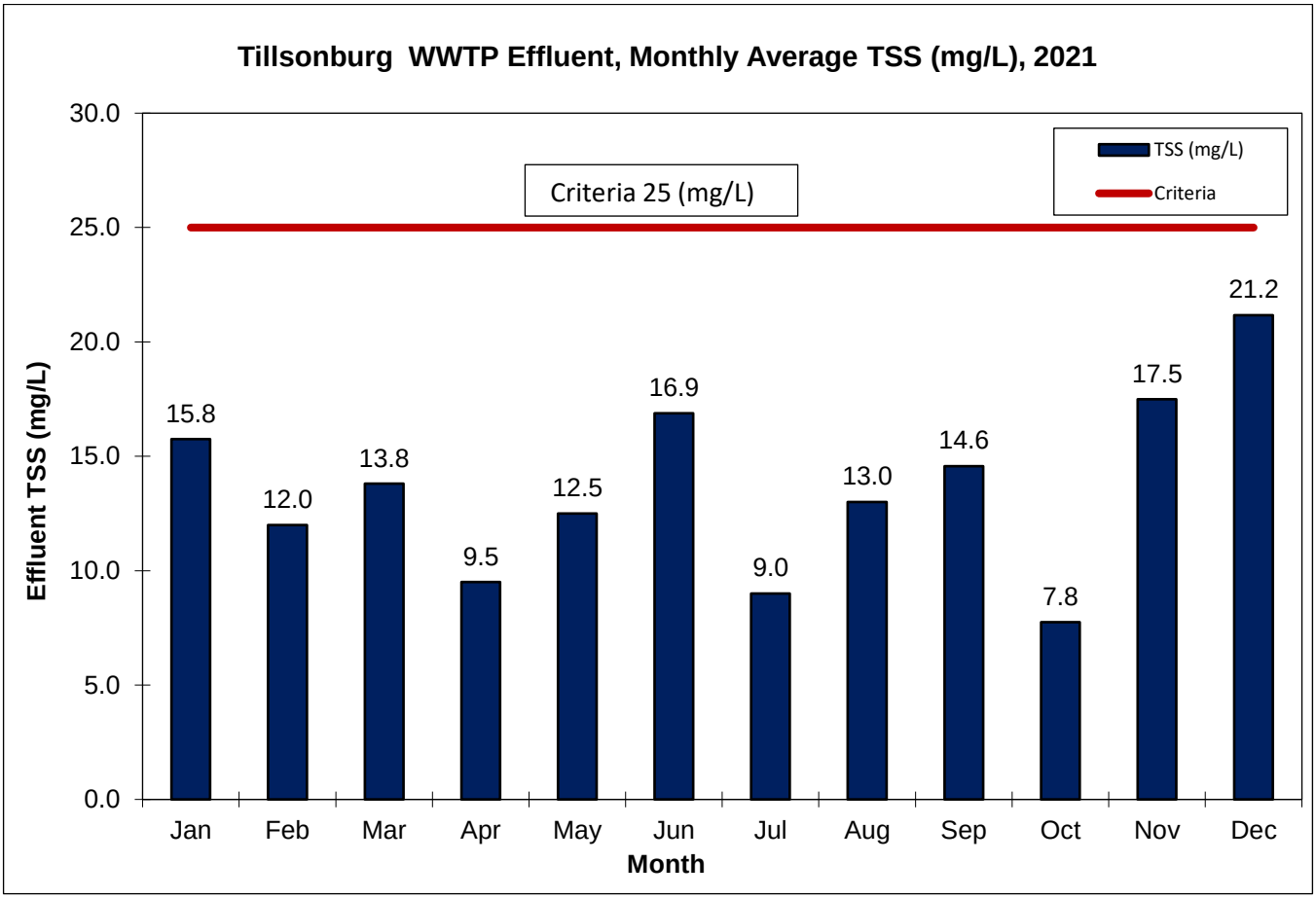
WWTP Upgrade

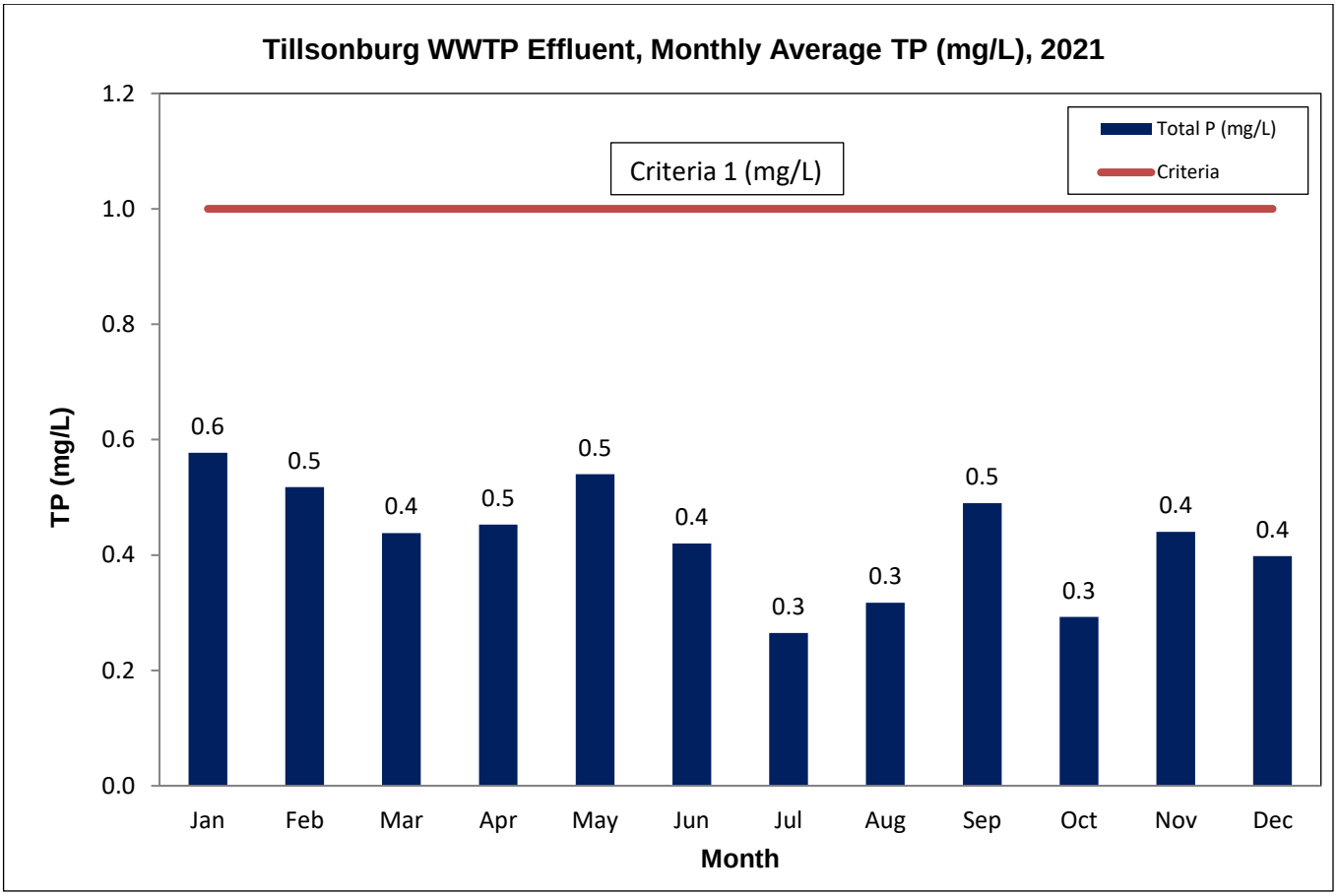
Construction of the upgrades to the Tillsonburg WWTP began in 2021. Upgrades to headworks, primary and secondary clarification, waste thickening and blowers are being completed. The upgrade will address bottlenecks in the treatment process and WWTP performance. Construction is expected to be completed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

APPENDIX A: GRAPHS OF 2021 DISCHARGE PARAMETERS VERSUS EFFLUENT DISCHARGE LIMITS






Tillsonburg WWTP Effluent, Monthly Average TSS (mg/L), 2021
Criteria 25 (mg/L)
TSS (mg/L)
Criteria
Effluent TSS (mg/L)
30.0
25.0
20.0
15.0
10.0
5.0
0.0
15.8
12.0
13.8
9.5
12.5
16.9
9.0
13.0
14.6
7.8
17.5
21.2
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Month


Tillsonburg WWTP Effluent, Monthly Average TP (mg/L), 2021
Criteria 1 (mg/L)
Total P (mg/L)
Criteria
TP (mg/L)
1.2
1.0
0.8
0.6
0.4
0.2
0.0
0.6
0.5
0.4
0.5
0.5
0.4
0.3
0.3
0.5
0.3
0.4
0.4
Jan
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Mar
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May
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Sep
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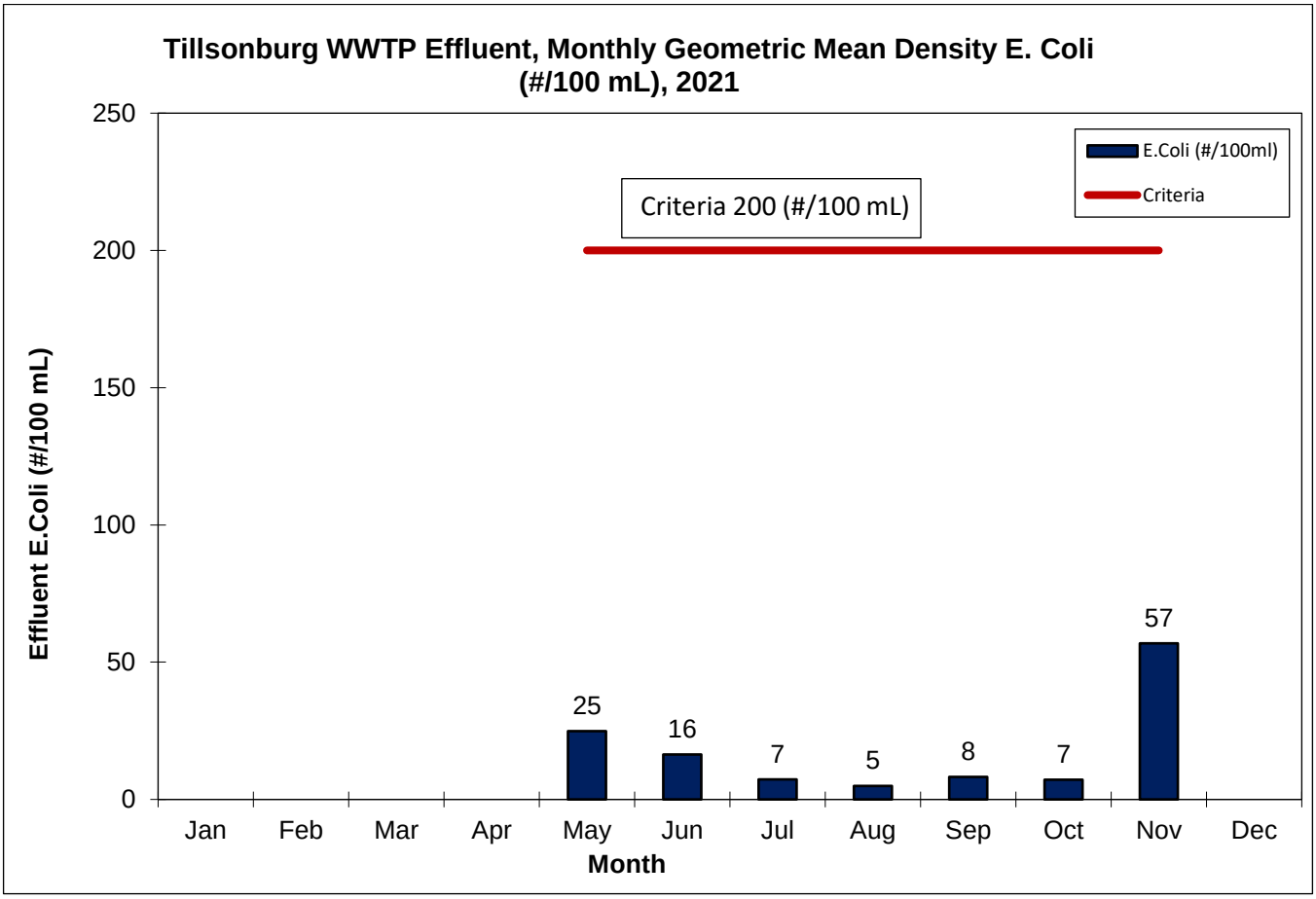
Nov
Dec
Month


Tillsonburg WWTP Effluent, Monthly Geometric Mean Density E. Coli (#/100 mL), 2021
Effluent E.Coli (#/100 mL)
250
200
150
100
50
0
E.Coli (#/100ml)
Criteria
Criteria 200 (#/100 mL)
25
16
7
5
8
7
57
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Month

2021 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 www.oxfordcounty.ca/Services-for-You/Water-Wastewater/Wastewater/Annual-reports 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 publicworks@oxfordcounty.ca.

Wastewater Treatment Plant:	Woodstock WWTP
Wastewater Treatment Plant Number:	120000685
Environmental Compliance Approval (ECA):	5950-7XQKXS (December 18, 2009)
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: publicworks@oxfordcounty.ca
Reporting Period:	January 1, 2021 – December 31, 2021

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), 249 kilometers of sanitary gravity sewers and 9.06 kilometers of sanitary forcemain sewers. The Embro and Innerkip wastewater collection systems together include 7 sewage pump stations, 19.5 kilometers of sanitary gravity sewers, 22.4 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 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.

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

Facility	Woodstock WWTP
Design Capacity (Average Day)	33,000 m^3/d
Design Capacity (Peak Flow)	66,000 m^3/d
2021 Average Daily Flow	21,060 m^3/d
2021 Maximum Daily Flow	60,249 m^3/d
2021 Total Volume of Wastewater	* 7,701,756 m^3/year
2021 Total Received Hauled Waste	41,768 m^3/year (25,722 m^3/year leachate)

* Included in this total is 169,318 m^3/year from the Embro & Innerkip wastewater collection systems

1.2. Major Expenses

In 2021, the Woodstock WWTP had forecasted operating and maintenance expenditures of approximately $4,889,000.

In 2021, Embro and Innerkip wastewater collection systems had forecasted operating and maintenance expenditures of approximately $953,000.

In addition to regular operational and maintenance expenditures, Capital Improvement Projects for Woodstock totaled $3,913,000 for improvements to the wastewater collection system (included Embro and Innerkip) and the Woodstock WWTP.

Capital Improvement Projects included:

- $240,000 Jack Poole Trunk Sewer
- $205,000 Woodstock North Trunk I&I Study
- $1,400,000 Woodstock Linear R/R CR Project
- $133,000 Innerkip Odour Control
- $160,000 for the replacement of general operating equipment

Capital Improvement Projects for all systems included:

- $720,000 to develop Countywide SCADA Master Plan for all water/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 2021, 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), 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 2021. 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 2021, the monthly average results at all times met the Monthly Average TRC limit and were less than 0.05 mg/L and, therefore, were in compliance. The Federal Government's P2 target for TRC of 0.02 mg/L was met on the annual average TRC of 0.02 mg/L in 2021.

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	156	3,274
Total Suspended Solids (TSS)	212	4,468
Total Phosphorus (TP)	3	63
Total Kjeldahl Nitrogen	24.7	520

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 – 2.8	98.0 – 98.6
$CBOD_5$ (December 01 to April 30)	weekly	20	2.0 – 5.3	96.2 – 98.6
TSS	weekly	15	3.3 – 6.8	96.8 – 98.4
TP	weekly	0.75	0.22 – 0.37	87.7 – 92.7
Total Ammonia Nitrogen (May 1 to November 30)	weekly	3	0.1 – 0.3	98.5 – 99.5

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
Total Ammonia Nitrogen (Dec. 1 to April 30)	weekly	5.0	0.4 – 2.5	87.4– 98.0
TRC (May 1-October 31)	weekly	<0.05	0.01 – 0.02	N/A
E. coli (May 1 – October 31)	weekly	200 organisms/100 mL (monthly Geometric Mean Density)	6.2 – 30.3 organisms/100 mL (monthly Geometric Mean Density)	N/A
pH any single sample	weekly	6.0 - 9.5	6.6 – 7.8	N/A

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 met at the Woodstock WWTP in 2021, with the exception of 3 single samples. The results 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 – 5.3
TSS	weekly	12	3.3 – 6.8
TP	weekly	0.5	0.22 – 0.37
Total Ammonia Nitrogen (May 1 to November 30)	weekly	2.0	0.1 – 0.3
Total Ammonia Nitrogen (Dec. 1 to April 30)	weekly	3.0	0.4 – 2.5
E. coli (May 1 – October 31)	weekly	200 organisms/100 mL (monthly Geometric Mean Density)	6.2 – 30.3 organisms/100 mL (monthly Geometric Mean Density)
pH any single sample	weekly	6.0 - 8.5	6.6 – 7.8

Woodstock effluent single samples that did not meet effluent objective concentrations in 2021 included the following:

Date	Parameter	Objective mg/L	Result mg/L
February 18, 2021	TAN	3.0	5.8
June 23, 2021	TP	0.5	0.52
July 20, 2021	E. coli	200 organisms/100 mL (monthly Geometric Mean Density)	306

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

On July 31, 2021 there was a leak discovered from the forcemain near the Innerkip Main SPS. The volume of the leak was approximately 86 m^3 during the previous 12 hours. The area was dug up to expose the break and then repaired. Wastewater that ponded in the area of the break was cleaned up with a vacuum truck and saturated soil was removed for disposal.

On August 30, 2021 there was a leak discovered from the forcemain near George Street in Innerkip. The volume of the leak was approximately 3 m^3 during the previous 4 hours. The area was dug up to expose the break and then repaired. Wastewater that ponded in the area of the break was cleaned up with a vacuum truck and saturated soil was removed for disposal.

Both events were reported to the MECP at the time they occurred.

A complaint was received on May 24, 2021 about high levels of septic odour in a subdivision under construction in Woodstock. After investigation, it was found that the subdivision developer was flushing and completing camera inspections of the sewers in the area, and had notified all residence of the work being performed.

There were no additional overflows, bypassing, upsets, spills, or abnormal conditions at the Woodstock WWTP in 2021.

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 2021. The MECP inspections typically occur on a 3-year schedule.

COVID-19 Study: Ontario Wastewater Surveillance Initiative

In 2021, the Woodstock WWTP was selected by the MECP to be a part of the Ontario Wastewater Surveillance Initiative. The study has been funded by a $12 million dollar 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.

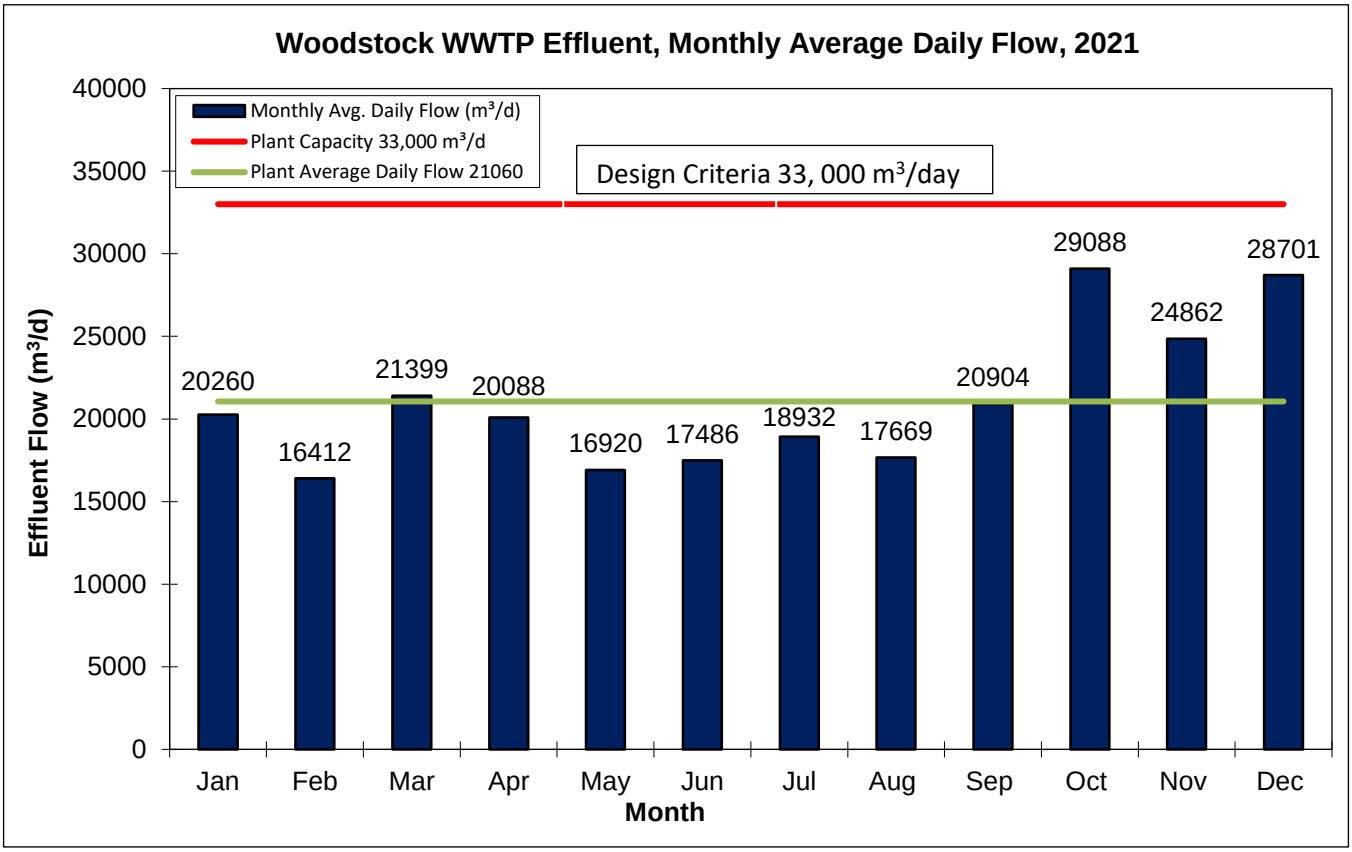
North Trunk Sewer Inflow and Infiltration Investigation

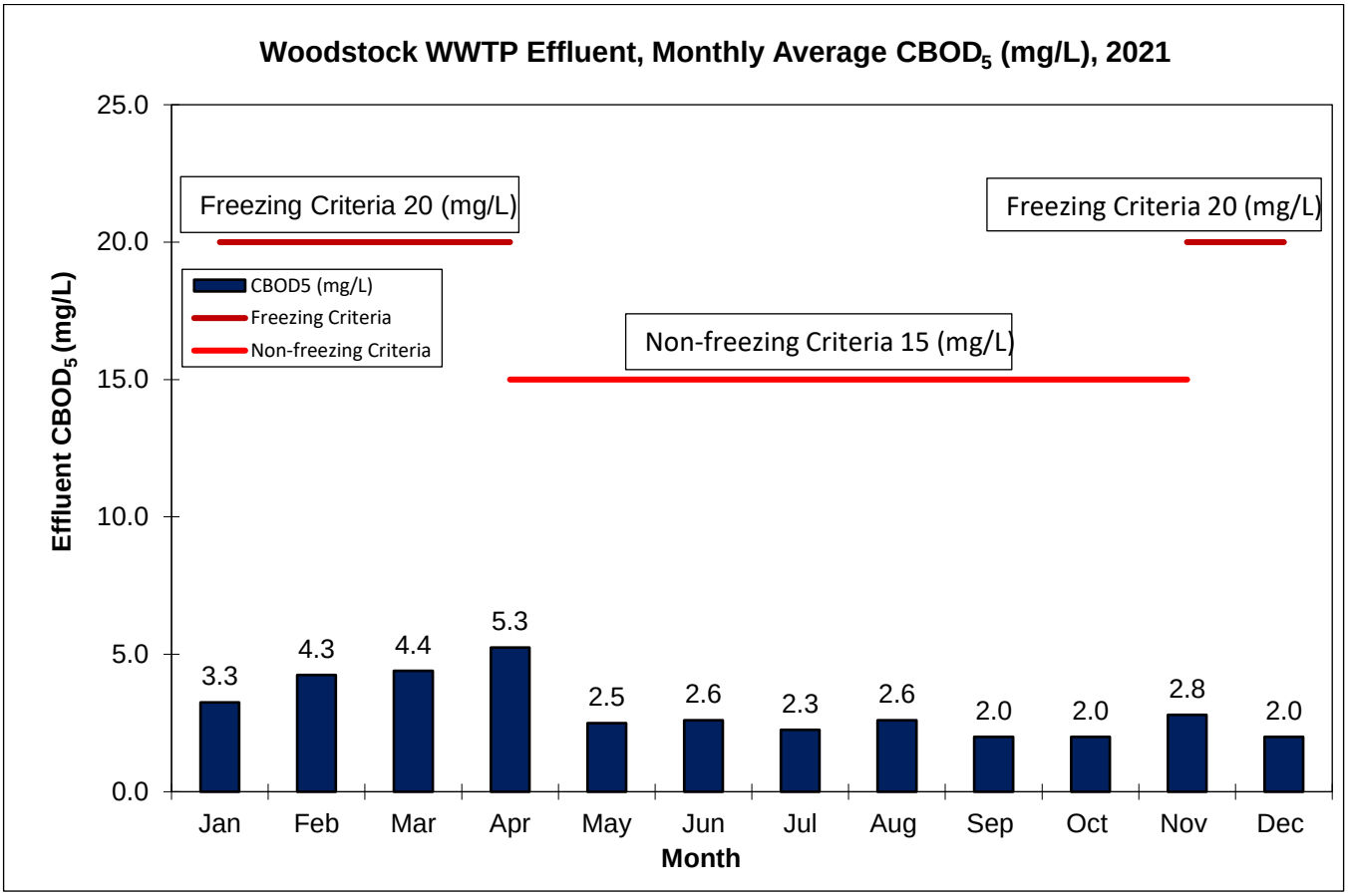
A study was initiated in the fall of 2021, to locate and reduce inflow and infiltration (I&I) within the City of Woodstock North Trunk Sewer catchment area. The County is actively pursuing ways of being sustainable, and have identified the older sections of the collection system are significant contributors 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 the fall of 2022.

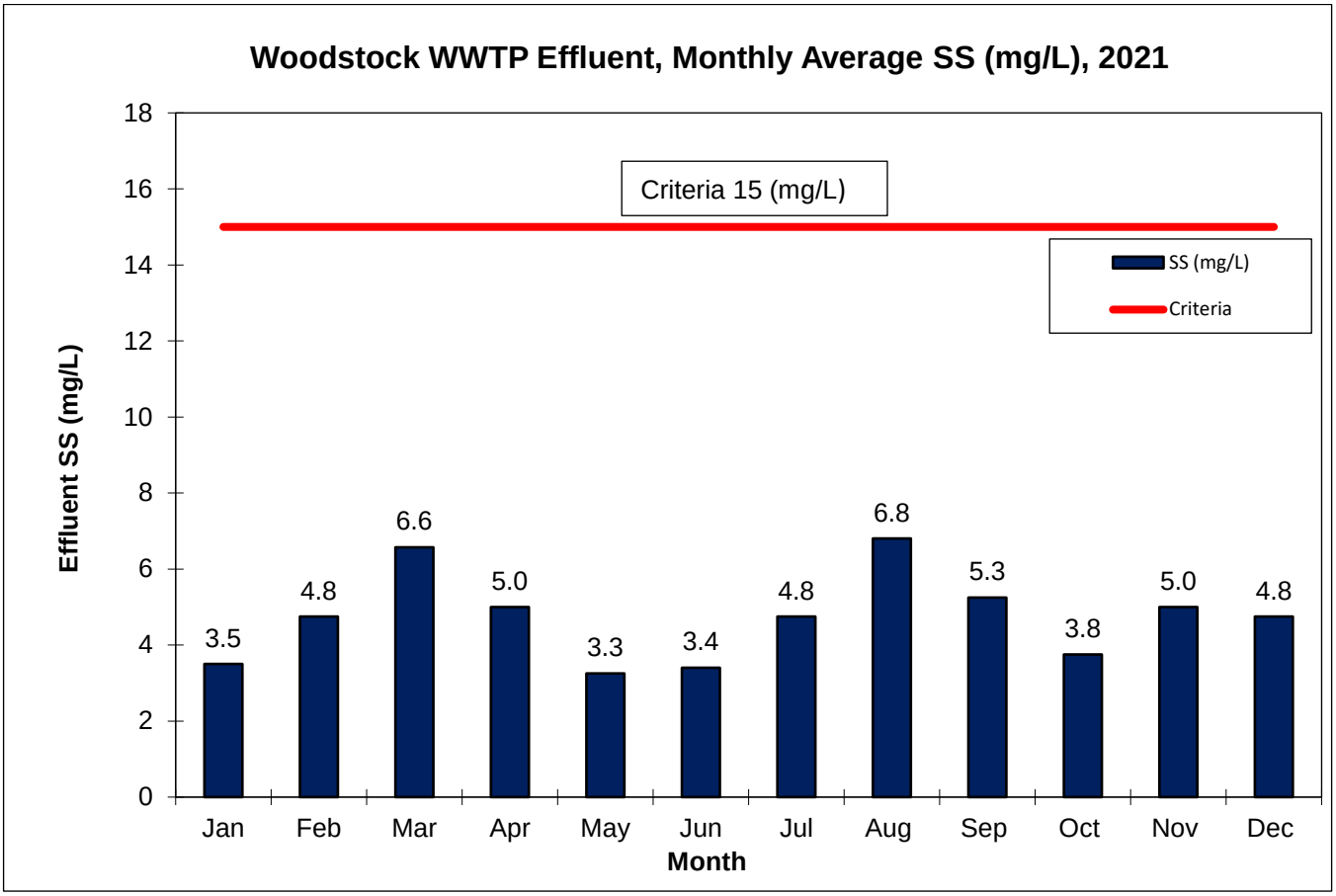
Capital Improvement Projects and Energy Optimization

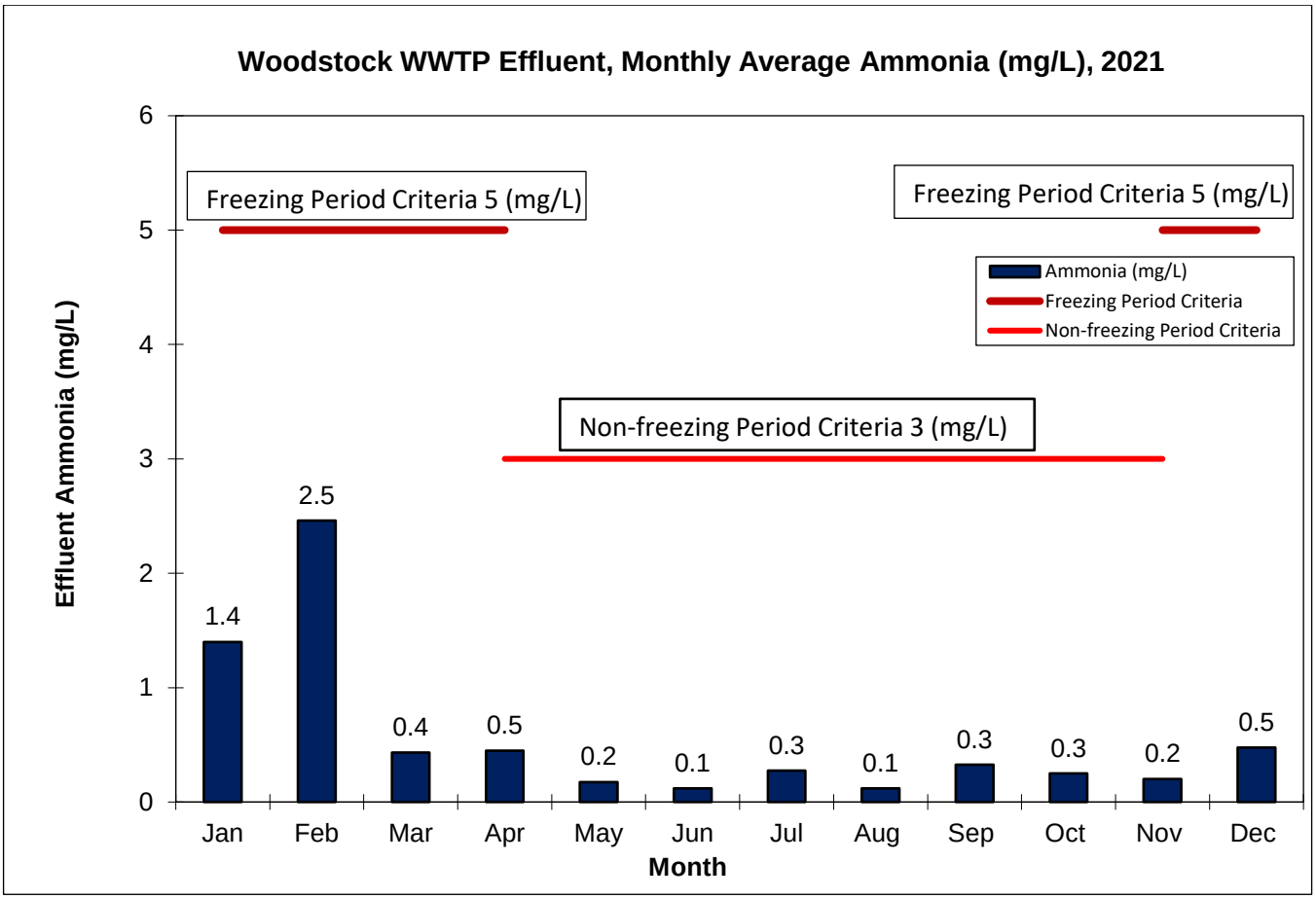
Various Capital Improvement Projects were completed at the Woodstock WWTP in 2021, which will result in significant energy and cost savings. The replacement of older equipment with more efficient units and the use of variable speed drives to control output will realize an annual electrical avoidance of 201,964 kWh (equivalent greenhouse gas emission reduction of approximately 8.1 Tonne CO_2e per year). The 2021 upgrades will avoid an additional $32,315 in yearly energy costs.

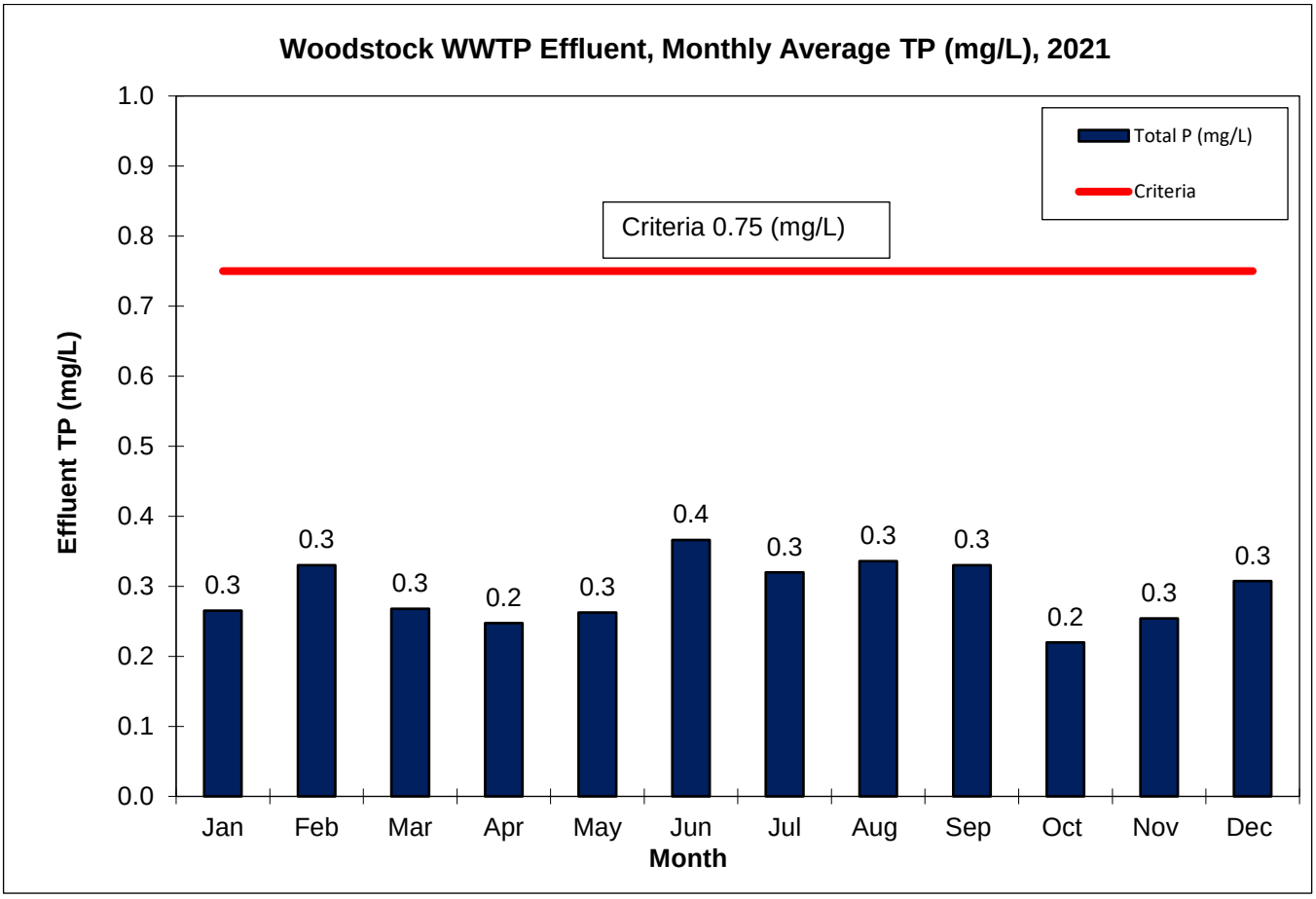
APPENDIX A: GRAPHS OF 2021 DISCHARGE PARAMETERS VS. EFFLUENT DISCHARGE LIMITS

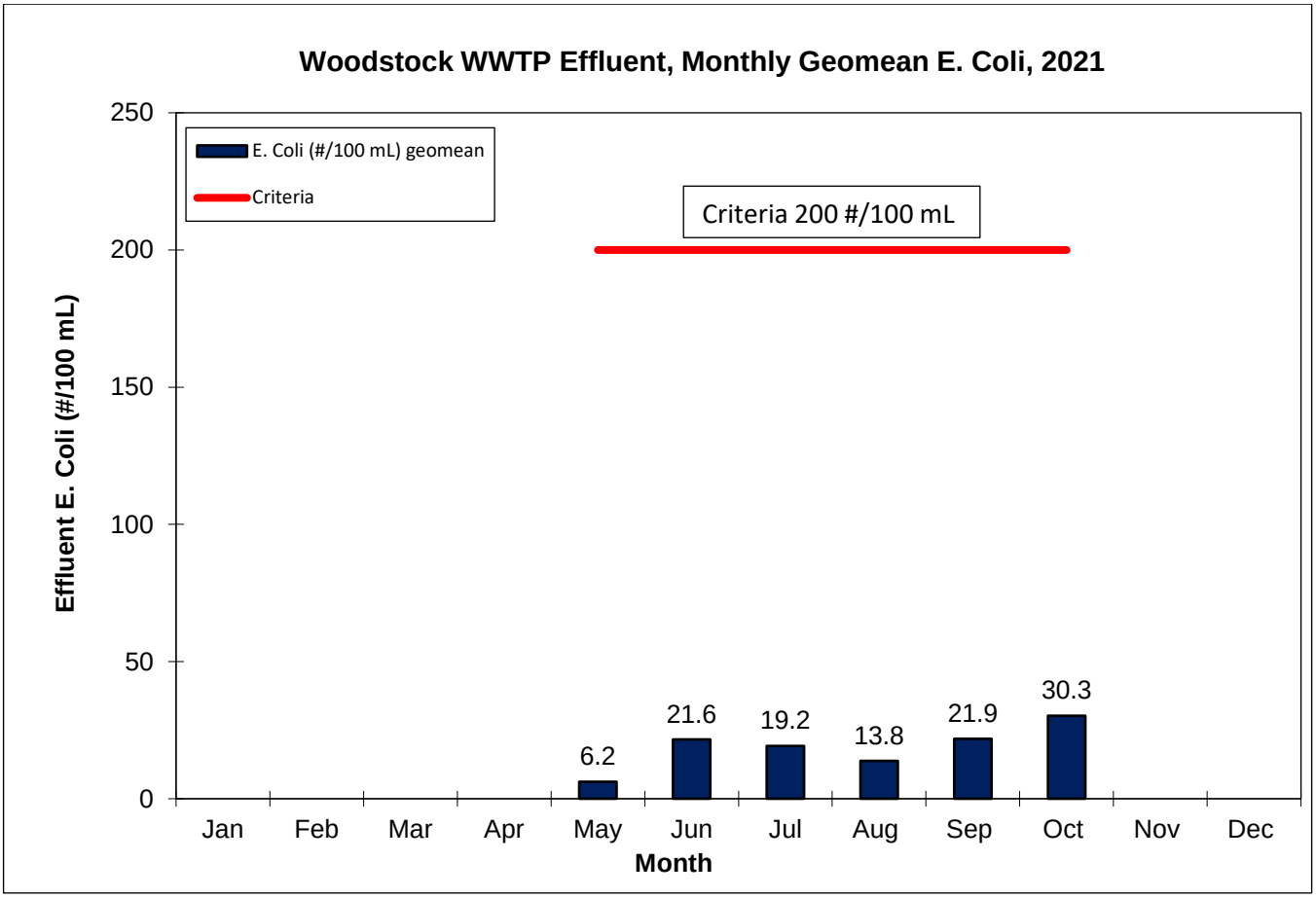





Woodstock WWTP Effluent, Monthly Average SS (mg/L), 2021
Effluent SS (mg/L)
Criteria 15 (mg/L)
SS (mg/L)
Criteria
3.5
4.8
6.6
5.0
3.3
3.4
4.8
6.8
5.3
3.8
5.0
4.8
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Month


Woodstock WWTP Effluent, Monthly Average Ammonia (mg/L), 2021
Effluent Ammonia (mg/L)
Freezing Period Criteria 5 (mg/L)
Freezing Period Criteria 5 (mg/L)
Ammonia (mg/L)
Freezing Period Criteria
Non-freezing Period Criteria
Non-freezing Period Criteria 3 (mg/L)
1.4
2.5
0.4
0.5
0.2
0.1
0.3
0.1
0.3
0.3
0.2
0.5
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Month


Woodstock WWTP Effluent, Monthly Average TP (mg/L), 2021
Effluent TP (mg/L)
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
Total P (mg/L)
Criteria
Criteria 0.75 (mg/L)
0.3
0.3
0.3
0.2
0.3
0.4
0.3
0.3
0.3
0.2
0.3
0.3
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Month


Woodstock WWTP Effluent, Monthly Geomean E. Coli, 2021
Effluent E. Coli (#/100 mL)
250
200
150
100
50
0
E. Coli (#/100 mL) geomean
Criteria
Criteria 200 #/100 mL
6.2
21.6
19.2
13.8
21.9
30.3
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Month