



2023 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 <http://www.oxfordcounty.ca/waterwastewater> or by contacting the Public Works Department.

All efforts have been made to ensure the information presented in this report is as accurate as possible.

If you have any questions or comments concerning the report, please contact the County at the address and phone number listed below or by email at wastewater@oxfordcounty.ca.

Wastewater Treatment Plant:	Drumbo WWTP
Wastewater Treatment Plant Number:	120002479
Environmental Compliance Approval (ECA):	7607-BYQRYA (April 29, 2021)
Reporting Period:	January 1, 2023 – December 31, 2023

Wastewater Treatment Plant Owner & Contact Information:
Oxford County Public Works Department - Wastewater Services
P.O. Box 1614
21 Reeve Street
Woodstock, ON N4S 7Y3
Telephone: 519-539-9800
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Email: wastewater@oxfordcounty.ca

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 stations (SPS), 6.9 kilometers of sanitary gravity sewers, and 2.7 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 with the regulations, and collect samples as required by the ECA. Alarms automatically notify operators in the event of failure of critical operational requirements.

The Drumbo WWTP is located at 93 Peterson Street, Drumbo, Ontario, with the Facility description provided below.

Facility	Drumbo WWTP
Design Capacity	300 m ³ /d
2023 Average Daily Flow	267 m ³ /d
2023 Maximum Daily Flow	624 m ³ /d
2023 Total Volume of Wastewater	97,314 m ³ /year

1.2 Major Expenses

In 2023, the Drumbo WWTP had forecasted operating and maintenance expenditures of approximately \$330,000.

In addition to regular operational and maintenance expenditures, Capital Improvement Projects for the Village of Drumbo were forecasted at \$1,902,000 which included improvements to the wastewater collection system and the Drumbo WWTP.

Drumbo Capital Improvement Projects included:

- \$1,800,000 - 2023 (\$9,660,000 total) for the expansion to the Drumbo WWTP (multi-year project with the Total Forecasted Capital Expenditures)
- \$72,000 for Standby Power Upgrade

- \$20,000 for the replacement of general operating equipment
- \$10,000 for Feasibility Study

Capital Improvement Projects for all systems included:

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

2. SUMMARY AND INTERPRETATION OF MONITORING DATA

2.1. Effluent Quality Assurance and Control Measures

Sampling Procedure

Influent samples are taken 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 2023, the Drumbo WWTP provided effective treatment with 776 samples out of 831 meeting compliance, or 93% compliance to its regulatory limits for all effluent discharged from the WWTP.

In April, extreme precipitation caused high average daily flows of 380 m³/day, well above the 300 m³/day rated capacity of the WWTP. The WWTP rated capacity was exceeded 24 out of 30 days during the month of April, which resulted in a washout of

aeration biomass. To respond, SBR cycle times were adjusted, vacuum trucks were brought in to temporarily transport liquid to another WWTP to provide hydraulic relief, aeration biomass was reseeded from another WWTP and additional operational time was dedicated to the WWTP.

- The Total Ammonia Nitrogen Monthly Average Daily Effluent Loading Concentration was 1.44 kg/d, which was above the ECA Total Ammonia Nitrogen Monthly Average Daily Effluent Loading Concentration Limit of 1.36 kg/d

During May, influent flow continued to exceed the design capacity of the plant at the beginning of the month. The temperature of the plant influent was slow to warm throughout the month due to some unseasonal late spring frosts resulting in reduced nitrification. Due to poor settling in the reactors, reactor set points were adjusted to help capture solids, which ultimately resulted in favourable WWTP effluent Total Suspended Solids rather than favourable WWTP effluent Total Ammonia Nitrogen concentrations. In response additional trash tank sludge loads were hauled to the Woodstock WWTP, reactors were reseeded with return activated sludge from the Woodstock WWTP, the filter equalization tank was cleaned more frequently, increased operational time was dedicated for microscopic analysis and process testing, and the waste activated sludge set points were lowered to increase sludge age to aide nitrification.

- The Total Ammonia Nitrogen Monthly Average Daily Effluent Loading Concentration was 1.59 kg/d, which was above the ECA Total Ammonia Nitrogen Monthly Average Daily Effluent Loading Concentration Limit of 0.8 kg/d
- The Total Ammonia Nitrogen Monthly Average Effluent Concentration was 5.78 mg/L, which was above the ECA Total Ammonia Nitrogen Monthly Average Effluent Concentration Limit of 2.7 mg/L

In June, trying to decrease the high effluent ammonia concentrations the WWTP had experienced in May, efforts were put into building up the aeration biomass. The Total Suspended Solids concentration and loading exceedances during the month were a direct result of an unfavourable WWTP effluent Total Suspended Solids concentration sample result of 59 mg/L on June 29, 2023. Reactor #2 was taken offline for approximately four hours on June 28, 2023 to inspect the air piping for any potential leaks or missing diffusers. While the air supply system was found to be intact and operating as designed, the aeration biomass concentration was quite light the following day resulting in poor treatment. Actions taken included swabbing the forcemain into the WWTP, adjusting SBR timers to increase the aeration biomass, additional trash tank loads removed to the Woodstock WWTP, and increased operational time was dedicated to monitor the process.

- The Total Ammonia Nitrogen Monthly Average Daily Effluent Loading Concentration was 1.79 kg/d, which was above the ECA Total Ammonia Nitrogen Monthly Average Daily Effluent Loading Concentration Limit of 0.8 kg/d

- The Total Ammonia Nitrogen Monthly Average Effluent Concentration was 8.15 mg/L, which was above the ECA Total Ammonia Nitrogen Monthly Average Effluent Concentration Limit of 2.7 mg/L
- The Total Suspended Solids Monthly Average Daily Effluent Loading Concentration was 3.29 kg/d, which was above the ECA Total Suspended Solids Monthly Average Daily Effluent Loading Concentration Limit of 2.8 kg/d
- The Total Suspended Solids Monthly Average Effluent Concentration was 15.0 mg/L, which was above the ECA Total Suspended Solids Monthly Average Effluent Concentration Limit of 9.3 mg/L

During September, Operations staff struggled to maintain the proper balance of food to micro-organism ratio and adequate sludge age. Additional operational time was dedicated to increase tank cleaning frequency, removal of additional trash tank loads to the Woodstock WWTP and adjustments to WWTP parameters to improve performance.

- The Total Ammonia Nitrogen Monthly Average Effluent Concentration was 3.70 mg/L, which was above the ECA Total Ammonia Nitrogen Monthly Average Effluent Concentration Limit of 2.7 mg/L
- The Total Suspended Solids Monthly Average Effluent Concentration was 9.8 mg/L, which was above the ECA Total Suspended Solids Monthly Average Effluent Concentration Limit of 9.3 mg/L

In October, Operations staff struggled to maintain the proper balance of food to micro-organism ratio and adequate sludge age. Additional operational time was dedicated to increase tank cleaning frequency, removal of additional trash tank loads to the Woodstock WWTP and adjustments to WWTP parameters to improve performance.

- The Total Ammonia Nitrogen Monthly Average Daily Effluent Loading Concentration was 1.17 kg/d, which was above the ECA Total Ammonia Nitrogen Monthly Average Daily Effluent Loading Concentration Limit of 0.8 kg/d
- The Total Ammonia Nitrogen Monthly Average Effluent Concentration was 5.84 mg/L, which was above the ECA Total Ammonia Nitrogen Monthly Average Effluent Concentration Limit of 2.7 mg/L

All non-compliances were reported to the 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 2023. 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.

Influent Wastewater Characteristics (annual average)		
Parameter	Concentration (mg/L)	Loading (kg/d)
BOD ₅	116	31
Total Suspended Solids	72	19
Total Phosphorus	3	1
Total Kjeldahl Nitrogen	31	8

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 – 5.5	94.1 – 97.8
Total Suspended Solids (TSS)	weekly	9.3	2.8 – 15.0	79.2 – 96.1
Total Phosphorus (TP)	weekly	0.46	0.1 – 0.36	88.0 – 96.7
Total Ammonia Nitrogen (TAN) (May 1 to October 31)	weekly	2.7	1.4 – 8.2	--
Total Ammonia Nitrogen (TAN) (Nov. 1 to April 30)	weekly	4.5	2.6 – 4.5	--
E. coli	weekly	200 colonies/100 mL (monthly Geometric Mean Density)	2.0 – 21.8 colonies/100 mL (month Geometric Mean Density)	--
DO any single sample	weekly	5.0 or higher	5.0 – 9.9	--
pH any single sample	weekly	6.0 - 9.5	6.7 – 7.8	--

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 – 5.5
Total Suspended Solids (TSS)	weekly	4.7	2.8 – 15.0
Total Phosphorus (TP)	weekly	0.27	0.1 – 0.36
Total Ammonia Nitrogen (TAN) (May 1 to October 31)	weekly	1.8	1.4 – 8.2
Total Ammonia Nitrogen (TAN) (Nov. 1 to April 30)	weekly	3.6	2.6 – 4.5
E. coli	weekly	150 colonies/100 mL (monthly Geometric Mean Density)	2.0 – 21.8 colonies/100 mL (month Geometric Mean Density)
DO any single sample	weekly	6 or higher	5.0 – 9.9
pH any single sample	weekly	6.5 - 8.5	6.7 – 7.8

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 m³/day to 450 m³/day (with a phase 2 expansion planned to increase capacity to approximately 660 m³/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 2024.

Effluent dissolved oxygen has a single sample objective of 6 mg/L, which was not achieved on June 12, 2023, with a measured result of 5.02 mg/L.

Exceedances of the Monthly Average Objectives in 2023, are included the following table.

Month	Parameter	Objective (mg/L unless otherwise indicated)	Monthly Average Result (mg/L unless otherwise indicated)
March 2023	FLOW	300 m ³ /d	364 m ³ /d
April 2023	FLOW	300 m ³ /d	380 m ³ /d
April 2023	TSS	4.7	6.7
April 2023	TAN	3.6	3.8
May 2023	TAN	1.8	5.8
June 2023	TSS	4.7	15.0
June 2023	TP	0.27	0.32
June 2023	TAN	1.8	8.2
July 2023	TSS	4.7	7.2
July 2023	TAN	1.8	2.3
August 2023	TSS	4.7	8.3
August 2023	TP	0.27	0.30
September 2023	TSS	4.7	9.8
September 2023	TP	0.27	0.36
September 2023	TAN	1.8	3.7
October 2023	TSS	4.7	7.5
October 2023	TAN	1.8	5.8
November 2023	TAN	3.6	4.5
December 2023	TSS	4.7	7.8
December 2023	CBOD ₅	4.7	5.5

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

There was one overflow event at the Drumbo WWTP in 2023.

On April 1, 2023, heavy rainfall in the area resulted in extremely high flow entering the WWTP, which alerted the On-call Wastewater Operator of high level alarm conditions. The Operator arrived onsite at the WWTP and found the trash tank liquid level rising, which eventually resulted in approximately 1 m³ of influent exiting through the trash tank overflow pipe into the onsite storm water area. Upon receiving the high level alarm, vacuum trucks were dispatched to the Drumbo WWTP. The vacuum trucks were used to provide hydraulic relief for the treatment plant and to clean up the spilled liquid. Loads of influent were trucked to neighbouring WWTPs, to decrease the chances of subsequent spills. Samples of the spill were collected and analyzed. The incident was reported to the Spills Action Center and MECP at the time of occurrence.

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

There were no complaints in 2023.

In conformance with Procedure F-5-1, to eliminate Bypass/Overflows, a new natural gas powered generator and automatic transfer switch was installed at the main SPS in April of 2023. Additionally, in February a linear repair was completed on Taylor Street, reducing infiltration into the wastewater collection system.

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 2023.

5. MONITORING EQUIPMENT MAINTENANCE AND CALIBRATION

The calibration of flow meters is conducted yearly by JBF Controls Ltd. in accordance with the requirements of the ECA. The records are kept on-site at the 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 conduct a facility inspection of the Drumbo WWTP in 2023. The MECP inspections typically occur on a three-year schedule.

Plant Expansion Phase 1

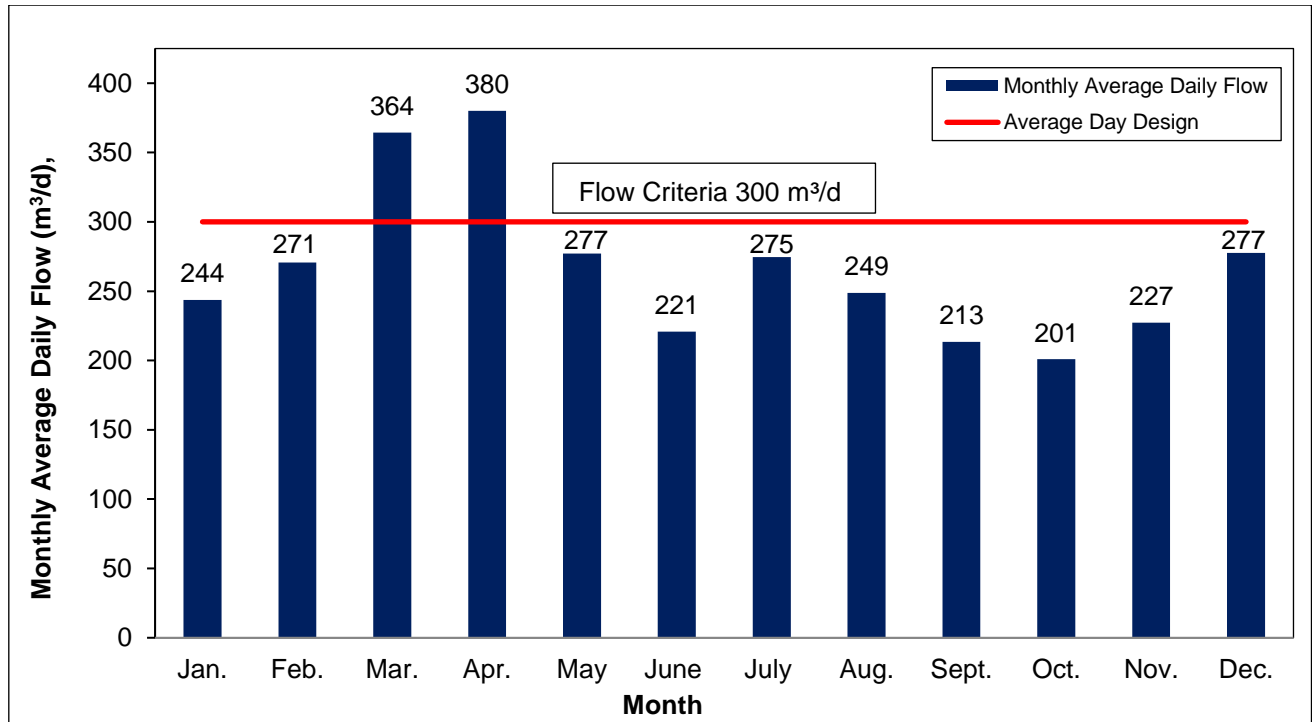
In 2021, construction began to expand the rated capacity of the Drumbo WWTP from 300 m³/day to 450 m³/day. The upgrades include headworks, Membrane Bioreactors (MBR), disinfection equipment, and new plant backup power supply. This work is expected to be completed in April 2024.

EA for Plant Expansion Phase 2

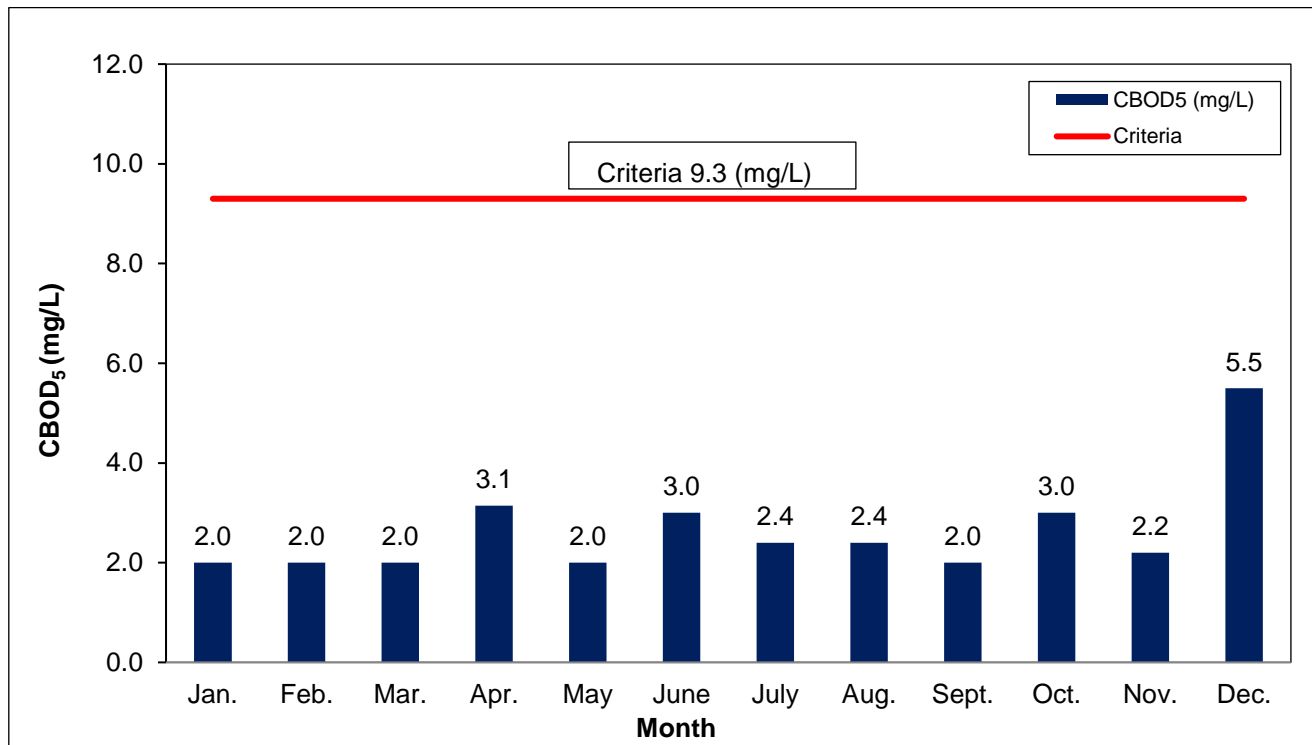
A Class Environmental Assessment (EA) for the Phase 2 Expansion of the Drumbo WWTP was initiated in June of 2023, which will increase WWTP rated capacity from 450 m³/day to 660 m³/day. The EA includes an Assimilative Capacity Study of the receiver and is expected to be completed this year.

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

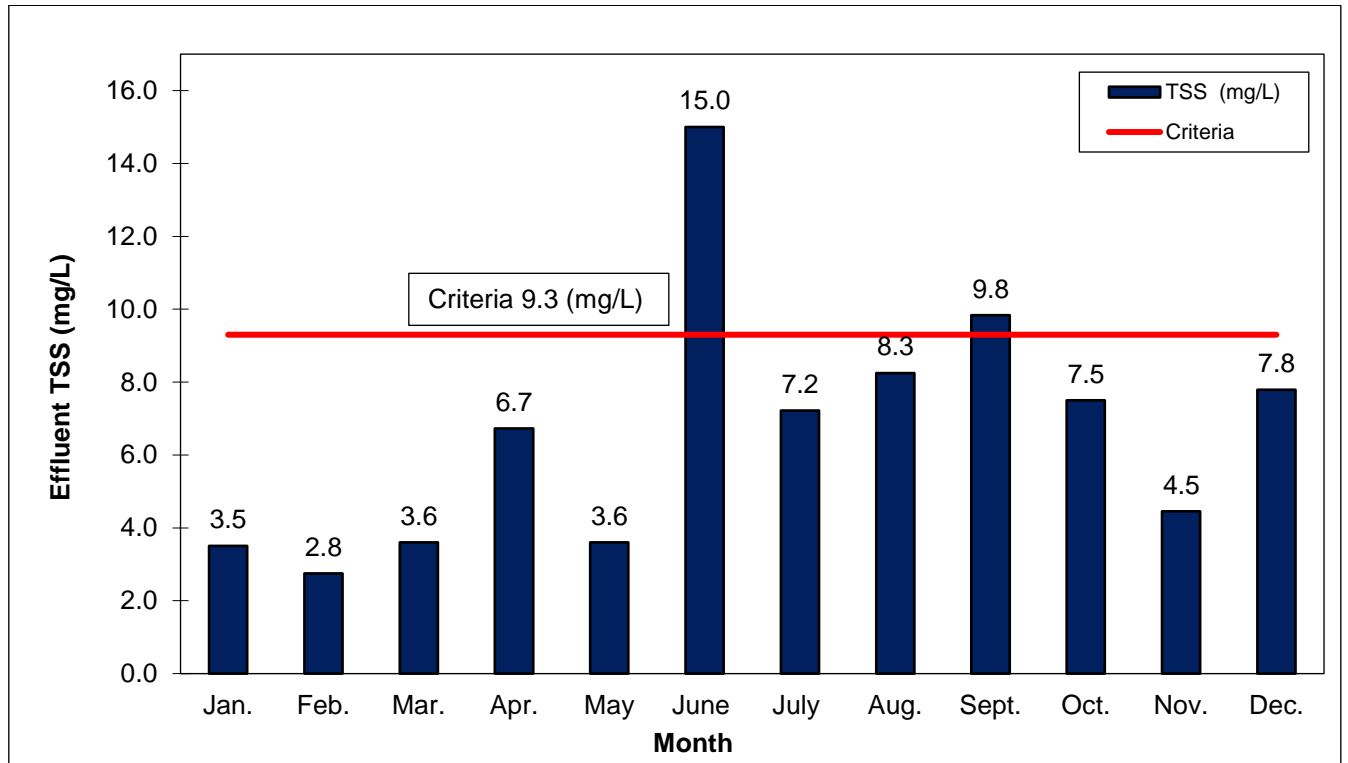
Drumbo WWTP Monthly Average Daily Flow in Cubic Meters per day, 2023



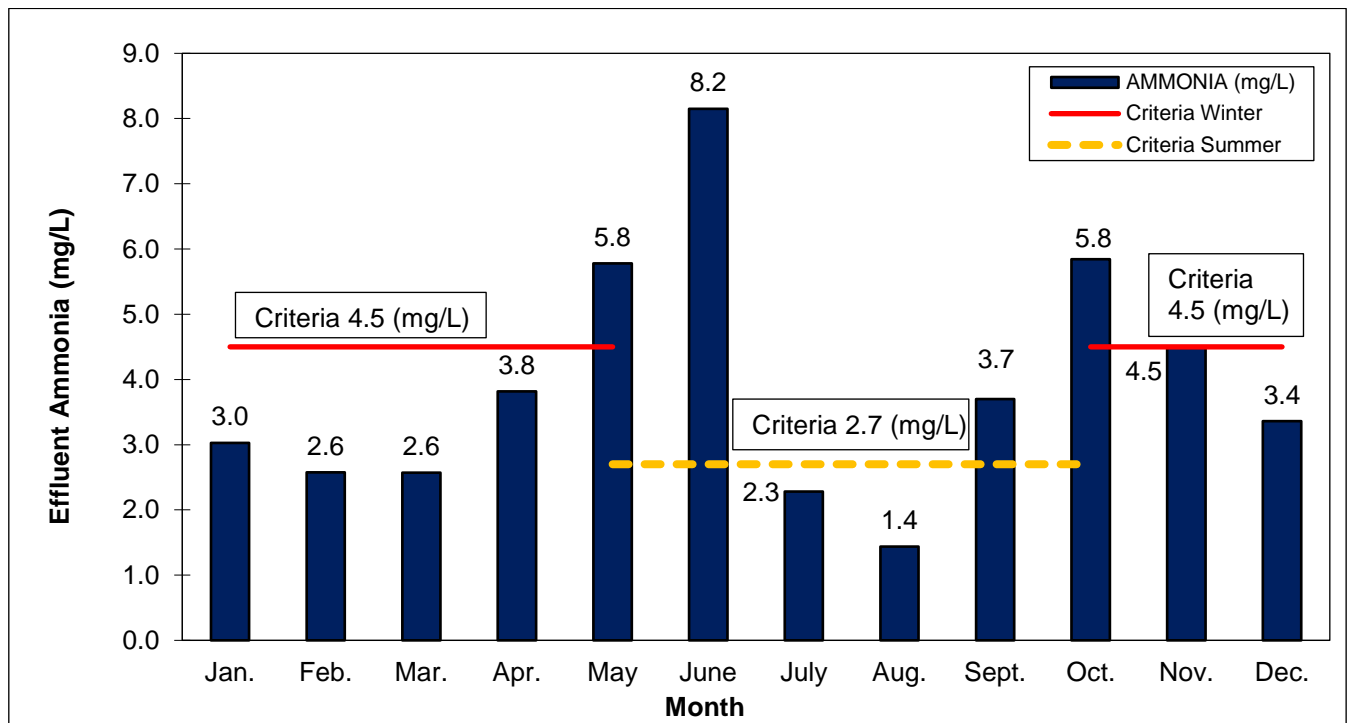
Drumbo WWTP Effluent, Monthly Average CBOD₅ (mg/L), 2023



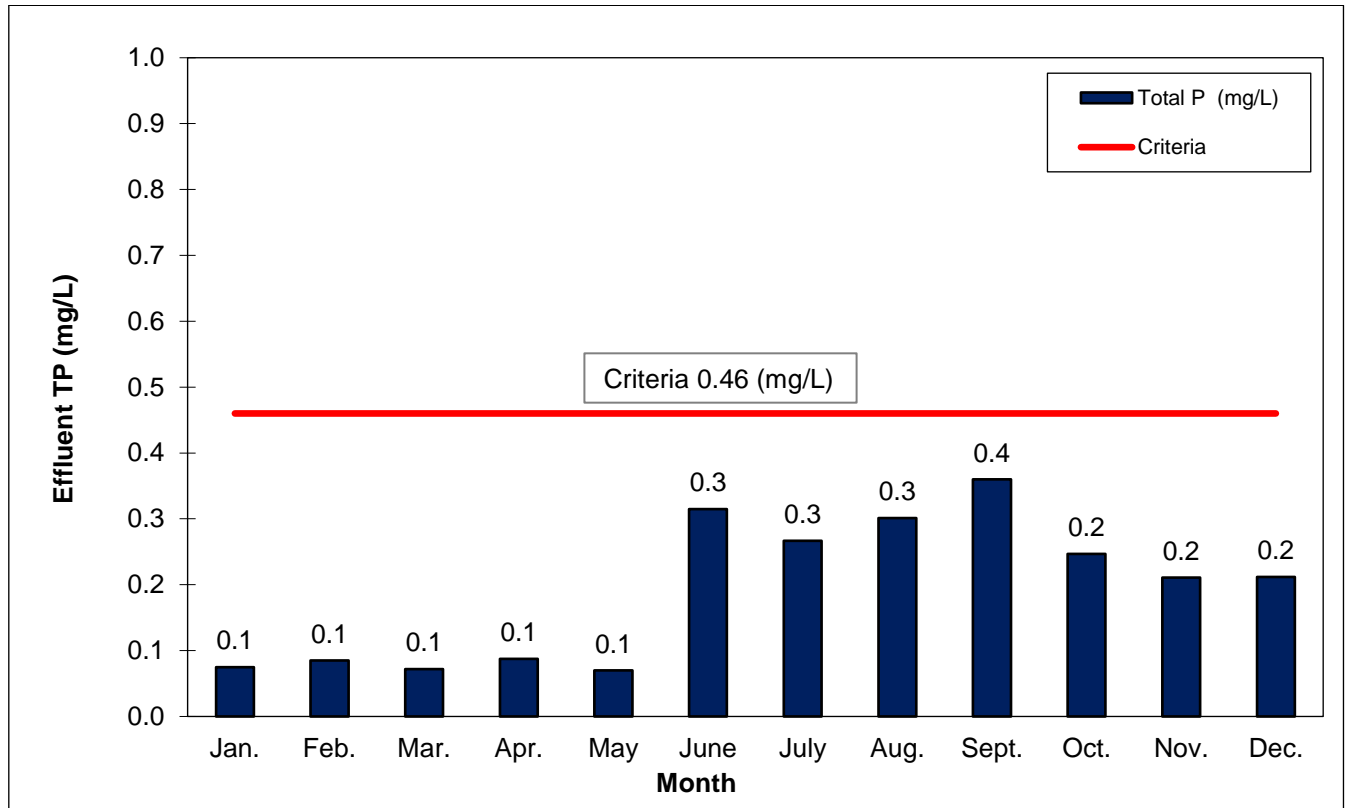
Drumbo WWTP Effluent, Monthly Average TSS (mg/L), 2023



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



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



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

