



NORTH TORONTO TREATMENT PLANT

2022 Annual Report



March 31, 2023

EXECUTIVE SUMMARY

The North Toronto Treatment Plant (NTTP) is one of four wastewater treatment facilities operated by the City of Toronto. This facility, located in the Don Valley, has a rated capacity of 45.5 ML/day, normally operates at a controlled flow rate, and serves an equivalent population of approximately 183,000. The North Toronto Treatment Plant discharges to the Don River and operates under Environmental Compliance Approval (ECA) No. 7459-B6QPM2 issued June 21, 2019.

The average daily influent flow rate in 2022 was 16.0 ML/day. Influent concentrations of Biochemical Oxygen Demand (BOD₅), Total Phosphorus (TP) and Total Suspended Solids (TSS) averaged 183 mg/L, 4.7 mg/L and 226 mg/L, respectively.

North Toronto Treatment Plant achieved the following effluent quality and loading rates in 2022 in comparison to ECA limits:

Parameter	ECA ¹	2022 Final Effluent
Total Suspended Solids (SS)	25.0 mg/L	6.7
Carbonaceous Biological Oxygen Demand (CBOD ₅)	25.0 mg/L	3.1
Total Phosphorus (TP)	1.0 mg/L	0.5
Escherichia Coli (E. Coli) ²	200 CFU/100mL	13
pH	6.0-9.5	7.2
Total Residual Chlorine (TRC) (Dechlorination)	0.02 mg/L	0.014
TSS Loading Rate	1,137.5 kg/day	108
CBOD ₅ Loading Rate	1,137.5 kg/day	50
TP Loading Rate	45.5 kg/day	8

¹ Referenced from ECA No. 7459-B6QPM2 issued on June 21, 2019.

² Arithmetic mean of monthly geometric mean data.

Sludge (raw sludge and waste activated sludge) generated at the North Toronto Treatment Plant is conveyed by gravity via the North Toronto Sanitary Trunk Sewer (STS) and the Coxwell STS to the Ashbridges Bay Treatment Plant (ABTP) for further treatment and disposal. The daily average of 462.3 m³/day at 0.94 % Total Solids (TS) sludge was transferred in 2022.

Ferrous chloride consumption for phosphorus removal totalled 72.69 tonnes as iron (Fe). Total sodium hypochlorite (12% w/v) consumption for effluent disinfection totalled 97.43 m³. Sodium bisulphite (SBS) (38% w/w) consumption for effluent de-chlorination totalled 65.37 tonnes.

The plant continued with various capital projects. Notable projects included the design of various process upgrades and the design of a new server room. A variety of scheduled, preventative,

predictive and reactive maintenance was performed, including annual calibration of effluent monitoring equipment.

Total annual consumption for potable water and hydro was 95,971 m³ and 2.58 M kWh, respectively.

Direct operating costs for 2022 totalled \$2.10M. In 2022, the North Toronto Treatment Plant had 9 employees. As of December 31, 2022, there were no lost time incidents and no lost time days due to work related injuries.

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GLOSSARY OF ABBREVIATIONS

AAC	Annual Average Concentration
BOD5	Five-Day Biochemical Oxygen Demand
CBOD5	Five-Day Carbonaceous Biochemical Oxygen Demand
CEU	Continuing Education Units
CFU	Colony Forming Units
E. Coli	Escherichia Coli
ECA	Environmental Compliance Approval
Fe	Iron
kg	kilogram
kWh	Kilowatt-hour
MAC	Monthly Average Concentration
MGMD	Monthly Geometric Mean Concentration
MWh	Megawatt-hour
m ³	Cubic metre
m ³ /day	Cubic metre per day
mA	Milliamps
mg/L	Milligrams per litre
mL	Millilitre
ML	Megalitre (million litres)
MECP	Ministry of the Environment, Conservation and Parks
Q	Flow Rate
RAS	Return Activated Sludge
SBS	Sodium Bisulphite
SBS (P)	Sodium Bisulphite Presence
scm	Standard Cubic Metres
SS	Suspended Solids
TRC	Total Residual Chlorine
TP	Total Phosphorus
TS	Total Solids
TSS	Total Suspended Solids
TVS	Total Volatile Solids
TWAS	Thickened Waste Activated Sludge
µg/L	Micrograms per litre
WAS	Waste Activated Sludge
% w/v	Percent concentration of components of solution expressed as weight by volume
% w/w	Percent concentration of components of a solution expressed as weight by weight

Definitions

Bypass: A bypass is defined as a diversion of sewage around one or more unit processes within the plant with the diverted sewage flows being returned to the plant treatment train upstream of the final effluent sampling location, and discharging to the environment through the plant outfall.

Overflow: An overflow is defined as a discharge to the environment from the plant at a location other than the plant outfall downstream of the final effluent sampling station.

Spill: A spill is defined within the meaning of Part X of the Environmental Protection Act. "Spill", when used in reference to a pollutant, means a discharge,

- a) into the natural environment,
- b) from or out of a structure, vehicle or other container, and
- c) that is abnormal in quality or quantity in light of the discharge.

Abnormal Discharge: A discharge of a pollutant designated by the regulations at a location designated by the regulations shall be deemed to be in a quantity or with a quality abnormal at the location. R.S.O. 1990, c. E.19, s. 91 (2).

$$\text{Loading} \left(\frac{\text{kg}}{\text{day}} \right) = \text{Concentration} \left(\frac{\text{mg}}{\text{L}} \right) \times \text{Flow} \left(\frac{\text{ML}}{\text{day}} \right)$$

$$\text{Percent Removal (\%)} = 1 - \frac{\text{Concentration (Final)}}{\text{Concentration (Initial)}}$$

$$\text{Aeration Loading} = \left(\frac{\text{kg cBOD}}{\text{m}^3 \text{ aeration capacity}} \right) = \frac{(Q_{\text{Primary Effluent}} + Q_{\text{RAS}}) \times [\text{cBOD}_{5\text{ primary effluent}}]}{V_{\text{aeration Tanks}}}$$

$$\text{Solids Capture (\%)} = \frac{\text{Centrifuge Feed TS} - \text{Centrate TSS}}{\text{Centrifuge Feed TS}} \times 100$$

1 INTRODUCTION

The North Toronto Treatment Plant is one of four wastewater treatment facilities operated by the City of Toronto under the responsibility of the Wastewater Treatment section of Toronto Water. The facility is located at 21 Redway Road, in the Don Valley on a 27.2 ha site serving a sewershed of approximately 3,060 ha. This area contains an estimated connected population of 183,000¹. The North Toronto Treatment Plant operates at a controlled flow rate and has a rated capacity of 45,500 m³/day, or 45.5 ML/day. Wastewater in excess of the controlled rate is diverted to the North Toronto Trunk Sewer and then conveyed by gravity to the Ashbridges Bay Treatment Plant via the Coxwell STS.

Major treatment processes include screening and grit removal, primary treatment, secondary treatment, phosphorus removal, effluent disinfection and de-chlorination. Treated effluent is discharged to the Don River. Co-settled sludge (raw sludge and waste activated sludge) is transferred via the North Toronto Sanitary Trunk Sewer (STS) and the Coxwell STS to the Ashbridges Bay Treatment Plant (ABTP) for further treatment and disposal. Numerous auxiliary systems are required for proper operation of many plant processes including: potable water, process water, heating, ventilation and air conditioning (HVAC), SCADA, odour control, electrical power distribution, and chemicals.

The Ministry of the Environment, Conservation and Parks (MECP) has classified the North Toronto Treatment Plant as a Class III wastewater treatment facility under Regulation 129/04. The facility operates under Environmental Compliance Approval (ECA) No. 7459-B6QPM2 issued June 21, 2019.

This report is a summary of plant operations and performance in 2022. Highlights of the report include a discussion on effluent quality and summaries of process operations, maintenance, chemical and utility consumption, capital projects, operational costs and human resources.

¹ Population estimated by sewershed delineation and 2021 census data

2 PLANT PROCESS OVERVIEW

A description of the plant process is included below. A plant process flow diagram is available in Appendix A. Additional information on the plant's process can be found on the City of Toronto website².

2.1 Influent

Wastewater from the Forman-Yonge Combined Trunk Sewer and Millwood Combined Trunk Sewer flows to the plant via a common sewer.

2.2 Preliminary Treatment

Raw wastewater enters the Headworks for grit and screenings removal. There is one automatic climber type bar screen that removes rags and large pieces of debris. Grit channels located downstream of the screen remove sand, gravel and similar heavy inorganic material by gravity separation. The removed grit and screenings are hauled to a sanitary landfill site.

2.3 Primary Treatment

Primary Treatment occurs in the Primary Clarification Tanks, where the flow velocity of the wastewater is reduced to allow heavier solids to settle to the bottom. There are four Primary Clarification Tanks. Sludge collectors in the tanks sweep the settled sludge, called primary or raw sludge, into sludge hoppers at the bottom of the tank. Floating solids, called scum, are drained periodically from the top of the tanks. The primary sludge and scum are then pumped out via the North Toronto STS and the Coxwell STS to the Ashbridges Bay Treatment Plant for further treatment. The primary effluent, continues to secondary treatment.

2.4 Secondary Treatment

The primary effluent receives secondary treatment through a conventional, suspended biomass activated sludge process in the Aeration Tanks. After entering the aeration tanks, the primary effluent mixes with return activated sludge (RAS) to form mixed liquor. RAS is removed from the Final Clarification Tanks and contains micro-organisms that naturally occur in wastewater and facilitate its degradation. In the presence of oxygen, these micro-organisms break down organic material in the mixed liquor. Air is supplied to the Aeration Tanks through four electrically driven blowers. There are a total of eight Aeration Tanks each

² <https://www.toronto.ca/services-payments/water-environment/managing-sewage-in-toronto/wastewater-treatment-plants-and-reports/>

equipped with ceramic fine bubble dome diffusers. Ferrous chloride is applied to the distribution conduits to the Aeration Tanks for phosphorous removal.

The mixed liquor from the Aeration Tanks flows to five large Final Clarification Tanks, where the activated sludge is allowed to settle. A controlled quantity of this sludge is returned to the Aeration Tanks as RAS in order to maintain a sufficient biomass concentration. The excess is removed as waste activated sludge (WAS), a portion of which is diverted to the Primary Clarification Tanks to co-settle with the raw sludge.

2.5 Final Effluent

Sodium hypochlorite is used to disinfect and kill pathogens in the final effluent. Sodium bisulphite (SBS) is added after disinfection to remove excess chlorine from the wastewater (i.e. dechlorinate); helping to protect the aquatic environment. The final effluent is discharged into the Don River. The plant uses direct measurement of Total Residual Chlorine (TRC) in the final effluent for monitoring and compliance.

2.6 Solids Handling

All primary sludge, WAS, and scum from the Primary and Secondary Clarification Tanks, collectively called sludge, is transferred to the Ashbridges Bay Treatment Plant for further treatment.

3 PROCESS SUMMARY

3.1 Process Parameters

In 2022, the North Toronto Treatment Plant continued to produce a high quality effluent. A summary of key final effluent parameters against the ECA objectives and limits are shown in Table 1. Influent and effluent performance charts are available in Appendix B. Historical performance data is included in Appendix C.

Table 1: Final Effluent Parameters

Parameter	CBOD ₅	TSS	TP	TRC ¹	E-Coli	pH	
	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(count/100mL)	Min	Max
<i>January</i>	4.3	9.1	0.5	0.018	3	6.9	7.3
<i>February</i>	2.9	7.4	0.5	0.019	4	7.0	7.5
<i>March</i>	3.5	5.2	0.3	0.019	4	7.0	7.6
<i>April</i>	2.8	5.1	0.4	0.018	4	6.8	7.5
<i>May</i>	3.8	8.4	0.5	0.018	4	6.9	7.5
<i>June</i>	6.1	10.5	0.5	0.020	45	6.9	7.4
<i>July</i>	2.1	7.0	0.5	0.019	23	7.0	7.7
<i>August</i>	3.1	4.4	0.5	0.018	10	6.8	7.4
<i>September</i>	1.4	4.7	0.5	0.018	9	6.9	7.4
<i>October</i>	3.0	6.7	0.6	0.018	6	6.8	7.2
<i>November</i>	2.3	7.7	0.6	0.019	14	7.0	7.6
<i>December</i>	2.1	4.7	0.5	0.018	27	7.1	7.6
Annual Average	3.1	6.7	0.5	0.014	13	7.2	
Loading (kg/d)²	49.7	108.0	7.9	N/A	N/A	N/A	
Removal Efficiency³ (%)	98%	97%	89%	N/A	N/A	N/A	
ECA Requirements^{4,5}							
<i>Effluent Objective</i>	AAC: 15.0 mg/L	AAC: 15.0 mg/L	MAC: 0.90 mg/L	MAC: non- detect	MGMD: 150 CFU/100 mL	6.5 - 8.5	
<i>Effluent Limit</i>	AAC: 25.0 mg/L	AAC: 25.0 mg/L	MAC: 1.0 mg/L	MAC: 0.02 mg/L	MGMD: 200 CFU/100 mL	6.0 - 9.5	
<i>Average Waste Loading Limit²</i>	AAL: 1,137.5 kg/d	AAL: 1,137.5 kg/d	AAL: 45.5 kg/d	N/A	N/A	N/A	

¹TRC – Total Residual Chlorine. Reported figure is the monthly maximum for the month. Annual Average is the average of all sample results.

²Loading is calculated based on flow rates as provided in Table 2

³CBOD = 0.8 * BOD assumed for removal efficiency calculations

⁴Referenced from ECA No. 7459-B6QPM2 issued June 21, 2019.

⁵AAC refers to Annual Average Concentration, MAC refers to Monthly Average Concentration, MGMD refers to Monthly Geometric Mean Density, and AAL refers to Annual Average Daily Loading.

Influent and Final effluent concentrations of eleven select heavy metals have been included in Appendix D. Any discharge into City sewers must meet the sewer use By-law limits. Final effluent concentrations are presented to assess the treatment plant's removal capacity.

A summary of the annual average of process parameters over the past three years is shown in Table 2.

Table 2: Process Summary

Parameter	Units in report	2022	2021	2020
Influent Parameters				
Flow ¹	ML/day	16.0	17.5	17.4
Total Annual Flow ¹	ML	5838	6380	6359
Total Suspended Solids (TSS)	mg/L	226	241	357
Biological Oxygen Demand (BOD)	mg/L	183	196	261
Total Phosphorus (TP)	mg/L	4.7	4.8	5.7
Preliminary Treatment				
Grit and Screenings	kg/day	169	291	232
Primary Treatment				
TSS	mg/L	126	117	108
cBOD5	mg/L	94	91	92
Secondary Treatment				
Aeration Loading	Kg cBOD5/ m3 day	0.15	0.16	0.16
Mixed Liquor Suspended Solids	mg/L	2442	2258	2353
Solids Handling				
Sludge to Ashbridges Bay Flow	ML/day	0.46	0.55	0.45
Sludge to Ashbridges Bay TS	%	0.94	0.89	0.91

¹Based on final effluent flow meters

Influent flow to the North Toronto Treatment Plant decreased by 8.5% in 2022. Influent strength of BOD, TSS, TP, and TKN decreased by 7%, 6%, 3%, and 4% respectively.

Final effluent annual average concentration for cBOD, TSS, and TP was 3.1 mg/L, 6.7 mg/L, and 0.5 mg/L, respectively, and met the monthly average effluent concentration specified in Schedule C of the ECA throughout 2022. The final effluent annual average for e. Coli monthly geometric mean density in 2022 was 13 CFU/100 mL and also met the Schedule C compliance limit for each month. Final effluent total residual chlorine analysis did not exceed 0.02 mg/L

in 2022. Furthermore, final effluent pH remained between the range of 6.0 – 9.5 throughout the course of 2022.

The North Toronto Treatment Plant encountered no chronic operating problems and continued to produce a high quality effluent through the continued improvement of operations and maintenance of treatment processes. The plant consistently surpassed the design objectives highlighted in Condition 6 as well as Schedule B of the ECA.

There was one deviation from the monitoring schedule in 2022. The influent and effluent samples which were scheduled to be taken on Tuesday, November 1 were delayed until the following day due to a temporary plant shutdown for maintenance and repair. Additionally, the analysis frequency of influent total phosphorus was decreased from three times per week to once per week (on Tuesdays) from May 17 to November 2, due to a shortage of test kits. All other parameters highlighted in the sampling program specified in Schedule D of the plants ECA meet or exceed the sampling frequency of 3 times/week specified by Condition 9(1)(b), negating the requirement for future sampling forecasts and scheduling.

3.2 Biosolids Management

The influent flow projection for 2023 will not exceed the rated plant capacity of 45.5 ML/day and is expected to generate a sludge volume that will be +/-5% of the given volume for 2022.

All sludge (primary sludge, WAS, and scum) generated at the North Toronto Treatment Plant is transferred to the Ashbridges Bay Treatment Plant for further treatment. The sludge generated during 2022 averaged 462.3 m³/day (0.94% TS).

3.3 Chemical Usage

Several chemicals are used during the treatment process at the plant. Table 3 outlines the chemical consumption for the current and previous year. Costs listed exclude applicable taxes.

Table 3: Chemical Usage Summary

Process	Chemical		2022	2021	2020
Phosphorus Removal	Ferrous Chloride as Fe	Dosage (mg/L)	12.93	11.73	9.56
		Consumption (tonnes)	72.69	71.62	65.93
		Cost (\$)	\$83,886.87	\$79,444.11	\$54,225.98
Disinfection	Sodium Hypochlorite (12% w/v)	Dosage (mg/L)	2.00	1.92	1.84
		Consumption (m ³)	97.43	102.55	97.32
		Cost (\$)	\$15,688.54	\$17,416.50	\$12,678.96
Dechlorination	Sodium Bisulfite (38% w/w)	Dosage (mg/L)	4.02	3.93	4.15
		Consumption (tonnes)	65.37	66.55	72.46
		Cost (\$)	\$15,232.50	\$14,871.60	\$16,192.30

3.4 Bypasses, Spills, and Abnormal Discharge Events

3.4.1 Bypasses

Treatment bypasses are not required or possible with the current plant configuration. The inflow to the plant is controlled.

3.4.2 Spills

There were no reportable spill events at the North Toronto Treatment Plant in 2022.

3.4.3 Abnormal Discharge Events

There were no abnormal discharge events at the North Toronto Treatment Plant in 2022.

3.5 Complaints

There were no odour or noise complaints received at the North Toronto Treatment Plant in 2022.

3.6 MECP Procedures F-5-1 and F-5-5

Condition 11 (4)(m) of the ECA describes requirements to summarize efforts to achieve conformance with MECP Procedure F-5-1 – Determination of Treatment Requirements for Municipal and Private Sewage Works and MECP Procedure F-5-5 – Determination of Treatment Requirements for Municipal and Private Combined and Partially Separated Sewer Systems.

In reference to procedure F-5-1, the plant utilizes the activated sludge treatment process to meet secondary or equivalent treatment and consistently achieves effluent quality at or beyond the objectives outlined in the ECA.

Furthermore, Toronto Water is committed to efforts to control the frequency and volume of CSO discharges and bypass events referenced in Procedure F-5-5. The City is currently implementing a 25 year plan related to its Wet Weather Flow Master Plan (WWFMP), which aims to reduce and eliminate the adverse impacts of storm water runoff and CSO discharges associated with wet weather events. It is expected that the on-going implementation of capital projects related to the City's WWFMP will eliminate CSO discharges and ultimately improve plant effluent.

3.7 Effluent Quality Assurance and Control Measures

Analytical tests to monitor required parameters are performed by the Toronto Water Laboratory which is accredited to ISO/IEC 17025 by Canadian Association for Laboratory Accreditation Inc. Plant operation and performance is monitored by licensed operators as well as by the facility management team. Standard Operation Procedures, emergency plans, equipment preventative and predictive maintenance, and a network of support staff, help ensure a rapid and effective response to issues, and maintain the high quality of the effluent and bio-solids. An Integrated Quality Management System emphasizing environmental, and health and safety objectives is also in the early implementation stages across Toronto Water and is expected to further standardize facility operations and improve facility performance.

4 CAPITAL PROJECTS

Under Toronto Water’s capital program, the North Toronto Treatment Plant commenced or continued with the capital works projects and studies listed in Table 4 in 2022.

Table 4: Capital Projects

Project Name	Project Description	Project Stage (Dec 31, 2022)	Estimated Completion
TNT Process Upgrade	Various process upgrades to secondary treatment systems, supplementary treatment systems, and electrical systems listed in the proposed works in the ECA.	Construction	2024
TNT Server Room	Construction of a new server room.	Design	2023

5 MAINTENANCE

Staff from the North Toronto Plant performed a variety of scheduled, preventative, predictive and reactive maintenance on a diverse spectrum of equipment. Equipment availability and reliability ensures operational requirements are achieved.

The annual calibration and maintenance records of flow meters and on-line analysers for regulated parameters was completed in 2022 and found to be within acceptable limits. A summary of effluent monitoring equipment calibration and maintenance performed in 2022 is included in Table 5.

Table 5: Summary of Regulated Monitoring Equipment Calibration and Maintenance

Calibration and/or Maintenance Record	Completion Date
Final Effluent pH and Temperature Meter - Calibration	Daily
Final Effluent Flow Meter - TNT-DCL-FIT-0002 - Calibration	June 23, 2022
Final Effluent ORP Sensor – TNT-DCL-AIT-0002 – Calibration	June 23, 2022
Residual Sulphite Meter - TNT-DCL-AIT-0001 - Calibration	June 23, 2022
Total Residual Chlorine Benchtop Analyzer - HACH DR3900 - Calibration	October 27, 2022
Chlorine Contact Tank 1 ORP Sensor – TNT-DIS-AIT-0101 - Calibration	September 20, 2022
Chlorine Contact Tank 2 ORP Sensor – TNT-DIS-AIT-0201 - Calibration	June 23, 2022
Influent Autosampler – TNT-PLT-SP-0001 - Verification	Jan 7, Apr 8, Jul 15, Oct 14, 2022
Final Effluent Autosampler – TNT-FT-SP-0003 – Verification	Jan 7, Apr 8, Jul 15, Oct 14, 2022
Emergency Generator – TNT-ELS-GEN-0001 - Load Test	June 27, 2022

In 2022, there was a total of 2721 work orders completed; refer to Appendix F for a summary of maintenance activities as per Conditions 11(4)(e) of the ECA. None of the maintenance activities undertaken at the plant fell under Limited Operational Flexibility.

6 UTILITIES

A summary of monthly utility consumption for the previous three years at the North Toronto Treatment Plant is provided in Figure 1. Table 6 below summarizes the total cost and average unit cost for water, and hydro. Total annual consumption for potable water and hydro was 95,971 m³ and 2.58 M kWh, respectively. Increased water consumption in 2022 was due to cleaning of the CSO tank during the summer.

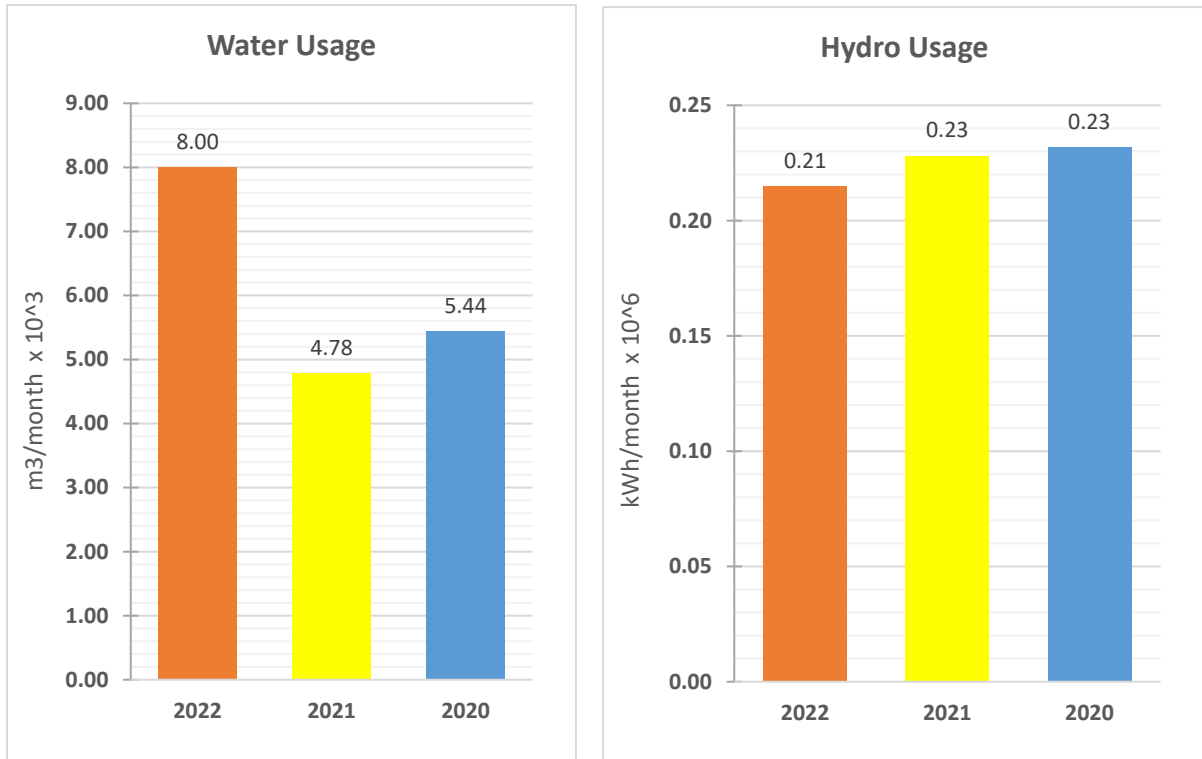


Figure 1: Monthly Utility Consumption (Water, Hydro)

Table 6: Average Unit and Total Utility Cost

Utility	2022	2021	2020
Water Unit Cost (\$/m ³)	\$4.48	\$4.35	\$4.29
Water Total Cost (\$/year)	\$430,207.33	\$249,873.73	\$280,091.71
Hydro Unit Cost (\$/kWh)	\$0.13	\$0.14	\$0.15
Hydro Total Cost (\$/year)	\$332,141.38	\$372,084.59	\$418,325.61

7 ADMINISTRATION

7.1 Operations and Maintenance Costs

The 2022 plant direct operational costs are broken down into five categories: Salaries and Benefits, Materials and Supplies, New Equipment, Services and Rents, and Inter-Divisional Charges. Materials and Supplies is further segregated into Utilities, Machine & Equipment Parts, Chemicals and Other Materials and Supplies. A breakdown of 2022, 2021 and 2020 annual operations and maintenance costs is illustrated in Figure 2. Overall, operational costs increased by 9.8% from 2021.

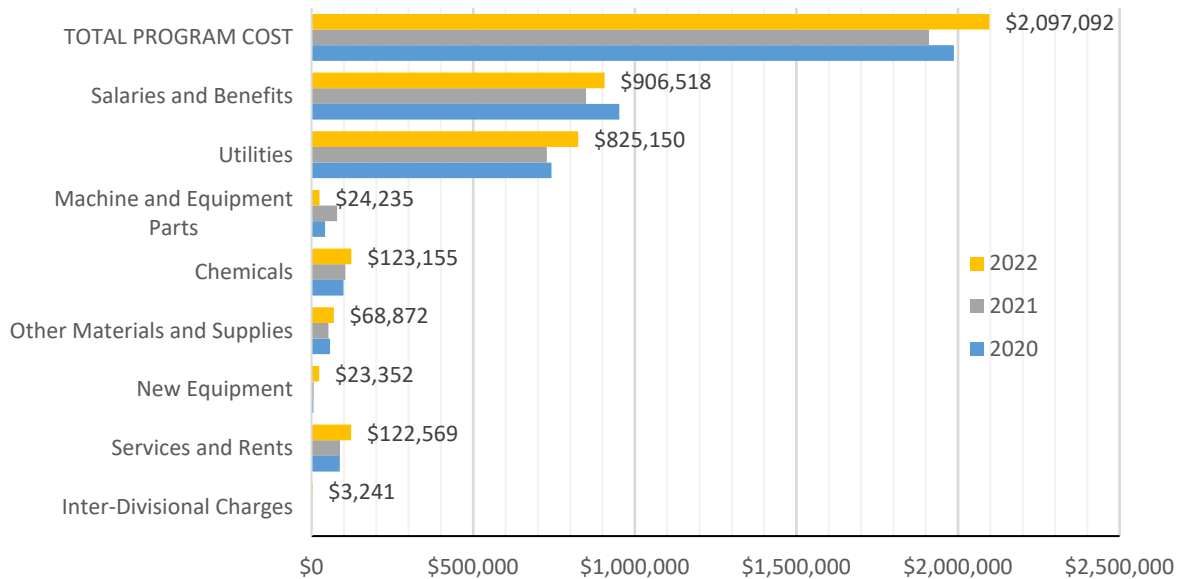


Figure 2: Operations and Maintenance Cost Breakdown

7.2 Human Resources

Plant Staffing at the North Toronto Treatment Plant in 2022 is shown in Table 7.

Table 7: Plant Staffing

Position	Number of FTE ¹
Area Supervisor, Process Operation and Maintenance	1
Electrical Instrumentation Control Technician	1
Plant Technician - Wastewater	2
Industrial Millwright	2
Wastewater Treatment Plant Worker	1
Developmental Plant Technician	2
Total FTE Positions	9

¹ FTE refers to Full Time Equivalent staff. Seasonal staff are considered 0.5 FTE staff.

7.3 Occupational Health & Safety

Continuous efforts are made to ensure a safe working environment at the North Toronto Treatment Plant. The Joint Health and Safety Committee (JHSC) assists management in resolving issues through regular meetings and monthly workplace inspections. Plant Health and Safety statistics for the North Toronto Treatment Plant are included in Figure 3.

As of December 31, 2022, there were no health and safety incidents and no lost time days in 2022 due to work related injuries.

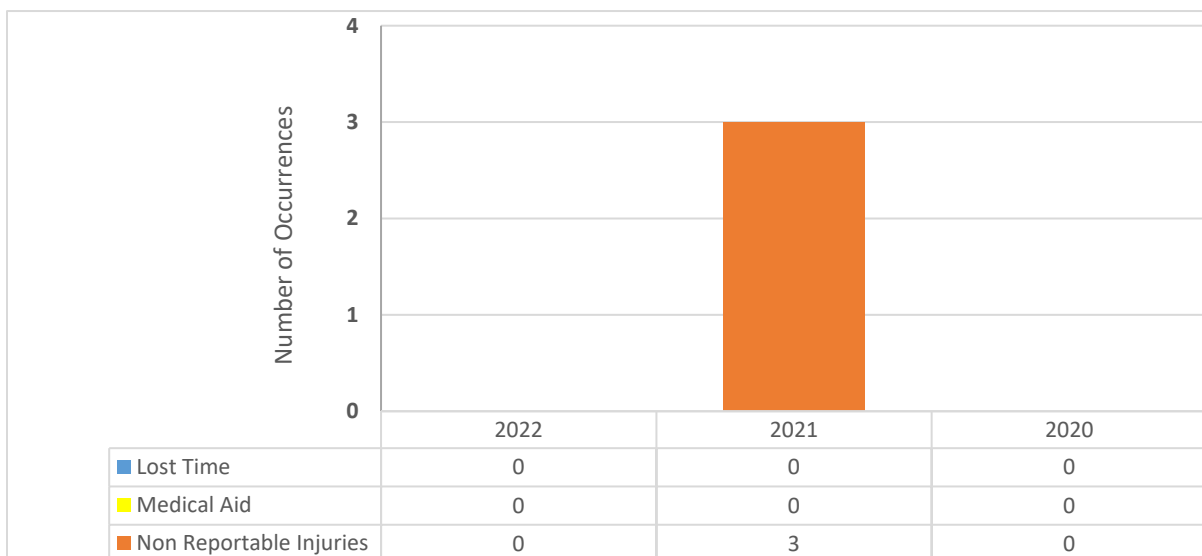


Figure 3: North Toronto Treatment Plant Health & Safety Injury Summary

7.4 Staff Training and Development

The Strategic Planning and Workforce Development unit of Toronto Water facilitates a comprehensive training program for all staff.

Training attended by North Toronto Treatment Plant operations and skilled trades staff in 2022 includes the list of courses shown in Appendix E. Some of these courses were eligible for Continuing Education Units (CEU’s) as specified by the Ontario Water and Wastewater Certification Office. Additional training related to the start-up and commissioning of new equipment/systems installed as part of the capital program was provided as required.

7.5 Utility Operator Certification

Toronto Water trains and provides the required resources to ensure all operators achieve and maintain Class IV certifications. In addition, all skilled trade positions are required to achieve and maintain a Class I operator’s licence. As part of this initiative, general operational/process training was delivered in order to prepare staff for any certification examination that they need to write. Table 8 summarizes the status of operator certification at the North Toronto Treatment Plant in 2022.

Table 8: Wastewater Treatment Certificates

Class Level	Number of Licenses
Class IV	2
Class III	2
Class II	1
Class I	1
O.I.T.	2
Total	8

7.6 MECP Correspondence

There were no orders issued by the Ministry of the Environment, Conservation and Parks (MECP).

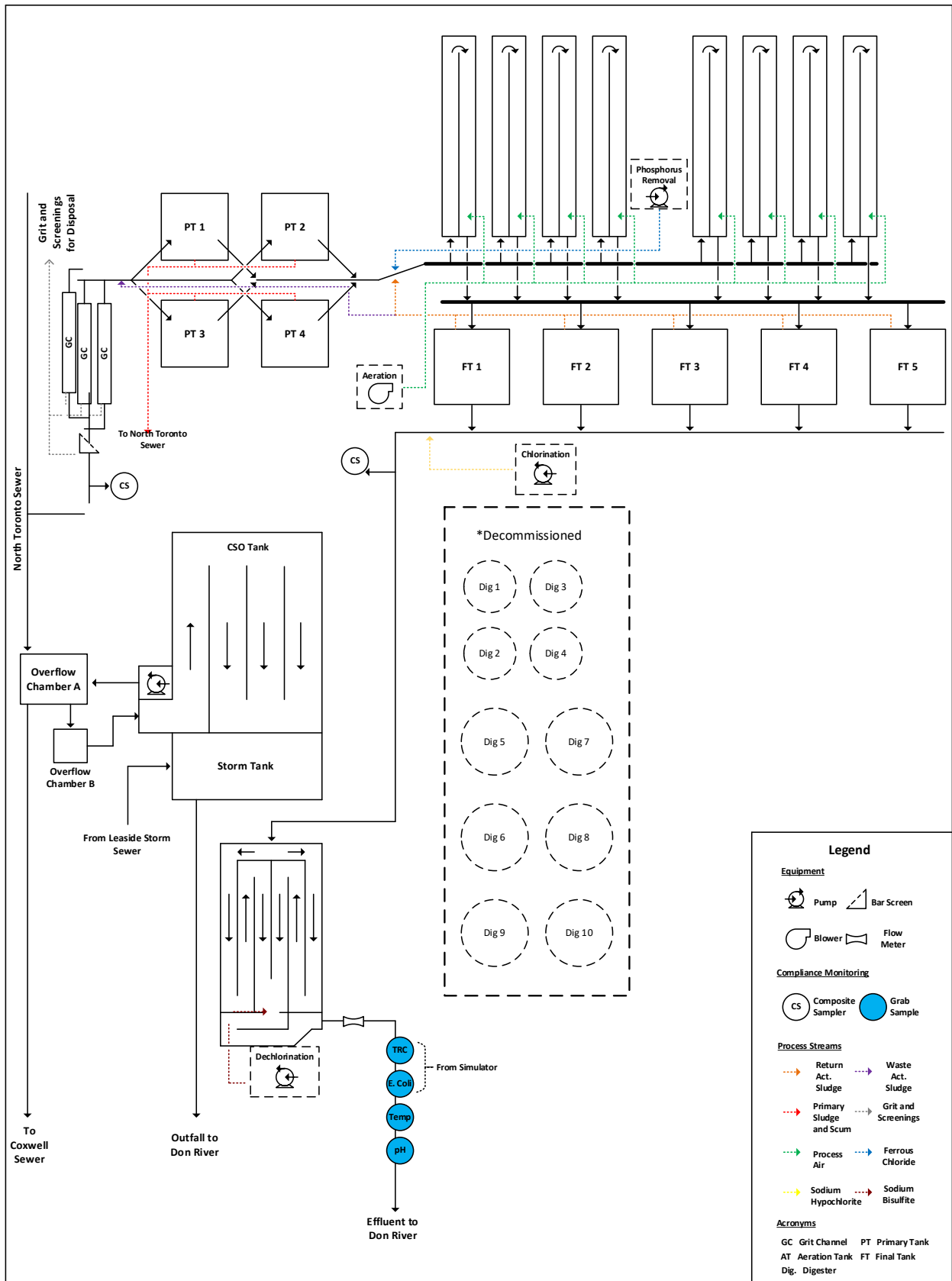
Table 9 summarizes the correspondence submitted to the MECP for the North Toronto Treatment Plant in 2022.

Table 9: Correspondence submitted to the MECP

Date	Type	Description	Resolution	Resolution Date
Notification on Construction of Proposed Works				
May 17, 2022	Notification on Commissioning	Commissioning operation of Blower 3 at North Toronto Treatment Plant.	N/A	N/A
June 3, 2022	Notification on Commissioning	Commissioning operation of Aeration Tank # 7 and 8 at North Toronto Treatment Plant.	N/A	N/A
MECP Inspection				
March 21, 2022	MECP Communal Sewage Inspection	MECP issued 2021-2022 compliance inspection report for the North Toronto Treatment Plant in March 2022. There were no Non-Compliance or Non-Conformance items identified.	N/A	N/A

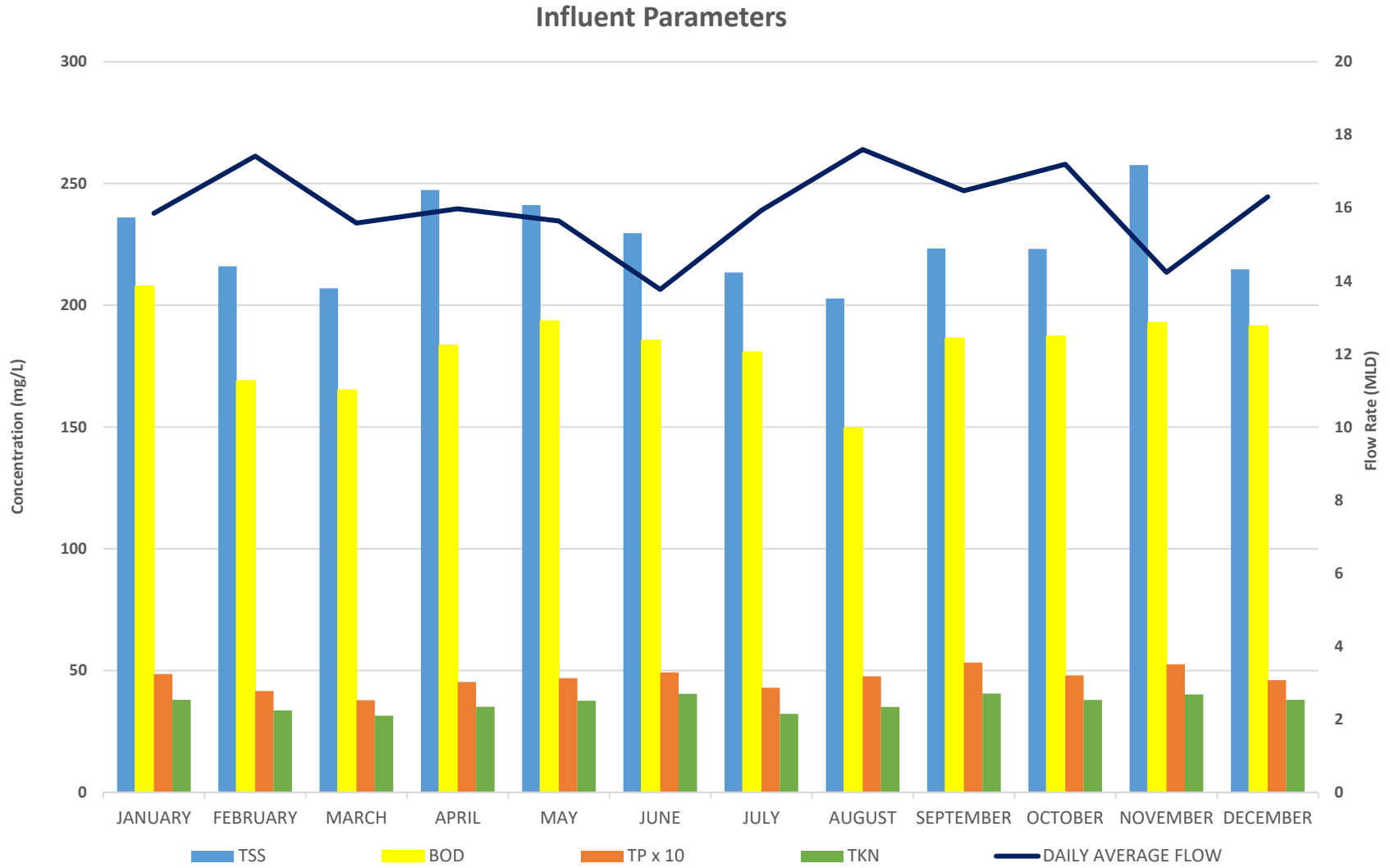
APPENDIX A – Plant Schematic

APPENDIX A – Plant Schematic



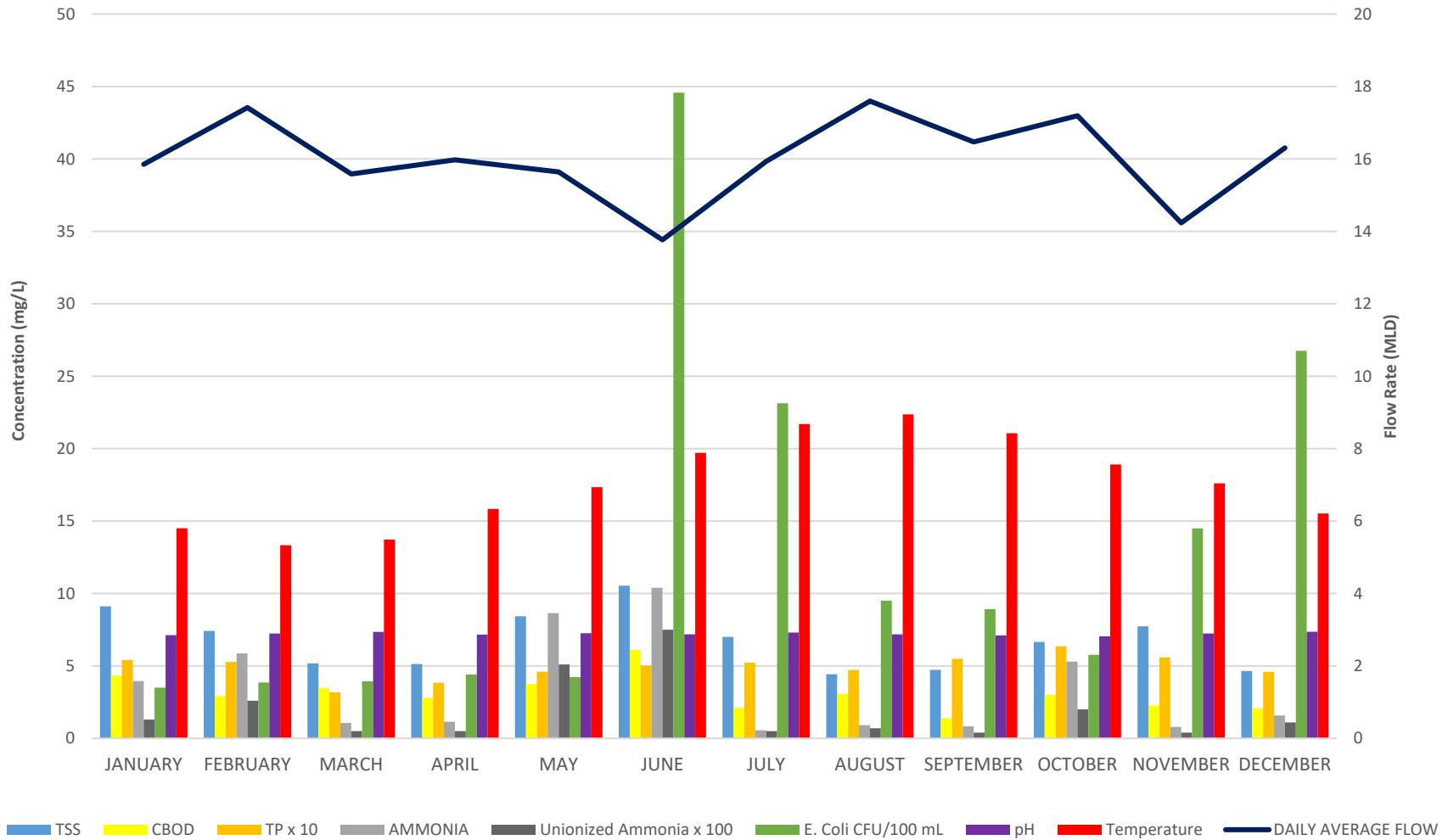
APPENDIX B – Influent and Effluent 2022 Performance Chart

APPENDIX B – Influent and Effluent 2022 Performance Chart



APPENDIX B – Influent and Effluent 2022 Performance Chart

Effluent Parameters



APPENDIX C – Historical Performance Data

APPENDIX C – Historical Performance Data

	Units	2022	2021	2020	2019	2018	2017	2016	2015	2014	2013	2012
Influent Parameters												
Flow	ML/day	16.0	17.5	17.4	21.5	18.8	15.7	17.6	20.0	23.2	24.4	26.3
Total Annual Flow	ML	5838	6380	6359	7,851	6,872	5,731	6,422	7,281	8,481	8,703	9,586
Total Suspended Solids (TSS)	mg/L	226.0	240.7	356.6	258.9	321.2	276.0	286.0	268.0	229.2	212.4	213.4
Biochemical Oxygen Demand (BOD ₅)	mg/L	182.7	196.3	260.7	182.5	204.4	192.0	197.0	206.0	169.1	148.6	144.7
Total Phosphorus (TP)	mg/L	4.7	4.8	5.7	4.8	5.4	5.2	5.5	5.5	4.4	4.0	4.2
Total Kjeldahl Nitrogen (TKN)	mg/L	36.7	38.1	42.9	39.1	40.1	40.5	41.1	38.8	34.5	35.1	38.1
Preliminary Treatment												
Grit and Screenings	kg/day	169.0	290.6	231.7	296.4	290.8	295	306.6	396.4	302.9	259.4	228.6
Primary Treatment												
TSS	mg/L	125.9	117.2	107.9	101.7	102.5	86.0	100.0	116.0	106.4	106.2	172.5
Carbonaceous Biochemical Oxygen Demand (cBOD ₅)	mg/L	93.7	91.4	92.1	70.9	85.0	69.0	89.0	89.0	73.5	82.1	90.3
Secondary Treatment												
Aeration Loading	kg CBOD ₅ /m ³ .day	0.15	0.16	0.16	0.15	0.16	0.11	0.15	0.17	0.17	0.19	0.16
Mixed Liquor Suspended Solids	mg/L	2442	2258	2353	2,228	2,397	2,351	2,439	2,317	2,434	2,512	2,274
Final Effluent												
Final Effluent Daily Average Flow	ML/day	16.0	17.5	17.4	21.5	18.8	15.7	17.5	19.9	23.2	24.3	26.2
TSS	mg/L	6.7	7.5	7.0	5.8	6.6	3.0	3.0	3.6	4.2	4.9	6.3
TSS Loading Rate	kg/day	108.0	131.6	121.4	124.4	123.2	52.7	52.3	71.2	99.3	120.1	169.1
cBOD ₅	mg/L	3.1	3.2	2.8	3.6	3.1	2.0	2.0	2.2	2.4	2.9	2.6
cBOD ₅ Loading Rate	kg/day	49.7	56.5	48.2	78.2	57.6	26.5	31.1	42.9	55.9	73.8	68.1
TP	mg/L	0.5	0.6	0.6	0.6	0.6	0.5	0.7	0.7	0.4	0.4	0.5
TP Loading Rate	kg/day	7.9	10.1	10.6	11.9	11.0	8.5	12.1	13.4	9.9	9.0	12.2
Escherichia Coli (E. Coli)	CFU/100 mL	13	13	16	13	11	5	11	9	14	6	9
pH	-	7.2	7.0	7.2	7.1	7.1	7.3	7.1	7.4	7.6	7.4	7.3
Total Chlorine Residual	SBS (P)/mg/L	0.014	0.014	0.009	0.011	*	SBS (P)	SBS (P)	SBS (P)	SBS (P)	N/A	N/A

APPENDIX C – Historical Performance Data

	Units	2022	2021	2020	2019	2018	2017	2016	2015	2014	2013	2012
Total Kjeldahl Nitrogen (TKN)	mg/L	4.4	3.3	2.8	5.6	6.7	2.1	1.7	4.0	11.4	5.1	7.7
Total Ammonia Nitrogen	mg/L	3.4	2.8	2.2	5.3	6.0	1.5	0.9	3.2	10.0	3.7	6.8
Unionized Ammonia	mg/L	0.019	0.011	0.012	0.028	0.038	0.010	0.007	0.038	0.105	0.040	0.020
Nitrate +Nitrite	mg/L	14.6	15.3	15.8	11.7	10.5	15.7	13.9	11.7	6.0	11.0	7.7
Temperature	degrees Celsius	18	19	18	17	18	17	18	-	-	-	-
Solids Handling												
Sludge to Ashbridges Bay Treatment Plant (ABTP) – Flow	ML/day	0.46	0.55	0.45	0.49	0.46	0.40	0.48	0.32	0.30	0.30	0.31
Sludge to ABTP – Total Solids (TS)	%	0.94	0.89	0.91	1.00	0.92	0.97	0.96	1.60	1.40	1.40	1.60

*From January to April 2018 SBS presence was confirmed; from May to December 2018 post De-Chlorination TRC was measured

APPENDIX D – Influent and Effluent Metal Concentrations

APPENDIX D – Influent and Effluent Metal Concentrations

Influent (Daily Composite tested once/month for metals)

Parameter	Arsenic	Cadmium	Chromium	Cobalt	Copper	Iron	Lead	Manganese	Mercury	Nickel	Zinc
Units	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
January	0.005	0.002	0.002	0.002	0.103	0.687	0.0025	0.043	0.00005	0.0025	0.119
February	0.005	0.002	0.002	0.002	0.084	0.8	0.0025	0.042	0.00005	0.0025	0.094
March	0.005	0.002	0.002	0.002	0.087	0.774	0.0025	0.041	0.00005	0.0025	0.093
April	0.005	0.002	0.002	0.002	0.098	0.947	0.0025	0.045	0.00005	0.0025	0.104
May	0.005	0.002	0.002	0.002	0.094	0.863	0.0025	0.044	0.00005	0.0025	0.112
June	0.005	0.002	0.002	0.002	0.097	0.799	0.0025	0.042	0.00005	0.0025	0.124
July	0.005	0.002	0.002	0.002	0.097	0.815	0.0025	0.044	0.00005	0.0025	0.125
August	0.005	0.002	0.002	0.002	0.103	1.05	0.0025	0.042	0.00005	0.0025	0.131
September	0.005	0.002	0.002	0.002	0.100	0.736	0.0025	0.037	0.00005	0.0025	0.123
October	0.005	0.002	0.002	0.002	0.105	0.762	0.0025	0.037	0.00018	0.0025	0.123
November	0.005	0.002	0.002	0.002	0.143	1.09	0.0055	0.043	0.00005	0.0025	0.113
December	0.005	0.002	0.002	0.002	0.085	0.701	0.0052	0.038	0.00005	0.0025	0.103
Annual Average	0.005	0.002	0.002	0.002	0.0996	0.8353	0.00298	0.0413	0.00006	0.0025	0.1137

Values in red are half the MDL

APPENDIX D – Influent and Effluent Metal Concentrations

Final Effluent (Daily Composite tested once/month for metals)

Parameter	Arsenic	Cadmium	Chromium	Cobalt	Copper	Iron	Lead	Manganese	Mercury	Nickel	Zinc
Units	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
January	0.005	0.002	0.002	0.002	0.017	0.893	0.0025	0.099	0.00005	0.0025	0.045
February	0.005	0.002	0.002	0.002	0.016	0.622	0.0025	0.071	0.00005	0.0025	0.029
March	0.005	0.002	0.002	0.002	0.015	0.43	0.0025	0.058	0.00005	0.0025	0.036
April	0.005	0.002	0.002	0.002	0.013	0.408	0.0025	0.069	0.00005	0.0025	0.035
May	0.005	0.002	0.002	0.002	0.011	0.906	0.0025	0.078	0.00005	0.0025	0.030
June	0.005	0.002	0.002	0.002	0.013	1.1	0.0025	0.060	0.00005	0.0025	0.030
July	0.005	0.002	0.002	0.002	0.015	0.778	0.0025	0.051	0.00005	0.0025	0.031
August	0.005	0.002	0.002	0.002	0.014	0.511	0.0025	0.060	0.00005	0.0025	0.040
September	0.005	0.002	0.002	0.002	0.018	0.497	0.0025	0.055	0.00005	0.0025	0.039
October	0.005	0.002	0.002	0.002	0.017	0.721	0.0025	0.054	0.00005	0.0025	0.035
November	0.005	0.002	0.0046	0.002	0.023	0.884	0.0025	0.050	0.00005	0.0025	0.036
December	0.005	0.002	0.002	0.002	0.016	0.479	0.0025	0.041	0.00005	0.0025	0.032
Annual Average	0.005	0.002	0.00222	0.002	0.0155	0.6858	0.0025	0.0622	0.00005	0.0025	0.0348

Values in red are half the MDL

APPENDIX E – Staff Training Courses

APPENDIX E – Staff Training Courses

Training attended by North Toronto Treatment Plant operations and skilled trades staff in 2022 includes the list of courses below.

Technical and Health and Safety Training:

- Basic Pumps and Pumping Hydraulics
- COVID Protocols - Preventing the Spread
- Equipment Safety Inspect It Before You Use It
- Ergonomics
- Fundamentals of Ladder Safety Awareness
- Heat Stress
- Incident Management Team Training (EHSC)
- Incident Reporting
- Industrial Maintenance Technician- Mechanical & Electrical (IMT-M & E)
- Joint Health and Safety Committee (JHSC) Certification Training – Certification Refresher
- Lock Out, Tag Out & Test Awareness
- Lockout, Tag & Test (LOTO) Program
- Logbook Entry
- Preventing Back Injuries
- Psychosocial Program, Risk Assessments & Mental Health in Our Work Place
- Quatrosafety Training for City ff Toronto Supervisory Staff
- Rigging Safety Awareness
- Safe Lifting
- Safety on the Road
- Scaffold Safety Awareness
- Sewage Works and Surface Water Spill Response
- Slips Trips Falls
- Toronto Water Covid Response Protocols
- Traffic Control Roadway Work
- Trenching and Excavation Awareness
- WHMIS 2015 New Chemical Safety Info System
- Workplace Violence

Other Training:

- Accessibility 101
- Human Rights 101
- Physical and Cyber Security Awareness
- Vehicle Idling
- Working Remotely

APPENDIX E – Staff Training Courses

- Safe Web Browsing
- Business Email Compromise
- Physical Security
- Public Wi-Fi
- Social Engineering
- Malware
- Password Security Brief
- Mobile Security
- Phishing
- Ransomware
- Sap Ariba – Client Division: Slp Supplier Request, Registration & Certificate Questionnaires
- Mission Values and Ethics
- Etime - Self Time Entry ESS Record Working Time
- Conflict Of Interest
- Fraud Prevention and Whistleblower Protection
- PTP - Creating And Managing Capital Works Program Project, Professional Services and Lump Sum Contracts

APPENDIX F – Maintenance Activities

APPENDIX F – Maintenance Activities

Maintenance Projects Completed in 2022:

- Installed new actuator control system for primary sludge line isolation valve.
- Installed new motor control center and transformer.
- Installed two new drainage pumps.
- Overhauled primary sludge pump #1.
- Performed four year cleaning and inspection of clarifier tank #2
- Repaired inlet valve on clarifier #3 collector mechanism
- Repaired motor limit switch on bar screen
- Repaired primary sludge inlet valve.
- Repaired primary sludge pump #2.
- Repaired sodium bisulphite metering pump.
- Replaced broken parts on residual sulphite analyzer.
- Replaced ferrous chloride pump.
- Replaced primary sludge grinder #2.
- Replaced sump pump.
- Serviced primary sludge grinder #1.