TORONTO Water

NORTH TORONTO TREATMENT PLANT

2021 Annual Report

March 31, 2022

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 55,000. 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 2021 was 17.5 ML/day. Influent concentrations of Biochemical Oxygen Demand (BOD_5), Total Phosphorus (TP) and Total Suspended Solids (TSS) averaged 196 mg/L, 4.8 mg/L and 241 mg/L, respectively.

North Toronto Treatment Plant achieved the following effluent quality and loading rates in 2021 in comparison to ECA limits:

Parameter	ECA[1]	2021 Final Effluent
Total Suspended Solids (SS)	25.0 mg/L	7.5
Carbonaceous Biological Oxygen Demand ($CBOD_5$)	25.0 mg/L	3.2
Total Phosphorus (TP)	1.0 mg/L	0.6
Escherichia Coli (E. Coli)[2]	200 CFU/100mL	13
pH	6.0-9.5	7.0
Total Residual Chlorine (TRC) (Dehlorination)	0.02 mg/L	0.014
TSS Loading Rate	1,137.5 kg/day	132
$CBOD_5$ Loading Rate	1,137.5 kg/day	56
TP Loading Rate	45.5 kg/day	10

[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 549.4 m^3/day at 0.89 % Total Solids (TS) sludge was transferred in 2021.

Ferrous chloride consumption for phosphorus removal totalled 71.62 tonnes as iron (Fe). Total sodium hypochlorite (12% w/v) consumption for effluent disinfection totalled 102.55 m^3. Sodium bisulphite (SBS) (38% w/w) consumption for effluent de-chlorination totalled 66.55 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 57,413 m^3 and 2.74 M kWh, respectively.

Direct operating costs for 2021 totalled $2.06M. In 2021, the North Toronto Treatment Plant had 9 employees. As of December 31, 2021, there were no lost time incidents and no lost time days due to work related injuries.

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GLOSSARY OF ABREVIATIONS

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
m3	Cubic metre
m3 /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).

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

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

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

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

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 55,000. The North Toronto Treatment Plant operates at a controlled flow rate and has a rated capacity of 45,500 m^3/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 2021. 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.

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 website[1].

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

[1] 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 2021, 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. Regulated parameters are highlighted. Influent and effluent performance charts are available in Appendix B. Historical performance data is included in Appendix C.

Table 1: Final Effluent Parameters

Parameter	$CBOD_5$ (mg/L)	TSS (mg/L)	TP (mg/L)	TRC[1] (mg/L)	E-Coli (count/100mL)	pH Min	pH Max
January	4.3	9.4	0.7	0.020	6	6.8	7.3
February	4.5	8.8	0.7	0.020	3	6.5	7.1
March	3.5	6.0	0.5	0.020	3	6.8	7.2
April	3.6	7.5	0.5	0.020	1	6.8	7.2
May	1.5	4.3	0.5	0.018	25	6.8	7.1
June	2.8	5.9	0.6	0.018	29	6.9	7.2
July	2.7	9.0	0.5	0.018	10	6.8	7.3
August	1.3	5.7	0.5	0.020	23	6.8	7.2
September	2.6	10.1	0.7	0.018	24	6.7	7.1
October	3.4	5.9	0.5	0.020	7	6.8	7.3
November	3.2	7.4	0.6	0.019	15	6.8	7.3
December	5.5	10.3	0.7	0.018	9	6.6	7.3
Annual Average	3.2	7.5	0.6	0.014	13	7.0	
Loading (kg/d)[2]	56.5	131.6	10.1	N/A	N/A	N/A	
Removal Efficiency[3] (%)	98%	97%	88%	N/A	N/A	N/A	
ECA Requirements[4,5]							
Effluent Objective	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	
Effluent Limit	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	
Average Waste Loading Limit[2]	AAL: 1,137.5 kg/d	AAL: 1,137.5 kg/d	AAL: 45.5 kg/d	N/A	N/A		

[1]TRC – Total Residual Chlorine. Reported figure is the monthly maximum for the month. Annual Average is the average of all sample results.
[2]Loading is calculated based on flow rates as provided in Table 2
[3]CBOD = 0.8 * BOD assumed for removal efficiency calculatons
[4]Referenced from ECA No. 7459-B6QPM2 issued June 21, 2019.
[5]AAC 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	2021	2020	2019
Influent Parameters				
Flow[1]	ML/day	17.5	17.4	21.5
Total Annual Flow[1]	ML	6380	6359	7851
Total Suspended Solids (TSS)	mg/L	241	357	259
Biological Oxygen Demand (BOD)	mg/L	196	261	183
Total Phosphorus (TP)	mg/L	4.8	5.7	4.8
Preliminary Treatment				
Grit and Screenings	kg/day	291	232	296
Primary Treatment				
TSS	mg/L	117	108	102
cBOD5	mg/L	91	92	71
Secondary Treatment				
Aeration Loading	Kg cBOD5/ m3 day	0.16	0.16	0.15
Mixed Liquor Suspended Solids	mg/L	2258	2353	2228
Solids Handling				
Sludge to Ashbridges Bay Flow	ML/day	0.55	0.45	0.48
Sludge to Ashbridges Bay TS	%	0.89	0.91	1.00

[1]Based on final effluent flow meters

Influent flow to the North Toronto Treatment Plant increased by 0.9% in 2021. Influent strength of BOD, TSS, TP, and TKN decreased by 25%, 33%, 15%, 11% respectively.

Final effluent annual average concentration for cBOD, TSS, and TP was 3.2 mg/L, 7.5 mg/L, and 0.6 mg/L, respectively, and met the monthly average effluent concentration specified in Schedule C of the ECA throughout 2021. The final effluent annual average for e. Coli monthly geometric mean density in 2021 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 2021. Furthermore, final effluent pH remained between the range of 6.0 – 9.5 throughout the course of 2021.

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 were no deviations from the monitoring schedule in 2021. In addition, all of the parameters highlighted in the sampling program specified in Schedule D of the plants ECA 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 2022 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 2021.

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 2021 averaged 549.4 m^3/day (0.89% 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		2021	2020	2019
Phosphorus Removal	Ferrous Chloride as Fe	Dosage (mg/L)	11.73	9.56	5.54
		Consumption (tonnes)	71.62	65.93	47.30
		Cost ($)	$79,444.11	$54,225.98	$38,508.54
Disinfection	Sodium Hypochlorite (12% w/v)	Dosage (mg/L)	1.92	1.84	2.44
		Consumption (m^3)	102.55	97.32	113.52
		Cost ($)	$17,416.50	$12,678.96	$22,753.15
Dechlorination	Sodium Bisulfite (38% w/w)	Dosage (mg/L)	3.93	4.15	1.20
		Consumption (tonnes)	66.55	72.46	72.8
		Cost ($)	$14,871.60	$16,192.30	$16,742.37

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 two reportable spill events at the North Toronto Treatment Plant in 2021.

Date	Duration (hr)	Volume (m^3)	Nature of event	Notes for paragraph
Sept. 17th, 2021	Not available.	0.2	Wet weather event	The spill was caused by a sudden surge flow into the trunk sewer which backed up through the process piping into the chamber and out the manhole. This manhole was reconfigured on October 13, 2021 and no more spills expected from this manhole in the future.

Date	Duration (hr)	Volume (m^3)	Nature of event	Notes for paragraph
Sept. 23rd, 2021	Not available.	0.2	Wet weather event	The spill was caused by a sudden surge flow into the trunk sewer which backed up through the process piping into the chamber and out the manhole. This manhole was reconfigured on October 13, 2021 and no more spills expected from this manhole in the future.

3.4.3 Abnormal Discharge Events

There were no abnormal discharge events at the North Toronto Treatment Plant in 2021.

3.5 Complaints

There were no odour or noise complaints received at the North Toronto Treatment Plant in 2021.

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. A hybrid Quality and Environmental Management System is also in development and will be reported on in future Annual Reports.

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 2021.

Table 4: Capital Projects

Project Name	Project Description	Project Stage (Dec 31, 2021)	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 2021, and found to be within acceptable limits. A summary of effluent monitoring equipment calibration and maintenance performed in 2021 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 verification
Final Effluent Flow Meter - TNT-DCL-FIT-0002 - Calibration	June 15, 2021
Final Effluent ORP Sensor – TNT-DCL-AIT-0002 – Calibration	June 15, 2021
Residual Sulphite Meter - TNT-DCL-AIT-0001 - Calibration	June 15, 2021
Total Residual Chlorine Benchtop Analyzer - HACH DR3900 - Calibration	October 27, 2021
Final Effluent Autosampler – TNT-FT-SP-0003 – Verification	Jan 7, Apr 16, Jul 7, Oct 15, 2021
Chlorine Contact Tank 1 ORP Sensor – TNT-DIS-AIT-0101 - Calibration	June 15, 2021
Chlorine Contact Tank 2 ORP Sensor – TNT-DIS-AIT-0201 - Calibration	June 15, 2021
Influent Autosampler – TNT-PLT-SP-0001 - Verification	Jan 7, Apr 16, Jul 7, Oct 15, 2021
Emergency Generator – TNT-ELS-GEN-0001 - Load Test	July 15, 2021

In 2021, there was a total of 2080 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 57,413 m^3 and 2.74 M kWh, respectively.

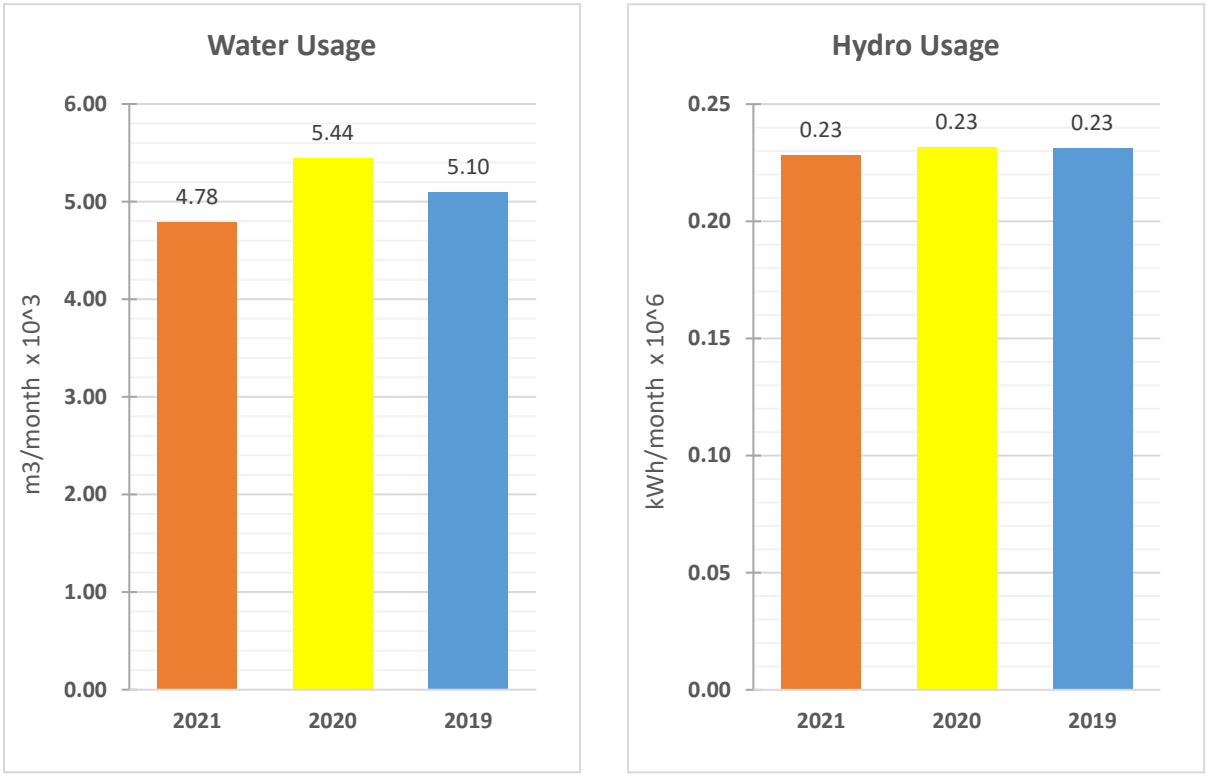


Figure 1: Monthly Utility Consumption (Water, Hydro)

Table 6: Average Unit and Total Utility Cost

Utility	2021	2020	2019
Water Unit Cost ($/$m^3$)	4.35	4.29	4.13
Water Total Cost ($/year)	0.25M	0.28M	0.25M
Hydro Unit Cost ($/kWh)	0.14	0.15	0.15
Hydro Total Cost ($/year)	0.37M	0.42M	0.42M

7 ADMINISTRATION

7.1 Operations and Maintenance Costs

The 2021 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 2021, 2020 and 2019 annual operations and maintenance costs is illustrated in Figure 2. Overall, operational costs increased by 3.7% from 2020.

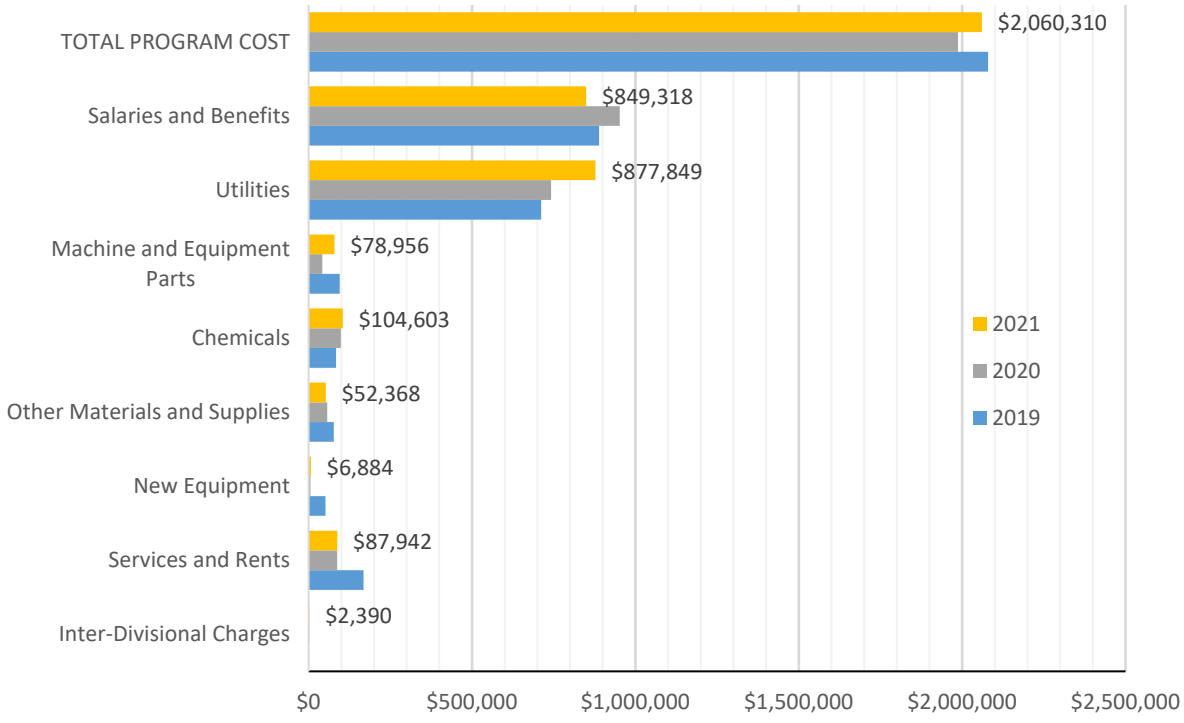


Figure 2: Operations and Maintenance Cost Breakdown

7.2 Human Resources

Plant Staffing at the North Toronto Treatment Plant in 2021 is shown in Table 7.

Table 7: Plant Staffing

Position	Number of FTE[1]
Supervisor, Operational Support	1
EICT	1
Plant Technician Wastewater	2
Industrial Millwrights	2
Wastewater 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, 2021, there were three health and safety incidents and no lost time days in 2021 due to work related injuries.

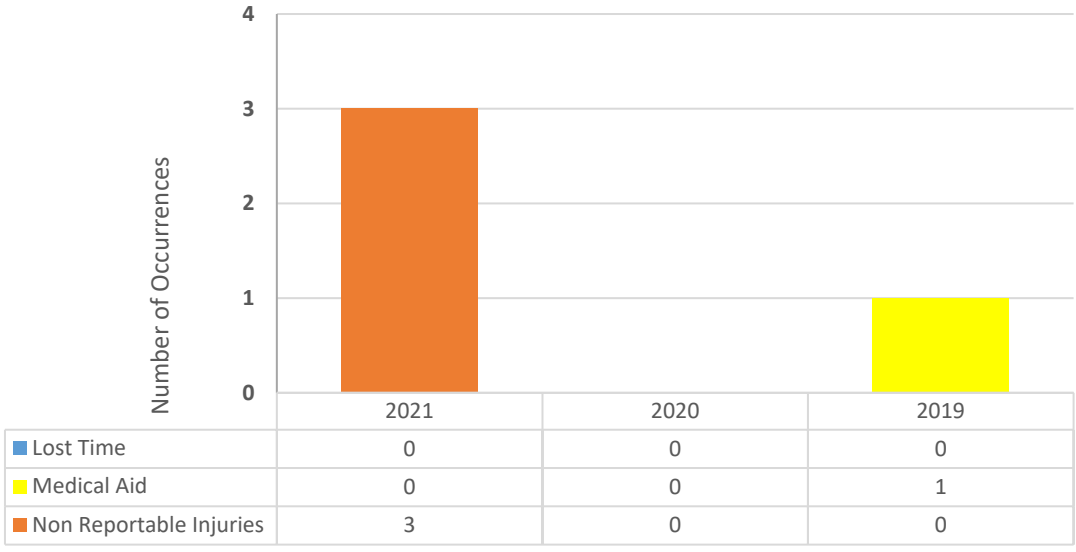


Figure 3: North Toronto Treatment Plant Health & Safety Injury Summary

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 2021 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 2021.

Table 8: Wastewater Treatment Certificates

Class Level	Number of Licenses
Class IV	1
Class III	1
Class II	2
Class I	1
O.I.T.	2
Total	7

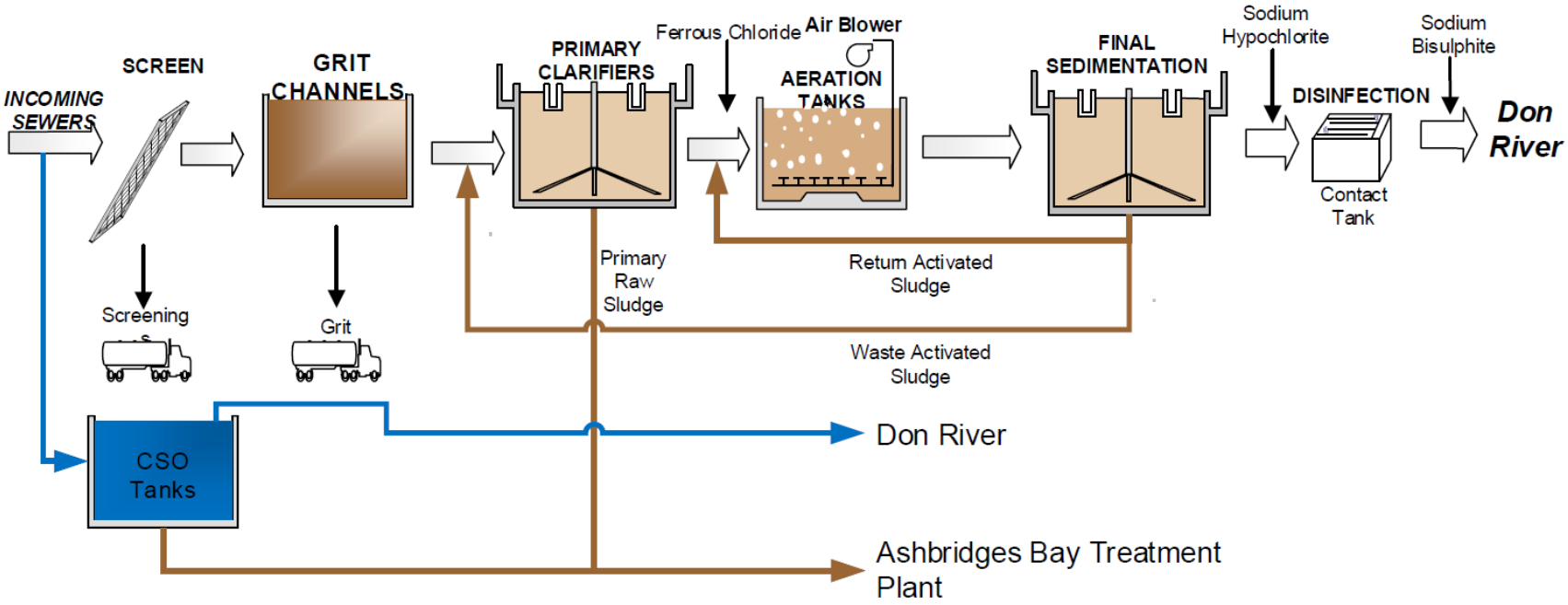
7.6 MECP Correspondence

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

There was no additional correspondence submitted MECP for the North Toronto Treatment Plant.

APPENDIX A – Plant Schematic

APPENDIX A – Plant Schematic



Process Flow Diagram for North Toronto Treatment Plant

APPENDIX B – Influent and Effluent 2021 Performance Chart

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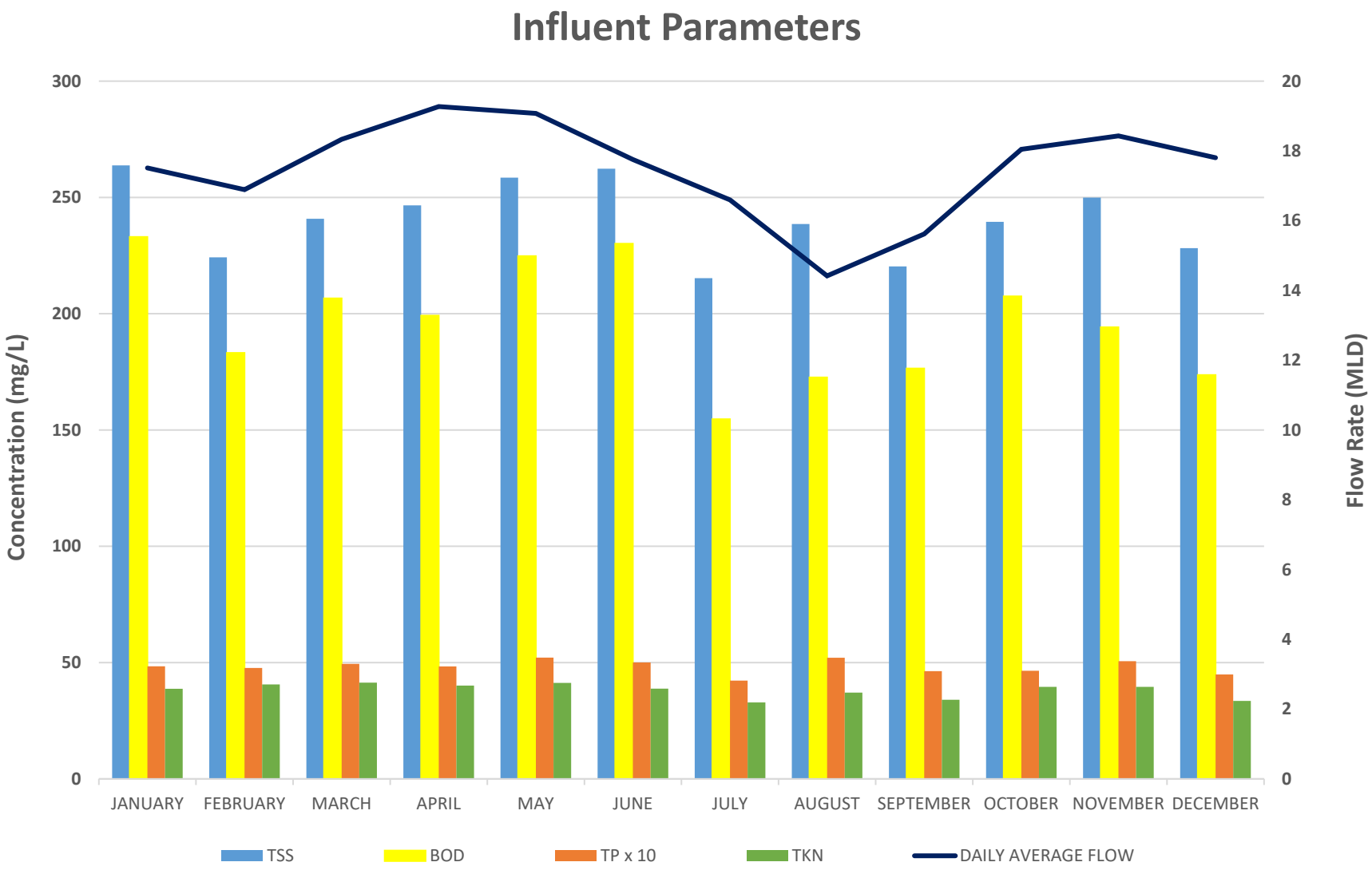
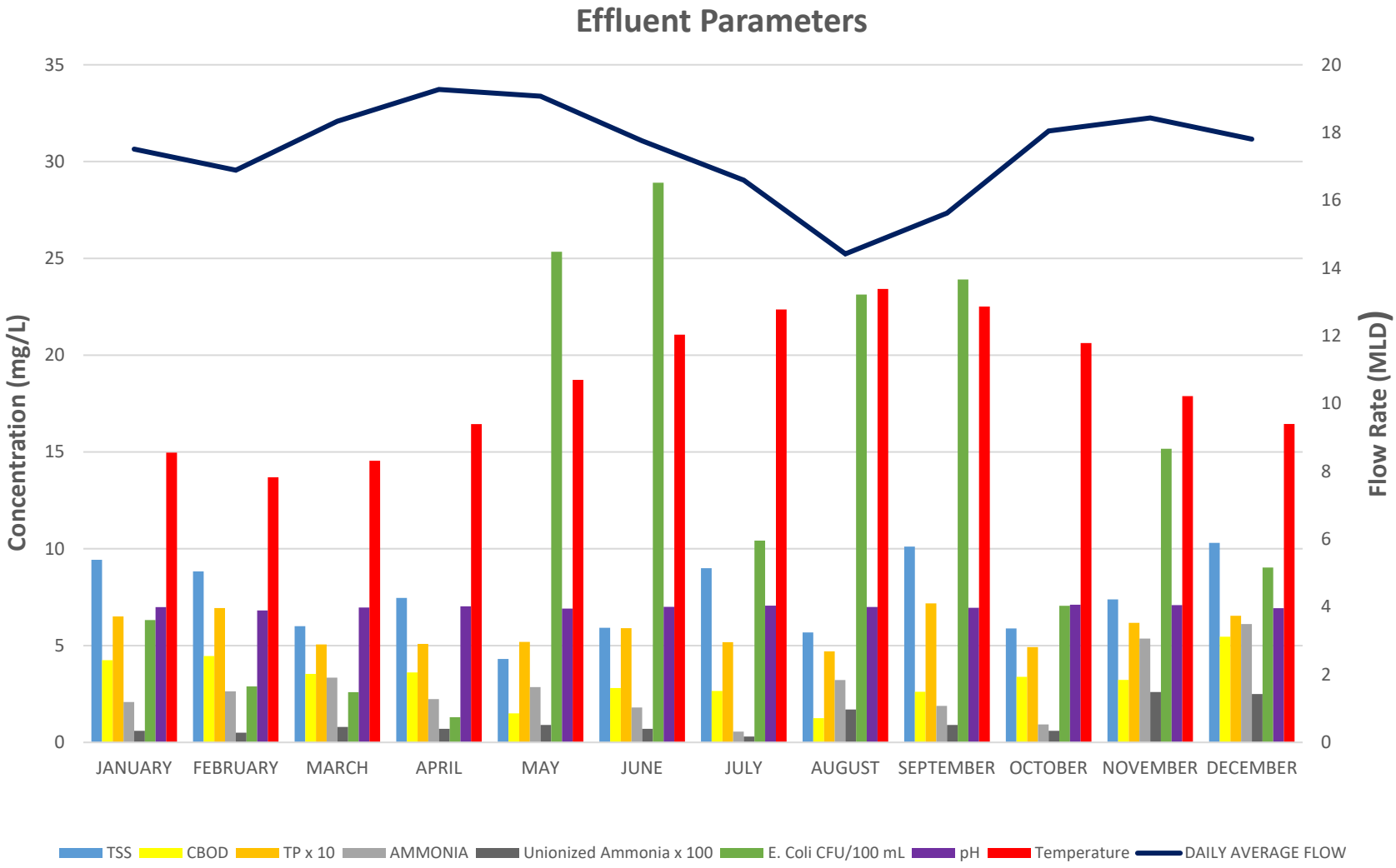


APPENDIX B – Influent and Effluent 2021 Performance Chart



APPENDIX C – Historical Performance Data

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	Units	2021	2020	2019	2018	2017	2016	2015	2014	2013	2012	2011
Influent Parameters												
Flow	ML/day	17.5	17.4	21.5	18.8	15.7	17.6	20.0	23.2	24.4	26.3	30.2
Total Annual Flow	ML	6380	6359	7,851	6,872	5,731	6,422	7,281	8,481	8,703	9,586	11,037
Total Suspended Solids (TSS)	mg/L	240.7	356.6	258.9	321.2	276.0	286.0	268.0	229.2	212.4	213.4	181.3
Biochemical Oxygen Demand (BOD_5)	mg/L	196.3	260.7	182.5	204.4	192.0	197.0	206.0	169.1	148.6	144.7	119.5
Total Phosphorus (TP)	mg/L	4.8	5.7	4.8	5.4	5.2	5.5	5.5	4.4	4.0	4.2	3.8
Total Kjeldahl Nitrogen (TKN)	mg/L	38.1	42.9	39.1	40.1	40.5	41.1	38.8	34.5	35.1	38.1	33.7
Preliminary Treatment												
Grit and Screenings	kg/day	290.6	231.7	296.4	290.8	295	306.6	396.4	302.9	259.4	228.6	151
Primary Treatment												
TSS	mg/L	117.2	107.9	101.7	102.5	86.0	100.0	116.0	106.4	106.2	172.5	136.0
Carbonaceous Biochemical Oxygen Demand ($CBOD_5$)	mg/L	91.4	92.1	70.9	85.0	69.0	89.0	89.0	73.5	82.1	90.3	78.1
Secondary Treatment												
Aeration Loading	kg $CBOD_5/m^3$.day	0.16	0.16	0.15	0.16	0.11	0.15	0.17	0.17	0.19	0.16	0.23
Mixed Liquor Suspended Solids	mg/L	2258	2353	2,228	2,397	2,351	2,439	2,317	2,434	2,512	2,274	2,014
Final Effluent												
Final Effluent Daily Average Flow	ML/day	17.5	17.4	21.5	18.8	15.7	17.5	19.9	23.2	24.3	26.2	29.9
TSS	mg/L	7.5	7.0	5.8	6.6	3.0	3.0	3.6	4.2	4.9	6.3	8.2
TSS Loading Rate	kg/day	131.6	121.4	124.4	123.2	52.7	52.3	71.2	99.3	120.1	169.1	250.3
CBOD5	mg/L	3.2	2.8	3.6	3.1	2.0	2.0	2.2	2.4	2.9	2.6	4.1
CBOD5 Loading Rate	kg/day	56.5	48.2	78.2	57.6	26.5	31.1	42.9	55.9	73.8	68.1	124.2
TP	mg/L	0.6	0.6	0.6	0.6	0.5	0.7	0.7	0.4	0.4	0.5	0.5
TP Loading Rate	kg/day	10.1	10.6	11.9	11.0	8.5	12.1	13.4	9.9	9.0	12.2	13.8
Escherichia Coli (E. Coli)	CFU/100 mL	13	16	13	11	5	11	9	14	6	9	24

APPENDIX C – Historical Performance Data

	Units	2021	2020	2019	2018	2017	2016	2015	2014	2013	2012	2011
Final Effluent (*con't*)												
pH	-	7.0	7.2	7.1	7.1	7.3	7.1	7.4	7.6	7.4	7.3	7.1
Total Chlorine Residual	SBS (P)/mg/L	0.014	0.009	0.011	***	SBS (P)	SBS (P)	SBS (P)	SBS (P)	N/A	N/A	N/A
Total Kjeldahl Nitrogen (TKN)	mg/L	3.3	2.8	5.6	6.7	2.1	1.7	4.0	11.4	5.1	7.7	11.8
Total Ammonia Nitrogen	mg/L	2.8	2.2	5.3	6.0	1.5	0.9	3.2	10.0	3.7	6.8	10.2
Unionized Ammonia	mg/L	0.011	0.012	0.028	0.038	0.010	0.007	0.038	0.105	0.040	0.020	-
Nitrate +Nitrite	mg/L	15.3	15.8	11.7	10.5	15.7	13.9	11.7	6.0	11.0	7.7	7.1
Temperature	degrees Celsius	19	18	17	18	17	18	-	-	-	-	-
Solids Handling												
Sludge to Ashbridges Bay Treatment Plant (ABTP) – Flow*	ML/day or dry tonnes/day	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)	%	0.89	0.91	1.00	0.92	0.97	0.96	1.60	1.40	1.40	1.60	3.50

*The North Toronto sludge digestion facilities were decommissioned in April 2011. Before 2011, flows are reported in dry tonnes of digested biosolids per day. After 2011, flows are reported in ML of sludge per day.

**From January to March 2011, the plant pumped 6.7 dry tonnes/day (3.5% TS) of digested biosolids to ABTP. From April to December 2011, the plant pumped 0.32 ML/day (1.97%) of sludge to ABTP.

*** 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 Units	Arsenic mg/L	Cadmium mg/L	Chromium mg/L	Cobalt mg/L	Copper mg/L	Iron mg/L	Lead mg/L	Manganese mg/L	Mercury mg/L	Nickel mg/L	Zinc mg/L
January	0.005	0.002	0.002	0.002	0.104	0.85	0.0025	0.045	0.00005	0.0025	0.115
February	0.005	0.002	0.002	0.002	0.108	0.90	0.0025	0.046	0.00005	0.0025	0.118
March	0.005	0.002	0.002	0.002	0.112	1.04	0.0065	0.048	0.00005	0.0025	0.12
April	0.005	0.002	0.002	0.002	0.0982	1.10	0.0062	0.043	0.00005	0.0025	0.113
May	0.005	0.002	0.002	0.002	0.103	0.87	0.0054	0.045	0.00005	0.0025	0.124
June	0.005	0.002	0.002	0.002	0.13	1.26	0.0071	0.057	0.00016	0.0025	0.161
July	0.005	0.002	0.002	0.002	0.103	0.89	0.0025	0.046	0.000137	0.0025	0.116
August	0.005	0.002	0.002	0.002	0.137	1.32	0.0055	0.040	0.00005	0.0025	0.143
September	0.005	0.002	0.002	0.002	0.113	0.89	0.0059	0.044	0.00005	0.0025	0.132
October	0.005	0.002	0.002	0.002	0.109	1.21	0.0025	0.042	0.00005	0.0025	0.122
November	0.005	0.002	0.002	0.002	0.0977	0.85	0.0025	0.042	0.00005	0.0025	0.113
December	0.005	0.002	0.002	0.002	0.1	0.72	0.0025	0.043	0.00005	0.0025	0.108
Annual Average	**0.005**	**0.002**	**0.002**	**0.002**	**0.110**	**0.99**	**0.0043**	**0.045**	**0.00007**	**0.0025**	**0.124**

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	0.018	0.79	0.0025	0.067	0.00005	0.0025	0.039
February	0.005	0.002	0.002	0.002	0.021	0.72	0.0025	0.084	0.00005	0.0025	0.047
March	0.005	0.002	0.002	0.002	0.018	0.63	0.0025	0.060	0.00005	0.0025	0.037
April	0.005	0.002	0.002	0.002	0.016	0.61	0.0025	0.041	0.00005	0.0025	0.028
May	0.005	0.002	0.002	0.002	0.014	0.37	0.0025	0.057	0.00005	0.0025	0.030
June	0.005	0.002	0.002	0.002	0.015	0.47	0.0025	0.042	0.00005	0.0025	0.032
July	0.005	0.002	0.002	0.002	0.019	0.88	0.0025	0.047	0.00005	0.0025	0.033
August	0.005	0.002	0.002	0.002	0.014	0.46	0.0025	0.052	0.00005	0.0025	0.032
September	0.005	0.002	0.002	0.002	0.027	0.53	0.0025	0.037	0.00005	0.0025	0.043
October	0.005	0.002	0.002	0.002	0.021	0.47	0.0025	0.046	0.00005	0.0025	0.030
November	0.005	0.002	0.002	0.002	0.019	0.61	0.0025	0.047	0.00005	0.0025	0.029
December	0.005	0.002	0.002	0.002	0.018	0.65	0.0025	0.096	0.00005	0.0025	0.035
Annual Average	**0.005**	**0.002**	**0.002**	**0.002**	**0.018**	**0.60**	**0.0025**	**0.056**	**0.00005**	**0.0025**	**0.035**

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 2021 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 2021:

- 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.