TORONTO Water

NORTH TORONTO TREATMENT PLANT

2020 Annual Report

March 31, 2021

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 2020 was 17.4 ML/day. Influent concentrations of Biochemical Oxygen Demand (BOD_5), Total Phosphorus (TP) and Total Suspended Solids (TSS) averaged 261 mg/L, 5.7 mg/L and 357 mg/L, respectively.

North Toronto Treatment Plant achieved the following effluent quality and loading rates in 2020 in comparison to ECA limits:

Parameter	ECA[1]	2020 Final Effluent
Total Suspended Solids (TSS)	25.0 mg/L	7.0
Carbonaceous Biochemical Oxygen Demand ($CBOD_5$)	25.0 mg/L	2.8
Total Phosphorus (TP)	1.0 mg/L	0.6
Escherichia Coli (E. Coli)[2]	200 CFU/100mL	16
pH	6.0 - 9.5	7.2
Total Chlorine Residual (De-chlorination)	0.02 mg/L	0.009
TSS Loading Rate	1,137.5 kg/day	121
$CBOD_5$ Loading Rate	1,137.5 kg/day	48
TP Loading Rate	45.5 kg/day	11

[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 451.9 m^3/day at 0.91 % Total Solids (TS) sludge was transferred in 2020.

Ferrous chloride consumption for phosphorus removal totalled 65.93 tonnes as iron (Fe). Total sodium hypochlorite (12% w/v) consumption for effluent disinfection totalled 97.32 m^3. Sodium bisulphite (SBS) (38% w/w) consumption for effluent de-chlorination totalled 72.46 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 65,324 m^3 and 2.78 M kWh, respectively.

Plant direct operating costs for 2020 totalled $1.99M. In 2020, the North Toronto Treatment Plant had 10 employees. As of December 31, 2020, 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
DAF	Dissolved Air Flotation
E. Coli	Escherichia Coli
ECA	Environmental Compliance Approval
Fe	Iron
HTP	Humber Treatment Plant
HP	Horsepower
HRT	Hydraulic Retention Time
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

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 2020. 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 2020, 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	1.9	6.1	0.5	0.012	5	7.0	7.4
February	2.2	6.4	0.7	0.007	21	7.0	7.4
March	3.2	3.8	0.6	0.011	3	7.1	7.5
April	2.7	3.8	0.7	0.007	5	7.1	7.4
May	2.3	4.8	0.8	0.009	4	7.0	7.4
June	2.8	4.7	0.6	0.006	29	6.9	7.3
July	2.6	6.5	0.5	0.009	30	6.9	7.3
August	3.1	8.0	0.6	0.007	37	7.0	7.5
September	2.0	7.7	0.6	0.009	4	6.9	7.4
October	3.5	12.4	0.7	0.009	19	6.9	7.5
November	3.6	10.5	0.6	0.007	33	6.8	7.2
December	3.4	9.1	0.6	0.013	3	6.7	7.3
Annual Average	2.8	7.0	0.6	0.009	16	7.2	
Loading (kg/d)[2]	48.2	121.4	10.6	N/A	N/A	N/A	
Removal Efficiency[3] (%)	99%	98%	89%	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	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	2020	2019	2018
Flow[1]	ML/day	17.4	21.5	18.8
Total Annual Flow[1]	ML	6359	7851	6872
Influent Parameters				
Total Suspended Solids (TSS)	mg/L	357	259	321
Biological Oxygen Demand (BOD)	mg/L	261	183	204
Total Phosphorus (TP)	mg/L	5.7	4.8	5.4
Preliminary Treatment				
Grit and Screenings	kg/day	232	296	291
Primary Treatment				
TSS	mg/L	108	102	103
cBOD5	mg/L	92	71	85
Secondary Treatment				
Aeration Loading	Kg cBOD5/ m3 day	0.16	0.15	0.16
Mixed Liquor Suspended Solids	mg/L	2353	2228	2397
Solids Handling				
Sludge to Ashbridges Bay Flow	ML/day	0.45	0.48	0.46
Sludge to Ashbridges Bay TS	%	0.91	1.00	0.92

[1]Based on final effluent flow meters

Over the past five years, sewage flow to North Toronto Treatment Plant has remained relatively constant. The plant operated at a controlled flow rate and is not considerably impacted by wet weather flows. Influent sewage flow was 20% lower than in 2019. TSS, BOD, and TP loading to the plant increased by 38%, 43%, and 19% respectively, compared to 2019.

Final Effluent cBOD, TSS, and TP met the design objectives in Schedule B of the ECA over the course of 2020. All additional final effluent parameters including e. Coli, pH, and Total Residual Chlorine met the compliance limits highlighted in Schedule C of the ECA. Marginal

differences were observed in effluent concentrations for each of the compliance parameters listed in the ECA relative to 2019.

The North Toronto Treatment Plant encountered no chronic operating problems, and continued to produce a high quality effluent. This was achieved through continuous improvement in operations and maintenance of treatment processes, and infrastructure delivery. The plant also met federal government effluent monitoring requirements for un-ionized ammonia and acute toxicity.

In 2020, there were three deviations from the monitoring schedule for *E. coli*. The scheduled sampling days for *E. coli* were Monday, Wednesday, and Friday of each week. On Wednesday, January 22, 2020, the scheduled sample could not be collected due to frozen sampling equipment. The scheduled samples for Wednesday, August 5, 2020 and Wednesday, December 16, 2020 were both delayed until the following day due to temporary plant shutdowns for maintenance and repair. All other parameters listed in the Schedule D Monitoring Program in the ECA comply with the sampling frequency requirements described in Condition 9(1)(b).

3.2 Biosolids Management

The influent flow projection for 2021 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 2020.

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 2020 averaged 451.9 m^3/day (0.91% 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		2020	2019	2018
Phosphorus Removal	Ferrous Chloride as Fe	Dosage (mg/L)	9.56	5.54	7.27
		Consumption (tonnes)	65.93	47.30	61.04
		Cost ($)	$54,225.98	$38, 509	$49,688
Disinfection	Sodium Hypochlorite (12% w/v)	Dosage (mg/L)	1.84	2.44	2.13
		Consumption (m^3)	97.32	113.52	106.66
		Cost ($)	$12,678.96	$22,753	$17,713
Dechlorination	Sodium Bisulfite (38% w/w)	Dosage (mg/L)	4.15	1.20	0.78
		Consumption (tonnes)	72.46	72.8	55.25
		Cost ($)	$16,192.30	$16,742	$12,706

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 2020.

3.4.3 Abnormal Discharge Events

There were no abnormal discharge events at the North Toronto Plant in 2020.

3.5 Complaints

There were no odour or noise complaints received at the North Toronto Treatment Plant in 2020.

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 2020.

Table 4: Capital Projects

Project Name	Project Description	Project Stage (Dec 31, 2020)	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.	Design	2025
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 2020, and found to be within acceptable limits. A summary of effluent monitoring equipment calibration and maintenance performed in 2020 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	September 24, 2020
Final Effluent ORP Sensor – TNT-DCL-AIT-0002 – Calibration	September 24, 2020
Residual Sulphite Meter - TNT-DCL-AIT-0001 - Calibration	October 10, 2020
Total Residual Chlorine Benchtop Analyzer - HACH DR3900 - Calibration	October 20, 2020
Final Effluent Autosampler – TNT-FT-SP-0003 – Verification	January 8, 2020, April 9, July 10, October 7
Chlorine Contact Tank 1 ORP Sensor – TNT-DIS-AIT-0101 - Calibration	February 19, September 23
Chlorine Contact Tank 2 ORP Sensor – TNT-DIS-AIT-0201 - Calibration	September 24, 2020
Influent Autosampler – TNT-PLT-SP-0001 - Verification	January 7, April 8, July 10, October 6
Emergency Generator – TNT-ELS-GEN-0001 - Load Test	May 22, 2020

In 2020, there was a total of 2193 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, hydro, and natural gas. Total annual consumption for potable water and hydro was 65,324 m^3 and 2.78 M kWh, respectively.

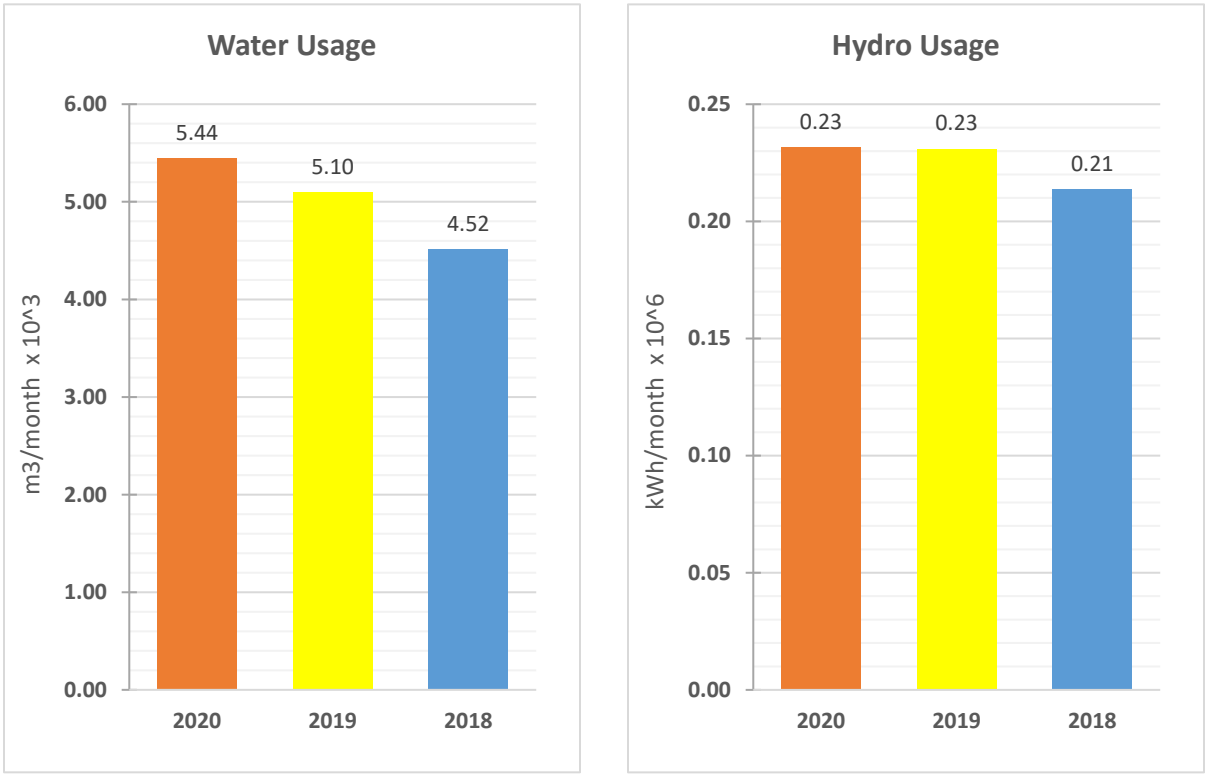


Figure 1: Monthly Utility Consumption (Water, Hydro)

Table 6: Average Unit and Total Utility Cost

Utility	2020	2019	2018
Water Unit Cost ($/$m^3$)	4.29	4.13	4.00
Water Total Cost ($/year)	0.28M	0.25M	0.22M
Hydro Unit Cost ($/kWh)	0.15	0.15	0.14
Hydro Total Cost ($/year)	0.42M	0.42M	0.35M

7 ADMINISTRATION

7.1 Operations and Maintenance Costs

The 2020 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 2020, 2019 and 2018 annual operations and maintenance costs is illustrated in Figure 2. Overall, operational costs decreased by 4.3% from 2019.

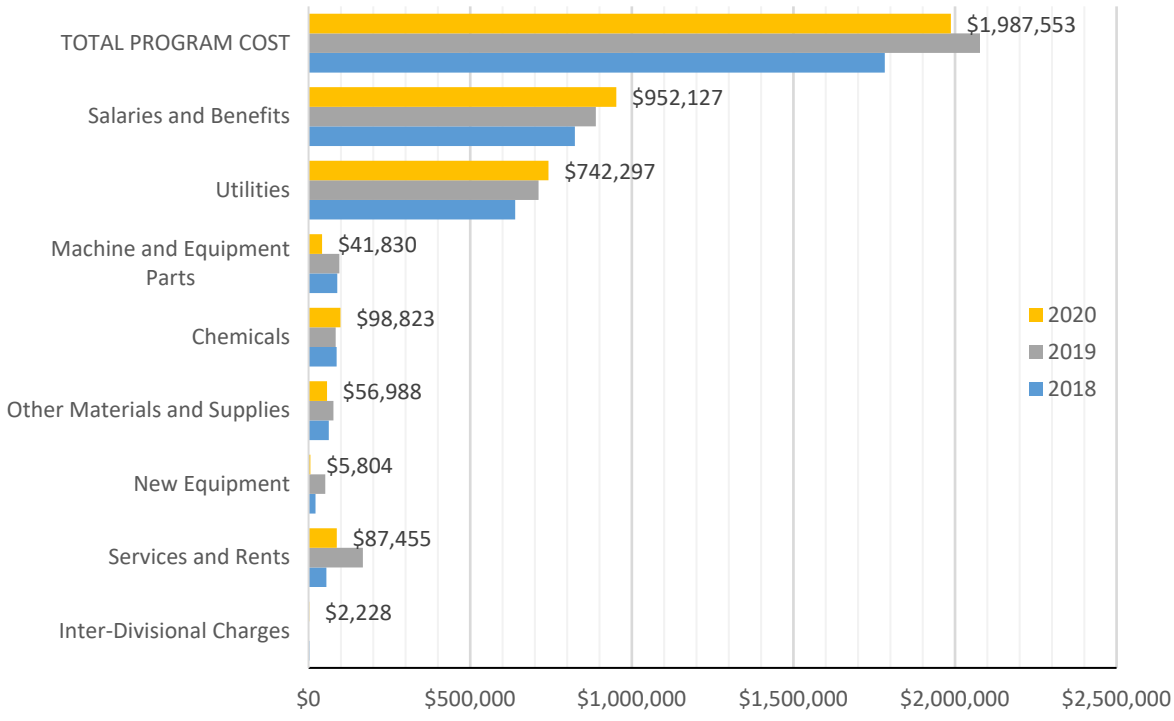


Figure 2: Operations and Maintenance Cost Breakdown

7.2 Human Resources

Plant Staffing at the North Toronto Treatment Plant in 2020 is shown in Table 7.

Table 7: Plant Staffing

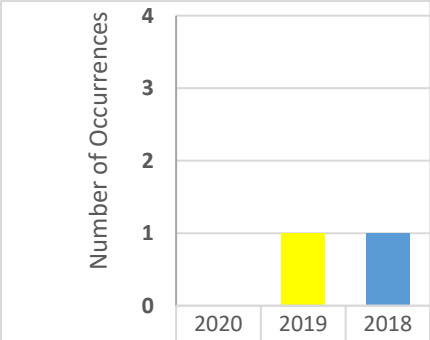
Position	Number of FTE[1]
Supervisor, Operational Support	1
EICT	1
Plant Technician Wastewater	3
Industrial Millwrights	4
Wastewater Plant Worker	1
Total FTE Positions	10

[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, 2020, there were no health and safety incidents and no lost time days in 2020 due to work related injuries.



	2020	2019	2018
Lost Time	0	0	1
Medical Aid	0	1	0
Non Reportable Injuries	0	0	0
Recurrence	0	0	0

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 2020 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 2020.

Table 8: Wastewater Treatment Certificates

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

7.6 MECP/MOL Correspondence

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

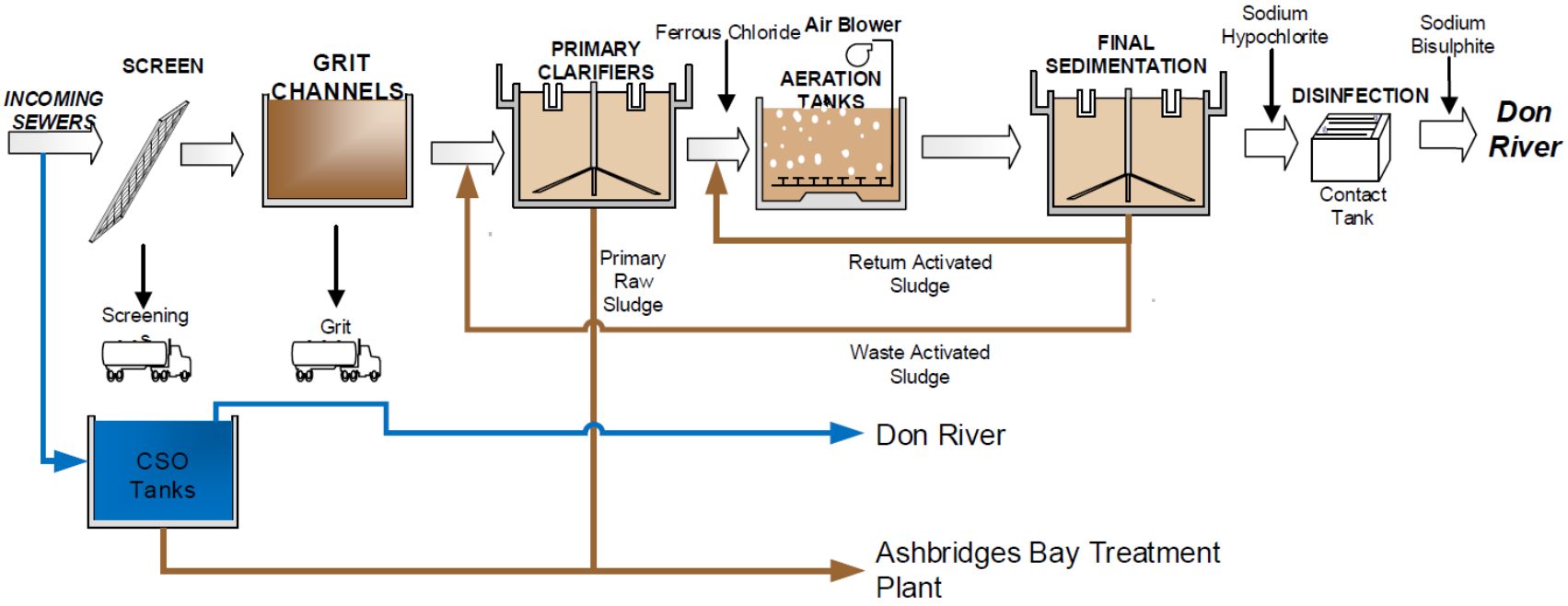
Table 9 summarizes the additional correspondence submitted to the MECP and MOL for the North Toronto Treatment Plant.

Table 9: Correspondence submitted to the MECP and MOL

Event Date	Type	Description	Resolution	Resolution Date
N/A	N/A	N/A	N/A	N/A
Consent Letters				
N/A	N/A	N/A	N/A	N/A
Notice of Start-up				
N/A	N/A	N/A	N/A	N/A
MECP Inspection				
N/A				

APPENDIX A – Plant Schematic

APPENDIX A – Plant Schematic



Process Flow Diagram for North Toronto Treatment Plant

APPENDIX B – Influent and Effluent 2020 Performance Chart

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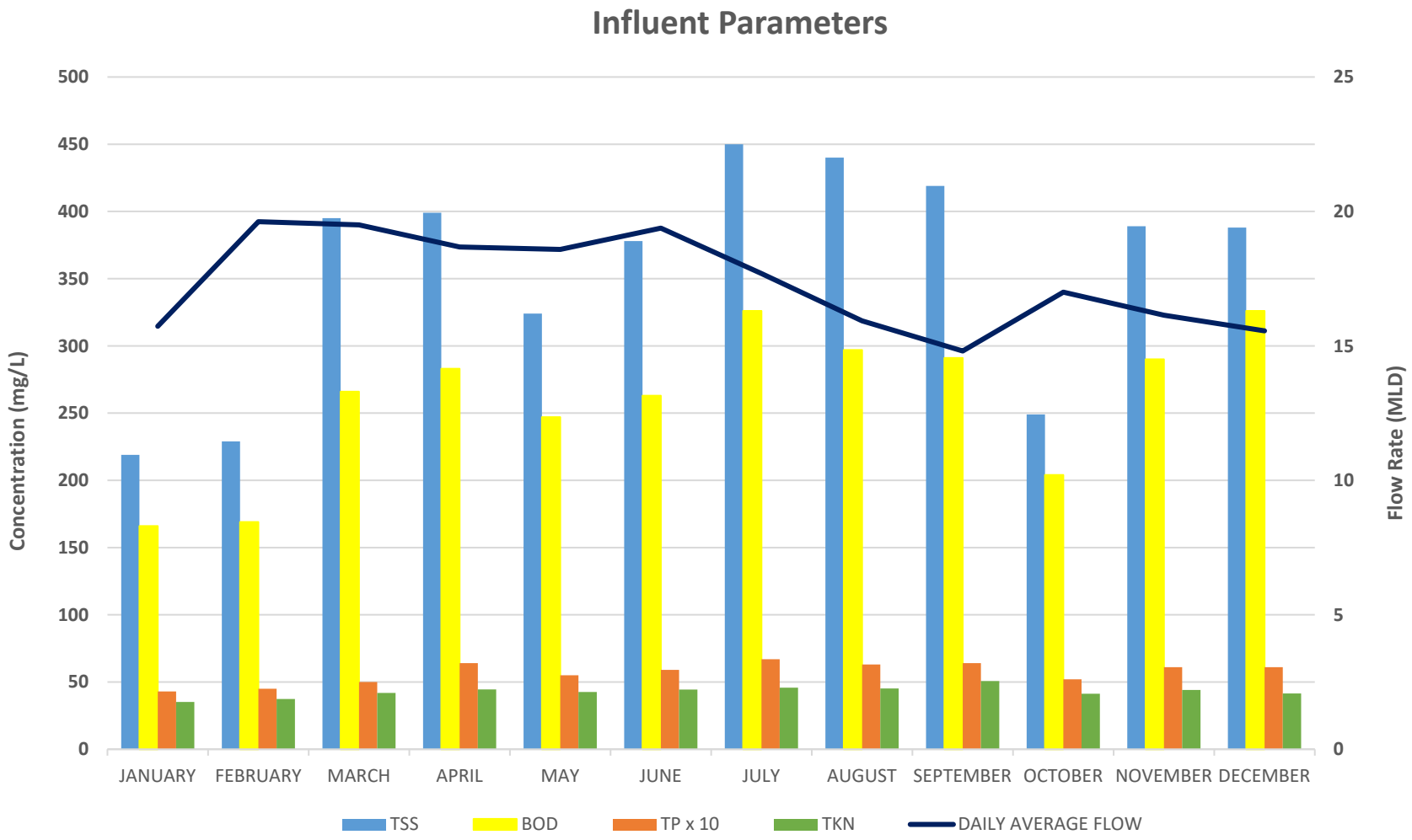
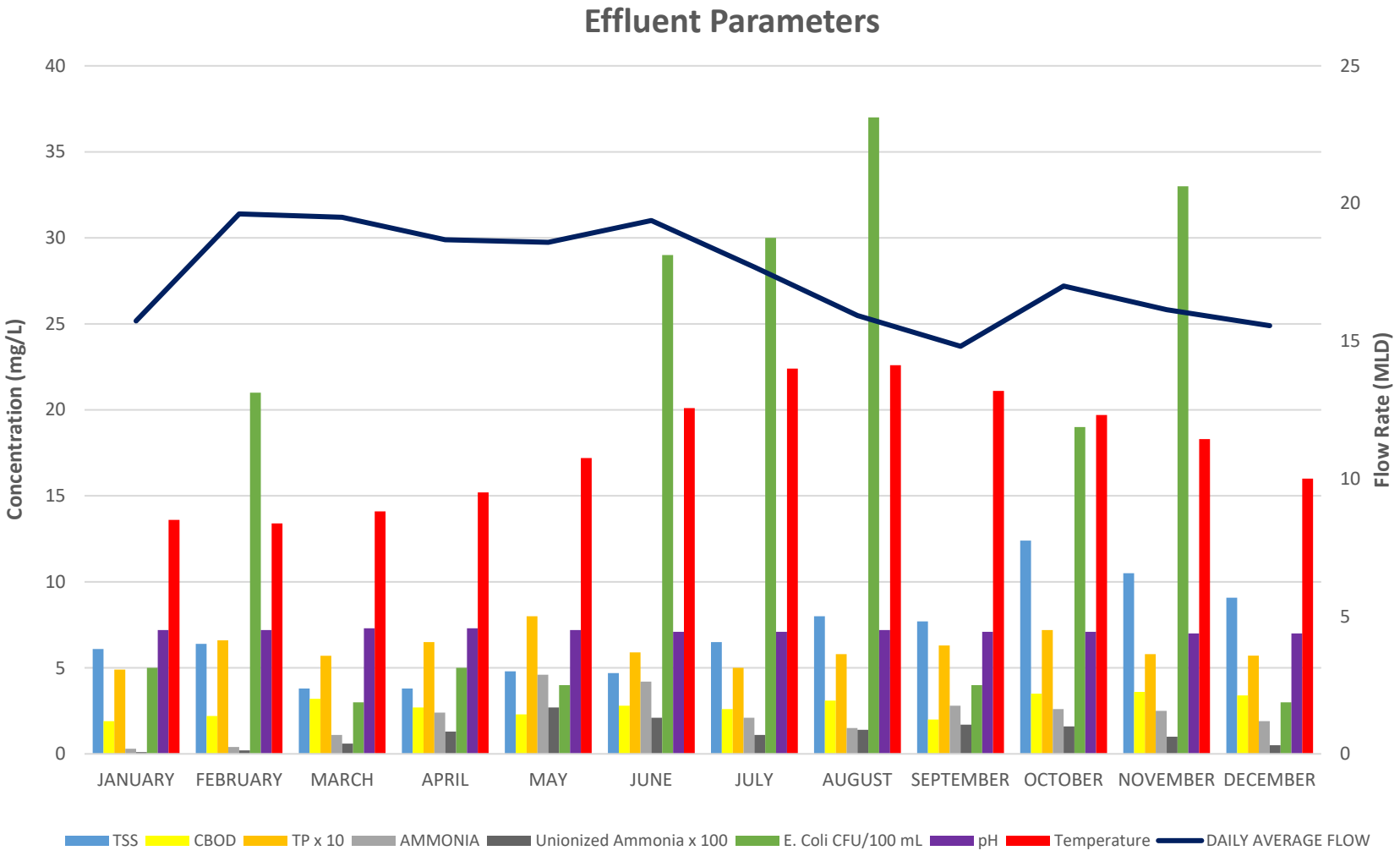


APPENDIX B – Influent and Effluent 2020 Performance Chart



APPENDIX C – Historical Performance Data

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	Units	2020	2019	2018	2017	2016	2015	2014	2013	2012	2011	2010
Influent Parameters												
Flow	ML/day	17.4	21.5	18.8	15.7	17.6	20.0	23.2	24.4	26.3	30.2	36.2
Total Annual Flow	ML	6359	7,851	6,872	5,731	6,422	7,281	8,481	8,703	9,586	11,037	13,208
Total Suspended Solids (TSS)	mg/L	356.6	258.9	321.2	276.0	286.0	268.0	229.2	212.4	213.4	181.3	184.9
Biochemical Oxygen Demand (BOD_5)	mg/L	260.7	182.5	204.4	192.0	197.0	206.0	169.1	148.6	144.7	119.5	113.3
Total Phosphorus (TP)	mg/L	5.7	4.8	5.4	5.2	5.5	5.5	4.4	4.0	4.2	3.8	4.4
Total Kjeldahl Nitrogen (TKN)	mg/L	42.9	39.1	40.1	40.5	41.1	38.8	34.5	35.1	38.1	33.7	34.0
Preliminary Treatment												
Grit and Screenings	kg/day	231.7	296.4	290.8	295	306.6	396.4	302.9	259.4	228.6	151	253
Primary Treatment												
TSS	mg/L	107.9	101.7	102.5	86.0	100.0	116.0	106.4	106.2	172.5	136.0	153.8
Carbonaceous Biochemical Oxygen Demand ($cBOD_5$)	mg/L	92.1	70.9	85.0	69.0	89.0	89.0	73.5	82.1	90.3	78.1	82.8
Secondary Treatment												
Aeration Loading	kg $CBOD_5/m^3$.day	0.16	0.15	0.16	0.11	0.15	0.17	0.17	0.19	0.16	0.23	0.30
Mixed Liquor Suspended Solids	mg/L	2353	2,228	2,397	2,351	2,439	2,317	2,434	2,512	2,274	2,014	2,470
Final Effluent												
Final Effluent Daily Average Flow	ML/day	17.4	21.5	18.8	15.7	17.5	19.9	23.2	24.3	26.2	29.9	36.2
TSS	mg/L	7.0	5.8	6.6	3.0	3.0	3.6	4.2	4.9	6.3	8.2	7.3
TSS Loading Rate	kg/day	121.4	124.4	123.2	52.7	52.3	71.2	99.3	120.1	169.1	250.3	266.2
cBOD5	mg/L	2.8	3.6	3.1	2.0	2.0	2.2	2.4	2.9	2.6	4.1	2.4
cBOD5 Loading Rate	kg/day	48.2	78.2	57.6	26.5	31.1	42.9	55.9	73.8	68.1	124.2	87.8
TP	mg/L	0.6	0.6	0.6	0.5	0.7	0.7	0.4	0.4	0.5	0.5	0.6
TP Loading Rate	kg/day	10.6	11.9	11.0	8.5	12.1	13.4	9.9	9.0	12.2	13.8	23.1

APPENDIX C – Historical Performance Data

	Units	2020	2019	2018	2017	2016	2015	2014	2013	2012	2011	2010
Escherichia Coli (E. Coli)	CFU/100 mL	16	13	11	5	11	9	14	6	9	24	2
Final Effluent (*con't*)												
pH	-	7.2	7.1	7.1	7.3	7.1	7.4	7.6	7.4	7.3	7.1	7.1
Total Chlorine Residual	SBS (P)/mg/L	0.009	0.011	***	SBS (P)	SBS (P)	SBS (P)	SBS (P)	N/A	N/A	N/A	N/A
Total Kjeldahl Nitrogen (TKN)	mg/L	2.8	5.6	6.7	2.1	1.7	4.0	11.4	5.1	7.7	11.8	3.1
Total Ammonia Nitrogen	mg/L	2.2	5.3	6.0	1.5	0.9	3.2	10.0	3.7	6.8	10.2	2.8
Unionized Ammonia	mg/L	0.012	0.028	0.038	0.010	0.007	0.038	0.105	0.040	0.020	-	-
Nitrate +Nitrite	mg/L	15.8	11.7	10.5	15.7	13.9	11.7	6.0	11.0	7.7	7.1	15.6
Temperature	degrees Celsius	18	17	18	17	18	-	-	-	-	-	-
Solids Handling												
Sludge to Ashbridges Bay Treatment Plant (ABTP) – Flow*	ML/day or dry tonnes/day	0.45	0.49	0.46	0.40	0.48	0.32	0.30	0.30	0.31	**	4.30
Sludge to ABTP – Total Solids (TS)	%	0.91	1.00	0.92	0.97	0.96	1.60	1.40	1.40	1.60	3.50	3.70

*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	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*	0.081	0.773	*0.0025*	0.0474	0.000115	*0.0025*	0.103
February	*0.005*	*0.002*	*0.002*	*0.002*	0.0955	0.898	0.00584	0.0523	*0.00005*	*0.0025*	0.122
March	*0.005*	*0.002*	0.00508	*0.002*	0.12	4.28	0.00624	0.0906	*0.00005*	*0.0025*	0.13
April	*0.005*	*0.002*	*0.002*	*0.002*	0.0988	1.1	0.00759	0.0633	*0.00005*	*0.0025*	0.122
May	*0.005*	*0.002*	*0.002*	*0.002*	0.128	1.3	0.00522	0.0666	0.000109	*0.0025*	0.148
June	*0.005*	*0.002*	0.00416	*0.002*	0.195	6.66	0.0102	0.0748	0.000201	0.00525	0.193
July	*0.005*	*0.002*	0.00428	*0.002*	0.209	1.8	0.0116	0.0743	*0.00005*	*0.0025*	0.255
August	*0.005*	*0.002*	*0.002*	*0.002*	0.169	1.58	0.0086	0.0633	0.000128	*0.0025*	0.222
September	*0.005*	*0.002*	*0.002*	*0.002*	0.157	1.49	0.00687	0.0589	*0.00005*	*0.0025*	0.19
October	*0.005*	*0.002*	0.00645	*0.002*	0.127	1.28	0.00628	0.0508	0.0001	0.00542	0.139
November	*0.005*	*0.002*	0.005	*0.002*	0.144	2.21	0.0104	0.0832	0.000121	0.00576	0.193
December	*0.005*	*0.002*	0.00533	*0.002*	0.157	4.76	0.00613	0.0721	0.000123	*0.0025*	0.176
Annual Average	**0.005**	**0.002**	**0.004**	**0.002**	**0.140**	**2.34**	**0.0073**	**0.06647**	**0.000096**	**0.0032**	**0.166**

Values in red italics 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*	0.0109	0.343	*0.0025*	0.0386	*0.00005*	*0.0025*	0.0355
February	*0.005*	*0.002*	*0.002*	*0.002*	0.0145	0.402	*0.0025*	0.0488	*0.00005*	*0.0025*	0.0435
March	*0.005*	*0.002*	*0.002*	*0.002*	0.0161	0.564	*0.0025*	0.0428	*0.00005*	*0.0025*	0.0462
April	*0.005*	*0.002*	*0.002*	*0.002*	0.0102	0.321	*0.0025*	0.0456	*0.00005*	*0.0025*	0.0327
May	*0.005*	*0.002*	*0.002*	*0.002*	0.0106	0.257	*0.0025*	0.0536	*0.00005*	*0.0025*	0.0266
June	*0.005*	*0.002*	*0.002*	*0.002*	0.014	0.391	*0.0025*	0.0409	*0.00005*	*0.0025*	0.0298
July	*0.005*	*0.002*	*0.002*	*0.002*	0.0185	0.477	*0.0025*	0.0329	*0.00005*	*0.0025*	0.034
August	*0.005*	*0.002*	*0.002*	*0.002*	0.0178	0.646	*0.0025*	0.0386	*0.00005*	*0.0025*	0.0334
September	*0.005*	*0.002*	*0.002*	*0.002*	0.017	0.41	*0.0025*	0.0397	*0.00005*	*0.0025*	0.039
October	*0.005*	*0.002*	*0.002*	*0.002*	0.0219	1.06	*0.0025*	0.0483	*0.00005*	*0.0025*	0.0428
November	*0.005*	*0.002*	*0.002*	*0.002*	0.0221	1.1	*0.0025*	0.0528	*0.00005*	*0.0025*	0.0423
December	*0.005*	*0.002*	*0.002*	*0.002*	0.0196	0.793	*0.0025*	0.057	*0.00005*	*0.0025*	0.0395
Annual Average	**0.005**	**0.002**	**0.002**	**0.002**	**0.016**	**0.56**	**0.0025**	**0.04497**	**0.00005**	**0.0025**	**0.037**

Values in red italics 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 2020 includes the list of courses below.

Technical and Health and Safety Training:

- 2015 Ontario Electrical Safety Code (26th Edition) New And Amended Requirements General Level 1
- Accident / Incident Investigation
- Activated Sludge
- Arc Flash / Blast Protection Course
- Arc Flash Awareness for Non-Electrical Personnel
- Asbestos Awareness
- Asbestos Gasket Removal & Replace
- Basic Vibration Analysis
- Care and Use of Electrical Insulating Gloves
- Centrifugal And Positive Displacement Pump Operation
- Chainsaw Safety
- Chemical Receiving and Unloading
- Cold Stress
- Compressed Air
- Confined Space Entry & Rescue Training Awareness
- Confined Space Rescue - 2 Day
- Contractor Safety at your Site
- Critical Injury/Elect Accid Report
- CSO Event Reporting - NTTP
- Designated Substances
- Digesters and the Sludge Digestion Process
- Distracted Driving
- Electrical Safety For Maintenance Staff
- Emergency First Aid and Level A CPR
- Entering/Leaving Construction Areas
- Environmental Compliance Approvals
- Equipment Safety Inspect It Before You Use It
- Ergonomic Injuries: Precautions
- Ergonomics: Safe Lifting
- Eyewash and Shower Stations Safety

APPENDIX E – Staff Training Courses

- Fall Protection
- Fight the Bug: Prevent It Spreading
- Fire Safety and Extinguisher Use
- Fuel Handling
- Gas Detection Equipment
- Grinding Wheel Safety
- Hand Sanitizing
- Hand Tool Safety
- Hazard Reporting: Procedure & Form
- Heat Stress & Sun Protection
- Hot Work Permit System
- Identify and Report Suspicious Behaviour
- Incident Notification
- Infection Control
- Infectious Diseases
- Injury Reporting
- Ladder Safety
- Legislative Comp & Due Diligence WWT
- Lock Out / Tag Out
- Machine Guarding
- MMR - Self-Contained Breathing Apparatus
- Mould Awareness
- MSD Awareness
- MSD Hazards Control Measures
- New Waste Gas Burner Pilot Lighting
- Noise Exposure
- North Toronto TP CSO Tank Improvements Project
- One Call System
- Overhead Crane Safety
- Personal Protective Equipment
- Pre Trip Inspection Circle Check
- Pressure Washer - Sand Blaster
- Propane Handling Awareness
- Protective Headwear (Hard Hats)
- Psychosocial Program and Risk Assessments
- Reporting Procedure on MOL Orders
- Respiratory Protection

APPENDIX E – Staff Training Courses

- Right to Participate – JHSC
- Right to Refuse Unsafe Work
- Safe Air: Indoor Air Quality & Resp.
- Safety on the Road
- Scaffold Safety
- SCBA & SAR Workshop
- Shovelling
- Slips, Trips and Falls Hazard
- Smoke-Free Workplace
- Spill Kits
- Spills and Reporting
- Standard First Aid Level "C" CPR and Automated External Defibrillation (AED)
- Three Point Contact
- Transportation of Dangerous Goods
- TW Emergency Plan Awareness
- Utility Knives
- Vehicle Refuelling
- WHMIS 1988 Training
- WHMIS 2015 Training
- Winter Driving Safety
- Working At Heights
- Working Near Overhead Power Lines
- Working with Wastewater - Construction
- Workplace violence

Other Training:

- AODA – OHRC
- Civility in the Workplace
- Conflict of Interest
- Conflict Resolution and Negotiation Skills
- Human Rights in the Workplace

APPENDIX F – Maintenance Activities

APPENDIX F – Maintenance Activities

Maintenance Projects Completed in 2020:

- Renovated the Control Room and Laboratory.
- Installed two new primary sludge pumps.
- Installed new primary sludge grinder.
- Reconfigured primary pump suction and discharge pipes.
- Installed new overhead beam in Rack House.
- Installed new energy efficient light fixtures and flood light timers.
- Installed permanent power supply to standby generator battery charger.
- Installed new audible alarm annunciators for boiler building.
- Performed 4 year cleaning and inspection on primary clarification tanks #1 and #3.
- Performed scissors and bridge overhaul for primary clarification tank #4.
- Performed 5 year overhaul for combined sewer overflow flush water pump.
- Replaced peristaltic pump for residual sulphite analyzer.
- Replaced fridge for raw sewage auto sampler.
- Replaced dechlorination metering pump.
- Replaced chlorine contact tank sump pumps.
- Replaced sump pumps in aeration gallery and boiler building.
- Repaired and replaced parts for chlorination dosing pump.
- Repaired and replaced parts for aeration blower motor.
- Repaired and replaced parts for capacitor bank.
- Repaired and replaced parts for bar screen screw conveyor.
- Repaired and replaced parts for return sludge pump.