



NORTH TORONTO TREATMENT PLANT

2019 Annual Report



March 31, 2020

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 Certificate of Approval (C of A) No. 7665-7NWMH2, issued on March 26, 2009. On June 21st, 2019, a new Environmental Compliance Approval (ECA) No. 7459-B6QQPM2 was issued for NTTP but for reporting purposes, this annual report refers to 7665-7NWMH2.

The average daily influent flow rate in 2019 was 21.5 ML/day. Influent concentrations of Biochemical Oxygen Demand (BOD₅), Total Phosphorus (TP) and Total Suspended Solids (TSS) averaged 183 mg/L, 4.8 mg/L and 259 mg/L, respectively.

North Toronto Treatment Plant achieved the following effluent quality and loading rates in 2019 in comparison to C of A limits:

Parameter	Certificate of Approval ¹	2019 Final Effluent
Total Suspended Solids (TSS)	25 mg/L	5.8 mg/L
Carbonaceous Biochemical Oxygen Demand (CBOD ₅)	25 mg/L	3.6 mg/L
Total Phosphorus (TP)	1.0 mg/L	0.6 mg/L
Escherichia Coli (E. Coli) ²	200 CFU/100mL	13 CFU / 100 mL
pH	6.0 - 9.5	7.1
Total Chlorine Residual (De-chlorination)	0.02 mg/L	0.011 mg/L
TSS Loading Rate	1,137.5 kg/day	124.4 kg/day
CBOD ₅ Loading Rate	1,137.5 kg/day	78.2 kg/day
TP Loading Rate	45.5 kg/day	11.9 kg/day

¹ Referenced from C of A No. 7665-7NWMH2 issued on March 26, 2009.

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 491.3 m³/day at 1.00% Total Solids (TS) sludge was transferred in 2019.

Ferrous chloride consumption for phosphorus removal totalled 47.3 tonnes as iron (Fe). Total sodium hypochlorite (12% w/v) consumption for effluent disinfection totalled 113.52 m³. Sodium bisulphite (SBS) (38% w/w) consumption for effluent de-chlorination totalled 72.8 tonnes.

The plant continued with various capital projects. Notable projects included Electrical upgrades design and a process upgrades design. 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 61,167 m³ and 2.77 M kWh, respectively.

Plant direct operating costs for 2019 totalled \$2.08M. In 2019, the North Toronto Treatment Plant had 9 employees. As of December 31, 2019, there were no lost time incidents and 0 lost time days due to work related injuries.

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GLOSSARY OF ABBREVIATIONS AND DEFINITIONS

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
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

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 55,000. 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 the C of A No. 7665-7NWMH2 issued on March 26, 2009. On June 21st, 2019, a new Environmental Compliance Approval (ECA) No. 7459-B6QQPM2 was issued. For reporting purposes, this annual report refers to 7665-7NWMH2.

This report is a summary of plant operations and performance in 2019. 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 website¹.

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. For 2019, the plant used 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 2019, 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	TSS	TP	TRC ¹	E-Coli	pH	
	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(count/100mL)	Min	Max
January	4.3	5.7	0.5	0.006	6	6.7	7.4
February	6.5	7.0	0.4	0.012	6	6.8	7.6
March	3.3	3.6	0.5	0.014	15	6.7	7.4
April	7.7	3.0	0.3	0.016	12	6.6	7.3
May	2.0	3.3	0.6	0.013	3	6.4	7.3
June	2.0	4.5	0.7	0.010	3	6.9	7.4
July	2.0	4.1	0.7	0.008	11	6.9	7.4
August	2.6	7.4	0.4	0.011	35	6.8	7.5
September	2.8	5.2	0.4	0.016	4	7.0	7.3
October	2.6	7.0	0.7	0.010	23	6.7	7.6
November	3.5	10.4	0.7	0.011	25	6.9	7.4
December	4.3	8.2	0.7	0.010	11	6.9	7.4
Annual Average	3.6	5.8	0.6	0.011	13	7.1	
Loading (kg/d) ²	78.2	124.4	11.9	N/A	N/A	N/A	
Removal Efficiency ³ (%)	97%	98%	88%	N/A	N/A	N/A	
ECA Requirements^{4,5,6}							
Effluent Objective	AAC: 15 mg/L	AAC: 15 mg/L	MAC: 0.9 mg/L	MAC: 0.0 mg/L	MGMD: 150 CFU/100 mL	6.5 - 8.5	
Effluent Limit	AAC: 25 mg/L	AAC: 25 mg/L	MAC: 1 mg/L	MAC: 0.02 mg/L	MGMD: 200 CFU/100 mL	6.5 - 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	

¹TRC – Total Residual Chlorine

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

³cBOD = 0.8 * BOD assumed for removal efficiency calculations

⁴Referenced from C of A No. 7665-7NWMH2 issued on March 26, 2009.

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	2019	2018	2017
Flow ¹	ML/day	21.5	18.8	15.7
Total Annual Flow ¹	ML	7851	6872	5731
Influent Parameters				
Total Suspended Solids (TSS)	mg/L	259	321	275.6
Biological Oxygen Demand (BOD)	mg/L	183	204	191.9
Total Phosphorus (TP)	mg/L	4.8	5.4	5.2
Preliminary Treatment				
Grit and Screenings	kg/day	296	291	295.0
Primary Treatment				
TSS	mg/L	102	103	85.9
cBOD5	mg/L	71	85	68.6
Secondary Treatment				
Aeration Loading	Kg cBOD5/ m ³ day	0.15	0.16	0.11
Mixed Liquor Suspended Solids	mg/L	2228	2397	2351
Solids Handling				
Sludge to Ashbridges Bay Flow	ML/day	0.48	0.46	0.399
Sludge to Ashbridges Bay TS	%	1.00	0.92	0.97

¹Based 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. TSS, BOD, and TP loading to the plant decreased by 19%, 11%, and 11% respectively, compared to 2018.

The method used by the North Toronto Treatment Plant to measure TRC allows the reporting of three decimal places, which is reflected in the data presented in Table 1.

The North Toronto Treatment Plant encountered no chronic operating problems in 2019, and continued to produce a high quality effluent which surpassed the effluent objectives as

described in Condition 6 of the plant's C of A. 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

3.2 Biosolids Management

The influent flow projection for 2020 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 2019.

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 2019 averaged 491.3 m³/day (1.00% 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		2019	2018	2017
Phosphorus Removal	Ferrous Chloride as Fe	Dosage (mg/L)	5.54	7.27	8.98
		Consumption (tonnes)	47.30	61.04	70.50
		Cost (\$)	\$38,509	\$49,688	\$57,395
Disinfection	Sodium Hypochlorite (12% w/v)	Dosage (mg/L)	2.44	2.13	1.95
		Consumption (m ³)	113.52	106.66	131.13
		Cost (\$)	\$22,753	\$17,713	\$17,673
Dechlorination	Sodium Bisulfite (38% w/w)	Dosage (mg/L)	1.20	0.78	0.53
		Consumption (tonnes)	72.8	55.25	46.68
		Cost (\$)	\$16,742	\$12,706	\$12,897

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 2019.

3.4.3 Abnormal Discharge Events

There were no abnormal discharge events at the North Toronto Plant in 2019.

3.5 Complaints

There were no odour or noise complaints received at the North Toronto Treatment Plant in 2019.

3.6 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 2019.

Table 4: Capital Projects

Project Name	Project Description	Project Stage (Dec 31, 2019)
TNT ECAP 02	Electrical upgrades project including replacement of various MCCs across the plant	Detail Design
CSO Tank Improvements	New CSO tank and chemical treatment facility	Construction
TNT Process Upgrade	Various process upgrades to secondary treatment systems and supplementary treatment systems listed in the proposed works in the ECA	Detail Design

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 2019, and found to be within acceptable limits. A summary of effluent monitoring equipment calibration and maintenance performed in 2019 is included in Table 5.

Table 5: Summary of Regulated Monitoring Equipment Calibration and Maintenance

Calibration and/or Maintenance Record	Completion Date
Final Effluent Flow Meter - Calibration	11/01/2019
Final Effluent pH and Temperature Meter - Calibration	Daily verification
Transmitter, Analyzer Indication, Residual Sulphite - Calibration	02/10/2019
HACH DR3900 (Total Residual Chlorine Benchtop analyzer) - Calibration	09/10/2019
Transmitter, Analyzer Indication, ORP -Calibration	30/10/2019
Transmitter, Analyzer Indication, Chlorine and ORP 0101 - Calibration	03/01/2019
Transmitter, Analyzer Indication, Chlorine and ORP 0201 - Calibration	03/01/2019
Emergency Generator - Load Test	05/10/2019

In 2019, there was a total of 2057 work orders completed; refer to Appendix F for a summary of maintenance activities as per Conditions 10(6)(c) of the C of A. None of the maintenance activities undertaken at the plant fell under Minor Modification; as a result, no Notices of Minor Modifications were submitted to the District Manager as per Condition 11(2) of the C of A.

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 61,167m³ and 2.77M kWh, respectively.

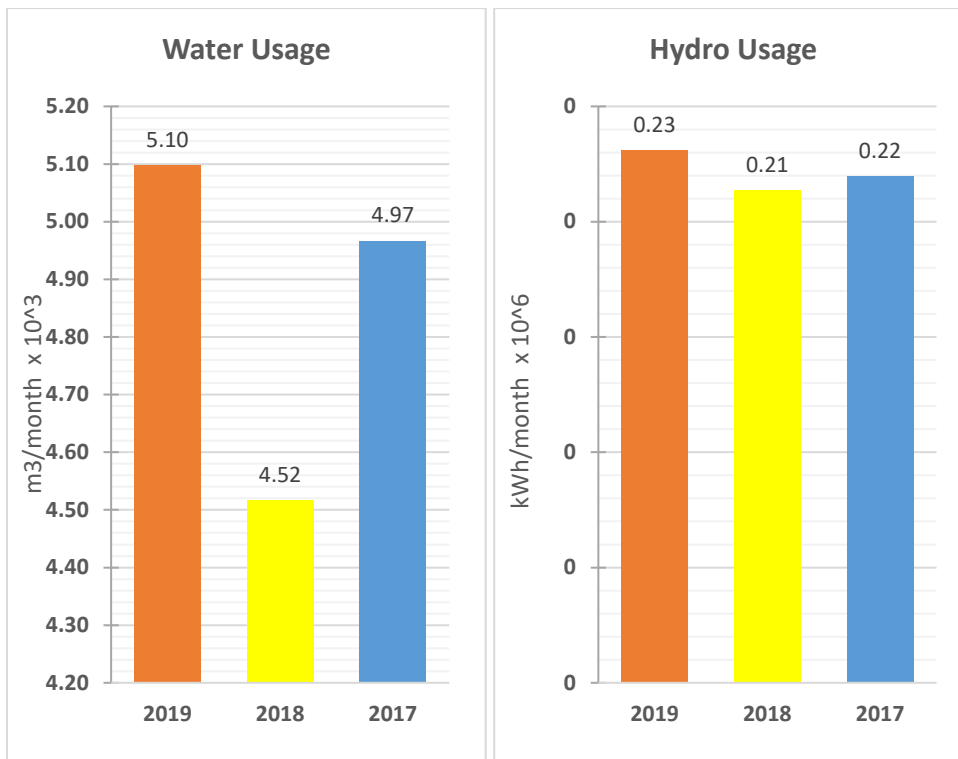


Figure 1: Monthly Utility Consumption (Water, Hydro)

Table 6: Average Unit and Total Utility Cost

Utility	2019	2018	2017
Water Unit Cost (\$/m ³)	4.13	4.00	3.81
Water Total Cost (\$/year)	252,567	217,000	227,261
Hydro Unit Cost (\$/kWh)	0.15	0.14	0.15
Hydro Total Cost (\$/year)	416,627	355,101	395,098

Total Hydro Cost increased 17.3% when compared with 2018.

7 ADMINISTRATION

7.1 Operations and Maintenance Costs

The 2019 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 2019, 2018 and 2017 annual operations and maintenance costs is illustrated in Figure 2. Overall, operational costs increased by 16.7% from 2018.

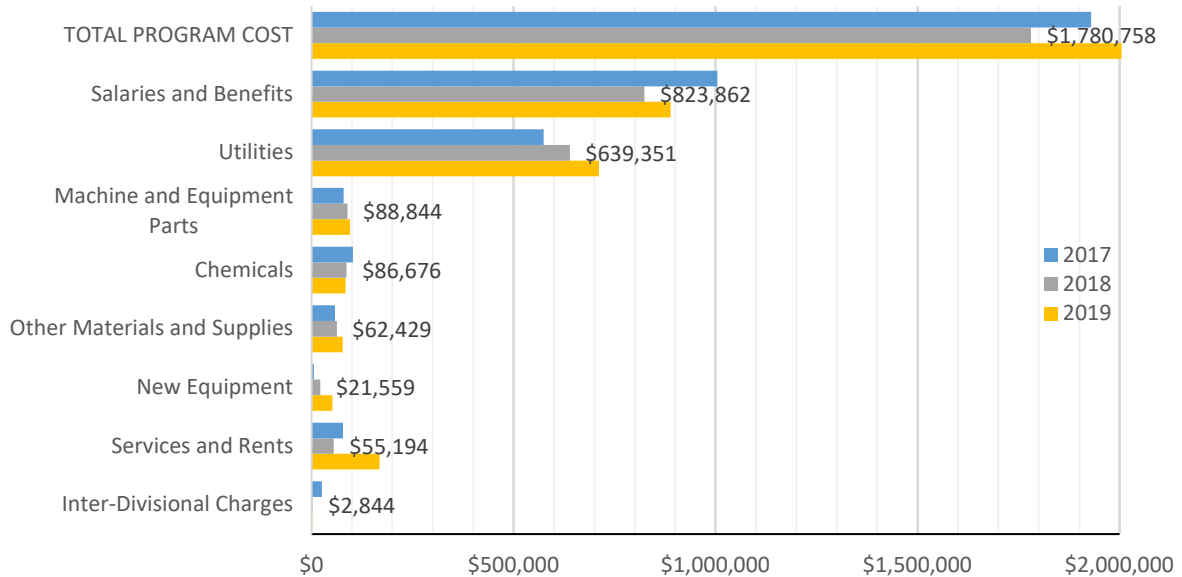


Figure 2: Operations and Maintenance Cost Breakdown

7.2 Human Resources

Plant Staffing at the North Toronto Treatment Plant in 2019 is shown in Table 7.

Table 7: Plant Staffing

Position	Number of FTE ¹
Supervisor, Operational Support	1
EICT	1
Development Plant Technicians	2
Plant Technician Wastewater	2
Industrial Millwrights	2
Wastewater Plant Worker	1
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, 2019, there was one health and safety incident and a total of 0 lost time days in 2019 due to work related injuries.

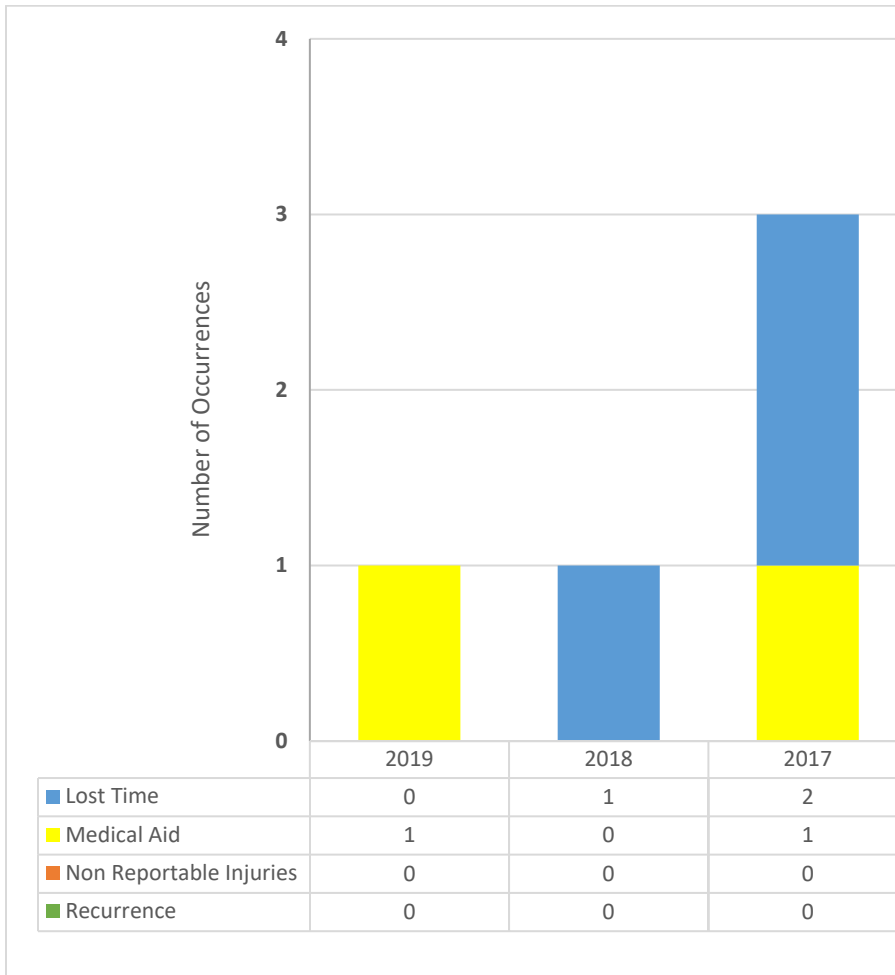


Figure 3: North Toronto Treatment Plant Health & Safety Injury Summary

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 2019 includes the list of courses shown in Appendix E. Some of these courses were eligible for Continuing Education Units (CEU’s) from the Ontario Environmental Training Consortium (OETC). 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 2019.

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.	1
Total	6

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). There were no odour complaints or noise complaints received at the plant in 2019.

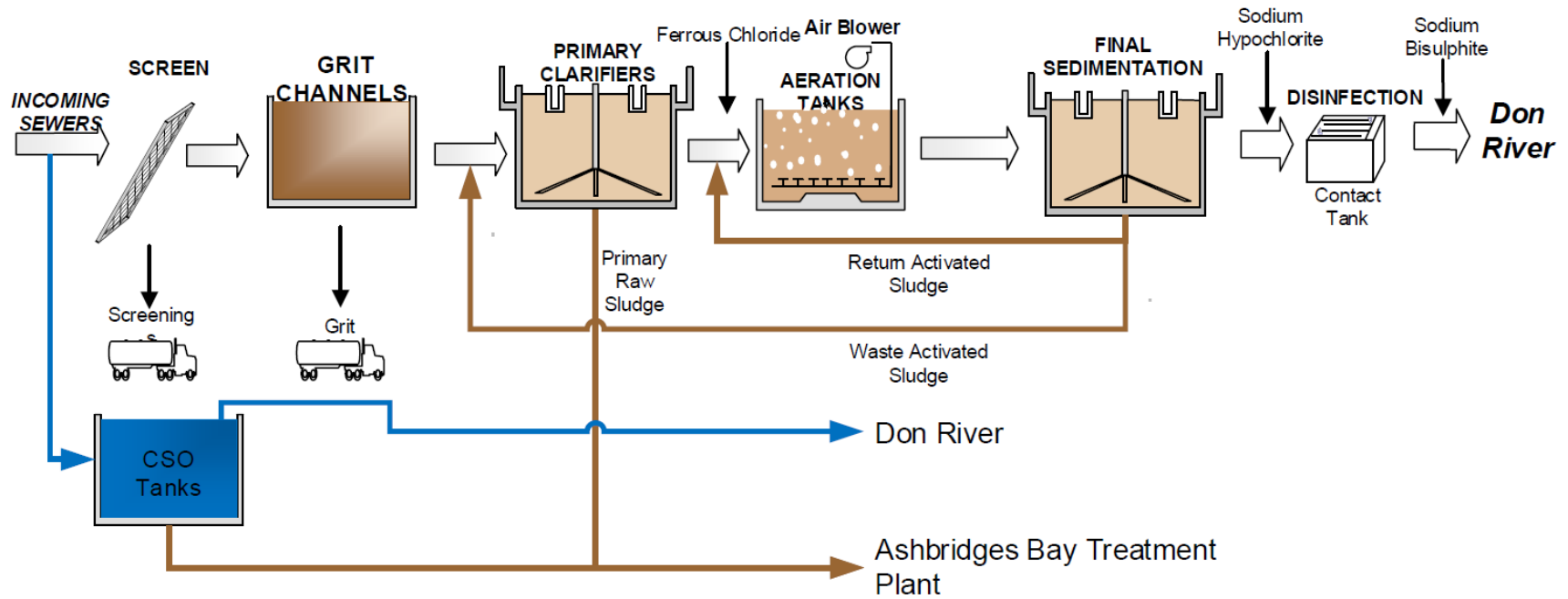
Table 9 summarizes the additional correspondence submitted to the MECP and MOL for the North Toronto Treatment Plant.

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 Notice of Start-up				
N/A	N/A	N/A	N/A	N/A
MECP Inspection				
N/a				

APPENDIX A – Plant Schematic

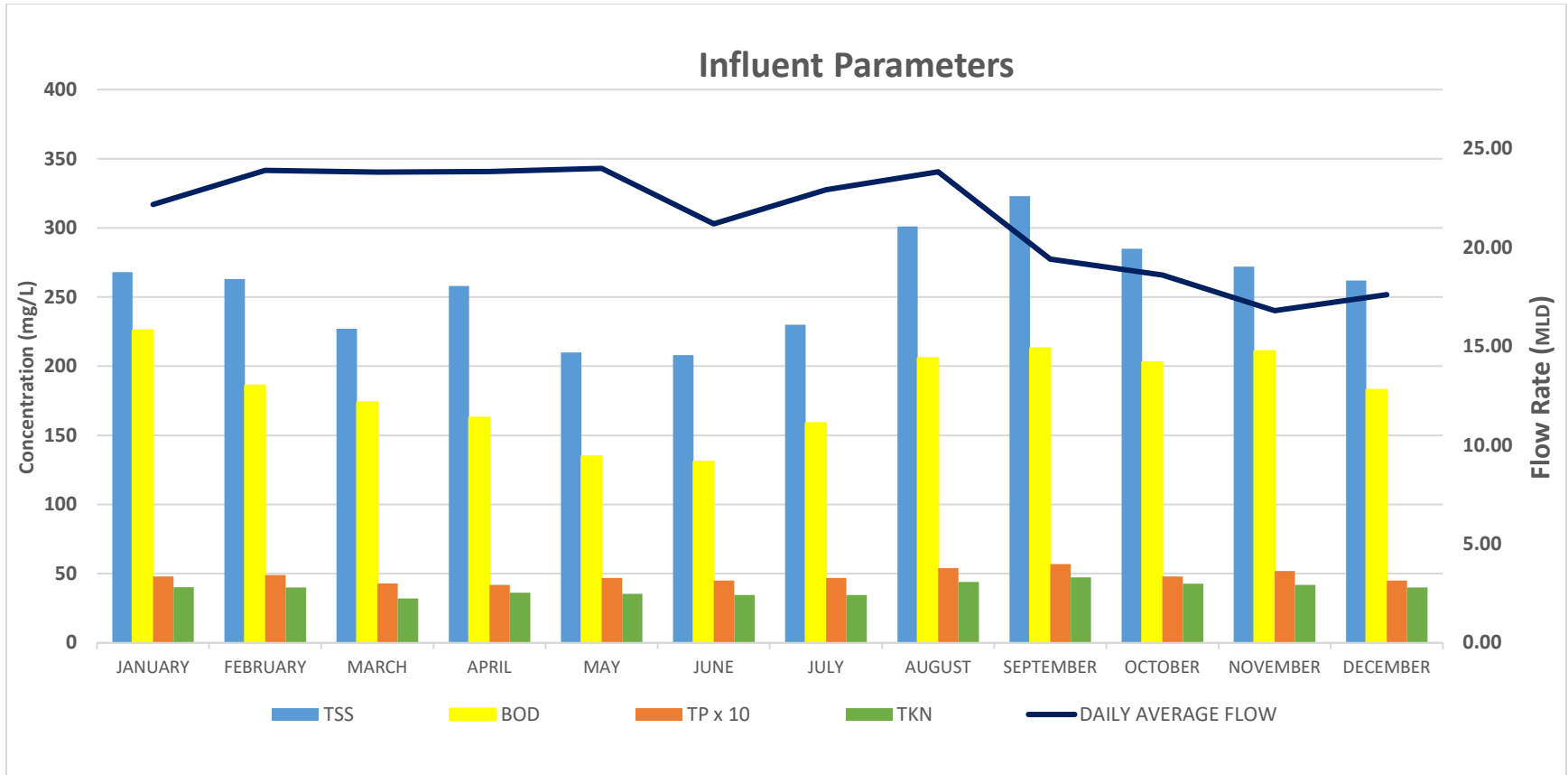
APPENDIX A – Plant Schematic



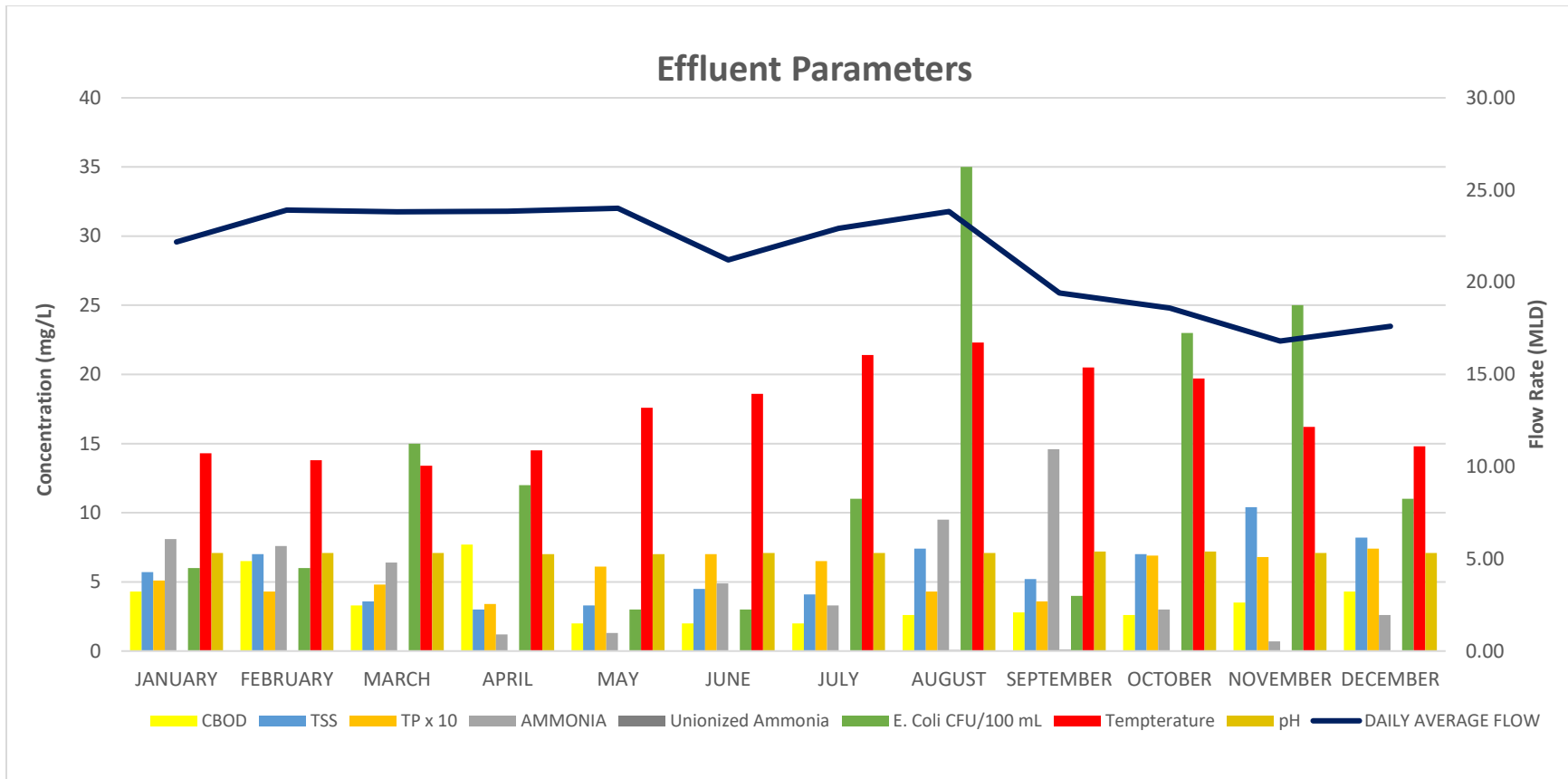
Process Flow Diagram for North Toronto Treatment Plant

APPENDIX B – Influent and Effluent 2019 Performance Charts

APPENDIX B – Influent and Effluent 2019 Performance Charts



APPENDIX B – Influent and Effluent 2019 Performance Charts



APPENDIX C – Historical Performance Data

APPENDIX C – Historical Performance Data

	Units	2019	2018	2017	2016	2015	2014	2013	2012	2011	2010	2009
Influent Parameters												
Flow	ML/day	21.51	18.8	15.7	17.6	20.0	23.2	24.4	26.3	30.2	36.2	33.8
Total Annual Flow	ML	7851	6,872	5,731	6,422	7,281	8,481	8,703	9,586	11,037	13,208	12,343
Total Suspended Solids (TSS)	mg/L	259	321	276	286	268	229.2	212.4	213.4	181.3	184.9	167.4
Biochemical Oxygen Demand (BOD5)	mg/L	183	204	192	197	206	169.1	148.6	144.7	119.5	113.3	96.9
Total Phosphorus (TP)	mg/L	4.8	5.4	5.2	5.5	5.5	4.4	4.0	4.2	3.8	4.4	4.1
Total Kjeldahl Nitrogen (TKN)	mg/L	39.10	40.14	40.51	41.10	38.75	34.54	35.10	38.10	33.70	34.00	33.80
Preliminary Treatment												
Grit and Screenings	kg/day	296.4	290.8	295.0	306.6	396.4	302.9	259.4	228.6	151	253	185
Primary Treatment												
TSS	mg/L	102	103	86	100	116	106.4	106.2	172.5	136.0	153.8	142.3
Carbonaceous Biochemical Oxygen Demand (cBOD5)	mg/L	71	85	69	89	89	73.5	82.1	90.3	78.1	82.8	81.7
Secondary Treatment												
Aeration Loading	kg CBOD5/m3.day	0.15	0.16	0.11	0.15	0.17	0.17	0.19	0.16	0.23	0.30	0.28
Mixed Liquor Suspended Solids	mg/L	2228	2,397	2,351	2,439	2,317	2,434	2,512	2,274	2,014	2,470	2,131
Final Effluent												
Final Effluent Daily Average Flow	ML/day	21.5	18.8	15.7	17.5	19.9	23.2	24.3	26.2	29.9	36.2	33.8
TSS	mg/L	5.8	6.6	3.0	3.0	3.6	4.2	4.9	6.3	8.2	7.3	6.8
TSS Loading Rate	kg/day	124.4	123.2	52.7	52.3	71.2	99.3	120.1	169.1	250.3	266.2	224.9
cBOD5	mg/L	3.6	3.1	2	2	2.2	2.4	2.9	2.6	4.1	2.4	3.0
cBOD5 Loading Rate	kg/day	78.2	57.6	26.5	31.1	42.9	55.9	73.8	68.1	124.2	87.8	98.1
TP	mg/L	0.6	0.6	0.5	0.7	0.7	0.4	0.4	0.5	0.5	0.6	0.7
TP Loading Rate	kg/day	11.9	11.0	8.5	12.1	13.4	9.9	9.00	12.2	13.8	23.1	21.7

APPENDIX C – Historical Performance Data

	Units	2019	2018	2017	2016	2015	2014	2013	2012	2011	2010	2009
Escherichia Coli (E. Coli)	CFU/100 mL	12.8	11.3	5	10.8	9.0	13.5	6.08	9.02	24.4	1.5	1.3
pH	-	7.1	7.1	7.3	7.1	7.4	7.6	7.44	7.25	7.1	7.1	7.2
Total Chlorine Residual	SBS (P)/ mg/L	0.011	***	SBS (P)	SBS (P)	SBS (P)	SBS (P)	N/A	N/A	N/A	N/A	N/A
Total Kjeldahl Nitrogen (TKN)	mg/L	5.56	6.67	2.11	1.68	4.02	11.41	5.10	7.70	11.80	3.10	3.70
Total Ammonia Nitrogen	mg/L	5.3	6.0	1.5	0.9	3.2	10.0	3.7	6.8	10.2	2.8	1.9
Unionized Ammonia	mg/L	0.028	0.038	0.010	0.007	0.038	0.105	0.040	0.020	-	-	-
Nitrate +Nitrite	mg/L	11.68	10.53	15.66	13.85	11.70	6.00	11.00	7.70	7.10	15.60	-
Temperature	degrees Celsius	17	18	17	18	-	-	-	-	-	-	-
Solids Handling												
Sludge to Ashbridges Bay Treatment Plant (ABTP) – Flow *	ML/day or dry tonnes/day	0.49	0.46	0.4	0.48	0.32	0.3	0.3	0.31	*	4.3	4.4
Sludge to ABTP – Total Solids (TS)	%	1.00	0.92	0.97	0.96	1.6	1.4	1.4	1.6	3.5	3.7	3.6

*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	<i>0.005</i>	<i>0.002</i>	<i>0.002</i>	<i>0.002</i>	0.101	1.16	0.00523	0.0542	<i>0.00005</i>	<i>0.0025</i>	0.107
February	<i>0.005</i>	<i>0.002</i>	<i>0.002</i>	<i>0.002</i>	0.0899	1.11	<i>0.0025</i>	0.05	<i>0.00005</i>	<i>0.0025</i>	0.104
March	<i>0.005</i>	<i>0.002</i>	<i>0.002</i>	<i>0.002</i>	0.0563	0.962	<i>0.0025</i>	0.0374	<i>0.00005</i>	<i>0.0025</i>	0.0716
April	<i>0.005</i>	<i>0.002</i>	0.00584	<i>0.002</i>	0.0887	1.84	0.00699	0.067	<i>0.00005</i>	<i>0.0025</i>	0.111
May	<i>0.005</i>	<i>0.002</i>	0.00499	<i>0.002</i>	0.0739	1.2	<i>0.0025</i>	0.0591	<i>0.00005</i>	<i>0.0025</i>	0.0973
June	<i>0.005</i>	<i>0.002</i>	0.00418	<i>0.002</i>	0.0947	1.38	0.0106	0.0522	<i>0.00005</i>	<i>0.0025</i>	0.116
July	<i>0.005</i>	<i>0.002</i>	<i>0.002</i>	<i>0.002</i>	0.114	0.98	0.00562	0.0515	0.000355	<i>0.0025</i>	0.14
August	<i>0.005</i>	<i>0.002</i>	<i>0.002</i>	<i>0.002</i>	0.126	1.29	0.00673	0.063	<i>0.00005</i>	<i>0.0025</i>	0.16
September	<i>0.005</i>	<i>0.002</i>	0.00428	<i>0.002</i>	0.152	1.38	0.00586	0.0551	<i>0.00005</i>	<i>0.0025</i>	0.146
October	<i>0.005</i>	<i>0.002</i>	<i>0.002</i>	<i>0.002</i>	0.114	1.27	0.00651	0.0598	0.000247	<i>0.0025</i>	0.149
November	<i>0.005</i>	<i>0.002</i>	0.00407	<i>0.002</i>	0.108	1.45	0.00728	0.0673	<i>0.00005</i>	<i>0.0025</i>	0.137
December	<i>0.005</i>	<i>0.002</i>	<i>0.002</i>	<i>0.002</i>	0.0913	0.821	<i>0.0025</i>	0.0511	<i>0.00005</i>	<i>0.0025</i>	0.111
Annual Average	<i>0.005</i>	<i>0.002</i>	0.00311	<i>0.002</i>	0.1008	1.2369	0.0054	0.055642	0.000092	<i>0.0025</i>	0.1208

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	<i>0.005</i>	<i>0.002</i>	<i>0.002</i>	<i>0.002</i>	0.0236	0.351	<i>0.0025</i>	0.0577	<i>0.00005</i>	<i>0.0025</i>	0.0373
February	<i>0.005</i>	<i>0.002</i>	<i>0.002</i>	<i>0.002</i>	0.0158	0.193	<i>0.0025</i>	0.0448	<i>0.00005</i>	<i>0.0025</i>	0.0327
March	<i>0.005</i>	<i>0.002</i>	<i>0.002</i>	<i>0.002</i>	0.0092	0.26	<i>0.0025</i>	0.0473	<i>0.00005</i>	<i>0.0025</i>	0.0268
April	<i>0.005</i>	<i>0.002</i>	<i>0.002</i>	<i>0.002</i>	0.0096	0.239	<i>0.0025</i>	0.0708	<i>0.00005</i>	<i>0.0025</i>	0.0296
May	<i>0.005</i>	<i>0.002</i>	<i>0.002</i>	<i>0.002</i>	0.0104	0.168	<i>0.0025</i>	0.0473	<i>0.00005</i>	<i>0.0025</i>	0.03
June	<i>0.005</i>	<i>0.002</i>	<i>0.002</i>	<i>0.002</i>	0.0107	0.297	<i>0.0025</i>	0.0407	<i>0.00005</i>	<i>0.0025</i>	0.0315
July	<i>0.005</i>	<i>0.002</i>	<i>0.002</i>	<i>0.002</i>	0.0091	0.269	<i>0.0025</i>	0.0365	<i>0.00005</i>	<i>0.0025</i>	0.0273
August	<i>0.005</i>	<i>0.002</i>	<i>0.002</i>	<i>0.002</i>	0.012	0.324	<i>0.0025</i>	0.0338	<i>0.00005</i>	<i>0.0025</i>	0.0321
September	<i>0.005</i>	<i>0.002</i>	<i>0.002</i>	<i>0.002</i>	0.0138	0.315	<i>0.0025</i>	0.0396	<i>0.00005</i>	<i>0.0025</i>	0.034
October	<i>0.005</i>	<i>0.002</i>	<i>0.002</i>	<i>0.002</i>	0.0119	0.265	<i>0.0025</i>	0.0335	<i>0.00005</i>	<i>0.0025</i>	0.0341
November	<i>0.005</i>	<i>0.002</i>	<i>0.002</i>	<i>0.002</i>	0.0215	0.702	<i>0.0025</i>	0.063	<i>0.00005</i>	<i>0.0025</i>	0.0451
December	<i>0.005</i>	<i>0.002</i>	<i>0.002</i>	<i>0.002</i>	0.0124	0.495	<i>0.0025</i>	0.0515	<i>0.00005</i>	0.0061	0.0363
Annual Average	<i>0.005</i>	<i>0.002</i>	<i>0.002</i>	<i>0.002</i>	0.0133	0.3232	<i>0.0025</i>	0.047208	<i>0.00005</i>	0.0028	0.0331

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 2019 includes the list of courses below:

Technical and Health and Safety Training:

- Activated Sludge
- Asbestos Awareness
- Basic Spill Response
- Become A Great Listener
- Centrifugal And Positive Displacement Pump Operation
- Coaching For Effectiveness, Improvement And Growth
- Conductors (2019-2021)
- Confined Space Awareness
- Confined Space Rescue - 2 Day
- Conflict Resolution & Negotiation Skills
- Customer Care Centre Information, Musculo-Skeletal Disorder Overview, Construction Contractor Safety Management Program, And General Emergency Response Plan Training For WWT Plant Techs
- Designated Substances (2019-2022)
- Difficult People: Strategies To Keep Everyone Working Together
- Difficult People: Why They Act That Way And How To Deal With Them
- Digesters And The Sludge Digestion Process
- Electrical Awareness
- Electrical Safety For Maintenance Staff (2019-2021)
- Facing Challenges As A First-Time Manager
- Fall Protection Awareness
- Health And Safety Competency For Front-Line Supervisors: One-Day Refresher
- How Culture Impacts Communication
- In-Service Health & Safety Orientation
- Introduction To Cyber Security Awareness
- JHSC Recognition Event
- Leading Through Positive Influence
- Making And Carrying Out Tough Decisions
- Making Feedback A Regular Occurrence
- Malware
- Mastering Active Listening In The Workplace
- Motivating Your Employees
- Mould Awareness (2019-2022)
- Outlook 2013 - Increase Your Productivity With Outlook
- Password Security
- Phishing
- Physical Security

Other Training:

- Building Innovation Cultures And Leaders
- Delivering Feedback

APPENDIX E Staff Training Courses

- Receiving Feedback
- Removable Media (I.E. CDs, DVDs And USBs)
- Respect In Our Workplace
- Social Engineering
- The Art And Science Of Communication
- Trust Building Through Effective Communication

APPENDIX F – Maintenance Activities

APPENDIX F – Maintenance Activities

Regular scheduled (WMS) maintenance work completed:

- **Process:**
 - Cleaned Cl/ORP analyzer sample probe weekly
 - Cleaned D.O. sensor weekly
 - Back flush sampler line weekly
 - Cleaned HVAC system annually
 - Bar Screen and screw conveyor system inspection and gear box oil change
 - RAS and WAS equipment and system maintenance
 - Chlorination and de-chlorination equipment and system maintenance
 - Check the ferrous chloride pumps and lubricate- 6 Monthly
 - Chlorine contact tank draining, cleaning and concrete inspection annually
 - Inspection of the furnace oil storage tank surface quarterly
 - Bridge rotating collector inspection and Checks annually
 - Boiler Inspections monthly
 - Above Ground Fuel Oil Tank monthly maintenance
 - 27.6 kV load switch and transformer, 600 V breakers, MCC and bus checks annually
 - Auxiliary portable generator inspection and start up weekly
 - Check for fatigued batteries on the UPS system - 6 monthly
 - Test wet well level transmitter functionality - Annually
 - Tank weir cleaning – 2 Monthly
 - Verification of the WAS/RAS Pumps, sludge pumps, flow meters, sodium bisulphite and sodium hypochlorite dosing pumps
 - Restoration of the analyzers and restoration of the peristaltic chemical dosing pumps and tubing
 - Test sump pits and associated controls
 - Exercising of valves include isolation, suction, discharge, bypass and drawing valves
- **Safety:**
 - JHSC Work place inspection monthly
 - All emergency eyewash station equipment tested weekly and maintenance monthly
 - All fire extinguishers and fire hydrant inspection and maintenance
 - All first aid kits maintained
 - Check the operation of the submersible building sump pumps annually
 - Check the MCC grounding system annually
 - Check the operation of the submersible building sump pumps annually
 - Emergency / Exit light Inspection monthly
 - Crane Inspections annually
 - SCBA Breathing Apparatus monthly inspection

APPENDIX F – Maintenance Activities

2019 Process Specific Maintenance Projects

- Cleaned and installed diffusers on Aeration Tank # 2 and # 3
- Cleaned Primary Tanks # 1 and # 2
- Installed new Seepex pump # 1 and overhauled Seepex Pump # 2
- Installed a new CSO Automatic Sampler
- Connected Ferrous Chloride level and MLSS meter reading to the SCADA
- Repaired Compressor # 1 that had been out of service for 5 years

2019 Maintenance Projects

- Paved around the West and South side of the Storm Tank and built a stone Retaining Wall
- Installed a Lifting device in the Primary Pump House
- Installed 6 new Dewatering valves on Aeration Tank # 1 to Tank # 3
- Relocated the Control Room to a temporal location to allow renovation for the new Control/LAB
- Installed new lights that are energy efficient on Aeration Gallery Basement