



HIGHLAND CREEK TREATMENT PLANT

2025 Annual Report



March 31, 2026

EXECUTIVE SUMMARY

The Highland Creek Treatment Plant (HCTP) is one of four wastewater treatment facilities operated by the City of Toronto. This facility, located at 51 Beechgrove Drive, has a rated capacity of 219,000 m³/day, or 219 ML/day, and serves an equivalent population of approximately 489,000. The HCTP discharges into Lake Ontario and operated under Amended Environmental Compliance Approval (ECA) Air No. 6101-CUBKC2, issued on November 6, 2023, and Amended Environmental Compliance Approval (ECA) Sewage No. 8001-CQBNPG, issued on December 6, 2023.

The influent parameters at HCTP is summarized in the table below.

Parameter	2025 Influent
Average Daily Flow Rate	186.4 ML/day
Biochemical Oxygen Demand (BOD ₅)	247.5 mg/L
Total Phosphorus (TP)	6.1 mg/L
Total Suspended Solids (TSS)	323.7 mg/L

HCTP achieved the following effluent quality and loading rates in 2025 in comparison to ECA limits:

Parameter	ECA ¹	2025 Final Effluent
Total Suspended Solids (TSS)	25.0 mg/L	15.7 mg/L
Carbonaceous Biological Oxygen Demand (CBOD ₅)	25.0 mg/L	6.9 mg/L
Total Phosphorus (TP)	1.0 mg/L	0.8 mg/L
Escherichia Coli (E. Coli) ²	200 CFU/100mL	76 CFU/100mL
pH	6.0-9.5	6.6
Total Chlorine Residual (TRC) (Dechlorination)	0.02 mg/L	0.00 mg/L
TSS Loading Rate	5,475 kg/day	2,929 kg/day
CBOD ₅ Loading Rate	5,475 kg/day	1,279 kg/day
TP Loading Rate	219 kg/day	150 kg/day

¹ Referenced from Amended ECA No. 8001-CQBNPG, issued on December 6, 2023.

² Arithmetic mean of monthly geometric mean data.

The summary of solids handling performance for 2025 is provided in the table below.

Solids handling performance	2025 quantity
Dewatering centrifuge sludge feed flow	1,932 m ³ /day
Dewatering solids generated	28.95 dry tonnes /day

The summary of major chemical consumption for 2025 is provided in the table below.

Chemical	2025 usage
Ferrous chloride and ferric sulphate	739 tonnes as Fe
Waste activated sludge (WAS) thickening polymer	4.5 tonnes
Sludge dewatering polymer	144 tonnes
Sodium hypochlorite (12% w/v) for disinfection	2,548 m ³
Sodium bisulphite (SBS) (38 % w/w) for effluent dechlorination	433 tonnes

Bypasses and overflows:

No bypasses occurred in 2025.

Capital Projects:

The plant continued with various capital projects. Notable projects include the following:

- Liquid Train Upgrades (Contract 1)
- Disinfection Electrical Upgrades
- Fluidized Bed Incinerator and South Facility Upgrades
- Excess Soil Removal
- North East Plant Project
- Sludge Storage Tank (SST) Cleaning, Biofilter and Thickened Waste Activated Sludge (TWAS) pumping Upgrades
- Variety of scheduled repenative, predictive, and reactive maintenance

HCTP operations and maintenance (O&M) costs, staffing, and health and safety incidents in 2025 is summarized below:

- \$24M in direct operating costs
- Staffing complement of 70 employees
- Seven health and safety incidents, two of which resulted in lost time days due to work related injuries
- Annual consumption of potable water, hydro, and natural gas: 67,684 m³, 33.1M kWh and 7.8M m³

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GLOSSARY OF ABBREVIATIONS AND DEFINITIONS

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
HRT	Hydraulic Retention Time
kg	kilogram
kWh	Kilowatt-hour
MAC	Monthly Average Concentration
MGMD	Monthly Geometric Mean Density
m ³	Cubic metre
m ³ /day	Cubic metre per day
mg/L	Milligrams per litre
mL	Millilitre
mm	Millimetre
ML	Megalitre (million Litres)
MECP	Ministry of the Environment, Conservation and Parks
Q	Flow Rate
RAS	Return Activated Sludge
RMDL	Regulatory Method Detection Limit
SBS	Sodium Bisulphite
SBS (P)	Sodium Bisulphite Presence
scm	Standard Cubic Metre
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 a solution expressed as weight by volume
% w/w	Percent concentration of components of a solution expressed as weight by weight

Definitions

Bypass: The diversion of sewage around one or more treatment processes, excluding the Preliminary Treatment System, within the Sewage Treatment Plant with the diverted sewage flows being returned to the Sewage Treatment Plant treatment train upstream of the Final Effluent sampling point(s) and discharged via the approved effluent disposal facilities.

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 Highland Creek Treatment Plant (HCTP) 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 51 Beechgrove Drive, south of Lawrence Avenue East and services an area bounded by Steeles Avenue on the north, Victoria Park Avenue on the west, the Rouge River on the east and Lake Ontario on the south. This area contains an estimated connected population of 489,000¹. The HCTP has a rated capacity of 219,000 m³/day, or 219 ML/day.

Major treatment processes include preliminary treatment, primary treatment, secondary treatment, phosphorus removal with ferric sulphate/ferrous chloride, final effluent disinfection using sodium hypochlorite, and final effluent dechlorination using sodium bisulphite. Treated effluent is discharged to Lake Ontario. Solids handling processes include Waste Activated Sludge Thickening, sludge stabilization by anaerobic digestion followed by dewatering using high speed centrifuges. Two multiple hearth incinerators are used for the disposal of the dewatered biosolids. Numerous auxiliary systems are required for the proper operation of plant processes and include potable water, process water, HVAC, SCADA, odour control, electrical power distribution, natural gas, digester gas and instrument air.

The Ministry of the Environment, Conservation and Parks (MECP) has classified the HCTP as a Class IV wastewater treatment facility under Regulation 129/04. The HCTP discharges into Lake Ontario and operated under Amended Environmental Compliance Approval (ECA) Air No. 6101-CUBKC2 November 6, 2023 and Amended Environmental Compliance Approval (ECA) Sewage No. 958001-CQBNGP, issued on December 6, 2023.

This report is a summary of plant operations and performance in 2025. Highlights of the report include a discussion of effluent quality and summaries of plant operations and maintenance, chemical and utility consumption, capital projects, operational costs and human resources.

¹ Population estimated by sewershed delineation and 2021 census data

2 PLANT PROCESS OVERVIEW

A description of the plant process is included below, and a schematic flow diagram is available in Appendix A. Additional information regarding the plant process can be found on the City of Toronto website.

2.1 Influent

Wastewater from the Morningside Sanitary Trunk Sewer and Highland Creek Sanitary Trunk Sewer flows to the plant via a common sewer.

2.2 Preliminary Treatment

Raw wastewater enters the Headworks for screenings and grit removal. Perforated plate screens (6 mm) and washer-compactors are used to capture, wash and remove rags, sticks and large pieces of debris. Vortex grit chambers, grit pumps and hydrocyclones are used to remove, wash and dewater sand, gravel and other heavy inorganics. An iron salt is applied to the raw wastewater upstream of the screens for phosphorous removal. The removed grit and screenings are hauled to a municipal 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 and lighter solids to float to the top. There are 12 Primary Clarification Tanks. Sludge collectors in the tanks convey the settled sludge, called primary or raw sludge, into sludge hoppers. The primary sludge and scum is then pumped out for further treatment and the wastewater, called 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. The mixed liquor consists of primary effluent mixed with return activated sludge (RAS), which is sludge removed from the Final Clarification Tanks. The mixed liquor contains micro-organisms that naturally occur in wastewater and facilitate the degradation of the organic pollutants. In the presence of oxygen, these micro-organisms break down organic material in the wastewater. Air is supplied to the Aeration Tanks through electrically driven blowers. There are a total of 16 Aeration Tanks each equipped with fine bubble dome diffusers.

The mixed liquor from the Aeration Tanks flows to 16 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 to maintain a sufficient biomass concentration. The excess sludge is removed as waste activated sludge (WAS) and thickened using centrifuges.

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 (i.e. dechlorinate) from the wastewater, helping to protect the aquatic environment. The final effluent is discharged to Lake Ontario through an outfall pipe extending approximately 1,000 m into the lake. The plant measures Total Residual Chlorine (TRC) in the final dechlorinated effluent for monitoring and compliance.

2.6 Solids Handling

All primary sludge, thickened WAS (TWAS), and scum from the Primary and Secondary Clarification Tanks, collectively called sludge, is treated, handled and disposed of through anaerobic digestion, intermediate blending and storage, dewatering and then incineration.

Primary sludge, from the Primary Clarification Tanks, is first fed into primary anaerobic digesters. WAS from the Secondary Clarification Tanks is thickened through centrifugation then fed into primary digesters. Centrifugation reduces the volume of sludge by separating solids from liquid.

Anaerobic digestion is the biological degradation (stabilization) of organic materials (sludge) in the absence of oxygen – it reduces the volume of solids, destroys pathogens and mitigates sludge odour. The process produces gas, made up predominantly of methane. This gas can be used as a supplementary fuel for plant needs, including process and space heating, reducing the plant's operating costs and carbon footprint. The digesters are operated in the mesophilic temperature range (34 – 38°C). The target operating temperature for the digesters is 36°C. The digestion process consists of a digester control building and four primary digesters.

Digested biosolids are conditioned with a polymer and dewatered by centrifugation. It is not essential that sludge be digested at HCTP – undigested sludge may be fed directly to the dewatering process and then incinerated.

2.7 Solids Management

The dewatered biosolids are incinerated in one of the two multiple-hearth incinerators. This thermal reduction process produces an ash that is mixed with effluent water from the

scrubbers and pumped to one of two ash lagoons. When a lagoon is full, ash is removed and hauled to a landfill site for final disposal.

In extreme situations when the incinerators are out of service for an extended period due to unforeseen equipment failure, dewatered biosolids may be hauled off-site for third-party processing and disposal.

3 PROCESS SUMMARY

3.1 Process Parameters

In 2025, the HCTP continued to produce a high-quality effluent. A summary of key final effluent parameters and their corresponding 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	cBOD5 (mg/L)	TSS (mg/L)	TP (mg/L)	TRC ¹ (mg/L)	E-Coli (count/100mL)	pH Min	pH Max
January	7	11	0.58	0.000	110	6.2	6.9
February	6	10	0.72	0.000	32	6.1	6.9
March	6	10	0.66	0.000	49	6.2	6.9
April	6	11	0.75	0.000	46	6.3	6.9
May	6	14	0.90	0.000	39	6.3	6.9
June	5	14	0.99	0.000	20	6.1	6.9
July	7	19	0.95	0.000	70	6.1	6.9
August	7	20	0.81	0.000	180	6.1	6.9
September	8	20	0.87	0.000	111	6.2	6.9
October	8	22	0.97	0.000	120	6.4	6.9
November	9	19	0.86	0.000	64	6.5	6.9
December	8	19	0.64	0.000	63	6.3	6.9
Annual Average	7	16	0.81	0.000	76	6.6	
Loading (kg/d) ²	1,279	2,929	150	N/A	N/A	N/A	
Removal Efficiency ³ (%)	97%	95%	87%	N/A	N/A	N/A	
ECA Requirements^{4,5}							
Effluent Objective	MAC: 15.0 mg/L	MAC: 15.0 mg/L	MAC: 0.9 mg/L	MAC: non-detect	MGMD: 150 CFU/100 mL	6.5 - 8.5	
Effluent Limit	MAC: 25.0 mg/L	MAC: 25.0 mg/L	MAC: 1.0 mg/L	MAC: 0.02 mg/L	MGMD: 200 CFU/100 mL	6.0 - 9.5	
Effluent Loading Limit	AAL: 5,475 kg/d	AAL: 5,475 kg/d	AAL: 219 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. Lower detection limit for TRC is 0.002 mg/L

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

³ cBOD = 0.8 * BOD assumed for removal efficiency calculations

⁴ Referenced from Amended ECA No. 8001-CQBNPG

⁵ 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 Sewers 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	2025	2024	2023
Influent Parameters				
Flow ¹	ML/day	186.4	184.4	178.4
Total Annual Flow ¹	ML	68,025	67,478	65,119
Total Suspended Solids (TSS)	mg/L	323.7	283.5	320.5
Biological Oxygen Demand (BOD)	mg/L	247.5	219.4	225.6
Total Phosphorus (TP)	mg/L	6.1	5.5	5.5
Preliminary Treatment				
Grit and Screenings	Tonnes/day	3.2	4.3	4.4
Primary Treatment				
TSS	mg/l	122.1	153.3	161.5
cBOD5	mg/L	173.8	174.8	178.1
Secondary Treatment				
Aeration Loading	kg CBOD5/m3.day	0.61	0.61	0.60
Mixed Liquor Suspended Solids	mg/L	1,989	2,271	2,134
Solids Handling				
Primary Sludge Treated	m3/day	1,276	1,034	836
Primary Sludge TS ²	%	2.5	1.8	1.4
Primary Sludge TVS ²	%	85	85	85
WAS to Thickening	m3/day	3,532.0	3,792.0	3,994.4
WAS SS	mg/L	6,181	6,467	6,219
TWAS Treated	m3/day	551	596	657
TWAS TS	%	3.3	3.4	3.1
TWAS TVS	%	77	76	77
Volume to Digestion	m3/day	1,827	1,631	1,494
Digesters Hydraulic Detention Time	days	12	22	25
Organic Loading to Digesters	TVS / m3/day	1.2	1.5	1.2
Digester Gas Volume	m3/day	15,401	14,064	15,273
Dewatering Centrifuge Feed Flow	m3/day	1,931.7	1,594.5	1,716.6
Dewatering Centrifuge Feed TS	%	1.55	1.78	1.89
Dewatered Biosolids TS	%	26.7	26.9	27.6
Centrate Quality	mg/L	542	443	1,818
Solids Capture Rate	%	97	97	92
Dewatered Biosolids Disposed	Dry tonnes/day	29	28	29
Dewatered Biosolids Hauled ³	Dry tonnes/day	0	0	0
Dewatered Biosolids Incinerated	Dry tonnes/day	29	28	29
Ash Removed	tonnes	3,277.3	6,427.5	4,335.6

¹ Flow monitoring is provided by influent flow meters. There are no effluent flow meters due to infrastructure limitations.

² Grab samples of raw sludge were replaced with TS% readings from online density analyser in 2019. TVS lab testing was halted, typical range of TVS is 80-90%

³ Dewatered Solids hauled for processing to the Lystek facility in Dundalk, Ontario, when required as a contingency measure.

Influent flow to the HCTP increased by 0.8% in 2025. The average daily flow corresponds to approximately 85% of the plant's rated capacity and remains manageable within the current works. Highland Creek has seen a steady increase in influent flow over the past few years, and the facility is currently undergoing design and construction to expand the facility to handle

future increases in flow. Influent strength increased compared to the previous year, with BOD, TSS, and TP concentrations rising by 12.8%, 14.2%, and 10.4% respectively.

Final effluent annual average concentrations for cBOD, TSS, and TP in 2025 were 6.9mg/L, 15.7mg/L, and 0.8mg/L, respectively. The annual average of the monthly geometric means for E. Coli was 76 CFU/100mL.

Final effluent total residual chlorine was 0.00 mg/L for each month, remaining below the compliance limit of 0.02mg/L. Final effluent pH ranged between 6.1 to 7.7 throughout 2025.

Although the HCTP consistently met the compliance limits for pH, the plant did not meet the pH objective in 2025. This was due to a major capital upgrade project that required several process units to be taken out of service. A significant portion of this multi-year project involves rehabilitation of aging infrastructure, requiring various primary and secondary clarifiers and aeration tanks to be taken off-line. As a result, prolonged operational disruptions occurred throughout 2025.

The on-going capital project improvements are intended to significantly improve the plant's state of good repair and enhance its ability to meet environmental compliance limits.

Due to the complexity and duration of the established HCTP Capital Program, and the need to schedule tanks and processes being taken offline to accommodate the current and upcoming construction projects, the plant will continue to experience operational challenges. However, best efforts will be made to manage the impacts on plant operations.

There were no deviations from the monitoring schedule in 2025. In addition, all parameters highlighted in the sampling program specified in Schedule D of the plant's ECA were monitored at a frequency exceeding the minimum requirement of three (3) times per week, as specified under Condition 9(1)(b). As such, there is no requirement for future sampling forecasts and scheduling adjustments.

3.2 Biosolids Management

During 2025, the sludge feed flow to the dewatering centrifuges averaged 1,932 m³/day which resulted in 29 dry tonnes of dewatered solids being generated per day.

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 years. Costs listed exclude applicable taxes.

Table 3: Chemical Usage Summary

Process	Chemical	2025	2024	2023	
Phosphorus Removal	Ferrous Chloride and Ferric Sulphate as Fe	Dosage as Fe (mg/L)	10.9	10.7	10.5
		Consumption (tonnes as Fe)	739.1	716.6	682.9
		Cost (\$)	2,446,008	889,634	\$833,176
Disinfection	Sodium Hypochlorite (12% w/v)	Dosage as Cl (mg/L)	4.6	4.4	3.9
		Consumption (m ³)	2,548	2441	2126
		Cost (\$)	1,455,309	1,413,113	\$2,076,970
Dechlorination	Sodium Bisulfite (38% w/w)	Dosage (mg/L)	2.4	2.4	2.3
		Consumption (tonnes)	433.0	433.3	390.3
		Cost (\$)	179,867	179,595	\$158,063
Thickening	Polymer	Consumption (tonne)	4.5	18	27
		Cost (\$)	28,025	58,980	\$95,980
Dewatering	Polymer	Consumption (tonne)	144	301	418
		Cost (\$)	760,514	1,056,970	\$1,528,647

3.4 Bypasses, Overflows, Spills, and Abnormal Discharge Events

3.4.1 Bypasses

Secondary bypass flow refers to wastewater that bypasses the secondary treatment (i.e. the Aeration Tanks) during periods of high wet weather flow that exceed the plant's secondary treatment capacity. All secondary bypass flow receives preliminary and primary treatment, nutrient removal, as well as disinfection and dechlorination before discharge into the lake.

Total plant bypass refers to wastewater that bypass the treatment plant and receives only disinfection and dechlorination before discharge into the lake.

No secondary or total plant bypass events occurred in 2025. The total precipitation in the Toronto area² was 587.9 mm, a 46.9% decrease from 2024.

3.4.2 Overflows

There were no overflow events at the HCTP in 2025. An overflow is defined as a discharge to the environment from a designated location within the plant other than the plant outfall located downstream of the final effluent sampling station.

3.4.3 Spills

There were six (6) spills reported to the MECP in 2025; summarized in Table 4 below.

² Adapted from http://climate.weather.gc.ca/historical_data/search_historic_data_e.html, Toronto City Station

Table 4: Spills Summary¹

Date	Duration (mins)	Nature of event	Description
30-Mar-25	1	Stub Stack Emergency Pressure Relief	Power interruption
29-Apr-25	160	Stub Stack Emergency Pressure Relief	Power interruption
21-May-25	41	Stub Stack Emergency Pressure Relief	Power interruption
11-Sep-25	NA	Release of effluent water	Release of treated effluent water on construction contractor site.
16-Sep-25	51	Stub Stack Emergency Pressure Relief	Power interruption
16-Nov-25	124	Stub Stack Emergency Pressure Relief	Equipment control failure

¹ Under Certificate of Approval No. 3-1044-75-877, use of the stub stacks is limited to emergency situations including power failure, mechanical or electrical failure with the incineration system, and shut down of the incinerator for unanticipated reasons. A notification to the District Officer was issued for every stub stack emergency pressure relief event.

3.4.4 Abnormal Discharge Events

There were no abnormal discharge events at the HCTP in 2025.

3.5 Complaints

The HCTP received no complaints related to odour or noise in 2025.

3.6 MECP Procedure F-5-1

Condition 12 (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. The plant utilizes the activated sludge treatment process to meet secondary or equivalent treatment and achieves effluent quality at or beyond the compliance limits outlined in the ECA.

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 operations and performance are monitored by licensed operators as well as by the facility management team. Standard Operating Procedures, emergency plans, equipment preventative and predictive maintenance, and a network of support staff, help ensure a rapid and effective response to issues. This ultimately maintains the high quality of the effluent and ensures proper treatment of biosolids. An Integrated Quality Management System

emphasizing environmental, health and safety objectives is currently in development and is expected to further standardize facility operations and improve performance.

4 CAPITAL PROJECTS

Under Toronto Water’s capital program, the HCTP commenced or continued the capital works projects and studies listed in Table 5 in 2025.

Table 5: Capital Projects

Project Name	Project Description	Project Stage (Dec 31, 2025)	Estimated Completion
Liquid Train Upgrades – Contract 1 and RAS Pumping, Aeration and Phosphorus Removal	Various liquid train upgrades of existing process (primary and secondary treatment) to maintain state of good repair. New chemical dosing facility for phosphorous removal and aeration upgrades to Southeast plant. Achieved substantial performance in 2025.	Construction	2025
Disinfection and Electrical Upgrades	Upgrades to disinfection and dechlorination chemical dosing systems and various electrical upgrades. Improvements to overall state of good repair. Achieved substantial performance in 2025.	Construction	2025
Fluidized Bed Incinerator and South Facility Upgrades	New fluidized bed incineration building and upgrades to the south plant facility.	Construction	2029
Excess Soil Removal	A preparatory contract to remove excess soil before beginning construction of the Northeast Plant Project was awarded in 2025 and is expected to be complete mid 2026	Construction	2026
Northeast Plant Project	Prepared tender documents to construct a new 110 MLD Northeast Plant. Project is expected to tender in early 2026.	Design	2033
Sludge Storage Tank (SST) Cleaning, Biofilter and TWAS pumping Upgrades	Detailed design for upgrades to the biofilters and TWAS pumping, as well as regular SST cleaning. Project tendered in late 2025 and is expected to be awarded in early 2026.	Design	2029
Security and Communication Project	Detailed design for physical security upgrades, and communication system upgrades across the plant. RFP issued in late 2025 and is expected to be awarded in early 2026.	RFP	2030
Stormwater Study	This project will perform a study encompassing the whole storm water drainage to determine whether alterations and possibly a centralized treatment system may be necessary to meet current and future discharge criteria required by authorities having jurisdiction.	Study	2026
Heat and Ash Recovery Project – Ash Study	This project is an Ash Management assessment and market survey required to meet the ash recovery and utilization requirement of the Beneficial Use criteria. The project will do the necessary analysis to enable the City to choose between remediating the existing ash lagoons and continuing to use them for settling ash slurry from the FBI process, or to install ash thickening and dewatering equipment for ash management as well as conducting a market survey and assisting the City in finding suitable receiver for the ash.	Study	2026

5 MAINTENANCE

Staff from the HCTP performed a variety of scheduled, preventative, predictive and reactive maintenance activities on a diverse spectrum of equipment. Equipment availability and reliability ensures regulatory compliance is achieved.

The annual calibration and maintenance records of flow meters and online analysers for regulated parameters was completed in 2025 and found to be within acceptable limits. A summary of effluent monitoring equipment calibration and maintenance performed in 2025 is included in Table 6.

Table 6: Summary of Regulated Monitoring Equipment Calibration and Maintenance

Calibration and/or Maintenance Record	Completion Date
Headworks Influent Chambers Flowmeters	March 19, 2025
Final Effluent pH and Temperature Meter Calibration	Weekly
Final Effluent HACH DR3900 Spectrophotometer Calibration	September 2, 2025
Influent Auto Sampler Calibration and Preventative Maintenance	May 7, August 18, 2025
Final Effluent Auto Sampler Calibration and Preventative Maintenance	June 10, August 18, December 1, 2025

In 2025, there was a total of 5,564 work orders completed; refer to Appendix F for a summary of maintenance activities as per Conditions 12(4)(e) of the ECA. None of the maintenance activities undertaken at the plant fell under Limited Operational Flexibility; as a result, no Notices of Modifications were submitted to the Water Supervisor as per Condition 12(4)(l) of the ECA. Regular safety inspections and preventative maintenance were performed on life safety systems at the plant in 2025.

6 UTILITIES

A summary of monthly utility consumption for the previous three years at HCTP is provided in Figure 1. Table 7 below summarizes the total cost and average monthly unit cost for water, hydro, and natural gas. Total annual consumption of potable water, hydro, and natural gas was 67,684 m³, 33.1M kWh, and 7.8M m³, respectively.

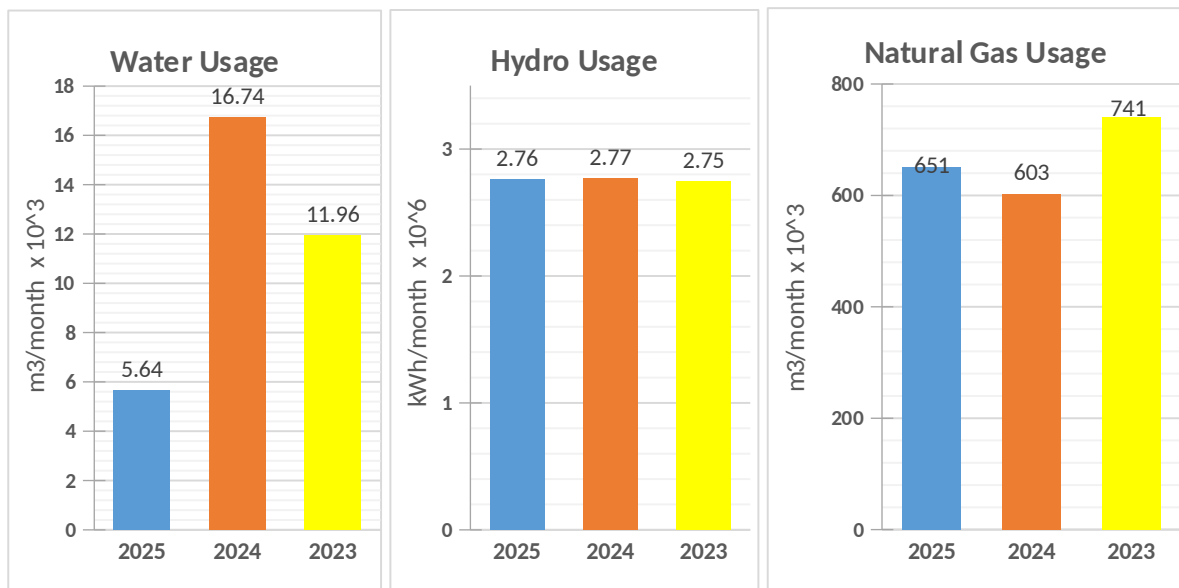


Figure 1: Annual Utility Consumption (Water, Hydro, Gas)

Table 7: Average Unit and Total Utility Cost

Utility	2025	2024	2023
Water Unit Cost (\$/m ³)	\$4.99	\$4.76	\$4.62
Water Total Cost (\$/year)	\$337,415.98	\$720,120.46	\$662,633.41
Hydro Unit Cost (\$/kWh)	\$0.12	\$0.10	\$0.10
Hydro Total Cost (\$/year)	\$3,928,249.82	\$3,441,663.20	\$3,198,254.30
Natural Gas Unit Cost (\$/m ³)	\$0.37	\$0.38	\$0.35
Natural Gas Total Cost (\$/year)	\$2,926,555.86	\$2,729,135.96	\$3,092,312.10

7 ADMINISTRATION

7.1 Operations and Maintenance Costs

The 2025 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 and Equipment Parts, Chemicals and Other Materials and Supplies. A breakdown of annual operations and maintenance costs for the past three years is illustrated in Figure 2. Overall, operational costs increased by 7.9% from 2024. All categories had an increased cost except for Inter-Divisional Charges.

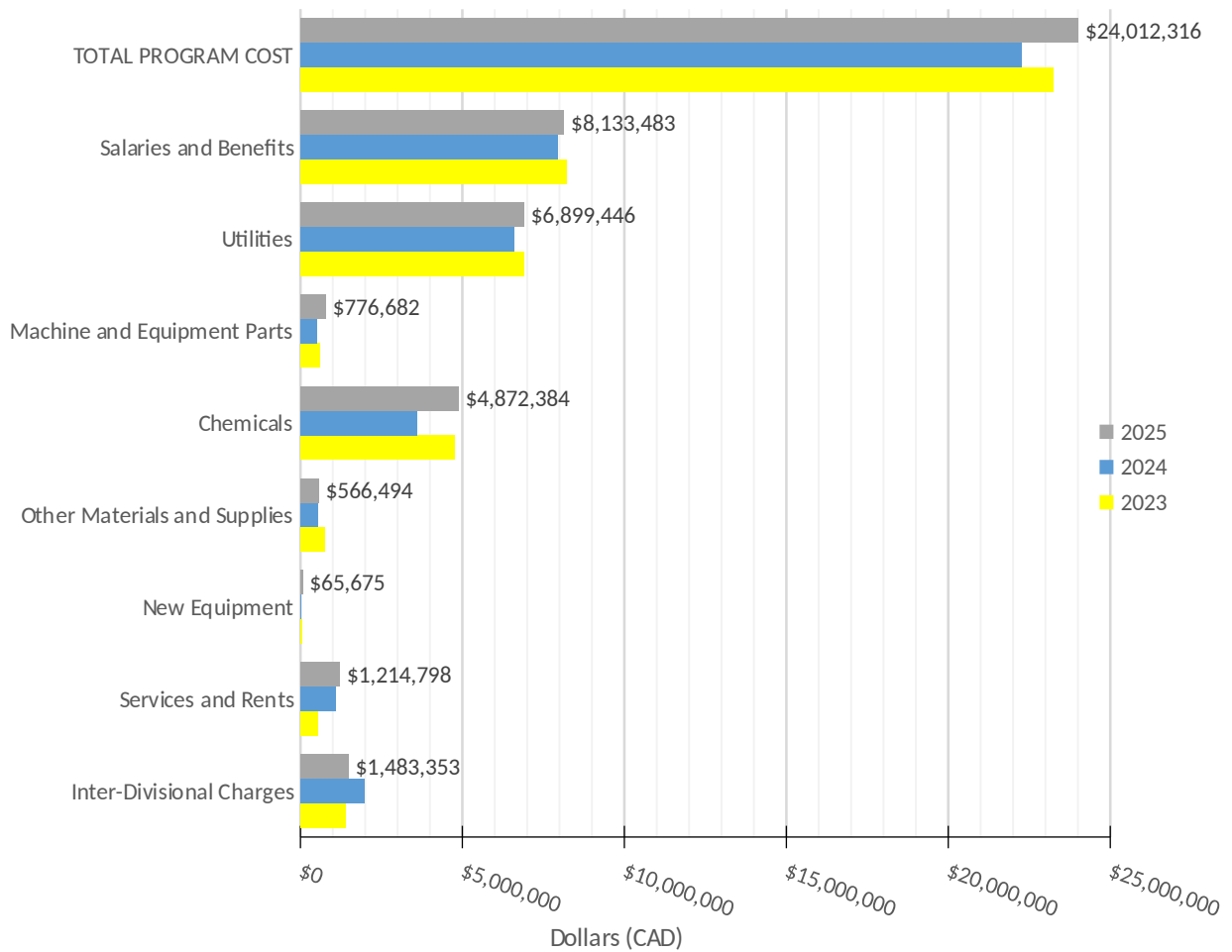


Figure 2: Operations and Maintenance Cost Breakdown

7.2 Human Resources

Plant Staffing at the HCTP in 2025 is shown in Table 8.

Table 8: Plant Staffing

Position	Number of FTE ¹
Plant Manager	1
Senior Engineer	2
Engineer	2
Area Supervisor	4
Electrical & Instrumentation Specialist	1
Plant Technician	27
Industrial Millwright	16
Electrical Instrumentation Control Technician	8
Wastewater Treatment Plant Worker	6
Support/Materials Management Assistant	1
Engineering Technologist	1
Total FTE Positions	69

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

7.3 Occupational Health and Safety

Continuous efforts are made to ensure a safe working environment at the HCTP. 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 HCTP are included in Figure 3.

As of December 31, 2025, there were 7 health and safety incidents, 2 of which resulted in lost time days due to work related injuries.

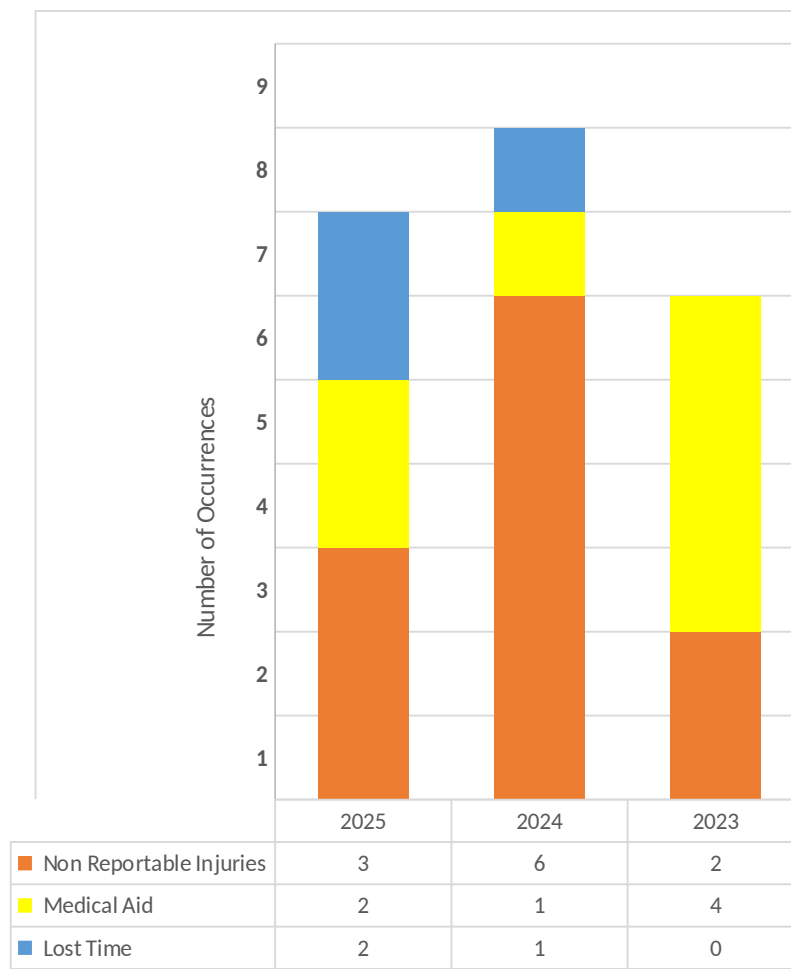


Figure 3: HCTP Health and Safety Injury Summary

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 HCTP operations and skilled trades staff in 2025 includes the list of courses shown in Appendix G. Some of these courses were eligible for Continuing Education Units (CEU's) as specified by the Ontario Water Wastewater Certification Office (OWWCO). 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 to prepare staff for any certification examination that they need to write. Table 9 summarizes the status of operator certification at the HCTP in 2025.

Table 9: Wastewater Treatment Certificates

Class Level	Number of Licenses
Class IV	25
Class III	3
Class II	1
Class I	14
O.I.T.	7
Total	50

7.6 MECP Correspondence

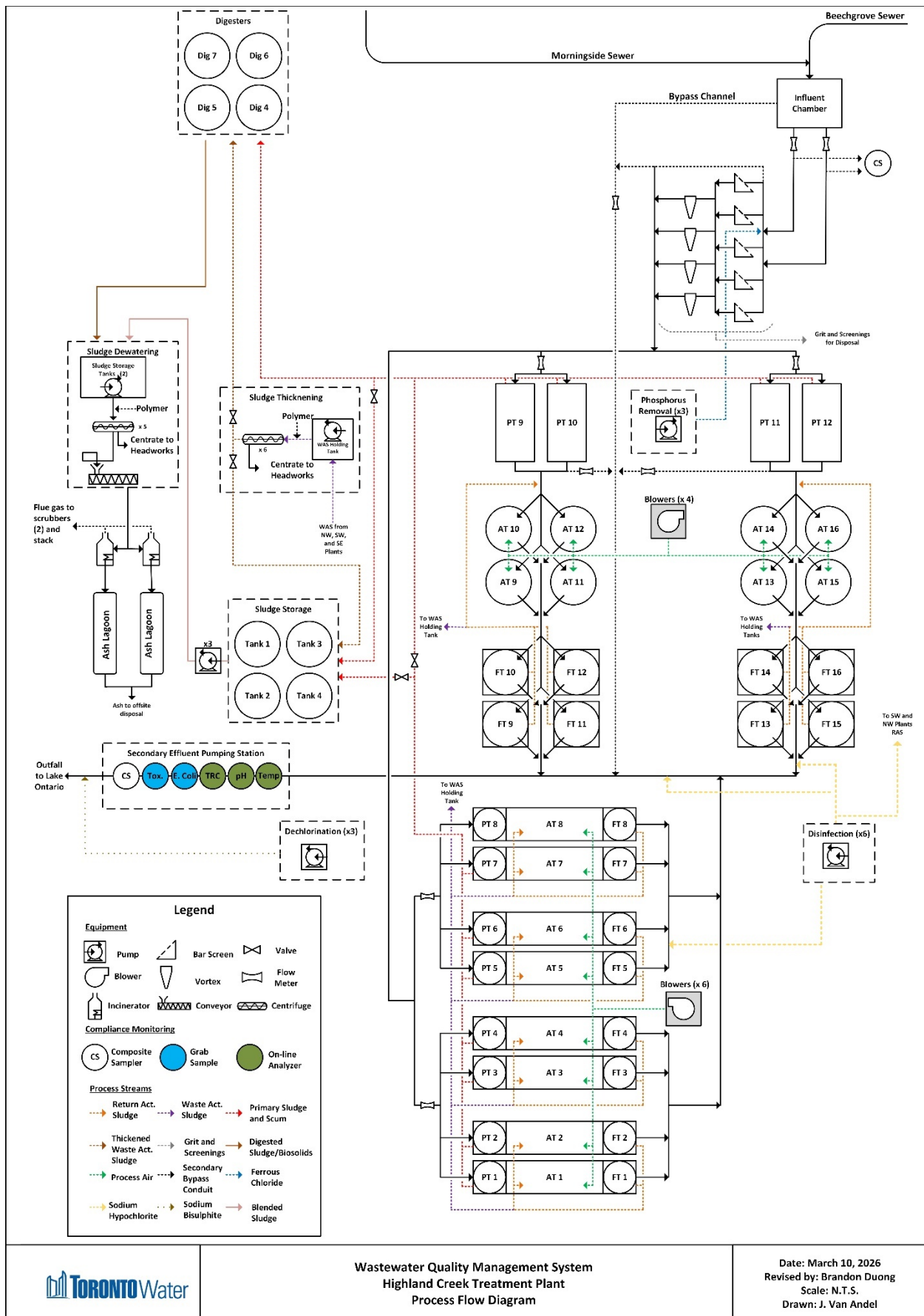
There were no orders issued by the MECP. Table 10 summarizes the correspondence submitted to the MECP for the HCTP. Correspondence related to spills can be referenced in Section 3.4.3.

Table 10: Correspondence submitted to the MECP

Event Date	Type	Description	Resolution	Resolution Date
Complaints				
N/A				
Consent Letters				
N/A				
Notice of Modification to Sewage Works				
On January 30, 2025, ferric sulphate was used in place of ferrous chloride for phosphorus removal due to supply chain shortages. The plant returned to ferrous chloride on July 14, 2025. No modifications were required to dosing systems, storage tanks, or related controls and instrumentation.				
Notification on Construction of Proposed Works				
Correspondence Submitted to MECP				
04-Apr-25	MECP Notification - Final Report on the completion of the verification testing of the New Chlorination Simulation System	The final report regarding the verification testing of the new chlorination simulation system, including a summary of all pertinent data, analysis and conclusions was submitted to the MECP for review and concurrence in accordance with condition 10.2 (c) of the ECA.	Resolved	04-Apr-25
Notice of Start-up				
N/A				
MECP Inspection				
N/A				

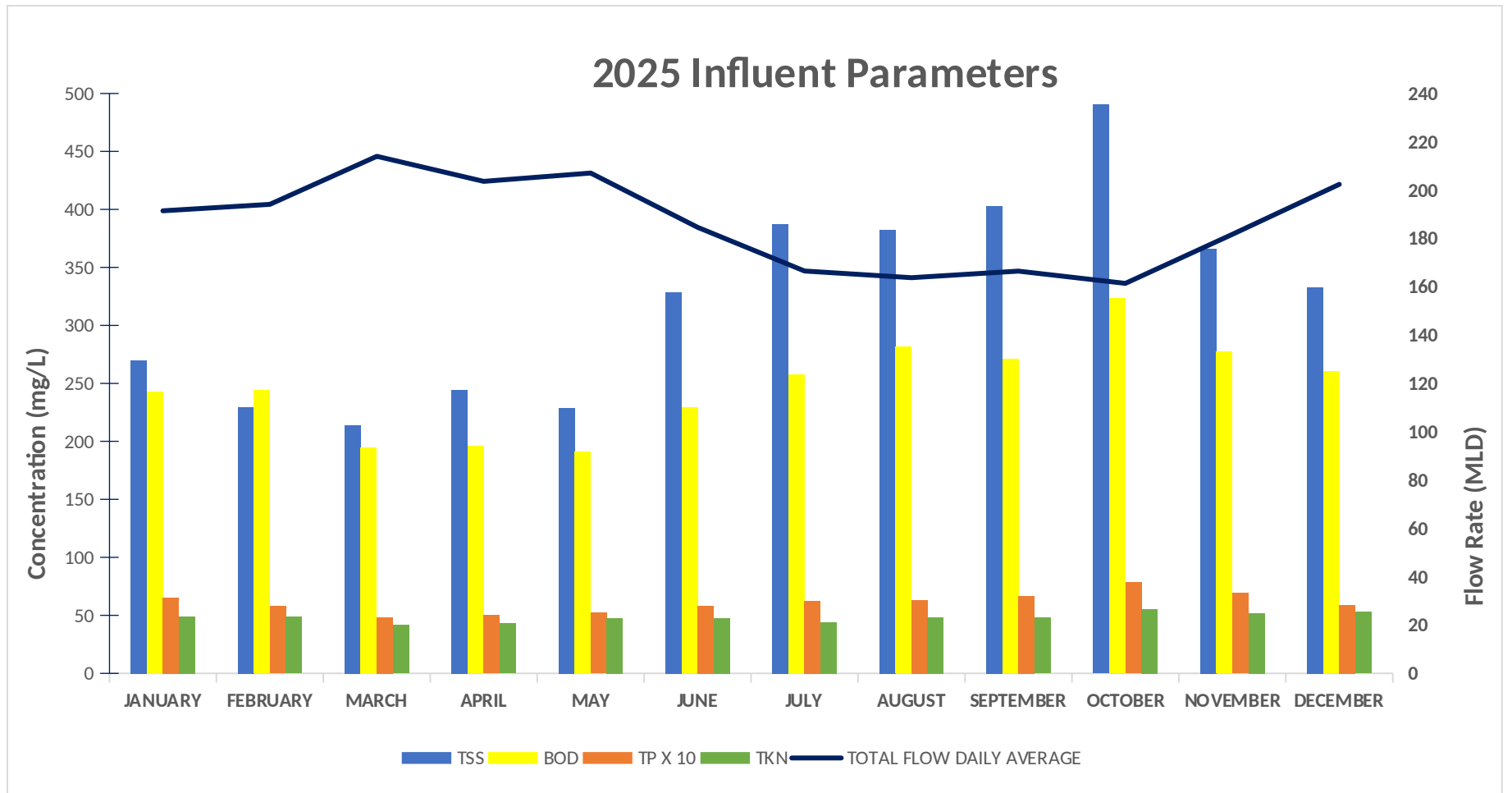
APPENDIX A – Plant Schematic

APPENDIX A - Plant Schematic

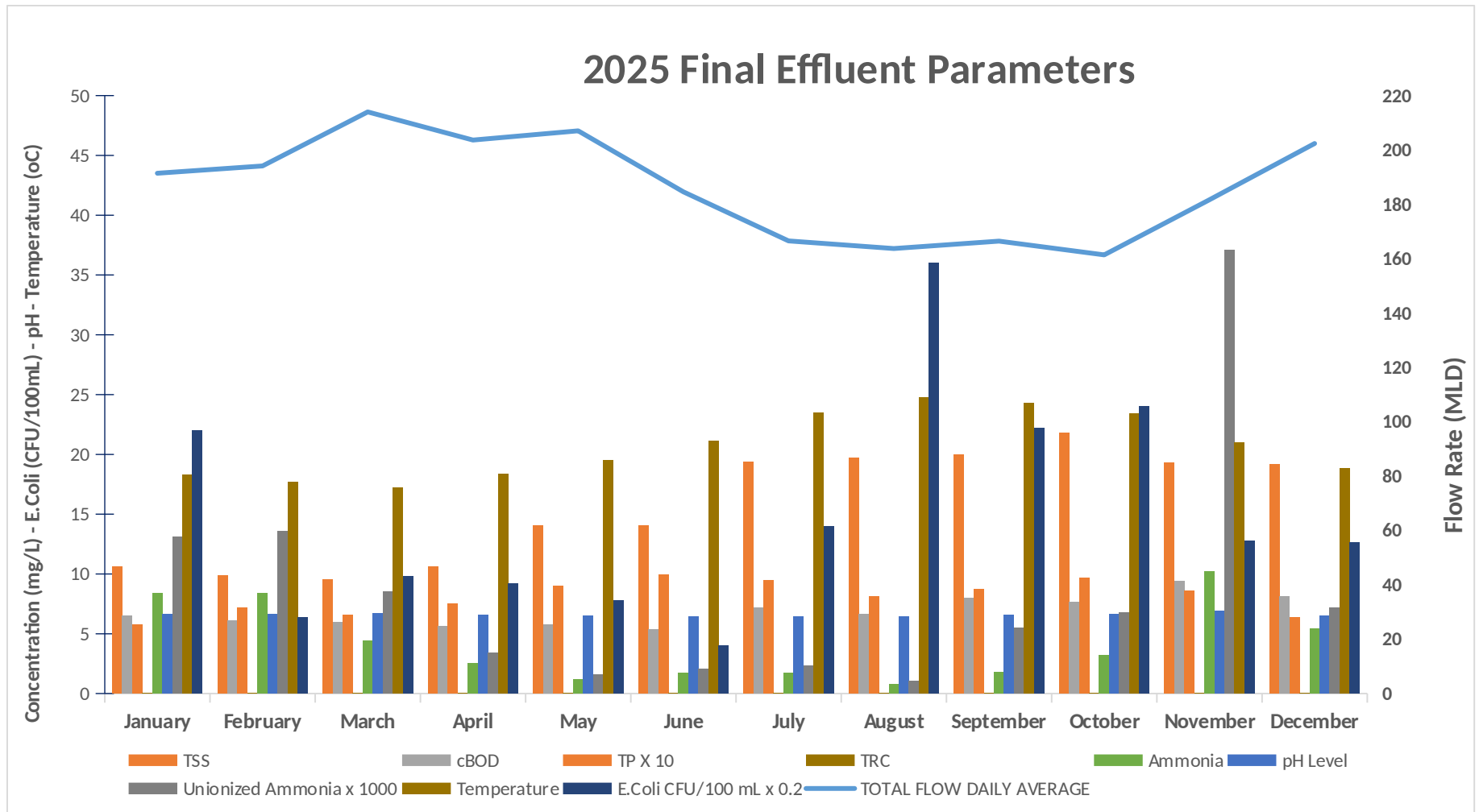


APPENDIX B – Influent and Effluent 2025 Performance Charts

APPENDIX B - Influent and Effluent 2025 Performance Charts



APPENDIX B - Influent and Effluent 2025 Performance Charts



APPENDIX C – Historical Performance Data

APPENDIX C - Historical Performance Data

	Units	2025	2024	2023	2022	2021	2020	2019	2018	2017	2016	2015	2014	2013
Influent Parameters														
Flow	ML/day	186.4	184.4	178.4	174.8	163.3	173.1	175.2	171.7	170.9	161.8	164.9	170.6	169.3
Total Annual Flow	ML	68,025	67,478	65,119	63,801	59,611	63,348	63,964	62,670	62,388	59,200	60,208	62,242	61,804
Total Suspended Solids (TSS)	mg/L	323.7	283.5	320.5	321.8	389.9	361.6	305.3	288.7	246.7	244.8	212.1	247.6	232.3
Biochemical Oxygen Demand (BOD ₅)	mg/L	247.5	219.4	225.6	243.5	246.7	242.9	232.5	255.9	221.4	242.2	234	232.1	205.9
Total Phosphorus (TP)	mg/L	6.1	5.5	5.5	5.8	5.7	5.5	5.2	5.7	5.2	5.2	5	4.9	4.4
Total Kjeldahl Nitrogen (TKN)	mg/L	48.1	44.0	43.2	47.5	46.6	45.7	48.1	48.3	44.0	46.1	39.6	44.3	48.7
Preliminary Treatment														
Grit and Screenings	tonnes/day	3.2	4.3	4.4	4.4	4.5	4.2	4.8	1.8	2	2.4	1.9	2.3	-
Primary Effluent														
TSS	mg/L	122.1	153.3	161.5	89.3	84.7	91.9	124.6	121.5	134.7	151	171	339	232.1
Carbonaceous Biochemical Oxygen Demand (cBOD ₅)	mg/L	173.8	174.8	178.1	126.2	133.1	143.9	173.6	169.3	183.9	178	170	180	129.8
Secondary Treatment														
Aeration Loading	kg CBOD ₅ /m ³ .day	0.61	0.61	0.60	0.42	0.41	0.47	0.6	0.5	0.59	0.54	0.53	0.58	0.65
Mixed Liquor Suspended Solids	mg/L	1,989	2,271	2134	2026	2036	2435	2704.6	2619.5	2723	2736	3243	3296	2380
Final Effluent														
TSS	mg/L	15.7	14.0	15.6	19.3	21.7	17.1	14.7	15.9	14.1	14.6	17.4	20.2	22.8
TSS Loading Rate	kg/day	2,929	2,584	2,787	3,378	3,537	2,967	2,578	2,736	2,406	2,368	2,877	3,440	3,868
cBOD ₅	mg/L	6.9	6.6	7.7	9.2	9.2	8.0	6.9	7.3	7.2	6.7	6.2	5.9	8.8
cBOD ₅ Loading Rate	kg/day	1,279	1,218	1,365	1,600	1,510	1,382	1,212.0	1,245.1	1,233	1,077	1,025	1,008	1,506
TP	mg/L	0.8	0.7	0.8	0.8	0.8	0.8	0.8	0.7	0.7	0.7	0.7	0.6	0.6
TP Loading Rate	kg/day	150	126	150	146	133	132	131.6	120.9	219	117	115	100	104
Escherichia Coli (E. Coli)	CFU/100 mL	75.9	31.5	45.0	42.3	11.6	11.3	11.3	21.0	16.0	53.2	40.2	10.4	34.9
pH	-	6.6	6.6	6.5	6.4	6.6	6.5	6.6	6.7	6.7	6.5	6.5	6.5	6.2
Total Residual Chlorine	mg/L	0.000	0.0008	0.008	0.007	0.008	0.006	0.003	0.004	0.004	0.007	0.006	SBS (P)	SBS (P)
Total Kjeldahl Nitrogen (TKN)	mg/L	6.2	5.4	4.2	3.4	5.4	4.4	3.6	3.8	3.4	2.8	3.5	4.6	5.0

APPENDIX C - Historical Performance Data

	Units	2025	2024	2023	2022	2021	2020	2019	2018	2017	2016	2015	2014	2013
Total Ammonia Nitrogen	mg/L	4.1	3.9	3.0	1.8	4.0	3.2	2.1	2.0	1.5	1.1	1.4	2.9	3.4
Temperature	degrees Celsius	20.7	21.1	21.0	21.4	21.5	21.6	21.1	21.8	21.5	22.2	-	-	-
Solids Handling														
Primary Sludge Treated	m3/day	1276	1034	836	561	758	684	463	770	910	1090	1525	2150	2900
Primary Sludge Total Solids (TS)	%	2.46	1.82	1.44	2.46	3.41	3.39	1.67	2.85	2.55	2.40	2.80	2.60	2.20
Primary Sludge TVS	%	85.0	85.0	85.0	85.0	85.0	82.0	55.4	93.6	81.8	81.9	81.6	77.9	73.5
WAS to Thickening	m3/day	3,532	3,792	3,994	3,031	3,019	3,720	4,159	4,315	3716	3519	3110	2254	-
Thickened WAS (TWAS) TS	%	3.3	3.4	2.8	2.8	2.8	2.4	3.1	3.2	4.1	3.8	5.3	5.7	-
TWAS Treated	m3/day	551	596	657	516	433	663	687	665	-	474	323	1236	-
WAS to Co-settling	m3/day	-	-	-	-	-	-	-	-	-	-	-	-	6600
WAS SS	mg/L	6,181	6,467	6,219	5,284	4,888	5,188	5,886	5,768	6732	6126	7358	7300	4500
Dewatering Centrifuge Feed Flow	m3/day	1,932	1,594	1,717	1,869	1,829	1,796	2,478	2,494	1849	1924	2143	2065	1966
Dewatering Centrifuge Feed TS	%	1.6	1.8	1.9	1.4	1.4	1.6	1.8	2.1	2.5	2.3	3.0	2.0	1.7
Dewatered Biosolids incinerated	Dry tonnes/day	29.0	27.8	29.5	25.6	25.7	26.7	41.6	45.4	31.1	45.1	57.4	38.5	29.2
Dewatered Biosolids TS	%	26.7	26.9	27.6	28.2	27.3	26.4	25.7	28.0	26.2	26.6	22.8	25.0	25.8
Ash Removed	tonnes	3,277	6,428	4336	3564	4519	3293	5502	2969	1815	3775	6141	3300	2100

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	0.125	2.91	*0.0025	0.0613	*0.00005	0.0051	0.137
February	*0.005	*0.002	*0.002	*0.002	0.119	0.746	*0.0025	0.0536	*0.00005	*0.0025	0.125
March	*0.005	*0.002	*0.002	*0.002	0.101	0.709	*0.0025	0.0596	*0.00005	*0.0025	0.103
April	*0.005	*0.002	*0.002	*0.002	0.0997	0.698	*0.0025	0.0572	*0.00005	*0.0025	0.11
May	*0.005	*0.002	*0.002	*0.002	0.0942	0.771	*0.0025	0.0733	*0.00005	*0.0025	0.098
June	*0.005	*0.002	*0.002	*0.002	0.119	1.11	*0.0025	0.0806	*0.00005	*0.0025	0.131
July	*0.005	*0.002	*0.002	*0.002	0.146	1.45	*0.0025	0.0801	0.000153	0.0052	0.147
August	*0.005	*0.002	*0.002	*0.002	0.143	1.38	*0.0025	0.0766	*0.00005	0.0078	0.161
September	*0.005	*0.002	0.004	*0.002	0.157	1.55	*0.0025	0.0828	0.000122	0.0071	0.158
October	*0.005	*0.002	0.0048	*0.002	0.147	1.6	*0.0025	0.0866	*0.00005	0.0056	0.152
November	*0.005	*0.002	*0.002	*0.002	0.117	0.956	*0.0025	0.0755	0.000102	0.0057	0.119
December	*0.005	*0.002	*0.002	*0.002	0.131	0.818	*0.0025	0.0719	*0.00005	0.0058	0.142
Annual Average	0.005	0.002	0.002	0.002	0.125	1.22	0.0025	0.072	0.00007	0.0046	0.132

Values in red with an asterisk prefix are half the MDL

APPENDIX D – Influent and Effluent Metal Concentrations

Final Effluent (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	0.0134	0.77	*0.0025	0.0783	*0.00005	*0.0025	0.0436
February	*0.005	*0.002	*0.002	*0.002	0.0182	0.625	*0.0025	0.0359	*0.00005	*0.0025	0.0306
March	*0.005	*0.002	*0.002	*0.002	0.0176	0.483	*0.0025	0.026	*0.00005	*0.0025	0.0289
April	*0.005	*0.002	*0.002	*0.002	0.0169	0.497	*0.0025	0.0267	*0.00005	*0.0025	0.0285
May	*0.005	*0.002	*0.002	*0.002	0.0165	0.602	*0.0025	0.0366	*0.00005	*0.0025	0.0319
June	*0.005	*0.002	*0.002	*0.002	0.0153	0.59	*0.0025	0.0397	*0.00005	*0.0025	0.0299
July	*0.005	*0.002	*0.002	*0.002	0.0174	1.24	*0.0025	0.0627	*0.00005	*0.0025	0.0329
August	*0.005	*0.002	*0.002	*0.002	0.0159	1.91	*0.0025	0.0901	*0.00005	0.0054	0.0275
September	*0.005	*0.002	*0.002	*0.002	0.0151	1.59	*0.0025	0.0875	*0.00005	*0.0025	0.0251
October	*0.005	*0.002	*0.002	*0.002	0.0158	1.72	*0.0025	0.0941	*0.00005	*0.0025	0.0303
November	*0.005	*0.002	*0.002	*0.002	0.0133	1.56	*0.0025	0.0996	*0.00005	0.0053	0.0232
December	*0.005	*0.002	*0.002	*0.002	0.016	1.61	*0.0025	0.12	*0.00005	*0.0025	0.0309
Annual Average	0.005	0.002	0.002	0.002	0.0160	1.100	0.0025	0.0664	0.00005	0.003	0.0303

Values in red with an asterisk prefix are half the MDL

APPENDIX E – Centrifuge Feed Sludge Analysis

APPENDIX E - Centrifuge Feed Sludge Analysis

	Arsenic	Cadmium	Chromium	Cobalt	Copper	Lead	Mercury	Molybdenum	Nickel	Selenium	Zinc
<i>Limit</i> ⁽¹⁾	170	34	2800	340	1700	1100	11	94	420	34	4200
January	2.59	0.25	47.72	5.4	599	11.96	0.19	8.3	19.2	0.6	452
February											
March											
April	4.40	0.64	16.57	8.1	513	11.57	0.25	7.8	17.5	4.1	506
May											
June											
July	3.93	0.76	48.61	5.8	613	14.37	0.55	8.2	19.3	4.7	602
August											
September											
October											
November											
December											
Annual Average	3.64	0.55	37.63	6.4	575	12.63	0.33	8.1	18.7	3.1	520

All values are expressed in terms of mg metal / kg sludge dry weight.

(1) As per MECP regulations for sludge utilization on agricultural lands.

APPENDIX F – Maintenance Activities

APPENDIX F – Maintenance Activities

Solids Maintenance

Solids maintenance encompasses the solids handling aspects of the plant, including sludge storage and dewatering centrifuges, incineration and ash handling, anaerobic digesters, as well as supporting services such as the digester gas system, boilers, process ventilation, odor control systems, and plant safety instrumentation. In 2025, 2,399 work orders were closed in this area.

The following maintenance on major structures, equipment, apparatus, mechanism, or thing forming the Works was completed by Solids Maintenance in 2025:

- Thickening:
 - Preventative maintenance and inspections on thickening centrifuges and associated feed, polymer dosing and centrate handling equipment
 - Inspection and maintenance of the odour control system
- Digester
 - Routine inspection and maintenance of the digester recirculation and mixing pumps, digester gas compressors and waste gas burners
- Dewatering:
 - Routine inspection and maintenance of sludge storage tanks, including sludge transfer and recirculation pumps
 - Inspection and maintenance of the odour control system
 - Preventative maintenance and inspections on dewatering centrifuges and associated sludge feed, polymer dosing and centrate handling equipment
- Incineration:
 - Routine inspection and maintenance of multiple hearth incinerators and associated equipment, including quenchers and scrubbers
 - Preventative maintenance on ash handling equipment, including grinders and slurry pumps
- Plant Services:
 - Functional testing and maintenance of backflow preventer valves
 - Routine servicing and inspection of boilers and hot water systems
 - Preventive maintenance and repairs on plant HVAC systems
 - Preventive maintenance on hazardous gas detection equipment
 - Inspections of forklifts and heavy lifting equipment
 - Inspections of elevators, flood protection systems, and life and fire safety equipment

Liquids Maintenance

Liquids Maintenance focuses on liquid treatment, including grit removal, screening, primary and secondary clarification, aeration, phosphorous removal, and effluent disinfection. In 2025, 3,165 work orders were closed in this area.

The following maintenance on major structures, equipment, apparatus, mechanism or thing forming the Works was completed by Liquids Maintenance in 2025:

- Preliminary Treatment:

APPENDIX F – Maintenance Activities

- o Inspection and preventative maintenance of headworks screens, grit and screening conveyors
- o Routine maintenance on flow measurement devices, flow control gates and channel aeration blowers, including associated sensors and instrumentation
- Primary Tanks:
 - o Inspection, maintenance and overhaul of primary tanks and associated equipment, including sludge and scum removal systems (skimmers and scrapers) and raw sludge pumps
- Secondary Tanks:
 - o Inspection, maintenance and overhaul of secondary clarification tanks and associated equipment, including return and waste activated sludge pumps and scum removal systems
 - o Maintenance and servicing of aeration tank blowers and associated instrumentation
- Chemical Feed Systems:
 - o Routine inspection and maintenance of iron salt, disinfection and dechlorination chemical systems, including feed pumps and storage tanks
- Plant Services:
 - o Maintenance of plant effluent water systems
 - o Inspection and maintenance of the headworks odour control system
 - o Functional testing and maintenance of backflow preventer valves
 - o Routine servicing and inspection of hot water systems
 - o Preventive maintenance and repairs on plant HVAC systems
 - o Preventive maintenance on hazardous gas detection equipment
 - o Inspections of flood protection systems, and life and fire safety equipment
 - o Maintenance and repair of plant vehicles
 - o Building maintenance, including landscaping and groundskeeping

APPENDIX G – Staff Training Courses

Training attended by HCTP operations and skilled trade staff in 2025 includes the list of courses below.

- Entry-Level Course for Drinking Water Operators
- Standard First Aid Level C, CPR & AED (CEU)
- Working at Heights Refresher (CEU)
- Scaffold Safety Training
- Traffic Control Roadway Work (CEU)
- Mould Awareness (CEU)
- Designated Substances Awareness (CEU)
- Confined Space Awareness (CEU)
- Backflow Prevention Awareness (CEU)
- Logbook Entry
- Wastewater Digester Operation and Control
- Emergency Plan Awareness Safety Talk
- Emergency Equipment
- Wastewater Treatment Exam Preparation Level 1 & 2
- Wastewater Treatment Exam Preparation Level 3 & 4
- THC Disinfection Interruption Contingency Plan Training
- Spill Contingency Plan Training
- SAP Ariba - Client Division: Sourcing Request
- HCTP Compliant Response Procedure
- Unconscious Bias for People Leaders
- Indigenous Awareness Training: Truth and Reconciliation
- Learning and Leading with Human Rights
- What to Do if a Vehicle Breaks Down