Hamilton

CITY OF HAMILTON
WASTEWATER TREATMENT FACILITIES

ANNUAL REPORT
2023

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Note: Wastewater Treatment Plant = WWTP
Combined Sewer Overflow = CSO

WOODWARD AVENUE WASTEWATER TREATMENT PLANT

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1 WOODWARD AVENUE WASTEWATER TREATMENT PLANT

1.1 GENERAL INFORMATION

1.1.1 THE WOODWARD AVENUE WASTEWATER TREATMENT PLANT

The Woodward Avenue Wastewater Treatment Plant is located at 700 Woodward Avenue in Hamilton, Ontario. It serves a population of approximately 518,228 and features an average day design capacity of 409 million litres per day (ML/d). In 2023, the plant treated an average of 322 ML/d.

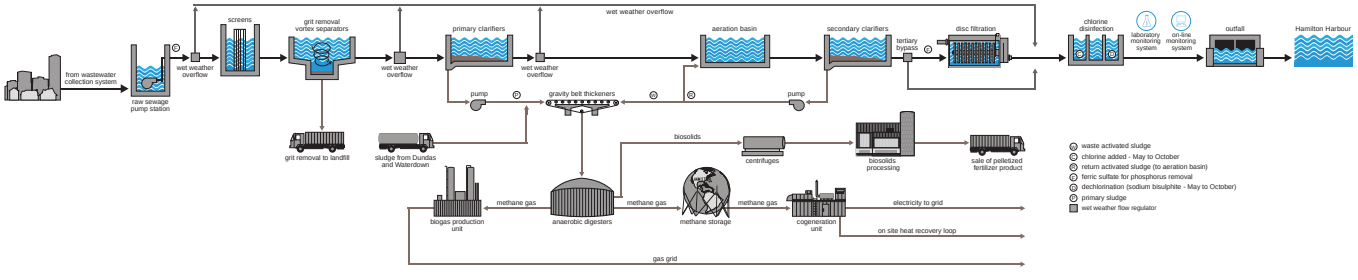
1.1.2 THE WOODWARD AVENUE WASTEWATER TREATMENT PROCESS

The Woodward Avenue Wastewater Treatment Plant began operation in 1964. The original facility consisted of a main pumping station, bar screens, grit removal, primary clarifiers and a sludge digestion system. Over time, the plant underwent significant upgrades that included the addition of several new treatment processes as well as the expansion and enhancement of existing processes.

Today, the plant consists of a main pumping station that conveys flow to the headworks for preliminary treatment, including bar screens and grit removal with vortex separators. Ferric sulphate is added at this point to aid in removing phosphorous through precipitation. Next, wastewater flows into primary clarifiers where fine solids settle to the bottom of the tanks as “raw sludge”, while fats, oils, and grease float to the top of the tanks as “scum”. Chain and flight systems remove both sludge and scum continuously. Primary effluent flows into aeration basins where air is forced through diffusers at the bottom of the tanks to supply oxygen for microbial populations that process organic material and oxidize ammonia. Following aeration, wastewater flows into the secondary clarifiers where solids again settle out, this time as “activated sludge” due to the high level of microbial activity. Most of this sludge will be returned to aeration as “return activated sludge” while the rest will be removed for further processing as “waste activated sludge”. Secondary effluent then flows to the new tertiary treatment process that is currently in the commissioning phase, receiving additional treatment via cloth media disk filters. The tertiary treated effluent is disinfected with chlorine and dechlorinated with sodium bisulphite from May 15 to October 15. The treated effluent water is then released into Red Hill Creek.

The raw sludge from the primary clarifiers and waste activated sludge from the secondary clarifiers are thickened using a polymer and gravity belt thickeners before undergoing biological processing in the anaerobic digesters. This process produces a great deal of methane biogas which can be utilized in one of two ways. The biogas can be utilized to generate electricity, or it can be refined to meet natural gas standards. The biogas utilized to generate electricity is stored in the iconic “Hamilton Globe”. Digested solids are subsequently dewatered using a polymer and large centrifuges before feeding into a biosolids facility. This facility uses a thermal reduction process to create a certified fertilizer product. Operations and maintenance of the biosolids facility is contracted out to Synagro Technologies which operated under a separate Environmental Compliance Approval from the Woodward Avenue Wastewater Treatment Plant listed under Subsection 1.2.1.

THE WOODWARD AVENUE WASTEWATER TREATMENT PROCESS



1.1.3 IMPROVEMENTS TO THE FACILITY

1.1.3.1 Woodward Upgrade Projects

The Woodward Avenue Wastewater Treatment Plant has undergone substantial upgrades in recent years to improve the performance and reliability of its treatment processes. The upgrades consist of three main contracts. Contract 1 was the construction of a new Main Pumping Station for wastewater. Contract 2 was the construction of a new Electrical Power Centre and power distribution loop. Contract 3 is the construction of a Tertiary Treatment Facility, the expansion of the south secondary treatment process including the construction of a new chlorine contact tank and plant outfall. All projects have been completed with the exception of Contract 3 which is currently in the commissioning phase and is expected to be completed in 2024.

1.1.3.1.1 Contract 1: Main Pumping Station – Substantial Performance reached August 31, 2022

Construction of the new Main Pumping Station was completed including the installation of 12 wastewater pumps (170 ML/d) with a firm capacity of 1,700 ML/d and 700 horsepower (hp) drive motors in the dry wells along with the interconnecting discharge pipe and isolation gate valves. The two conveyance channels interconnecting the new main pumping station to the plant headworks facility were fully operational throughout the year. All wastewater flow to the plant was received through the new Main Pumping Station facility. The existing Main Pumping Station structure demolition was completed in early 2023. Final site grading and landscaping, along with construction deficiencies around the new Main Pumping Station facility were completed by December 2023.

1.1.3.1.2 Contract 2: Electrical Upgrades – Substantial Performance Reached November 11, 2022

The new Electrical Power Centre was fully operational throughout the year. The upgrades included the installation of 4, 3 megawatt (MW) standby generators, fuel storage tanks and a 13.8 kilovolt (kV) main switch gear. Both the Woodward Avenue Water Treatment Plant and Wastewater Treatment Plant processes are powered on the new 13.8 kV distribution loop. As part of this project, the commissioning of the new chlorine tank car air padding system at the Woodward Avenue Water Treatment Plant was extended to install additional safety instrumentation. This work was in preparation for future bypass chlorine contact tank operations in 2024.

1.1.3.1.3 Contract 3: Tertiary Treatment Facility and Secondary Treatment Expansion – Construction completion expected in 2024

Construction on the Tertiary Treatment Facility continued throughout the year, with all plant effluent receiving tertiary treatment (up to the wastewater plant operating capacity of 614 ML/d) before discharging from the new outfall channel into Red Hill Creek. Commissioning and performance monitoring of the new tertiary treatment facility, including the 10 disk filter units and new chlorine contact tank continued through 2023. The commissioning of the Tertiary Treatment Facility was delayed into 2024 due to technical issues with the filter backwash system, necessitating additional time for corrective actions. The backwash system will enter another round of commissioning and performance testing after this work has been completed.

1.1.3.2 Headworks Biofilter Media Replacement and Rehabilitation

The headworks biofilter media required full replacement as the existing media was at the end of its life. The scope of work included the replacement of the sprinkler system and the air ducting insulation to improve overall system reliability. Substantial performance was obtained in Q1 2022 and the project was completed in Q1 2023.

1.1.3.3 Aeration Gallery Walkway and Access Repairs

Repairs/replacement of the walkways, railing, stairs and ladders were undertaken to provide safe access to all four of the Woodward North Aeration galleries. Substantial performance was achieved in September 2023.

1.1.3.4 Anaerobic Digester Improvements

In 2021, Anaerobic Digester #3 underwent an enhancement with the installation of five new mixers, ensuring dependable mixing capabilities during the interim period leading up to the commencement of further rehabilitation work scheduled for Anaerobic Digester #3 and Anaerobic Digester #5 in 2024. In February 2022, an over-pressurization occurred within Anaerobic Digester #3, resulting in structural damage to the cover supports and required emergency repairs. The work required a full clean-out of the digester, welding repairs to support beams to the thrust ring and re-coating of the metal surface including insulating foam. Anaerobic Digester #3 was returned to service in Q2 2023 and reached substantial performance in September 2023.

1.1.3.5 Emergency Boiler Line Repair

A section of the closed loop boiler system between the Dewatering Building and the South Digester Complex experienced significant losses which suggested a leak within the system. The leak disrupted the system's intended operation and jeopardized the vital digestion process at the Woodward Avenue Wastewater Treatment Plant. An emergency repair was initiated to replace the damaged piping. Replacement piping was installed and substantial performance was obtained in September 2023.

1.1.3.6 South Plant Waste Activated Sludge Piping Upgrade

The South Plant waste activated sludge piping size was increased from 100 mm to 150 mm for improved flushing and control of wasting rates. This work was completed in November 2023.

1.2 REGULATORY INSTRUMENTS

1.2.1 ENVIRONMENTAL COMPLIANCE APPROVALS

1.2.1.1 Sewage

No. 9410-B65QRT: May 14, 2019 – Amended Environmental Compliance Approval

No. 4876-AWNRYL: June 21, 2018 – Biosolids Management Facility Environmental Compliance Approval

1.2.1.2 Air

No. 3677-6LBLSY: February 9, 2006 – Amended Certificate of Approval – Cogeneration Unit

No. 5265-B77RLX: December 17, 2018 – Amended Environmental Compliance Approval

No. 9463-B2YLGW: July 26, 2018 – Biosolids Management Facility Environmental Compliance Approval

1.2.2 EFFLUENT REQUIREMENTS

SECONDARY EFFLUENT			
Parameter	Monthly Average Concentration Objectives (mg/L)	Monthly Average Concentration Limits (mg/L)	Monthly Average Daily Loading Limits (kg/d)
Carbonaceous Biochemical Oxygen Demand (cBOD)	15.0	25.0	10,225
Total Suspended Solids (TSS)	15.0	25.0	10,225
Total Phosphorus (TP)	0.6	0.8	327

FINAL EFFLUENT		
Parameter	Objectives	Limits
Total Residual Chlorine (Single Sample Result)	Non-detect	0.02 mg/L
E.coli (Monthly Geometric Mean Density)	200 CFU*/100mL (May 15 - Oct 15)	n/a
pH (Single Sample Result)	6.5 - 8.5	Between 6.0 - 9.5 inclusive

*CFU = Colony-forming unit

1.2.3 SAMPLING PROCEDURES

Raw influent wastewater is sampled seven days per week and is tested for alkalinity, ammonia, carbonaceous biological oxygen demand (cBOD), chemical oxygen demand (COD), chloride, conductivity, potential of hydrogen (pH), soluble phosphorus (SP), total phosphorus (TP), total biological oxygen demand (tBOD), total Kjeldahl nitrogen (TKN) and total suspended solids (TSS). Twenty-four-hour composite samples are refrigerated before analysis at the on-site City of Hamilton Environmental Laboratory.

Final Effluent is sampled five days per week. It is tested for alkalinity, ammonia, cBOD, COD, chloride, conductivity, nitrates, nitrites, pH, SP, TP, TKN, TSS, volatile suspended solids (VSS) and un-ionized ammonia. Twenty-four-hour composite samples are collected by the samplers on each side of the twin effluent channel and refrigerated before analysis at the on-site City of Hamilton Environmental Laboratory. The average concentrations for the two samples are reported to the Ministry of the Environment, Conservation and Parks for compliance purposes. Total chlorine residual is measured daily in the final effluent on a seasonal basis from May 15 to October 15. E. coli is sampled every week in the final effluent. Samples are always under the strict chain of custody process managed by the Compliance and Regulations Section staff.

1.3 ENVIRONMENTAL COMPLIANCE APPROVAL REPORTING REQUIREMENTS

Regarding Condition 11 'Reporting' in Environmental Compliance Approval #9410-B65QRT the following information is provided to address the items listed under Subsection 4.

1.3.1 CONDITION 11 (4A) INFLUENT MONITORING

Appendix A titled 'Woodward WWTP Operating Data Summary' in the section titled 'Plant Flows' outlines influent plant flow quantities, including imported sewage.

Appendix A titled 'Woodward WWTP Operating Data Summary' in the section titled 'Raw Influent', table titled 'Raw Influent Concentrations' outlines influent parameter concentrations in 2023.

DAILY AVERAGE PLANT FLOW (ML/d)		
Year	Daily Average Plant Flow (ML/d)	Total Precipitation (mm)
2018	322.09	966
2019*	390.25	1,087
2020	299.98	797
2021	284.99	938
2022	263.28	680
2023	321.56	991

*High lake levels resulted in lakewater infiltration into the combined sewer system impacting Woodward WWTP flows for an extended period.

Influent flow values in 2023 were very close to the five-year average, however there was significant seasonal variance. The City experienced an exceptionally wet spring, followed by an average summer and a drier than average fall. Influent analytical data shows higher concentrations of most parameters versus previous years, particularly total suspended solids, total phosphorous and cBOD. This may be the result of recycle process streams within the facility and abnormal collection system discharges including industrial spills. Monitoring of influent characteristics will continue into 2024 to determine whether the recent observed values represent a new baseline or the concentrations revert to historical norms.

INFLUENT CONCENTRATIONS (mg/L)						
Year	TSS	cBOD	TP	SP	NH_3	TKN
2018	308.22	183.57	4.95	1.03	18.47	33.42
2019	231.06	135.78	4.25	1.16	16.01	27.51
2020	281.20	178.22	5.49	1.53	21.40	35.30
2021	244.04	157.70	4.87	1.54	21.72	33.93
2022	261.93	157.51	5.22	1.65	25.55	36.66
2023	568.61	222.91	8.21	1.30	22.23	41.12

INFLUENT LOADINGS (kg/d)						
Year	TSS	cBOD	TP	SP	NH_3	TKN
2018	96,328	57,773	1,553	325	5,865	10,551
2019	85,614	49,706	1,560	416	5,928	10,203
2020	82,605	52,239	1,611	447	6,258	10,329
2021	66,952	43,215	1,344	426	6,066	9,415
2022	66,165	39,862	1,331	414	6,489	9,309
2023	186,121	71,189	2,664	404	6,906	13,033

1.3.1.1 Imported Sewage

The Woodward Avenue Wastewater Treatment Plant receives imported sewage from approved septic haulers that discharge at the plant. These wastewater volumes are included in the overall plant flow data as it is discharged upstream of the influent flow meters. This represents a very small proportion (approximately 0.04% in 2023) of the overall flows into the plant.

The Woodward Avenue Wastewater Treatment Plant also receives untreated sludge from the Dundas Wastewater Treatment Plant that is hauled by truck. This sludge is processed with the sludge generated in the primary treatment process at the Woodward Avenue Wastewater Treatment Plant. Sludge from the Dundas Wastewater Treatment Plant contributed approximately 9% of the total raw sludge volume in 2023.

IMPORTED SEWAGE		
Month	Septic Haulers m^3/month	Sludge from Dundas WWTP* Tonnes/month
January	4,286	3,448
February	3,989	3,097
March	4,855	3,483
April	4,482	3,026
May	5,768	3,902
June	4,389	3,491
July	4,022	3,217
August	5,374	3,507
September	3,789	3,117
October	1,675	3,368
November	4,384	3,109
December	3,920	3,312
Total	50,934	40,078

*WWTP = Wastewater Treatment Plant

1.3.2 CONDITION 11 (4B) EFFLUENT MONITORING

Appendix A titled 'Woodward WWTP Operating Data Summary' in the section titled 'Plant Flows' outlines effluent plant flow rates.

In 2023, the plant achieved 100% compliance with all effluent parameter concentrations and loading limits.

Effluent concentrations and loadings show low results compared to previous years. This is largely due to improved performance related to the implementation of the tertiary treatment system.

Details of plant performance can be found in Appendix A titled 'Woodward WWTP Operating Data Summary' in the section titled 'Final Effluent' table titled 'Final Effluent Concentrations' and 'Final Effluent Loadings' outlines the concentrations and loadings achieved in 2023.

EFFLUENT CONCENTRATIONS (mg/L)						
Year	TSS	cBOD	TP	SP	NH_3	TKN
2018	6.06	4.86	0.426	0.271	3.68	4.81
2019	9.10	5.12	0.504	0.282	1.97	3.18
2020	8.38	5.26	0.572	0.362	1.87	3.12
2021	6.91	4.04	0.573	0.401	1.29	2.42
2022	6.10	4.31	0.433	0.302	2.82	3.80
2023	4.34	2.93	0.200	0.064	1.03	1.91

EFFLUENT LOADINGS (kg/d)						
Year	TSS	cBOD	TP	SP	NH_3	TKN
2018	2,045	1,596	135	84	1,265	1,629
2019	3,715	2,036	194	105	762	1,239
2020	2,644	1,637	171	106	582	959
2021	2,045	1,151	162	112	354	676
2022	1,701	1,159	115	79	744	1,003
2023	1,378	949	63	20	321	606

1.3.3 CONDITION 11 (4C) DEVIATION FROM THE MONITORING SCHEDULE

The City was successful in complying with the monitoring requirements of the plant's Environmental Compliance Approval due to the sampling frequencies exceeding requirements. The following deviations from the monitoring schedule were observed in 2023:

DEVIATION FROM THE MONITORING SCHEDULE		
Date	Sample Location	Reason for Deviation
2023-02-01	Secondary Effluent (9,10,11)	No analysis; samples were mislabelled
2023-02-01	Secondary Effluent (12,13,14)	No analysis; samples were mislabelled
2023-02-26	Plant Influent	Sample was not analyzed for conductivity due to instrument malfunction
2023-02-26	Final Effluent 1	Sample was not analyzed for conductivity due to instrument malfunction
2023-02-26	Final Effluent 2	Sample was not analyzed for conductivity due to instrument malfunction
2023-10-02	Centrifuge #4 Filtrate	TP result not available
2023-12-09	Plant Influent	cBOD result not available due to spilled sample

Failure of an autosampler triggers staff to generate a work order promptly, through which repairs are made by City of Hamilton Plant Maintenance staff.

In 2024, the City will be utilizing the following schedule to fulfill the sampling requirements of the plant's Environmental Compliance Approval's Monitoring Program (Schedule D).

CONDITION 11 (4C) 2024 SAMPLING SCHEDULE

2024 INFLUENT SAMPLING		
Parameter	Sample Type	Frequency
pH	Grab Sample	Weekly
tBOD	24-hour composite	Daily
TSS	24-hour composite	Daily
TP	24-hour composite	Daily
TKN	24-hour composite	Daily

CONDITION 11 (4C) 2024 SAMPLING SCHEDULE continued

2024 PRIMARY EFFLUENT SAMPLING		
Parameter	Sample Type	Frequency
tBOD	24-hour composite	Daily
TSS	24-hour composite	Daily

2024 FINAL EFFLUENT SAMPLING		
Parameter	Sample Type	Frequency
E. coli	Grab sample	Weekly
Total Residual Chlorine	Grab sample field analysis	Daily (May 15 - Oct 15)
pH	Grab sample field analysis	Weekly
Temperature	Grab sample field analysis	Weekly
Un-ionized Ammonia as NH_3	Calculated	Weekly
cBOD	24-hour composite	Five times per week
TSS	24-hour composite	Five times per week
TP	24-hour composite	Five times per week
Ammonia as Nitrogen	24-hour composite	Five times per week
TKN	24-hour composite	Five times per week
Nitrate as Nitrogen	24-hour composite	Five times per week
Nitrite as Nitrogen	24-hour composite	Five times per week
Metals (B, Co, Mg, Mn, K, Sr)	Grab sample	Monthly
Bis (2-ethylhexyl) Phthalate	Grab sample	Monthly

2024 BIOSOLIDS (CAKE) SAMPLING		
Parameter	Sample Type	Frequency
Total Solids	Grab sample	Two times per month
TP	Grab sample	Two times per month
Ammonia as Nitrogen	Grab sample	Two times per month
Nitrate as Nitrogen	Grab sample	Two times per month
Metals (As, Cd, Co, Cr, Cu, Pb, Hg, Mo, Ni, K, Se, Zn)	Grab sample	Two times per month

1.3.4 CONDITION 11 (4D) OPERATING PROBLEMS AND CORRECTIVE ACTION

1.3.4.1 In February 2022, the Digester #3 draw-off line became plugged, resulting in over pressurization causing structural damage and damage to the gas seal. This required the digester to be taken out of service for clean-out and emergency roof repair. This longer-term project limited the treatment capacity of the anaerobic digestion system. The project was completed in April 2023.

1.3.4.2 Throughout 2023, Plant Operations staff continued to observe turbid secondary effluent. In response, City of Hamilton Environmental Monitoring and Enforcement staff have continued evidentiary sampling linked to associated industries and the City of Hamilton Environmental Laboratory has increased analysis for organic acids in influent samples. Investigations at the plant level will continue for process optimization in 2024.

1.3.4.3 Dewatering Polymer Storage Tank #2 failed resulting in a leak in October 2023. Subsequently, the polymer storage tanks were assessed and deemed to be corroded beyond repair. Replacement of these tanks is underway with completion expected in 2024.

1.3.5 CONDITION 11 (4E) MAINTENANCE ACTIVITIES

Regular plant maintenance is carried out by City of Hamilton Plant Maintenance staff based at the Woodward Avenue Wastewater Treatment Plant. A computerized maintenance management system is used for scheduling and tracking routine and preventative maintenance. Larger or specialized maintenance activities are completed through third-party external contractors.

In 2023, approximately $9.69 million was spent maintaining the Woodward Avenue Wastewater Treatment Plant. Significant maintenance activities completed at the facility in 2023 are provided in Appendix B titled ‘Maintenance Activities’ in the table titled ‘Cost Summary’ which includes a cost breakdown of all maintenance activities completed on the City’s vertical wastewater infrastructure.

1.3.6 CONDITION 11 (4F) EFFLUENT QUALITY ASSURANCE AND CONTROL MEASURES

Analytical tests to monitor required parameters are performed by the City of Hamilton Environmental Lab which is accredited by the Canadian Association for Laboratory Accreditation Incorporated. Wastewater Treatment Plant operation and performance are monitored by licensed operators as well as the facility’s management team. Standard operating procedures, emergency plans, equipment preventative maintenance and a team of support staff help ensure a rapid and effective response to issues and maintain high quality effluent and biosolids.

The City of Hamilton’s Wastewater Quality Management System was endorsed by Council on December 16, 2020. The Wastewater Quality Management System was fully implemented and operational in 2021. The Wastewater Quality Management System was implemented to ensure the effective and efficient collection and treatment of wastewater in a manner that protects the environment, meets legal and regulatory requirements and meets the City of Hamilton’s commitment to operating and maintaining a high-quality wastewater system.

1.3.7 CONDITION 11 (4G) MONITORING EQUIPMENT CALIBRATION AND MAINTENANCE

Appendix C titled ‘Calibration and Maintenance of Monitoring Equipment’ table titled ‘Woodward Avenue WWTP Calibration and Maintenance of Monitoring Equipment’ contains records of the calibrations performed on monitoring equipment in 2023.

1.3.8 CONDITION 11 (4H) DESIGN OBJECTIVES – EFFORTS MADE AND RESULTS ACHIEVED

Efforts made to achieve design objectives include:

- Continual monitoring and periodic adjustment of processes by licensed and highly skilled operators
- By-law enforcement of sewer use violations
- Preventive maintenance routines of vital components

Schedule B of the plant Environmental Compliance Approval establishes the following design objectives:

PRIMARY EFFLUENT OVERFLOW DESIGN OBJECTIVES		
Effluent Parameter	Averaging Calculator	Objective
tBOD	Annual Average Removal Percentage	30%
TSS	Annual Average Removal Percentage	50%

Removal percentages for the above parameters during secondary bypass events can be found in Appendix A titled 'Woodward WWTP Operating Data Summary' in the section titled 'Bypass Removals' table titled 'Secondary Bypass Removal Efficiency'. The plant achieved an annual average removal of 69% of tBOD and 77% of TSS. These values exceed the design objectives of the plant.

SECONDARY EFFLUENT DESIGN OBJECTIVES		
Effluent Parameter	Averaging Calculator	Objective (mg/L)
cBOD	Monthly Average Effluent Concentration	15.0
TSS	Monthly Average Effluent Concentration	15.0
TP	Monthly Average Effluent Concentration	0.6

Throughout 2023, the Woodward Avenue Wastewater Treatment Plant was in a transitionary phase while the tertiary treatment system commissioning is finalized. During this time, effluent reporting has been completed using Final Effluent from the tertiary facility. These results met the secondary effluent objectives without exception. The maximum monthly average effluent concentrations for cBOD, Total Suspended Solids and Total Phosphorus are 2.93 mg/L, 4.34 mg/L and 0.20 mg/L, respectively.

FINAL EFFLUENT DESIGN OBJECTIVES		
Effluent Parameter	Averaging Calculator	Objective
Total Residual Chlorine	Single Sample Result	Non-detect (when chlorine is in use)
E. coli	Monthly Geometric Mean Density	<200 organisms/100 mL (May 15 to October 15)
pH	Single Sample Result	6.5 - 8.5 inclusive

Final effluent chlorine residual readings for the 2023 disinfection season averaged 0.015 mg/L. Since the hand-held chlorine analyzers utilized by operations staff are rated to a precision of +/- 0.01 mg/L, non-detect readings and readings of 0.01 mg/L are deemed to meet the objective. Individual sample results did, at times, reach 0.02 mg/L which does not meet the design objective.

During the disinfection season, final effluent E. coli results consistently satisfied the objective of 200 organisms/100 mL with the maximum monthly geometric mean density being 2 organisms/100 mL. The pH objective was met consistently throughout 2023 with results ranging from 6.84 to 7.25.

1.3.9 CONDITION 11 (4I) SLUDGE GENERATION

The biosolids sludge volume generated in 2023 totalled 54,050 tonnes. Based on recent history, the volume anticipated in 2024 is approximately 54,000 tonnes as production is expected to continue at current rates. A monthly breakdown can be found in Appendix A titled 'Woodward WWTP Operating Data Summary' in the section titled 'Biosolids Dewatering' table titled 'Biosolids to Synagro'. Starting in May 2020, dewatered biosolids is further processed at the Biosolids Management Facility on-site which is operated by Synagro Technologies. This facility is reported on by Synagro Technologies under the Environmental Compliance Approval #4876-AWNRYL.

1.3.10 CONDITION 11 (4J) SUMMARY OF COMPLAINTS

Appendix D titled 'Woodward Avenue WWTP- Summary of Complaints' contains a summary of the complaints received in 2023.

In 2023, there were a total of 12 complaints associated with the Woodward Avenue Wastewater Treatment Plant, 11 of which were related to odour, while one complaint pertained to noise within the plant. Six out of 11 odour complaints were submitted by a single property owner located near the plant. Plant Operations staff respond to each complaint with a thorough investigation and appropriate corrective action. Following a site-wide odour assessment completed in 2022, the media in the biosolids facility air scrubber unit has been replaced, with further work on odour mitigation to continue in 2024.

1.3.11 CONDITION 11 (4K) SUMMARY OF BYPASS EVENTS, SPILLS, AND ABNORMAL DISCHARGE EVENTS

The Woodward Avenue Wastewater Treatment Plant experienced 21 bypass events in 2023 totalling 2,495 ML. This compares to a five-year average of 19 events totalling 2,080 ML, showing that 2023 was slightly above average.

The table below summarizes all bypass events occurring in 2023.

WOODWARD AVENUE WWTP - 2023 BYPASS EVENTS							
SAC #	Bypass Location	Start Date	Start Time	Stop Date	Stop Time	Duration (Hours)	Volume (ML)
230104-000014	Secondary Bypass	2023-01-04	18:05	2023-01-05	04:24	10.27	100.871
1-2FWXRA	Headworks Bypass	2023-01-04	18:55	2023-01-04	19:50	0.92	19.370
230209-000005	Secondary Bypass	2023-02-09	11:18	2023-02-10	15:09	27.86	317.410
230304-000009	Secondary Bypass	2023-03-04	12:03	2023-03-06	02:27	26.68	173.791
230317-000006	Secondary Bypass	2023-03-17	10:32	2023-03-18	22:06	35.56	240.352
230325-000007	Secondary Bypass	2023-03-25	11:53	2023-03-26	19:18	31.42	214.490
230401-000002	Secondary Bypass	2023-04-01	01:55	2023-04-02	08:18	30.37	318.780
1-345ZT0	Headworks Bypass	2023-04-01	02:55	2023-04-01	07:10	4.25	13.244
230404-000011	Secondary Bypass	2023-04-04	07:04	2023-04-04	14:18	7.23	29.750
230405-000010	Secondary Bypass	2023-04-05	14:30	2023-04-06	18:18	27.80	220.162
230422-000002	Secondary Bypass	2023-04-22	12:12	2023-04-22	23:21	11.15	68.336
230612-000002	Secondary Bypass	2023-06-12	04:44	2023-06-13	00:45	20.02	129.390
230627-000003	Secondary Bypass	2023-06-27	15:54	2023-06-27	21:55	4.98	15.465
230703-000002	Secondary Bypass	2023-07-03	08:28	2023-07-04	05:13	20.74	206.343
1-3LFMPR	Headworks Bypass	2023-07-03	09:33	2023-07-03	12:10	2.62	2.136
230727-000003	Secondary Bypass	2023-07-27	1:47	2023-07-27	11:03	9.56	100.347
230729-000009	Secondary Bypass	2023-07-29	10:45	2023-07-29	17:23	5.23	53.409
230815-000017	Secondary Bypass	2023-08-15	17:15	2023-08-16	5:32	12.28	121.819
1-3QLCFX	Headworks Bypass	2023-08-15	17:19	2023-08-15	23:10	5.85	43.217
230824-000017	Secondary Bypass	2023-08-24	22:27	2023-08-25	4:27	5.24	42.483
231227-000004	Secondary Bypass	2023-12-27	9:42	2023-12-28	8:50	22.35	63.680

1.3.11.1 Spill Events

Ten spill events relating to the Woodward Avenue Wastewater Treatment Plant were reported in 2023. Most spill events were very minor except for three chlorinated effluent water incidents. The table below contains a summary of the spills occurring in 2023.

SPILL EVENTS				
Date	SAC Reference #	Spill Material	Approximate Volume	Event Description
2023-01-11	1-2G5RW8	Ferric sulphate	50 L	A leak developed in a hose being used to discharge ferric sulphate from a tanker truck into the storage tanks at the plant. Staff applied dry absorbent material around the area and the nearby catch basin was covered with a rubber mat. It was determined that the material did not reach the environment, and the catch basin was subsequently pumped out to the containment area for the chemical tanks wherein a sump pump can transfer the material to the main pumping station.
2023-01-24	1-2GU9JH	Dewatering polymer	50 - 100 L	Polymer used in the biosolids dewatering process was spilled to a drain which connected to a stormwater pipe. Polymer residual could be found in three storm maintenance holes downstream of the area. A vacuum truck with a flushing attachment was brought in to clean out the affected maintenance holes. Drains in the dewatering polymer area were plugged with industrial drain stoppers. The drain line in question was subsequently re-routed to an adjacent sanitary sewer. It was determined that the material did not reach the environment.
2023-04-04	1-34AJLS	Digester biogas	Trace amounts	An operator detected methane on a portable gas meter in the Gas Compressor Room at the Woodward Avenue Wastewater Treatment Plant. A very small leak was found on a filter cap gasket requiring a shutdown of the cogenerator, isolation of the leaking filter and replacement of the gasket.
2023-04-07	1-36Q4J9	Potable hot water	40 L	An operator observed water seeping from the concrete covering a hot water pipe under a roadway at the Woodward Avenue Wastewater Treatment Plant. A partial bypass of the make-up water pressure relief valve was set up to keep the boilers running and dechlorination pucks were placed at the nearby catch basin. New piping has since been installed.

SPILL EVENTS				
Date	SAC Reference #	Spill Material	Approximate Volume	Event Description
2023-05-04	1-1SGQHA	Effluent water	1 m^3	Effluent water was discovered seeping up through the ground near the chlorine injection chamber beside Secondary Clarifier #1. A sump pump was set up to pump the water into the effluent water channel and the leaking line was isolated pending repairs which have since been completed. A hydrovac truck was utilized to clean up the surrounding area.
2023-05-09	1-3GAKSG	Chlorinated effluent water	15 ML	Chlorinated effluent water was discharged during testing of the new chlorination system in preparation for the disinfection season which begins on May 15 at the Woodward Avenue Wastewater Treatment Plant. A break in a sodium bisulphite dosing line resulted in a lack of dechlorination during this testing. Dechlorination pucks were placed near the outfall and Chlorine Contact Tank #1 was closed to mitigate the chlorine release. The broken line was isolated pending repairs and sodium bisulphite dosing was reinstated to Chlorine Contact Tank #1 before the tank was returned to service. Subsequent chlorine residual testing at the outfall indicated that dechlorination was occurring as designed.
2023-05-18	1-3GYMWC	Chlorinated effluent water	36.6 ML	Operators observed an outfall chlorine residual of 0.03 mg/L using a handheld analyzer, exceeding the regulatory limit of 0.02 mg/L. Subsequent residual analyses were below this limit.
2023-05-26	1-3H81PT	Hydraulic fluid	2 L	The hydraulic line of a vacuum truck at the plant ruptured resulting in a spill of hydraulic fluid around the septic hauler discharge area. Staff utilized absorbents to clean up the spill.
2023-08-24	1-3RS9R8	Digester biogas	Trace amounts	A SCADA gas alarm indicated methane in the Gas Compressor Building. The building was isolated and an investigation determined that there was a leak resulting from a faulty gasket which was subsequently replaced.
2023-10-15	1-3XPES4	Chlorinated effluent water	11.8 ML	A chlorine residual analysis in the effluent outfall was tested at 0.15 mg/L, exceeding the regulatory limit of 0.02 mg/L. Sodium bisulphite dosing was switched to manual operation and increased until chlorine residual analyses reached 0.02 mg/L.

1.3.12 CONDITION 11 (4L) NOTICE OF MODIFICATION

There were no Notices of Modification submitted in 2023.

1.3.13 CONDITION 11 (4M) EFFORTS MADE TO ACHIEVE CONFORMANCE WITH F-5-1 AND F-5-5

Hamilton Water has ongoing programs and has undertaken various projects to meet the Ministry of the Environment, Conservation and Parks' requirements for municipal combined sewer systems as per Procedure F-5-5, "Determination of Treatment Requirements for Municipal and Private Combined". This is a supporting document for Guideline F-5 "Levels of Treatment for Municipal and Private Sewage Treatment Works Discharging to Surface Waters". Wet weather system capture is highly influenced by annual rainfall conditions. In 2020 and 2022, the City achieved a 91.30% capture rate of the combined sewage during wet weather which is above the limit of 90% however, it is not achieved consistently year over year. Hamilton Water has retained the services of an engineering consulting firm to assess the status of existing programs and projects as per the requirements of Procedure F-5-5, identifying any gaps requiring additional work. Deliverables include the development of the following two documents:

- Hamilton Combined Sewer System Characterization Study
- Pollution Prevention and Control Plan

Key project milestones and their status are as follows:

- Final Terms of Reference Submission - December 2, 2019 (Complete)
- Progress Updates - January 31, 2020 and March 31, 2020 (Complete)
- Pollution Prevention and Control Plan Kickoff Workshop - July 20, 2022 (Complete)
- Consultation with the Ministry of the Environment, Conservation and Parks and the Ministry of the Environment, Conservation and Parks' comments regarding the Draft Combined Sewer System Characterization Study - November 3, 2022 and January 13, 2023 (Complete)
- Part A of the Pollution Prevention and Control Plan: Final Combined Sewer System Characterization Study Submission to the Ministry of the Environment, Conservation and Parks - March 14, 2023 (Complete)
- Part B of the Pollution Prevention and Control Plan: Additional Combined Sewer Overflow Control Alternatives and Proposed Remedial Measures Submission to Ministry of the Environment, Conservation and Parks - August 1, 2023 (Complete)
- Part C of the Pollution Prevention and Control Plan: Implementation Plan Supporting Adaptive Enhancement Strategy Submission to the Ministry of the Environment, Conservation and Parks - (Pending)

In addition, the following projects are underway that will improve combined sewage capture during wet weather and identify options to remove wet weather flow from the combined sewer system:

1.3.13.1 Wastewater Collection System Control Upgrades (Real-Time Control Phase 2)

This project involves modifications to existing flow control structures within the combined sewer system at several locations as well as improvements to the system of hydraulic controls to help mitigate combined sewer overflows into Hamilton Harbour. Real-Time Control Phase 2 upgrades will specifically target the reduction of combined sewer overflows to the sensitive receiving waters of Cootes Paradise and Red Hill Creek. This work will include the modification of weirs, the addition of level monitoring devices and the automation of some control devices in the system. The project is currently scheduled for completion in Q2 2024.

1.3.13.2 Flooding and Drainage Improvement Framework

Following the completion of a draft Flooding and Drainage Master Servicing Study in 2019, the City initiated a new assignment referred to as the Flooding and Drainage Improvement Framework. This new study advanced the work completed in the previous assignment by providing a framework and implementation roadmap of recommended solutions to address both short and long-term urban flooding issues in the combined sewer service area. The Flooding and Drainage Improvement Framework was completed in 2022 and the recommendation of the study was a program of further, more detailed studies (including Class Environmental Assessments), investigations, policies and infrastructure work for a twenty-plus year timeframe to achieve system performance objectives. The cost of the program, over the twenty-plus year timeframe, is estimated at $1.029 billion. Several studies have been included within the City's 2024 capital budget and planned for initiation. Some capital budget has been approved to allow for sewer separations as they are recommended by the Class Environmental Assessment and alternative funding opportunities are being explored to continue the program for more than twenty years.

1.3.14 CONDITION 11 (4N) CHANGES OR UPDATES TO THE CONSTRUCTION SCHEDULE

The updated completion dates for the Woodward Avenue Wastewater Treatment Plant upgrade projects are as follows:

Contract 1: Main Pumping Station – August 31, 2022 (Original Contract – June 3, 2021)

Contract 2: Electrical Upgrades – November 11, 2022 (Original Contract – June 17, 2021)

Contract 3: Tertiary Treatment Unit and Secondary Treatment Expansion – Target September 2024 (Original Contract – December 30, 2021)

DUNDAS
WASTEWATER
TREATMENT PLANT

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2 DUNDAS WASTEWATER TREATMENT PLANT

2.1 GENERAL INFORMATION

2.1.1 THE DUNDAS WASTEWATER TREATMENT PLANT

The Dundas Wastewater Treatment Plant is located at 135 King Street East in Dundas, Ontario. It serves a population of around 50,360 and features an average day design capacity of 18.2 ML/d. The plant treated an average of 11.79 ML/d in 2023 compared to 10.28 ML/d in 2022.

2.1.2 THE DUNDAS WASTEWATER TREATMENT PROCESS

The Dundas Wastewater Treatment Plant began operations in 1919. The original facility consisted only of grit channels and an Imhoff tank. Over time, the plant completed several significant upgrades which included the addition of new treatment processes as well as the expansion and enhancement of existing processes.

Today, the plant consists of a preliminary treatment process containing bar screens and a grit removal chamber. Ferric sulphate is added at this point to aid in the removal of phosphorous through precipitation. Next, wastewater flows into primary clarifiers where fine solids settle out to the bottom of the tanks as “raw sludge”, while fats, oils, and grease float to the top of the tanks as “scum”. Chain and flight systems remove both sludge and scum continuously. Primary effluent flows into aeration basins where air is forced through diffusers at the bottom of the tanks to supply oxygen for microbial populations that process organic material and oxidize ammonia. Following aeration, wastewater flows into the secondary clarifiers where solids again settle out, this time as “activated sludge” due to the high level of microbial activity. Most of this sludge will be returned to aeration as “return activated sludge” while the rest will be removed for further processing as “waste activated sludge”. The secondary effluent is then disinfected with chlorine from May 1 to October 31. A tertiary sand filtration system is then used to further reduce the suspended solids and phosphorus content of the effluent, after which sodium bisulphite is added to remove chlorine. The treated effluent water is then released into the Desjardins Canal.

The Dundas Wastewater Treatment Plant does not feature its own solids treatment processes. Instead, sludge is hauled by truck to the Woodward Avenue Wastewater Treatment Plant where it is mixed and processed with the Woodward Avenue Wastewater Treatment Plant sludge. Refer to Subsection 1.1.2 of the Woodward Avenue Wastewater Treatment Plant report for additional details.

2.1.3 IMPROVEMENTS TO THE FACILITY

The Hamilton Water and Wastewater Master Plan (2006) identified the current strategy to maintain the Dundas Wastewater Treatment Plant in place with no change in capacity. The current Water, Wastewater and Stormwater Master Plans will be an update of the 2006 Water, Wastewater and the 2007 Stormwater Master Plans and will consider reviewing capacity demand up to the 2051 horizon year. The Water, Wastewater and Stormwater Master Plan is expected to be completed by Q1 2025.

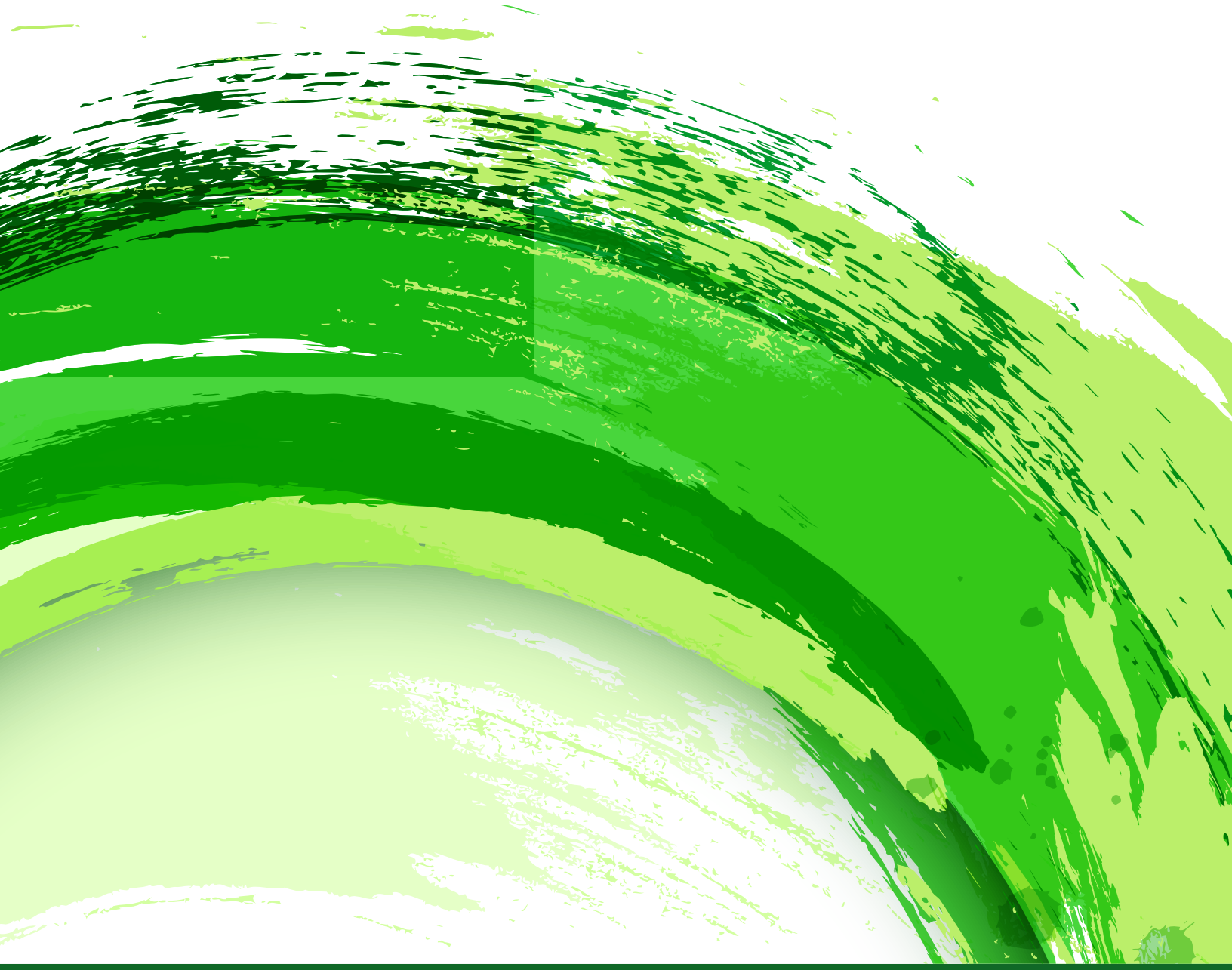
Effluent targets for the Dundas Wastewater Treatment Plant have been identified by the Hamilton Harbour Remedial Action Plan process to reflect efforts for improved environmental health within Cootes Paradise. In 2023, the City met with the Hamilton Harbour Remedial Action Plan, Royal Botanical Gardens and the Ministry of the Environment, Conservation and Parks to discuss further refinement of the environmental effluent targets that can be achieved based on a best available technology approach. A conceptual design study is currently underway for the Dundas Wastewater Treatment Plant to assess the required upgrades to meet a range of performance levels, including the updated Harbour Remedial Action Plan targets. Further consultation with the Ministry of the Environment, Conservation and Parks will occur once the capital design of the Dundas Wastewater Treatment Plant Upgrades has commenced (anticipated in 2025) to discuss and confirm compliance effluent targets. This work will further evaluate

several options and costs, taking into consideration long-term operations and maintenance, reflected in a net present value approach. In late 2022, an additional budget was approved to support the Dundas Wastewater Treatment Plant Upgrades Project for a total of $140 million. However, as the City progresses through the conceptual design, additional funds may be required to support the best available technology to achieve the environmental goals.

To further address health and safety concerns, repairs at the Dundas Wastewater Treatment Plant include concrete restoration and replacement of the guard rails around open tanks. The design is currently in progress with construction to commence in 2024.

Other improvements completed in 2023 include a change in the control of effluent chamber pumps which was transferred from the float device to the level transmitter for more effective control. Further details are provided in Section 2.3.2.

Programming was added to the headworks bar screen operation control to prevent material spillage from the screw conveyer during a power disruption.



2.2 REGULATORY INSTRUMENTS

2.2.1 ENVIRONMENTAL COMPLIANCE APPROVAL

2.2.1.1 Sewage

No. 3101-89PNRC: October 6, 2010 – Amended Certificate of Approval

2.2.1.2 Air

In response to the Ministry of the Environment, Conservation and Parks inspection conducted in March 2020, the City retained a consultant to submit an application for an Environmental Compliance Approval (Air) for the Dundas Wastewater Treatment Plant. The initial application was submitted to the Ministry of the Environment, Conservation and Parks in 2020. The consultant completed a noise assessment and the application was resubmitted to the Ministry of the Environment, Conservation and Parks in 2023. Necessary actions including installation of a noise wall will begin in 2024.

2.2.2 EFFLUENT REQUIREMENTS

EFFLUENT REQUIREMENTS			
Parameter	Monthly Average Concentration Objectives (mg/L)	Monthly Average Concentration Limits (mg/L)	Effluent Daily Loading Limits (kg/d)
Carbonaceous Biochemical Oxygen Demand (cBOD)	5.0	5.0	91.0
Total Suspended Solids (TSS)	5.0	5.0	91.0
Total Kjeldahl Nitrogen - Summer (May 1 to October 31)	2.0	2.0	36.4
Total Kjeldahl Nitrogen - Winter (November 1 to April 30)	0.5	0.5	9.1
Total Phosphorus (TP)	0.5	0.5	9.1
Chlorine Residual (May 1 to October 31)	0.02	0.02	-
E. coli (May 1 to October 31)	100 organisms / 100 mL	-	-
pH of the effluent is to be maintained between 6.0 and 9.5, inclusive, at all times			

2.2.3 SAMPLING PROCEDURES

Raw influent wastewater is sampled weekly and is tested for ammonia, carbonaceous biochemical oxygen demand (cBOD), chemical oxygen demand (COD), potential of hydrogen (pH), soluble phosphorus (SP), total phosphorus (TP), total biochemical oxygen demand (tBOD), total Kjeldahl nitrogen (TKN) and total suspended solids (TSS).

Final effluent is sampled weekly and is tested for alkalinity, ammonia, cBOD, nitrates, nitrites, pH, SP, TP, TKN, TSS and Volatile Suspended Solids (VSS). E. coli and total chlorine residuals are sampled weekly on a seasonal basis from May 1 to October 31.

Samples are collected using a flow-proportional automatic water quality sampler and composited over 24 hours. The samples are refrigerated before analysis at the City of Hamilton Environmental Laboratory located at the Woodward Avenue Wastewater Treatment Plant.

2.3 ENVIRONMENTAL COMPLIANCE APPROVAL REPORTING REQUIREMENTS

Regarding Condition 11 'Reporting' in Certificate of Approval #3101-89PNRC the following information is provided to address the items listed under Subsection 6.

2.3.1 CONDITION 11 (6A) EFFLUENT LIMITS SUMMARY AND INTERPRETATION

Throughout 2023, the Dundas Wastewater Treatment Plant succeeded in meeting the effluent concentration and loading limits as per Condition 7 of the Certificate of Approval with monitoring data for all applicable parameters. This has been the eighth consecutive calendar year in which the plant has achieved 100% compliance with all effluent limits, owing to the mission of continuous improvement and the hard work of dedicated staff. Details of plant performance in 2023 can be found in Appendix E titled 'Dundas WWTP Operating Data Summary' in the section titled 'Final Effluent' table titled 'Final Effluent Concentrations' and 'Final Effluent Loadings'.

EFFLUENT CONCENTRATIONS (mg/L)						
Year	TSS	cBOD	TP	SP	NH_3	TKN
2018	0.96	1.26	0.052	0.030	0.04	0.57
2019	0.84	1.26	0.083	0.064	0.09	0.62
2020	0.89	1.26	0.108	0.091	0.08	0.60
2021	0.88	1.99	0.131	0.103	0.66	1.27
2022	1.16	1.49	0.129	0.105	0.07	0.67
2023	0.85	1.21	0.089	0.071	0.06	0.57

EFFLUENT LOADINGS (kg/d)						
Year	TSS	cBOD	TP	SP	NH_3	TKN
2018	12.2	15.8	0.7	0.4	0.5	7.2
2019	10.9	16.5	1.1	0.8	1.2	8.1
2020	10.7	15.2	1.3	1.1	0.9	7.2
2021	10.0	21.1	1.5	1.1	6.4	13.2
2022	11.7	15.1	1.3	1.0	0.6	6.7
2023	10.0	14.3	1.1	0.1	0.7	6.7

Effluent concentrations and loadings in 2023 fell within the expected ranges based on historical data.

2.3.2 CONDITION 11 (6B) OPERATING PROBLEMS AND CORRECTIVE ACTION

It was determined that the effluent chamber pumps were drawing levels down too low, causing process issues including air locking and faulty effluent analyzer readings. To resolve this, the pump control was changed from a float device to a level transmitter.

2.3.3 CONDITION 11 (6C) MAINTENANCE ACTIVITIES

Regular plant maintenance is carried out by City of Hamilton Plant Maintenance staff based at the Woodward Avenue Wastewater Treatment Plant. A computerized maintenance management system is used for scheduling and tracking routine and preventative maintenance. Larger or specialized maintenance activities are completed through third-party external contractors.

In 2023, the City spent approximately $227,305 on maintenance activities at the Dundas Wastewater Treatment Plant. Appendix B titled 'Maintenance Activities' table titled 'Cost Summary' contains a cost breakdown of maintenance activities completed on all the City's vertical wastewater infrastructure and lists the significant maintenance activities completed in 2023 at the Dundas Wastewater Treatment Plant.

2.3.4 CONDITION 11 (6D) EFFLUENT QUALITY ASSURANCE

Analytical tests to monitor required parameters are performed by the City of Hamilton Environmental Lab which is accredited by the Canadian Association for Laboratory Accreditation Incorporated. Wastewater Treatment Plant operation and performance are monitored by licensed operators as well as by the facility's management team. Standard operating procedures, emergency plans, equipment preventative maintenance and a team of support staff help ensure a rapid and effective response to issues and maintain high quality effluent.

The City of Hamilton's Wastewater Quality Management System received endorsement from Council on January 21, 2021. The Wastewater Quality Management System was fully implemented and operational in 2021. The Wastewater Quality Management System was implemented to ensure the effective and efficient collection and treatment of wastewater in a manner that protects the environment, meets legal and regulatory requirements, and meets the City of Hamilton's commitment to operating and maintaining a high-quality wastewater system.

2.3.5 CONDITION 11 (6E) CALIBRATION & MAINTENANCE OF EFFLUENT MONITORING EQUIPMENT

Appendix C titled 'Calibration and Maintenance of Monitoring Equipment table titled 'Dundas WWTP Calibration and Maintenance of Monitoring Equipment' contains records of the calibrations performed on monitoring equipment during 2023.

2.3.6 CONDITION 11 (6F) EFFLUENT OBJECTIVES - EFFORTS MADE AND RESULTS ACHIEVED

Condition 6 of the Certificate of Approval identifies effluent concentration objectives for cBOD, TSS, TP, TKN, total residual chlorine and E. coli which match those of the effluent limit requirements as seen in Section 2.2.2.

Throughout 2023 the Dundas Wastewater Treatment Plant effluent consistently met the effluent objectives laid out in Condition 6 of the plant Certificate of Approval.

Details of plant performance can be found in Appendix E, titled 'Dundas WWTP Operating Data Summary' in the section titled 'Final Effluent' table titled 'Final Effluent Concentrations' and 'Final Effluent Loadings'. Efforts made to obtain these objectives include:

- Continual monitoring and periodic adjustment of processes by licensed and highly skilled operators
- By-law enforcement of sewer use violations
- Preventive maintenance routines of vital components

2.3.7 CONDITION 11 (6G) QUANTITY OF LANDFILL LEACHATE

Leachate from the Redland Brow Landfill contributed 68,381 m^3 in 2023. Appendix E titled 'Dundas WWTP Operating Data Summary' in the section titled 'Plant Flows' table titled 'Redland Brow Landfill Leachate' captures the monthly volume of leachate entering the Dundas Wastewater Treatment Plant.

2.3.8 CONDITION 11 (6H) CHEMICAL CHARACTERIZATION OF LANDFILL LEACHATE

Appendix E, titled 'Dundas WWTP Operating Data Summary' in the section titled 'Sewer Discharge Sampling Results' table titled '2023 Quarterly Sewer Discharge Sampling Results Redland Brow Landfill' contains the 2023 quarterly sewer discharge sampling results from the Redland Brow Landfill.

2.3.9 CONDITION 11 (6I) SLUDGE VOLUME

Raw sludge collected at the Dundas Wastewater Treatment Plant is hauled by truck to the Woodward Avenue Wastewater Treatment Plant for processing. The sludge volume generated in 2023 totalled 40,078 tonnes. Based on recent history, the volume anticipated in 2024 is forecasted at approximately 41,000 tonnes. Monthly details can be found in Appendix E, titled 'Dundas WWTP Operating Data Summary' in the section titled 'Sludge' table titled 'Sludge Hauled to Woodward'.

2.3.10 CONDITION 11 (6J) SUMMARY OF COMPLAINTS

No complaints were received at the Dundas Wastewater Treatment Plant in 2023.

2.3.11 CONDITION 11 (6K) SUMMARY OF ALL BYPASS, SPILL AND ABNORMAL DISCHARGE EVENTS

In 2023, there were no spill events or abnormal discharges at the Dundas Wastewater Treatment Plant or associated stations reported to the Ministry of the Environment, Conservation and Parks.

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3 WASTEWATER COLLECTION FACILITIES

3.1 GENERAL INFORMATION

The City of Hamilton operates 71 sewage pumping stations and 9 combined sewer overflow tank facilities and is required to report on the performance of 18 facilities due to conditions within the individual facilities' Environmental Compliance Approvals. It is anticipated that reporting requirements will be expanded with the development of the Sewage Consolidated Linear Infrastructure Environmental Compliance Approval. This report is intended to satisfy the reporting requirements of the existing Environmental Compliance Approvals.

3.1.1 HCS01/HCS06: GREENHILL COMBINED SEWER OVERFLOW TANKS

The Greenhill Combined Sewer Overflow Tanks are located on the south side of Greenhill Avenue and east of Rosseau Road. The first tank (HCS01) has a capacity of 75,000 m^3 and was completed in 1988. The second tank (HCS06) was built upstream of the first tank and has a volume of 65,000 m^3. It was completed in 2004 and was designed to reduce the frequency of combined sewer overflows entering Red Hill Creek at the Greenhill Combined Sewer Overflow Outfall, based on the synthetic average year. Flow into HCS06 is regulated upstream of the tank and if it becomes full, it will overflow to HCS01 and upon its filling will overflow into a wetland area adjacent to Red Hill Creek.

3.1.2 HCS02: STRACHAN COMBINED SEWER OVERFLOW TANK

The Strachan Combined Sewer Overflow Tank is located at 201 Harbourfront Drive, near Hamilton's Bayfront Park. The tank volume is 23,000 m^3, consisting of two relatively equally sized cells. It was completed in 1993 and was designed to reduce the frequency of combined sewer overflows entering Hamilton Harbour at the former Queen Street and Hess Street Combined Sewer Overflow Outfalls from 13 per year to one per year, based on the synthetic average year.

3.1.3 HCS03: JAMES COMBINED SEWER OVERFLOW TANK

The James Street Combined Sewer Overflow Tank is located at the foot of James Street, north of Guise Street. The tank volume is 2,000 m^3 and was completed in 1993. The station was designed to reduce the frequency of combined sewer overflows entering Hamilton Harbour at the James Street Combined Sewer Overflow Outfall from 24 per year to one per year, based on the synthetic average year.

3.1.4 HCS04: MAIN/KING COMBINED SEWER OVERFLOW TANK

The Main/King Combined Sewer Overflow Tank is located in Cathedral Park, bounded by Main Street West, Highway 403, King Street West and Dundurn Street. The tank volume is 75,000 m^3, consisting of two cells. Cell #1 with an approximate volume of 22,000 m^3 and Cell #2 with an approximate volume of 53,000 m^3. It was completed in 1997 and was designed to reduce the frequency of combined sewer overflows entering Chedoke Creek at the Glen Road and former McKittrick Combined Sewer Overflow Outfalls.

3.1.5 HCS05: EASTWOOD COMBINED SEWER OVERFLOW TANK

The Eastwood Park Combined Sewer Overflow Tank is located in Eastwood Park on the southwest corner of Ferguson Avenue and Dock Service Road. The tank volume is 25,000 m^3, consisting of two similarly sized cells. It was completed in 1997 and was designed to reduce the frequency of combined sewer overflows entering Hamilton Harbour at the Catharine Street and Ferguson Avenue Combined Sewer Overflow Outfalls.

3.1.6 HCS07: RED HILL COMBINED SEWER OVERFLOW PIPE

The Red Hill Combined Sewer Overflow Pipe is located below the Red Hill Valley Parkway between Lawrence Road and Barton Street. The 2.7 km by 3 m diameter pipe has a storage capacity of approximately 14,400 m^3. This facility became operational on December 20, 2011. It was designed to capture combined sewer overflows from Lawrence Road, Queenston Road and Melvin Avenue which would have historically discharged into Red Hill Creek.

3.1.7 HCS08: ROYAL COMBINED SEWER OVERFLOW TANK

The Royal Avenue Combined Sewer Overflow Tank is located in Stroud Park, on the southwest corner of Royal Avenue and Stroud Road. The tank volume is 15,000 m³. It was completed in late 2007 and was designed to reduce the frequency of combined sewer overflows entering Chedoke Creek from the Royal Avenue Combined Sewer System.

3.1.8 HCS09: MCMASTER COMBINED SEWER OVERFLOW TANK

The McMaster Combined Sewer Overflow Tank is located at McMaster University in the Zone 6 parking lot. The tank was completed in April 2012. The storage volume of 5,935 m³ was designed to reduce combined sewer overflows to Coldwater Creek which discharges into Cootes Paradise.

3.1.9 HC011: CALVIN STREET WASTEWATER PUMPING STATION

The Calvin Street Wastewater Pumping Station is located at 170 Calvin Street. The facility is a single-storey building with an adjacent subsurface wet well. The station collects wastewater in a wet well and automatically pumps it to the Woodward Avenue Wastewater Treatment Plant. There are two sewage lift pumps (one duty and one standby), each with a rated capacity of 59 L/s. The station is equipped with an overflow to protect the sewer catchment from surcharging. Should the pumps fail to operate or when sewage inflows are greater than the pump capacity ratings, there is a possibility that the station will overflow into Ancaster Creek before basement flooding occurs.

3.1.10 HC018: TWENTY ROAD WASTEWATER PUMPING STATION

The Twenty Road Wastewater Pumping Station is located at 1980 Upper James Street. The station is a single-storey building laid out in a dry well/wet well configuration. The dry well contains the sewage lift pumps, piping, and process instrumentation. The site has an outdoor pad-mounted generator with a noise abatement enclosure. The wet well is a single cell with three pumps (two duty, one standby), each with a rated capacity of 320 L/s. Should the pumps fail to operate or when sewage inflows are greater than the pump capacity ratings, there is a possibility that the station will overflow into final receiver Twenty Mile Creek.

3.1.11 HC019: ENGLISH CHURCH WASTEWATER PUMPING STATION

The English Church Wastewater Pumping Station is located at 2844 Upper James Street. The station is a single-storey building with an adjacent subsurface wet well. The station collects wastewater in a wet well and automatically pumps it to the Woodward Avenue Wastewater Treatment Plant. There are three sewage lift pumps (two duty, one standby), each with a rated capacity of 210 L/s. There are no overflow provisions at this facility.

3.1.12 HC027: HOMESTEAD WASTEWATER PUMPING STATION

The Homestead Wastewater Pumping Station is located at 3359 Homestead Drive. The station is a single-storey building with an adjacent subsurface wet well. The station collects wastewater in 2 wet wells and automatically pumps it to the Woodward Avenue Wastewater Treatment Plant. There are three sewage lift pumps (two duty, one standby), each with a rated capacity of 91 L/s. There are no overflow provisions at this facility.

3.1.13 HC058: BINBROOK WASTEWATER PUMPING STATION

The Regional Road 56 Binbrook Wastewater Pumping Station is located at 3255 Regional Road 56 in Binbrook. The station is a single-storey building with an adjacent subsurface wet well. The station collects wastewater in a wet well and automatically pumps it to the Woodward Avenue Wastewater Treatment Plant. There are three sewage lift pumps (two duty, one standby), each with a rated capacity of 257 L/s. The station is rated for an initial period peak flow of 231 L/s and an ultimate peak flow of 507 L/s. There is a wet weather valve between the two discharge forcemains. During high flow conditions (two pumps are running), the valve will open to allow sewage to flow through both forcemains. There are no overflow provisions at this facility.

3.1.14 REAL-TIME CONTROL FACILITIES

3.1.14.1 HCG03 Rosemary-Wentworth Regulator

The Rosemary-Wentworth (HCG03) regulator chamber is located underground on the northeast corner of Rosemary Street and Wentworth Street. It houses the isolation actuator and associated gate. The Rosemary-Wentworth regulator chamber directs dry weather flow to the Burlington-Hillyard area where flows enter the Western Sanitary Interceptor North branch. The Rosemary-Wentworth (HCG03) monitoring chamber is located underground in the middle of the intersection of Rosemary Street and Wentworth Street. A water level meter was installed to monitor the upstream gate water level for overflow detection. The purpose of the Rosemary-Wentworth regulator site is to limit the surcharge of the Western Sanitary Interceptor and the peak flow at the Woodward Avenue Wastewater Treatment Plant. The regulator chamber houses the isolation sluice gate and electric actuator which, when closed, directs flow to the 2,440 mm by 2,540 mm combined sewer overflow north along Wentworth Street toward Hamilton Harbour. The Rosemary-Wentworth (HCG03) station isolation gate is controlled based on the Western Sanitary Interceptor North branch water level measurement at the Wellington-Burlington (HCG14) Western Sanitary Interceptor North branch monitoring chamber. The control building houses the electrical and communication equipment for the operation of the Rosemary-Wentworth (HCG03) Real-Time Control Station. It is located at the southeast corner of Rosemary Street and Wentworth Street.

3.1.14.2 HCG07 Ferguson-Ferrie Regulator

The Ferguson-Ferrie Wastewater Regulator (HCG07) is located at the intersection of Ferguson Street and Ferrie Street where the local collector sewer crosses the Western Sanitary Interceptor South branch. The purpose of the Ferguson-Ferrie regulator site is to limit the surcharge of the Western Sanitary Interceptor and the peak flow at the Woodward Avenue Wastewater Treatment Plant. To limit the surcharge of the flow being conveyed to the Western Sanitary Interceptor South branch, the Ferguson-Ferrie regulator chamber is equipped with an isolation slide gate. The gate is operated based on level measurements on the receiving Western Sanitary Interceptor South branch provided by the Mary-Ferrie (HCG08) station. The Ferguson-Ferrie station consists of a main control panel that houses the programmable automation controller panel and the isolation gate local control panel for the operation of the Ferguson-Ferrie (HCG07) station. It is located at the northeast corner of Ferguson Street and Ferrie Street. The Mary-Ferrie (HCG08) control building houses the electrical and communication equipment for the operation of the Ferguson-Ferrie (HCG07) station. It is located at the northwest corner of Mary Street and Ferrie Street. A duct bank running from Mary-Ferrie (HCG08) along Ferrie Street relays power and communications to the Ferguson-Ferrie (HCG07) control panel located near the gate regulator chamber.

3.1.14.3 HCG08 Mary-Ferrie Regulator

The Mary-Ferrie Wastewater Regulator (HCG08) is located at the intersection of Mary Street and Ferrie Street where the local collector sewer crosses the Western Sanitary Interceptor South branch. The purpose of the Mary-Ferrie regulator site is to maximize the interception capacity available in the Western Sanitary Interceptor South branch during small to medium-sized rain events by intercepting the sub-catchment flows into the Western Sanitary Interceptor South branch without exceeding downstream conveyance capacity and preventing backflows from the interceptor into the local collection system. To control the flow to the Western Sanitary Interceptor South branch, the Mary-Ferrie regulator chamber is equipped with a modulation slide gate and backup isolation slide gate. The gates are operated based on level measurements on the receiving Western Sanitary Interceptor South branch and based on level monitoring within the regulator chamber. The station consists of a single-storey control building with a subsurface regulator chamber located at the intersection of Mary Street and Ferrie Street. The control building houses the electrical, control and communication equipment. Two slide gates with associated actuators are housed in the regulator chamber. The isolation gate facilitates the maintenance of the modulation gate and provides a redundant backup if necessary. The modulation gate controls the site's flow.

3.1.14.4 HCG14 Wellington-Burlington Regulator

The Wellington-Burlington Wastewater Regulator (HCG14) is located at the intersection of Wellington Street North and Burlington Street East where the Wellington Combined Sewer Overflow Outfall Sewer crosses the Western Sanitary Interceptor North branch. The Wellington Combined Sewer Overflow Outfall Sewer runs south to north along Wellington Street where combined sewer overflows from the numerous regulators along Wellington Street are conveyed north to Hamilton Harbour. The purpose of the Wellington-Burlington regulator is to reduce the volume of combined sewer overflows to Hamilton Harbour by capturing combined sewage from the Wellington Combined Sewer Overflow Outfall Sewer and conveying it to the Western Sanitary Interceptor North branch when capacity is available. To control the flow being conveyed to the Western Sanitary Interceptor North branch, the regulator chamber is equipped with a modulation slide gate and backup isolation slide gate. The gates are operated based on level measurements on the receiving Western Sanitary Interceptor North branch, level measurements within the combined sewer overflow outfall sewer and based on level monitoring within the regulator itself. The station consists of a single-storey control building with a subsurface regulator chamber. The control building houses the electrical, control and communications equipment. Two slide gates with associated actuators are housed in the chamber. The isolation gate facilitates the maintenance of the modulation gate and provides a redundant backup if necessary. The modulation gate controls the site's flow. Two flap gates are also located just downstream of the flow diversion channel to the regulator preventing the receiving lake from backflowing into the regulator.

3.2 COMPLIANCE APPROVALS

Facility	ECA Number	Issue Date
HCS01/HCS06: Greenhill Combined Sewer Overflow Tanks	6240-8YAJ3G	September 19, 2012
HCS02: Strachan Combined Sewer Overflow Tank	0706-5UHHVC	February 4, 2004
HCS03: James Combined Sewer Overflow Tank	3-1194-92-006	October 16, 1992
HCS04: Main/King Combined Sewer Overflow Tank	3-1455-94-956	January 6, 1995
HCS05: Eastwood Combined Sewer Overflow Tank	3-1686-95-966	February 8, 1996
HCS07: Red Hill Superpipe	7667-5W4LBK	April 23, 2004
HCS08: Royal Combined Sewer Overflow Tank	5975-6ADPCK	May 31, 2005
HCS09: McMaster Combined Sewer Overflow Tank	7422-7K9GZE	November 14, 2008
HC011: Calvin Street	0185-CMXL2M	March 29, 2023
HC018: Twenty Road Wastewater Pumping Station	6048-BS9KV5	March 23, 2021
HC019: English Church Wastewater Pumping Station	8318-BSCP8D	September 11, 2020
HC027: Homestead Wastewater Pumping Station	2627-BSEQB2	September 11, 2020
HC058: Binbrook Wastewater Pumping Station	4299-B75MSK	February 7, 2019
HCG03, HCG07, HCG08, HCG14: Real-Time Control Facilities	5433-CJ7JMB	April 5, 2023

3.2.1 SEWAGE CONSOLIDATED LINEAR INFRASTRUCTURE ENVIRONMENTAL COMPLIANCE APPROVAL

The application for a Sewage Consolidated Linear Infrastructure Environmental Compliance Approval was submitted as per the deadline on January 21, 2021. The City of Hamilton received drafts of the Consolidated Linear Infrastructure Environmental Compliance Approval from the Ministry of the Environment, Conservation and Parks in 2023 and had an in-person meeting with the Ministry of the Environment, Conservation and Parks in Q1 2024 to work on Hamilton-specific conditions in the Sewage Consolidated Linear Infrastructure Environmental Compliance Approval.

The City of Hamilton and the Ministry of the Environment, Conservation and Parks continue to work towards a finalized Environmental Compliance Approval.

3.2.2 NOTICE OF MODIFICATION

There were no Notices of Modification submitted in 2023 for any of the above facilities.

3.2.3 MONITORING AND ANALYTICAL DATA

The table '2023 Overflow Events' below summarizes the overflows from each of the reported facilities in 2023 and the table 'Historical Overflow Events' compares the 2023 overflows to previous years. It should be noted that 2023 saw an increase in overflows in comparison to 2022 due to the increased rainfall in 2023. Furthermore, 2023 represents the first year that the real-time control structures (HCG03, HCG07, HCG08 and HCG14) are required to be included in this report and they account for 81 of the 124 overflow events. Analytical results of samples collected during storm events can be found in Appendix F titled 'CSO Tank Analytical Data'.

2023 OVERFLOW EVENTS			
Facility	Number of Overflow Events	Total Duration (Hours)	Total Volume (ML)
HCS01: Greenhill Combined Sewer Overflow Tank	11	165.2	878.504
HCS02: Strachan Combined Sewer Overflow Tank	0	0.0	0.000
HCS03: James Combined Sewer Overflow Tank	3	1.7	1.651
HCS04: Main/King Combined Sewer Overflow Tank	9	94.3	234.353
HCS05: Eastwood Combined Sewer Overflow Tank	3	60.7	174.440
HCS07: Red Hill Superpipe	0	0.0	0.000
HCS08: Royal Combined Sewer Overflow Tank	7	57.0	83.498
HCS09: McMaster Combined Sewer Overflow Tank	0	0.0	0.000
HCG03: Rosemary - Wentworth Regulator*	59	161.5	not available
HCG07: Ferguson-Ferrie Regulator	0	0.0	0.000
HCG08: Mary-Ferrie Regulator	0	0.0	0.000
HCG14: Wellington-Burlington Regulator	32	116.9	not available
All facilities	124	657.3	1,372.446

*Overflows due to height of upstream static weir and not due to operation of control gate.

HISTORICAL OVERFLOW EVENTS			
Year	Number of Overflow Events	Total Duration (Hours)	Total Volume (ML)
2018	19	484.0	1,930.120
2019	23	382.5	1,219.650
2020	13	261.0	963.040
2021	27	406.0	1,639.600
2022	10	158.0	699.700
Five-year average	18.4	338.3	1,290.422

3.2.4 MAINTENANCE OF MAJOR EQUIPMENT

Regular facilities maintenance is carried out by City of Hamilton Plant Maintenance staff based at the Woodward Avenue Wastewater Treatment Plant. A computerized maintenance management system is used for scheduling and tracking routine and preventative maintenance. Larger or specialized maintenance activities are completed through third-party external contractors.

In 2023, approximately $798,001 was spent maintaining the wastewater pumping stations and combined sewer overflow facilities. Significant maintenance activities completed at the facilities in 2023 are provided in Appendix B titled 'Maintenance Activities' table titled 'Cost Summary' which includes a cost breakdown of all maintenance activities completed on the City's vertical wastewater infrastructure.

3.2.5 CALIBRATION AND MAINTENANCE OF MONITORING EQUIPMENT

Appendix C titled 'Calibration and Maintenance of Monitoring Equipment' table titled 'Wastewater Collection Facilities Calibration and Maintenance of Monitoring Equipment' contains the calibration activities on the monitoring equipment.

3.2.6 OPERATING PROBLEMS AND CORRECTIVE ACTION

In general, the wastewater collection facilities operated as designed in 2023 except for the issues noted below.

Wastewater Collection Facility	Operational Issues and Actions Taken
HCS04: Main/King Combined Sewer Overflow Tank	The overflow autosampler at this station experienced intermittent issues resulting in samples not being collected during some overflow events from late June through mid-August 2023.
HCS08: Royal Combined Sewer Overflow Tank	During the preparation of the 2023 CSO Report, it was discovered that the overflow monitoring device at the Royal/Stroud CSO tank was incorrectly calculating discharges at high flows. Hamilton Water immediately pursued investigations and found that the issue may have originated from the initial device commissioning in 2008. Hamilton Water is initiating a third-party engineering review of the history of overflows at the facility. The engineering review will also provide recommendations for reliable overflow monitoring going forward. In the interim, empirical formulas have been used to supplement the existing flow monitoring system and estimate overflows for the 2023 reporting period. The Ministry will be informed of the outcomes of the third-party engineering review and revised overflow volumes. The influent autosampler experienced problems resulting in influent samples not being collected after late March of 2023, and the effluent autosampler experienced problems resulting in two of seven overflow samples being missed (on March 17 and August 15, 2023).
HCS05: Eastwood Combined Sewer Overflow Tank	The influent autosampler at this station has experienced intermittent issues in which samples were not collected.
HCS02: Strachan Combined Sewer Overflow Tank	The wash water system at this station was not functioning properly and has since been repaired as of September 2023.
HC018: Twenty Road Wastewater Pumping Station	On September 12th the utility-owned transformer at this station shorted resulting in damage to the variable frequency drive on Pump #1 which is to be repaired in 2024.
HCG14: Wellington-Burlington Regulator	A faulty flap gate at this station allowed lake water to flow into the regulator station. Repairs were completed in August 2023.

3.2.7 SUMMARY OF COMPLAINTS

No complaints about the wastewater collection stations covered in Section 3.1 were received in 2023.

3.2.8 SUMMARY OF SPILLS AND ABNORMAL DISCHARGES

All discharge events at these facilities in 2023 were combined sewer overflow events occurring during storm events due to heavy precipitation except for one dry weather event which occurred at Rosemary-Wentworth Regulator (HCG03) on August 2, 2023. This occurred because of systems testing in which the isolation gate was fully closed in error, resulting in an overflow lasting 10 to 15 seconds. This event was reported to the Ministry of the Environment, Conservation and Parks Spills Action Centre as required.

3.2.9 OTHER INFORMATION REQUIRED BY THE MINISTRY OF THE ENVIRONMENT, CONSERVATION AND PARKS DISTRICT MANAGER

No additional information was requested for inclusion in this report by the District Manager.

3.2.10 OVERVIEW OF THE SUCCESS AND ADEQUACY OF THE WORKS AND EVALUATION OF THE NEED FOR MODIFICATIONS

In general, these combined sewer overflow tank facilities and wastewater pumping stations are operating effectively as designed. There are several facilities undergoing upgrades and modifications to optimize system operations and to maintain the facilities in a state of good repair.

3.2.10.1 Rosemary-Wentworth Regulator (HCG03) Overflow Weir Modification

It was determined that there is an opportunity to increase the overflow weir height at HCG03 to reduce overflows to the environment. Accordingly, a plan has been developed to raise the weir height by 45 cm in 2024.

3.2.10.2 Main/King Combined Sewer Overflow Rehabilitation

This project encompasses rehabilitation efforts to enhance redundancy in gate position detection and elevate the overall reliability and performance of the facility during operation. The existing five gates, operated by aging electrical actuators utilizing outdated technology, are planned to be replaced. This initiative aims to not only address the end-of-life cycle of these actuators but also to install redundancy in gate positioning detection. On-site mobilization commenced in Q2 2023, with a substantial performance date expected in Q2 2024.

3.2.10.3 Binbrook Odour Control Pilot

In previous years, high levels of hydrogen sulphide (H_2S) were causing significant corrosion of new concrete sewers and odour concerns for residents living along Highway 56 and Highway 20. A pilot project with USP Technologies - Canada (USP) was approved in December 2020. USP's scope included the interim supply of chemicals, equipment, logistics, monitoring and program management of an odour and corrosion control system to mitigate high levels of hydrogen sulphide in the wastewater collection system. The City continues to monitor the effectiveness of the pilot project which, combined with other process optimizations, has shown a significant reduction in hydrogen sulphide levels. The City plans to implement a permanent solution in 2024.

APPENDICES

APPENDIX A
WOODWARD WWTP OPERATING DATA SUMMARY

PLANT FLOWS

PLANT FLOWS					
Month	Monthly Volume ML	Daily Average ML/d	Daily Maximum ML/d	Daily Minimum ML/d	Disinfected Volume ML
January	9,373.926	302.385	570.125	220.092	-
February	8,817.849	314.923	710.903	224.917	-
March	14,687.495	473.790	747.269	329.774	-
April	12,726.427	424.214	914.299	262.724	-
May	9,171.250	295.847	483.313	230.810	4,416.391
June	9,299.402	309.980	699.657	222.987	9,299.402
July	10,889.378	351.270	739.333	222.862	10,889.378
August	10,788.595	348.019	585.816	235.762	10,788.595
September	6,988.883	232.963	334.338	205.666	6,988.883
October	7,385.360	238.237	377.667	204.269	3,530.050
November	7,578.977	252.633	419.756	208.376	-
December	9,748.866	314.480	569.508	237.899	-
Total	**117,456.407**	**-**	**-**	**-**	**45,912.697**
Average	**9,788.034**	**321.562**	**595.999**	**233.845**	**7,652.116**
Maximum	**14,687.495**	**473.790**	**914.299**	**329.774**	**10,889.378**
Minimum	**6,988.883**	**232.963**	**334.338**	**204.269**	**3,530.050**

Flow Capacity Utilization 78.6%

CAPACITY EXCEEDANCE				
Month	> 90% of 409 ML/day		> 100% of 409 ML/day	
	Days	%	Days	%
January	5	16.1%	5	16.1%
February	6	21.4%	4	14.3%
March	26	83.9%	17	54.8%
April	14	46.7%	13	43.3%
May	4	12.9%	3	9.7%
June	8	26.7%	6	20.0%
July	9	29.0%	8	25.8%
August	11	35.5%	7	22.6%
September	0	0.0%	0	0.0%
October	1	3.2%	0	0.0%
November	1	3.3%	1	3.3%
December	6	19.4%	3	9.7%
Total	**91**	**24.8%**	**67**	**18.3%**
Average	**8**	**-**	**6**	**-**
Maximum	**26**	**-**	**17**	**-**
Minimum	**0**	**-**	**0**	**-**

PLANT BYPASSING										
Month	Plant Bypass			Primary/Headworks Bypass			Secondary Bypass			Proportion of Plant Flow
	# of Events	Hours	Volume ML	# of Events	Hours	Volume ML	# of Events	Hours	Volume ML	%
January	0	0.00	0.000	1	0.92	19.37	1	10.27	100.871	1.28%
February	0	0.00	0.000	0	0.00	0.00	1	27.86	317.410	3.60%
March	0	0.00	0.000	0	0.00	0.00	3	93.66	628.633	4.28%
April	0	0.00	0.000	1	4.25	13.24	4	76.55	637.028	5.11%
May	0	0.00	0.000	0	0.00	0.000	0	0.00	0.000	0.00%
June	0	0.00	0.000	0	0.00	0.000	2	25.00	144.855	1.56%
July	0	0.00	0.000	1	2.62	2.136	3	35.53	360.099	3.33%
August	0	0.00	0.000	1	5.85	43.217	2	17.52	164.302	1.92%
September	0	0.00	0.000	0	0.00	0.000	0	0.00	0.000	0.00%
October	0	0.00	0.000	0	0.00	0.000	0	0.00	0.000	0.00%
November	0	0.00	0.000	0	0.00	0.000	0	0.00	0.000	0.00%
December	0	0.00	0.000	0	0.00	0.000	1	22.35	63.680	0.65%
Total	**0**	**0.00**	**0.000**	**4**	**13.64**	**77.967**	**17**	**308.74**	**2,416.878**	**2.12%**
Average	**0.0**	**0.00**	**0.000**	**0.3**	**1.14**	**6.497**	**1.4**	**25.73**	**201.407**	**-**
Maximum	**0**	**0.00**	**0.000**	**1**	**5.85**	**43.217**	**4**	**93.66**	**637.028**	**5.11%**
Minimum	**0**	**0.00**	**0.000**	**0**	**0.00**	**0.000**	**0**	**0.00**	**0.000**	**0.00%**

RAW INFLUENT

RAW INFLUENT DAILY LOADINGS						
Month	TSS kg/day	cBOD kg/day	TP kg/day	SP kg/day	NH_3 kg/day	TKN kg/day
January	232,134	81,907	3,201	498	6,764	13,751
February	249,172	85,603	3,394	476	7,367	14,693
March	349,825	113,908	4,882	488	7,365	18,230
April	326,475	96,820	4,280	405	7,638	18,004
May	169,807	64,800	2,472	356	7,156	14,122
June	134,655	57,253	2,053	390	6,969	11,510
July	141,585	56,441	2,055	339	6,695	11,179
August	121,343	56,076	1,873	301	6,345	10,545
September	164,907	65,998	2,527	370	6,478	11,838
October	107,430	51,160	1,726	390	6,434	10,504
November	111,428	57,457	1,747	413	6,753	10,830
December	124,696	66,848	1,755	424	6,904	11,187
Average	**186,121**	**71,189**	**2,664**	**404**	**6,906**	**13,033**
Maximum	**349,825**	**113,908**	**4,882**	**498**	**7,638**	**18,230**
Minimum	**107,430**	**51,160**	**1,726**	**301**	**6,345**	**10,504**

RAW INFLUENT CONCENTRATIONS							
Month	TSS mg/L	cBOD mg/L	TP mg/L	SP mg/L	NH_3 mg/L	TKN mg/L	pH
January	767.68	270.87	10.58	1.65	22.37	45.47	7.44
February	791.21	271.82	10.78	1.51	23.39	46.66	7.50
March	738.35	240.42	10.30	1.03	15.55	38.48	7.55
April	769.60	228.23	10.09	0.96	18.01	42.44	7.54
May	573.97	219.03	8.35	1.20	24.19	47.74	7.63
June	434.40	184.70	6.62	1.26	22.48	37.13	7.60
July	403.06	160.68	5.85	0.97	19.06	31.83	7.63
August	348.67	161.13	5.38	0.87	18.23	30.30	7.61
September	707.87	283.30	10.85	1.59	27.81	50.82	7.61
October	450.94	214.74	7.25	1.64	27.01	44.09	7.62
November	441.07	227.43	6.91	1.63	26.73	42.87	7.56
December	396.52	212.57	5.58	1.35	21.95	35.57	7.54
Average	**568.61**	**222.91**	**8.21**	**1.30**	**22.23**	**41.12**	**7.57**
Maximum	**791.21**	**283.30**	**10.85**	**1.65**	**27.81**	**50.82**	**7.63**
Minimum	**348.67**	**160.68**	**5.38**	**0.87**	**15.55**	**30.30**	**7.44**

PRIMARY EFFLUENT

PRIMARY EFFLUENT TO NORTH PLANT								
Month	TSS		cBOD		TP		NH_3	TKN
	mg/L	% removal	mg/L	% removal	mg/L	% removal	mg/L	mg/L
January	88.15	88.5%	81.74	69.8%	2.46	76.8%	21.30	27.61
February	85.79	89.2%	89.21	67.2%	2.46	77.1%	22.64	29.32
March	86.20	88.3%	58.55	75.6%	2.03	80.3%	14.29	20.08
April	102.50	86.7%	65.43	71.3%	2.40	76.2%	17.30	24.88
May	93.95	83.6%	75.13	65.7%	2.41	71.2%	21.92	31.86
June	112.74	74.0%	75.20	59.3%	2.51	62.1%	20.49	27.77
July	89.16	77.9%	61.29	61.9%	2.09	64.3%	17.44	23.42
August	90.11	74.2%	61.03	62.1%	2.11	60.7%	16.50	21.13
September	76.65	89.2%	80.00	71.8%	2.36	78.2%	27.15	32.32
October	85.43	81.1%	79.97	62.8%	2.38	67.1%	26.06	31.87
November	122.27	72.3%	100.03	56.0%	3.02	56.4%	25.23	32.30
December	128.75	67.5%	91.90	56.8%	2.83	49.2%	21.19	28.81
Average	**96.81**	**81.0%**	**76.62**	**65.0%**	**2.42**	**68.3%**	**20.96**	**27.61**
Maximum	**128.75**	**89.2%**	**100.03**	**75.6%**	**3.02**	**80.3%**	**27.15**	**32.32**
Minimum	**76.65**	**67.5%**	**58.55**	**56.0%**	**2.03**	**49.2%**	**14.29**	**20.08**

PRIMARY EFFLUENT TO SOUTH PLANT								
Month	TSS		cBOD		TP		NH_3	TKN
	mg/L	% removal	mg/L	% removal	mg/L	% removal	mg/L	mg/L
January	76.19	90.1%	76.74	71.7%	2.28	78.5%	21.24	27.21
February	86.15	89.1%	87.00	68.0%	2.41	77.7%	22.20	28.86
March	77.90	89.4%	56.58	76.5%	1.90	81.6%	14.23	19.99
April	84.45	89.0%	60.17	73.6%	2.05	79.7%	16.81	23.80
May	88.37	84.6%	70.45	67.8%	2.27	72.8%	22.23	31.12
June	88.48	79.6%	65.10	64.8%	2.18	67.2%	20.59	27.53
July	71.30	82.3%	53.74	66.6%	1.87	68.0%	17.81	22.94
August	70.62	79.7%	54.10	66.4%	1.73	67.9%	17.06	21.30
September	90.43	87.2%	85.17	69.9%	2.65	75.6%	27.08	33.81
October	99.87	77.9%	92.23	57.1%	2.81	61.2%	27.85	34.65
November	95.51	78.3%	94.03	58.7%	2.85	58.8%	26.28	31.92
December	94.23	76.2%	77.52	63.5%	2.35	58.0%	21.18	27.50
Average	**85.29**	**83.6%**	**72.74**	**67.0%**	**2.28**	**70.6%**	**21.21**	**27.55**
Maximum	**99.87**	**90.1%**	**94.03**	**76.5%**	**2.85**	**81.6%**	**27.85**	**34.65**
Minimum	**70.62**	**76.2%**	**53.74**	**57.1%**	**1.73**	**58.0%**	**14.23**	**19.99**

AERATION

NORTH AERATION								
Month	Flow ML/d	SVI mL/g	F/M ratio	MLSS mg/L	MLVSS mg/L	RAS mg/L	SRT days	HRT hours
January	187.86	162.23	0.11	2,518	1,922	6,386	9.68	9.41
February	184.41	95.91	0.12	2,524	1,904	6,625	9.02	9.55
March	272.24	111.06	0.12	2,382	1,794	6,447	7.14	6.33
April	241.02	129.87	0.12	2,486	1,785	7,038	7.08	7.57
May	177.50	110.15	0.13	2,004	1,486	5,117	7.60	9.74
June	178.80	125.87	0.14	2,232	1,649	5,769	8.72	8.85
July	203.20	99.75	0.17	1,537	1,102	4,248	11.46	8.87
August	204.17	55.02	0.13	2,109	1,425	6,533	11.99	8.60
September	139.79	63.42	0.13	1,801	1,303	4,920	9.19	11.97
October	142.96	85.41	0.11	1,947	1,461	4,860	10.37	11.87
November	157.34	66.44	0.15	1,958	1,457	5,459	8.35	10.86
December	189.79	57.76	0.14	2,259	1,701	5,714	7.67	9.25
Average	**189.92**	**96.91**	**0.13**	**2,147**	**1,582**	**5,760**	**9.02**	**9.41**
Maximum	**272.24**	**162.23**	**0.17**	**2,524**	**1,922**	**7,038**	**11.99**	**11.97**
Minimum	**139.79**	**55.02**	**0.11**	**1,537**	**1,102**	**4,248**	**7.08**	**6.33**

SOUTH AERATION								
Month	Flow ML/d	SVI mL/g	F/M ratio	MLSS mg/L	MLVSS mg/L	RAS mg/L	SRT days	HRT hours
January	121.01	89.48	0.21	1,385	1,055	4,321	4.27	8.57
February	125.19	87.20	0.20	1,851	1,399	4,530	5.59	8.50
March	190.82	80.42	0.18	1,878	1,424	5,996	5.04	5.34
April	166.22	79.06	0.19	1,777	1,274	5,126	5.75	6.53
May	114.36	93.88	0.19	1,384	1,029	2,989	6.12	9.15
June	122.01	81.77	0.18	1,420	1,037	3,171	7.04	8.71
July	136.69	84.70	0.17	1,338	940	3,125	7.15	7.92
August	138.87	79.15	0.19	1,342	935	3,031	8.71	7.57
September	91.79	75.85	0.17	1,577	1,124	3,392	11.00	10.83
October	96.23	74.12	0.18	1,677	1,215	3,467	10.06	10.45
November	90.38	69.73	0.19	1,455	1,057	2,972	7.73	11.32
December	127.83	56.60	0.17	1,896	1,389	4,124	7.65	8.13
Average	**126.78**	**79.33**	**0.18**	**1,582**	**1,156**	**3,854**	**7.18**	**8.59**
Maximum	**190.82**	**93.88**	**0.21**	**1,896**	**1,424**	**5,996**	**11.00**	**11.32**
Minimum	**90.38**	**56.60**	**0.17**	**1,338**	**935**	**2,972**	**4.27**	**5.34**

FINAL EFFLUENT

FINAL EFFLUENT CONCENTRATIONS												
Month	TSS mg/L	cBOD mg/L	TP mg/L	SP mg/L	NH_3 mg/L	TKN mg/L	NO_3 mg/L	NO_2 mg/L	Alkalinity mg/L	Temp. ^{O}C	pH	E. coli*
January	3.53	3.00	0.218	0.086	0.75	1.77	18.36	0.44	106.09	16.96	6.96	-
February	3.61	3.63	0.196	0.064	1.19	2.29	20.10	0.40	123.23	17.30	7.14	-
March	3.27	2.73	0.128	0.035	0.57	1.37	14.42	0.31	139.09	16.59	7.09	-
April	3.34	2.91	0.172	0.060	0.97	1.90	16.12	0.32	134.70	18.35	7.10	-
May	4.93	3.66	0.240	0.074	2.95	3.87	20.24	0.22	125.45	17.14	7.10	1
June	5.08	3.52	0.249	0.090	0.92	1.97	17.38	0.14	105.52	22.95	6.95	1
July	4.52	2.93	0.191	0.066	0.88	1.90	16.39	0.18	116.02	25.24	7.03	1
August	5.05	2.61	0.204	0.063	0.68	1.44	16.80	0.15	112.00	24.75	7.08	2
September	3.80	2.12	0.190	0.072	0.70	1.56	22.27	0.10	95.86	23.66	7.05	1
October	3.99	2.07	0.186	0.062	0.80	1.46	21.73	0.12	87.51	23.81	7.05	1
November	4.62	2.75	0.210	0.054	1.32	2.00	21.33	0.19	93.39	18.59	7.08	-
December	6.29	3.23	0.213	0.042	0.57	1.34	18.45	0.18	101.20	17.10	7.05	-
Average	**4.34**	**2.93**	**0.200**	**0.064**	**1.03**	**1.91**	**18.63**	**0.23**	**111.67**	**20.20**	**7.06**	**1**
Maximum	**6.29**	**3.66**	**0.249**	**0.090**	**2.95**	**3.87**	**22.27**	**0.44**	**139.09**	**25.24**	**7.14**	**2**
Minimum	**3.27**	**2.07**	**0.128**	**0.035**	**0.57**	**1.34**	**14.42**	**0.10**	**87.51**	**16.59**	**6.95**	**1**

*E. coli geometric mean - MPN/100ml

FINAL EFFLUENT LOADINGS									
Month	TSS kg/day	cBOD kg/day	TP kg/day	SP kg/day	NH_3 kg/day	TKN kg/day	NO_3 kg/day	NO_2 kg/day	Alkalinity kg/day
January	1,067	907	66	26	226	534	5,553	134	32,080
February	1,135	1,142	62	20	375	722	6,328	124	38,806
March	1,550	1,292	61	16	268	650	6,831	148	65,900
April	1,417	1,234	73	25	412	805	6,837	135	57,144
May	1,460	1,083	71	22	873	1,146	5,987	65	37,115
June	1,575	1,092	77	28	286	610	5,386	44	32,710
July	1,589	1,030	67	23	309	667	5,756	63	40,755
August	1,759	908	71	22	237	500	5,846	53	38,978
September	886	494	44	17	162	364	5,188	24	22,331
October	950	493	44	15	190	348	5,178	28	20,849
November	1,167	695	53	14	335	504	5,390	48	23,592
December	1,978	1,015	67	13	180	422	5,803	57	31,827
Average	**1,378**	**949**	**63**	**20**	**321.1**	**606**	**5,840**	**77**	**36,841**
Maximum	**1,978**	**1,292**	**77**	**28**	**873.4**	**1,146**	**6,837**	**148**	**65,900**
Minimum	**886**	**493**	**44**	**13**	**162.0**	**348**	**5,178**	**24**	**20,849**

EFFLUENT continued

REMOVAL EFFICIENCY						
Month	TSS % removed	cBOD % removed	TP % removed	SP % removed	NH_3 % removed	TKN % removed
January	99.5	98.9	97.9	94.8	96.7	96.1
February	99.5	98.7	98.2	95.8	94.9	95.1
March	99.6	98.9	98.8	96.6	96.4	96.4
April	99.6	98.7	98.3	93.7	94.6	95.5
May	99.1	98.3	97.1	93.9	87.8	91.9
June	98.8	98.1	96.2	92.8	95.9	94.7
July	98.9	98.2	96.7	93.2	95.4	94.0
August	98.6	98.4	96.2	92.7	96.3	95.3
September	99.5	99.3	98.2	95.5	97.5	96.9
October	99.1	99.0	97.4	96.2	97.0	96.7
November	99.0	98.8	97.0	96.7	95.0	95.3
December	98.4	98.5	96.2	96.9	97.4	96.2
Average	**99.1**	**98.6**	**97.4**	**94.9**	**95.4**	**95.4**
Maximum	**99.6**	**99.3**	**98.8**	**96.9**	**97.5**	**96.9**
Minimum	**98.4**	**98.1**	**96.2**	**92.7**	**87.8**	**91.9**

REMOVAL QUANTITY						
Month	TSS kg/month	cBOD kg/month	TP kg/month	SP kg/month	NH_3 kg/month	TKN kg/month
January	7,163,087	2,511,003	97,176	14,633	202,651	409,718
February	6,945,020	2,364,916	93,302	12,773	195,762	391,201
March	10,796,548	3,491,101	149,456	14,606	220,027	544,975
April	9,751,740	2,867,573	126,204	11,395	216,774	515,958
May	5,218,750	1,975,241	74,424	10,360	194,750	402,276
June	3,992,410	1,684,830	59,273	10,860	200,513	326,976
July	4,339,872	1,717,751	61,613	9,800	197,955	325,873
August	3,707,106	1,710,212	55,860	8,662	189,350	311,392
September	4,920,605	1,965,141	74,487	10,610	189,477	344,219
October	3,300,867	1,570,660	52,148	11,638	193,561	314,837
November	3,307,816	1,702,870	50,812	11,965	192,549	309,762
December	3,804,276	2,040,822	52,316	12,729	208,454	333,714
Total	**67,248,097**	**25,602,119**	**947,072**	**140,031**	**2,401,823**	**4,530,901**
Average	**5,604,008**	**2,133,510**	**78,923**	**11,669**	**200,152**	**377,575**
Maximum	**10,796,548**	**3,491,101**	**149,456**	**14,633**	**220,027**	**544,975**
Minimum	**3,300,867**	**1,570,660**	**50,812**	**8,662**	**189,350**	**309,762**

SLUDGE THICKENING

RAW SLUDGE THICKENING

Month	Raw Sludge			Thickened Raw Sludge		
	Total Volume m^3/month	Total Solids %	Volatile Solids %	Total Volume m^3/month	Total Solids %	Volatile Solids %
January	37,527	4.22	70.42	27,702	5.79	72.01
February	33,923	4.29	69.44	21,961	6.18	69.91
March	41,825	3.94	66.45	26,372	6.86	68.33
April	40,566	4.29	62.91	31,281	6.32	62.99
May	41,007	4.15	66.63	24,929	6.68	67.91
June	39,152	3.54	67.97	23,311	7.45	69.79
July	39,817	4.08	62.65	22,615	8.37	61.92
August	30,755	3.51	63.94	22,872	8.32	64.23
September	31,529	3.54	66.83	24,749	7.50	69.56
October	32,892	3.00	70.35	24,138	7.03	71.15
November	37,976	3.42	67.88	19,811	7.60	70.06
December	38,908	3.39	73.62	20,480	7.44	73.92
Total	**445,877**	**-**	**-**	**290,221**	**-**	**-**
Average	**37,156.4**	**3.78**	**67.42**	**24,185**	**7.13**	**68.48**
Maximum	**41,825**	**4.29**	**73.62**	**31,281**	**8.37**	**73.92**
Minimum	**30,755**	**3.00**	**62.65**	**19,811**	**5.79**	**61.92**

WASTE ACTIVATED SLUDGE THICKENING

Month	Waste Activated Sludge			Thickened Waste Activated Sludge		
	Total Volume m^3/month	Total Solids %	Volatile Solids %	Total Volume m^3/month	Total Solids %	Volatile Solids %
January	152,752	0.54	0.34	23,231	5.28	75.46
February	138,482	0.56	0.41	25,053	4.60	74.68
March	153,005	0.62	0.52	26,955	5.33	74.50
April	147,543	0.61	0.43	24,794	5.08	71.55
May	150,528	0.41	0.31	21,388	5.06	72.72
June	106,382	0.45	0.26	19,181	4.83	71.35
July	112,370	0.37	0.30	14,707	4.28	67.48
August	76,456	0.48	0.31	11,169	5.60	66.12
September	122,139	0.42	0.34	20,272	5.15	69.60
October	129,022	0.42	0.29	19,079	4.28	72.26
November	130,965	0.42	0.30	17,938	5.08	72.80
December	121,250	0.49	0.31	17,550	5.00	73.30
Total	**1,540,893**	**-**	**-**	**241,316**	**-**	**-**
Average	**128,407.8**	**0.48**	**0.34**	**20,110**	**4.96**	**71.82**
Maximum	**153,005**	**0.37**	**0.26**	**26,955**	**5.60**	**75.46**
Minimum	**76,456**	**0.62**	**0.52**	**11,169**	**4.28**	**66.12**

ANAEROBIC DIGESTION

PRIMARY DIGESTERS					
Month	Total Feed m^3/month	Total Solids %	Volatile Solids %	Volatile Acids mg/L	Retention Time days
January	50,932.59	2.62	56.96	327.00	9.99
February	47,014.10	3.13	58.96	287.50	9.67
March	53,326.75	3.50	60.19	395.00	9.54
April	56,074.68	2.45	55.16	1,478.18	12.27
May	46,317.41	3.32	54.10	321.33	16.51
June	42,491.99	3.10	54.03	248.33	17.80
July	37,322.17	3.59	50.63	215.00	20.97
August	34,040.50	3.61	46.87	346.00	22.28
September	45,020.66	3.12	49.63	242.50	16.50
October	43,216.43	2.91	55.16	266.67	17.71
November	37,749.36	3.02	55.61	250.83	19.28
December	38,030.25	3.26	55.28	309.17	15.44
Total	**531,536.88**	**-**	**-**	**-**	**-**
Average	**44,294.74**	**3.14**	**54.38**	**390.63**	**15.66**
Maximum	**56,074.68**	**3.61**	**60.19**	**1,478.18**	**22.28**
Minimum	**34,040.50**	**2.45**	**46.87**	**215.00**	**9.54**

SECONDARY DIGESTER			
Month	Total Solids %	Volatile Solids %	Volatile Solids Reduction %
January	2.96	60.74	47.2
February	3.10	59.25	46.8
March	3.43	60.18	39.0
April	4.05	54.75	43.4
May	3.30	53.64	51.1
June	3.00	53.68	49.9
July	3.70	50.38	47.0
August	3.58	46.02	56.7
September	2.98	49.43	56.6
October	2.88	55.00	52.7
November	2.88	55.55	49.7
December	3.10	54.68	57.8
Average	**3.25**	**54.44**	**49.8**
Maximum	**4.05**	**60.74**	**57.8**
Minimum	**2.88**	**46.02**	**39.0**

METHANE GAS PRODUCTION				
Month	Co-Gen m^3/month	BPU m^3/month	Waste Gas m^3/month	Total m^3/month
January	147,167	277,494	162,945	587,606
February	150,457	247,818	145,932	544,206
March	167,463	283,884	76,832	528,178
April	238,831	194,137	53,539	486,507
May	323,978	75,644	297,120	696,741
June	186,777	95,224	365,357	647,358
July	105,813	111,726	421,073	638,612
August	313,708	177,382	94,763	585,852
September	287,412	174,904	117,548	579,864
October	293,621	133,827	176,673	604,121
November	323,639	168,564	151,648	643,852
December	225,550	187,605	343,763	756,918
Total	**2,764,415**	**2,128,208**	**2,407,192**	**7,299,816**
Average	**230,368**	**177,351**	**200,599**	**608,318**
Maximum	**323,978**	**283,884**	**421,073**	**756,918**
Minimum	**105,813**	**75,644**	**53,539**	**486,507**

BIOSOLIDS DEWATERING

CENTRIFUGE PERFORMANCE			
Month	Total Feed m^3/month	Cake Solids %	Filtrate Solids kg/month
January	41,684.97	25.59	31,115
February	37,700.30	25.23	34,725
March	40,735.66	25.27	32,378
April	36,839.71	28.38	13,279
May	41,206.67	28.23	9,593
June	38,555.57	28.48	7,635
July	36,517.66	29.04	7,524
August	34,384.16	30.96	10,397
September	39,482.24	27.93	67,009
October	39,848.34	25.78	55,329
November	39,315.09	25.02	45,728
December	37,527.52	25.84	16,674
Total	**463,797.90**	**-**	**-**
Average	**38,649.82**	**27.15**	**27,616**
Maximum	**41,684.97**	**30.96**	**67,009**
Minimum	**34,384.16**	**25.02**	**7,524**

BIOSOLIDS TO SYNAGRO		
Month	Wet Tonnes Tonnes/month	Anticipated 2024 Volume Tonnes/month
January	4,762.61	4,500.00
February	4,579.64	4,500.00
March	5,266.04	4,500.00
April	4,903.00	4,500.00
May	4,583.05	4,500.00
June	3,809.88	4,500.00
July	4,432.47	4,500.00
August	3,932.98	4,500.00
September	4,537.76	4,500.00
October	4,449.79	4,500.00
November	4,490.54	4,500.00
December	4,452.73	4,500.00
Total	**54,200.49**	**54,000.00**
Average	**4,516.71**	**4,500.00**
Maximum	**5,266.04**	**4,500.00**
Minimum	**3,809.88**	**4,500.00**

CHEMICAL ADDITION

CHLORINATION			
Month	Chlorine Used Kg	Dosage mg/L	Residual Level mg/L
January	-	-	-
February	-	-	-
March	-	-	-
April	-	-	-
May	10,951	1.90	0.49
June	14,931	1.64	0.63
July	18,335	1.69	0.63
August	19,018	1.76	0.61
September	11,252	1.61	0.60
October	5,989	0.82	0.57
November	-	-	-
December	-	-	-
Total	**80,476**	**-**	**-**
Average	**13,413**	**1.57**	**0.59**
Maximum	**19,018**	**1.90**	**0.63**
Minimum	**5,989**	**0.82**	**0.49**

Chlorine added from May 15 to October 15

DECHLORINATION		
Month	Sodium Bisulphite m^3	Outfall Residual mg/L
January	-	-
February	-	-
March	-	-
April	-	-
May	24	0.027
June	34	0.013
July	44	0.012
August	41	0.012
September	22	0.013
October	14	0.015
November	-	-
December	-	-
Total	**179.4**	**-**
Average	**29.9**	**0.015**
Maximum	**44.2**	**0.027**
Minimum	**14.4**	**0.012**

FERRIC SULPHATE		
Month	Ferric Sulphate m^3/month	Dosage mg/L
January	368.13	7.92
February	325.46	7.77
March	378.63	5.24
April	356.76	6.05
May	370.37	8.29
June	421.05	9.38
July	422.93	7.96
August	416.19	7.85
September	380.85	10.81
October	435.33	11.62
November	357.84	9.46
December	406.64	8.33
Total	**4,640.18**	**-**
Average	**386.68**	**8.39**
Maximum	**435.33**	**11.62**
Minimum	**325.46**	**5.24**

BYPASS REMOVALS

SECONDARY BYPASS REMOVAL EFFICIENCY							
Event #	Bypass Date	Influent		Primary Effluent (North Channel)		Percent Removal	
		TBOD (mg/L)	TSS (mg/L)	TBOD (mg/L)	TSS (mg/L)	TBOD (mg/L)	TSS (mg/L)
3	2023-01-04	332	677	99	165	70.2%	75.6%
	2023-01-05	213	485	47	88.5	77.9%	81.8%
8	2023-02-09	366	1470	132	145	63.9%	90.1%
	2023-02-10	200	846	53	102	73.5%	87.9%
13	2023-03-04	198	714	84	180	57.6%	74.8%
	2023-03-05	272	702	64	73	76.5%	89.6%
	2023-03-06	210	419	45	86.9	78.6%	79.3%
15	2023-03-17	390	1120	74	101	81.0%	91.0%
	2023-03-18	232	905	45	76.5	80.6%	91.5%
21	2023-03-25	208	714	61	98	70.7%	86.3%
	2023-03-26	189	524	40	79	78.8%	84.9%
31	2023-04-01	181	533	49	132	72.9%	75.2%
	2023-04-02	166	225	46	66	72.3%	70.7%
41	2023-04-04	256	530	69	80.0	73.0%	84.9%
45	2023-04-05	216	666	73	123.0	66.2%	81.5%
	2023-04-06	168	408	51	78.0	69.6%	80.9%
55	2023-04-22	219	828	58	99.0	73.5%	88.0%
65	2023-06-12	172	646	72	114	58.1%	82.4%
	2023-06-13	166	260	64	85.0	61.4%	67.3%
75	2023-06-27	222	504	100	152.0	55.0%	69.8%

SECONDARY BYPASS REMOVAL EFFICIENCY							
Event #	Bypass Date	Influent		Primary Effluent (North Channel)		Percent Removal	
		TBOD (mg/L)	TSS (mg/L)	TBOD (mg/L)	TSS (mg/L)	TBOD (mg/L)	TSS (mg/L)
83	2023-07-03	112	326	45	110.0	59.8%	66.3%
	2023-07-04	122	220	52	74.0	57.4%	66.4%
102	2023-07-27	186	340	54	91.0	71.0%	73.2%
111	2023-07-29	164	292	49	78.0	70.1%	73.3%
125	2023-08-15	181	474	71	110	60.8%	76.8%
	2023-08-16	165	339	58	86.9	64.8%	74.4%
147	2023-08-24	161	170	66	81	59.0%	52.4%
	2023-08-25	292	505	42	116	85.6%	77.0%
168	2023-12-27	206	309	96	133	53.4%	57.0%
	2023-12-28	160	225	38	81	76.3%	63.9%
Annual Average						**69%**	**77%**
Objective						**>30%**	**>50%**

APPENDIX B
MAINTENANCE ACTIVITIES

COST SUMMARY					
Department	Direct Purchase Materials	Parts From Stock	Labour	External Services	Total Cost
Combined Sewage Overflow - Tanks / Gates / Pipes	$33,091	$2,032	$59,497	$76,296	$170,915
Dundas Wastewater Pumping Stations	$1,133	$75,418	$24,009	$6,856	$107,416
Dundas Wastewater Treatment Plant	$104,016	$39,072	$56,399	$27,817	$227,305
Hamilton Storm System/Sewer	$0	$0	$368	$0	$368
Hamilton Wastewater Pumping Stations	$147,609	-$16,705	$114,971	$253,741	$499,616
Leachate Pumping Stations	$630	$2,132	$7,070	$0	$9,832
Woodward Wastewater Treatment Plant	$189,085	$410,548	$234,894	$8,857,736	$9,692,263
Waterdown Wastewater Pumping Stations	$6,610	$0	$2,824	$788	$10,222
Operations	$0	$0	$35	$0	$35
*Multiple Locations	$98,164	$64,286	$55,791	$11,717	$229,958
Grand Total	**$580,338**	**$576,782**	**$555,860**	**$9,234,951**	**$10,947,930**

SIGNIFICANT WORKS OVER $10,000

CSOs

Install new solenoid valves and switches at Strachan St. CSO Tank = $27,865

Replacement of Pump 1 at Main/King CSO = $46,214

Technical Services Projects

Replace roof at Greenhill Tank CSO = $27,583

Dundas Wastewater Pumping Stations

Replacement of Sewage Lift Pump 1 at Mill St. Pump Station = $29,742

Replacement of Sewage Lift Pump 1 at 135 Dundas Station = $45,598

Dundas Wastewater Treatment Plant

Replace Residual Bisulphite #1 Analyzer = $17,151

Replace RAS #2 Pump Motor = $20,248

Replace 4 exhaust fan assemblies on Digester roof = $11,659

Rebuild Aeration Blower #3 = $31,296

Repair Travelling Bridge #2 = $11,754

Install and commission new VFD for RSP#1 = $10,655

Rebuild Aeration Blower #3 VFD = $12,568

Technical Services Projects

Dundas Expansion Tank - Fuel System compliance upgrades = $30,206

135 King St Dundas - Fuel System compliance upgrades = $69,170

Taywood / Pleasant Avenue Station – new asphalt driveway = $50,795

Hamilton Wastewater Pumping Stations

Replaced Sewage Lift Pump #1 at Strachan Pump Station = $28,040

Replace Sewage Lift Pump #1 at Highway 6 / English Church Rd Pump Station = $39,800

Repair Wet Well Mixer #2 at Old Dundas Rd / Ancaster Pump Station = $17,252

Replace Sewage Lift Pump #1 at Beach Blvd. Pump Station = $14,183

Woodward Wastewater Treatment Plant

Rebuild #1 Bar Screen = $23,787

Replace pressure ring on Sludge Cake Pump #1 = $12,110

Repair Gravity Belt Thickener #3 Booster Pump = $22,152

Repair Gravity Belt Thickener #2 = $10,239

Repair Waste Activated Sludge Pump #3 Motor = $12,197

Replace Primary Raw Sludge Pump #8 = $33,326

Repair Primary #10 Inlet Gate Actuator = $10,255

Repair Sludge Pump #5 Grinder = $18,239

Repair Thickened Sludge Pump #4 = $22,251

Repair Grit Pump #6 = $10,262

Woodward Wastewater Treatment Plant continued

Install Remote Breaker Panel in Dewatering Building = $15,809
Rebuild Primary Clarifier Tank #5 = $44,892
Repair Primary Sludge Grinder #8 = $20,047
Repair Primary Muffin Monster Grinder #8 = $20,259
Installation of cabling and PAC Panel = $48,873
Replace Digester #3 Sludge Transfer Pump #6 = $45,984
Replace Polymer Transfer Pump #1 = $25,917
Replace Weir Strips in Secondary Settling Tank #4 = $10,361

Technical Services Projects

Expansion Tank Replacement = $8,139
Roof Access Ladder Replacement = $12,816
Hot Water Tank Replacement = $18,565
Roof Top HVAC Unit Replacement = $12,493
Exhaust Venting Deficiency Upgrades = $9,638
Digester #3 Emergency Repairs of digester roof and axial seal = $4,816,463
Aeration Galleries – address Health & Safety deficiencies and replacement of walkways = $2,471,338
Emergency Repairs of Boiler Return Lines = $1,213,404
Emergency concrete repairs in North Effluent Channel = $163,432

APPENDIX C
CALIBRATION AND MAINTENANCE OF MONITORING EQUIPMENT

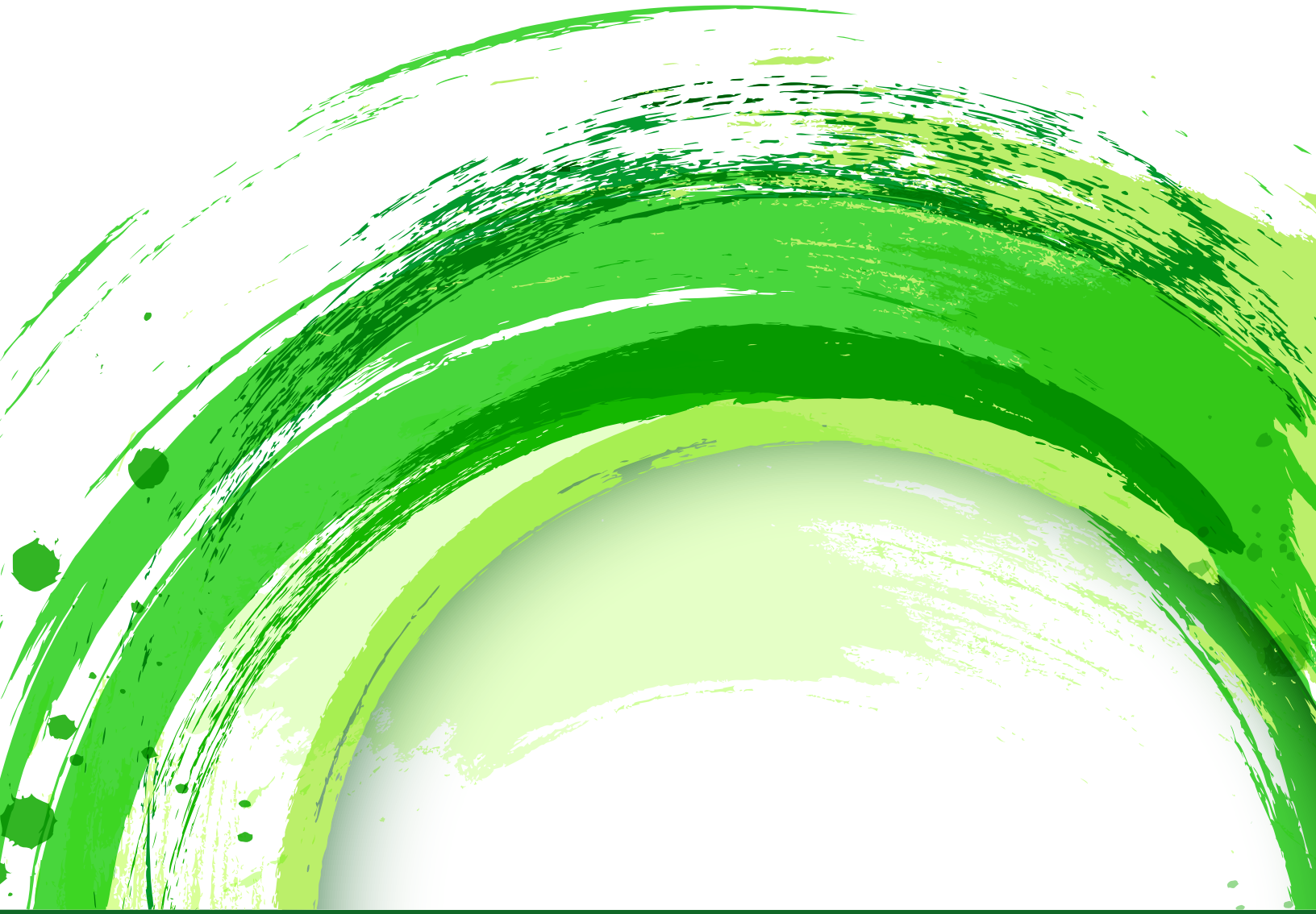
WOODWARD AVENUE WWTP CALIBRATION AND MAINTENANCE OF MONITORING EQUIPMENT				
Work Order	Description	Equipment	Equipment Description	Date Completed
889950	I-WW-2W-MOE-EFFLUENT AUTO SAMPLERS-SERVICE	114514	HSMPS, EFFLUENT AUTO SAMPLER #2	2023-01-06
889947	I-WW-2W-MOE-EFFLUENT AUTO SAMPLERS-SERVICE	114513	HSMPS, EFFLUENT AUTO SAMPLER #1	2023-01-06
889951	I-WW-2W-MOE-EFFLUENT AUTO SAMPLERS-SERVICE	114514	HSMPS, EFFLUENT AUTO SAMPLER #2	2023-01-16
889948	I-WW-2W-MOE-EFFLUENT AUTO SAMPLERS-SERVICE	114513	HSMPS, EFFLUENT AUTO SAMPLER #1	2023-01-16
889952	I-WW-2W-MOE-EFFLUENT AUTO SAMPLERS-SERVICE	114514	HSMPS, EFFLUENT AUTO SAMPLER #2	2023-01-30
889949	I-WW-2W-MOE-EFFLUENT AUTO SAMPLERS-SERVICE	114513	HSMPS, EFFLUENT AUTO SAMPLER #1	2023-01-30
892097	I-WW-2W-MOE-EFFLUENT AUTO SAMPLERS-SERVICE	114514	HSMPS, EFFLUENT AUTO SAMPLER #2	2023-02-06
892095	I-WW-2W-MOE-EFFLUENT AUTO SAMPLERS-SERVICE	114513	HSMPS, EFFLUENT AUTO SAMPLER #1	2023-02-13
892065	I-WW-1Y-MOE-FLOW TRANSMITTER-CALIBRATION	114501	HSMPS, SEWAGE LIFT PUMP #1 DISCHARGE FLOW TRANSMITTER	2023-02-23
892066	I-WW-1Y-MOE-FLOW TRANSMITTER-CALIBRATION	114502	HSMPS, SEWAGE LIFT PUMP #2 DISCHARGE FLOW TRANSMITTER	2023-02-23
892096	I-WW-2W-MOE-EFFLUENT AUTO SAMPLERS-SERVICE	114513	HSMPS, EFFLUENT AUTO SAMPLER #1	2023-02-27
892070	I-WW-1Y-MOE-FLOW TRANSMITTER-CALIBRATION	114506	HSMPS, SEWAGE LIFT PUMP #6 DISCHARGE FLOW TRANSMITTER	2023-02-27
892072	I-WW-1Y-MOE-FLOW TRANSMITTER-CALIBRATION	114508	HSMPS, SEWAGE LIFT PUMP #8 DISCHARGE FLOW TRANSMITTER	2023-02-27
892071	I-WW-1Y-MOE-FLOW TRANSMITTER-CALIBRATION	114507	HSMPS, SEWAGE LIFT PUMP #7 DISCHARGE FLOW TRANSMITTER	2023-02-27

WOODWARD AVENUE WWTP CALIBRATION AND MAINTENANCE OF MONITORING EQUIPMENT				
Work Order	Description	Equipment	Equipment Description	Date Completed
892075	I-WW-1Y-MOE-FLOW TRANSMITTER-CALIBRATION	114511	HSMPS, SEWAGE LIFT PUMP #11 DISCHARGE FLOW TRANSMITTER	2023-02-28
892074	I-WW-1Y-MOE-FLOW TRANSMITTER-CALIBRATION	114510	HSMPS, SEWAGE LIFT PUMP #10 DISCHARGE FLOW TRANSMITTER	2023-02-28
892073	I-WW-1Y-MOE-FLOW TRANSMITTER-CALIBRATION	114509	HSMPS, SEWAGE LIFT PUMP #9 DISCHARGE FLOW TRANSMITTER	2023-02-28
892069	I-WW-1Y-MOE-FLOW TRANSMITTER-CALIBRATION	114505	HSMPS, SEWAGE LIFT PUMP #5 DISCHARGE FLOW TRANSMITTER	2023-03-01
892068	I-WW-1Y-MOE-FLOW TRANSMITTER-CALIBRATION	114504	HSMPS, SEWAGE LIFT PUMP #4 DISCHARGE FLOW TRANSMITTER	2023-03-01
892067	I-WW-1Y-MOE-FLOW TRANSMITTER-CALIBRATION	114503	HSMPS, SEWAGE LIFT PUMP #3 DISCHARGE FLOW TRANSMITTER	2023-03-01
892076	I-WW-1Y-MOE-FLOW TRANSMITTER-CALIBRATION	114512	HSMPS, SEWAGE LIFT PUMP #12 DISCHARGE FLOW TRANSMITTER	2023-03-01
892098	I-WW-2W-MOE-EFFLUENT AUTO SAMPLERS-SERVICE	114514	HSMPS, EFFLUENT AUTO SAMPLER #2	2023-03-13
893128	I-WW-2W-MOE-EFFLUENT AUTO SAMPLERS-SERVICE	114514	HSMPS, EFFLUENT AUTO SAMPLER #2	2023-03-13
893126	I-WW-2W-MOE-EFFLUENT AUTO SAMPLERS-SERVICE	114513	HSMPS, EFFLUENT AUTO SAMPLER #1	2023-03-13
893127	I-WW-2W-MOE-EFFLUENT AUTO SAMPLERS-SERVICE	114513	HSMPS, EFFLUENT AUTO SAMPLER #1	2023-03-27
893129	I-WW-2W-MOE-EFFLUENT AUTO SAMPLERS-SERVICE	114514	HSMPS, EFFLUENT AUTO SAMPLER #2	2023-03-27
894102	I-WW-2W-MOE-EFFLUENT AUTO SAMPLERS-SERVICE	114514	HSMPS, EFFLUENT AUTO SAMPLER #2	2023-03-28
894100	I-WW-2W-MOE-EFFLUENT AUTO SAMPLERS-SERVICE	114513	HSMPS, EFFLUENT AUTO SAMPLER #1	2023-03-28
894103	I-WW-2W-MOE-EFFLUENT AUTO SAMPLERS-SERVICE	114514	HSMPS, EFFLUENT AUTO SAMPLER #2	2023-04-24

WOODWARD AVENUE WWTP CALIBRATION AND MAINTENANCE OF MONITORING EQUIPMENT				
Work Order	Description	Equipment	Equipment Description	Date Completed
894101	I-WW-2W-MOE-EFFLUENT AUTO SAMPLERS-SERVICE	114513	HSMPS, EFFLUENT AUTO SAMPLER #1	2023-04-24
905224	I-WW-2W-MOE-EFFLUENT AUTO SAMPLERS-SERVICE	114513	HSMPS, EFFLUENT AUTO SAMPLER #1	2023-05-08
905226	I-WW-2W-MOE-EFFLUENT AUTO SAMPLERS-SERVICE	114514	HSMPS, EFFLUENT AUTO SAMPLER #2	2023-05-08
905225	I-WW-2W-MOE-EFFLUENT AUTO SAMPLERS-SERVICE	114513	HSMPS, EFFLUENT AUTO SAMPLER #1	2023-06-01
905227	I-WW-2W-MOE-EFFLUENT AUTO SAMPLERS-SERVICE	114514	HSMPS, EFFLUENT AUTO SAMPLER #2	2023-06-01
916309	I-WW-2W-MOE-EFFLUENT AUTO SAMPLERS-SERVICE	114514	HSMPS, EFFLUENT AUTO SAMPLER #2	2023-06-05
916307	I-WW-2W-MOE-EFFLUENT AUTO SAMPLERS-SERVICE	114513	HSMPS, EFFLUENT AUTO SAMPLER #1	2023-06-05
916310	I-WW-2W-MOE-EFFLUENT AUTO SAMPLERS-SERVICE	114514	HSMPS, EFFLUENT AUTO SAMPLER #2	2023-06-19
916308	I-WW-2W-MOE-EFFLUENT AUTO SAMPLERS-SERVICE	114513	HSMPS, EFFLUENT AUTO SAMPLER #1	2023-06-19
927914	I-WW-2W-MOE-EFFLUENT AUTO SAMPLERS-SERVICE	114514	HSMPS, EFFLUENT AUTO SAMPLER #2	2023-07-10
927911	I-WW-2W-MOE-EFFLUENT AUTO SAMPLERS-SERVICE	114513	HSMPS, EFFLUENT AUTO SAMPLER #1	2023-07-10
927915	I-WW-2W-MOE-EFFLUENT AUTO SAMPLERS-SERVICE	114514	HSMPS, EFFLUENT AUTO SAMPLER #2	2023-07-17
927912	I-WW-2W-MOE-EFFLUENT AUTO SAMPLERS-SERVICE	114513	HSMPS, EFFLUENT AUTO SAMPLER #1	2023-07-17
927916	I-WW-2W-MOE-EFFLUENT AUTO SAMPLERS-SERVICE	114514	HSMPS, EFFLUENT AUTO SAMPLER #2	2023-07-31
927913	I-WW-2W-MOE-EFFLUENT AUTO SAMPLERS-SERVICE	114513	HSMPS, EFFLUENT AUTO SAMPLER #1	2023-07-31

WOODWARD AVENUE WWTP CALIBRATION AND MAINTENANCE OF MONITORING EQUIPMENT				
Work Order	Description	Equipment	Equipment Description	Date Completed
928808	I-WW-2W-MOE-EFFLUENT AUTO SAMPLERS-SERVICE	114514	HSMPS, EFFLUENT AUTO SAMPLER #2	2023-08-14
928806	I-WW-2W-MOE-EFFLUENT AUTO SAMPLERS-SERVICE	114513	HSMPS, EFFLUENT AUTO SAMPLER #1	2023-08-14
928809	I-WW-2W-MOE-EFFLUENT AUTO SAMPLERS-SERVICE	114514	HSMPS, EFFLUENT AUTO SAMPLER #2	2023-08-28
928807	I-WW-2W-MOE-EFFLUENT AUTO SAMPLERS-SERVICE	114513	HSMPS, EFFLUENT AUTO SAMPLER #1	2023-08-28
942928	I-WW-2W-MOE-EFFLUENT AUTO SAMPLERS-SERVICE	114514	HSMPS, EFFLUENT AUTO SAMPLER #2	2023-09-11
942926	I-WW-2W-MOE-EFFLUENT AUTO SAMPLERS-SERVICE	114513	HSMPS, EFFLUENT AUTO SAMPLER #1	2023-09-11
942929	I-WW-2W-MOE-EFFLUENT AUTO SAMPLERS-SERVICE	114514	HSMPS, EFFLUENT AUTO SAMPLER #2	2023-09-25
942927	I-WW-2W-MOE-EFFLUENT AUTO SAMPLERS-SERVICE	114513	HSMPS, EFFLUENT AUTO SAMPLER #1	2023-09-25
949472	I-WW-2W-MOE-EFFLUENT AUTO SAMPLERS-SERVICE	114514	HSMPS, EFFLUENT AUTO SAMPLER #2	2023-10-12
949470	I-WW-2W-MOE-EFFLUENT AUTO SAMPLERS-SERVICE	114513	HSMPS, EFFLUENT AUTO SAMPLER #1	2023-10-12
949473	I-WW-2W-MOE-EFFLUENT AUTO SAMPLERS-SERVICE	114514	HSMPS, EFFLUENT AUTO SAMPLER #2	2023-10-23
949471	I-WW-2W-MOE-EFFLUENT AUTO SAMPLERS-SERVICE	114513	HSMPS, EFFLUENT AUTO SAMPLER #1	2023-10-23
960715	I-WW-2W-MOE-EFFLUENT AUTO SAMPLERS-SERVICE	114513	HSMPS, EFFLUENT AUTO SAMPLER #1	2023-11-06
960717	I-WW-2W-MOE-EFFLUENT AUTO SAMPLERS-SERVICE	114514	HSMPS, EFFLUENT AUTO SAMPLER #2	2023-11-06
960716	I-WW-2W-MOE-EFFLUENT AUTO SAMPLERS-SERVICE	114513	HSMPS, EFFLUENT AUTO SAMPLER #1	2023-11-20
960718	I-WW-2W-MOE-EFFLUENT AUTO SAMPLERS-SERVICE	114514	HSMPS, EFFLUENT AUTO SAMPLER #2	2023-11-20
963101	I-WW-2W-MOE-EFFLUENT AUTO SAMPLERS-SERVICE	114514	HSMPS, EFFLUENT AUTO SAMPLER #2	2023-12-04
963099	I-WW-2W-MOE-EFFLUENT AUTO SAMPLERS-SERVICE	114513	HSMPS, EFFLUENT AUTO SAMPLER #1	2023-12-04

DUNDAS WWTP CALIBRATION AND MAINTENANCE OF MONITORING EQUIPMENT				
Work Order	Description	Equipment	Equipment Description	Date Completed
892959	I-WW-1Y-MOE-FLOW METER-CALIBRATION	002661	DSCBB, PLANT B EFFLUENT FLOW METER	2023-03-27
894112	I-Y1 DSSTP SEASONAL DISINFECTION SYSTEM START-UP	DSCHL	Dundas Chlorine Building	2023-04-29
942726	I-WW-1Y-MOE-FLOW METER-CALIBRATION	002660	DSCBA, PLANT A EFFLUENT FLOW METER	2023-09-05
949434	I-Y1 SEASONAL BISULFITE ANALYZERS SYSTEM SHUT-DOWN	012169	DSFIL, BI-SULFITE ANALYZER #2	2023-11-04
949433	I-Y1 SEASONAL BISULFITE ANALYZERS SYSTEM SHUT-DOWN	012168	DSFIL, BI-SULFITE ANALYZER #1	2023-11-04



WASTEWATER COLLECTION FACILITIES CALIBRATION AND MAINTENANCE OF MONITORING EQUIPMENT				
Work Order	Description	Equipment	Equipment Description	Date Completed
893113	I-6M-POD-VERIFICATION HCG14 LIT03 INTERCEPTOR LEVEL TRANSMITTER	107330	HCG14 LIT03 INTERCEPTOR LEVEL TRANSMITTER	2023-03-21
893112	I-6M-POD-VERIFICATION HCG14 LIT02 INFLOW 2 LEVEL TRANSMITTER	107329	HCG14 LIT02 INFLOW 2 LEVEL TRANSMITTER	2023-03-21
893111	I-6M-POD-VERIFICATION HCG14 LIT01 INFLOW 1 LEVEL TRANSMITTER	107328	HCG14 LIT01 INFLOW 1 LEVEL TRANSMITTER	2023-03-21
893114	I-6M-POD-VERIFICATION HCG14 LAKE LEVEL TRANSMITTER	107331	HCG14 LIT04 LAKE LEVEL TRANSMITTER	2023-03-21
893131	I-6M-POD-VERIFICATION HCG14 WSIN LEVEL TRANSMITTER	116112	HCG14, WSIN LEVEL TRANSMITTER	2023-03-24
893130	I-6M-POD-VERIFICATION HCG14 UPSTREAM LEVEL TRANSMITTER	116110	HCG14, LEVEL TRANSMITTER, BURLINGTON/WELLINGTON UPSTREAM LEVEL	2023-03-24
905203	I-WW-1Y-MOE-FLOW METER-CALIBRATION	210989	HCS05, CSO OVERFLOW TRANSMITTER	2023-06-01
852816	I-WW-1Y-POD-LEVEL TRANSMITTER-CALIBRATION	001583	HC018, WET WELL LEVEL TRANSMITTER	2023-07-27
928787	I-Y1-MOE- ANNUAL CALIBRATION HCS01 CHAMBER OUTLET LEVEL TRANSMITTER	106165	HCS01, OUTLET CHAMBER LEVEL TRANSMITTER	2023-08-28
942725	I-WW-1Y-MOE-FLOW METER-CALIBRATION	001664	HCS04, OVERFLOW CHANNEL LEVEL	2023-09-08
942910	I-6M-POD-VERIFICATION HCG14 LIT01 INFLOW 1 LEVEL TRANSMITTER	107328	HCG14 LIT01 INFLOW 1 LEVEL TRANSMITTER	2023-09-13
865732	I-WW-1Y-POD-LEVEL TRANSMITTER-CALIBRATION	107293	HC019, WET WELL #1 LEVEL TRANSMITTER	2023-09-15
865731	I-WW-1Y-POD-LEVEL TRANSMITTER-CALIBRATION	107294	HC019, WET WELL #2 LEVEL TRANSMITTER	2023-09-15
942728	I-WW-1Y-MOE-FLOW METER-CALIBRATION	004686	HCS01, OVERFLOW TO CREEK TRANSMITTER	2023-09-15

COLLECTION STATIONS CALIBRATION AND MAINTENANCE OF MONITORING EQUIPMENT continued				
Work Order	Description	Equipment	Equipment Description	Date Completed
942727	I-WW-1Y-MOE-FLOW METER-CALIBRATION	002839	HCS08, CHANNEL OVERFLOW FLOW TRANSMITTER	2023-09-15
942772	I-Y1-POD- HCS06 TANK #2 LEVEL TRANSMITTER CALIBRATION	106156	HCS06, CELL #2 LEVEL TRANSMITTER	2023-10-12
942771	I-Y1-POD- HCS06 TANK #1 LEVEL TRANSMITTER CALIBRATION	106155	HCS06, CELL #1 LEVEL TRANSMITTER	2023-10-12
942795	I-Y1-POD- HCS01 CELL #2 LEVEL TRANSMITTER CALIBRATION	107067	HCS01, CELL 2 LEVEL TRANSMITTER	2023-10-12
942773	I-Y1-POD- HCS01 CELL #1 LEVEL TRANSMITTER CALIBRATION	106174	HCS01, CELL #1 LEVEL TRANSMITTER	2023-10-12
949281	I-WW-1Y-MOE-FLOW METER-CALIBRATION	107303	HCS03, OVERFLOW CHANNEL FLOW TRANSMITTER	2023-10-17
949249	I-WW-1Y-MOE-FLOW METER-CALIBRATION	013158	HCS09, OVER FLOW LEVEL TRANSMITTER	2023-10-17
942755	I-Y1-POD- ANNUAL CALIBRATION TANK CELL LEVEL TRANSMITTER	013157	HCS09, TANK #2 LEVEL TRANSMITTER	2023-10-27
942767	I-Y1-POD- ANNUAL CALIBRATION TANK CELL LEVEL TRANSMITTER	013891	HCS08, CSO TANK LEVEL TRANSMITTER	2023-11-02
942899	I-Y1-POD- ANNUAL CALIBRATION WET WELL LEVEL TRANSMITTER	013156	HCS09, TANK #1 LEVEL TRANSMITTER	2023-11-02
942932	I-6M-POD-VERIFICATION HCG14 WSIN LEVEL TRANSMITTER	116112	HCG14, WSIN LEVEL TRANSMITTER	2023-11-03
942913	I-6M-POD-VERIFICATION HCG14 LAKE LEVEL TRANSMITTER	107331	HCG14 LIT04 LAKE LEVEL TRANSMITTER	2023-11-03
942912	I-6M-POD-VERIFICATION HCG14 LIT03 INTERCEPTOR LEVEL TRANSMITTER	107330	HCG14 LIT03 INTERCEPTOR LEVEL TRANSMITTER	2023-11-03
942911	I-6M-POD-VERIFICATION HCG14 LIT02 INFLOW 2 LEVEL TRANSMITTER	107329	HCG14 LIT02 INFLOW 2 LEVEL TRANSMITTER	2023-11-03

COLLECTION STATIONS CALIBRATION AND MAINTENANCE OF MONITORING EQUIPMENT continued				
Work Order	Description	Equipment	Equipment Description	Date Completed
942931	I-6M-POD-VERIFICATION HCG14 UPSTREAM LEVEL TRANSMITTER	116110	HCG14, LEVEL TRANSMITTER, BURLINGTON/WELLINGTON UPSTREAM LEVEL	2023-11-06
866036	I-WW-1Y-POD-LEVEL TRANSMITTER-CALIBRATION	118171	HC058, WET WELL LEVEL TRANSMITTER	2023-12-07
942898	I-Y1-POD- ANNUAL CALIBRATION WET WELL LEVEL TRANSMITTER	010722	HCS05, CSO TANK LEVEL TRANSMITTER	2023-12-08
942933	I-Y1-POD- ANNUAL CALIBRATION WET WELL LEVEL TRANSMITTER	118107	HCS02, CELL #1 LEVEL TRANSMITTER (HYDROSTATIC)	Cancelled*
942814	I-Y1-POD- ANNUAL CALIBRATION TANK CELL LEVEL TRANSMITTER	108560	HCS02, CELL #2 LEVEL TRANSMITTER (HYDROSTATIC)	Cancelled*
942924	I-Y1-POD- ANNUAL VERIFICATION OVERFLOW LEVEL TRANSMITTER	108561	HCS02, OVERFLOW OUTLET CHANNEL LEVEL TRANSMITTER (HYDROSTATIC)	Cancelled*
942816	I-Y1-POD- ANNUAL CALIBRATION TANK CELL LEVEL TRANSMITTER	108565	HCS04, TANK CELL #2 LEVEL TRANSMITTER (HYDROSTATIC)	Cancelled*
942815	I-Y1-POD- ANNUAL CALIBRATION TANK CELL LEVEL TRANSMITTER	108564	HCS04, TANK CELL #1 LEVEL TRANSMITTER (HYDROSTATIC)	Cancelled*
942930	I-Y1-POD- ANNUAL VERIFICATION CHAMBER LEVEL TRANSMITTER	115222	HCG03, UPSTREAM LEVEL TRANSMITTER	Cancelled*
893015	I-Y1 ANNUAL CALIBRATION HCG08 WSIS LEVEL TRANSMITTER	108231	HCG08, WSIS LEVEL TRANSMITTER	Cancelled*

* Could not complete due to staffing resources

APPENDIX D
WOODWARD AVENUE WWTP- SUMMARY OF COMPLAINTS

WOODWARD AVENUE WWTP - SUMMARY OF COMPLAINTS				
Date	Time Call Received	Details of Complaint	Odour Control System In Service	Investigator Observations and Actions Taken
2023-02-19	18:45	Odour complaint	No	Operator indicated that odours could be detected at various times around the biosolids process and even inside other buildings in the plant. Steam was observed emanating from a sewer manhole beside the biosolids building which receives warm sump process water from the facility. Manhole covers were ordered for this location which may help to mitigate the odours and a site-wide odour assessment was completed to assess odour sources from the plant.
2023-05-02	12:42	Odour complaint	No	The resident indicated that the odours were observed two days prior to the complaint being made. At the time of investigation operators could not detect any notable odours.
2023-06-01	22:13	Odour complaint	Yes	Operators were unable to detect any significant odours in the plant. The odour control system was confirmed to be operational and perfume concentration was increased.
2023-06-03	12:12	Odour complaint	Yes	Operators were unable to detect any significant odours in the plant. The odour control system was confirmed to be operational and perfume concentration was increased.
2023-06-04	1:01	Noise complaint - high pitched whining sound	n/a	A resident reported hearing a loud, high pitched, whining noise from the plant over multiple days. It was determined that the source of this noise was an aeration blower which was subsequently shut down for the time being. The resident confirmed that the source could no longer be heard.
2023-09-21	10:51	Odour complaint	Yes	Operators were able to detect odours around the solids processing areas of the plant, although a precise source of the odour could not be definitively identified. No process issues were observed at this time. Portable perfume misters were set up in the area to mitigate the odours.
2023-09-22	11:58	Odour complaint	Yes	Operators were able to detect odours around the Biosolids Management Facility wherein an exhaust vent in the loading bay was found open during loading operations. This vent was then closed and staff indicated that it would no longer be opened while loading is occurring.

WOODWARD AVENUE WWTP - SUMMARY OF COMPLAINTS continued				
Date	Time Call Received	Details of Complaint	Odour Control System In Service	Investigator Observations and Actions Taken
2023-09-24	15:05	Odour complaint	Yes	Operators were unable to detect any significant odours in the plant. It was discovered that one portable perfume mister was not working properly and this was subsequently replaced.
2023-09-30	13:48	Odour complaint	Yes	Operators were unable to identify any obvious sources of odour. A second portable perfume mister was set up near the main pumping station and the odour control system along the south fenceline was switched into continuous operation.
2023-10-04	18:50	Odour complaint	Yes	Operators determined that the source of the odour was a primary clarifier (#12) that was out of service and turning septic. An operator opened the drain gate to empty the tank, and the odour control system along the south fenceline was switched into continuous operation for the night.
2023-10-12	21:45	Odour complaint	Yes	Operators determined that the source of the odour was a primary clarifier (#4) that was drained that day and had not yet been cleaned out. Flushing of the tank commenced shortly afterward.

APPENDIX E
DUNDAS WWTP OPERATING DATA SUMMARY

PLANT FLOWS

PLANT A FLOW					
Month	Monthly Volume m^3/month	Percent of Flow %	Daily Average m^3/day	Daily Maximum m^3/day	Daily Minimum m^3/day
January	159,224	43.8%	5,136	6,112	4,600
February	135,811	47.4%	4,850	5,786	3,931
March	151,803	38.8%	4,897	6,008	3,625
April	143,162	39.4%	4,772	5,860	3,859
May	142,676	42.7%	4,602	5,090	4,034
June	143,715	41.3%	4,790	6,204	3,740
July	149,356	36.0%	4,818	5,693	3,221
August	163,851	38.4%	5,286	6,129	3,844
September	133,631	35.6%	4,454	5,947	3,585
October	137,086	42.5%	4,422	7,237	3,544
November	131,364	40.0%	4,379	5,105	3,846
December	135,053	38.0%	4,357	5,078	3,848
Total	**1,726,733**	**-**	**-**	**-**	**-**
Average	**143,894**	**40.3%**	**4,730**	**-**	**-**
Maximum	**163,851**	**47.4%**	**5,286**	**7,237**	**-**
Minimum	**131,364**	**35.6%**	**4,357**	**-**	**3,221**

PLANT B FLOW					
Month	Monthly Volume m^3/month	Percent of Flow %	Daily Average m^3/day	Daily Maximum m^3/day	Daily Minimum m^3/day
January	204,388	56.2%	6,593	9,435	5,231
February	150,553	52.6%	5,377	7,806	4,123
March	236,025	60.4%	7,614	10,351	4,029
April	219,857	60.6%	7,329	10,499	4,764
May	191,320	57.3%	6,172	7,665	4,380
June	204,087	58.7%	6,803	8,679	5,301
July	265,060	64.0%	8,550	10,955	5,496
August	262,371	61.6%	8,464	10,310	6,786
September	241,792	64.4%	8,060	9,207	5,588
October	189,753	58.8%	6,121	8,431	3,929
November	197,152	60.0%	6,572	8,413	5,478
December	220,321	62.0%	7,107	9,515	5,969
Total	**2,582,679**	**-**	**-**	**-**	**-**
Average	**215,223**	**59.7%**	**7,063**	**-**	**-**
Maximum	**265,060**	**64.4%**	**8,550**	**10,955**	**-**
Minimum	**150,553**	**52.6%**	**5,377**	**-**	**3,929**

PLANT FLOWS continued

COMBINED PLANT FLOWS				
Month	Monthly Volume m^3/month	Daily Average m^3/day	Daily Maximum m^3/day	Daily Minimum m^3/day
January	363,612	11,729	15,547	9,831
February	286,364	10,227	13,593	8,581
March	390,948	12,511	15,465	8,410
April	363,018	12,101	16,359	8,623
May	333,997	10,774	12,724	8,414
June	347,802	11,593	14,883	9,091
July	414,416	13,368	15,707	9,435
August	426,223	13,749	15,626	11,762
September	375,423	12,514	14,709	9,407
October	322,544	10,543	12,273	9,348
November	328,515	10,951	13,517	9,324
December	355,375	11,464	14,592	9,896
Total	**4,308,237**	**-**	**-**	**-**
Average	**359,020**	**11,794**	**14,583**	**9,343**
Maximum	**426,223**	**13,749**	**16,359**	**11,762**
Minimum	**286,364**	**10,227**	**12,273**	**8,410**

Flow Capacity Utilization 64.8%

DUNDAS DIVERSION TANK	
Month	Monthly Volume m^3/month
January	5,062
February	62,563
March	179,789
April	177,963
May	54,615
June	10,936
July	80,636
August	43,669
September	2,074
October	763
November	1,676
December	16,062
Total	**635,808**
Average	**52,984**
Maximum	**179,789**
Minimum	**763**

REDLAND BROW LANDFILL LEACHATE (included in Plant flow)		
Month	Monthly Volume m^3/month	Proportion of Plant Flow %
January	2,990.10	0.82%
February	3,730.00	1.30%
March	6,315.40	1.62%
April	10,964.00	3.02%
May	10,077.00	3.02%
June	4,788.00	1.38%
July	5,009.00	1.21%
August	8,491.00	1.99%
September	5,456.00	1.45%
October	3,967.00	1.23%
November	3,826.00	1.16%
December	2,767.00	0.78%
Total	**68,381**	**-**
Average	**5,698**	**1.58%**
Maximum	**10,964**	**3.02%**
Minimum	**2,767**	**0.78%**

RAW INFLUENT

RAW INFLUENT CONCENTRATIONS									
Month	pH	TSS mg/L	cBOD mg/L	TP mg/L	SP mg/L	TKN mg/L	NH_3 mg/L	COD mg/L	Temperature ^{o}C
January	7.59	166.00	98.75	4.08	2.03	30.88	21.58	162.75	12.66
February	7.55	138.00	101.00	3.46	1.66	25.45	20.05	413.00	11.53
March	7.57	105.24	72.60	2.33	1.01	17.38	12.41	194.00	10.65
April	7.72	194.50	93.00	3.33	1.65	25.28	16.01	142.25	11.57
May	7.78	177.40	117.60	4.32	2.34	33.12	20.92	185.75	13.47
June	7.50	185.50	122.75	3.85	1.65	26.88	20.68	195.00	16.28
July	7.49	172.75	87.75	3.26	1.38	19.48	14.50	151.75	17.75
August	7.55	164.70	75.00	2.77	1.19	17.64	13.37	177.75	18.64
September	7.27	621.25	211.25	12.73	5.41	51.70	24.08	209.60	18.99
October	7.46	144.75	112.75	3.91	1.97	27.65	22.05	111.75	18.56
November	7.51	140.80	108.00	3.71	1.78	26.30	20.86	129.75	16.56
December	7.69	158.25	126.25	4.57	2.46	36.03	26.58	159.00	14.55
Average	**7.56**	**197.43**	**110.56**	**4.36**	**2.05**	**28.15**	**19.42**	**186.03**	**15.10**
Maximum	**7.78**	**621.25**	**211.25**	**12.73**	**5.41**	**51.70**	**26.58**	**413.00**	**18.99**
Minimum	**7.27**	**105.24**	**72.60**	**2.33**	**1.01**	**17.38**	**12.41**	**111.75**	**10.65**

RAW INFLUENT LOADINGS						
Month	TSS kg/day	cBOD kg/day	TP kg/day	SP kg/day	TKN kg/day	NH_3 kg/day
January	1,947	1,158	48	24	362	253
February	1,411	1,033	35	17	260	205
March	1,317	908	29	13	217	155
April	2,354	1,125	40	20	306	194
May	1,911	1,267	47	25	357	225
June	2,151	1,423	45	19	312	240
July	2,309	1,173	44	18	260	194
August	2,264	1,031	38	16	243	184
September	7,774	2,644	159	68	647	301
October	1,526	1,189	41	21	292	232
November	1,542	1,183	41	20	288	228
December	1,814	1,447	52	28	413	305
Average	**2,360**	**1,298**	**52**	**24**	**330**	**226**
Maximum	**7,774**	**2,644**	**159**	**68**	**647**	**305**
Minimum	**1,317**	**908**	**29**	**13**	**217**	**155**

PRIMARY EFFLUENT

PRIMARY EFFLUENT CONCENTRATIONS								
	PLANT A				PLANT B			
Month	TSS mg/L	cBOD mg/L	TKN mg/L	NH_3 mg/L	TSS mg/L	cBOD mg/L	TKN mg/L	NH_3 mg/L
January	62.33	47.50	24.63	16.85	20.70	33.25	21.70	16.38
February	252.75	104.75	33.20	16.45	26.63	33.50	17.10	13.58
March	128.16	53.20	20.98	10.06	18.46	22.00	12.94	8.70
April	81.05	40.00	18.70	10.55	29.35	31.50	15.03	10.13
May	60.98	37.80	20.04	13.75	27.78	28.80	16.76	13.21
June	46.00	31.50	20.03	15.40	20.75	28.00	19.40	16.30
July	22.23	18.00	13.50	11.81	27.10	17.25	12.78	11.12
August	37.98	21.20	12.46	10.73	22.00	15.40	11.96	10.57
September	35.43	26.25	16.63	15.80	28.88	26.75	16.78	16.15
October	64.00	45.50	21.10	18.58	33.48	36.00	19.50	18.25
November	65.28	46.80	23.40	19.32	24.90	31.20	22.04	18.04
December	70.30	44.00	22.98	17.63	51.20	40.25	23.18	19.00
Average	**77.21**	**43.04**	**20.64**	**14.74**	**27.60**	**28.66**	**17.43**	**14.29**
Maximum	**252.8**	**104.8**	**33.20**	**19.3**	**51.20**	**40.25**	**23.18**	**19.00**
Minimum	**22.2**	**18.0**	**12.46**	**10.1**	**18.46**	**15.40**	**11.96**	**8.70**

PRIMARY EFFLUENT LOADINGS								
	PLANT A				PLANT B			
Month	TSS kg/day	cBOD kg/day	TKN kg/day	NH_3 kg/day	TSS kg/day	cBOD kg/day	TKN kg/day	NH_3 kg/day
January	320	244	126	87	136	219	143	108
February	1,226	508	161	80	143	180	92	73
March	628	261	103	49	141	168	99	66
April	387	191	89	50	215	231	110	74
May	281	174	92	63	171	178	103	82
June	220	151	96	74	141	190	132	111
July	107	87	65	57	232	147	109	95
August	201	112	66	57	186	130	101	89
September	158	117	74	70	233	216	135	130
October	283	201	93	82	205	220	119	112
November	286	205	102	85	164	205	145	119
December	306	192	100	77	364	286	165	135
Average	**367**	**203**	**97**	**69**	**194**	**198**	**121**	**99**
Maximum	**1,226**	**508**	**161**	**87**	**364**	**286**	**165**	**135**
Minimum	**107**	**87**	**65**	**49**	**136**	**130**	**92**	**66**

SLUDGE

RAW SLUDGE SOLIDS CONTENT							
Month	PLANT A			PLANT B			Total Volume m^3/month
	Total Volume m^3/month	Total Solids %	Volatile Solids %	Total Volume m^3/month	Total Solids %	Volatile Solids %	
January	1,120	2.08	74.05	2,510	1.58	73.95	3,630
February	735	2.13	72.18	2,449	1.55	72.25	3,185
March	1,165	2.18	69.74	2,722	1.22	66.64	3,887
April	1,158	2.53	67.50	2,722	1.00	61.25	3,879
May	1,382	2.48	70.04	2,812	1.00	58.70	4,195
June	1,436	2.78	71.50	2,722	1.00	66.63	4,158
July	1,219	2.83	71.48	2,631	1.03	59.68	3,850
August	1,227	2.42	67.26	2,631	0.90	61.38	3,858
September	947	2.68	69.78	2,722	1.03	68.80	3,669
October	1,079	2.58	72.95	2,812	1.68	72.48	3,891
November	1,049	2.90	74.22	2,722	1.46	71.84	3,770
December	1,232	2.40	75.30	2,812	1.55	73.03	4,045
Total	**13,750**	**-**	**-**	32,266	-	-	46,016
Average	**1,146**	**2.50**	**71.33**	2,689	1.25	67.22	3,835
Maximum	**1,436**	**2.90**	**75.30**	2,812	1.68	73.95	4,195
Minimum	**735**	**2.08**	**67.26**	2,449	0.90	58.70	3,185

SLUDGE HAULED TO WOODWARD		
Month	Volume Tonnes/month	Anticipated 2024 Volume Tonnes/month
January	3,448	3,417
February	3,097	3,417
March	3,483	3,417
April	3,026	3,417
May	3,902	3,417
June	3,491	3,417
July	3,217	3,417
August	3,507	3,417
September	3,117	3,417
October	3,368	3,417
November	3,109	3,417
December	3,312	3,417
Total	**40,078**	**41,004**
Average	**3,340**	**3,417**
Maximum	**3,902**	**3,417**
Minimum	**3,026**	**3,417**

AERATION

AERATION										
Month	PLANT A					PLANT B				
	MLSS mg/L	MLVSS mg/L	SVI mL/g	F/M Ratio	SRT Days	MLSS mg/L	MLVSS mg/L	SVI mL/g	F/M Ratio	SRT Days
January	1,510.00	1,145.00	119.25	0.12	6.17	1,290.00	1,892.50	406.94	0.05	18.26
February	1,840.00	1,355.00	106.32	0.22	3.58	1,200.00	2,605.00	382.20	0.05	21.20
March	1,390.00	988.40	99.99	0.14	5.59	1,195.80	2,578.00	583.81	0.04	36.12
April	1,387.50	956.00	83.28	0.11	7.62	1,282.50	2,310.00	534.74	0.06	27.71
May	1,544.00	1,098.40	87.00	0.09	10.24	1,653.20	1,258.60	579.02	0.05	30.58
June	1,452.50	1,051.00	87.84	0.09	8.74	1,902.50	1,460.00	443.49	0.03	40.66
July	1,257.50	870.75	80.69	0.06	26.57	1,975.00	1,475.00	317.88	0.03	39.16
August	1,221.20	795.40	83.63	0.09	18.67	1,632.00	1,173.00	283.67	0.04	44.19
September	1,532.50	999.75	89.58	0.07	17.48	1,745.00	1,252.50	215.11	0.05	23.06
October	1,817.50	1,260.00	82.03	0.12	11.25	1,875.00	1,395.00	234.69	0.05	43.05
November	1,616.00	1,160.00	90.29	0.10	9.00	2,130.00	1,574.00	273.38	0.04	36.61
December	1,687.50	1,262.50	102.66	0.09	8.42	2,240.00	1,697.50	295.51	0.05	31.55
Average	**1,521.35**	**1,078.52**	**92.71**	**0.11**	**11.11**	**1,676.75**	**1,722.59**	**379.20**	**0.04**	**32.68**
Maximum	**1,840.00**	**1,355.00**	**119.25**	**0.22**	**26.57**	**2,240.00**	**2,605.00**	**583.81**	**0.06**	**44.19**
Minimum	**1,221.20**	**795.40**	**80.69**	**0.06**	**3.58**	**1,195.80**	**1,173.00**	**215.11**	**0.03**	**18.26**

EFFLUENT

FINAL EFFLUENT CONCENTRATIONS												
Month	pH	Alkalinity mg/L	TSS mg/L	cBOD mg/L	TP mg/L	SP mg/L	TKN mg/L	NH_3 mg/L	NO_3 mg/L	NO_2 mg/L	E. Coli MPN/100ml	Chlorine Residual mg/L
January	7.36	77.25	0.93	1.50	0.086	0.065	0.58	0.06	19.15	0.11	-	-
February	7.46	85.75	0.98	1.00	0.073	0.055	0.55	0.02	17.18	0.10	-	-
March	7.64	125.40	0.70	1.00	0.043	0.030	0.50	0.06	13.36	0.10	-	-
April	7.69	132.25	0.65	1.00	0.036	0.026	0.60	0.03	13.80	0.10	-	-
May	7.63	100.00	0.80	1.20	0.066	0.043	0.58	0.07	16.42	0.10	1	0.01
June	7.61	77.75	0.73	1.25	0.090	0.067	0.95	0.09	16.38	0.14	2	0.01
July	7.70	106.00	0.93	1.25	0.092	0.070	0.53	0.05	12.38	0.12	1	0.01
August	7.71	145.40	0.98	1.60	0.093	0.073	0.46	0.10	12.34	0.10	2	0.01
September	7.60	89.75	1.08	1.25	0.116	0.096	0.73	0.05	14.15	0.13	2	0.01
October	7.60	70.25	0.98	1.25	0.133	0.114	0.50	0.05	16.60	0.12	1	0.01
November	7.51	82.00	0.64	1.20	0.137	0.118	0.44	0.12	16.38	0.10	-	-
December	7.52	101.25	0.83	1.00	0.110	0.100	0.43	0.03	16.85	0.11	-	-
Average	**7.59**	**99.42**	**0.85**	**1.21**	**0.089**	**0.071**	**0.57**	**0.06**	**15.41**	**0.11**	**1.50**	**0.01**
Maximum	**7.71**	**145.40**	**1.08**	**1.60**	**0.137**	**0.118**	**0.95**	**0.12**	**19.15**	**0.14**	**2.00**	**0.01**
Minimum	**7.36**	**70.25**	**0.64**	**1.00**	**0.036**	**0.026**	**0.43**	**0.02**	**12.34**	**0.10**	**1.00**	**0.01**

FINAL EFFLUENT LOADINGS								
Month	TSS kg/day	cBOD kg/day	TP kg/day	SP kg/day	TKN kg/day	NH_3 kg/day	NO_3 kg/day	NO_2 kg/day
January	10.85	17.59	1.01	0.77	6.74	0.67	224.62	1.32
February	9.97	10.23	0.74	0.56	5.63	0.23	175.65	1.02
March	8.76	12.51	0.54	0.38	6.26	0.75	167.14	1.28
April	7.87	12.10	0.43	0.32	7.26	0.39	166.99	1.21
May	8.62	12.93	0.71	0.46	6.25	0.73	176.91	1.08
June	8.41	14.49	1.04	0.77	11.01	0.99	189.84	1.57
July	12.37	16.71	1.23	0.94	7.02	0.67	165.47	1.57
August	13.47	22.00	1.28	1.00	6.32	1.43	169.66	1.37
September	13.45	15.64	1.45	1.20	9.07	0.63	177.07	1.60
October	10.28	13.18	1.40	1.20	5.27	0.53	175.02	1.29
November	7.01	13.14	1.50	1.30	4.82	1.36	179.37	1.10
December	9.46	11.46	1.26	1.14	4.87	0.37	193.16	1.29
Average	**10.04**	**14.33**	**1.05**	**0.84**	**6.7**	**0.7**	**180.1**	**1.31**
Maximum	**13.47**	**22.00**	**1.50**	**1.30**	**11.0**	**1.4**	**224.6**	**1.60**
Minimum	**7.01**	**10.23**	**0.43**	**0.32**	**4.8**	**0.2**	**165.5**	**1.02**

REMOVAL EFFICIENCY						
Month	TSS %	cBOD %	TP %	SP %	TKN %	NH_3 %
January	99.4%	98.5%	97.9%	96.8%	98.1%	99.7%
February	99.3%	99.0%	97.9%	96.7%	97.8%	99.9%
March	99.3%	98.6%	98.1%	97.0%	97.1%	99.5%
April	99.7%	98.9%	98.9%	98.4%	97.6%	99.8%
May	99.5%	99.0%	98.5%	98.2%	98.2%	99.7%
June	99.6%	99.0%	97.7%	96.0%	96.5%	99.6%
July	99.5%	98.6%	97.2%	94.9%	97.3%	99.7%
August	99.4%	97.9%	96.6%	93.9%	97.4%	99.2%
September	99.8%	99.4%	99.1%	98.2%	98.6%	99.8%
October	99.3%	98.9%	96.6%	94.2%	98.2%	99.8%
November	99.5%	98.9%	96.3%	93.4%	98.3%	99.4%
December	99.5%	99.2%	97.6%	95.9%	98.8%	99.9%
Average	**99.5%**	**98.8%**	**97.7%**	**96.1%**	**97.8%**	**99.7%**
Maximum	**99.8%**	**99.4%**	**99.1%**	**98.4%**	**98.8%**	**99.9%**
Minimum	**99.3%**	**97.9%**	**96.3%**	**93.4%**	**96.5%**	**99.2%**

REMOVAL QUANTITY						
Month	TSS kg/month	cBOD kg/month	TP kg/month	SP kg/month	TKN kg/month	NH_3 kg/month
January	60,023	35,361	1,453	715	11,017	7,824
February	39,239	28,636	969	460	7,130	5,735
March	40,544	27,768	886	381	6,547	4,791
April	70,371	33,398	1,197	591	8,957	5,801
May	58,984	38,877	1,421	767	10,868	6,964
June	64,265	42,258	1,306	552	9,017	7,161
July	71,207	35,847	1,313	543	7,853	5,988
August	69,781	31,285	1,142	478	7,323	5,655
September	232,828	78,839	4,736	1,994	19,137	9,020
October	46,991	36,443	1,235	607	8,874	7,190
November	46,045	35,086	1,174	547	8,495	6,812
December	55,945	44,511	1,584	839	12,651	9,433
Total	**856,223**	**468,308**	**18,416**	**8,473**	**117,870**	**82,375**
Average	**71,352**	**39,026**	**1,535**	**706**	**9,823**	**6,865**
Maximum	**232,828**	**78,839**	**4,736**	**1,994**	**19,137**	**9,433**
Minimum	**39,239**	**27,768**	**886**	**381**	**6,547**	**4,791**

CHEMICAL ADDITION

CHLORINATION			
Month	Sodium Hypochlorite Kg/month	Dosage mg/L	Residual Level mg/L
January	-	-	-
February	-	-	-
March	-	-	-
April	-	-	-
May	1,848	5.59	1.79
June	1,804	5.22	1.75
July	1,987	4.80	1.62
August	2,017	4.76	1.61
September	1,797	4.78	1.70
October	1,437	4.46	1.62
November	-	-	-
December	-	-	-
Total	**10,891**	**-**	**-**
Average	**1,815.1**	**4.94**	**1.68**
Maximum	**2,017**	**5.59**	**1.79**
Minimum	**1,437**	**4.46**	**1.61**

Chlorine added from May 1 to October 31

DECHLORINATION		
Month	Sodium Bisulphite m^3/month	Outfall Residual mg/L
January	-	-
February	-	-
March	-	-
April	-	-
May	1.46	0.01
June	1.72	0.01
July	3.55	0.01
August	3.00	0.01
September	2.60	0.01
October	2.05	0.01
November	-	-
December	-	-
Total	**14.39**	**-**
Average	**2.40**	**0.01**
Maximum	**3.55**	**0.01**
Minimum	**1.46**	**0.01**

FERRIC SULPHATE		
Month	Ferric Sulphate L/month	Dosage mg/L
January	22,260	11.30
February	19,215	12.24
March	24,465	11.58
April	23,310	11.80
May	23,573	12.85
June	24,308	12.75
July	29,610	13.12
August	28,928	12.43
September	21,578	10.52
October	20,318	11.21
November	19,373	10.89
December	20,832	10.72
Total	**277,767**	**-**
Average	**23,147**	**11.78**
Maximum	**29,610**	**13.12**
Minimum	**19,215**	**10.52**

DUNDAS WEEKLY DATA

DUNDAS WASTEWATER TREATMENT PLANT DAILY EFFLUENT LOADINGS														
Date	Flow ML/D	TSS			$cBOD_5$			Total Phosphorus			TKN			
				loading limit			loading limit			loading limit			loading limit kg/d	
		mg/L	kg/d	kg/d	mg/L	kg/d	kg/d	mg/L	kg/d	kg/d	mg/L	kg/d	winter	summer
January 4, 2023	11.779	1.3	15.31	91	1	11.78	91	0.095	1.12	9.1	0.3	3.53	182.0	-
January 11, 2023	10.617	0.8	8.49	91	3	31.85	91	0.083	0.88	9.1	0.9	9.56	182.0	-
January 18, 2023	10.906	0.8	8.72	91	1	10.91	91	0.088	0.96	9.1	0.2	2.18	182.0	-
January 25, 2023	10.825	0.8	8.66	91	1	10.83	91	0.077	0.83	9.1	0.9	9.74	182.0	-
February 1, 2023	10.964	1.5	16.45	91	1	10.96	91	0.082	0.90	9.1	0.7	7.67	182.0	-
February 8, 2023	11.137	0.8	8.91	91	1	11.14	91	0.075	0.84	9.1	0.7	7.80	182.0	-
February 15, 2023	9.142	0.8	7.31	91	1	9.14	91	0.066	0.60	9.1	0.6	5.49	182.0	-
February 22, 2023	8.808	0.8	7.05	91	1	8.81	91	0.067	0.59	9.1	0.2	1.76	182.0	-
March 1, 2023	8.410	0.6	5.05	91	1	8.41	91	0.060	0.50	9.1	0.8	6.73	182.0	-
March 8, 2023	8.745	0.6	5.25	91	1	8.75	91	0.041	0.36	9.1	0.6	5.25	182.0	-
March 15, 2023	13.790	1.1	15.17	91	1	13.79	91	0.045	0.62	9.1	0.2	2.76	182.0	-
March 22, 2023	13.656	0.6	8.19	91	1	13.66	91	0.038	0.52	9.1	0.4	5.46	182.0	-
March 29, 2023	14.437	0.6	8.66	91	1	14.44	91	0.033	0.48	9.1	0.5	7.22	182.0	-
April 5, 2023	14.037	0.8	11.23	91	1	14.04	91	0.034	0.48	9.1	0.5	7.02	182.0	-
April 12, 2023	14.930	0.6	8.96	91	1	14.93	91	0.028	0.42	9.1	0.7	10.45	182.0	-
April 19, 2023	10.047	0.6	6.03	91	1	10.05	91	0.030	0.30	9.1	0.6	6.03	182.0	-
April 26, 2023	9.049	0.6	5.43	91	1	9.05	91	0.050	0.45	9.1	0.6	5.43	182.0	-
May 3, 2023	10.570	0.6	6.34	91	1	10.57	91	0.064	0.68	9.1	0.6	6.34	-	36.4
May 10, 2023	9.442	0.6	5.67	91	1	9.44	91	0.052	0.49	9.1	0.8	7.55	-	36.4
May 17, 2023	9.942	0.6	5.97	91	1	9.94	91	0.056	0.56	9.1	0.6	5.97	-	36.4

DUNDAS WASTEWATER TREATMENT PLANT DAILY EFFLUENT LOADINGS														
Date	Flow ML/D	TSS			$cBOD_5$			Total Phosphorus			TKN			
				loading limit			loading limit			loading limit			loading limit kg/d	
		mg/L	kg/d	kg/d	mg/L	kg/d	kg/d	mg/L	kg/d	kg/d	mg/L	kg/d	winter	summer
May 24, 2023	11.247	0.6	6.75	91	2	22.49	91	0.084	0.94	9.1	0.7	7.87	-	36.4
May 31, 2023	11.351	1.6	18.16	91	1	11.35	91	0.074	0.84	9.1	0.2	2.27	-	36.4
June 7, 2023	11.142	0.6	6.69	91	1	11.14	91	0.073	0.81	9.1	0.9	10.03	-	36.4
June 14, 2023	13.974	0.9	12.58	91	1	13.97	91	0.083	1.16	9.1	0.8	11.18	-	36.4
June 21, 2023	9.091	0.6	5.45	91	1	9.09	91	0.107	0.97	9.1	0.5	4.55	-	36.4
June 28, 2023	12.915	0.8	10.33	91	2	25.83	91	0.097	1.25	9.1	1.6	20.66	-	36.4
July 5, 2023	9.435	1.3	12.27	91	1	9.44	91	0.091	0.86	9.1	0.6	5.66	-	36.4
July 12, 2023	14.119	1.2	16.94	91	1	14.12	91	0.086	1.21	9.1	0.2	2.82	-	36.4
July 19, 2023	13.038	0.6	7.82	91	1	13.04	91	0.095	1.24	9.1	0.7	9.13	-	36.4
July 26, 2023	13.661	0.6	8.20	91	2	27.32	91	0.097	1.33	9.1	0.6	8.20	-	36.4
August 2, 2023	14.605	0.6	8.76	91	2	29.21	91	0.087	1.27	9.1	0.2	2.92	-	36.4
August 9, 2023	12.406	1.1	13.65	91	1	12.41	91	0.079	0.98	9.1	0.3	3.72	-	36.4
August 16, 2023	14.080	1.1	15.49	91	2	28.16	91	0.101	1.42	9.1	0.6	8.45	-	36.4
August 23, 2023	13.706	1.3	17.82	91	1	13.71	91	0.104	1.43	9.1	0.5	6.85	-	36.4
August 30, 2023	14.859	0.8	11.89	91	2	29.72	91	0.094	1.40	9.1	0.7	10.40	-	36.4
September 6, 2023	13.407	1.1	14.75	91	2	26.81	91	0.122	1.64	9.1	0.9	12.07	-	36.4
September 13, 2023	12.672	1.3	16.47	91	1	12.67	91	0.102	1.29	9.1	0.8	10.14	-	36.4
September 20, 2023	11.810	1.0	11.81	91	1	11.81	91	0.113	1.33	9.1	0.5	5.91	-	36.4
September 27, 2023	11.155	0.9	10.04	91	1	11.16	91	0.128	1.43	9.1	0.7	7.81	-	36.4
October 4, 2023	9.468	0.6	5.68	91	2	18.94	91	0.136	1.29	9.1	0.9	8.52	-	36.4
October 11, 2023	9.701	0.6	5.82	91	1	9.70	91	0.116	1.13	9.1	0.4	3.88	-	36.4

DUNDAS WASTEWATER TREATMENT PLANT DAILY EFFLUENT LOADINGS														
Date	Flow ML/D	TSS			$cBOD_5$			Total Phosphorus			TKN			
				loading limit			loading limit			loading limit			loading limit kg/d	
		mg/L	kg/d	kg/d	mg/L	kg/d	kg/d	mg/L	kg/d	kg/d	mg/L	kg/d	winter	summer
October 18, 2023	9.985	1.9	18.97	91	1	9.99	91	0.138	1.38	9.1	0.5	4.99	-	36.4
October 25, 2023	9.924	0.8	7.94	91	1	9.92	91	0.14	1.39	9.1	0.2	1.98	-	36.4
November 1, 2023	10.632	0.6	6.38	91	2	21.26	91	0.148	1.57	9.1	0.2	2.13	182.0	-
November 8, 2023	11.010	0.6	6.61	91	1	11.01	91	0.171	1.88	9.1	0.6	6.61	182.0	-
November 15, 2023	10.911	0.6	6.55	91	1	10.91	91	0.107	1.17	9.1	0.3	3.27	182.0	-
November 23, 2023	11.458	0.6	6.87	91	1	11.46	91	0.116	1.33	9.1	0.6	6.87	182.0	-
November 29, 2023	9.785	0.8	7.83	91	1	9.79	91	0.144	1.41	9.1	0.5	4.89	182.0	-
December 6, 2023	10.223	0.6	6.13	91	1	10.22	91	0.118	1.21	9.1	0.5	5.11	182.0	-
December 13, 2023	10.356	1.5	15.53	91	1	10.36	91	0.121	1.25	9.1	0.2	2.07	182.0	-
December 20, 2023	10.359	0.6	6.22	91	1	10.36	91	0.102	1.06	9.1	0.4	4.14	182.0	-
December 27, 2023	10.990	0.6	6.59	91	1	10.99	91	0.097	1.07	9.1	0.6	6.59	182.0	-
Average	**11.437**	**0.84**	**9.73**	**-**	**1.21**	**14.05**	**-**	**0.089**	**1.01**	**-**	**0.56**	**6.45**	**-**	**-**
Maximum	**14.930**	**1.90**	**18.97**	**-**	**3.00**	**31.85**	**-**	**0.171**	**1.88**	**-**	**1.60**	**20.66**	**-**	**-**
Minimum	**8.410**	**0.60**	**5.05**	**-**	**1.00**	**8.41**	**-**	**0.028**	**0.30**	**-**	**0.20**	**1.76**	**-**	**-**

SEWER DISCHARGE SAMPLING RESULTS

2023 QUARTERLY SEWER DISCHARGE SAMPLING RESULTS REDLAND BROW LANDFILL						
Parameter List (Dundas WWTP Certificate of Approval)	RDL	Units	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
BOD_5	2	mg/L	14	8	16	20
COD	4	mg/L	140	84	120	180
Dissolved Organic Carbon	0.2	mg/L	42	26	34	57
Oil and Grease	0.5	mg/L	4.8	3.6	1.7	4.8
Total Dissolved Solids	10	mg/L	975	815	875	1,460
Total Kjeldahl Nitrogen	0.5	mg/L	18	10	14	25
Phosphorus	0.004	mg/L	0.23	0.054	0.23	0.16
Total Suspended Solids	10	mg/L	100	140	230	92
Alkalinity (as $CaCO_3$)	1	mg/L	150	130	270	520
Conductivity	1	umho/cm	1,900	1,500	1,700	2,500
pH (20°C)	-	-	8.31	8.76	8.5	8.84
Aluminum	0.005	mg/L	0.014	0.012	0.077	0.03
Ammonia (as N)	0.25	mg/L	16	9.6	13	21
Un-ionized Ammonia		mg/L	1.892	3.754	1.885	5.572
Arsenic	0.001	mg/L	0.018	0.087	0.015	0.017
Beryllium	0.0005	mg/L	<0.0004	<0.0004	<0.0004	<0.002
Boron	0.01	mg/L	2.4	1.7	2.1	3.8
Cadmium	0.0001	mg/L	<0.00009	<0.00009	<0.00009	<0.00045
Calcium	0.2	mg/L	64	110	140	66
Chloride	2	mg/L	260	170	200	290
Chromium	0.005	mg/L	<0.005	0.007	<0.005	<0.005
Copper	0.001	mg/L	0.0032	0.0044	0.0067	<0.0009
Sulphide	0.02	mg/L	0.085	0.15	0.31	0.13
Iron	0.1	mg/L	<0.1	0.18	0.13	0.36
Lead	0.0005	mg/L	0.0071	0.0077	0.0027	0.00069
Magnesium	0.05	mg/L	17	24	19	22
Nitrate (as N)	0.1	mg/L	<0.1	<0.1	0.2	0.11
Nitrite (as N)	0.01	mg/L	0.115	0.194	0.087	0.075
Phenols	0.002	mg/L	0.054	0.065	0.059	0.059
Potassium	0.2	mg/L	62	44	43	64
Selenium	0.002	mg/L	<0.002	<0.002	<0.002	<0.002
Silver	0.0001	mg/L	<0.00009	<0.00009	<0.00009	<0.00009
Sulphate (as SO_4)	1	mg/L	320	300	220	210
Zinc	0.005	mg/L	0.011	0.021	0.064	0.005

Note: 1. First Quarter sample collected on February 21, 2023. **2.** Second Quarter sample collected on April 25, 2023. **3.** Third Quarter sample collected on August 23, 2023. **4.** Fourth Sample collected November 30, 2023. **5.** Un-ionized Ammonia calculated from field pH, Field Temperature and Total Ammonia Results.

APPENDIX F
CSO TANK ANALYTICAL DATA

EASTWOOD CSO TANK INFLUENT 24 HOUR COMPOSITE

EASTWOOD CSO TANK INFLUENT 24 HOUR COMPOSITE									
Date & Time	Aluminum (mg/L)	Arsenic (mg/L)	Barium (mg/L)	Beryllium (mg/L)	Bismuth (mg/L)	Cadmium (mg/L)	Chromium (mg/L)	Cobalt (mg/L)	Copper (mg/L)
1/01/23 07:06	0.045	<0.020	0.028	<0.0001	<0.020	<0.0005	<0.001	<0.0009	0.002
2023-01-05 12:56	4.63	<0.020	0.062	0.0001	<0.020	<0.0005	0.009	<0.0009	0.021
2023-01-20 09:58	0.419	<0.020	0.020	<0.0001	<0.020	<0.0005	0.005	0.0010	0.013
3/26/23 12:10	0.445	<0.020	0.025	<0.0001	<0.020	<0.0005	0.004	0.0012	0.026
4/01/23 10:08	0.72	<0.020	0.024	<0.0001	<0.020	<0.0005	0.005	<0.0009	0.013
4/05/23 13:30	0.590	<0.020	0.045	<0.0001	<0.020	<0.0005	0.005	0.0020	0.038
4/23/23 07:32	0.161	<0.020	0.034	<0.0001	<0.020	<0.0005	0.001	<0.0009	0.014
6/28/23 09:30	0.365	<0.020	0.020	<0.0001	<0.020	<0.0005	0.003	<0.0009	0.021
7/03/23 08:40	0.198	<0.020	0.026	<0.0001	<0.020	<0.0005	0.001	<0.0009	0.023
7/03/23 19:20	0.319	<0.020	0.025	<0.0001	<0.020	<0.0005	0.002	<0.0009	0.019
First Flush 2023-02-10 05:06	0.328	<0.020	0.024	<0.0001	<0.020	<0.0005	0.004	<0.0009	0.014
First Flush 2023-06-12 17:02	0.358	<0.020	0.018	<0.0001	<0.020	<0.0005	0.003	<0.0009	0.036
Average	**0.7148**	**0.0200**	**0.0293**	**0.0001**	**0.0200**	**0.0005**	**0.0036**	**0.0010**	**0.0200**
Maximum	**4.6300**	**0.0200**	**0.0620**	**0.0001**	**0.0200**	**0.0005**	**0.0090**	**0.0020**	**0.0380**
Minimum	**0.0450**	**0.0200**	**0.0180**	**0.0001**	**0.0200**	**0.0005**	**0.0010**	**0.0009**	**0.0020**

EASTWOOD CSO TANK INFLUENT 24 HOUR COMPOSITE continued							
Date & Time	Iron (mg/L)	Lead (mg/L)	Manganese (mg/L)	Molybdenum (mg/L)	Nickel (mg/L)	Phosphorus Total (mg/L)	Selenium (mg/L)
1/01/23 07:06	0.203	<0.020	0.015	0.005	<0.005	0.055	<0.020
2023-01-05 12:56	7.57	<0.020	0.199	<0.005	0.007	0.596	<0.020
2023-01-20 09:58	0.718	<0.020	0.060	<0.005	<0.005	0.740	<0.020
3/26/23 12:10	1.01	<0.020	0.082	<0.005	<0.005	1.19	<0.020
4/01/23 10:08	1.20	<0.020	0.090	<0.005	<0.005	0.421	<0.020
4/05/23 13:30	1.19	<0.020	0.131	<0.005	<0.005	2.26	<0.020
4/23/23 07:32	0.423	<0.020	0.112	<0.005	<0.005	1.23	<0.020
6/28/23 09:30	0.819	<0.020	0.085	<0.005	<0.005	0.930	<0.020
7/03/23 08:40	0.459	<0.020	0.064	<0.005	<0.005	1.08	<0.020
7/03/23 19:20	0.570	<0.020	0.044	<0.005	<0.005	0.636	<0.020
First Flush 2023-02-10 05:06	0.604	<0.020	0.070	<0.005	<0.005	1.14	<0.020
First Flush 2023-06-12 17:02	0.814	<0.020	0.073	<0.005	<0.005	1.24	<0.020
Average	**1.2983**	**0.0200**	**0.0854**	**0.0050**	**0.0052**	**0.9598**	**0.0200**
Maximum	**7.5700**	**0.0200**	**0.1990**	**0.0050**	**0.0070**	**2.2600**	**0.0200**
Minimum	**0.2030**	**0.0200**	**0.0150**	**0.0050**	**0.0050**	**0.0550**	**0.0200**

EASTWOOD CSO TANK INFLUENT 24 HOUR COMPOSITE continued							
Date & Time	Silver (mg/L)	Strontium (mg/L)	Thallium (mg/L)	Tin (mg/L)	Titanium (mg/L)	Vanadium (mg/L)	Zinc (mg/L)
1/01/23 07:06	<0.005	0.384	<0.010	<0.020	0.001	<0.002	0.007
2023-01-05 12:56	<0.005	0.250	<0.010	<0.020	0.098	0.010	0.083
2023-01-20 09:58	<0.005	0.244	<0.010	<0.020	0.018	0.004	0.081
3/26/23 12:10	<0.005	0.278	<0.010	<0.020	0.016	0.003	0.098
4/01/23 10:08	<0.005	0.232	<0.010	<0.020	0.033	0.003	0.078
4/05/23 13:30	<0.005	0.557	<0.010	<0.020	0.025	0.003	0.104
4/23/23 07:32	<0.005	0.444	<0.010	<0.020	0.005	<0.002	0.051
6/28/23 09:30	<0.005	0.195	<0.010	<0.020	0.015	0.004	0.072
7/03/23 08:40	<0.005	0.282	<0.010	<0.020	0.004	0.003	0.057
7/03/23 19:20	<0.005	0.340	<0.010	<0.020	0.009	0.004	0.059
First Flush 2023-02-10 05:06	<0.005	0.410	<0.010	<0.020	0.015	<0.002	0.076
First Flush 2023-06-12 17:02	<0.005	0.217	<0.010	<0.020	0.015	0.004	0.095
Average	**0.0050**	**0.3194**	**0.0100**	**0.0200**	**0.0212**	**0.0037**	**0.0718**
Maximum	**0.0050**	**0.5570**	**0.0100**	**0.0200**	**0.0980**	**0.0100**	**0.1040**
Minimum	**0.0050**	**0.1950**	**0.0100**	**0.0200**	**0.0010**	**0.0020**	**0.0070**

EASTWOOD CSO TANK INFLUENT 24 HOUR COMPOSITE continued						
Date & Time	Ammonia + Ammonium as N (mg/L)	cBiochemical Oxygen Demand (mg/L)	Escherichia coli (MPN/100 mL)	Nitrate as N (mg/L)	Total Kjeldahl Nitrogen as N (mg/L)	Total Suspended Solids (mg/L)
1/01/23 07:06	5.78	437	4,000,000	<0.1	29.7	1,030
2023-01-05 12:56	10.9	98	2,280,000	1.52	22.8	109
2023-01-20 09:58	3.94	24	280,000	0.85	9.8	35.0
3/26/23 12:10	3.58	58	550,000	0.94	8.0	106
4/01/23 10:08	1.44	<10	90,000	1.28	2.6	49.5
4/05/23 13:30	12.2	61	14,100,000	0.20	18.0	108
4/23/23 07:32	7.38	25	1,110,000	0.55	12.3	44.0
6/28/23 09:30	1.78	53	5,790,000	<0.1	5.4	85.9
7/03/23 08:40	4.30	41	2,010,000	<0.2	8.4	60.0
7/03/23 19:20	2.97	24	1,140,000	0.46	5.1	46.4
First Flush 2023-02-10 05:06	4.29	49	720,000	1.35	9.3	38.1
First Flush 2023-06-12 17:02	4.11	36	3,870,000	<0.1	8.1	71.0
Average	**5.22**	**76.33**	**2,995,000.00**	**0.64**	**11.63**	**148.58**
Maximum	**12.20**	**437.00**	**14,100,000.00**	**1.52**	**29.70**	**1,030.00**
Minimum	**1.44**	**10.00**	**90,000.00**	**0.10**	**2.60**	**35.00**

EASTWOOD CSO TANK EFFLUENT

EASTWOOD CSO TANK EFFLUENT									
Date & Time	Aluminum (mg/L)	Arsenic (mg/L)	Barium (mg/L)	Beryllium (mg/L)	Bismuth (mg/L)	Cadmium (mg/L)	Chromium (mg/L)	Cobalt (mg/L)	Copper (mg/L)
4/01/23 21:31	0.380	<0.020	0.017	<0.0001	<0.020	<0.0005	0.002	<0.0009	0.012
4/06/23 10:03	0.529	<0.020	0.027	<0.0001	<0.020	<0.0005	0.004	0.0015	0.017
Average	**0.4545**	**0.0200**	**0.0220**	**0.0001**	**0.0200**	**0.0005**	**0.0030**	**0.0012**	**0.0145**
Maximum	**0.5290**	**0.0200**	**0.0270**	**0.0001**	**0.0200**	**0.0005**	**0.0040**	**0.0015**	**0.0170**
Minimum	**0.3800**	**0.0200**	**0.0170**	**0.0001**	**0.0200**	**0.0005**	**0.0020**	**0.0009**	**0.0120**

EASTWOOD CSO TANK EFFLUENT continued							
Date & Time	Iron (mg/L)	Lead (mg/L)	Manganese (mg/L)	Molybdenum (mg/L)	Nickel (mg/L)	Phosphorus Total (mg/L)	Selenium (mg/L)
4/01/23 21:31	0.560	<0.020	0.058	<0.005	<0.005	0.573	<0.020
4/06/23 10:03	0.951	<0.020	0.107	<0.005	<0.005	0.938	<0.020
Average	**0.7555**	**0.0200**	**0.0825**	**0.0050**	**0.0050**	**0.7555**	**0.0200**
Maximum	**0.9510**	**0.0200**	**0.1070**	**0.0050**	**0.0050**	**0.9380**	**0.0200**
Minimum	**0.5600**	**0.0200**	**0.0580**	**0.0050**	**0.0050**	**0.5730**	**0.0200**

EASTWOOD CSO TANK EFFLUENT continued							
Date & Time	Silver (mg/L)	Strontium (mg/L)	Thallium (mg/L)	Tin (mg/L)	Titanium (mg/L)	Vanadium (mg/L)	Zinc (mg/L)
4/01/23 21:31	<0.005	0.201	<0.010	<0.020	0.018	0.003	0.058
4/06/23 10:03	<0.005	0.299	<0.010	<0.020	0.023	0.002	0.075
Average	**0.0050**	**0.2500**	**0.0100**	**0.0200**	**0.0205**	**0.0025**	**0.0665**
Maximum	**0.0050**	**0.2990**	**0.0100**	**0.0200**	**0.0230**	**0.0030**	**0.0750**
Minimum	**0.0050**	**0.2010**	**0.0100**	**0.0200**	**0.0180**	**0.0020**	**0.0580**

EASTWOOD CSO TANK EFFLUENT continued						
Date & Time	Ammonia + Ammonium as N (mg/L)	cBiochemical Oxygen Demand (mg/L)	Escherichia coli (MPN/100 mL)	Nitrate as N (mg/L)	Total Kjeldahl Nitrogen as N (mg/L)	Total Suspended Solids (mg/L)
4/01/23 21:31	3.05	10	340,000	1.07	4.4	26.5
4/06/23 10:03	5.23	14	660,000	0.58	7.9	39.2
Average	**4.14**	**12.00**	**500,000.00**	**0.83**	**6.15**	**32.85**
Maximum	**5.23**	**14.00**	**660,000.00**	**1.07**	**7.90**	**39.20**
Minimum	**3.05**	**10.00**	**340,000.00**	**0.58**	**4.40**	**26.50**

ROYAL CSO TANK INFLUENT 24 HOUR COMPOSITE

ROYAL CSO TANK INFLUENT 24 HOUR COMPOSITE									
Date & Time	Aluminum (mg/L)	Arsenic (mg/L)	Barium (mg/L)	Beryllium (mg/L)	Bismuth (mg/L)	Cadmium (mg/L)	Chromium (mg/L)	Cobalt (mg/L)	Copper (mg/L)
1/04/23 22:42	0.326	<0.020	0.036	<0.0001	<0.020	<0.0005	0.004	<0.0009	0.044
3/23/23 19:30	7.34	<0.020	0.071	0.0002	<0.020	<0.0005	0.010	0.0050	0.018
First Flush 2/10/23 12:00	10.5	<0.020	0.102	0.0003	<0.020	<0.0005	0.018	0.0059	0.034
Average	**6.0553**	**0.0200**	**0.0697**	**0.0002**	**0.0200**	**0.0005**	**0.0107**	**0.0039**	**0.0320**
Maximum	**10.5000**	**0.0200**	**0.1020**	**0.0003**	**0.0200**	**0.0005**	**0.0180**	**0.0059**	**0.0440**
Minimum	**0.3260**	**0.0200**	**0.0360**	**0.0001**	**0.0200**	**0.0005**	**0.0040**	**0.0009**	**0.0180**

ROYAL CSO TANK INFLUENT 24 HOUR COMPOSITE continued							
Date & Time	Iron (mg/L)	Lead (mg/L)	Manganese (mg/L)	Molybdenum (mg/L)	Nickel (mg/L)	Phosphorus Total (mg/L)	Selenium (mg/L)
1/04/23 22:42	0.831	<0.020	0.090	<0.005	<0.005	3.13	<0.020
3/23/23 19:30	8.42	<0.020	0.192	<0.005	0.009	0.612	<0.020
First Flush 2/10/23 12:00	15.6	<0.020	0.366	<0.005	0.017	0.845	<0.020
Average	**8.2837**	**0.0200**	**0.2160**	**0.0050**	**0.0103**	**1.5290**	**0.0200**
Maximum	**15.6000**	**0.0200**	**0.3660**	**0.0050**	**0.0170**	**3.1300**	**0.0200**
Minimum	**0.8310**	**0.0200**	**0.0900**	**0.0050**	**0.0050**	**0.6120**	**0.0200**

ROYAL CSO TANK INFLUENT 24 HOUR COMPOSITE continued							
Date & Time	Silver (mg/L)	Strontium (mg/L)	Thallium (mg/L)	Tin (mg/L)	Titanium (mg/L)	Vanadium (mg/L)	Zinc (mg/L)
1/04/23 22:42	<0.005	0.457	<0.010	<0.020	0.011	0.002	0.086
3/23/23 19:30	<0.005	0.680	<0.010	<0.020	0.135	0.014	0.091
First Flush 2/10/23 12:00	<0.005	0.690	<0.010	<0.020	0.214	0.022	0.220
Average	**0.0050**	**0.6090**	**0.0100**	**0.0200**	**0.1200**	**0.0127**	**0.1323**
Maximum	**0.0050**	**0.6900**	**0.0100**	**0.0200**	**0.2140**	**0.0220**	**0.2200**
Minimum	**0.0050**	**0.4570**	**0.0100**	**0.0200**	**0.0110**	**0.0020**	**0.0860**

ROYAL CSO TANK INFLUENT 24 HOUR COMPOSITE continued						
Date & Time	Ammonia + Ammonium as N (mg/L)	cBiochemical Oxygen Demand (mg/L)	Escherichia coli (MPN/100 mL)	Nitrate as N (mg/L)	Total Kjeldahl Nitrogen as N (mg/L)	Total Suspended Solids (mg/L)
1/04/23 22:42	0.28	12	110,000	0.36	3.2	732
3/23/23 19:30	1.12	12	230,000	0.98	3.0	249
First Flush 2/10/23 12:00	0.88	13	180,000	0.59	3.0	440
Average	**0.76**	**12.33**	**173,333.33**	**0.64**	**3.07**	**473.67**
Maximum	**1.12**	**13.00**	**230,000.00**	**0.98**	**3.20**	**732.00**
Minimum	**0.28**	**12.00**	**110,000.00**	**0.36**	**3.00**	**249.00**

ROYAL CSO TANK EFFLUENT

ROYAL CSO TANK EFFLUENT									
Date & Time	Aluminum (mg/L)	Arsenic (mg/L)	Barium (mg/L)	Beryllium (mg/L)	Bismuth (mg/L)	Cadmium (mg/L)	Chromium (mg/L)	Cobalt (mg/L)	Copper (mg/L)
3/25/23 20:54	3.64	<0.020	0.040	<0.0001	<0.020	<0.0005	0.004	0.0027	0.010
4/01/23 08:59	4.91	<0.020	0.047	0.0002	<0.020	<0.0005	0.006	0.0026	0.012
4/06/23 06:28	5.90	<0.020	0.054	<0.0001	<0.020	<0.0005	0.007	0.0030	0.011
7/27/23 10:28	3.38	<0.020	0.034	<0.0001	<0.020	<0.0005	0.006	0.0029	0.014
8/25/23 05:17	4.85	<0.020	0.039	0.0001	<0.020	<0.0005	0.008	0.0026	0.013
Average	**4.5360**	**0.0200**	**0.0428**	**0.0001**	**0.0200**	**0.0005**	**0.0062**	**0.0028**	**0.0120**
Maximum	**5.9000**	**0.0200**	**0.0540**	**0.0002**	**0.0200**	**0.0005**	**0.0080**	**0.0030**	**0.0140**
Minimum	**3.3800**	**0.0200**	**0.0340**	**0.0001**	**0.0200**	**0.0005**	**0.0040**	**0.0026**	**0.0100**

ROYAL CSO TANK EFFLUENT continued							
Date & Time	Iron (mg/L)	Lead (mg/L)	Manganese (mg/L)	Molybdenum (mg/L)	Nickel (mg/L)	Phosphorus Total (mg/L)	Selenium (mg/L)
3/25/23 20:54	3.64	<0.020	0.081	<0.005	<0.005	0.288	<0.020
4/01/23 08:59	5.59	<0.020	0.111	<0.005	0.006	0.257	<0.020
4/06/23 06:28	5.03	<0.020	0.112	<0.005	<0.005	0.273	<0.020
7/27/23 10:28	4.56	<0.020	0.143	<0.005	0.005	0.387	<0.020
8/25/23 05:17	5.89	<0.020	0.180	<0.005	0.007	0.401	<0.020
Average	**4.9420**	**0.0200**	**0.1254**	**0.0050**	**0.0056**	**0.3212**	**0.0200**
Maximum	**5.8900**	**0.0200**	**0.1800**	**0.0050**	**0.0070**	**0.4010**	**0.0200**
Minimum	**3.6400**	**0.0200**	**0.0810**	**0.0050**	**0.0050**	**0.2570**	**0.0200**

ROYAL CSO TANK EFFLUENT continued							
Date & Time	Silver (mg/L)	Strontium (mg/L)	Thallium (mg/L)	Tin (mg/L)	Titanium (mg/L)	Vanadium (mg/L)	Zinc (mg/L)
3/25/23 20:54	<0.005	0.449	<0.010	<0.020	0.071	0.006	0.056
4/01/23 08:59	<0.005	0.361	<0.010	<0.020	0.086	0.009	0.061
4/06/23 06:28	<0.005	0.374	<0.010	<0.020	0.225	0.012	0.060
7/27/23 10:28	<0.005	0.140	<0.010	<0.020	0.128	0.009	0.092
8/25/23 05:17	<0.005	0.181	<0.010	<0.020	0.095	0.009	0.094
Average	**0.0050**	**0.3010**	**0.0100**	**0.0200**	**0.1210**	**0.0090**	**0.0726**
Maximum	**0.0050**	**0.4490**	**0.0100**	**0.0200**	**0.2250**	**0.0120**	**0.0940**
Minimum	**0.0050**	**0.1400**	**0.0100**	**0.0200**	**0.0710**	**0.0060**	**0.0560**

ROYAL CSO TANK EFFLUENT continued						
Date & Time	Ammonia + Ammonium as N (mg/L)	cBiochemical Oxygen Demand (mg/L)	Escherichia coli (MPN/100 mL)	Nitrate as N (mg/L)	Total Kjeldahl Nitrogen as N (mg/L)	Total Suspended Solids (mg/L)
3/25/23 20:54	0.49	<5	120,000	0.77	1.6	102
4/01/23 08:59	0.25	<10	20,000	1.05	0.8	62.2
4/06/23 06:28	0.44	<6	50,000	0.68	1.4	93.0
7/27/23 10:28	0.41	7	173,000	0.25	1.5	112
8/25/23 05:17	0.55	6	199,000	0.30	1.9	132
Average	**0.43**	**6.80**	**112,400.00**	**0.61**	**1.44**	**100.24**
Maximum	**0.55**	**10.00**	**199,000.00**	**1.05**	**1.90**	**132.00**
Minimum	**0.25**	**5.00**	**20,000.00**	**0.25**	**0.80**	**62.20**

STRACHAN CSO TANK INFLUENT 24 HOUR COMPOSITE

STRACHAN CSO TANK INFLUENT 24 HOUR COMPOSITE									
Date & Time	Aluminum (mg/L)	Arsenic (mg/L)	Barium (mg/L)	Beryllium (mg/L)	Bismuth (mg/L)	Cadmium (mg/L)	Chromium (mg/L)	Cobalt (mg/L)	Copper (mg/L)
1/04/23 20:38	1.65	<0.020	0.054	<0.0001	<0.020	<0.0005	0.014	<0.0009	0.115
4/01/23 05:39	4.55	<0.020	0.038	0.0001	<0.020	<0.0005	0.007	0.0025	0.020
6/26/23 04:23	1.38	<0.020	0.040	<0.0001	<0.020	<0.0005	0.006	0.0018	0.021
6/27/23 12:00	1.18	<0.020	0.035	<0.0001	<0.020	<0.0005	0.005	<0.0009	0.013
7/04/23 12:17	4.04	<0.020	0.033	0.0001	<0.020	<0.0005	0.008	0.0030	0.020
7/27/23 04:28	7.79	<0.020	0.073	0.0002	<0.020	<0.0005	0.022	0.0062	0.051
8/12/23 12:00	1.37	<0.020	0.029	<0.0001	<0.020	<0.0005	0.006	<0.0009	0.016
8/18/23 03:25	2.51	<0.020	0.038	<0.0001	<0.020	<0.0005	0.007	0.0013	0.018
8/25/23 01:09	3.13	<0.020	0.042	<0.0001	<0.020	<0.0005	0.007	0.0025	0.018
11/09/23 02:42	1.94	<0.020	0.021	<0.0001	<0.020	<0.0005	0.006	0.0016	0.019
First Flush 2023-02-09 21:17	4.87	<0.020	0.052	0.0001	<0.020	<0.0005	0.011	0.0026	0.033
Average	**3.1282**	**0.0200**	**0.0414**	**0.0001**	**0.0200**	**0.0005**	**0.0090**	**0.0022**	**0.0313**
Maximum	**7.7900**	**0.0200**	**0.0730**	**0.0002**	**0.0200**	**0.0005**	**0.0220**	**0.0062**	**0.1150**
Minimum	**1.1800**	**0.0200**	**0.0210**	**0.0001**	**0.0200**	**0.0005**	**0.0050**	**0.0009**	**0.0130**

STRACHAN CSO TANK INFLUENT 24 HOUR COMPOSITE continued

STRACHAN CSO TANK INFLUENT 24 HOUR COMPOSITE continued							
Date & Time	Iron (mg/L)	Lead (mg/L)	Manganese (mg/L)	Molybdenum (mg/L)	Nickel (mg/L)	Phosphorus Total (mg/L)	Selenium (mg/L)
1/04/23 20:38	3.71	0.024	0.219	<0.005	0.006	4.07	<0.020
4/01/23 05:39	6.28	<0.020	0.156	<0.005	0.007	0.222	<0.020
6/26/23 04:23	2.77	0.028	0.245	<0.005	<0.005	0.404	<0.020
6/27/23 12:00	1.93	<0.020	0.156	0.008	<0.005	0.379	<0.020
7/04/23 12:17	5.98	<0.020	0.187	<0.005	0.006	0.287	<0.020
7/27/23 04:28	12.9	0.070	0.542	<0.005	0.013	0.647	<0.020
8/12/23 12:00	2.30	<0.020	0.162	0.008	<0.005	0.409	<0.020
8/18/23 03:25	3.70	<0.020	0.163	<0.005	<0.005	0.341	<0.020
8/25/23 01:09	5.16	0.029	0.231	<0.005	0.007	0.371	<0.020
11/09/23 02:42	3.07	<0.020	0.103	<0.005	<0.005	0.311	<0.020
First Flush 2023-02-09 21:17	7.97	0.030	0.221	<0.005	0.008	0.382	<0.020
Average	**5.0700**	**0.0274**	**0.2168**	**0.0055**	**0.0065**	**0.7112**	**0.0200**
Maximum	**12.9000**	**0.0700**	**0.5420**	**0.0080**	**0.0130**	**4.0700**	**0.0200**
Minimum	**1.9300**	**0.0200**	**0.1030**	**0.0050**	**0.0050**	**0.2220**	**0.0200**

STRACHAN CSO TANK INFLUENT 24 HOUR COMPOSITE continued

STRACHAN CSO TANK INFLUENT 24 HOUR COMPOSITE continued							
Date & Time	Silver (mg/L)	Strontium (mg/L)	Thallium (mg/L)	Tin (mg/L)	Titanium (mg/L)	Vanadium (mg/L)	Zinc (mg/L)
1/04/23 20:38	<0.005	0.409	<0.010	<0.020	0.061	0.008	0.265
4/01/23 05:39	<0.005	0.353	<0.010	<0.020	0.090	0.009	0.082
6/26/23 04:23	<0.005	0.340	<0.010	<0.020	0.050	0.006	0.113
6/27/23 12:00	<0.005	0.283	<0.010	<0.020	0.050	0.005	0.066
7/04/23 12:17	<0.005	0.358	<0.010	<0.020	0.087	0.009	0.080
7/27/23 04:28	<0.005	0.135	<0.010	<0.020	0.294	0.021	0.226
8/12/23 12:00	<0.005	0.210	<0.010	<0.020	0.053	0.004	0.079
8/18/23 03:25	<0.005	0.316	<0.010	<0.020	0.061	0.006	0.069
8/25/23 01:09	<0.005	0.327	<0.010	<0.020	0.076	0.007	0.088
11/09/23 02:42	<0.005	0.076	<0.010	<0.020	0.044	0.005	0.082
First Flush 2023-02-09 21:17	<0.005	0.303	<0.010	<0.020	0.109	0.012	0.140
Average	**0.0050**	**0.2827**	**0.0100**	**0.0200**	**0.0886**	**0.0084**	**0.1173**
Maximum	**0.0050**	**0.4090**	**0.0100**	**0.0200**	**0.2940**	**0.0210**	**0.2650**
Minimum	**0.0050**	**0.0760**	**0.0100**	**0.0200**	**0.0440**	**0.0040**	**0.0660**

STRACHAN CSO TANK INFLUENT 24 HOUR COMPOSITE continued						
Date & Time	Ammonia + Ammonium as N (mg/L)	cBiochemical Oxygen Demand (mg/L)	Escherichia coli (MPN/100 mL)	Nitrate as N (mg/L)	Total Kjeldahl Nitrogen as N (mg/L)	Total Suspended Solids (mg/L)
1/04/23 20:38	0.28	8	90,000	0.24	2.2	124
4/01/23 05:39	0.19	<10	10,500	0.52	0.8	87.5
6/26/23 04:23	1.16	15	30,000	0.85	2.7	94.0
6/27/23 12:00	0.60	8	100,000	0.59	2.4	45.7
7/04/23 12:17	0.20	<6	60,000	0.18	1.0	155
7/27/23 04:28	0.09	7	32,600	0.16	0.6	408
8/12/23 12:00	0.62	12	160,000	0.64	2.0	68.0
8/18/23 03:25	0.40	11	210,000	0.44	1.6	86.8
8/25/23 01:09	0.47	10	173,000	0.37	1.9	110
11/09/23 02:42	0.42	14	36,500	0.29	1.2	53.0
First Flush 2023-02-09 21:17	0.44	11	24,200	0.36	1.7	115
Average	**0.44**	**10.18**	**84,254.55**	**0.42**	**1.65**	**122.45**
Maximum	**1.16**	**15.00**	**210,000.00**	**0.85**	**2.70**	**408.00**
Minimum	**0.09**	**6.00**	**10,500.00**	**0.16**	**0.60**	**45.70**

MAIN/KING CSO TANK INFLUENT 24 HOUR COMPOSITE

MAIN/KING CSO TANK INFLUENT 24 HOUR COMPOSITE									
Date & Time	Aluminum (mg/L)	Arsenic (mg/L)	Barium (mg/L)	Beryllium (mg/L)	Bismuth (mg/L)	Cadmium (mg/L)	Chromium (mg/L)	Cobalt (mg/L)	Copper (mg/L)
2/10/23 07:15	0.636	<0.020	0.050	<0.0001	<0.020	<0.0005	0.002	<0.0009	0.011
4/02/23 0 3:19	0.549	<0.020	0.034	<0.0001	<0.020	<0.0005	0.002	<0.0009	0.010
4/05/23 12:17	0.124	<0.020	0.054	<0.0001	<0.020	<0.0005	<0.001	0.0021	0.009
4/06/23 11:29	1.27	<0.020	0.055	<0.0001	<0.020	<0.0005	0.004	0.0021	0.014
6/12/23 23:10	0.663	<0.020	0.041	<0.0001	<0.020	<0.0005	0.004	<0.0009	0.022
7/04/23 08:20	1.68	<0.020	0.032	<0.0001	<0.020	<0.0005	0.003	0.0016	0.011
7/27/23 12:28	1.82	<0.020	0.042	<0.0001	<0.020	<0.0005	0.006	0.0022	0.019
8/24/23 22:38	4.70	<0.020	0.074	0.0001	<0.020	<0.0005	0.007	0.0035	0.015
Average	**1.4303**	**0.0200**	**0.0478**	**0.0001**	**0.0200**	**0.0005**	**0.0036**	**0.0018**	**0.0139**
Maximum	**4.7000**	**0.0200**	**0.0740**	**0.0001**	**0.0200**	**0.0005**	**0.0070**	**0.0035**	**0.0220**
Minimum	**0.1240**	**0.0200**	**0.0320**	**0.0001**	**0.0200**	**0.0005**	**0.0010**	**0.0009**	**0.0090**

MAIN/KING CSO TANK INFLUENT 24 HOUR COMPOSITE continued							
Date & Time	Iron (mg/L)	Lead (mg/L)	Manganese (mg/L)	Molybdenum (mg/L)	Nickel (mg/L)	Phosphorus Total (mg/L)	Selenium (mg/L)
2/10/23 07:15	1.24	<0.020	0.072	<0.005	<0.005	0.755	<0.020
4/02/23 0 3:19	0.847	<0.020	0.054	<0.005	<0.005	0.525	<0.020
4/05/23 12:17	0.302	<0.020	0.066	<0.005	<0.005	0.454	<0.020
4/06/23 11:29	1.89	<0.020	0.115	<0.005	<0.005	0.616	<0.020
6/12/23 23:10	1.56	<0.020	0.101	<0.005	<0.005	0.937	<0.020
7/04/23 08:20	2.59	<0.020	0.098	<0.005	<0.005	0.383	<0.020
7/27/23 12:28	4.45	<0.020	0.163	<0.005	<0.005	0.936	<0.020
8/24/23 22:38	8.39	<0.020	0.223	<0.005	0.007	0.610	<0.020
Average	**2.6586**	**0.0200**	**0.1115**	**0.0050**	**0.0053**	**0.6520**	**0.0200**
Maximum	**8.3900**	**0.0200**	**0.2230**	**0.0050**	**0.0070**	**0.9370**	**0.0200**
Minimum	**0.3020**	**0.0200**	**0.0540**	**0.0050**	**0.0050**	**0.3830**	**0.0200**

MAIN/KING CSO TANK INFLUENT 24 HOUR COMPOSITE continued

MAIN/KING CSO TANK INFLUENT 24 HOUR COMPOSITE continued							
Date & Time	Silver (mg/L)	Strontium (mg/L)	Thallium (mg/L)	Tin (mg/L)	Titanium (mg/L)	Vanadium (mg/L)	Zinc (mg/L)
2/10/23 07:15	<0.005	1.06	<0.010	<0.020	0.016	<0.002	0.076
4/02/23 0 3:19	<0.005	0.611	<0.010	<0.020	0.027	<0.002	0.056
4/05/23 12:17	<0.005	1.05	<0.010	<0.020	0.006	<0.002	0.136
4/06/23 11:29	<0.005	0.965	<0.010	<0.020	0.049	0.003	0.150
6/12/23 23:10	<0.005	0.550	<0.010	<0.020	0.023	0.004	0.094
7/04/23 08:20	<0.005	0.383	<0.010	<0.020	0.038	0.004	0.057
7/27/23 12:28	<0.005	0.231	<0.010	<0.020	0.064	0.006	0.124
8/24/23 22:38	<0.005	0.492	<0.010	<0.020	0.104	0.010	0.112
Average	**0.0050**	**0.6678**	**0.0100**	**0.0200**	**0.0409**	**0.0041**	**0.1006**
Maximum	**0.0050**	**1.0600**	**0.0100**	**0.0200**	**0.1040**	**0.0100**	**0.1500**
Minimum	**0.0050**	**0.2310**	**0.0100**	**0.0200**	**0.0060**	**0.0020**	**0.0560**

MAIN/KING CSO TANK INFLUENT 24 HOUR COMPOSITE continued							
Date & Time	Ammonia + Ammonium as N (mg/L)	cBiochemical Oxygen Demand (mg/L)	Escherichia coli (MPN/100 mL)	Fecal Coliform (Subcontract) (CFU/100 mL)	Nitrate as N (mg/L)	Total Kjeldahl Nitrogen as N (mg/L)	Total Suspended Solids (mg/L)
2/10/23 07:15	2.24	12	500,000	14,400	1.80	3.8	28.8
4/02/23 0 3:19	2.11	<6	190,000	NDOGFC	1.69	4.4	17.8
4/05/23 12:17	3.67	<6	24,200	7000	1.67	4.6	7.6
4/06/23 11:29	3.52	7	17,300	11,200	0.92	5.0	60.0
6/12/23 23:10	3.04	13	1,310,000	20,800	0.89	5.6	47.0
7/04/23 08:20	0.56	<6	50,000	46,000	0.40	1.4	66.1
7/27/23 12:28	0.96	19	880,000	64,000	0.57	2.8	92.0
8/24/23 22:38	0.22	7	57,900	110,000	0.46	2.3	158
Average	**2.04**	**9.50**	**378,675.00**	**34,175.00**	**1.05**	**3.74**	**59.66**
Maximum	**3.67**	**19.00**	**1,310,000.00**	**110,000.00**	**1.80**	**5.60**	**158.00**
Minimum	**0.22**	**6.00**	**17,300.00**	**0.00**	**0.40**	**1.40**	**7.60**

Hamilton

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