



# 2022

CITY OF HAMILTON  
WASTEWATER TREATMENT  
FACILITIES ANNUAL REPORT



Hamilton





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# WOODWARD AVENUE WASTEWATER TREATMENT PLANT

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## 1.1.3 IMPROVEMENTS TO THE FACILITY

### 1.1.3.1 Woodward Upgrade Project (WUP)

The Woodward Avenue WWTP has undergone substantial upgrades to improve the performance and reliability of its treatment processes. These upgrades were implemented under three main contracts and consist of: Contract 1: New Main Wastewater Pumping Station, Contract 2: Electrical and Chlorination System Upgrades, and Contract 3: Secondary Plant Upgrades, New Tertiary Treatment Facility, New Chlorine Contact Tank and Modifications to Red Hill Creek.

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

The installation of all associated equipment for the New Main Wastewater Pumping Station (MPS), including the twelve (12) 170 MLD wastewater pumps arranged as ten (10) duty and two (2) standby pumps with 700 horsepower (hp) drive motors in the drywell, along with the interconnecting discharge pipe and isolation gate valves was completed; and commissioning of the station has concluded. The MPS facility was fully operational throughout 2022, with a firm rated capacity of 1,700 MLD. Demolition of the existing MPS facility structure commenced after 57 years of continuous operations, with full demolition completed in July 2022. The project reached Substantial Performance on August 31, 2022, with remaining final site grading/landscaping works, along with some project deficiency works still ongoing and expected to be completed by mid-June 2023.

#### 1.1.3.1.2 Contract 2: Electrical and Chlorination System Upgrades – Substantial Performance reached November 11, 2022

The Electrical and Chlorination System Upgrades project was completed and achieved Substantial Performance on November 11, 2022. The new Electrical Power Centre building, including the installation of four 3 Megawatt (MW) standby generators, fuel storage tanks and 13.8 Kilovolt (kV) main switch gear were fully operational throughout the year. Both Water Treatment and Wastewater Treatment plant processes were connected to the new 13.8 (kV) distribution loop, including the cogeneration facility. The existing standby power building was demolished; including the old back-up diesel generators. This contract also includes the Chlorination System Upgrades, which involve installation of a new chlorine tonner unloading facility and chlorination equipment. These improvements to the plant's disinfection capabilities are required for the new Tertiary Facility and Chlorine Contact Tank and will provide sufficient capacity to disinfect wet weather flows in the future bypass chlorine contact tank.

#### 1.1.3.1.3 Contract 3: Secondary Plant Upgrades, New Tertiary Treatment Facility, New Chlorine Contact Tank and Modifications to Red Hill Creek – Substantial Performance expected in June 2023

Construction continued on the New Tertiary Treatment Facility south plant secondary treatment expansion (stage two), and new chlorine contact tank. Additional launder works in the south plant aeration tank 9 were completed and the wastewater plant operating capacity returned to 614 MLD in December 2022. The capacity of the WWTP was reduced to 511 MLD to facilitate these additions. Commissioning and start-up of the new tertiary treatment process saw secondary treated effluent flow being directed through the ten (10) disc filter units and new chlorine contact tank starting in October 2022. The tertiary treatment facility is currently undergoing a 60-day commissioning period, that will be followed by a 180 day performance period. All plant effluent is now discharging from the new outfall channel into Red Hill Creek and the old plant outfall is for plant bypasses only.

#### 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 works included the replacement of the sprinkler system and the air ducting insulation to improve overall system reliability. Substantial Completion was obtained and the warranty period started in Q1 2022. The Warranty Period was concluded in Q1 2023.

#### 1.1.3.3 Aeration Gallery Walkway and Access Repairs

Repairs/replacement of the walkways, railing, stairs and ladders are being undertaken to provide safe access to all four of the Woodward North Aeration galleries. Notice to Proceed was issue to the Contractor in September 2022 and the construction is approximately 60% complete. Substantial Performance is anticipated to be achieved Q3 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 – Co-Generation 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 <sub>5</sub> )	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

### 1.2.3 SAMPLING PROCEDURES

Raw influent wastewater is sampled seven (7) days per week and is tested for alkalinity, ammonia, carbonaceous biochemical oxygen demand (cBOD), chemical oxygen demand (COD), chloride, conductivity, pH, soluble phosphorus (SP), total phosphorus (TP), total biochemical oxygen demand (TBOD), total Kjeldahl nitrogen (TKN), and total suspended solids (TSS). Twenty-four (24) hour composite samples are refrigerated prior to analysis at the on-site City of Hamilton Environmental Laboratory.

Secondary effluent is sampled five (5) days per week and is tested for alkalinity, ammonia, cBOD, COD, chloride, conductivity, nitrates, nitrites, pH, SP, TP, TKN, TSS, volatile suspended solids (VSS), and unionized ammonia. Total chlorine residual is measured daily in the final effluent on a seasonal basis from May 15 to October 15. E. coli is sampled on a weekly basis in the final effluent. Twenty-four (24) hour composite samples are collected by the samplers on each side of the twin effluent channel and refrigerated prior to analysis at the on-site City of Hamilton Environmental Laboratory. The average concentration of the two samples is reported to the Ministry of Environment, Conservation, and Parks (MECP) for compliance purposes. Samples are, at all times, under the strict chain of custody of Compliance and Regulations Section staff.



## 1.3 ENVIRONMENTAL COMPLIANCE APPROVAL REPORTING REQUIREMENTS

With reference to 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 outlines plant flow quantities, including imported sewage as well as influent parameter concentrations in 2022.

Influent flow values in 2022 were lower than average, owing primarily to low total precipitation. Overall, influent concentrations in 2022 were within the expected ranges based on historical data.

DAILY AVERAGE PLANT FLOW (ML/d)		
Year	Daily Average Plant Flow (ML/d)	Total Precipitation (mm)
2017	345.97*	1072
2018	322.09	966
2019	390.25*	1087
2020	299.98	797
2021	284.99	938
2022	263.28	680

\* Plant Flow in 2017 and 2019 was heavily impacted by elevated water levels in Hamilton Harbour and Lake Ontario.

INFLUENT CONCENTRATIONS (mg/L)						
Year	TSS	cBOD	TP	SP	NH3	TKN
2017	269.36	153.03	4.26	0.89	17.18	29.48
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

INFLUENT LOADINGS (kg/d)						
Year	TSS	cBOD	TP	SP	NH3	TKN
2017	91,494	50,679	1,430	285	5,638	9,773
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

## IMPORTED SEWAGE

Month	Septic Haulers - m <sup>3</sup> /mth	Sludge from Dundas - Tonnes/mth
January	3,153	2,813
February	1,566	2,672
March	1,376	3,745
April	4,781	3,171
May	5,408	3,616
June	8,231	3,643
July	2,306	3,604
August	7,223	3,876
September	4,514	3,446
October	5,116	3,307
November	3,810	3,334
December	3,259	3,185
Total	50,725	40,412

### 1.3.1.1 IMPORTED SEWAGE

The Woodward Avenue WWTP 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 of the overall flows into the plant approximately 0.05% in 2022.

The Woodward Avenue WWTP also receives untreated sludge from the Dundas WWTP which is hauled by truck. This sludge is processed with the sludge generated in primary treatment at the Woodward Avenue WWTP. Sludge from the Dundas WWTP contributed approximately 11% of the total raw sludge volume in 2022.



### 1.3.2 CONDITION 11 (4B) EFFLUENT MONITORING

Appendix A outlines plant flow rates, effluent concentrations, and loadings achieved in 2022.

In 2022, the plant achieved 100% compliance with all effluent parameter concentration and loading limits for the fifth consecutive year.

EFFLUENT CONCENTRATIONS (mg/L)						
Year	TSS	cBOD	TP	SP	NH3	TKN
2017	11.09	5.73	0.45	0.22	2.03	3.40
2018	6.06	4.86	0.43	0.27	3.68	4.81
2019	9.10	5.12	0.50	0.28	1.97	3.18
2020	8.38	5.26	0.57	0.36	1.87	3.12
2021	6.91	4.04	0.57	0.40	1.29	2.42
2022	6.10	4.31	0.43	0.30	2.82	3.80

EFFLUENT LOADINGS (kg/d)						
Year	TSS	cBOD	TP	SP	NH3	TKN
2017	4,175	2,048	155	67	676	1,177
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

Effluent concentrations and loadings in 2022 were comparatively low on average with the exception of ammonia which was elevated in September due to issues with aeration blowers coinciding with an aeration basin being taken out of service which impacted nitrification. The new tertiary treatment facility was placed in service in October 2022 and underwent commissioning and testing activities for the remainder of the year. Early results indicate a marked improvement to reduction of TSS and TP. Unfortunately, results in December were elevated due to a plant upset resulting from the introduction of oleic acid in the collection system which adversely impacted biological processes and solids settleability in secondary clarification. Tertiary effluent results during this upset were still fully compliant with the upcoming reduced effluent limits which will take effect in 2023 following completion of commissioning activities.

Details of plant performance can be found in [Appendix A 'Final Effluent - Concentrations'](#).



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

The City was successful in complying with the monitoring requirements of the plant Environmental Compliance Approval due to the sampling frequencies exceeding requirements. The following deviations from the monitoring schedule were observed in 2022:

DEVIATION FROM THE MONITORING SCHEDULE		
Date	Sample Location	Reason form Deviation
2022-03-16	Final Effluent Outfall	No sample due to autosampler maintenance.
2022-03-18	Final Effluent Outfall	No sample due to autosampler maintenance.
2022-03-22	Aeration North	No sample due to sampling error.
2022-03-22	Aeration South	No sample due to sampling error.
2022-05-14	Final Effluent North Channel	No sample due to autosampler malfunction.
2022-05-07	Primary Effluent South	cBOD and TBOD results are not available for this sample.
2022-06-28	Final Effluent Outfall	No sample due to autosampler malfunction.
2022-06-14	Centrifuge Filtrate	Sample discarded due to mislabeling.
2022-10-13	Plant Influent	Sample was not analyzed for TBOD due to instrument malfunction.
2022-11-17	Centrifuge #1 Cake	Sample discarded due to mislabeling.
2022-11-17	Centrifuge #4 Cake	Sample discarded due to mislabeling.

Failure of an autosampler triggers staff to generate a work order in Infor EAM promptly, through which repairs are made by plant maintenance staff.

In 2023, the City will be utilizing the following schedule to fulfill the sampling requirements of the plant Environmental Compliance Approval's Monitoring Program (Schedule D).

2023 INFLUENT SAMPLING		
Parameter	Sample Type	Frequency
Total Biochemical Oxygen Demand	24 hour composite	Daily
Total Suspended Solids	24 hour composite	Daily
Total Phosphorous	24 hour composite	Daily
Total Kjeldahl Nitrogen	24 hour composite	Daily
pH	Grab sample	Weekly

2023 PRIMARY EFFLUENT SAMPLING		
Parameter	Sample Type	Frequency
Total Biochemical Oxygen Demand	24 hour composite	Daily
Total Suspended Solids	24 hour composite	Daily

2023 FINAL EFFLUENT SAMPLING		
Parameter	Sample Type	Frequency
E. coli	Grab sample	Weekly (Thursday)
Total Residual Chlorine	Grab sample field analysis	Daily (May 15 - Oct 15)
pH	Grab sample field analysis	Weekly (Wednesday)
Temperature	Grab sample field analysis	Weekly (Wednesday)
Unionized Ammonia as NH <sub>3</sub>	Calculated	Weekly (Wednesday)
cBiochemical Oxygen Demand	24 hour composite	5 x per week
Total Suspended Solids	24 hour composite	5 x per week
Total Phosphorous	24 hour composite	5 x per week
Ammonia as N	24 hour composite	5 x per week
Total Kjeldahl Nitrogen	24 hour composite	5 x per week
Nitrate as N	24 hour composite	5 x per week
Nitrite as N	24 hour composite	5 x per week
Metals (Boron, Cobalt, Magnesium, Manganese, Potassium, Strontium)	Grab sample	Monthly
Bis (2-ethylhexyl) Phthalate	Grab sample	Monthly

2023 BIOSOLIDS (CAKE) SAMPLING		
Parameter	Sample Type	Frequency
Total Solids	Grab sample	Bimonthly
Total Phosphorous	Grab sample	Bimonthly
Ammonia as N	Grab sample	Bimonthly
Nitrate as N	Grab sample	Bimonthly
Metals (Arsenic, Cadmium, Cobalt, Chromium, Copper, Lead, Mercury, Molybdenum, Nickel, Potassium, Selenium, Zinc)	Grab sample	Bimonthly

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

In February 2022, the Digester #3 draw-off line was plugged resulting in over pressurization which caused structural damage, as well as damage to the gas seal, requiring the digester to be taken out of service for clean-out and emergency roof repair. This is a longer-term project which limits the treatment capacity of the anaerobic digestion system. Completion of this project is expected in March 2023.

In late June through mid-July 2022, filamentous sludge and foaming developed in the north plant as a result of high solids mass, low flows, and high temperatures. This impacted biological processes and settleability. In response, operations staff increased solids wasting, decreased RAS flows, and utilized vac trucks to remove foam from the top of the basin. To mitigate future recurrence, a continuous improvement strategy was initiated to consolidate process data for ease of monitoring.

Throughout December 2022, operations staff noted impacted solids removal and turbid secondary effluent. An investigation identified very high concentrations of oleic acid on the surface of process tanks. It is suspected that this is the result of an industrial spill. In response, operations staff increased sludge wasting, adjusted MPS drain and fill cycles, and closely monitored process data. In spite of this upset, the new tertiary treatment system performed effectively to meet compliance limits. The City's Environmental Monitoring and Enforcement (EME) staff's investigative sampling pinpointed issues at a specific company. The company has proceeded with a self monitoring program and implemented corrective actions. In addition, EME has commenced evidentiary sampling and enforcement actions continue to pursue laying charges.

### 1.3.5 CONDITION 11 (4E) MAINTENANCE ACTIVITIES

Regular plant maintenance is carried out by Maintenance staff located at the Woodward Avenue WWTP. A computerized maintenance management system (Infor EAM) is used for scheduling and tracking routine and preventative maintenance. Larger or specialized maintenance activities are completed through third party external contractors.

In 2022, approximately \$1.16 million was spent maintaining the WWTP. Significant maintenance activities completed at the facility in 2022 are provided in [Appendix B](#) along with a cost breakdown of all maintenance activities completed on Hamilton'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's Environmental Lab which is accredited by the Canadian Association for Laboratory Accreditation Inc. (CALA). WWTP operation and performance is 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 a high quality of effluent and biosolids.

The City of Hamilton's Wastewater Quality Management System (WWQMS) was first endorsed by City Council on December 16, 2020. The WWQMS was fully implemented and operational in 2021. The WWQMS 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 a high-quality wastewater system.

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

[Appendix C](#) contains records pertaining to the calibrations performed on monitoring equipment during 2022.

### 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.
- Bylaw 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
BOD5	Annual Average Removal Percentage	30%
Total Suspended Solids	Annual Average Removal Percentage	50%

Removal percentages for the above parameters during secondary bypass events can be found in [Appendix A](#). The plant achieved an annual average removal of -13% of BOD5 and -42% of total suspended solids. These values are likely not representative of actual plant performance and rather, due to issues with the new influent autosampler that were identified in October 2022. Of the bypass removal results, ten (10) events with negative TSS removal and ten (10) events with negative BOD5 removal were recorded. Following adjustments made to the influent autosampler in October, removals averaged 70.6% of BOD5 and 80.4% of TSS both above design objective. Ongoing monitoring will determine if further adjustments are required.

### SECONDARY EFFLUENT DESIGN OBJECTIVES

Effluent Parameter	Averaging Calculator	Objective (mg/L)
cBOD5	Monthly Average Effluent Concentration	15.0
Total Suspended Solids	Monthly Average Effluent Concentration	15.0
Total Phosphorous	Monthly Average Effluent Concentration	0.6

The Woodward Avenue WWTP met the expectations of the secondary effluent design objectives without exception through 2022.

### 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/100mL (May 15 - October 15)
pH	Single sample result	6.5 – 8.5 inclusive

Final effluent chlorine residual readings for the 2022 disinfection season averaged at 0.01 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 do not meet the Design Objective.

During the disinfection season final effluent E. coli results consistently satisfied the objective of 200 organisms/100mL with the maximum monthly geometric mean density being 51 organisms/100mL.

The single sample result pH objective of 6.5 – 8.5 was met consistently throughout 2022 with results ranging from 6.71 – 7.46.

### 1.3.9 CONDITION 11 (4I) SLUDGE GENERATION

The biosolids sludge volume generated in 2022 totalled 51,625 wet tonnes. Based on recent history the volume anticipated in 2023 is 51,600 wet tonnes. Production is expected to continue at current rates. [Appendix A, Biosolids to Synagro](#) provides a monthly breakdown. Starting in May 2020 dewatered biosolids cake is further processed at the Biosolids Management Facility on site which is operated by Synagro Technologies. This facility is further reported on by Synagro under Environmental Compliance Approval #4876-AWNRYL.

### 1.3.10 CONDITION 11 (4J) SUMMARY OF COMPLAINTS

Appendix D contains a summary of the complaints received in 2022.

In 2022, there were a total of fourteen (14) complaints associated with Woodward Avenue WWTP, twelve (12) of which were related to odour, while two (2) complaints pertained to noise within the plant.

Of the twelve (12) odour complaints, investigation by staff determined that three (3) events are attributable to the facility's on-site biosolids processing contractor showing a marked improvement compared to the eleven (11) complaints associated with the biosolids facility in 2021. The City has worked with the contractor to address the concerns and the contractor has completed the following corrective actions:

- Performed a gap analysis to odour design intent
- Revised, re-issued, and trained staff on the Odour Management Plan and Odour Complaint Response Procedure
- Revised, re-issued, and trained staff on the Biosolids Product Truck Loading Procedure
- Equipment maintenance – completed an investigation on silo spillage within truck load out area with root cause and corrective action
- Conducted an evaluation of the HVAC system

Additionally, following completion of the above actions, the City carried out a site-wide odour assessment in 2022 with results and recommendations to be finalized in 2023.

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

The Woodward Avenue WWTP experienced eleven (11) bypass events in 2022 compared with twenty-three (23) events in 2021 and twelve (12) in 2020. The volume bypassed in 2022 totalled 1,674 ML compared to 2,404 ML bypassing treatment in 2021 and 1,387 ML in 2020.

The table below summarizes all bypass events occurring in 2022.

WOODWARD AVENUE WWTP 2022 BYPASS EVENTS							
SAC #	Bypass Location	Start Date	Start Time	Stop Date	Stop Time	Duration (Hours)	Volume (ML)
1-1N63O2	Secondary Bypass	2022-02-17	05:08	2022-02-19	01:51	44.71	541.728
220222 - 000007	Secondary Bypass	2022-02-22	15:36	2022-02-24	00:21	32.73	327.240
1-1NLXCS	Secondary Bypass	2022-03-06	14:16	2022-03-06	21:20	7.06	55.983
1-1P7L6O	Secondary Bypass	2022-03-23	21:10	2022-03-24	17:08	19.97	248.256
1-1P7Q08	Headworks Bypass	2022-03-23	23:35	2022-03-24	01:16	1.69	16.080
1-1SFVRL	Secondary Bypass	2022-05-03	19:30	2022-05-05	00:48	29.31	289.341
1-1U1J0D	Secondary Bypass	2022-06-07	09:29	2022-06-07	17:03	7.56	79.128
220718-000007	Secondary Bypass	2022-07-18	07:21	2022-07-18	10:05	2.73	28.062
220720-000008	Secondary Bypass	2022-07-20	23:05	2022-07-21	02:49	3.73	25.087
220912-000004	Secondary Bypass	2022-09-12	11:30	2022-09-12	13:39	2.16	21.442
221215-000007	Secondary Bypass	2022-12-15	13:23	2022-12-16	09:18	19.92	41.960

### 1.3.11.1 SPILL EVENTS

Nine (9) spill events relating to the Woodward Avenue WWTP and associated stations were reported in 2022.

**1. January 25, 2022 – SAC Reference 1-1KG7S5**

Methane gas leak discovered at the discharge valve of the plant's biogas storage sphere. Responding operations and maintenance staff were able to isolate the valve, stopping the leak. The cause was determined to be a blown gasket on the valve assembly.

**2. February 5, 2022 – SAC Reference 1-1LCDAH**

Spill of approximately 50,000 L of digester sludge from Digester #3. Spill was fully contained around the digester and did not reach any catch basins. Vac truck contractors were called to site to assist with clean-up and the digester transfer lines were flushed out by operations staff.

**3. March 22, 2022 – SAC Reference 1125-CCRGJY**

Planned release of methane gas to relieve pressure from Digester #3. Three hatches were left open for 24 hours to allow for ventilation. The repairs are expected to be completed by end of March 2023.

**4. April 13, 2022 – SAC Reference 1-1RFW40**

Methane gas leak discovered at the bottom of the biogas storage sphere. The leak was caused by a defective gasket at a flange under the aluminum insulation cladding at the sphere. Operations staff began to flare off remaining gas inside the tank as the leak could not be isolated and the tank required depressurization before repairs could be completed. Corrective actions were completed to replace two (2) gaskets.

**5. May 4, 2022 - SAC Reference 1-1SGQHA**

A leak of chlorinated effluent water was discovered beside the secondary clarifier chlorine injection chamber. A sump pump was set up to pump the water into the effluent water channel. Operations staff isolated the effluent water line and began planning for a hydro vac excavation to repair the line.

**6. July 14, 2022 – SAC Reference 1-1WC2ID**

Methane gas leak discovered at the biogas storage sphere. Operations staff quickly closed the discharge valve from the sphere, isolating the leak. The cogeneration unit was shut down while repairs were made. The cause was determined to be a blown gasket.

**7. August 18, 2022 – SAC Reference 103919150**

Spill of approximately 5 gallons of hydraulic fluid from a contractor's truck on site at the Woodward Avenue WWTP. Staff built a berm of absorbent socks to prevent the material from reaching any catch basins and ensured clean-up of the area.

**8. September 3, 2022 – SAC Reference 1-24WOT6**

Discharge of chlorinated effluent water due to an issue with sodium bisulphite dosage. The total duration of release was approximately 10 to 15 minutes.

**9. October 26, 2022 – SAC Reference 3087-CKKSGL**

Discharge of chlorinated effluent water during commissioning of the new tertiary treatment chlorination and de-chlorination systems. The total duration of this release was approximately 1 hour with a volume of approximately 16.25 ML.



### 1.3.12 CONDITION 11 (4L) NOTICE OF MODIFICATIONS

There were no notices of modifications submitted in 2022.

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

Hamilton Water has on-going programs and has undertaken various projects to meet MECP requirements for municipal combined sewer systems as per Procedure F-5-5, "Determination of Treatment Requirements for Municipal and Private Combined", which is a supporting document for Guideline F-5 "Levels of Treatment for Municipal and Private Sewage Treatment Works Discharging to Surface Waters". However, the City does not consistently achieve 90% capture of combined sewage during wet weather. 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 (CSS) Characterization Study
- Pollution Prevention and Control Plan (PPCP)

Key project milestones and their status are as follows:

- Final Terms of Reference Submission: December 02, 2019 (Complete)
- Progress Update: January 31, 2020 (Complete)
- Progress Update: March 31, 2020 (Complete)
- Draft CSS Characterization Study Submission to the MECP – June 15, 2020 (Complete)
- Held workshop to kick-off PPCP – January 27, 2022 (Complete)
- Consultation with MECP regarding Draft CSS Characterization Study - November 3, 2022 (Complete)
- MECP's Comments on the Draft CSS Characterization Study – January 13, 2023 (Complete)
- Revised schedule from MECP (Pending)
- Final CSS Characterization Study Submission (Pending)
- Draft Submission of PPCP to MECP (Pending)

In 2022, the development of the F-5-5 continued to be carried out in the following two stages:

**Stage 1:** The Ministry continued to review the revised draft CSS Report and met with the City on November 23, 2022 to present their comments.

**Stage 2:** Held kick-off workshop on January 27, 2022 to commence the development of the PPCP.

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 CSOs into Hamilton Harbour. RTC Phase 2 upgrades will specifically target the reduction of CSOs to the sensitive receiving waters of Cootes Paradise and Red Hill Creek. This work will include the modification of weirs, addition of level monitoring devices, and automation of some control devices in the system. The project is currently scheduled for completion in Q1 2024.

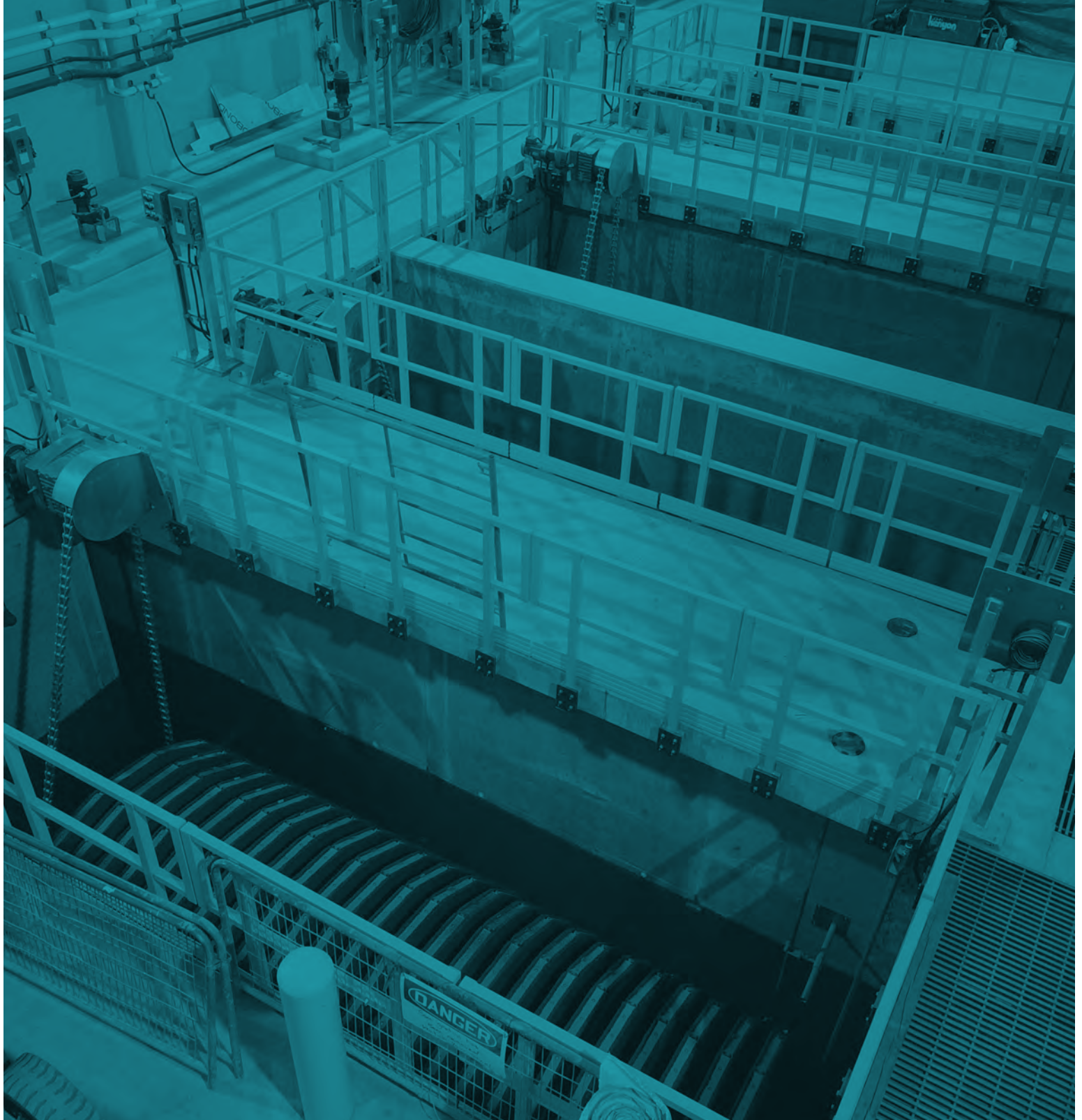
#### 1.3.13.2 Flooding and Drainage Improvement Framework

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 (FDIF). This new study advanced the work completed in the previous assignment by providing a framework and implementation road map of recommended solutions to address both short and long-term urban flooding issues in the combined sewer service area. The FDIF was completed in 2022 and the recommendation of the study is a program of ongoing studies (including Class Environmental Assessments), investigations, policies, and infrastructure works for a 20+ year timeframe to achieve system performance objectives. The overall cost of the program, over the 20+ year timeframe is estimated at \$1.029 billion.

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

The completion dates for the Woodward Avenue WWTP 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 – Expected June 2023 (Original Contract – December 30, 2021)





A black and white photograph of a wastewater treatment plant. The image shows concrete structures, pipes, and a body of water. A large teal geometric shape, resembling a triangle, is overlaid on the lower half of the image. The title "DUNDAS WASTEWATER TREATMENT PLANT" is written in white, bold, sans-serif capital letters across the teal shape.

# 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 (WWTP) is located at 135 King St. E in Dundas, Ontario and services a population of around 49,780. The plant treated an average of 10.28 million litres per day (MLD) in 2022 compared to 11.24 MLD in 2021 and features an average day design capacity of 18.2 MLD.

#### 2.1.2 THE DUNDAS WASTEWATER TREATMENT PROCESS

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

Today, the plant consists of preliminary treatment containing bar screens and a grit removal chamber. Ferric sulphate is added at this point to aid in the removal of phosphorous via precipitation. Next, wastewater flows into primary clarifiers wherein 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 in which air is forced through diffusers at the bottom of the tanks to supply oxygen for microbial populations that process organic material and oxidize ammonia to form nitrate. Following aeration, wastewater flows into secondary clarifiers in which 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 is then disinfected with chlorine from May 1 to October 31. The chlorinated water runs through a baffled chlorine contact chamber to ensure sufficient contact time for disinfection. A tertiary sand filtration system is then used to further reduce the suspended solids content of the secondary effluent, after which sodium bisulphite is added to remove chlorine from its disinfectant form. The treated effluent water is then released to Desjardins Canal.

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







### 2.1.3 IMPROVEMENTS TO THE FACILITY

The Hamilton Water and Wastewater Master Plan (2006) identified the current strategy to keep the Dundas WWTP in place with no increase or decrease in design flows. The ongoing Hamilton Water, Wastewater, and Stormwater Master Plan work will update plant capacity requirements in 2023. Effluent targets have been identified by the Hamilton Harbour Remedial Action Plan (HHRAP) process to reflect efforts for improved environmental health within Cootes Paradise. A previously developed conceptual design study is currently being updated for the Dundas WWTP to assess required upgrades that meet a range of performance levels for the future including the new HHRAP 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 2022, Hamilton Water requested additional budget to support commencement of the Dundas WWTP Upgrades project in 2024. Once started, this project will be a multi-year design and construction initiative potentially requiring updated technology to achieve a higher-quality effluent that will benefit the local environment.

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

## 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

### 2.2.2 EFFLUENT REQUIREMENTS

EFFLUENT REQUIREMENTS			
Parameter	Effluent Objectives (mg/L)	Effluent Monthly Average Concentration Limits (mg/L)	Effluent Daily Loading Limits (kg/d)
cBOD5	5.0	5.0	91.0
TSS	5.0	5.0	91.0
TKN - Summer (May 1 - October 31)	2.0	2.0	36.4
TKN - Winter (November 1 - April 30)	10.0	10.0	182.0
TP	0.5	0.5	9.1
Chlorine Residual (May 1 - October 31)	0.02	0.02	-
E. Coli (May 1 - 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), 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 residual are sampled daily on a seasonal basis from May 1 to October 31.

Samples are collected using a flow proportional automatic water quality sampler and composited over a 24-hour period. The samples are refrigerated prior to analysis at the City of Hamilton Environmental Laboratory located at the Woodward Avenue WWTP.





## 2.3 ENVIRONMENTAL COMPLIANCE APPROVAL REPORTING REQUIREMENTS

With reference to 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 2022, the Dundas WWTP 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 seventh consecutive calendar year in which the plant has achieved 100% compliance with all effluent limits. Details of plant performance in 2022 can be found in [Appendix E](#).

EFFLUENT CONCENTRATIONS (mg/L)						
Year	TSS	cBOD	TP	SP	NH3	TKN
2017	0.92	1.18	0.07	0.05	0.07	0.56
2018	0.96	1.26	0.05	0.03	0.04	0.57
2019	0.84	1.26	0.08	0.06	0.09	0.62
2020	0.89	1.26	0.11	0.09	0.08	0.60
2021	0.88	1.99	0.13	0.10	0.66	1.27
2022	1.16	1.49	0.13	0.11	0.07	0.67

EFFLUENT LOADINGS (kg/d)						
Year	TSS	cBOD	TP	SP	NH3	TKN
2017	12.1	15.6	0.9	0.6	0.9	7.3
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

Effluent concentrations and loadings in 2022 fell within the expected ranges based on historical data.

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

During a rain and thunderstorm event on May 21, 2022 the Dundas plant experienced 3 power outages resulting in the plant being shut down for 3 hours. SCADA communications and power were lost through this period. The backup generator failed due to an overcharge of the battery and has since been replaced with a voltage regulator. This did not impact the City of Hamilton's ability to treat incoming wastewater.

### 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 WWTP. A computerized maintenance management system (Infor EAM) is used for scheduling and tracking routine and preventative maintenance. Large or specialized maintenance is completed by qualified third-party contractors. In 2022, the City spent approximately \$111,488 on maintenance activities at the Dundas WWTP. [Appendix B](#) contains a cost breakdown of maintenance activities completed on all of the City's vertical wastewater infrastructure and lists the significant maintenance activities completed in 2022 at the Dundas WWTP.

### 2.3.4 CONDITION 11 (6D) EFFLUENT QUALITY ASSURANCE

Analytical tests to monitor required parameters are performed by the City of Hamilton's Environmental Lab which is accredited by the Canadian Association for Laboratory Accreditation Inc. (CALA). WWTP operation and performance is 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 a high quality of effluent and biosolids.

The City of Hamilton's Wastewater Quality Management System (WWQMS) was first endorsed by City Council on December 16, 2020. The WWQMS was fully implemented and operational in 2021. The WWQMS 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 a high-quality wastewater system.

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

[Appendix C](#) contains records pertaining to the calibrations performed on monitoring equipment during 2022.

### 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 2022 the Dundas WWTP 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](#) 'Combined Plant Effluent - Concentrations' and the daily loading limits. Efforts made to obtain these objectives include:

- Continual monitoring and periodic adjustment of process by licensed and highly skilled operators.
- Bylaw 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 59,963 cubic meters in 2022. [Appendix E](#) captures the monthly volume of leachate entering the Dundas WWTP.

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

[Appendix E](#) contains the 2022 quarterly sewer discharge sampling results from the Redland Brow Landfill.

### 2.3.9 CONDITION 11 (6I) SLUDGE VOLUME

Raw sludge collected at the Dundas WWTP is hauled by truck to the Woodward Avenue WWTP for processing. The sludge volume generated in 2022 totalled 40,412 tonnes. Based on recent history the volume anticipated in 2023 is forecasted at around 42,000 tonnes. Monthly details can be found in [Appendix E](#) titled 'Sludge Hauled to Woodward'.

### 2.3.10 CONDITION 11 (6J) SUMMARY OF COMPLAINTS

No complaints were received at the Dundas WWTP in 2022.

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

In 2022, there were two spill events at the Dundas WWTP and associated stations reported to the MECP.

#### 1. May 2, 2022 – SAC Reference 1-1SDMXL

Discharge of approximately 188 m<sup>3</sup> of chlorinated effluent water from the Dundas WWTP due to failure of the sodium bisulphite pumps. During investigation and repair of the issue, staff carried out gravity dosing from small containers.

#### 2. November 29, 2022 – SAC Reference 1-2AI19N

Spill of approximately 5 litres of diesel fuel from a temporary portable generator in place at wastewater pumping station DC017. Absorbent pads were applied by operations staff and clean-up was completed by T&T Power staff. It was determined that the fuel tank had been overfilled.







# **WASTEWATER COLLECTION FACILITIES**



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## 3 WASTEWATER COLLECTION FACILITIES

### 3.1 GENERAL INFORMATION

The City of Hamilton operates seventy-one (71) sewage pumping stations and nine (9) combined sewer overflow (CSO) tank facilities and is required to report the performance of thirteen (13) facilities as a result of conditions within the individual facilities' Environmental Compliance Approvals (ECA) or Certificate of Approval (CofA). It is anticipated that reporting requirements will be expanded with the development of the Combined Linear Infrastructure Environmental Compliance Approval (CLI ECA). This report is intended to satisfy reporting requirements of the existing Environmental Compliance Approvals.

#### 3.1.1 HCS01/HCS06: GREENHILL CSO TANKS

The Greenhill CSO Tanks are located on the south side of Greenhill Ave and east of Rosseau Rd. The first tank (HCS01) has a capacity of 75,000 m<sup>3</sup> and was completed in 1988. The second tank (HCS06) was built upstream of the first tank and has a volume of 65,000 m<sup>3</sup>. It was completed in 2004 and was designed to reduce the frequency of CSOs entering the Red Hill Creek at the Greenhill CSO Outfall (based on the synthetic average year). Flow into HCS06 is regulated upstream of the tank and if it is filled completely, it will overflow to HCS01 and finally to a wetland area adjacent to Red Hill Creek.

#### 3.1.2 HCS02: STRACHAN CSO TANK

The Strachan CSO Tank is located at 201 Harbourfront Drive, near Hamilton's Bayfront Park. The tank volume is 23,000 m<sup>3</sup>, consisting of two relatively equally sized cells. It was completed in 1993 and designed to reduce the frequency of CSOs entering the Hamilton Harbour at the former Queen Street and Hess Street CSO Outfalls from thirteen (13) per year to one (1) per year (based on the synthetic average year).

#### 3.1.3 HCS03: JAMES CSO TANK

The James CSO Tank is located at the foot of James Street, north of Guise Street. The tank volume is 2,000 m<sup>3</sup> and was completed in 1993. The station was designed to reduce the frequency of CSOs entering Hamilton Harbour at James Street CSO Outfall from twenty-four (24) per year to one (1) per year (based on the synthetic average year). As part of the real time control program the Mary/Ferrie sluice gate (HCG08) was upgraded in 2012 to benefit this CSO tank.

#### 3.1.4 HCS04: MAIN/KING CSO TANK

The Main/King CSO Tank is located in Cathedral Park, bounded by Main Street West, Hwy 403, King Street West, and Dundurn Street. The tank volume is 75,000 m<sup>3</sup>, consisting of two (2) cells (Cell #1 with an approximate volume of 22,000 m<sup>3</sup> and Cell #2 with an approximate volume of 53,000 m<sup>3</sup>). The tank was completed in 1997 and was designed to reduce the frequency of CSOs entering Chedoke Creek at the Glen Road and McKittrick CSO Outfalls.

#### 3.1.5 HCS05: EASTWOOD CSO TANK

The Eastwood CSO Tank is located in Eastwood Park, on the southwest corner of Ferguson Avenue and Dock Service Road. The tank volume is 25,000 m<sup>3</sup>, consisting of two (2) similarly sized cells. It was completed in 1997 and was designed to reduce the frequency of CSOs entering Hamilton Harbour at the Catharine Street and Ferguson Avenue CSO Outfalls.

#### 3.1.6 HCS07: RED HILL SUPERPIPE

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

### 3.1.7 HCS08: ROYAL CSO TANK

The Royal CSO Tank is located in Stroud Park, on the southwest corner of Royal Avenue and Stroud Road. The tank volume is 15,000 m<sup>3</sup>. It was completed in late 2007 and was designed to reduce the frequency of CSOs entering Chedoke Creek from the Royal Avenue combined sewer system.



### 3.1.8 HCS09: MCMASTER CSO TANK

The McMaster CSO Tank is located at McMaster University in the Zone 6 parking lot. The tank was completed in April 2012 and the storage volume of 5,935 m<sup>3</sup> is designed to reduce combined sewer overflows to Coldwater Creek which discharges into Cootes Paradise.

### 3.1.9 HCO18: TWENTY ROAD WASTEWATER PUMPING STATION

The Twenty Road Wastewater Pumping Station is located at 1980 Upper James St. The station itself is a single storey building laid out in a drywell/wet well configuration. The drywell contains the sewage lift pumps, piping, and process instrumentation. There is also an electrical room that contains the motor control center (MCC), variable frequency drive (VFD) cabinet (considered to be part of the MCC), programmable automation controller (PAC) panel, and wide area network (WAN) panel. The site has an outdoor pad-mounted generator with a noise abatement enclosure. The wet well is a single cell with three (3) pumps (2 duty, 1 standby), each with a rated capacity of 320 L/s. This facility features an overflow which could discharge to Twenty Mile Creek.

### 3.1.10 HCO19: ENGLISH CHURCH WASTEWATER PUMPING STATION

The English Church Wastewater Pumping Station is located at 2844 Upper James St. The station itself 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 WWTP. There are three (3) sewage lift pumps (2 duty, 1 standby), each with a rated capacity of 210 L/s. There are no overflow provisions at the facility.

### 3.1.11 HCO27: HOMESTEAD WASTEWATER PUMPING STATION

The Homestead Wastewater Pumping Station is located at 3359 Homestead Dr. The station itself is a single-storey building with an adjacent subsurface wet well. The station collects wastewater in two wet wells and automatically pumps it to the Woodward Avenue WWTP. There are three (3) sewage lift pumps (2 duty, 1 standby), each with a rated capacity of 91 L/s. There are no provisions for overflows at this facility.

### 3.1.12 HCO58: BINBROOK WASTEWATER PUMPING STATION

The Regional Road 56 Binbrook Wastewater Pumping Station is located at 3255 Regional Rd 56 in Binbrook. The station itself 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 WWTP. There are three (3) sewage lift pumps (2 duty, 1 standby), each with a rated capacity of 257L/s. The station is rated for an ultimate peak flow of 507 L/s. There is also a wet weather valve between the two (2) 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 provisions for overflows at this facility.

## 3.2 ENVIRONMENTAL COMPLIANCE APPROVAL REPORTING REQUIREMENTS

Facility	ECA or CofA Number	Issue Date
HCS01/HCS06: Greenhill CSO Tanks	6240-8YAJ3G	September 19, 2012
HCS02: Strachan CSO Tank	0706-5UHHVC	February 4, 2004
HCS03: James CSO Tank	3-1194-92-006	October 16, 1992
HCS04: Main/King CSO Tank	3-1455-94-956	January 6, 1995
HCS05: Eastwood CSO Tank	3-1686-95-966	February 8, 1996
HCS07: Red Hill Superpipe	7667-5W4LBK	April 23, 2004
HCS08: Royal CSO Tank	5975-6ADPCK	May 31, 2005
HCS09: McMaster CSO Tank	7422-7K9GZE	November 14, 2008
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

### 3.2.1 CONSOLIDATED LINEAR INFRASTRUCTURE ENVIRONMENTAL COMPLIANCE APPROVAL (CLI ECA)

The Consolidated Linear Infrastructure Environmental Compliance Approval (CLI ECA) application was submitted as per the deadline on January 21, 2022. The City continues to work with the MECP on the Hamilton-specific conditions in the CLI ECA.

### 3.2.2 NOTICE OF MODIFICATIONS

No Notices of Modification were submitted in 2022 for any of the above facilities.

### 3.2.3 MONITORING AND ANALYTICAL DATA

The tables below contain summaries of overflows from each of the reported facilities. These facilities experienced a combined total of ten (10) overflows in 2022 with a total duration of approximately 158 hours and a total volume of approximately 699.7 ML. By comparison, these facilities experienced a combined total of twenty-seven (27) overflows in 2021 with a total duration of approximately 406 hours and a total volume of approximately 1,639.6 ML. Analytical results of samples collected during storm events can be found in [Appendix F](#).

Facility	Number of Overflow Events	Total Duration (Hours)	Total Volume (ML)
HCS01 Greenhill CSO Tank	4	78.7	558.85
HCS02 Strachan CSO Tank	0	0	0
HCS03 James CSO Tank	0	0	0
HCS04 Main/King CSO Tank	4	57.8	134.61
HCS05 Eastwood CSO Tank	0	0	0
HCS07 Red Hill Superpipe	0	0	0
HCS08 Royal CSO Tank	2	21.6	6.25
HCS09 McMaster CSO Tank	0	0	0



2022 COMBINED SEWER OVERFLOW EVENTS						
Location	Start Date	Start Time	End Date	End Time	Duration (Hours)	Volume (ML)
HCS08	2022-02-17	07:12	2022-02-17	20:35	13.37	4.850
HCS01	2022-02-17	07:45	2022-02-18	01:56	18.18	230.986
HCS04	2022-02-17	08:15	2022-02-17	21:10	12.92	15.565
HCS01	2022-02-22	23:45	2022-02-23	15:43	15.98	96.289
HCS08	2022-02-23	00:58	2022-02-23	09:13	8.24	1.400
HCS04	2022-02-23	02:25	2022-02-24	02:03	23.63	58.831
HCS04	2022-03-23	23:53	2022-03-24	19:41	19.80	57.032
HCS01	2022-03-24	00:07	2022-03-25	01:21	25.24	134.244
HCS01	2022-05-04	06:12	2022-05-05	01:29	19.28	97.327
HCS04	2022-05-04	13:50	2022-05-04	15:15	1.42	3.181

### 3.2.4 MAINTENANCE OF MAJOR EQUIPMENT

Regular maintenance is carried out by Maintenance staff located at the Woodward Avenue WWTP. A computerized maintenance management system (Infor EAM) monitors routine and preventative maintenance scheduling. Larger or specialized maintenance activities are completed through third party external contractors. In 2022, approximately \$688,854 was spent maintaining the wastewater pumping stations and CSO facilities. Significant maintenance activities completed at the facilities in 2022 are provided in [Appendix B](#) along with a cost breakdown of all maintenance activities completed on Hamilton's vertical wastewater infrastructure.

### 3.2.5 CALIBRATION AND MAINTENANCE OF MONITORING EQUIPMENT

[Appendix C](#) contains the calibration activities on the effluent monitoring equipment.

### 3.2.6 OPERATING PROBLEMS AND CORRECTIVE ACTION

In general, the CSO facilities operated as designed in 2022; however, ongoing issues occurred with the effluent autosampler at the Main/King CSO tank. As a result of these issues, no overflow samples at this location could be collected in 2022 prior to the autosampler being put back into service on September 15, 2022. In addition, the table below summarizes sample events that did not yield any samples due to operational problems.

CSO Event Date	EME Work Order Number	Asset Description	Operational problems and corrective actions
February 16, 2022	7081917, 7082199 & 7082895	Strachan CSO Tank Influent	SCADA indicated influent sampler fault. EME staff followed up and reset the sampler for restart 3 times on 3 separate visits. No samples collected for these 3 events. Damaged tube was replaced and preventative maintenance was performed.
March 23, 2022	7100509	Eastwood CSO Tank Influent	Sampler failed to collect any sample due to power failure. Auto email for work order not sent out due to erroneous trigger code during power outage. When power came back on, the autosampler was back in service but did not need to collect samples as the event had ended.
May 3, 2022	7121132	Eastwood CSO Tank Influent	CSO hit trigger level but did not collect sample. All samples showed "no liquid detected". Pump tubing was damaged. Instrumentation team replaced tubing and investigated pump.

### 3.2.7 SUMMARY OF COMPLAINTS

One (1) odour complaint was received in relation to sewer odours in Binbrook in 2022. This compares to seven (7) odour complaints in 2021 and forty-three (43) complaints received in 2020. A pilot project with USP Technologies – Canada (USP) at Binbrook was initiated in response to the odour complaints in 2020. Further information about the pilot project can be found in Section 3.2.10.2

Throughout 2022 the City continued its ongoing response to hydrogen sulphide ( $H_2S$ ) odour complaints from 2020 through increased monitoring of  $H_2S$  in certain locations, as well as ongoing system optimization through pumping schedules, operation and maintenance of biofilters and carbon scrubbers and a pilot system dosing hydrogen peroxide as a means of  $H_2S$  control.

### 3.2.8 SUMMARY OF SPILLS AND ABNORMAL DISCHARGE EVENTS

All discharge events at these facilities in 2022 were CSO tank overflow events occurring during storm events in which tank capacity was exceeded due to heavy precipitation. No further spills or abnormal discharge events occurred.

### 3.2.9 OTHER INFORMATION REQUIRED BY THE MECP 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 CSO tank facilities and wastewater pumping stations are operating effectively as designed. Significant projects currently underway at these facilities include the rehabilitation of the Main/King CSO infrastructure and an odour control pilot project at the Binbrook Wastewater Pumping Station.

#### 3.2.10.1 Main/King CSO Rehabilitation

The scope of work includes rehabilitation to provide redundancy of gate position detection, as well as to improve the facility's overall reliability and performance during operation. A total of five (5) gates operate by means of an electrical actuator. These actuators are at the end of their life cycle and built with obsolete technology. All actuators will be replaced to provide gate positioning detection redundancy and improve the facility's reliability. Notice to Proceed was issued to the Contractor in December 2022 and the Contractor will mobilize on site in Q2 2023.

#### 3.2.10.2 Binbrook Odour Control Pilot

High levels of  $H_2S$  were causing significant corrosion of new concrete sewers and odour concerns for residents living along Highways 56 and 20. A Pilot with USP Technologies - Canada (USP) was approved in December 2020. USP's scope included the interim supply of chemical, equipment, logistics, monitoring and program management of an odour and corrosion control system to mitigate high levels of  $H_2S$  in the wastewater collection system. The City continues to monitor the effectiveness of the pilot which, combined with other process optimizations, has shown significant reduction in  $H_2S$  levels throughout 2022. The City plans to come to a decision regarding the long-term application of the chemical dosing system in 2023.



# APPENDICES

PLANT FLOWS					
Month	Monthly Volume ML	Daily Average ML/d	Daily Maximum ML/d	Daily Minimum ML/d	Disinfected Volume ML
January	7,144.48	230.467	275.93	207.32	-
February	10,729.91	383.211	890.11	213.08	-
March	11,346.00	366.000	666.34	268.78	-
April	8,619.44	287.315	396.60	226.22	-
May	8,929.25	288.040	717.91	220.87	4,062.28
June	8,048.70	268.290	499.48	205.08	8,048.70
July	7,269.06	234.486	443.75	188.52	7,269.06
August	6,741.51	217.468	369.62	183.59	6,741.51
September	6,532.57	217.752	375.55	189.23	6,532.57
October	6,240.13	201.295	383.42	171.83	3,001.08
November	6,252.88	208.429	404.19	181.30	-
December	7,956.04	256.646	480.38	202.22	-
Total	95,809.97				35,655.20
Avg	7,984.16	263.283	491.94	204.84	5,942.53
Max	11,346.00	383.211	890.11	268.78	8,048.70
Min	6,240.13	201.295	275.93	171.83	3,001.08

CAPACITY EXCEEDANCE				
Month	> 90% of 409 ML/day		> 100% of 409 ML/day	
	Days	%	Days	%
January	0	0.0%	0	0.0%
February	10	35.7%	9	32.1%
March	10	32.3%	9	29.0%
April	2	6.7%	0	0.0%
May	3	9.7%	3	9.7%
June	3	10.0%	1	3.3%
July	2	6.5%	1	3.2%
August	1	3.2%	0	0.0%
September	1	3.3%	0	0.0%
October	1	3.2%	0	0.0%
November	1	3.3%	0	0.0%
December	3	9.7%	3	9.7%
Total	37	10.3%	26	7.3%
Avg	3		2	
Max	10		9	
Min	0		0	



RAW INFLUENT DAILY LOADINGS							
Month	TSS kg/day	cBOD kg/day	TP kg/day	SP kg/day	NH3 kg/day	TKN kg/day	Chloride kg/day
January	47,322	33,299	1,199	371	5,825	8,378	77,299
February	65,229	41,428	1,647	395	6,972	10,174	97,158
March	40,188	31,157	1,083	360	6,517	8,450	96,777
April	69,040	40,301	1,389	388	6,374	9,530	80,324
May	81,241	44,061	1,228	422	6,645	9,562	82,305
June	55,258	37,596	1,176	438	6,663	9,276	74,173
July	54,242	33,736	1,216	384	6,252	8,836	67,547
August	47,485	33,259	1,075	439	6,215	8,467	62,785
September	42,491	31,690	1,066	443	6,171	8,558	60,049
October	56,487	34,562	1,182	447	6,413	8,846	56,973
November	99,150	52,976	1,524	421	6,521	9,725	58,242
December	137,155	63,816	2,203	464	7,164	11,754	70,941
Avg	66,274	39,823	1,332	414	6,478	9,296	73,714
Max	137,155	63,816	2,203	464	7,164	11,754	97,158
Min	40,188	31,157	1,066	360	5,825	8,378	56,973

RAW INFLUENT CONCENTRATIONS												
Month	TSS mg/L	cBOD mg/L	TP mg/L	SP mg/L	NH3 mg/L	TKN mg/L	Chloride mg/L	Conductivity umhos/cm	Temp. °C	Alkalinity mg/L	COD mg/L	pH
January	205.33	144.48	5.20	1.61	25.27	36.35	335.40	1,840	15.84	291.94	401.75	7.60
February	170.22	108.11	4.30	1.03	18.19	26.55	253.54	421	12.77	253.54	319.75	7.58
March	109.80	85.13	2.96	0.98	17.81	23.09	264.42	387	12.89	264.42	229.40	7.61
April	240.29	140.27	4.83	1.35	22.18	33.17	279.57	288	14.76	279.57	349.25	7.60
May	282.05	152.97	4.26	1.47	23.07	33.20	285.74	270	16.97	285.74	487.25	7.60
June	205.96	140.13	4.38	1.63	24.84	34.57	276.47	232	19.52	276.47	322.20	7.56
July	231.32	143.87	5.19	1.64	26.66	37.68	288.06	246	21.92	288.06	450.75	7.62
August	218.35	152.94	4.95	2.02	28.58	38.93	288.71	186	23.53	288.71	492.60	7.58
September	195.14	145.53	4.89	2.04	28.34	39.30	275.77	189	23.96	275.77	467.00	7.59
October	280.62	171.70	5.87	2.22	31.86	43.94	283.03	208	21.94	283.03	504.33	7.57
November	475.70	254.17	7.31	2.02	31.29	46.66	279.43	208	20.07	279.43	711.60	7.48
December	534.41	248.66	8.58	1.81	27.91	45.80	276.41	263	17.33	276.41	631.25	7.54
Avg	262.43	157.33	5.23	1.65	25.50	36.60	282.21	395	18.46	278.59	447.26	7.58
Max	534.41	254.17	8.58	2.22	31.86	46.66	335.40	1,840	23.96	291.94	711.60	7.62
Min	109.80	85.13	2.96	0.98	17.81	23.09	253.54	186	12.77	253.54	229.40	7.48

PRIMARY EFFLUENT TO NORTH PLANT								
Month	TSS		cBOD		TP		NH3	TKN
	mg/L	% removal	mg/L	% removal	mg/L	% removal	mg/L	mg/L
January	60.93	70.3%	90.32	37.5%	2.45	53.0%	26.78	32.58
February	84.58	50.3%	86.43	20.1%	2.45	43.0%	19.49	25.29
March	63.30	42.4%	69.32	18.6%	2.12	28.4%	18.25	22.96
April	75.06	68.8%	91.20	35.0%	2.52	47.8%	22.35	28.62
May	75.98	73.1%	76.87	49.7%	2.09	51.1%	22.11	28.15
June	70.24	65.9%	81.77	41.7%	2.31	47.4%	22.99	29.15
July	77.23	66.6%	92.23	35.9%	2.51	51.5%	26.17	32.96
August	82.39	62.3%	100.84	34.1%	2.51	49.3%	26.92	33.16
September	77.85	60.1%	96.00	34.0%	2.54	48.2%	26.88	34.03
October	66.42	76.3%	101.52	40.9%	2.65	55.0%	29.99	36.36
November	182.08	61.7%	107.43	57.7%	2.76	62.3%	28.97	35.73
December	103.78	80.6%	91.94	63.0%	2.79	67.5%	25.97	34.15
Avg	84.99	64.9%	90.49	39.0%	2.47	50.4%	24.74	31.10
Max	182.08	80.6%	107.43	63.0%	2.79	67.5%	29.99	36.36
Min	60.93	42.4%	69.32	18.6%	2.09	28.4%	18.25	22.96

PRIMARY EFFLUENT TO SOUTH PLANT								
Month	TSS		cBOD		TP		NH3	TKN
	mg/L	% removal	mg/L	% removal	mg/L	% removal	mg/L	mg/L
January	61.03	70.3%	94.55	34.6%	2.54	51.2%	27.01	32.92
February	75.39	55.7%	84.04	22.3%	2.29	46.8%	18.87	24.33
March	59.02	46.2%	71.10	16.5%	2.01	32.0%	18.36	22.72
April	73.40	69.5%	85.13	39.3%	2.49	48.5%	21.93	28.15
May	67.77	76.0%	76.37	50.1%	2.07	51.4%	21.35	27.59
June	65.01	68.4%	81.47	41.9%	2.23	49.3%	22.58	28.57
July	77.80	66.4%	97.35	32.3%	2.66	48.7%	25.95	32.29
August	75.40	65.5%	110.65	27.7%	2.73	44.9%	27.73	33.73
September	69.08	64.6%	97.87	32.8%	2.55	48.0%	27.90	33.98
October	68.04	75.8%	104.16	39.3%	2.61	55.6%	31.50	37.10
November	88.65	81.4%	114.17	55.1%	2.88	60.6%	31.43	37.38
December	102.32	80.9%	92.00	63.0%	2.82	67.1%	26.16	33.82
Avg	73.58	68.4%	92.40	37.9%	2.49	50.3%	25.06	31.05
Max	102.32	81.4%	114.17	63.0%	2.88	67.1%	31.50	37.38
Min	59.02	46.2%	71.10	16.5%	2.01	32.0%	18.36	22.72

## SLUDGE

RAW SLUDGE					
Month	Raw Sludge Pumped m <sup>3</sup> /mth	pH	Total Solids %	Volatile Solids %	Sludge to Digester Dry Tonnes
January	30,383	6.38	3.30	74.01	1,003
February	35,177	6.30	4.13	64.53	1,454
March	31,667	6.35	4.55	65.29	1,440
April	35,235	5.96	4.21	67.51	1,483
May	31,324	6.27	4.11	68.99	1,288
June	27,347	6.20	3.65	70.12	999
July	30,742	6.06	3.43	68.47	1,053
August	32,864	6.15	3.39	67.80	1,115
September	27,542	6.29	3.77	70.37	1,038
October	25,580	6.22	3.72	72.54	952
November	25,794	5.94	3.54	72.13	912
December	33,061	6.18	3.67	73.26	1,212
<b>Total</b>	<b>366,714</b>				
<b>Avg</b>	<b>30,560</b>	<b>6.19</b>	<b>3.79</b>	<b>69.58</b>	<b>1,163</b>
<b>Max</b>	<b>35,235</b>	<b>6.38</b>	<b>4.55</b>	<b>74.01</b>	<b>1,483</b>
<b>Min</b>	<b>25,580</b>	<b>5.94</b>	<b>3.30</b>	<b>64.53</b>	<b>912</b>

## AERATION

AERATION RETENTION TIME				
Month	North		South	
	SRT days	HRT hours	SRT days	HRT hours
January	11.02	9.98	15.73	8.75
February	7.99	6.79	9.77	6.77
March	7.89	6.39	6.39	6.48
April	7.88	7.89	8.54	7.87
May	7.71	8.85	7.46	8.83
June	9.81	8.94	9.59	8.51
July	9.06	10.48	9.12	9.48
August	11.28	11.93	7.97	11.66
September	11.18	11.85	8.60	12.33
October	10.92	12.10	11.18	8.44
November	8.09	11.77	5.04	7.16
December	9.29	11.16	5.27	8.57
<b>Avg</b>	<b>9.34</b>	<b>9.84</b>	<b>8.72</b>	<b>8.74</b>
<b>Max</b>	<b>11.28</b>	<b>12.10</b>	<b>15.73</b>	<b>12.33</b>
<b>Min</b>	<b>7.71</b>	<b>6.39</b>	<b>5.04</b>	<b>6.48</b>

NORTH AERATION						
MONTH	Flow	SVI	F/M	MLSS	MLVSS	WAS
	ML/d	mL/g	ratio	mg/L	mg/L	mg/L
January	153.6	140.13	0.10	2,628	2,095	7,935
February	255.5	106.77	0.16	2,576	1,978	8,309
March	244.0	108.25	0.13	2,705	2,063	8,122
April	191.5	179.73	0.15	2,401	1,874	7,440
May	192.0	97.10	0.11	2,505	1,911	8,345
June	178.9	184.50	0.12	2,509	1,870	8,699
July	156.3	136.11	0.22	1,451	1,118	5,102
August	145.0	108.67	0.15	1,858	1,412	5,755
September	145.2	79.16	0.16	1,665	1,260	5,103
October	134.2	81.55	0.13	2,114	1,573	6,037
November	139.0	95.88	0.13	2,126	1,651	6,685
December	171.1	93.00	0.12	2,155	1,651	5,676
<b>Avg</b>	<b>175.5</b>	<b>117.57</b>	<b>0.14</b>	<b>2,225</b>	<b>1,705</b>	<b>6,934</b>
<b>Max</b>	<b>255.5</b>	<b>184.50</b>	<b>0.22</b>	<b>2,705</b>	<b>2,095</b>	<b>8,699</b>
<b>Min</b>	<b>134.2</b>	<b>79.16</b>	<b>0.10</b>	<b>1,451</b>	<b>1,118</b>	<b>5,102</b>

SOUTH AERATION						
MONTH	Flow	SVI	F/M	MLSS	MLVSS	WAS
	ML/d	mL/g	ratio	mg/L	mg/L	mg/L
January	76.8	58.47	0.12	2,819	2,213	7,164
February	127.7	66.30	0.15	2,678	2,029	7,507
March	122.0	90.30	0.15	2,360	1,816	6,559
April	95.8	82.16	0.14	2,493	1,926	6,008
May	96.0	80.64	0.16	1,781	1,357	4,304
June	89.4	103.86	0.17	1,919	1,430	4,712
July	78.2	84.59	0.17	2,037	1,522	4,809
August	72.5	94.06	0.24	1,346	1,008	3,173
September	72.6	80.98	0.24	1,152	857	3,639
October	67.1	65.29	0.25	1,665	1,258	5,623
November	69.5	91.73	0.26	1,987	1,522	6,819
December	85.5	96.64	0.21	1,712	1,292	5,633
<b>95.0</b>	<b>87.8</b>	<b>82.92</b>	<b>0.19</b>	<b>1,996</b>	<b>1,519</b>	<b>5,496</b>
<b>140.0</b>	<b>127.7</b>	<b>103.86</b>	<b>0.26</b>	<b>2,819</b>	<b>2,213</b>	<b>7,507</b>
<b>75.0</b>	<b>67.1</b>	<b>58.47</b>	<b>0.12</b>	<b>1,152</b>	<b>857</b>	<b>3,173</b>



FINAL EFFLUENT LOADINGS									
Month	TSS kg/day	cBOD kg/day	TP kg/day	SP kg/day	NH3 kg/day	TKN kg/day	NO3 kg/day	NO2 kg/day	Alkalinity kg/day
January	1,638	1,027	138	101	423	669	4,600	200	29,191
February	4,321	2,405	177	97	1,476	1,868	3,877	592	59,982
March	2,690	1,790	160	108	1,484	1,769	4,274	336	62,029
April	1,847	1,156	148	109	500	800	4,916	104	39,273
May	1,964	978	124	85	439	725	5,180	117	38,691
June	1,496	902	119	89	211	480	4,538	75	32,451
July	1,274	1,039	103	77	509	787	4,335	139	28,964
August	1,010	964	95	75	321	526	4,255	78	24,594
September	1,461	1,042	111	76	1,954	2,206	3,532	69	29,200
October	972	737	98	74	872	1,025	4,454	59	16,918
November	498	914	43	29	727	914	3,912	91	21,066
December	1,528	1,190	69	28	603	925	4,960	128	25,444
Avg	1,725	1,179	116	79	793.4	1,058	4,403	166	33,984
Max	4,321	2,405	177	109	1,954.4	2,206	5,180	592	62,029
Min	498	737	43	28	211.2	480	3,532	59	16,918

FINAL EFFLUENT CONCENTRATIONS												
Month	TSS mg/L	cBOD mg/L	TP mg/L	SP mg/L	NH3 mg/L	TKN mg/L	NO3 mg/L	NO2 mg/L	Alkalinity mg/L	Temp. °C	pH	E coli*
January	7.11	4.45	0.60	0.44	1.84	2.90	19.96	0.87	126.66	12.38	7.41	-
February	11.28	6.28	0.46	0.25	3.85	4.88	10.12	1.54	156.53	10.38	7.52	-
March	7.35	4.89	0.44	0.30	4.05	4.83	11.68	0.92	169.48	11.45	7.55	-
April	6.43	4.02	0.52	0.38	1.74	2.78	17.11	0.36	136.69	13.35	7.59	-
May	6.82	3.40	0.43	0.30	1.53	2.52	17.98	0.41	134.33	15.95	7.50	6
June	5.58	3.36	0.44	0.33	0.79	1.79	16.92	0.28	120.95	19.35	7.52	11
July	5.43	4.43	0.44	0.33	2.17	3.36	18.49	0.59	123.52	21.80	7.55	51
August	4.65	4.43	0.44	0.34	1.48	2.42	19.57	0.36	113.09	21.87	7.60	28
September	6.71	4.79	0.51	0.35	8.98	10.13	16.22	0.31	134.10	21.65	7.57	25
October	4.83	3.66	0.49	0.37	4.33	5.09	22.13	0.29	84.05	19.14	7.43	6
November	2.39	4.39	0.21	0.14	3.49	4.38	18.77	0.44	101.07	20.95	7.66	-
December	5.95	4.64	0.27	0.11	2.35	3.60	19.33	0.50	99.14	19.08	7.63	-
Avg	6.21	4.39	0.44	0.30	3.05	4.06	17.36	0.57	124.97	17.28	7.54	21
Max	11.28	6.28	0.60	0.44	8.98	10.13	22.13	1.54	169.48	21.87	7.66	51
Min	2.39	3.36	0.21	0.11	0.79	1.79	10.12	0.28	84.05	10.38	7.41	6

Any exceedances of monthly ECA limits will be indicated by red type

\*E coli geometric mean - MPN/100ml

POLLUTANT REMOVAL EFFICIENCY						
Month	TSS %	cBOD %	TP %	SP %	TKN %	NH3 %
January	96.5	96.9	88.5	72.9	92.7	92.0
February	93.4	94.2	89.2	75.5	78.8	81.6
March	93.3	94.3	85.2	69.8	77.2	79.1
April	97.3	97.1	89.3	72.0	92.2	91.6
May	97.6	97.8	89.9	79.8	93.4	92.4
June	97.3	97.6	89.9	79.7	96.8	94.8
July	97.7	96.9	91.5	80.0	91.9	91.1
August	97.9	97.1	91.1	83.0	94.8	93.8
September	96.6	96.7	89.6	82.8	68.3	74.2
October	98.3	97.9	91.7	83.4	86.4	88.4
November	99.5	98.3	97.2	93.2	88.8	90.6
December	98.9	98.1	96.9	93.9	91.6	92.1
Avg	97.0	96.9	90.8	80.5	87.8	88.5
Max	99.5	98.3	97.2	93.9	96.8	94.8
Min	93.3	94.2	85.2	69.8	68.3	74.2

LIQUID STREAM CONTAMINATE REMOVAL						
Month	TSS kg/mth	cBOD kg/mth	TP kg/mth	SP kg/mth	TKN kg/mth	NH3 kg/mth
January	1,416,178	1,000,436	32,882	8,390	167,443	238,962
February	1,705,443	1,092,650	41,166	8,362	153,868	232,571
March	1,162,434	910,377	28,605	7,785	156,031	207,115
April	2,015,784	1,174,338	37,217	8,395	176,210	261,916
May	2,457,595	1,335,569	34,211	10,447	192,386	273,933
June	1,612,865	1,100,818	31,719	10,471	193,566	263,874
July	1,641,998	1,013,592	34,486	9,516	178,019	249,526
August	1,440,723	1,001,138	30,386	11,305	182,728	246,160
September	1,230,914	919,444	28,658	11,015	126,502	190,566
October	1,720,956	1,048,580	33,609	11,568	171,743	242,426
November	2,959,561	1,561,847	44,430	11,772	173,817	264,349
December	4,204,442	1,941,423	66,165	13,504	203,397	335,727
Total	23,568,893	14,100,213	443,535	122,530	2,075,711	3,007,124
Avg	1,964,074	1,175,018	36,961	10,211	172,976	250,594
Max	4,204,442	1,941,423	66,165	13,504	203,397	335,727
Min	1,162,434	910,377	28,605	7,785	126,502	190,566

TWAS GBT OPERATION				
Month	#1 GBT running time hrs/day	#2 GBT running time hrs/day	#3 GBT running time hrs/day	Total WAS m³/mth
January	0.00	23.98	2.49	81,131
February	1.03	20.71	18.00	98,256
March	0.02	0.63	23.70	117,260
April	1.49	0.00	22.65	111,677
May	23.83	0.29	11.30	113,606
June	4.35	0.71	23.24	88,963
July	23.99	0.03	20.49	126,505
August	24.00	1.22	17.02	131,796
September	24.00	0.00	10.92	97,710
October	17.62	0.00	20.31	112,176
November	23.96	0.00	14.78	107,414
December	24.00	0.00	11.70	122,535
Total				1,309,029
Avg	14.02	3.96	16.38	109,085.7
Max	24.00	23.98	23.70	131,796
Min	0.00	0.00	2.49	81,131

TWAS GBT PERFORMANCE						
Month	TWAS		Filtrate Solids mg/L	Polymer Consumption kg/mth	Dosage Active Basis kg/Tonne	Total TWAS m³/mth
	T.S. %	V.S. %				
January	4.93	77.80	85	2,601	1.81	15,227
February	5.13	76.43	233	3,672	1.92	21,451
March	4.28	74.74	192	3,143	1.51	22,845
April	4.73	76.85	265	3,124	1.72	19,553
May	5.58	75.18	277	3,592	2.08	18,552
June	3.58	73.23	129	2,653	1.84	16,351
July	4.23	74.05	85	3,711	2.62	17,583
August	3.84	73.64	52	4,197	3.01	19,556
September	4.95	73.30	70	3,129	3.16	15,115
October	4.20	72.28	179	3,913	2.54	19,889
November	4.40	76.12	142	3,790	2.19	18,000
December	5.05	75.45	148	4,126	2.66	19,042
Total				41,650		223,163
Avg	4.57	74.92	155	3,471	2.25	18,597
Max	5.58	77.80	277	4,197	3.16	22,845
Min	3.58	72.28	52	2,601	1.51	15,115



RAW SLUDGE GBT OPERATION			
Month	#1 GBT running time hrs/day	#2 GBT running time hrs/day	Total RS m <sup>3</sup> /mth
January	2.38	21.52	33,195
February	14.71	8.76	37,849
March	23.56	0.00	35,413
April	21.15	3.03	38,406
May	0.49	23.85	34,940
June	5.91	18.01	30,990
July	19.65	4.34	34,346
August	23.76	0.00	36,739
September	22.62	0.00	30,988
October	23.87	0.00	28,887
November	21.69	0.00	29,128
December	23.81	0.00	36,246
<b>Total</b>			<b>407,126</b>
<b>Avg</b>	<b>16.97</b>	<b>6.63</b>	<b>33,927.1</b>
<b>Max</b>	<b>23.87</b>	<b>23.85</b>	<b>38,406</b>
<b>Min</b>	<b>0.49</b>	<b>0.00</b>	<b>28,887</b>

RAW SLUDGE GBT PERFORMANCE						
Month	TWAS		Filtrate Solids mg/L	Polymer Consumption kg/mth	Dosage Active Basis kg/Tonne	Total TWAS m <sup>3</sup> /mth
	T.S. %	V.S. %				
January	6.77	74.82	262	2,118	2.31	30,431
February	7.76	65.55	213	2,949	1.98	25,294
March	7.03	67.03	368	2,772	1.94	24,916
April	6.57	68.35	865	3,126	2.48	30,332
May	7.36	70.49	306	2,880	3.00	21,681
June	7.62	70.70	189	2,466	3.16	17,593
July	6.57	69.13	348	2,856	2.84	26,931
August	4.82	68.38	537	3,848	3.58	33,757
September	6.76	71.85	391	2,486	2.69	19,334
October	6.95	73.65	393	2,772	3.38	20,780
November	5.71	73.85	258	2,863	3.99	21,230
December	5.85	74.07	267	4,138	3.43	25,034
<b>Total</b>				<b>35,276</b>		<b>297,312</b>
<b>Avg</b>	<b>6.65</b>	<b>70.66</b>	<b>366</b>	<b>2,940</b>	<b>2.90</b>	<b>24,776</b>
<b>Max</b>	<b>7.76</b>	<b>74.82</b>	<b>865</b>	<b>4,138</b>	<b>3.99</b>	<b>33,757</b>
<b>Min</b>	<b>4.82</b>	<b>65.55</b>	<b>189</b>	<b>2,118</b>	<b>1.94</b>	<b>17,593</b>





NORTH PRIMARY DIGESTERS							
MONTH	No. 3		No. 4		No. 5		Total
	Feed m <sup>3</sup> /day	Temperature °C	Feed m <sup>3</sup> /day	Temperature °C	Feed m <sup>3</sup> /day	Temperature °C	Feed m <sup>3</sup> /day
January	490.95	35.32	490.95	37.69	490.95	41.30	45,657.90
February	135.56	37.77	766.95	29.21	766.95	34.29	46,745.18
March	0.00	32.46	770.33	28.86	770.33	34.29	47,760.26
April	0.00	33.96	831.41	32.77	831.41	36.46	49,884.87
May	0.00	24.80	648.92	36.29	648.92	37.91	40,232.85
June	0.00	27.08	565.73	36.91	565.73	39.51	33,943.89
July	0.00	29.26	717.97	35.34	717.97	38.54	44,514.20
August	0.00	29.87	859.90	34.22	859.90	39.66	53,313.82
September	0.00	28.01	574.15	38.75	574.15	43.36	34,448.82
October	0.00	23.88	655.94	38.44	655.94	39.31	40,668.21
November	0.00	24.93	653.83	35.66	653.83	36.55	39,229.89
December	0.00	32.44	710.89	34.92	710.89	31.91	44,075.20
Total							520,475.10
Avg	52.21	29.98	687.25	34.92	687.25	37.76	43,372.92
Max	490.95	37.77	859.90	38.75	859.90	43.36	53,313.82
Min	0.00	23.88	490.95	28.86	490.95	31.91	33,943.89

PRIMARY DIGESTED SLUDGE							
Month	pH	Total Solids %	Volatile Solids %	Alkalinity mg/L	Volatile Acids mg/L	Retention Time days	Loading kg VS/m <sup>3</sup> /day
January	7.44	3.08	55.42	5,070	253.33	16.87	1.01
February	7.22	3.45	57.08	3,940	267.50	10.80	1.93
March	7.23	3.72	56.77	3,766	277.00	10.56	1.91
April	7.24	3.23	56.73	3,630	251.25	9.75	1.94
May	7.41	3.51	55.84	4,565	287.00	12.83	1.54
June	7.44	3.50	53.86	5,020	411.25	14.95	1.44
July	7.41	3.11	57.10	4,136	278.75	11.43	1.65
August	7.38	2.64	55.93	3,538	196.00	9.69	1.60
September	7.40	2.84	56.91	3,835	1,001.25	14.98	1.22
October	7.38	2.84	57.34	3,725	576.25	12.53	1.40
November	7.32	2.75	59.82	3,785	407.00	13.62	1.27
December	7.27	2.98	55.55	3,640	277.50	11.42	1.36
Avg	7.34	3.14	56.53	4,054	373.67	12.45	1.52
Max	7.44	3.72	59.82	5,070	1,001.25	16.87	1.94
Min	7.22	2.64	53.86	3,538	196.00	9.69	1.01

SECONDARY DIGESTED SLUDGE			
Month	Total Solids %	Volatile Solids %	VS Reduction %
January	2.98	55.45	62.6
February	3.45	57.00	49.3
March	3.66	56.56	45.2
April	3.40	56.58	48.1
May	3.48	55.60	52.6
June	3.45	53.88	57.4
July	3.08	56.53	44.1
August	2.63	56.04	46.1
September	2.60	57.70	44.7
October	2.93	56.93	52.4
November	2.72	59.44	50.4
December	2.93	59.63	51.8
Avg	3.11	56.78	50.4
Max	3.66	59.63	62.6
Min	2.60	53.88	44.1



CENTRIFUGE PERFORMANCE					
Month	Cake Solids %	Sludge Cake Tonnes/mth	Filtrate Solids kg/mth	Polymer Used kg/mth	Dosage per Tonne DS kg/Tonne
January	25.32	3,751.68	33,528	12,427	8.55
February	23.97	4,075.80	32,106	12,370	11.01
March	25.18	4,558.21	23,449	15,477	10.89
April	25.91	4,563.81	22,310	15,289	12.01
May	27.04	4,609.08	8,712	13,625	9.01
June	28.28	3,969.28	6,964	10,837	7.83
July	25.45	4,828.80	11,576	11,385	9.35
August	25.96	4,281.74	13,760	9,387	14.89
September	26.92	3,475.85	16,619	8,887	10.41
October	26.28	4,189.43	19,605	11,329	7.05
November	24.04	4,366.89	21,964	13,129	10.24
December	24.41	4,954.72	24,303	13,785	12.06
<b>Total</b>				<b>147,927</b>	
<b>Avg</b>	<b>25.73</b>	<b>4,302</b>	<b>19,575</b>	<b>12,327</b>	<b>10.27</b>
<b>Max</b>	<b>28.28</b>	<b>4,955</b>	<b>33,528</b>	<b>15,477</b>	<b>14.89</b>
<b>Min</b>	<b>23.97</b>	<b>3,476</b>	<b>6,964</b>	<b>8,887</b>	<b>7.05</b>

CENTRIFUGE FILTRATE			
Month	NH3 mg/L	TKN mg/L	TSS mg/L
January	1120.75	1195.00	1022.50
February	783.25	942.50	1286.25
March	721.50	774.50	939.00
April	735.60	750.60	261.60
May	882.75	954.25	315.00
June	1012.33	1103.33	236.33
July	846.40	875.20	361.20
August	677.25	725.75	366.00
September	735.60	795.00	653.80
October	729.75	814.75	526.00
November	760.50	878.50	763.00
December	748.20	843.00	626.80
<b>Avg</b>	<b>812.82</b>	<b>887.70</b>	<b>613.12</b>
<b>Max</b>	<b>1120.75</b>	<b>1195.00</b>	<b>1286.25</b>
<b>Min</b>	<b>677.25</b>	<b>725.75</b>	<b>236.33</b>



CENTRIFUGE OPERATION									
Month	#GP1 Centrifuge		#GP2 Centrifuge		#GP3 Centrifuge		#GP4 Centrifuge		Total Feed
	Running Time hrs/day	Sludge Feed m³/day	Running Time hrs/day	Sludge Feed m³/day	Running Time hrs/day	Sludge Feed m³/day	Running Time hrs/day	Sludge Feed m³/day	m³/day
January	0.00	0.0	0.00	0.0	23.65	546.3	21.04	460.9	31,222.97
February	3.76	95.2	11.24	257.1	16.99	416.7	12.29	274.9	29,232.97
March	7.58	196.4	13.83	356.6	2.80	69.5	18.62	476.0	34,050.86
April	0.00	0.0	16.70	444.7	6.87	184.6	23.35	623.6	37,589.05
May	1.92	43.7	17.85	437.5	22.99	574.6	3.00	80.6	35,230.11
June	14.22	348.4	6.71	181.4	15.80	396.8	6.39	173.9	33,014.54
July	0.00	0.0	21.07	569.2	13.96	389.4	13.03	350.0	40,565.69
August	0.00	0.0	2.01	53.8	21.39	624.7	22.97	670.1	41,807.53
September	2.57	80.3	6.19	151.3	14.77	423.8	18.82	510.7	34,981.54
October	23.67	631.5	0.00	0.0	15.74	412.0	7.66	196.8	38,449.44
November	11.94	335.8	7.96	228.9	17.40	492.2	9.26	256.6	39,403.18
December	6.71	193.2	16.76	504.7	16.62	500.5	6.72	193.3	43,144.26
Total									438,692.15
Avg	6.03	160.4	10.03	265.4	15.75	419.3	13.60	355.6	36,557.68
Max	23.67	631.5	21.07	569.2	23.65	624.7	23.35	670.1	43,144.26
Min	0.00	0.0	0.00	0.0	2.80	69.5	3.00	80.6	29,232.97



# CHEMICAL ADDITION

chlorine added from May 15 to October 15

CHLORINATION			
Month	Chlorine Used Kg	Dosage mg/L	Residual Level mg/L
January	-	-	-
February	-	-	-
March	-	-	-
April	-	-	-
May	14,317	1.95	0.69
June	31,250	3.92	0.77
July	29,066	4.09	0.78
August	30,236	4.52	0.82
September	12,305	1.91	1.21
October	5,217	0.83	1.06
November	-	-	-
December	-	-	-
<b>Total</b>	<b>122,391</b>	<b>-</b>	<b>-</b>
<b>Avg</b>	<b>20,399</b>	<b>2.87</b>	<b>0.89</b>
<b>Max</b>	<b>31,250</b>	<b>4.52</b>	<b>1.21</b>
<b>Min</b>	<b>5,217</b>	<b>0.83</b>	<b>0.69</b>

DECHLORINATION			
Month	Sodium Bisulphite Used m³	Outfall Residual mg/L	ORP Level mV
January	-	-	-
February	-	-	-
March	-	-	-
April	-	-	-
May	60	0.004	59.34
June	74	0.006	75.17
July	72	0.007	75.93
August	74	0.008	72.24
September	58	0.011	77.81
October	28	0.021	88.37
November	-	-	-
December	-	-	-
<b>Total</b>	<b>365.0</b>	<b>-</b>	<b>-</b>
<b>Avg</b>	<b>60.8</b>	<b>0.010</b>	<b>74.81</b>
<b>Max</b>	<b>73.9</b>	<b>0.021</b>	<b>88.37</b>
<b>Min</b>	<b>28.0</b>	<b>0.004</b>	<b>59.34</b>

FERRIC SULFATE		
Month	Dosage mg/L	Consumption m³/mth
January	7.42	267.0
February	4.75	246.5
March	4.78	270.9
April	6.22	270.9
May	7.94	339.1
June	7.81	313.6
July	8.59	310.0
August	11.27	376.4
September	11.16	366.4
October	11.99	378.3
November	13.40	414.6
December	10.24	383.0
<b>Total</b>	<b>-</b>	<b>3,936.6</b>
<b>Avg</b>	<b>8.80</b>	<b>328.1</b>
<b>Max</b>	<b>13.40</b>	<b>414.6</b>
<b>Min</b>	<b>4.75</b>	<b>246.5</b>



LIQUID WASTE HAULAGE		
Month	Septic Haulers m³/mth	Sludge from Dundas Tonnes/mth
January	3,153.45	2,812.54
February	1,565.73	2,672.22
March	1,376.39	3,745.08
April	4,781.23	3,170.95
May	5,407.99	3,616.06
June	8,212.57	3,642.71
July	2,305.79	3,604.15
August	7,222.97	3,875.78
September	4,513.97	3,445.92
October	5,115.55	3,307.20
November	3,810.35	3,334.07
December	3,259.08	3,184.82
<b>Total</b>	<b>50,725.06</b>	<b>40,411.50</b>
<b>Avg</b>	<b>4,227.09</b>	<b>3,367.63</b>
<b>Max</b>	<b>8,212.57</b>	<b>3,875.78</b>
<b>Min</b>	<b>1,376.39</b>	<b>2,672.22</b>

BIOSOLIDS TO SYNAGRO		
Month	Wet Tonnes Tonnes/mth	Anticipated 2023 Volume Tonnes/mth
January	3,751.68	4,300.00
February	4,075.80	4,300.00
March	4,558.21	4,300.00
April	4,563.81	4,300.00
May	4,609.08	4,300.00
June	3,969.28	4,300.00
July	4,828.80	4,300.00
August	4,281.74	4,300.00
September	3,475.85	4,300.00
October	4,189.43	4,300.00
November	4,366.89	4,300.00
December	4,954.72	4,300.00
<b>Total</b>	<b>51,625.29</b>	<b>51,600.00</b>
<b>Avg</b>	<b>4,302.11</b>	<b>4,300.00</b>
<b>Max</b>	<b>4,954.72</b>	<b>4,300.00</b>
<b>Min</b>	<b>3,475.85</b>	<b>4,300.00</b>

METHANE GAS PRODUCTION				
Month	Co-Gen m³/mth	BPU m³/mth	Waste Gas m³/mth	Total m³/mth
January	0	135,282	577,308	712,590
February	10	134,762	460,983	595,755
March	54	179,635	452,786	632,476
April	26,978	247,663	403,496	678,136
May	0	144,454	602,758	747,212
June	133,217	142,657	357,038	632,912
July	281,645	174,623	111,078	567,346
August	277,152	208,578	31,254	516,984
September	257,287	171,173	63,623	492,083
October	316,526	49,957	186,502	552,985
November	268,131	183,742	104,529	556,402
December	238,990	235,182	109,047	583,219
<b>Total</b>	<b>1,799,990</b>	<b>2,007,709</b>	<b>3,460,401</b>	<b>7,268,100</b>
<b>Avg</b>	<b>149,999</b>	<b>167,309</b>	<b>288,367</b>	<b>605,675</b>
<b>Max</b>	<b>316,526</b>	<b>247,663</b>	<b>602,758</b>	<b>747,212</b>
<b>Min</b>	<b>0</b>	<b>49,957</b>	<b>31,254</b>	<b>492,083</b>

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	0.00	0	0.00	0.00	0	0.00	0.00	0.00%
February	0	0.00	0.00	0	0.00	0.00	2	77.44	868.97	8.10%
March	0	0.00	0.00	1	1.69	16.08	2	27.03	304.24	2.82%
April	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0.00%
May	0	0.00	0.00	0	0.00	0.00	1	29.31	289.34	3.24%
June	0	0.00	0.00	0	0.00	0.00	1	7.56	79.13	0.98%
July	0	0.00	0.00	0	0.00	0.00	2	6.46	53.15	0.73%
August	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0.00%
September	0	0.00	0.00	0	0.00	0.00	1	2.16	21.44	0.33%
October	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0.00%
November	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0.00%
December	0	0.00	0.00	0	0.00	0.00	1	19.92	41.96	0.53%
<b>Total</b>	<b>0</b>	<b>0.00</b>	<b>0.00</b>	<b>1</b>	<b>1.69</b>	<b>16.08</b>	<b>10</b>	<b>169.88</b>	<b>1,658.23</b>	<b>1.75%</b>
<b>Avg</b>	<b>0.0</b>	<b>0.00</b>	<b>0.00</b>	<b>0.1</b>	<b>0.14</b>	<b>1.34</b>	<b>0.8</b>	<b>14.16</b>	<b>138.19</b>	
<b>Max</b>	<b>0</b>	<b>0.00</b>	<b>0.00</b>	<b>1</b>	<b>1.69</b>	<b>16.08</b>	<b>2</b>	<b>77.44</b>	<b>868.97</b>	<b>8.10%</b>
<b>Min</b>	<b>0</b>	<b>0.00</b>	<b>0.00</b>	<b>0</b>	<b>0.00</b>	<b>0.00</b>	<b>0</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00%</b>



Primary Clarifiers				
Month	HRT Hours	Surface Loading m <sup>3</sup> /day/m <sup>2</sup>	Weir Overflow L/sec/m	SLR kg/mth/m <sup>2</sup>
January	4.75	17.28	2.54	3.50
February	3.15	30.17	4.44	4.44
March	2.94	29.38	4.32	3.16
April	3.80	21.87	3.21	5.34
May	4.02	22.09	3.25	5.79
June	3.82	22.26	3.27	4.29
July	4.50	18.85	2.77	4.29
August	4.97	16.88	2.48	3.68
September	4.63	18.06	2.65	3.51
October	4.74	17.61	2.59	5.03
November	5.14	16.36	2.40	7.85
December	4.20	20.75	3.05	11.35
Avg	4.22	20.96	3.08	5.19
Max	5.14	30.17	4.44	11.35
Min	2.94	16.36	2.40	3.16

TOTAL HRT		
Month	North Plant Hours	South Plant Hours
January	19.37	19.26
February	13.10	14.38
March	12.35	13.67
April	15.22	16.85
May	16.90	18.66
June	16.85	17.93
July	19.58	20.21
August	22.45	24.25
September	21.98	24.87
October	22.46	18.74
November	22.33	17.00
December	20.26	18.86
Avg	18.57	18.72
Max	22.46	24.87
Min	12.35	13.67

NORTH PLANT				
Month	North Secondary Clarifiers			
	HRT Hours	Surface Loading m <sup>3</sup> /day/m <sup>2</sup>	Weir Overflow L/sec/m	SLR kg/mth/m <sup>2</sup>
January	4.64	15.62	1.68	73.64
February	3.16	24.78	2.66	104.96
March	3.02	24.96	2.68	113.33
April	3.53	20.88	2.24	87.25
May	4.02	19.01	2.04	86.80
June	4.08	18.22	1.96	84.84
July	4.60	16.44	1.77	41.74
August	5.55	13.39	1.44	47.03
September	5.51	13.38	1.44	41.53
October	5.62	13.11	1.41	51.33
November	5.42	13.64	1.46	53.44
December	4.90	15.63	1.68	59.21
Avg	4.50	17.42	1.87	70.42
Max	5.62	24.96	2.68	113.33
Min	3.02	13.11	1.41	41.53

SOUTH PLANT				
Month	South Secondary Clarifiers			
	HRT Hours	Surface Loading m <sup>3</sup> /day/m <sup>2</sup>	Weir Overflow L/sec/m	SLR kg/mth/m <sup>2</sup>
January	5.75	15.57	1.04	82.81
February	4.46	21.85	1.46	104.35
March	4.26	21.83	1.46	92.51
April	5.18	17.47	1.17	82.26
May	5.81	16.47	1.10	55.91
June	5.60	16.53	1.11	57.64
July	6.23	14.84	0.99	57.70
August	7.62	12.54	0.84	33.38
September	7.92	12.07	0.81	24.91
October	5.55	17.02	1.14	49.20
November	4.71	19.57	1.31	64.91
December	6.09	16.82	1.13	48.34
Avg	5.77	16.88	1.13	62.83
Max	7.92	21.85	1.46	104.35
Min	4.26	12.07	0.81	24.91



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)
6	2022-02-17	82	111	81	135	1.2%	-21.6%
	2022-02-18	15	25	41	76	-173.3%	-204.0%
	2022-02-19	101	150	64	61	36.6%	59.3%
15	2022-02-22	35	46	72	97	-105.7%	-110.0%
	2022-02-23	66	88	58	73	12.1%	16.9%
	2022-02-24	78	101	68	63	12.8%	37.6%
20	2022-03-06	94	229	64	78.9	31.9%	65.5%
25	2022-03-23	76	29	88	54.5	-15.8%	-90.6%
	2022-03-24	35	25	48	88.0	-37.1%	-247.8%
45	2022-05-03	58	43	78	100.0	-34.5%	-132.6%
	2022-05-04	70	98	58	179.0	17.1%	-82.7%
	2022-05-05	39	90	58	74.0	-48.7%	17.8%
60	2022-06-07	35	37	62	105	-77.1%	-183.8%
67	2022-07-18	68	127	76	82	-11.8%	35.4%
70	2022-07-20	149	88	125	180	16.1%	-104.5%
	2022-07-21	65	59	77	75	-18.5%	-27.1%
80	2022-09-12	100	76	103	72	-3.0%	5.3%
90	2022-12-15	308	792	112	148	63.6%	81.3%
	2022-12-16	263	482	59	99	77.6%	79.5%
Annual Average						-13%	-42%
Objective						>30%	>50%

2022 WASTEWATER MAINTENANCE ACTIVITIES					
System	Direct Purchase	Parts	Staff Labour	External Services	Total Cost
Combined Sewage Overflow - Tanks / Gates / Pipes	\$90,312	\$5,216	\$53,461	\$45,799	\$194,788
Dundas Wastewater Pumping Stations	\$71,117	\$4,701	\$28,167	\$16,888	\$120,872
Dundas Wastewater Treatment Plant	\$45,242	\$13,762	\$36,202	\$16,242	\$111,448
Hamilton Storm System/ Sewer	\$0	\$0	\$550	\$0	\$550
Hamilton Wastewater Pumping Stations	\$55,768	\$90,670	\$117,428	\$90,878	\$354,744
Leachate Pumping Stations	\$445	\$3,253	\$8,983	\$3,785	\$16,466
Woodward Avenue Wastewater Treatment Plant	\$438,222	\$344,781	\$214,351	\$170,085	\$1,167,439
Waterdown Wastewater Pumping Stations	\$0	\$0	\$2,084	\$0	\$2,084
*Multiple locations	\$4,992	\$89,626	\$16,536	\$1,919	\$113,073
Grand Total	\$706,097	\$552,008	\$477,763	\$345,596	\$2,081,463

## SIGNIFICANT WORKS OVER \$10,000

### CSOs

Station HCG08 RTC Gate - new actuator installation = \$11,692

New SCADA Panel installation at Glen Road gate (Main King CSO) = \$14,992

Rebuild sluice gate actuator at Red Hill Wastewater station = \$15,030

Ferguson and Ferrie Street sluice gate actuator gate replacement = \$13,909

Flygt pump overhaul at McMaster CSO Tank = \$23,888

Royal Ave CSO HCS08 – asphalt repairs = \$10,150

### Hamilton Wastewater Pumping Stations

Installation of electrical surge protection device at Binbrook Wastewater Pump Station = \$11,453

English Church HC19 pump #2 rebuild = \$41,556

HC019-T&T to replace station generator radiator = \$11,316

Beach Blvd/Main Station 12 HC051 – TSSA B-139 “Fuels” Compliance Upgrade = \$51,608

Hwy 6 / Twenty Road HC018 – TSSA B-139 “Fuels” Compliance Upgrade = \$14,600

## Woodward Avenue Wastewater Treatment Plant

Dewatering Cake Pump #1 rebuild = \$162,115

Main Pump House - Pump rebuild = \$19,002

Rotork valve actuator - new installation at digester #5 = \$11,242

Centrifuge #1 rebuild at dewatering building = \$69,478

Replacement of gas monitoring system in North Digester complex = \$32,246

Primary Clarifier #8 maintenance and repair = \$17,383

Pump #3 rebuild and VFD installation in WAS building = \$12,911

Polymer Tanks Level transmitter replacement (x2) = \$14,025

Headworks Bar Screen #2 motor and brake assembly rebuild = \$14,444

Digester #5 chopper pump replacement = \$16,614

Aeration blower motor overhaul = \$11,284

Digester #3 motor gear box replacement = \$21,194

Final Clarifier screw bearing replacement = \$10,109

Final Clarifier sluice gate #2 actuator replacement = \$21,805

Primary Clarifier #6 raw sludge pump grinder overhaul = \$12,798

Effluent building heat trace system replacement = \$11,436

Sludge thickening building - Pump #5 overhaul = \$19,626

Headworks grit pump #6 system overhaul = \$58,398

Digester #3 sludge transfer pump #6 replacement = \$17,416

Primary Clarifier maintenance = \$13,228

Primary Clarifier raw sludge pump grinder #7 replacement = \$18,109

Gas monitors and sensors and maintenance and service = \$16,025

Woodward Avenue WWTP Asphalt Repairs = \$10,055

Digester #4 cleanout and mixer replacement = \$25,486

## Dundas Wastewater Treatment Plant

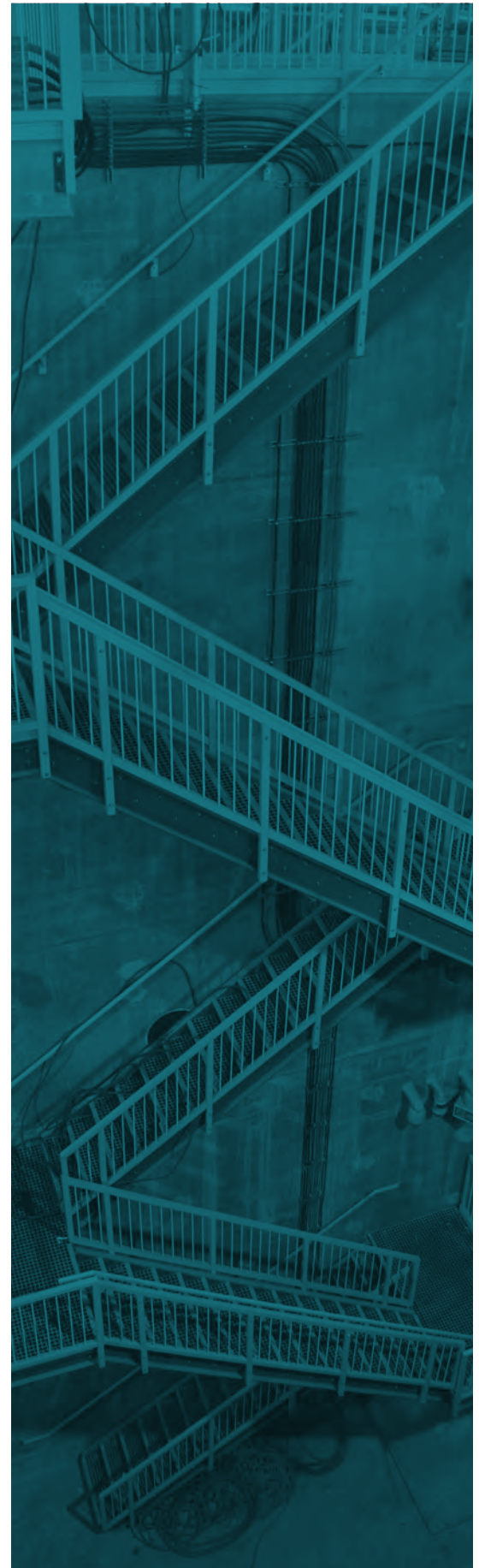
Bisulphite analyzer replacement = \$10,900

Aeration blower motor overhaul = \$17,780

## Dundas Wastewater Pumping Stations

Pump #1 at DC015 Rockliffe wastewater pump station - pump rebuild = \$15,878

Pump #2 at DC005 Pleasant Avenue wastewater pump station - replacement = \$11,220



2022 WOODWARD AVENUE WWTP CALIBRATION & MAINTENANCE OF MONITORING EQUIPMENT				
Work Order	Description	Equipment	Equipment Description	Date Completed
n/a	HSMPSL01FIT01 STANDARD VERIFICATION	114501	HSMPS, SEWAGE LIFT PUMP #1 DISCHARGE FLOW METER	2022-04-19
n/a	HSMPSL02FIT01 STANDARD VERIFICATION	114502	HSMPS, SEWAGE LIFT PUMP #2 DISCHARGE FLOW METER	2022-04-19
n/a	HSMPSL03FIT01 STANDARD VERIFICATION	114503	HSMPS, SEWAGE LIFT PUMP #3 DISCHARGE FLOW METER	2022-04-19
n/a	HSMPSL04FIT01 STANDARD VERIFICATION	114504	HSMPS, SEWAGE LIFT PUMP #4 DISCHARGE FLOW METER	2022-04-19
n/a	HSMPSL05FIT01 STANDARD VERIFICATION	114505	HSMPS, SEWAGE LIFT PUMP #5 DISCHARGE FLOW METER	2022-04-19
n/a	HSMPSL06FIT01 STANDARD VERIFICATION	114506	HSMPS, SEWAGE LIFT PUMP #6 DISCHARGE FLOW METER	2022-04-19
n/a	HSMPSL07FIT01 STANDARD VERIFICATION	114507	HSMPS, SEWAGE LIFT PUMP #7 DISCHARGE FLOW METER	2022-04-19
n/a	HSMPSL08FIT01 STANDARD VERIFICATION	114508	HSMPS, SEWAGE LIFT PUMP #8 DISCHARGE FLOW METER	2022-04-19
n/a	HSMPSL09FIT01 STANDARD VERIFICATION	114509	HSMPS, SEWAGE LIFT PUMP #9 DISCHARGE FLOW METER	2022-04-19
n/a	HSMPSL10FIT01 STANDARD VERIFICATION	114510	HSMPS, SEWAGE LIFT PUMP #10 DISCHARGE FLOW METER	2022-04-19
n/a	HSMPSL11FIT01 STANDARD VERIFICATION	114511	HSMPS, SEWAGE LIFT PUMP #11 DISCHARGE FLOW METER	2022-04-19
n/a	HSMPSL12FIT01 STANDARD VERIFICATION	114512	HSMPS, SEWAGE LIFT PUMP #12 DISCHARGE FLOW METER	2022-04-19
810301	I-Y1 HSCCC ORP ANALYZER (APRIL)	013207	HSCCC, ORP ANALYZER	2022-05-10
808259	I-WW-1Y-POD-LEVEL TRANSMITTER CALIBRATION	013207	HSCCC, ORP ANALYZER	2022-05-30
852690	I-1Y-HSCCC ORP ANALYZER SERVICE (JULY)	013207	HSCCC, ORP ANALYZER	2022-07-20
876394	I-WW-2W-MOE-EFFLUENT AUTO SAMPLERS-SERVICE	114514	HSMPS, EFFLUENT AUTO SAMPLER #2	2022-10-27
876391	I-WW-2W-MOE-EFFLUENT AUTO SAMPLERS-SERVICE	114513	HSMPS, EFFLUENT AUTO SAMPLER #1	2022-10-28



## 2022 WOODWARD AVENUE WWTP CALIBRATION &amp; MAINTENANCE OF MONITORING EQUIPMENT continued

Work Order	Description	Equipment	Equipment Description	Date Completed
876392	I-WW-2W-MOE-EFFLUENT AUTO SAMPLERS-SERVICE	114513	HSMPS, EFFLUENT AUTO SAMPLER #1	2022-11-07
876395	I-WW-2W-MOE-EFFLUENT AUTO SAMPLERS-SERVICE	114514	HSMPS, EFFLUENT AUTO SAMPLER #2	2022-11-07
887727	I-WW-2W-MOE-EFFLUENT AUTO SAMPLERS-SERVICE	114513	HSMPS, EFFLUENT AUTO SAMPLER #1	2022-11-07
887729	I-WW-2W-MOE-EFFLUENT AUTO SAMPLERS-SERVICE	114514	HSMPS, EFFLUENT AUTO SAMPLER #2	2022-11-07
887728	I-WW-2W-MOE-EFFLUENT AUTO SAMPLERS-SERVICE	114513	HSMPS, EFFLUENT AUTO SAMPLER #1	2022-11-21
887730	I-WW-2W-MOE-EFFLUENT AUTO SAMPLERS-SERVICE	114514	HSMPS, EFFLUENT AUTO SAMPLER #2	2022-11-21
888968	I-WW-2W-MOE-EFFLUENT AUTO SAMPLERS-SERVICE	114514	HSMPS, EFFLUENT AUTO SAMPLER #2	2022-12-05
888966	I-WW-2W-MOE-EFFLUENT AUTO SAMPLERS-SERVICE	114513	HSMPS, EFFLUENT AUTO SAMPLER #1	2022-12-05
888969	I-WW-2W-MOE-EFFLUENT AUTO SAMPLERS-SERVICE	114514	HSMPS, EFFLUENT AUTO SAMPLER #2	2022-12-19
888967	I-WW-2W-MOE-EFFLUENT AUTO SAMPLERS-SERVICE	114513	HSMPS, EFFLUENT AUTO SAMPLER #1	2022-12-19

## 2022 DUNDAS WWTP CALIBRATION AND MAINTENANCE OF MONITORING EQUIPMENT

Work Order	Description	Equipment	Equipment Description	Date Completed
736660	I-WW-1Y-MOE-FLOW METER-CALIBRATION	002661	DSCBB, PLANT B EFFLUENT FLOW METER	2022-03-22
810401	I-Y1 SEASONAL BISULFITE ANALYZERS SYSTEM START-UP	012169	DSFIL, BI-SULFITE ANALYZER #2	2022-07-11
810400	I-Y1 SEASONAL BISULFITE ANALYZERS SYSTEM START-UP	012168	DSFIL, BI-SULFITE ANALYZER #1	2022-07-11
784867	I-WW-1Y-MOE-FLOW METER-CALIBRATION	002660	DSCBA, PLANT A EFFLUENT FLOW METER	2022-09-07
876351	I-Y1 SEASONAL BISULFITE ANALYZERS SYSTEM SHUT-DOWN	012169	DSFIL, BI-SULFITE ANALYZER #2	2022-11-01
876350	I-Y1 SEASONAL BISULFITE ANALYZERS SYSTEM SHUT-DOWN	012168	DSFIL, BI-SULFITE ANALYZER #1	2022-11-01

## 2022 CSO TANK CALIBRATION AND MAINTENANCE OF MONITORING EQUIPMENT

Work Order	Description	Equipment	Equipment Description	Date Completed
829313	I-WW-1Y-MOE-FLOW METER-CALIBRATION	210989	HCS05, CSO OVERFLOW TRANSMITTER	2022-05-11
864860	I-Y1-POD- ANNUAL CALIBRATION WET WELL LEVEL TRANSMITTER	010722	HCS05, CSO TANK LEVEL TRANSMITTER	2022-08-24
864901	I-Y1-POD- ANNUAL CALIBRATION WET WELL LEVEL TRANSMITTER	118107	HCS02, CELL #1 LEVEL TRANSMITTER (HYDROSTATIC)	2022-09-01
864730	I-Y1-POD- ANNUAL CALIBRATION TANK CELL LEVEL TRANSMITTER	108560	HCS02, CELL #2 LEVEL TRANSMITTER (HYDROSTATIC)	2022-09-01
864891	I-Y1-POD- ANNUAL VERIFICATION OVERFLOW LEVEL TRANSMITTER	108561	HCS02, OVERFLOW OUTLET CHANNEL LEVEL TRANSMITTER (HYDROSTATIC)	2022-09-01
784868	I-WW-1Y-MOE-FLOW METER-CALIBRATION	001664	HCS04, OVERFLOW CHANNEL LEVEL	2022-09-02
864717	I-Y1-POD- HCS01 CELL #2 LEVEL TRANSMITTER CALIBRATION	107067	HCS01, CELL 2 LEVEL TRANSMITTER	2022-09-10
864714	I-Y1-POD- HCS06 TANK #1 LEVEL TRANSMITTER CALIBRATION	106155	HCS06, CELL #1 LEVEL TRANSMITTER	2022-09-10
864715	I-Y1-POD- HCS06 TANK #2 LEVEL TRANSMITTER CALIBRATION	106156	HCS06, CELL #2 LEVEL TRANSMITTER	2022-09-10
864716	I-Y1-POD- HCS01 CELL #1 LEVEL TRANSMITTER CALIBRATION	106174	HCS01, CELL #1 LEVEL TRANSMITTER	2022-09-13
785669	I-WW-1Y-MOE-FLOW METER-CALIBRATION	004686	HCS01, OVERFLOW TO CREEK TRANSMITTER	2022-09-14
864713	I-Y1-POD- ANNUAL CALIBRATION TANK CELL LEVEL TRANSMITTER	013891	HCS08, CSO TANK LEVEL TRANSMITTER	2022-09-17
784873	I-WW-1Y-MOE-FLOW METER-CALIBRATION	002839	HCS08, CHANNEL OVERFLOW FLOW TRANSMITTER	2022-09-17
864861	I-Y1-POD- ANNUAL CALIBRATION WET WELL LEVEL TRANSMITTER	013156	HCS09, TANK #1 LEVEL TRANSMITTER	2022-09-19
864704	I-Y1-POD- ANNUAL CALIBRATION TANK CELL LEVEL TRANSMITTER	013157	HCS09, TANK #2 LEVEL TRANSMITTER	2022-09-19
864732	I-Y1-POD- ANNUAL CALIBRATION TANK CELL LEVEL TRANSMITTER	108565	HCS04, TANK CELL #2 LEVEL TRANSMITTER (HYDROSTATIC)	2022-11-04

2022 CSO TANK CALIBRATION AND MAINTENANCE OF MONITORING EQUIPMENT continued				
Work Order	Description	Equipment	Equipment Description	Date Completed
864731	I-Y1-POD- ANNUAL CALIBRATION TANK CELL LEVEL TRANSMITTER	108564	HCS04, TANK CELL #1 LEVEL TRANSMITTER (HYDROSTATIC)	2022-11-04
793028	I-WW-1Y-MOE-FLOW METER-CALIBRATION	013158	HCS09, OVER FLOW LEVEL TRANSMITTER	2022-11-11
793029	I-WW-1Y-MOE-FLOW METER-CALIBRATION	107303	HCS03, OVERFLOW CHANNEL FLOW TRANSMITTER	2022-11-11
784410	I-Y1-MOE- ANNUAL CALIBRATION HCS01 CHAMBER OUTLET LEVEL TRANSMITTER	106165	HCS01, OUTLET CHAMBER LEVEL TRANSMITTER	2022-12-02



2022 SUMMARY OF COMPLAINTS - WOODWARD AVENUE WWTP				
Date	Time Call Received	Details of Complaint	Odour Control System In Service	Investigator Observations and Actions Taken
2022-02-25	14:02	Noise complaint from a resident near the plant	Yes	Operators investigated and found that the noise was the result of Synagro operating a vacuum truck overnight. Synagro directed to not operate vacuum trucks at night and were also directed to review the applicable noise by-laws.
2022-06-14	20:45	Odour complaint from a resident near the plant	Yes	An operator investigated and found a bin of waste producing odour outside of Synagro Biosolids Facility. Synagro was notified and operator set up portable mister near Biosolids Facility.
2022-06-24	15:38	Odour complaint from a resident near the plant	Yes	Operators investigated and were unable to detect any odours or issues within the plant. Mister frequency increased and portable mister setup near Synagro.
2022-06-25	20:00	Odour complaint from a resident near the plant	Yes	Operators investigated and reported slight odour near Brampton Street. Odour system perfume dosing and frequency was increased.
2022-07-03	18:30	Odour complaint from a resident near the plant	Yes	Operators investigated and found odour control valve malfunctioning, a work order was put in. Staff made a fresh batch of perfume with higher concentration and restarted system in continuous mode. System to be monitored until valve is repaired.
2022-07-26	20:37	Odour complaint from a resident near the plant	Yes	Operators investigated and found source of odour from secondary clarifier down for repairs with some sludge remaining in the tank. Operators acted in hosing down tank to break up sludge to encourage better drainage.
2022-07-30	1:24	Odour complaint from a resident near the plant	Yes	Operators investigated and were unable to detect any odours or issues within the plant. Mister concentration and frequency increased.
2022-08-12	23:25	Odour complaint from a resident near the plant	Yes	Operators investigated and were unable to detect any odours or issues within the plant, south wind direction may have caused increase in smell. Mister concentration and frequency increased.
2022-08-14	23:15	Odour complaint from a resident near the plant	Yes	No findings regarding source of odour. Mister concentration and frequency increased. WO also placed to check that mister nozzles are functioning.
2022-08-14	23:15	Noise complaint from a resident near the plant	Yes	Whistling sound caused by testing being performed in new aeration tank. Project team notified of issue.
2022-08-24	23:17	Odour complaint from a resident near the plant	Yes	Operator investigated and noticed slight smell. Operator inspected mister nozzles and confirmed they are in good working order. Mister concentration and frequency increased.



## 2022 SUMMARY OF COMPLAINTS - WOODWARD AVENUE WWTP continued

Date	Time Call Received	Details of Complaint	Odour Control System In Service	Investigator Observations and Actions Taken
2022-08-26	22:55	Odour complaint from a resident near the plant	Yes	Operators investigated and were unable to detect any odours or issues within the plant. Mister concentration and frequency increased.
2022-08-27	21:33	Odour complaint from a resident near the plant	Yes	Operator investigated and noticed strong sewage odours north of pump house and west of Biosolids Facility. Unable to determine source of smell. Portable misters set up in area. Synagro staff contacted regarding issue.
2022-09-14	21:37	Odour complaint from a resident near the plant	Yes	Supervisor investigated and detected odours. Potentially caused by out of service Primary Clarifier (being hosed out during this time) as well as out of service Aeration Tank and 3 Final Clarifiers being cleaned by contractors. Odour system dosing put in local continuous mode.







PLANT A FLOWS					
Month	Monthly Volume m <sup>3</sup> /mth	Percent of Flow %	Daily Average m <sup>3</sup> /day	Daily Maximum m <sup>3</sup> /day	Daily Minimum m <sup>3</sup> /day
January	141,906	41.5%	4,578	5,377	3,884
February	130,399	38.0%	4,657	5,344	3,987
March	151,454	37.1%	4,886	5,386	4,439
April	147,446	39.3%	4,915	5,514	4,449
May	150,085	40.4%	4,841	6,042	3,817
June	116,835	40.9%	3,894	4,552	3,616
July	116,256	43.0%	3,750	4,454	3,341
August	115,506	41.3%	3,726	4,877	3,010
September	103,124	45.6%	3,437	3,998	2,705
October	118,007	44.3%	3,807	4,444	3,179
November	122,617	45.1%	4,087	4,555	3,487
December	140,157	45.4%	4,521	5,473	4,102
<b>Total</b>	<b>1,553,791</b>				
<b>Avg</b>	<b>129,483</b>	<b>41.8%</b>	<b>4,258</b>		
<b>Max</b>	<b>151,454</b>	<b>45.6%</b>	<b>4,915</b>	<b>6,042</b>	
<b>Min</b>	<b>103,124</b>	<b>37.1%</b>	<b>3,437</b>		<b>2,705</b>

PLANT B FLOWS					
Month	Monthly Volume m <sup>3</sup> /mth	Percent of Flow %	Daily Average m <sup>3</sup> /day	Daily Maximum m <sup>3</sup> /day	Daily Minimum m <sup>3</sup> /day
January	199,888	58.5%	6,448	8,581	5,437
February	212,864	62.0%	7,602	9,666	5,593
March	256,541	62.9%	8,276	9,792	6,916
April	227,975	60.7%	7,599	8,994	6,526
May	221,467	59.6%	7,144	9,813	5,411
June	168,614	59.1%	5,620	7,527	4,915
July	154,279	57.0%	4,977	7,076	4,041
August	164,135	58.7%	5,295	8,048	4,117
September	122,924	54.4%	4,097	5,003	3,003
October	148,083	55.7%	4,777	7,120	3,711
November	149,232	54.9%	4,974	6,177	3,813
December	168,384	54.6%	5,432	7,728	4,564
<b>Total</b>	<b>2,194,385</b>				
<b>Avg</b>	<b>182,865</b>	<b>58.2%</b>	<b>6,020</b>		
<b>Max</b>	<b>256,541</b>	<b>62.9%</b>	<b>8,276</b>	<b>9,813</b>	
<b>Min</b>	<b>122,924</b>	<b>54.4%</b>	<b>4,097</b>		<b>3,003</b>

COMBINED PLANT FLOWS				
Month	Monthly Volume m³/mth	Daily Average m³/day	Daily Maximum m³/day	Daily Minimum m³/day
January	341,794	11,026	13,958	9,323
February	343,263	12,259	14,982	9,580
March	407,995	13,161	15,178	11,355
April	375,420	12,514	14,508	11,011
May	371,552	11,986	15,855	9,228
June	285,449	9,515	12,080	8,531
July	270,535	8,727	11,530	7,642
August	279,641	9,021	12,925	7,133
September	226,048	7,535	9,000	5,914
October	266,090	8,584	11,564	7,004
November	271,849	9,062	10,672	7,300
December	308,540	9,953	13,201	8,666
<b>Total</b>	<b>3,748,176</b>			
<b>Avg</b>	<b>312,348</b>	<b>10,278</b>	<b>12,954</b>	<b>8,557</b>
<b>Max</b>	<b>407,995</b>	<b>13,161</b>	<b>15,855</b>	<b>11,355</b>
<b>Min</b>	<b>226,048</b>	<b>7,535</b>	<b>9,000</b>	<b>5,914</b>

DUNDAS DIVERSION TANK	
Month	Monthly Volume m³/mth
January	293
February	74,729
March	43,684
April	3,302
May	25,023
June	0
July	1,152
August	6,255
September	16,002
October	8
November	1,920
December	6,596
<b>Total</b>	<b>178,965</b>
<b>Avg</b>	<b>14,914</b>
<b>Max</b>	<b>74,729</b>
<b>Min</b>	<b>0</b>

REDLAND BROW LANDFILL LEACHATE (included in Plant flow)		
Month	Monthly Volume m³/mth	Proportion of Plant Flow %
January	6,014.80	1.76%
February	4,923.10	1.43%
March	8,025.70	1.97%
April	6,695.10	1.78%
May	8,352.20	2.25%
June	6,704.20	2.35%
July	4,983.50	1.84%
August	3,683.20	1.32%
September	3,060.30	1.35%
October	2,936.30	1.10%
November	2,754.80	1.01%
December	1,829.50	0.59%
<b>Total</b>	<b>59,963</b>	
<b>Avg</b>	<b>4,997</b>	<b>1.56%</b>
<b>Max</b>	<b>8,352</b>	<b>2.35%</b>
<b>Min</b>	<b>1,830</b>	<b>0.59%</b>



RAW INFLUENT CONCENTRATIONS									
Month	pH	TSS mg/L	cBOD mg/L	TP mg/L	SP mg/L	TKN mg/L	NH3 mg/L	COD mg/L	Temperature °C
January	7.66	42.80	64.00	3.21	2.12	26.18	22.00	162.75	11.98
February	7.68	88.08	87.00	3.49	2.10	27.95	21.04	413.00	10.34
March	7.62	30.68	40.60	2.22	1.41	18.26	16.82	194.00	10.31
April	7.80	79.35	75.50	3.61	2.19	26.63	19.60	142.25	11.51
May	7.64	44.40	56.25	2.68	1.65	21.68	16.80	185.75	13.69
June	7.72	157.40	105.40	4.72	2.87	37.44	28.54	195.00	16.15
July	7.59	99.00	89.00	4.16	2.32	33.20	26.90	151.75	18.25
August	7.51	94.80	83.80	4.16	2.51	33.42	27.82	177.75	19.73
September	7.52	52.58	73.00	3.86	2.41	31.18	26.23	209.60	19.94
October	7.55	48.23	78.25	3.86	2.40	32.48	28.53	111.75	18.38
November	7.53	147.86	117.40	4.54	2.43	33.46	25.78	129.75	16.75
December	7.46	200.25	146.25	4.64	2.19	33.73	26.80	159.00	14.15
Avg	7.61	90.45	84.70	3.76	2.21	29.63	23.90	186.03	15.10
Max	7.80	200.25	146.25	4.72	2.87	37.44	28.54	413.00	19.94
Min	7.46	30.68	40.60	2.22	1.41	18.26	16.80	111.75	10.31

RAW INFLUENT DAILY LOADINGS						
Month	TSS kg/day	cBOD kg/day	TP kg/day	SP kg/day	TKN kg/day	NH3 kg/day
January	472	706	35	23	289	243
February	1,080	1,067	43	26	343	258
March	404	534	29	19	240	221
April	993	945	45	27	333	245
May	532	674	32	20	260	201
June	1,498	1,003	45	27	356	272
July	864	777	36	20	290	235
August	855	756	38	23	301	251
September	396	550	29	18	235	198
October	414	672	33	21	279	245
November	1,340	1,064	41	22	303	234
December	1,993	1,456	46	22	336	267
Avg	903	850	38	22	297	239
Max	1,993	1,456	46	27	356	272
Min	396	534	29	18	235	198

PRIMARY EFFLUENT CONCENTRATIONS								
PLANT A					PLANT B			
Month	TSS mg/L	cBOD mg/L	TKN mg/L	NH3 mg/L	TSS mg/L	cBOD mg/L	TKN mg/L	NH3 mg/L
January	81.48	55.25	25.18	17.00	48.4	49.5	23.5	17.9
February	112.43	69.00	25.83	15.53	38.5	40.0	20.9	14.9
March	115.00	57.00	20.58	12.33	66.4	43.0	19.5	12.9
April	132.50	71.00	23.98	14.30	26.4	28.0	18.7	13.9
May	70.40	38.00	17.38	11.21	24.7	30.8	17.3	13.2
June	135.14	74.80	31.94	22.64	29.8	33.3	21.5	18.6
July	45.90	35.75	23.08	19.05	33.5	44.8	24.0	20.6
August	37.98	30.80	21.96	19.64	27.4	40.4	22.6	21.5
September	50.75	39.25	22.65	18.60	38.3	54.5	26.0	22.9
October	58.80	50.75	26.88	24.35	49.7	52.3	26.5	23.2
November	53.04	43.80	25.48	20.66	30.4	39.0	23.6	20.4
December	42.55	42.50	24.48	20.33	38.9	49.3	27.5	22.8
Avg	78.00	50.66	24.12	17.97	37.7	42.1	22.63	18.6
Max	135.1	74.8	31.94	24.4	66.4	54.5	27.48	23.2
Min	38.0	30.8	17.38	11.2	24.7	28.0	17.33	12.9

PRIMARY EFFLUENT DAILY LOADINGS								
PLANT A					PLANT B			
Month	TSS kg/day	cBOD kg/day	TKN kg/day	NH3 kg/day	TSS kg/day	cBOD kg/day	TKN kg/day	NH3 kg/day
January	373	253	115	78	312	319	152	116
February	524	321	120	72	293	304	159	114
March	562	278	101	60	549	356	162	107
April	651	349	118	70	201	213	142	106
May	341	184	84	54	177	220	124	94
June	526	291	124	88	168	187	121	105
July	172	134	87	71	166	223	119	102
August	142	115	82	73	145	214	120	114
September	174	135	78	64	157	223	106	94
October	224	193	102	93	237	250	127	111
November	217	179	104	84	151	194	117	101
December	192	192	111	92	211	268	149	124
Avg	341	219	102	75	231	247	133	107
Max	651	349	124	93	549	356	162	124
Min	142	115	78	54	145	187	106	94

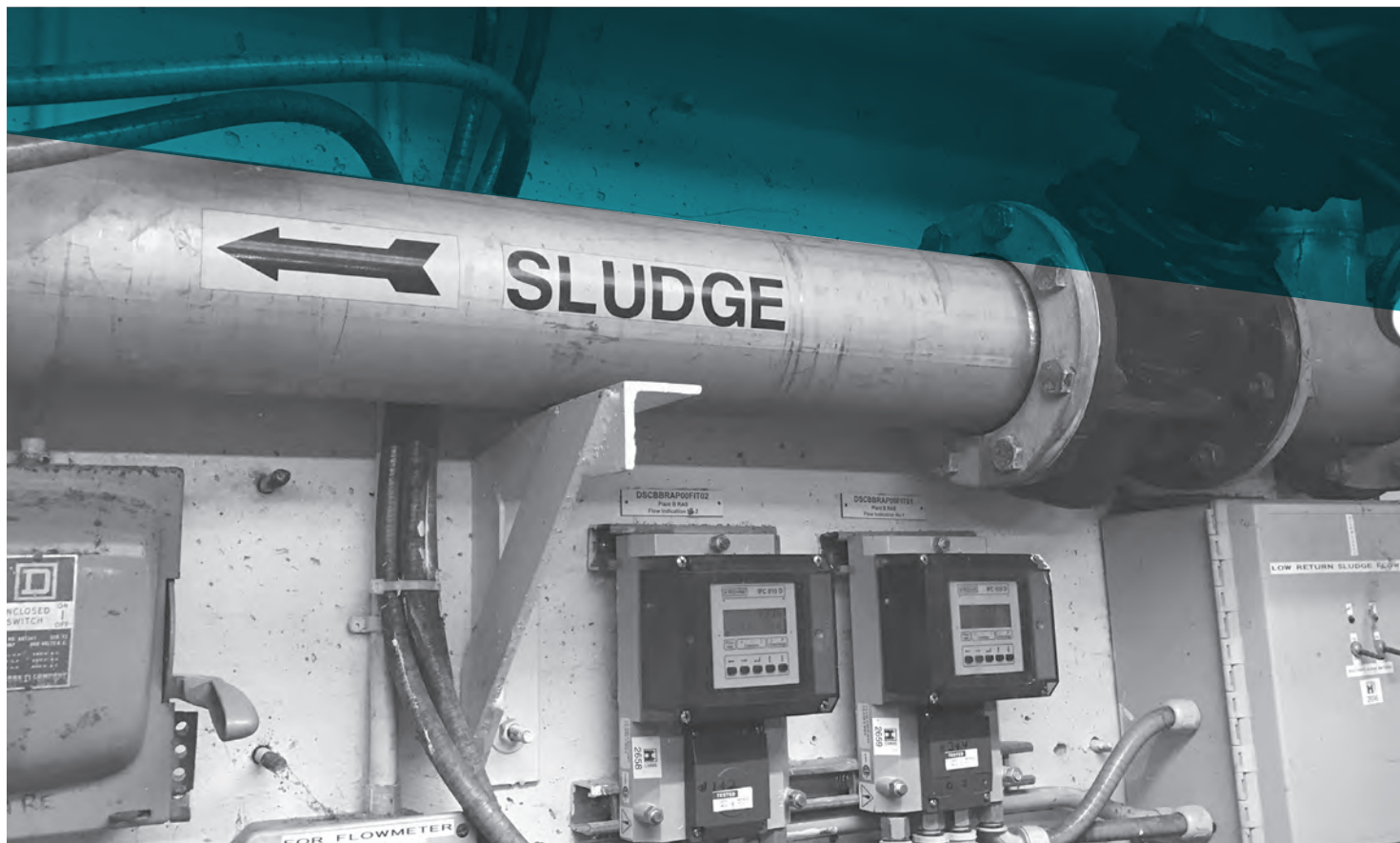
\* estimates based on pump runtime and capacity

RAW SLUDGE PUMPED *			
Month	Plant A m³/mth	Plant B m³/mth	Total m³/mth
January	1,163	2,812	3,975
February	949	2,449	3,399
March	1,586	2,344	3,930
April	1,703	1,663	3,367
May	1,349	3,084	4,433
June	1,334	2,722	4,055
July	1,608	2,812	4,420
August	1,691	2,812	4,503
September	1,411	2,722	4,133
October	1,193	2,722	3,915
November	1,329	2,631	3,960
December	1,380	2,722	4,101
<b>Total</b>	<b>16,695</b>	<b>31,495</b>	<b>48,190</b>
<b>Avg</b>	<b>1,391</b>	<b>2,625</b>	<b>4,016</b>
<b>Max</b>	<b>1,703</b>	<b>3,084</b>	<b>4,503</b>
<b>Min</b>	<b>949</b>	<b>1,663</b>	<b>3,367</b>

RAW SLUDGE SOLIDS CONTENT				
Month	PLANT A		PLANT B	
	Total Solids %	Volatile Solids %	Total Solids %	Volatile Solids %
January	3.10	75.98	2.75	77.68
February	2.35	74.25	2.95	74.50
March	1.96	73.66	2.12	74.04
April	2.33	73.83	2.70	75.75
May	2.43	72.78	1.33	69.73
June	2.42	72.68	1.78	74.94
July	2.70	75.63	1.85	73.60
August	2.34	72.28	1.36	66.72
September	2.95	75.00	0.90	64.13
October	2.63	75.55	1.73	70.33
November	2.62	74.84	1.12	72.04
December	2.55	76.60	1.83	75.48
<b>Avg</b>	<b>2.53</b>	<b>74.42</b>	<b>1.87</b>	<b>72.41</b>
<b>Max</b>	<b>3.10</b>	<b>76.60</b>	<b>2.95</b>	<b>77.68</b>
<b>Min</b>	<b>1.96</b>	<b>72.28</b>	<b>0.90</b>	<b>64.13</b>

SLUDGE HAULED TO WOODWARD			
Month	Truck Loads #trucks/mth	Volume Tonnes/mth	Anticipated 2023 Volume Tonnes/mth
January	64	2,813	3,500
February	62	2,672	3,500
March	85	3,745	3,500
April	72	3,171	3,500
May	82	3,616	3,500
June	83	3,643	3,500
July	82	3,604	3,500
August	89	3,876	3,500
September	80	3,446	3,500
October	76	3,307	3,500
November	80	3,334	3,500
December	73	3,185	3,500
<b>Total</b>	<b>928</b>	<b>40,412</b>	<b>42,000</b>
<b>Avg</b>	<b>77</b>	<b>3,368</b>	<b>3,500</b>
<b>Max</b>	<b>89</b>	<b>3,876</b>	<b>3,500</b>
<b>Min</b>	<b>62</b>	<b>2,672</b>	<b>3,500</b>

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	1577.50	1200.00	84.20	0.12	7.42	1890.00	1455.00	124.24	0.06	23.80
February	1837.50	1397.50	76.62	0.13	6.44	1612.50	1272.50	187.25	0.06	21.40
March	1800.00	1320.00	87.88	0.13	5.79	1942.00	1516.00	258.23	0.07	25.17
April	1592.50	1192.50	109.59	0.18	4.81	1655.00	1285.00	304.04	0.05	11.22
May	1470.00	1085.00	98.66	0.10	6.11	1630.00	1259.00	215.45	0.05	28.77
June	1592.00	1186.00	116.66	0.15	7.35	1564.00	1194.20	183.32	0.05	19.06
July	1367.50	1000.00	124.14	0.08	9.36	1685.00	1255.00	180.52	0.06	28.46
August	1490.00	1061.20	88.55	0.07	12.79	1291.20	948.40	161.08	0.08	34.99
September	1530.00	1067.00	99.19	0.08	12.92	1700.00	1217.75	139.27	0.06	36.89
October	1692.50	1220.00	76.83	0.09	9.33	1827.50	1335.00	174.41	0.05	20.57
November	1482.00	1084.00	93.00	0.10	7.37	1586.00	1182.00	167.91	0.05	19.97
December	1557.50	1152.50	104.17	0.09	9.72	1685.00	1285.00	170.91	0.06	23.32
Avg	1582.42	1163.81	96.62	0.11	8.28	1672.35	1267.07	188.88	0.06	24.47
Max	1837.50	1397.50	124.14	0.18	12.92	1942.00	1516.00	304.04	0.08	36.89
Min	1367.50	1000.00	76.62	0.07	4.81	1291.20	948.40	124.24	0.05	11.22





COMBINED PLANT EFFLUENT CONCENTRATIONS												
Month	pH	Alkalinity mg/L	TSS mg/L	cBOD mg/L	TP mg/L	SP mg/L	TKN mg/L	NH3 mg/L	Nitrate mg/L	Nitrite mg/L	E Coli CFU/100ml	Chlorine Residual mg/L
January	7.48	93.00	0.80	1.00	0.10	0.09	0.75	0.03	20.40	0.15	-	-
February	7.46	94.75	0.93	1.25	0.10	0.09	0.65	0.03	18.20	0.28	-	-
March	7.66	120.00	0.86	1.20	0.07	0.05	0.44	0.03	16.46	0.12	-	-
April	7.61	104.00	0.88	1.50	0.08	0.06	0.48	0.07	17.30	0.12	-	-
May	7.60	102.00	1.10	1.75	0.08	0.06	0.50	0.05	17.10	0.10	1.00	0.01
June	7.56	86.20	1.68	2.20	0.14	0.10	0.94	0.05	18.24	0.13	1.00	0.01
July	7.66	83.50	1.75	2.00	0.21	0.18	0.93	0.05	17.65	0.13	2.00	0.01
August	7.53	57.20	1.26	2.20	0.18	0.15	0.72	0.06	18.92	0.10	1.00	0.01
September	7.48	50.75	1.15	1.50	0.17	0.15	0.60	0.06	21.00	0.10	1.00	0.01
October	7.46	53.75	1.30	1.25	0.18	0.15	0.48	0.29	19.88	0.13	1.00	0.01
November	7.38	43.60	0.90	1.00	0.12	0.10	0.70	0.05	20.90	0.11	-	-
December	7.19	47.25	1.38	1.00	0.10	0.08	0.85	0.05	22.58	0.12	-	-
Avg	7.51	78.00	1.16	1.49	0.13	0.11	0.67	0.07	19.05	0.13	1.17	0.01
Max	7.66	120.00	1.75	2.20	0.21	0.18	0.94	0.29	22.58	0.28	2.00	0.01
Min	7.19	43.60	0.80	1.00	0.07	0.05	0.44	0.03	16.46	0.10	1.00	0.01

Any exceedances of monthly CofA limits will be indicated by red type

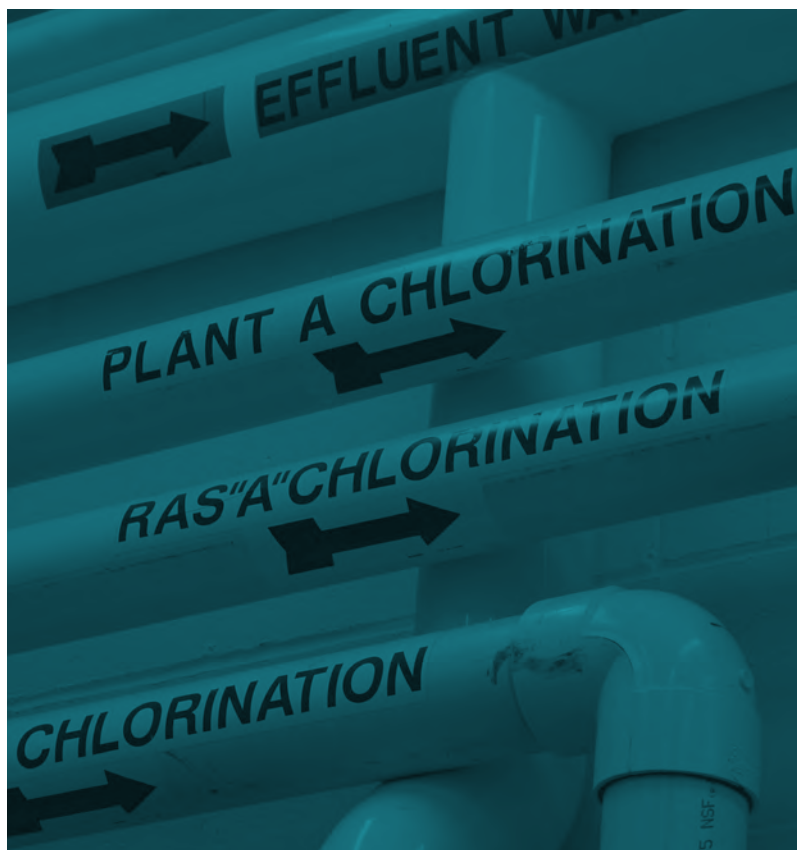
COMBINED PLANT EFFLUENT DAILY LOADINGS								
Month	TSS kg/day	cBOD kg/day	TP kg/day	SP kg/day	TKN kg/day	NH3 kg/day	Nitrate kg/day	Nitrite kg/day
January	8.8	11.0	1.11	0.96	8.27	0.28	224.92	1.68
February	11.3	15.3	1.23	1.08	7.97	0.31	223.12	3.40
March	11.3	15.8	0.92	0.69	5.79	0.37	216.63	1.55
April	10.9	18.8	0.99	0.77	5.94	0.81	216.49	1.44
May	13.2	21.0	1.00	0.76	5.99	0.57	204.95	1.20
June	16.0	20.9	1.36	0.99	8.94	0.51	173.55	1.20
July	15.3	17.5	1.87	1.55	8.07	0.46	154.03	1.16
August	11.4	19.8	1.61	1.33	6.49	0.56	170.67	0.90
September	8.7	11.3	1.30	1.14	4.52	0.45	158.23	0.75
October	11.2	10.7	1.59	1.31	4.08	2.51	170.60	1.12
November	8.2	9.1	1.11	0.91	6.34	0.47	189.39	1.01
December	13.7	10.0	0.98	0.81	8.46	0.45	224.69	1.14
Avg	11.7	15.1	1.25	1.02	6.7	0.6	193.9	1.38
Max	16.0	21.0	1.87	1.55	8.9	2.5	224.9	3.40
Min	8.2	9.1	0.92	0.69	4.1	0.3	154.0	0.75

REMOVAL EFFICIENCY						
Month	TSS %	cBOD %	TP %	SP %	TKN %	NH3 %
January	98.1%	98.4%	96.9%	95.9%	97.1%	99.9%
February	98.9%	98.6%	97.1%	95.8%	97.7%	99.9%
March	97.2%	97.0%	96.9%	96.3%	97.6%	99.8%
April	98.9%	98.0%	97.8%	97.2%	98.2%	99.7%
May	97.5%	96.9%	96.9%	96.2%	97.7%	99.7%
June	98.9%	97.9%	97.0%	96.4%	97.5%	99.8%
July	98.2%	97.8%	94.9%	92.3%	97.2%	99.8%
August	98.7%	97.4%	95.7%	94.1%	97.8%	99.8%
September	97.8%	97.9%	95.5%	93.7%	98.1%	99.8%
October	97.3%	98.4%	95.2%	93.6%	98.5%	99.0%
November	99.4%	99.1%	97.3%	95.9%	97.9%	99.8%
December	99.3%	99.3%	97.9%	96.3%	97.5%	99.8%
Avg	98.4%	98.1%	96.6%	95.3%	97.7%	99.7%
Max	99.4%	99.3%	97.9%	97.2%	98.5%	99.9%
Min	97.2%	96.9%	94.9%	92.3%	97.1%	99.0%

LIQUID STREAM CONTAMINANT REMOVAL						
Month	TSS kg/mth	cBOD kg/mth	TP kg/mth	SP kg/mth	TKN kg/mth	NH3 kg/mth
January	14,355	21,533	1,063	694	8,690	7,511
February	29,915	29,435	1,165	692	9,371	7,214
March	12,166	16,075	877	552	7,270	6,851
April	29,461	27,781	1,326	798	9,817	7,334
May	16,088	20,250	963	588	7,868	6,224
June	44,450	29,458	1,307	790	10,419	8,131
July	26,310	23,537	1,068	578	8,732	7,263
August	26,158	22,819	1,113	661	9,144	7,762
September	11,625	16,162	833	510	6,911	5,915
October	12,486	20,489	979	597	8,515	7,512
November	39,951	31,643	1,200	632	8,906	6,994
December	61,361	44,815	1,402	651	10,143	8,255
Total	324,326	303,997	13,295	7,743	105,786	86,967
Avg	27,027	25,333	1,108	645	8,816	7,247
Max	61,361	44,815	1,402	798	10,419	8,255
Min	11,625	16,075	833	510	6,911	5,915

DISINFECTION			
Month	Sodium Hypochlorite kg/mth	Dosage mg/L	Residual Level mg/L
January	-	-	-
February	-	-	-
March	-	-	-
April	-	-	-
May	1,751	4.8	1.68
June	1,826	6.4	1.66
July	1,936	7.2	1.70
August	1,745	6.3	1.71
September	1,525	6.8	1.74
October	1,723	6.5	1.62
November	-	-	-
December	-	-	-
Total	10,508		
Avg	1,751.3	6.3	1.68
Max	1,936	7.2	1.74
Min	1,525	4.8	1.62

sodium hypochlorite added from May 1 to October 31



DECHLORINATION		
Month	Sodium Bisulfite m³/mth	Outfall Residual mg/L
January	-	-
February	-	-
March	-	-
April	-	-
May	2.3	0.01
June	2.6	0.01
July	1.7	0.01
August	2.1	0.01
September	2.1	0.01
October	2.6	0.01
November	-	-
December	-	-
Total	13.3	
Avg	2.2	0.01
Max	2.6	0.01
Min	1.7	0.01

FERRIC SULFATE		
Month	Ferric Sulfate L/mth	Dosage mg/L
January	21,263	11.11
February	18,743	10.08
March	22,156	9.88
April	22,365	10.99
May	24,833	12.26
June	20,423	13.13
July	17,693	12.04
August	21,420	14.08
September	17,378	14.09
October	19,058	13.12
November	20,843	14.05
December	22,103	13.15
Total	248,273	
Avg	20,689	12.33
Max	24,833	14.09
Min	17,378	9.88

# DUNDAS DAILY EFFLUENT LOADINGS

DUNDAS WASTEWATER TREATMENT PLANT DAILY EFFLUENT LOADINGS														
Date	Flow ML/D	TSS			cBOD <sub>5</sub>			Total Phosphorus			T.K.N.			
				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 5, 2022	13.247	0.8	10.60	91	1	13.25	91	0.057	0.76	9.1	0.4	5.30	182.0	
January 12, 2022	10.651	0.8	8.52	91	1	10.65	91	0.078	0.83	9.1	0.8	8.52	182.0	
January 19, 2022	10.823	0.8	8.66	91	1	10.82	91	0.126	1.36	9.1	0.9	9.74	182.0	
January 26, 2022	9.828	0.8	7.86	91	1	9.83	91	0.143	1.41	9.1	0.9	8.85	182.0	
February 2, 2022	11.677	0.8	9.34	91	2	23.35	91	0.141	1.65	9.1	0.9	10.51	182.0	
February 9, 2022	10.502	1.3	13.65	91	1	10.50	91	0.106	1.11	9.1	0.6	6.30	182.0	
February 16, 2022	11.847	0.8	9.48	91	1	11.85	91	0.093	1.10	9.1	0.7	8.29	182.0	
February 23, 2022	11.015	0.8	8.81	91	1	11.02	91	0.060	0.66	9.1	0.4	4.41	182.0	
March 2, 2022	12.595	1.1	13.85	91	2	25.19	91	0.070	0.88	9.1	0.7	8.82	182.0	
March 9, 2022	14.272	0.8	11.42	91	1	14.27	91	0.072	1.03	9.1	0.2	2.85	182.0	
March 16, 2022	12.090	0.8	9.67	91	1	12.09	91	0.083	1.00	9.1	0.8	9.67	182.0	
March 23, 2022	13.278	0.8	10.62	91	1	13.28	91	0.065	0.86	9.1	0.3	3.98	182.0	
March 30, 2022	14.048	0.8	11.24	91	1	14.05	91	0.058	0.81	9.1	0.2	2.81	182.0	
April 6, 2022	12.149	0.8	9.72	91	1	12.15	91	0.068	0.83	9.1	0.6	7.29	182.0	
April 13, 2022	11.324	0.9	10.19	91	2	22.65	91	0.081	0.92	9.1	0.2	2.26	182.0	
April 20, 2022	12.558	0.8	10.05	91	1	12.56	91	0.075	0.94	9.1	0.9	11.30	182.0	
April 27, 2022	13.711	1.0	13.71	91	2	27.42	91	0.091	1.25	9.1	0.2	2.74	182.0	

Any exceedances of daily loading and flow are indicated by red type



## DUNDAS WASTEWATER TREATMENT PLANT DAILY EFFLUENT LOADINGS continued

Date	Flow ML/D	TSS			cBOD <sub>5</sub>			Total Phosphorus			T.K.N.			
				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 11, 2022	13.310	0.8	10.65	91	1	13.31	91	0.061	0.81	9.1	0.5	6.66		36.4
May 18, 2022	12.878	1.7	21.89	91	1	12.88	91	0.086	1.11	9.1	0.2	2.58		36.4
May 25, 2022	9.522	1.0	9.52	91	2	19.04	91	0.104	0.99	9.1	0.6	5.71		36.4
June 1, 2022	10.621	1.9	20.18	91	3	31.86	91	0.132	1.40	9.1	1.0	10.62		36.4
June 8, 2022	10.784	1.2	12.94	91	1	10.78	91	0.110	1.19	9.1	0.9	9.71		36.4
June 15, 2022	9.179	1.4	12.85	91	2	18.36	91	0.120	1.10	9.1	0.8	7.34		36.4
June 22, 2022	8.842	2.1	18.57	91	2	17.68	91	0.143	1.26	9.1	1.2	10.61		36.4
June 29, 2022	8.991	1.8	16.18	91	3	26.97	91	0.208	1.87	9.1	0.8	7.19		36.4
July 6, 2022	8.550	2.9	24.80	91	2	17.10	91	0.207	1.77	9.1	1.1	9.41		36.4
July 13, 2022	8.213	1.8	14.78	91	2	16.43	91	0.228	1.87	9.1	1.0	8.21		36.4
July 20, 2022	9.511	1.4	13.32	91	2	19.02	91	0.214	2.04	9.1	1.0	9.51		36.4
July 27, 2022	8.878	0.9	7.99	91	2	17.76	91	0.208	1.85	9.1	0.6	5.33		36.4
August 3, 2022	8.720	1.1	9.59	91	2	17.44	91	0.158	1.38	9.1	0.2	1.74		36.4
August 10, 2022	7.133	1.0	7.13	91	2	14.27	91	0.197	1.41	9.1	0.6	4.28		36.4
August 17, 2022	8.735	1.1	9.61	91	2	17.47	91	0.209	1.83	9.1	1.0	8.74		36.4
August 24, 2022	9.984	2.1	20.97	91	2	19.97	91	0.149	1.49	9.1	1.0	9.98		36.4
August 31, 2022	8.308	1.0	8.31	91	3	24.92	91	0.182	1.51	9.1	0.8	6.65		36.4
September 7, 2022	8.126	1.4	11.38	91	3	24.38	91	0.157	1.28	9.1	0.2	1.63		36.4

Any exceedances of daily loading and flow are indicated by red type

DUNDAS WASTEWATER TREATMENT PLANT DAILY EFFLUENT LOADINGS continued														
Date	Flow ML/D	TSS			cBOD <sub>5</sub>			Total Phosphorus			T.K.N.			
				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
September 14, 2022	6.104	1.0	6.10	91	1	6.10	91	0.160	0.98	9.1	0.7	4.27		36.4
September 21, 2022	7.804	0.8	6.24	91	1	7.80	91	0.183	1.43	9.1	0.7	5.46		36.4
September 28, 2022	8.088	1.4	11.32	91	1	8.09	91	0.190	1.54	9.1	0.8	6.47		36.4
October 5, 2022	7.589	1.8	13.66	91	2	15.18	91	0.173	1.31	9.1	0.2	1.52		36.4
October 12, 2022	7.922	1.3	10.30	91	1	7.92	91	0.228	1.81	9.1	0.3	2.38		36.4
October 19, 2022	9.181	1.3	11.94	91	1	9.18	91	0.174	1.60	9.1	1.2	11.02		36.4
October 26, 2022	8.950	0.8	7.16	91	1	8.95	91	0.164	1.47	9.1	0.2	1.79		36.4
November 2, 2022	7.627	0.9	6.86	91	1	7.63	91	0.174	1.33	9.1	0.9	6.86	182.0	
November 9, 2022	9.077	1.2	10.89	91	1	9.08	91	0.120	1.09	9.1	0.2	1.82	182.0	
November 16, 2022	10.224	0.8	8.18	91	1	10.22	91	0.105	1.07	9.1	0.6	6.13	182.0	
November 23, 2022	8.324	0.8	6.66	91	1	8.32	91	0.109	0.91	9.1	0.8	6.66	182.0	
November 30, 2022	10.380	0.8	8.30	91	1	10.38	91	0.104	1.08	9.1	1.0	10.38	182.0	
December 7, 2022	8.950	3.1	27.75	91	1	8.95	91	0.092	0.82	9.1	0.7	6.27	182.0	
December 14, 2022	8.850	0.8	7.08	91	1	8.85	91	0.099	0.88	9.1	1.2	10.62	182.0	
December 21, 2022	9.462	0.8	7.57	91	1	9.46	91	0.099	0.94	9.1	0.7	6.62	182.0	
December 28, 2022	9.459	0.8	7.57	91	1	9.46	91	0.103	0.97	9.1	0.8	7.57	182.0	
Average	10.101	1.17	11.46		1.50	14.89		0.129	1.22		0.67	6.60		
Max	14.272	3.10	27.75		3.00	34.02		0.228	2.04		1.20	11.30		
Min	6.104	0.80	6.10		1.00	6.10		0.057	0.66		0.20	1.52		

Any exceedances of daily loading and flow are indicated by red type

# SEWER DISCHARGE SAMPLING RESULTS

Note: 1. 1st Quarter sample collected on February 24, 2022. 2. Unionized Ammonia calculated from field pH, Field Temperature and total ammonia results  
3. 2nd Quarter sample collected on April 27, 2022. 4. 3rd Quarter sample collected on August 29, 2022. 5. 4th Quarter Sample collected November 22, 2022.

2022 QUARTERLY SEWER DISCHARGE SAMPLING RESULTS REDLAND BROW LANDFILL						
Parameter List (Dundas WWTP C of A)	RDL	Units	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
BOD5	2	mg/L	8	6	30	36
COD	4	mg/L	55	60	220	320
Dissolved Organic Carbon	0.2	mg/L	19	19	72	99
Oil and Grease	0.5	mg/L	1.2	<0.5	1.9	7.2
Total Dissolved Solids	10	mg/L	705	750	1610	1770
Total Kjeldahl Nitrogen	0.5	mg/L	9	7.6	22	34
Phosphorus	0.004	mg/L	0.036	0.038	0.14	0.31
Total Suspended Solids	10	mg/L	130	120	14	12
Alkalinity (as CaCO3)	1	mg/L	160	180	640	750
Conductivity	1	mmho/cm	1500	1400	2900	3800
pH (20°C)	-	-	7.97	8.02	8.42	8.11
Aluminum	0.005	mg/L	0.01	0.048	0.014	0.028
Ammonia (as N)	0.25	mg/L	7.5	7.3	21	33
Unionized Ammonia		mg/L	0.022	0.191	2.04	1.66
Arsenic	0.001	mg/L	0.0085	0.0087	0.017	0.025
Beryllium	0.0005	mg/L	<0.0004	<0.0004	<0.0004	<0.002
Boron	0.01	mg/L	1.3	1.5	4.7	6
Cadmium	0.0001	mg/L	<0.00009	<0.00009	<0.00009	<0.00045
Calcium	0.2	mg/L	95	96	57	77
Chloride	2	mg/L	180	150	410	630
Chromium	0.005	mg/L	<0.005	<0.005	0.0055	<0.025
Copper	0.001	mg/L	0.0026	0.0025	0.0017	<0.0045
Sulphide	0.02	mg/L	0.11	0.069	0.093	02
Iron	0.1	mg/L	0.12	0.13	0.39	<0.5
Lead	0.0005	mg/L	0.0073	0.0014	0.0011	<0.0025
Magnesium	0.05	mg/L	26	28	24	22
Nitrate (as N)	0.1	mg/L	0.27	0.24	<0.10	<0.10
Nitrite (as N)	0.01	mg/L	0.19	0.217	0.075	0.071
Phenols	0.002	mg/L	0.023	0.017	0.13	0.061
Potassium	0.2	mg/L	35	37	62	77
Selenium	0.002	mg/L	<0.002	<0.002	<0.002	<0.010
Silver	0.0001	mg/L	<0.00009	<0.00009	<0.00009	<0.00045
Sulphate (as SO4)	1	mg/L	260	270	1500	200
Zinc	0.005	mg/L	0.021	0.018	0.029	0.035







EASTWOOD CSO TANK INFLUENT 24 H COMPOSITE								
Date & Time	Aluminum (mg/L)	Ammonia + Ammonium as N (mg/L)	Arsenic (mg/L)	Barium (mg/L)	Beryllium (mg/L)	Bismuth (mg/L)	Cadmium (mg/L)	cBiochemical Oxygen Demand (mg/L)
2022-02-17 12:06:00	2.79	1.02	<0.020	0.047	<0.0001	<0.020	0.0005	19
2022-02-18 12:03:00	0.390	4.55	<0.020	0.041	<0.0001	<0.020	<0.0005	31
2022-03-24 02:00:00	2.06	1.05	<0.020	0.034	<0.0001	<0.020	<0.0005	25
2022-04-19 00:16:00	0.189	4.92	<0.020	0.028	<0.0001	<0.020	<0.0005	46
2022-06-01 17:55:00	1.78	2.50	<0.020	0.037	<0.0001	<0.020	<0.0005	32
2022-07-19 01:34:00	0.423	2.40	<0.020	0.017	<0.0001	<0.020	<0.0005	16
2022-12-16 11:00:00	0.754	4.25	<0.020	0.031	<0.0001	<0.020	<0.0005	136

EASTWOOD CSO TANK INFLUENT 24 H COMPOSITE continued

Date & Time	Chromium (mg/L)	Cobalt (mg/L)	Copper (mg/L)	Escherichia coli (MPN/100mL)	Iron (mg/L)	Lead (mg/L)	Manganese (mg/L)	Molybdenum (mg/L)
2022-02-17 12:06:00	0.015	0.0017	0.066	220000	6.06	0.071	0.376	<0.005
2022-02-18 12:03:00	0.002	0.0009	0.013	1120000	0.846	<0.020	0.136	<0.005
2022-03-24 02:00:00	0.011	0.0014	0.035	201000	4.07	0.037	0.284	<0.005
2022-04-19 00:16:00	0.002	<0.0009	0.016	24200	0.563	<0.020	0.098	<0.005
2022-06-01 17:55:00	0.014	0.0022	0.034	200000	3.60	0.027	0.283	<0.005
2022-07-19 01:34:00	0.004	<0.0009	0.023	1110000	0.783	<0.020	0.060	<0.005
2022-12-16 11:00:00	0.009	<0.0009	0.054	710000	1.77	<0.020	0.118	0.005

EASTWOOD CSO TANK INFLUENT 24 H COMPOSITE continued							
Date & Time	Nickel (mg/L)	Nitrate as N (mg/L)	Total Phosphorus (mg/L)	Selenium (mg/L)	Silver (mg/L)	Strontium (mg/L)	Thallium (mg/L)
2022-02-17 12:06:00	0.010	0.53	0.940	<0.020	<0.005	0.194	<0.010
2022-02-18 12:03:00	<0.005	1.05	1.20	<0.020	<0.005	0.556	<0.010
2022-03-24 02:00:00	0.005	0.44	0.740	<0.020	<0.005	0.144	<0.010
2022-04-19 00:16:00	<0.005	1.68	1.30	<0.020	<0.005	0.299	<0.010
2022-06-01 17:55:00	0.006	0.75	0.920	<0.020	<0.005	0.170	<0.010
2022-07-19 01:34:00	<0.005	0.51	0.716	<0.020	<0.005	0.156	<0.010
2022-12-16 11:00:00	<0.005	0.73	1.70	<0.020	<0.005	0.205	<0.010

EASTWOOD CSO TANK INFLUENT 24 H COMPOSITE continued						
Date & Time	Tin (mg/L)	Titanium (mg/L)	Total Kjeldahl Nitrogen as N (mg/L)	Total Suspended Solids (mg/L)	Vanadium (mg/L)	Zinc (mg/L)
2022-02-17 12:06:00	<0.020	0.099	4.2	214	0.014	0.252
2022-02-18 12:03:00	<0.020	0.012	8.4	36.0	0.002	0.056
2022-03-24 02:00:00	<0.020	0.065	17.7	194	0.009	0.177
2022-04-19 00:16:00	<0.020	0.008	11.3	31.0	<0.002	0.072
2022-06-01 17:55:00	<0.020	0.060	5.5	141	0.008	0.147
2022-07-19 01:34:00	<0.020	0.011	4.4	44.0	0.002	0.066
2022-12-16 11:00:00	<0.020	0.030	11.3	228	0.005	0.151

# ROYAL INFLUENT - 24 H COMPOSITE

ROYAL CSO TANK INFLUENT 24 H COMPOSITE								
Date & Time	Aluminum (mg/L)	Ammonia + Ammonium as N (mg/L)	Arsenic (mg/L)	Barium (mg/L)	Beryllium (mg/L)	Bismuth (mg/L)	Cadmium (mg/L)	cBiochemical Oxygen Demand (mg/L)
2022-02-17 14:21:00	13.9	0.66	<0.020	0.111	0.0005	<0.020	<0.0005	17
2022-02-17 22:43:00	3.23	0.45	<0.020	0.042	<0.0001	<0.020	<0.0005	<10
2022-02-23 07:00:00	7.67	0.40	<0.020	0.082	0.0002	<0.020	<0.0005	9
2022-03-24 04:37:00	30.7	0.44	<0.020	0.201	0.0013	<0.020	0.0007	11
2022-05-03 19:57:00	9.64	0.39	<0.020	0.082	0.0004	<0.020	<0.0005	9
2022-07-18 16:38:00	6.15	0.30	<0.020	0.052	0.0002	<0.020	<0.0005	10
2022-07-21 07:34:00	9.89	1.00	<0.020	0.081	0.0003	<0.020	<0.0005	22
2022-08-05 01:41:00	14.8	1.41	<0.020	0.117	0.0005	<0.020	<0.0005	21
2022-08-21 17:02:00	5.60	1.25	<0.020	0.067	0.0001	<0.020	<0.0005	62

ROYAL CSO TANK INFLUENT 24 H COMPOSITE continued								
Date & Time	Chromium (mg/L)	Cobalt (mg/L)	Copper (mg/L)	Escherichia coli (MPN/100mL)	Iron (mg/L)	Lead (mg/L)	Manganese (mg/L)	Molybdenum (mg/L)
2022-02-17 14:21:00	0.022	0.0084	0.041	60000	20.0	0.022	0.606	<0.005
2022-02-17 22:43:00	0.005	0.0026	0.012	22800	3.99	<0.020	0.176	<0.005
2022-02-23 07:00:00	0.015	0.0057	0.031	77000	10.6	0.020	0.346	<0.005
2022-03-24 04:37:00	0.048	0.0221	0.079	142000	44.4	0.044	1.16	<0.005
2022-05-03 19:57:00	0.014	0.0057	0.027	77000	12.3	<0.020	0.361	<0.005
2022-07-18 16:38:00	0.009	0.0035	0.020	150000	7.52	<0.020	0.272	<0.005
2022-07-21 07:34:00	0.018	0.0060	0.048	910000	13.6	0.022	0.463	<0.005
2022-08-05 01:41:00	0.022	0.0100	0.045	910000	20.1	<0.020	0.698	<0.005
2022-08-21 17:02:00	0.011	<0.0009	0.058	990000	6.81	<0.020	0.256	<0.005

ROYAL CSO TANK INFLUENT 24 H COMPOSITE continued							
Date & Time	Nickel (mg/L)	Nitrate as N (mg/L)	Total Phosphorus (mg/L)	Selenium (mg/L)	Silver (mg/L)	Strontium (mg/L)	Thallium (mg/L)
2022-02-17 14:21:00	0.023	0.58	1.03	<0.020	<0.005	0.454	<0.010
2022-02-17 22:43:00	0.005	0.82	0.334	<0.020	<0.005	0.373	<0.010
2022-02-23 07:00:00	0.014	0.62	0.571	<0.020	<0.005	0.625	<0.010
2022-03-24 04:37:00	0.053	0.54	1.56	<0.020	<0.005	0.543	<0.010
2022-05-03 19:57:00	0.014	0.58	0.572	<0.020	<0.005	0.563	<0.010
2022-07-18 16:38:00	0.009	0.52	0.499	<0.020	<0.005	0.351	<0.010
2022-07-21 07:34:00	0.017	0.46	1.22	<0.020	<0.005	0.260	<0.010
2022-08-05 01:41:00	0.023	0.40	1.39	<0.020	<0.005	0.549	<0.010
2022-08-21 17:02:00	0.009	0.60	1.56	<0.020	<0.005	0.263	<0.010

ROYAL CSO TANK INFLUENT 24 H COMPOSITE continued						
Date & Time	Tin (mg/L)	Titanium (mg/L)	Total Kjeldahl Nitrogen as N (mg/L)	Total Suspended Solids (mg/L)	Vanadium (mg/L)	Zinc (mg/L)
2022-02-17 14:21:00	<0.020	0.257	3.1	606	0.028	0.218
2022-02-17 22:43:00	<0.020	0.058	1.3	105	0.005	0.060
2022-02-23 07:00:00	<0.020	0.156	2.1	304	0.016	0.177
2022-03-24 04:37:00	<0.020	0.442	3.4	1550	0.058	0.356
2022-05-03 19:57:00	<0.020	0.170	2.1	380	0.018	0.138
2022-07-18 16:38:00	<0.020	0.113	1.8	185	0.012	0.101
2022-07-21 07:34:00	<0.020	0.178	4.8	465	0.019	0.203
2022-08-05 01:41:00	<0.020	0.280	5.0	569	0.029	0.185
2022-08-21 17:02:00	<0.020	0.260	7.0	279	0.013	0.201



ROYAL CSO TANK INFLUENT								
Date & Time	Aluminum (mg/L)	Ammonia + Ammonium as N (mg/L)	Arsenic (mg/L)	Barium (mg/L)	Beryllium (mg/L)	Bismuth (mg/L)	Cadmium (mg/L)	cBiochemical Oxygen Demand (mg/L)
2022-02-17 09:23:00	11.2	0.44	<0.020	0.083	0.0004	<0.020	<0.0005	6
2022-02-17 21:35:00	4.28	0.40	<0.020	0.044	0.0001	<0.020	<0.0005	<10
2022-02-23 07:20:00	4.03	0.30	<0.020	0.043	<0.0001	<0.020	<0.0005	<6

ROYAL CSO TANK INFLUENT continued								
Date & Time	Chromium (mg/L)	Cobalt (mg/L)	Copper (mg/L)	Escherichia coli (MPN/100mL)	Iron (mg/L)	Lead (mg/L)	Manganese (mg/L)	Molybdenum (mg/L)
2022-02-17 09:23:00	0.017	0.0062	0.026	50000	15.0	<0.020	0.412	<0.005
2022-02-17 21:35:00	0.006	0.0031	0.014	27600	5.65	<0.020	0.216	<0.005
2022-02-23 07:20:00	0.006	0.0028	0.014	38700	4.77	<0.020	0.146	<0.005

ROYAL CSO TANK INFLUENT continued							
Date & Time	Nickel (mg/L)	Nitrate as N (mg/L)	Total Phosphorus (mg/L)	Selenium (mg/L)	Silver (mg/L)	Strontium (mg/L)	Thallium (mg/L)
2022-02-17 09:23:00	0.017	0.59	0.650	<0.020	<0.005	0.313	<0.010
2022-02-17 21:35:00	0.008	2.36	0.371	<0.020	<0.005	0.306	<0.010
2022-02-23 07:20:00	0.006	0.63	0.289	<0.020	<0.005	0.376	<0.010

ROYAL CSO TANK INFLUENT continued						
Date & Time	Tin (mg/L)	Titanium (mg/L)	Total Kjeldahl Nitrogen as N (mg/L)	Total Suspended Solids (mg/L)	Vanadium (mg/L)	Zinc (mg/L)
2022-02-17 09:23:00	<0.020	0.199	1.8	387	0.021	0.148
2022-02-17 21:35:00	<0.020	0.078	1.4	133	0.008	0.081
2022-02-23 07:20:00	<0.020	0.072	1.1	92.6	0.007	0.070

STRACHAN CSO TANK INFLUENT 24 H COMPOSITE								
Date & Time	Aluminum (mg/L)	Ammonia + Ammonium as N (mg/L)	Arsenic (mg/L)	Barium (mg/L)	Beryllium (mg/L)	Bismuth (mg/L)	Cadmium (mg/L)	cBiochemical Oxygen Demand (mg/L)
2022-03-24 02:09:00	24.4	0.33	<0.020	0.166	0.0009	<0.020	0.0007	13
2022-06-01 21:40:00	42.6	2.18	0.021	0.268	0.0016	<0.020	0.0019	16
2022-08-04 19:54:00	51.1	0.50	0.022	0.302	0.0022	<0.020	0.0010	8
2022-09-12 14:30:00	4.76	0.32	<0.020	0.057	0.0002	<0.020	<0.0005	<5

STRACHAN CSO TANK INFLUENT 24 H COMPOSITE continued								
Date & Time	Chromium (mg/L)	Cobalt (mg/L)	Copper (mg/L)	Escherichia coli (MPN/100mL)	Iron (mg/L)	Lead (mg/L)	Manganese (mg/L)	Molybdenum (mg/L)
2022-03-24 02:09:00	0.038	0.0154	0.097	16000	38.5	0.094	1.02	<0.005
2022-06-01 21:40:00	0.062	0.0286	0.200	70000	67.5	0.289	1.85	<0.005
2022-08-04 19:54:00	0.074	0.0306	0.157	130000	83.8	0.072	1.41	<0.005
2022-09-12 14:30:00	0.008	0.0025	0.019	50000	7.34	<0.020	0.187	<0.005

STRACHAN CSO TANK INFLUENT 24 H COMPOSITE continued							
Date & Time	Nickel (mg/L)	Nitrate as N (mg/L)	Total Phosphorus (mg/L)	Selenium (mg/L)	Silver (mg/L)	Strontium (mg/L)	Thallium (mg/L)
2022-03-24 02:09:00	0.040	0.43	1.15	<0.020	<0.005	0.508	<0.010
2022-06-01 21:40:00	0.072	1.40	2.36	<0.020	<0.005	0.720	<0.010
2022-08-04 19:54:00	0.082	1.19	1.78	<0.020	<0.005	0.572	<0.010
2022-09-12 14:30:00	0.007	0.53	0.506	<0.020	<0.005	0.311	<0.010

## STRACHAN CSO TANK INFLUENT 24 H COMPOSITE continued

Date & Time	Tin (mg/L)	Titanium (mg/L)	Total Kjeldahl Nitrogen as N (mg/L)	Total Suspended Solids (mg/L)	Vanadium (mg/L)	Zinc (mg/L)
2022-03-24 02:09:00	<0.020	0.409	2.5	689	0.050	0.279
2022-06-01 21:40:00	<0.020	0.702	7.0	1400	0.084	0.619
2022-08-04 19:54:00	<0.020	0.913	3.1	1580	0.104	0.303
2022-09-12 14:30:00	<0.020	0.111	1.9	120	0.009	0.045

