# 2024 WASTEWATER FACILITIES ANNUAL REPORT

Hamilton

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# 1 WOODWARD AVENUE WASTEWATER TREATMENT PLANT

## 1.1 GENERAL INFORMATION

### 1.1.1 THE WOODWARD AVENUE WASTEWATER TREATMENT PLANT

The Woodward Avenue Wastewater Treatment Plant (WWTP) is located at 700 Woodward Avenue in Hamilton, Ontario. It services a population of approximately 518,228* and features an average day design capacity of 409 million litres per day (ML/d). In 2024, the Plant treated an average of 306.18 ML/d.

*The City of Hamilton experienced a cybersecurity incident on February 25, 2024, which led to a loss of the database used to calculate the population served. This number was the last-calculated population and was reported in the 2023 Annual Report.

### 1.1.2 THE WOODWARD AVENUE WASTEWATER TREATMENT PROCESS

The Woodward Avenue WWTP began operating in 1964. The original facility consisted of a main pumping station, bar screens, grit removal, primary clarifiers and a sludge digestion system. Over time, the Plant underwent significant upgrades, including the addition of several new treatment processes and the expansion and enhancement of existing processes.

Today, the Plant consists of a main pumping station that conveys flow to the headworks for preliminary treatment, including bar screens and grit removal with vortex separators. Ferric sulphate is added upstream of the preliminary treatment to aid in removing phosphorus. Next, wastewater flows into primary clarifiers, where fine solids settle to the bottom of the tanks as “raw sludge,” while lighter materials such as fats, oils, and grease float to the top of the tanks as “scum.” Chain and flight systems remove both sludge and scum continuously.

Primary effluent flows into aeration basins where air is forced through diffusers at the bottom of the tanks to supply oxygen for microbial populations that process organic material and oxidize ammonia. Following aeration, wastewater flows into the secondary clarifiers where solids again settle out, this time as “activated sludge” due to the high level of microbial activity. Most of this sludge is returned to aeration as “return activated sludge”, and the rest is removed as “waste activated sludge” for further processing. Secondary effluent then flows to the new tertiary treatment process, receiving additional treatment via cloth media disk filters. The treated tertiary effluent is disinfected with chlorine and dechlorinated with sodium bisulphite from May 15 to October 15. The treated effluent is then released into Red Hill Creek.

The raw sludge from the primary clarifiers, and waste activated sludge from the secondary clarifiers are thickened using a polymer and gravity belt thickeners before undergoing biological processing in the anaerobic digesters. The digestion process produces methane biogas which is utilized in one of two ways. The biogas can be used to generate electricity or refined to meet natural gas standards. The biogas utilized to generate electricity is stored in the “Hamilton Globe.” Any unused biogas is burned through a flare in accordance with the Environmental Compliance Approval (ECA). Digested solids are subsequently dewatered using a polymer and large centrifuges before feeding into the biosolids facility. This facility uses a thermal reduction process to

create a certified fertilizer product. Operations and maintenance of the biosolids facility are contracted out to Synagro Technologies, which operated under a separate ECA from the Woodward Avenue WWTP listed under Subsection 1.2.1.

### 1.1.3 IMPROVEMENTS TO THE FACILITY

#### 1.1.3.1 Woodward Upgrade Projects

The Woodward Avenue WWTP has undergone substantial upgrades in recent years to improve the performance and reliability of its treatment processes. The City recently completed the Phase 1 Upgrades to address Hamilton Harbour Remedial Action Plan targets under the existing rated plant capacity. These upgrades consisted of three main construction contracts: Contract 1 was the construction of a new Main Pumping Station for wastewater, completed August 2022. Contract 2 was the construction of a new Electrical Power Centre and power distribution loop, completed November 2022. Contract 3 included the construction of a Tertiary Treatment Facility and the expansion of the South Secondary Treatment process, including the construction of a new Chlorine Contact Tank and Plant outfall. All projects in Phase 1 have been completed.

The City is currently in the early design phase of the Phase 2 Expansion Project. Phase 2 is a continuation from the Phase 1 Woodard Upgrades Project that will increase the average rated capacity from 409 to 500 ML/d and the peak capacity from 614 to 1,000 ML/d, while meeting the same stringent effluent limits under Phase 1. The work also addresses the necessary asset renewal of both the North Secondary Treatment Plant and North Digester Complex to ensure process reliability.

##### 1.1.3.1.1 Contract 3: Tertiary Treatment Facility and Secondary Treatment Expansion – Substantial Performance reached October 30, 2024

Construction and deficiency work continued throughout 2024, including commissioning and performance monitoring of the new Tertiary Treatment Facility, with the 180-day performance test period starting on July 15, 2024. The project is now in the warranty period. Work will continue to address deficiencies in 2025.

#### 1.1.3.2 Anaerobic Digester Improvements

In May 2024, the contract to upgrade Anaerobic Primary Digester #3 and Anaerobic Primary Digester #5 commenced. The sequence of work requires that upgrades to Anaerobic Primary Digester #5 be complete, with the digester returning to service before undertaking upgrades on Anaerobic Primary Digester #3. In 2024, the work performed on Anaerobic Primary Digester #5 included a full cleanout, removal of interior coatings, and partial preparation of the interior surfaces to receive new coatings. This project was expected to be completed in May 2026; however, delays were experienced in December 2024 due to the unexpected presence of vivianite beneath the wall coatings in the immersion zone of Anaerobic Primary Digester #5. The project is expected to be completed August 2026.

#### 1.1.3.3 Thickening Sludge Building (TSB) Biofilter Upgrades

As part of ongoing efforts to improve air quality and reduce odours, the TSB facility received biofilter upgrades. These upgrades included the remediation of biofilter media,

the replacement of two leaking solenoids and the reconfiguration and installation of an exterior-mounted immersion heater to improve the efficiency of biofilter media. This improves the system's overall odour removal and air treatment performance. This work was completed in June 2024.

#### 1.1.3.4 Arc Flash Project

Arc flash mitigation measures across both the Woodward Avenue and Dundas WWTPs were implemented in 2024 to improve electrical safety. The project involved updating electrical system labelling, conducting arc flash studies, and updating single-line drawings to ensure a safer working environment for staff.

#### 1.1.3.5 Tertiary Filter Metric Page

In August 2024, the Supervisory Control and Data Acquisition (SCADA) team developed the Tertiary Filter Metric Page, which provides operators with enhanced capabilities to analyze the performance of tertiary filters. This tool enables more informed decisions, improves filter performance and optimizes maintenance processes.

## 1.2 REGULATORY INSTRUMENTS

### 1.2.1 ENVIRONMENTAL COMPLIANCE APPROVALS

#### 1.2.1.1 Sewage

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

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

#### 1.2.1.2 Air

No. 3677-6LBLSY: February 9, 2006 – Amended Certificate of Approval – Cogeneration Unit No. 5265-B77RLX: December 17, 2018 – Amended Environmental Compliance Approval

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

### 1.2.2 EFFLUENT REQUIREMENTS

Prior to completion of construction of Contract 3 (Section 1.1.3.1.1) of Proposed Works on October 30, 2024

### Secondary Effluent Table

| Parameter | Monthly Average Concentration Objectives (mg/L) | Monthly Average Concentration Limits (mg/L) | Monthly Average Daily Loading Limits (kg/d) |
|---|---|---|---|
| cBOD | 15.0 | 25.0 | 10,225 |
| Total Suspended Solids (TSS) | 15.0 | 25.0 | 10,225 |
| Total Phosphorus (TP) | 0.6 | 0.8 | 327 |

Prior to completion of construction of Contract 3 (Section 1.1.3.1.1) of Proposed Works on October 30, 2024

### Final Effluent Table

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

Upon completion of construction of Contract 3 (section 1.1.3.1.1) of Proposed Works on October 30, 2024

### Final Effluent Table

| Parameter | Concentration Limit | Monthly Average Daily Loading Limit |
|---|---|---|
| cBOD | 8.0 mg/L (Monthly Average) | 3,272 (kg/d) |
| TSS | 10.0 mg/L (Monthly Average) | 4,090 (kg/d) |
| TSS | 6.0 mg/L (Annual Average) | - |
| TP | 0.30 mg/L (Monthly Average) | 123 (kg/d) |
| Total Ammonia Nitrogen | 3.0 mg/L (May 01 - Nov 30)<br>7.0 mg/L (Dec 01 - Apr 30)<br>(Monthly Average) | - |
| *E. coli | *200 (CFU/100 mL) (May 15 - Oct 15) (Monthly Geometric Mean Density) | - |
| pH | Between 6.0 - 9.5 inclusive (Single Sample Result) | - |
| **Total Chlorine Residual | 0.02 (mg/L) (Single Sample Result) | - |

*If the most probable number (MPN) method is utilized for E. coli analysis, the objective shall be 100 MPN/100 mL

**Total Residual Chlorine shall be non-detectable as measured by a method with a sensitivity of at least 0.02 mg/L

## 1.2.3 SAMPLING PROCEDURES

Raw influent wastewater is sampled seven days per week. It is tested for alkalinity, ammonia ($NH_3$), carbonaceous biochemical oxygen demand (cBOD), potential of hydrogen (pH), soluble phosphorus (SP), total phosphorus (TP), total biochemical oxygen demand (tBOD), total Kjeldahl nitrogen (TKN) and total suspended solids (TSS). Twenty-four-hour composite samples are refrigerated before analysis at the on-site City of Hamilton Environmental Laboratory.

Final Effluent is sampled five days per week. It is tested for alkalinity, ammonia, cBOD, nitrates ($NO_3$), nitrites ($NO_2$), pH, SP, TP, TKN, TSS, and un-ionized ammonia. Twenty-four-hour composite samples are collected by the samplers on each side of the twin effluent channel and refrigerated before analysis at the on-site City of Hamilton

Environmental Laboratory. The average concentrations for the two samples are reported to the Ministry of the Environment, Conservation and Parks (MECP) for compliance purposes. Total chlorine residual is measured daily in the final effluent on a seasonal basis from May 15 to October 15. E. coli is sampled every week in the final effluent. Samples are always under the strict chain of custody process managed by the Compliance and Regulations Section staff.

## 1.3 ENVIRONMENTAL COMPLIANCE APPROVAL REPORTING REQUIREMENTS

Regarding Condition 11 'Reporting' in ECA #9410-B65QRT, the following information addresses the items listed under Subsection 4.

### 1.3.1 CONDITION 11 (4A) INFLUENT MONITORING

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

Appendix A, titled 'Woodward Avenue WWTP Operating Data Summary', the table titled 'Raw Influent Concentrations' outlines influent parameter concentrations in 2024.

Influent flow values in 2024 were very close to the five-year average, only marginally lower with slightly lower total precipitation. Influent analytical data, while lower than 2023, shows higher concentrations of most parameters than in previous years, particularly TSS, TP and cBOD. This may be the result of recycling process streams within the facility from the newly implemented tertiary treatment system as a result of higher solids capture. These elevated concentrations and loadings likely represent a new baseline with the existing configuration.

#### Daily Average Plant Flow (ML/d) Table

| Year | Daily Average Plant Flow (ML/d) | Total Precipitation (mm) |
|---|---|---|
| 2019 | 390.25 | 1,087 |
| 2020 | 299.98 | 797 |
| 2021 | 284.99 | 938 |
| 2022 | 263.28 | 680 |
| 2023 | 321.56 | 991 |
| 2024 | 306.18 | 868 |

### Influent Concentrations (mg/L) Table

| Year | TSS | cBOD | TP | SP | $NH_3$ | TKN |
|---|---|---|---|---|---|---|
| 2019 | 231.06 | 135.78 | 4.25 | 1.16 | 16.01 | 27.51 |
| 2020 | 281.20 | 178.22 | 5.49 | 1.53 | 21.40 | 35.30 |
| 2021 | 244.04 | 157.70 | 4.87 | 1.54 | 21.72 | 33.93 |
| 2022 | 261.93 | 157.51 | 5.22 | 1.65 | 25.55 | 36.66 |
| 2023 | 568.61 | 222.91 | 8.21 | 1.30 | 22.23 | 41.12 |
| 2024 | 499.02 | 197.85 | 7.39 | 1.32 | 22.28 | 38.99 |

### Influent Loadings (kg/d) Table

| Year | TSS | cBOD | TP | SP | $NH_3$ | TKN |
|---|---|---|---|---|---|---|
| 2019 | 85,614 | 49,706 | 1,560 | 416 | 5,928 | 10,203 |
| 2020 | 82,605 | 52,239 | 1,611 | 447 | 6,258 | 10,329 |
| 2021 | 66,952 | 43,215 | 1,344 | 426 | 6,066 | 9,415 |
| 2022 | 66,165 | 39,862 | 1,331 | 414 | 6,489 | 9,309 |
| 2023 | 186,121 | 71,189 | 2,664 | 404 | 6,906 | 13,033 |
| 2024 | 150,062 | 57,738 | 2,246 | 365 | 6,303 | 11,238 |

#### 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 they are discharged upstream of the influent flow meters. However, this represents a very small proportion (approximately 0.05% in 2024) of the overall flows into the Plant.

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 the primary treatment process at the Woodward Avenue WWTP. The Dundas WWTP sludge contributed approximately 7.8% of the total raw sludge volume in 2024.

Imported Sewage Table

| Month | Septic Haulers ($m^3$/month) | Sludge from Dundas WWTP ($m^3$/month) |
|---|---|---|
| Jan | 5,658 | 3,417 |
| Feb | 3,577 | 3,109 |
| Mar | 5,359 | 3,041 |
| Apr | 5,586 | 3,182 |
| May | 6,096 | 3,346 |
| Jun | 4,825 | 2,640 |
| Jul | 4,922 | 2,868 |
| Aug | 3,702 | 2,593 |
| Sep | 5,473 | 2,438 |
| Oct | 5,499 | 2,350 |
| Nov | 5,169 | 2,285 |
| Dec | 1,121 | 2,936 |
| | | |
| **Total** | **56,988** | **34,207** |

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

Appendix A, titled ‘Woodward Avenue WWTP Operating Data Summary’, the chart titled ‘Plant Flows’, outlines effluent plant flow rates.

The Woodward Avenue WWTP reported a single non-compliance in 2024. On May 25, 2024, Plant Operations staff recorded a total chlorine residual result of 0.15 mg/L, exceeding the ECA limit of 0.02 mg/L, which is based on a single sample result. Subsequently, dechlorination and chlorination doses were adjusted. Upon initial resampling, the result was 0.24 mg/L. Further adjustments were made, and the second resampling result was 0.00 mg/L of Final Effluent Total Residual Chlorine. The event was resolved in 1.5 hours.

Compliance with all other effluent parameter concentrations and loading limits was met throughout the year.

Effluent concentrations for TSS and TP and loadings for TSS are slightly higher than in 2023. However, all other parameters are lower compared to 2023 and previous years. This improvement is due to the enhanced performance of implementing the Tertiary Treatment System. A planned tertiary bypass for maintenance occurred from mid-February to mid-March, which may have skewed the TSS results higher.

Contract 3 (section 1.1.3.1.1) of the Woodward Upgrades Project was completed on October 30, 2024. With this completion, the facility is required to meet more stringent effluent compliance limits for TSS, cBOD, and TP. Additionally, the facility is now required to meet new limits for ammonia and E. coli concentrations. Each of these new limits has been met since their implementation.

Details of plant performance can be found in Appendix A, titled 'Woodward Avenue WWTP Operating Data Summary' in the table titled 'Final Effluent Concentrations' and 'Final Effluent Loadings'. This outlines the concentrations and loadings achieved in 2024.

### Effluent Concentrations (mg/L) Table

| Year | TSS | cBOD | TP | SP | $NH_3$ | TKN |
|---|---|---|---|---|---|---|
| 2019 | 9.10 | 5.12 | 0.504 | 0.282 | 1.97 | 3.18 |
| 2020 | 8.38 | 5.26 | 0.572 | 0.362 | 1.87 | 3.12 |
| 2021 | 6.91 | 4.04 | 0.573 | 0.401 | 1.29 | 2.42 |
| 2022 | 6.10 | 4.31 | 0.433 | 0.302 | 2.82 | 3.80 |
| 2023 | 4.34 | 2.93 | 0.200 | 0.064 | 1.03 | 1.91 |
| 2024 | 5.18 | 2.79 | 0.210 | 0.058 | 0.57 | 1.48 |

### Effluent Loadings (kg/d) Table

| Year | TSS | cBOD | TP | SP | $NH_3$ | TKN |
|---|---|---|---|---|---|---|
| 2019 | 3,715 | 2,036 | 194 | 105 | 762 | 1,239 |
| 2020 | 2,644 | 1,637 | 171 | 106 | 582 | 959 |
| 2021 | 2,045 | 1,151 | 162 | 112 | 354 | 676 |
| 2022 | 1,701 | 1,159 | 115 | 79 | 744 | 1,003 |
| 2023 | 1,378 | 949 | 63 | 20 | 321 | 606 |
| 2024 | 1,654 | 867 | 63 | 16 | 158 | 436 |

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

The City successfully complied with the Plant's ECA monitoring requirements due to the sampling frequencies exceeding requirements. The following deviations from the monitoring schedule were observed in 2024:

| Date | Sample Location | Reason for Deviation |
|---|---|---|
| 2024-03-20 | Final Effluent #2 | No sample due to autosampler malfunction |
| 2024-05-22 | Secondary Effluent (1,2,5,6) | No sample due to autosampler malfunction |
| 2024-09-10 | Final Effluent #1 | No sample due to autosampler malfunction |
| 2024-09-11 | Final Effluent #1 | No sample due to autosampler malfunction |
| 2024-09-12 | Final Effluent #1 | No sample due to autosampler malfunction |
| 2024-09-14 | Final Effluent #1 | No sample due to autosampler malfunction |
| 2024-09-15 | Final Effluent #1 | No sample due to autosampler malfunction |

Failure of an autosampler triggers staff to generate a work order promptly, resulting in timely repairs by Plant Maintenance staff.

In 2025 the City will be utilizing the following schedule to fulfill the sampling requirements of the Plant's ECA Monitoring Program (Schedule D).

#### 1.3.3.1 CONDITION 11 (4C) 2025 SAMPLING SCHEDULE

##### 2025 Influent Sampling Table

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

## 2025 Primary Effluent Sampling Table

| Parameter | Sample Type | Frequency |
|---|---|---|
| tBOD | 24-hour composite | Daily |
| TSS | 24-hour composite | Daily |

## 2025 Final Effluent Sampling Table

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

2025 Biosolids (Cake) Sampling Table

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

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

#### 1.3.4.1 Secondary Effluent Turbidity

Plant Operations staff continued to observe turbid secondary effluent throughout 2024. Investigations at the Plant continue, including process optimization studies.

#### 1.3.4.2 Polymer Storage Tank Corrosion

Dewatering Polymer Storage Tank #2 failed, resulting in a leak in October 2023. Subsequently, the polymer storage tanks were assessed and deemed to be corroded beyond repair. Replacement of these tanks was completed in July 2024.

#### 1.3.4.3 South Secondary Clarifiers

In the summer of 2024, algae accumulated in the south secondary clarifiers. Subsequently, Plant Operations staff systematically drained and cleaned all six south secondary clarifiers.

#### 1.3.4.4 Backwash Manifolds

In December 2023, Plant Operations staff discovered cracks in various welds on the backwash manifolds within the tertiary treatment process related to Contract 3. In late February/early March 2024, all 30 backwash manifolds were replaced.

#### 1.3.4.5 Tertiary Treatment Suction Pipe

In Q1 2023, it was discovered that the suction pipe for the effluent water system was causing air entrainment in the effluent water pumps. Following a consultant review, it was determined that the pipe needed to be redesigned, as part of the work associated with Contract 3. In consultation with the MECP, the Tertiary Treatment System was taken offline on February 22, 2024, to allow for the reinstallation of the suction pipe to

prevent air entrainment. Once the work was completed, the Tertiary Treatment System was put back online on March 14, 2024.

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

City of Hamilton Plant Maintenance staff based at the Woodward Avenue WWTP carry out regular plant maintenance. Typically, a computerized maintenance management system schedules and tracks routine and preventative maintenance. Larger or specialized maintenance activities are completed by third-party external contractors.

Significant maintenance activities completed at the facility in 2024 are provided in Appendix B, titled ‘Maintenance Activities.’ Historically, the City of Hamilton provides a table summarizing major maintenance activities with expenditures to the City’s vertical infrastructure for a reporting year. However, on February 25, 2024, the City of Hamilton experienced a cybersecurity incident that led to the loss of all computerized maintenance management systems and the loss of the ability to provide these expenditures.

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

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

The City of Hamilton’s Wastewater Quality Management System (WWQMS) was fully implemented and operational in 2021. The City of Hamilton’s WWQMS was endorsed most recently by Council on March 29, 2023. The WWQMS was implemented to ensure the effective and efficient collection and treatment of wastewater that protects the environment, meets legal and regulatory requirements and meets the City of Hamilton’s commitment to operating and maintaining a high-quality wastewater system.

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

Appendix C, titled ‘Calibration and Maintenance of Monitoring Equipment’, table titled ‘Calibration and Maintenance of Monitoring Equipment,’ contains records of the calibrations performed on monitoring equipment in 2024.

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

Efforts made to achieve design objectives include:

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

Schedule B of the Woodward WWTP ECA establishes the following design objectives:

Prior to the completion of construction of Contract 3 (section 1.1.3.1.1) of Proposed Works on October 30, 2024

Primary Effluent Overflow Design Objectives Table

| Effluent Parameter | Averaging Calculator | Objective |
|---|---|---|
| tBOD | Annual Average Removal Percentage | 30% |
| TSS | Annual Average Removal Percentage | 50% |

Upon completion of construction of Contract 3 (section 1.1.3.1.1) of Proposed Work on October 30, 2024

Primary Effluent Overflow Design Objectives Table

| Effluent Parameter | Averaging Calculator | Objective |
|---|---|---|
| tBOD | Annual Average Removal Percentage | 30% |
| TSS | Annual Average Removal Percentage | 50% |
| E. coli* | Monthly Geometric Mean Density | <1,000 CFU per 100 mL* (May 15 - Oct 15) |
| Total Residual Chlorine | Single Sample Result | Non-detect (when chlorine is in use) |

* If the MPN method is utilized for the E. coli analysis the objective shall be <1,000 MPN per 100mL.

Removal percentages for the above parameters during secondary bypass events can be found in Appendix A, titled 'Woodward Avenue WWTP Operating Data Summary' in the table titled 'Secondary Bypass Removal Efficiency.' In 2024, the Plant achieved an annual average removal of 63% of tBOD and 72% of TSS. These values exceed the design objectives of the Woodward Avenue WWTP ECA.

*Secondary Effluent Design Objectives Table

| Effluent Parameter | Averaging Calculator | Objective (mg/L) |
|---|---|---|
| cBOD | Monthly Average Effluent Concentration | 15.0 |
| Total Suspended Solids | Monthly Average Effluent Concentration | 15.0 |
| Total Phosphorus | Monthly Average Effluent Concentration | 0.6 |

* No Longer applicable after Oct 30, 2024, Upon completion of construction of Contract 3 (section 1.1.3.1.1) of Proposed Work.

Prior to the completion of construction of Contract 3 (section 1.1.3.1.1) of Proposed Works on October 30, 2024

Final Effluent Design Objectives Table

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

* If the MPN method is utilized for the E. coli analysis the objective shall be <1,000 MPN per 100mL

** Total Residual Chlorine shall be non-detectable as measured by method with a sensitivity of at least 0.02 mg/L.

Upon completion of construction of Contract 3 (section 1.1.3.1.1) of Proposed Work on October 30, 2024

### Final Effluent Design Objectives Table

| Effluent Parameter | Averaging Calculator | Objective |
|---|---|---|
| cBOD | Monthly Average Effluent Concentration | 5.0 mg/L |
| TSS | Monthly Average Effluent Concentration | 5.0 mg/L |
| TP | Monthly Average Effluent Concentration | 0.18 mg/L |
| Total Ammonia Nitrogen | Monthly Average Effluent Concentration | 2.0 mg/L (May 01 - Nov 30)<br>5.0 mg/L (Dec 01 - Apr 30) |
| E. coli* | Monthly Geometric Mean Density | <100 organisms/100mL (May 15 to October 15) |
| pH | Single Sample Result | 6.5 - 8.5 inclusive |
| Total Residual Chlorine ** | Single Sample Result | Non-detect (when chlorine is in use) |
| TSS | Annual Average Daily Effluent Loading | 1,227 kg/d |

* If the most probable number (MPN) method is utilized for E. coli analysis, the objective shall be 100 MPN/100 mL

** Total Residual Chlorine shall be non-detectable as measured by a method with a sensitivity of at least 0.02 mg/L

Throughout 2024, the Woodward Avenue WWTP was in a transitionary phase, while the Tertiary Treatment System commissioning was finalized on October 30, 2024. During this time, effluent reporting was completed using the Final Effluent from the Tertiary Treatment Facility. These results met the secondary effluent objectives without exception. The maximum monthly average effluent concentrations for cBOD, TSS and TP are 3.34 mg/L, 7.81 mg/L and 0.33 mg/L, respectively.

Following the completion of Contract 3 (Section 1.1.3.1.1) on October 30, 2024, the Woodward Avenue WWTP adopted new final effluent objectives. The Plant successfully met the cBOD objective during this period, achieving a maximum monthly average of 2.63 mg/L. However, the final effluent exceeded the objectives for TSS in October and November, with monthly averages of 5.43 mg/L and 5.17 mg/L, respectively. Additionally, the Plant exceeded its TP objective in November and December, with monthly averages of 0.19 mg/L and 0.20 mg/L, respectively.

Final effluent chlorine residual readings for the 2024 disinfection season (May 15 to October 15) averaged 0.012 mg/L. Since the hand-held chlorine analyzers utilized by Plant Operations staff are rated to a precision of +/- 0.01 mg/L, non-detect readings and

readings of 0.01 mg/L are deemed to meet the objective. Individual sample results did, at times, reach 0.02 mg/L, which does not meet the design objective.

During the disinfection season, final effluent E. coli results consistently satisfied the objective of 200 CFU/100 mL prior to completion of construction of Contract 3 (Section 1.1.3.1.1) on October 30, 2024, and 100 CFU/100 mL following completion of construction of Contract 3, with the maximum monthly geometric mean density being 5 organisms/100 mL. The pH objective was met consistently throughout 2024, with results ranging from 6.90 to 7.21.

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

The biosolids sludge volume generated in 2024 totalled 57,361 tonnes. Based on recent history, the volume anticipated in 2025 is approximately 55,000 tonnes, as production is expected to continue at current rates. A monthly breakdown can be found in Appendix A, titled 'Woodward Avenue WWTP Operating Data Summary' in the table titled 'Biosolids to Synagro.' Starting in May 2020, dewatered biosolids are further processed at the Biosolids Management Facility on-site, which is operated by Synagro Technologies. Synagro Technologies report on this facility under ECA #4876-AWNRYL.

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

Appendix D, titled 'Woodward Avenue WWTP Summary of Complaints,' contains a summary of the complaints received in 2024.

In 2024, three complaints were associated with the Woodward Avenue WWTP, two related to odour and one to noise within the Plant. Plant Operations staff responded to each complaint with a thorough investigation and appropriate corrective action. Following a site-wide odour assessment completed in 2022, efforts in odour mitigation continued in 2024.

However, the cybersecurity incident in February 2024 compromised the City's ability to receive and report complaints, potentially preventing capturing of all customer complaints for the 2024 reporting year. Hamilton Water informed the MECP of deficiencies encountered and provided interim solutions.

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

The Woodward Avenue WWTP experienced 19 bypass and overflow events in 2024, totalling 2,453 ML. This compares to a five-year average of 20 events totalling 2,205 ML, showing that 2024 was a typical year.

Following substantial performance of the Tertiary Treatment System and completion of Contract 3 (section 1.1.3.1.1) on October 30, 2024, the terminology and reporting requirements for plant bypasses and overflows have been updated. "Plant Bypasses" are now termed "Raw Overflows," "Headworks Bypasses" are now "Preliminary Effluent Overflows," and "Secondary Bypasses" are now "Primary Effluent Overflows." Additionally, the City has begun reporting Tertiary Bypasses.

The table below summarizes all bypass events occurring in 2024.

| SAC # | Bypass Location | Start Date | Start Time | Stop Date | Stop Time | Duration (Hours) | Volume (ML) |
|---|---|---|---|---|---|---|---|
| 240109-000013 | Secondary Bypass | 2024-01-09 | 16:02 | 2024-01-10 | 22:28 | 30.44 | 234.522 |
| 240113-000003 | Secondary Bypass | 2024-01-13 | 6:56 | 2024-01-13 | 21:37 | 14.68 | 92.028 |
| 240125-000001 | Secondary Bypass | 2024-01-24 | 23:55 | 2024-01-25 | 3:27 | 4.56 | 6.946 |
| 240126-000009 | Secondary Bypass | 2024-01-26 | 4:12 | 2024-01-27 | 23:14 | 43.03 | 399.389 |
| 1-4M7FBY / 240126-000012 | Headworks Bypass | 2024-01-26 | 4:41 | 2024-01-26 | 8:09 | 3.47 | 24.244 |
| 240314-000010 | Secondary Bypass | 2024-03-14 | 21:44 | 2024-03-15 | 2:36 | 4.87 | 35.490 |
| 240411-000003 | Secondary Bypass | 2024-04-11 | 7:15 | 2024-04-13 | 11:11 | 51.19 | 437.975 |
| 240527-000006 | Secondary Bypass | 2024-05-27 | 13:08 | 2024-05-27 | 16:31 | 3.38 | 14.280 |
| 240528-000009 | Secondary Bypass | 2024-05-28 | 22:05 | 2024-05-29 | 14:44 | 16.65 | 140.956 |
| 240710-000005 | Secondary Bypass | 2024-07-10 | 8:16 | 2024-07-11 | 15:35 | 21.25 | 192.290 |
| 240714-000025 | Secondary Bypass | 2024-07-14 | 15:38 | 2024-07-15 | 1:03 | 9.56 | 53.010 |
| 240716-000016 | Secondary Bypass | 2024-07-16 | 12:17 | 2024-07-17 | 19:04 | 30.78 | 253.637 |
| 240724-000009 | Secondary Bypass | 2024-07-24 | 12:30 | 2024-07-24 | 21:27 | 8.57 | 54.360 |
| 240923-000002 | Secondary Bypass | 2024-09-23 | 6:25 | 2024-09-23 | 10:13 | 2.98 | 17.320 |
| 240925-000001 | Secondary Bypass | 2024-09-25 | 2:34 | 2024-09-25 | 5:56 | 3.37 | 15.935 |
| 241029-000004 | Secondary Bypass | 2024-10-29 | 12:53 | 2024-10-29 | 16:19 | 3.43 | 30.995 |
| 241120-000009 | Tertiary Bypass | 2024-11-20 | 19:50 | 2024-11-20 | 20:01 | 0.18 | 16.060 |
| 241229-000006 | Primary Effluent Overflow | 2024-12-29 | 13:00 | 2024-12-31 | 0:52 | 35.87 | 353.222 |
| 241229-000014 | Tertiary Bypass | 2024-12-29 | 15:30 | 2024-12-30 | 12:30 | 21.00 | 80.630 |

#### 1.3.11.1 Spill Events

Three spill events related to the Woodward Avenue WWTP were reported in 2024. The table below summarizes these spills.

| Date | SAC Reference # | Spill Material | Approximate Volume | Event Description |
|---|---|---|---|---|
| 2024-01-15 | 1-4KZ177 | Methane Gas | 2300 $m^3$ | On January 15, 2024, at 8:33 a.m., Primary Digester #5 was opened for a planned release of pressurized methane for a 24-hour period. The release was required to allow for rehabilitation work to proceed on the Digester and consent for the activity was provided by the MECP in advance of the opening. At 8:38 a.m., this planned activity and methane gas spill was reported to the MECP Spills Action Centre, estimating a release volume of 2300 $m^3$ over the 24-hour period. The digester had been idle for 5-week period to minimize gas presence, and prior notifications of the release were made to the local health unit and residents within 500 meters.<br><br>On January 16, 2024, at 8:30 a.m., the ventilation had confirmed completed, and the report was closed. |
| 2024-07-29 | 1-9E3KQE | Plant Effluent | 409.2 $m^3$ | On July 28, 2024, at 11:08 p.m., a low effluent pressure issue was noted. Upon investigation a break was found on the effluent water piping in the vicinity of Aeration Tank A and the spill was estimated to have begun at approximately 10:54 p.m.<br><br>At 11:20 p.m., the Hamilton Spills hotline was notified. Partial isolation of the leak improved effluent pressure by 11:27 p.m. An Environmental Enforcement Officer was briefed and reported the spill, generating reference #1-9E3KQE. By 11:50 p.m., the leak was fully isolated, and normal pressure was restored. A work request was created to repair the water main leak. |

| Date | SAC Reference # | Spill Material | Approximate Volume | Event Description |
|---|---|---|---|---|
| 2024-10-30 | 1-CNS8XU | Methane Gas | 5000 $m^3$ | On October 30, 2024, at 3:40 a.m., a methane leak was detected at the bottom of the gas sphere. The issue was reported, and attempts were made to close the isolation valve. Caution tape was installed around the sphere, and contractors were notified of the leak.<br><br>By 5:00 a.m., the leak was reported to SAC, and further notifications were made to Hamilton Customer Service and Spill Hot Line and Environmental Monitoring and Enforcement. It was determined that the isolation valve was broken, necessitating the draining of the sphere for safe repair. Efforts to drain the sphere began, and gas flow to the flares was monitored.<br><br>The leak ended by 2:00 a.m. on October 31. Repairs were completed by November 1, with the replacement of a failed gasket and inlet valve. The sphere was purged and refilled, with no leaks detected. Normal operating pressure was restored by November 2, and SAC was notified. |

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

There were no Notices of Modification submitted in 2024.

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

Hamilton Water has ongoing programs and has undertaken various projects to meet the MECP's requirements for municipal combined sewer systems as per Procedure F-5-5, "Determination of Treatment Requirements for Municipal and Private Combined".

This is a supporting document for Guideline F-5, "Levels of Treatment for Municipal and Private Sewage Treatment Works Discharging to Surface Waters." Wet weather system capture is highly influenced by annual rainfall conditions. In 2020 and 2022, the City achieved a 91.3% and 91.2% capture rate, respectively, of the combined sewage during wet weather, which is above the limit of 90%; however, it is not achieved consistently year over year. Hamilton Water has retained the services of an engineering consulting firm to assess the status of existing programs and projects as per the requirements of Procedure F-5-5, identifying any gaps requiring additional work. Deliverables include the

development of the following two documents:

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

Key project milestones and their status are as follows:

- Final Terms of Reference Submission - December 2, 2019 (Complete).
- Progress Updates - January 31, 2020, and March 31, 2020 (Complete).
- Pollution Prevention and Control Plan Kickoff Workshop - July 20, 2022 (Complete).
- Consultation with the MECP and the comments regarding the Draft Combined Sewer System Characterization Study - November 3, 2022, and January 13, 2023 (Complete).
- Part A of the Pollution Prevention and Control Plan: Final Combined Sewer System Characterization Study Submission to the MECP - March 14, 2023 (Complete).
- Part B of the Pollution Prevention and Control Plan: Additional Combined Sewer Overflow Control Alternatives and Proposed Remedial Measures Submission to MECP - August 1, 2023 (Complete).
- Part C of the Pollution Prevention and Control Plan: Implementation Plan Supporting Adaptive Enhancement Strategy Submission to the MECP – March 2025 (Complete).
- The City of Hamilton received comments from the MECP regarding Parts A and B on September 26, 2024. The City provided a response letter to the MECP's comments on January 28, 2025.

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)

The Real-Time Control Phase 2 project involved modifications to existing flow control structures within the combined sewer system at several locations and improvements to the system of hydraulic controls to help mitigate combined sewer overflows into Hamilton Harbour. The upgrades specifically target the reduction of combined sewer overflows to the sensitive receiving waters of Cootes Paradise. The work included the modification of weirs, the addition of level monitoring devices and the automation of some control devices in the system. The project was completed in December 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 called the Flooding and Drainage Improvement Framework. This new study advanced the work completed in the previous assignment by providing a framework and implementation roadmap of recommended solutions to address short-term and long-term urban flooding issues in the combined

sewer service area. The Flooding and Drainage Improvement Framework was completed in 2022, and the recommendation of the study was a program of further, more detailed studies (including Class Environmental Assessments), investigations, policies and infrastructure work for a twenty-plus-year timeframe to achieve system performance objectives. The cost of the program, over the twenty-plus year timeframe, is estimated at $1.029 billion. Several studies have been included within the City's 2025 capital budget and are planned for initiation. Some capital budget has been approved to allow for sewer separations as they are recommended by the Class Environmental Assessment and alternative funding opportunities are being explored to continue the program. It is estimated that the projects identified in the Flooding and Drainage Improvement Framework could take at least twenty years to complete.

A milestone was met in 2024 with the Ainslie Wood Neighbourhood Creek Separation Schedule 'B' Class Environmental Assessment (EA), a shorter-term priority project recommendation of the Flooding and Drainage Improvement Framework. The purpose of the Ainslie Wood EA was to consider various design alternatives to separate Chedoke Creek sewer inflows from the combined sewer system and ultimately recommend a preferred solution.

The preliminary preferred solution will result in the diversion of flows from Chedoke Creek to Ancaster Creek, requiring additional studies to define the potential impacts on water quality, water quantity, and the surrounding environment of these watercourses. The City is also initiating the West End Sewer Separation Environmental Assessment, which will take a system-wide approach to addressing combined sewer separation in the area. The West End EA is a major study recommendation of the Flooding and Drainage Improvement Framework. It will overlap with the additional studies required to support the preliminary preferred solution for the Ainslie Wood EA. As such, the City is deferring the finalization of the Ainslie Wood EA until the West End Sewer Separation EA has developed a recommended sewer separation strategy for West Hamilton.

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

The updated completion dates for the Woodward Avenue WWTP upgrade projects are as follows:

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

# 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 Street East in Dundas, Ontario. It serves a population of approximately 50,360* and features an average day design capacity of 18.2 ML/d. The Plant treated an average of 12.29 ML/d in 2024 compared to 11.79 ML/d in 2023.

*The City of Hamilton experienced a cybersecurity incident on February 25, 2024, which led to a loss of the database used to calculate the population served. This number was the last-calculated population and was reported in the 2023 Annual Report.

### 2.1.2 THE DUNDAS WASTEWATER TREATMENT PROCESS

The Dundas WWTP began operations in 1919. The original facility consisted only of grit channels and an Imhoff tank. Over time, the Plant completed several significant upgrades, including adding new treatment processes and expanding and enhancing existing processes.

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

The Dundas WWTP does not have its own solids treatment process. Sludge generated at the Dundas WWTP is hauled by truck to the Woodward Avenue WWTP, where it is mixed and processed with the Woodward Avenue WWTP sludge. For additional details, refer to Subsection 1.1.2 of the Woodward Avenue WWTP report.

### 2.1.3 IMPROVEMENTS TO THE FACILITY

The Hamilton Water and Wastewater Master Plan (2006) identified the current strategy to maintain the Dundas WWTP in place with no change in capacity. The current Water, Wastewater and Stormwater Master Plans will update the 2006 Water, Wastewater and 2007 Stormwater Master Plans and consider reviewing capacity demand up to the 2051 horizon year. A streamlined Water, Wastewater and Stormwater Master Plan is expected to be completed in Q3 2025.

In 2024, the City received correspondence from the Hamilton Harbour Remedial Action Plan (HHRAP) Coordinating Committee supporting the Cootes-Grindstone Water Quality Targets Subcommittee recommendation and advised that the total phosphorus target of 0.05 mg/L in the treated final effluent at the Dundas WWTP be adopted and maintained. The Coordinating Committee recognized the reduction in treated final effluent total phosphorus as critical to achieving restoration goals for water quality and aquatic habitat in Cootes Paradise Marsh. The Coordinating Committee also supports reductions of total suspended solids and total ammonia nitrogen that are consistent with the Best Available Technology Economically Achievable. Hamilton Water has developed a comprehensive upgrade approach to enhance plant-treated final effluent using a modern process and technology that can meet the effluent quality targets supported by the Coordinating Committee.

In 2024, in collaboration with various City divisions and an engineering consultant firm, Hamilton Water completed a conceptual design and evaluation study for the Dundas WWTP. This study involved a comprehensive screening and evaluation process to select the Best Available Technology Economically Achievable to meet the proposed effluent criteria and assess the necessary upgrades to achieve various performance levels. The evaluation recommended a membrane bioreactor process, which considered multiple options and costs focused on achieving HHRAP targets and long-term operations and maintenance objectives. As part of the conceptual design, a life cycle assessment was completed that compared several upgrade options and evaluated the long-term costs to the City.

The estimated capital cost for the Dundas WWTP upgrade project is $254M, including inflation, engineering, construction, and contingency. Timing estimates will evolve as more detailed information is developed. Currently the project design is anticipated to commence in 2025, construction start for 2028, and completion planned by 2033.

In the interim, the Capital Delivery team, is conducting an immediate needs project to address health and safety concerns and ensure efficient facility operations. The project includes concrete repair and restoration, replacement of the guard rails around open tanks, miscellaneous improvements throughout the Plant and replacement of Plant A&B aeration tank diffusers. Construction of this project is anticipated to start in Q2 of 2025.

#### 2.1.3.1 Arc Flash Project

Arc flash mitigation measures across both the Woodward Avenue and Dundas WWTPs were implemented in 2024 to improve electrical safety. The project involved updating electrical system labelling, conducting arc flash studies, and updating single-line drawings to ensure a safer working environment for staff.

## 2.2 REGULATORY INSTRUMENTS

### 2.2.1 ENVIRONMENTAL COMPLIANCE APPROVAL

#### 2.2.1.1 Sewage

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

#### 2.2.1.2 Air

In response to the MECP inspection conducted in March 2020, the City retained a consultant to submit an application for an ECA (Air) for the Dundas WWTP. The initial application was submitted to the MECP in 2020. The consultant completed a noise assessment, and the application was resubmitted to the MECP in 2023. However, the Ministry has requested additional work be completed to support the noise assessment. The updated assessment will be undertaken in 2025.

### 2.2.2 EFFLUENT REQUIREMENTS

| Parameter | Monthly Average Concentration Objectives (mg/L) | Monthly Average Concentration Limits (mg/L) | Effluent Daily Loading Limits (kg/d) |
|---|---|---|---|
| cBOD | 5.0 | 5.0 | 91.0 |
| TSS | 5.0 | 5.0 | 91.0 |
| TKN - Summer (May 1 to October 31) | 2.0 | 2.0 | 36.4 |
| TKN - Winter (November 1 to April 30) | 10 | 10 | 182 |
| TP | 0.5 | 0.5 | 9.1 |
| Chlorine Residual (May 1 to October 31) | 0.02 | 0.02 | - |
| E. coli (May 1 to October 31) | 100 organisms /100 mL | - | - |

pH of the effluent is to be maintained between 6.0 and 9.5, inclusive, at all times.

### 2.2.3 SAMPLING PROCEDURES

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

Final effluent is sampled weekly and is tested for alkalinity, ammonia, cBOD, nitrates ($NO_3$), nitrites ($NO_2$), pH, SP, TP, TKN, and TSS. E. coli and total chlorine residuals are sampled weekly on a seasonal basis from May 1 to October 31.

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

## 2.3 ENVIRONMENTAL COMPLIANCE APPROVAL REPORTING REQUIREMENTS

The following information addresses the items listed under Subsection 6 regarding Condition 11 'Reporting' in Certificate of Approval #3101-89PNRC.

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

Throughout 2024, the Dundas WWTP met 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 ninth consecutive calendar year in which the Plant has achieved 100% compliance with all effluent limits, owing to the mission of continuous improvement and the hard work of dedicated staff. Details of plant performance in 2024 can be found in Appendix E, titled 'Dundas WWTP Operating Data Summary' in the table titled 'Final Effluent Concentrations' and 'Final Effluent Loadings.' Historical data shows effluent concentrations and loadings in 2024 fell within the expected ranges.

Effluent Concentrations (mg/L) Table

| Year | TSS | cBOD | TP | SP | TKN | $NH_3$ |
|---|---|---|---|---|---|---|
| 2019 | 0.84 | 1.26 | 0.083 | 0.064 | 0.62 | 0.09 |
| 2020 | 0.89 | 1.26 | 0.108 | 0.091 | 0.60 | 0.08 |
| 2021 | 0.88 | 1.99 | 0.131 | 0.103 | 1.27 | 0.66 |
| 2022 | 1.16 | 1.49 | 0.129 | 0.105 | 0.67 | 0.07 |
| 2023 | 0.85 | 1.21 | 0.089 | 0.071 | 0.57 | 0.06 |
| 2024 | 0.97 | 1.41 | 0.093 | 0.070 | 0.60 | 0.13 |

Effluent Loadings (kg/d) Table

| Year | TSS | cBOD | TP | SP | TKN | $NH_3$ |
|---|---|---|---|---|---|---|
| 2019 | 10.9 | 16.5 | 1.1 | 0.8 | 8.1 | 1.2 |
| 2020 | 10.7 | 15.2 | 1.3 | 1.1 | 7.2 | 0.9 |
| 2021 | 10.0 | 21.1 | 1.5 | 1.1 | 13.2 | 6.4 |
| 2022 | 11.7 | 15.1 | 1.3 | 1.0 | 6.7 | 0.6 |
| 2023 | 10.0 | 14.3 | 1.1 | 0.1 | 6.7 | 0.7 |
| 2024 | 12.0 | 17.6 | 1.1 | 0.8 | 7.3 | 1.7 |

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

#### 2.3.2.1 Heavy Rainfall

In July 2024, heavy rains washed out excessive plant solids, resulting in high TKN values in the second half of the month. Plant Operations staff acted to reseed Plant A with activated sludge from Plant B to reestablish effective nitrification. This allowed the plant to remain in compliance with effluent limits and TKN values returned to normal the following month.

#### 2.3.2.2 Elevated E. coli

In October 2024, elevated E. coli levels were observed in the plant's final effluent. In response, chlorine dosage was increased, and Plant Operations staff worked to clean the effluent channels thoroughly. By the end of the month, E. coli levels had decreased to normal levels. While the E. coli levels were elevated during this period, the Plant remained in compliance.

### 2.3.3 CONDITION 11 (6C) MAINTENANCE ACTIVITIES

City of Hamilton Plant Maintenance staff based at the Woodward Avenue WWTP carry out regular plant maintenance. Typically, a computerized maintenance management system schedules and tracks routine and preventative maintenance. Third-party external contractors complete larger or specialized maintenance activities.

Significant maintenance activities completed at the facility in 2024 are provided in Appendix B, titled 'Maintenance Activities'. Historically, the City of Hamilton provides a table summarizing major maintenance activities with expenditures to the City's vertical infrastructure for a reporting year. However, on February 25, 2024, the City of Hamilton

experienced a cybersecurity incident that led to the loss of all computerized maintenance management systems and the loss of the ability to provide these expenditures.

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

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

The City of Hamilton's Wastewater Quality Management System (WWQMS) was fully implemented and operational in 2021. The City of Hamilton's WWQMS was endorsed most recently by Council on March 29, 2023. The WWQMS was implemented to ensure the effective and efficient collection and treatment of wastewater that protects the environment, meets legal and regulatory requirements and meets the City of Hamilton's commitment to operating and maintaining a high-quality wastewater system.

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

Appendix C, titled 'Calibration and Maintenance of Monitoring Equipment', table titled 'Calibration and Maintenance of Monitoring Equipment,' contains records of the calibrations performed on monitoring equipment during 2024.

### 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 2024 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, titled 'Dundas WWTP Operating Data Summary' in the table titled 'Final Effluent Concentrations' and 'Final Effluent Loadings.' Efforts made to obtain these objectives include:

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

### 2.3.7 CONDITION 11 (6G) QUANTITY OF LANDFILL LEACHATE

Leachate from the Redland Brow Landfill contributed 60,441 $m^3$ in 2024. Appendix E, titled 'Dundas WWTP Operating Data Summary', the table titled 'Redland Brow Landfill Leachate' captures the monthly volume of leachate entering the Dundas WWTP.

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

Appendix E, titled ‘Dundas WWTP Operating Data Summary’ in the table titled ‘2024 Redland Brow Landfill Sampling Results’ contains the 2024 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 2024 totalled 34,207 $m^3$. Based on recent history, the volume anticipated in 2025 is forecasted to be approximately 38,000 $m^3$. Monthly details can be found in Appendix E, titled ‘Dundas WWTP Operating Data Summary’ in the table titled ‘Sludge Hauled to Woodward.’

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

No complaints were received at the Dundas WWTP in 2024.

However, the cybersecurity incident in February 2024 compromised the City’s ability to receive and report complaints, potentially preventing capturing all customer complaints for the 2024 reporting year. Hamilton Water informed the MECP of deficiencies encountered and provided interim solutions.

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

In 2024, there was one spill event at the Dundas WWTP (SAC #1-DH3ZYF). On November 17, 2024, Plant Operations staff were alerted to high levels in the Filter Inlet Chamber and Effluent Chamber.

Pumps couldn’t be started remotely, which caused secondary effluent being discharged to the plant outfall. An operator was dispatched and started the pumps manually, ending the discharge. The duration of the spill was 11 minutes and the volume was approximately 77 $m^3$.

### 2.3.12 CONDITION 11 (6L) OTHER INFORMATION REQUIRED BY THE MINISTRY OF THE ENVIRONMENT, CONSERVATION AND PARKS DISTRICT MANAGER

The District Manager requested no additional information for inclusion in this report.

# 3 WASTEWATER COLLECTION FACILITIES

## 3.1 GENERAL INFORMATION

The City of Hamilton operates 71 sewage pumping stations and nine combined sewer overflow tank facilities. It is required to report on the performance of 21 facilities due to conditions within the individual facilities' ECAs. Reporting requirements are anticipated to be expanded with the development of the Sewage Consolidated Linear Infrastructure Environmental Compliance Approval (CLI ECA). This report is intended to satisfy the reporting requirements of the existing ECAs.

### 3.1.1 HCS01/HCS06: GREENHILL COMBINED SEWER OVERFLOW TANKS

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

### 3.1.2 HCS02: STRACHAN COMBINED SEWER OVERFLOW TANK

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

### 3.1.3 HCS03: JAMES COMBINED SEWER OVERFLOW TANK

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

### 3.1.4 HCS04: MAIN/KING COMBINED SEWER OVERFLOW TANK

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

### 3.1.5 HCS05: EASTWOOD COMBINED SEWER OVERFLOW TANK

The Eastwood Park Combined Sewer Overflow Tank is located in Eastwood Park on the southwest corner of Ferguson Avenue and Dock Service Road. The tank volume is

25,000 $m^3$, consisting of two similarly sized cells. It was completed in 1997 and was designed to reduce the frequency of combined sewer overflows entering Hamilton Harbour at the Catharine Street and Ferguson Avenue combined sewer overflow outfalls.

### 3.1.6 HCS07: RED HILL COMBINED SEWER OVERFLOW PIPE

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

### 3.1.7 HCS08: ROYAL COMBINED SEWER OVERFLOW TANK

The Royal Avenue Combined Sewer Overflow Tank is located in Stroud Park, on the southwest corner of Royal Avenue and Stroud Road. The tank volume is 15,000 $m^3$. It was completed in late 2007 and was designed to reduce the frequency of combined sewer overflows entering Chedoke Creek from the Royal Avenue Combined Sewer System.

### 3.1.8 HCS09: MCMASTER COMBINED SEWER OVERFLOW TANK

The McMaster Combined Sewer Overflow Tank is located in the Zone 6 parking lot at McMaster University. The tank was completed in April 2012. The storage volume of 5,935 $m^3$ was designed to reduce combined sewer overflows to Coldwater Creek, which discharges into Cootes Paradise.

### 3.1.9 HC011: CALVIN STREET WASTEWATER PUMPING STATION

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

### 3.1.10 HC018: TWENTY ROAD WASTEWATER PUMPING STATION

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

### 3.1.11 HC019: ENGLISH CHURCH WASTEWATER PUMPING STATION

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

### 3.1.12 HC027: HOMESTEAD WASTEWATER PUMPING STATION

The Homestead Wastewater Pumping Station is located at 3359 Homestead Drive. It 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 sewage lift pumps (two duty, one standby) with a rated capacity of 91 L/s. There are no overflow provisions at this facility.

### 3.1.13 HC058: BINBROOK WASTEWATER PUMPING STATION

The Regional Road 56 Binbrook Wastewater Pumping Station is located at 3255 Regional Road 56 in Binbrook. The station is a single-storey building with an adjacent subsurface wet well. The station collects wastewater in a wet well and automatically pumps it to the Woodward Avenue WWTP. There are three sewage lift pumps (two duty, one standby) with a rated capacity of 257 L/s. The station is rated for an initial period peak flow of 231 L/s and an ultimate peak flow of 507 L/s. There is a wet weather valve between the two discharge forcemains. During high flow conditions (two pumps are running), the valve will open to allow sewage to flow through both forcemains. There are no overflow provisions at this facility. There is currently an ongoing pilot project to reduce/eliminate hydrogen sulphide odours in the downstream sewers through the addition of hydrogen peroxide as an oxidizing agent. It is the intention of Hamilton Water to maintain the pilot project until a permanent process can be implemented at the site.

### 3.1.14 REAL-TIME CONTROL FACILITIES

#### 3.1.14.1 HCG03: Rosemary-Wentworth Regulator

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

operation of the Rosemary-Wentworth (HCG03) Real-Time Control Station. It is located at the southeast corner of Rosemary Street and Wentworth Street.

#### 3.1.14.2 HCG07: Ferguson-Ferrie Regulator

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

#### 3.1.14.3 HCG08: Mary-Ferrie Regulator

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

#### 3.1.14.4 HCG09: Main-Ewen Regulator

The Main-Ewen Regular is located at the intersection of Main Street West and Ewen Road. This site consists of a manual sluice gate and crest weir. During storm or wet weather events that may exceed the treatment capacity of the Woodward Avenue WWTP, excess wastewater overflowing the weir is diverted to the McMaster Combined Sewage Overflow.

#### 3.1.14.5 HCG14: Wellington-Burlington Regulator

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

#### 3.1.14.6 HCG26: Glen Road Regulator and Glen-Tope Overflow Chamber

The Glen Road Regulation Chamber is located on the east side of Glen Road, between Macklin Street North and Tope Crescent in Hamilton. The station itself consists of an outside control cabinet with two adjacent underground chambers: the Glen-Road / Main King #1 regulation chamber and the Glen-Tope overflow chamber. The Glen Road station is a regulation chamber with a 1.7 m wide by 1.0 m high modulating sluice gate. The flows from the Cootes Paradise Area (from the HCG27 Sterling Weir Chamber) are routed through the Glen Road chamber, where the gate position is controlled so the flows are routed to the Glen-Tope overflow chamber without overflowing, and then to the Woodward Avenue WWTP. At Glen Road, when the chamber level reaches an elevation of 87.65 m, the excess flows are discharged in the Main/King CSO Tank. The overflow structure consists of a 3-stop log wall. Three other spare stop logs are stored in the chamber (storage rack) for future use. At Glen-Tope, when the level reaches an elevation of 81.00 m, the excess flows are discharged to the Glen Road combined sewer overflow site. The programmable automation controller panel controls the gate to minimize overflows at Glen-Tope and then minimize the overflows to the Main/King CSO Tank.

#### 3.1.14.7 HCG27 Sterling Weir Chamber

The Sterling Weir Chamber consists of an overflow chamber equipped with two bending weirs. A bending weir consists of a structural frame fixed to an overflow weir wall, a pivoting flap, and a counterweight structure. The bending weir mechanism is entirely passive and does not require any external energy for operation. The fixed

counterweights act directly against the bending weir flap to maintain a constant upstream water level for all overflows varying from zero to the design flow. The opening of each bending weir is monitored by an inclinometer and transmitted to the programmable automation controller. A programmed angle/flow relation provides an overflow measurement.

The flows from the Main/Ewen chamber, the McMaster CSO tank and the Dundas Diversion tank are routed through the Sterling Chamber to the Glen-Road Chamber and from there to the Woodward WWTP. The flows in excess are discharged to Cootes Paradise via the Sterling Canal.

The overflow level is not reached in dry weather and during small wet weather events. Therefore, the bending weirs are closed, and all the incoming flow is routed to the downstream Glen Road Regulator.

During major wet weather events, the chamber level rises. When the overflow level is reached, the weight of the water exceeds the force exerted by the counterweights, and the bending weirs open. The upstream level is maintained at the overflow level. The installation is set for an initial control of the upstream water level at elevation 94 m.

## 3.2 COMPLIANCE APPROVALS

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

| Facility | ECA Number | Issue Date |
|---|---|---|
| HC011: Calvin Street | 0185-CMXL2M | March 29, 2023 |
| HC018: Twenty Road Wastewater Pumping Station | 6048-BS9KV5 | March 23, 2021 |
| HC019: English Church Wastewater Pumping Station | 8318-BSCP8D | September 11, 2020 |
| HC027: Homestead Wastewater Pumping Station | 2627-BSEQB2 | September 11, 2020 |
| HC058: Binbrook Wastewater Pumping Station | 4299-B75MSK | February 7, 2019 |
| HCG03, HCG07, HCG08, HCG09, HCG14, HCG26 and HCG27: Real-Time Control Facilities | 5433-CJ7JMB | April 5, 2023 |

### 3.2.1 SEWAGE CONSOLIDATED LINEAR INFRASTRUCTURE ENVIRONMENTAL COMPLIANCE APPROVAL

The application for a Sewage CLI ECA was submitted as per the deadline on January 21, 2021. The City of Hamilton received drafts of the CLI ECA from MECP in 2023 and had in-person meetings in Q1 and Q3 2024, as well as multiple virtual meetings in Q4 2024 with the Ministry to discuss on Hamilton-specific conditions in the Sewage CLI ECA.

The City of Hamilton and the Ministry of the Environment, Conservation and Parks continue to work towards a finalized Sewage CLI ECA.

### 3.2.2 NOTICE OF MODIFICATION

No Notices of Modification were submitted in 2024 for any of the above facilities.

### 3.2.3 MONITORING AND ANALYTICAL DATA

The Table ‘2024 Overflow Events’ below summarizes the overflows from each of the reported facilities in 2024, and the table ‘Historical Overflow Events’ compares the 2024 overflows to previous years. It should be noted that 2023 represents the first year that the real-time control structures (HCG03, HCG07, HCG08 and HCG14) are required to be included in this report, and they account for the majority of overflow events reported since that time. Analytical results of samples collected during storm events can be found in Appendix F, titled ‘CSO Tank Analytical Data.’

## 2024 Overflow Events Table

| Facility | Number of Overflow Events | Total Duration (Hours) | Total Volume (ML) |
|---|---|---|---|
| HCS01: Greenhill CSO Tank | 7 | 108.2 | 600.754 |
| HCS02: Strachan CSO Tank | 0 | 0.0 | 0 |
| HCS03: James CSO Tank | 0 | 0.0 | 0 |
| HCS04: Main/King CSO Tank | 8 | 62.0 | 178.174 |
| HCS05: Eastwood CSO Tank | 2 | 55.8 | 220.741 |
| HCS07: Red Hill Superpipe | 0 | 0.0 | 0 |
| HCS08: Royal CSO Tank | 5 | 67.7 | 80.707 |
| HCS09: McMaster CSO Tank | 0 | 0.0 | 0 |
| HCG03: Rosemary - Wentworth Regulator* | 61 | 170.9 | n/a |
| HCG07: Ferguson-Ferrie Regulator | 0 | 0.0 | 0 |
| HCG08: Mary-Ferrie Regulator | 0 | 0.0 | 0 |
| HCG14: Wellington-Burlington Regulator | 25 | 29.3 | n/a |
| | | | |
| **All facilities** | **108** | **493.85** | **1,080.376** |

* Overflows due to the height of the upstream static weir and not due to the operation of the control gate. Historical Overflow Events Table

| Year | Number of Overflow Events | Total Duration (Hours) | Total Volume (ML) |
|---|---|---|---|
| 2019 | 23 | 382.53 | 1219.65 |
| 2020 | 13 | 261.03 | 963.04 |
| 2021 | 27 | 406.00 | 1639.60 |
| 2022 | 10 | 158.00 | 699.70 |
| 2023 | 124 | 661.17 | 1300.83 |
| 2024 | 108 | 493.85 | 1080.38 |
| | | | |
| **5-year average** | **39** | **373.75** | **1164.56** |

A review of the historical trend of the sewage characteristics and flow rates is required per ECA 5433-CJ7JMB for RTC Phase I & II sites. However, as this amended ECA was issued in April 2023 and Phase II sites were commissioned in 2024, no historical data is currently available.

### 3.2.4 MAINTENANCE OF MAJOR EQUIPMENT

City of Hamilton Plant Maintenance staff based at the Woodward Avenue WWTP carry out regular facilities maintenance. Typically, a computerized maintenance management system schedules and tracks routine and preventative maintenance. Larger or specialized maintenance activities are completed by third-party external contractors.

Significant maintenance activities completed at the wastewater pumping stations and combined sewer overflow facilities in 2024 are provided in Appendix B, titled ‘Maintenance Activities.’ Historically, the City of Hamilton provides a table summarizing major maintenance activities to the City’s vertical infrastructure for a reporting year including expenditures. However, on February 25, 2024, the City of Hamilton experienced a cybersecurity incident that led to the loss of all computerized maintenance management systems and the loss of the ability to provide these expenditures.

### 3.2.5 EFFLUENT QUALITY ASSURANCE OR CONTROL MEASURES TAKEN

The City of Hamilton Environmental Laboratory, which is accredited by the Canadian Association for Laboratory Accreditation Incorporated, performs analytical tests to monitor required parameters. The WWTP's operation and performance are monitored by licensed operators and the facility’s management team. Standard operating procedures, emergency plans, equipment preventative maintenance and a team of support staff help ensure a rapid and effective response to issues and maintain high-quality effluent.

The City of Hamilton’s Wastewater Quality Management System (WWQMS) was fully

implemented and operational in 2021. The City of Hamilton's WWQMS was most recently endorsed by Council on March 29, 2023. The WWQMS was implemented to ensure the effective and efficient collection and treatment of wastewater in a manner that protects the environment, meets regulatory requirements and meets the City of Hamilton's commitment to operating and maintaining a high-quality wastewater system.

### 3.2.6 CALIBRATION AND MAINTENANCE OF MONITORING EQUIPMENT

Appendix C, titled 'Calibration and Maintenance of Monitoring Equipment' table titled 'Wastewater Collection Facilities Calibration and Maintenance of Monitoring Equipment', contains the calibration activities on the monitoring equipment during 2024.

### 3.2.7 OPERATING PROBLEMS AND CORRECTIVE ACTION

The wastewater collection facilities generally operated as designed in 2024, except for the issues noted below.

| Wastewater Collection Facility | Operational Issues and Actions Taken |
|---|---|
| HC011: Calvin Street Wastewater Pumping Station | The pumps at HC011 were experiencing erratic operation and frequently pumping at low levels, causing them to airlock. In June 2024, a radar-level instrument was installed to address this issue. As a result, the pumps are now operating as designed. |
| HC018: Twenty Road Wastewater Pumping Station | On September 12th, the utility-owned transformer at this station was shorted, damaging the variable frequency drive on Pump #1, which will be repaired in 2025. |
| HCS08: Royal CSO Tank | In 2024, it was discovered that the overflow volume calculations at this location could be inaccurate. The City has engaged a consultant to investigate and recalculate overflow volumes using all available historical data. |

### 3.2.8 SUMMARY OF COMPLAINTS

One complaint about the wastewater collection stations covered in Section 3.1 was received in 2024.

On May 7, 2024, a resident reported sewage odours around the Greenhill Combined Sewer Overflow Facility (HCS06). It was explained that the tank had recently been utilized during a storm event and was emptied and washed on the day of the complaint. Plant Operations staff visiting the facility the following day detected only slight odours.

However, the cybersecurity incident in February 2024 compromised the City's ability to receive and report complaints, potentially preventing capturing all customer complaints for the 2024 reporting year. Hamilton Water informed the MECP of deficiencies encountered and provided interim solutions.

### 3.2.9 SUMMARY OF SPILLS AND ABNORMAL DISCHARGES

All discharge events at these facilities in 2024 were combined sewer overflow events caused by heavy precipitation during storm events.

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

The District Manager requested no additional information for inclusion in this report.

### 3.2.11 OVERVIEW OF THE SUCCESS AND ADEQUACY OF THE WORKS AND EVALUATION OF THE NEED FOR MODIFICATIONS

These combined sewer overflow tank facilities and wastewater pumping stations are operating effectively as designed. Several facilities are undergoing upgrades and modifications to optimize system operations and maintain the facilities in a state of good repair.

#### 3.2.11.1 Rosemary-Wentworth Regulator (HCG03) Overflow Weir Modification

It was determined that there is an opportunity to increase the overflow weir height at HCG03 to reduce overflows to the environment. Accordingly, a plan has been developed to raise the weir height by 45 cm. This work is pending approval of an amendment to the ECA for this facility, submitted Q2 2024.

#### 3.2.11.2 Main/King Combined Sewer Overflow (HCS04) Rehabilitation

The Main/King Combined Sewer Overflow (HCS04) Rehabilitation Project was initiated to address Provincial Order 1-J25YB, Item 7, and implement select recommendations from the "CSO Facilities Engineering Feasibility Study" completed by Hatch on April 28, 2020. The primary focus was upgrading existing actuators with redundant gate position sensors. The project achieved substantial performance in August 2024.

#### 3.2.11.3 Binbrook Odour Control Pilot Project

In previous years, high hydrogen sulphide ($H_2S$) levels were causing significant corrosion of new concrete sewers and odour concerns for residents living along Highway 56 and Highway 20. A pilot project with USP Technologies - Canada (USP) was approved in December 2020. USP’s scope included the interim supply of chemicals, equipment, logistics, monitoring and program management of an odour and corrosion control system to mitigate high levels of hydrogen sulphide in the wastewater collection system. As a result of this success and the benefits to the City's assets, the City has decided to make the dosing system permanent. The design of the works will start in 2025, with construction to follow in 2026-2027.

#### 3.2.11.4 Arc Flash Project

Arc flash mitigation measures across the Wastewater Collection Facilities were implemented in 2024 to improve electrical safety. The project involved updating electrical system labelling, conducting arc flash studies, and updating single-line drawings to ensure a safer working environment for staff.

### 3.2.12 SUMMARY OF EFFORTS MADE TO ACHIEVE CONFORMANCE WITH F-5-1 AND F-5-5

Hamilton Water has ongoing programs and has undertaken various projects to meet the Ministry's requirements for municipal combined sewer systems as per Procedure F-5-5, "Determination of Treatment Requirements for Municipal and Private Combined". For additional details, refer to Subsection 1.3.13 of the Woodward Avenue WWTP report.

### 3.2.13 CHANGES OR UPDATES TO THE CONSTRUCTION SCHEDULE

The updated completion dates for the Real-Time Control Program – Phase II Sites are as follows:

Real-Time Control Program - Phase II: December 2024 (Original – October 2024)

# 4 APPENDICES

## Appendix A - Woodward Avenue WWTP Operating Data Summary

### Plant Flows

| Month | Monthly Volume (ML) | Daily Average Flow (ML/d) | Daily Maximum Flow (ML/d) | Daily Minimum Flow (ML/d) | Peak Instantaneous Flow (ML/d) | # of days >409 (ML/d) | # of days >90(%) of 409 (ML/d) | Disinfected Volume (ML) |
|---|---|---|---|---|---|---|---|---|
| Jan | 12,841.585 | 414.245 | 937.834 | 249.326 | 1,458.000 | 14 | 15 | - |
| Feb | 7,973.248 | 274.940 | 504.183 | 214.999 | 652.000 | 1 | 1 | - |
| Mar | 9,269.531 | 299.017 | 541.130 | 230.688 | 943.000 | 3 | 4 | - |
| Apr | 11,526.053 | 384.202 | 874.027 | 259.788 | 1,243.000 | 9 | 12 | - |
| May | 9,624.539 | 310.469 | 691.959 | 234.905 | 1,264.000 | 4 | 5 | 5,845 |
| Jun | 8,860.499 | 295.350 | 482.300 | 226.876 | 794.000 | 1 | 3 | 8,861 |
| Jul | 11,583.941 | 373.676 | 736.460 | 235.081 | 1,435.000 | 11 | 12 | 11,584 |
| Aug | 7,899.731 | 254.830 | 361.085 | 212.324 | 804.000 | 0 | 0 | 7,900 |
| Sep | 7,887.169 | 262.906 | 540.720 | 209.531 | 891.000 | 2 | 2 | 7,887 |
| Oct | 7,992.428 | 257.820 | 399.831 | 211.793 | 952.000 | 0 | 2 | 3,994 |
| Nov | 7,569.751 | 252.325 | 432.656 | 216.695 | 667.000 | 1 | 1 | - |
| Dec | 9,125.180 | 294.361 | 715.961 | 219.274 | 1,160.000 | 3 | 3 | - |
| | | | | | | | | |
| **Total** | **112,153.655** | **-** | **-** | **-** | **12,263.000** | **49** | **60** | **46,070.05** |
| **Avg** | **9,346.138** | **306.178** | **601.512** | **226.773** | **1,021.917** | **4** | **5** | **7,678.34** |
| **Max** | **12,841.585** | **414.245** | **937.834** | **259.788** | **1,458.000** | **14** | **15** | **11,583.94** |
| **Min** | **7,569.751** | **252.325** | **361.085** | **209.531** | **652.000** | **0** | **0** | **3,994.18** |

## Plant Bypassing

| Plant Bypass (Raw Overflow) | | | | Primary/Headworks Bypass (Preliminary Effluent Overflow) | | | Secondary Bypass (Primary Effluent Overflow) | | | Tertiary Bypass | | | Proportion of Plant Flow |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Month | # of Events | Hours | Volume (ML) | # of Events | Hours | Volume (ML) | # of Events | Hours | Volume (ML) | # of Events | Hours | Volume (ML) | % |
| Jan | 0 | 0.00 | 0.00 | 1 | 3.47 | 24.24 | 4 | 92.71 | 732.89 | - | - | - | 5.90 |
| Feb | 0 | 0.00 | 0.00 | 0 | 0.00 | 0.00 | 0 | 0.00 | 0.00 | - | - | - | 0.00 |
| Mar | 0 | 0.00 | 0.00 | 0 | 0.00 | 0.00 | 1 | 4.87 | 35.49 | - | - | - | 0.38 |
| Apr | 0 | 0.00 | 0.00 | 0 | 0.00 | 0.00 | 1 | 51.19 | 437.98 | - | - | - | 3.80 |
| May | 0 | 0.00 | 0.00 | 0 | 0.00 | 0.00 | 2 | 20.03 | 155.24 | - | - | - | 1.61 |
| Jun | 0 | 0.00 | 0.00 | 0 | 0.00 | 0.00 | 0 | 0.00 | 0.00 | - | - | - | 0.00 |
| Jul | 0 | 0.00 | 0.00 | 0 | 0.00 | 0.00 | 4 | 70.16 | 553.30 | - | - | - | 4.78 |
| Aug | 0 | 0.00 | 0.00 | 0 | 0.00 | 0.00 | 0 | 0.00 | 0.00 | - | - | - | 0.00 |
| Sep | 0 | 0.00 | 0.00 | 0 | 0.00 | 0.00 | 2 | 6.35 | 33.26 | - | - | - | 0.42 |
| Oct | 0 | 0.00 | 0.00 | 0 | 0.00 | 0.00 | 1 | 3.43 | 31.00 | - | - | - | 0.39 |
| Nov | 0 | 0.00 | 0.00 | 0 | 0.00 | 0.00 | 0 | 0.00 | 0.00 | 1 | 0.18 | 16.06 | 0.21 |
| Dec | 0 | 0.00 | 0.00 | 0 | 0.00 | 0.00 | 1 | 35.87 | 353.22 | 1 | 21.00 | 80.63 | 4.75 |
| | | | | | | | | | | | | | |
| **Total** | **0** | **0.00** | **0.00** | **1** | **3.47** | **24.24** | **16** | **284.61** | **2,332.36** | **2** | **21.18** | **96.69** | **22.24** |
| **Avg** | **0** | **0.00** | **0.00** | **0** | **0.29** | **2.02** | **1** | **23.72** | **194.36** | **1** | **10.59** | **48.35** | **1.85** |
| **Max** | **0** | **0.00** | **0.00** | **1** | **3.47** | **24.24** | **4** | **92.71** | **732.89** | **1** | **21.00** | **80.63** | **5.90** |
| **Min** | **0** | **0.00** | **0.00** | **0** | **0.00** | **0.00** | **0** | **0.00** | **0.00** | **1** | **0.18** | **16.06** | **0.00** |

## Raw Influent Concentrations

| Month | TSS (mg/L) | tBOD (mg/L) | cBOD (mg/L) | TP (mg/L) | SP (mg/L) | $NH_3$ (mg/L) | TKN (mg/L) | Temp (C) | Alkalinity (mg/L) | pH Grab |
|---|---|---|---|---|---|---|---|---|---|---|
| Jan | 343.84 | 203.08 | 170.81 | 4.78 | 1.07 | 18.07 | 29.47 | 14.40 | 245.23 | 7.82 |
| Feb | 679.64 | 230.78 | 203.50 | 6.44 | 1.29 | 23.59 | 34.97 | 15.23 | 273.50 | 7.78 |
| Mar | 476.94 | 243.45 | 206.02 | 8.27 | 1.31 | 22.91 | 40.74 | 15.12 | 268.24 | 7.78 |
| Apr | 644.20 | 257.85 | 214.63 | 9.00 | 1.04 | 17.84 | 40.29 | 15.53 | 262.50 | 7.68 |
| May | 506.18 | 237.18 | 208.61 | 7.56 | 1.25 | 21.67 | 40.04 | 18.46 | 265.60 | 7.63 |
| Jun | 612.75 | 240.07 | 195.72 | 8.96 | 1.05 | 22.44 | 41.09 | 20.40 | 254.68 | 7.60 |
| Jul | 416.37 | 216.26 | 163.15 | 6.56 | 1.16 | 18.77 | 33.81 | 22.19 | 239.76 | 7.56 |
| Aug | 415.97 | 242.32 | 196.63 | 6.50 | 1.69 | 23.93 | 39.71 | 23.65 | 266.42 | 7.58 |
| Sep | 475.28 | 241.72 | 207.72 | 7.09 | 1.53 | 24.10 | 40.50 | 23.61 | 259.22 | 7.55 |
| Oct | 454.76 | 239.89 | 203.63 | 7.95 | 1.45 | 24.71 | 42.26 | 22.49 | 272.97 | 7.66 |
| Nov | 460.00 | 229.78 | 193.82 | 7.96 | 1.50 | 25.41 | 42.28 | 20.47 | 279.27 | 7.55 |
| Dec | 502.32 | 294.72 | 209.98 | 7.59 | 1.44 | 23.85 | 42.66 | 17.58 | 274.72 | 7.60 |
| | | | | | | | | | | |
| **Avg** | **499.02** | **239.76** | **197.85** | **7.39** | **1.32** | **22.28** | **38.99** | **19.09** | **263.51** | **7.65** |
| **Max** | **679.64** | **294.72** | **214.63** | **9.00** | **1.69** | **25.41** | **42.66** | **23.65** | **279.27** | **7.82** |
| **Min** | **343.84** | **203.08** | **163.15** | **4.78** | **1.04** | **17.84** | **29.47** | **14.40** | **239.76** | **7.55** |

## Raw Influent - Daily Loadings

| Month | TSS (kg/d) | tBOD (kg/d) | cBOD (kg/d) | TP (kg/d) | SP (kg/d) | $NH_3$ (kg/d) | TKN (kg/d) |
|---|---|---|---|---|---|---|---|
| Jan | 134,508 | 77,551 | 63,542 | 1,822 | 372 | 6,531 | 10,909 |
| Feb | 190,720 | 62,518 | 55,369 | 1,764 | 343 | 6,313 | 9,399 |
| Mar | 139,633 | 71,610 | 60,001 | 2,421 | 376 | 6,607 | 11,841 |
| Apr | 241,644 | 95,157 | 78,320 | 3,332 | 362 | 6,280 | 14,344 |
| May | 163,761 | 72,254 | 63,093 | 2,312 | 352 | 6,258 | 11,901 |
| Jun | 177,680 | 69,829 | 56,511 | 2,564 | 297 | 6,483 | 11,869 |
| Jul | 143,444 | 72,461 | 53,776 | 2,133 | 365 | 6,117 | 11,186 |
| Aug | 106,728 | 61,391 | 49,618 | 1,645 | 420 | 5,954 | 9,968 |
| Sep | 123,822 | 61,516 | 52,723 | 1,811 | 373 | 6,038 | 10,255 |
| Oct | 116,461 | 61,119 | 51,994 | 2,023 | 362 | 6,208 | 10,676 |
| Nov | 116,152 | 57,745 | 48,503 | 1,993 | 369 | 6,265 | 10,521 |
| Dec | 146,186 | 83,674 | 59,412 | 2,186 | 386 | 6,583 | 11,982 |
| | | | | | | | |
| **Avg** | **150,062** | **70,569** | **57,738** | **2,167** | **365** | **6,303** | **11,238** |
| **Max** | **241,644** | **95,157** | **78,320** | **3,332** | **420** | **6,607** | **14,344** |
| **Min** | **106,728** | **57,745** | **48,503** | **1,645** | **297** | **5,954** | **9,399** |

## North Primary Effluent

| Month | TSS (mg/L) | cBOD (mg/L) | $NH_3$ (mg/L) | TKN (mg/L) | TP (mg/L) | SP (mg/L) |
|---|---|---|---|---|---|---|
| Jan | 93.27 | 69.74 | 17.87 | 23.15 | 2.24 | 0.22 |
| Feb | 92.33 | 69.93 | 23.05 | 28.51 | 2.26 | 0.21 |
| Mar | 97.71 | 78.68 | 21.77 | 29.94 | 2.70 | 0.30 |
| Apr | 107.56 | 60.93 | 17.30 | 26.36 | 2.39 | 0.15 |
| May | 105.54 | 70.65 | 21.04 | 29.14 | 2.49 | 0.13 |
| Jun | 104.07 | 72.37 | 21.42 | 27.69 | 2.43 | 0.14 |
| Jul | 90.85 | 57.77 | 18.00 | 23.77 | 2.13 | 0.15 |
| Aug | 70.98 | 70.87 | 22.08 | 28.25 | 2.06 | 0.14 |
| Sep | 74.78 | 77.87 | 24.16 | 29.90 | 2.17 | 0.15 |
| Oct | 101.12 | 82.58 | 24.70 | 31.70 | 2.69 | 0.20 |
| Nov | 96.43 | 79.23 | 25.89 | 31.33 | 2.62 | 0.23 |
| Dec | 95.37 | 79.68 | 23.45 | 31.35 | 2.65 | 0.24 |
| | | | | | | |
| **Avg** | **94.17** | **72.52** | **21.73** | **28.42** | **2.40** | **0.19** |
| **Max** | **107.56** | **82.58** | **25.89** | **31.70** | **2.70** | **0.30** |
| **Min** | **70.98** | **57.77** | **17.30** | **23.15** | **2.06** | **0.13** |

## South Primary Effluent

| Month | TSS (mg/L) | cBOD (mg/L) | $NH_3$ (mg/L) | TKN (mg/L) | TP (mg/L) | SP (mg/L) |
|---|---|---|---|---|---|---|
| Jan | 76.06 | 60.32 | 18.07 | 22.47 | 1.92 | 0.19 |
| Feb | 85.08 | 68.34 | 23.28 | 28.65 | 2.17 | 0.17 |
| Mar | 72.95 | 74.26 | 22.25 | 29.14 | 2.28 | 0.26 |
| Apr | 95.25 | 55.43 | 17.19 | 25.20 | 2.20 | 0.14 |
| May | 98.00 | 66.87 | 21.27 | 29.14 | 2.34 | 0.11 |
| Jun | 96.10 | 67.53 | 21.40 | 27.50 | 2.28 | 0.11 |
| Jul | 78.89 | 51.73 | 18.33 | 23.59 | 1.97 | 0.14 |
| Aug | 65.36 | 68.00 | 22.19 | 28.48 | 1.94 | 0.13 |
| Sep | 70.65 | 75.00 | 24.16 | 29.45 | 2.08 | 0.12 |
| Oct | 101.35 | 81.94 | 24.65 | 31.10 | 2.74 | 0.19 |
| Nov | 92.53 | 78.37 | 25.79 | 30.06 | 2.59 | 0.21 |
| Dec | 90.13 | 77.87 | 23.10 | 31.15 | 2.57 | 0.23 |
| | | | | | | |
| **Avg** | **85.20** | **68.81** | **21.81** | **28.00** | **2.26** | **0.17** |
| **Max** | **101.35** | **81.94** | **25.79** | **31.15** | **2.74** | **0.26** |
| **Min** | **65.36** | **51.73** | **17.19** | **22.47** | **1.92** | **0.11** |

## Primary Treatment Summary

| Month | TSS Reduction (%) | cBOD Reduction (%) | TP Reduction (%) |
|---|---|---|---|
| Jan | 72 | 61 | 52 |
| Feb | 85 | 66 | 61 |
| Mar | 81 | 63 | 69 |
| Apr | 83 | 72 | 76 |
| May | 79 | 67 | 69 |
| Jun | 81 | 64 | 71 |
| Jul | 78 | 66 | 67 |
| Aug | 81 | 64 | 68 |
| Sep | 84 | 63 | 71 |
| Oct | 77 | 59 | 67 |
| Nov | 79 | 59 | 66 |
| Dec | 80 | 61 | 64 |
| | | | |
| **Avg** | **80** | **64** | **67** |
| **Max** | **85** | **72** | **76** |
| **Min** | **72** | **59** | **52** |

## Aeration North Summary

| Month | North Flow (ML/day) | MLSS (mg/L) | MLVSS (mg/L) | SRT (days) | HRT (hrs) |
|---|---|---|---|---|---|
| Jan | 235 | 2,782 | 2,036 | 10 | 8 |
| Feb | 166 | 2,489 | 1,847 | 12 | 10 |
| Mar | 178 | 2,483 | 1,877 | 8 | 10 |
| Apr | 221 | 2,466 | 1,813 | 6 | 8 |
| May | 183 | 2,233 | 1,630 | 6 | 10 |
| Jun | 177 | 2,216 | 1,566 | 7 | 10 |
| Jul | 212 | 2,086 | 1,402 | 8 | 9 |
| Aug | 153 | 2,175 | 1,539 | 13 | 11 |
| Sep | 157 | 1,918 | 1,393 | 8 | 11 |
| Oct | 154 | 2,133 | 1,548 | 8 | 11 |
| Nov | 151 | 1,974 | 1,465 | 8 | 11 |
| Dec | 171 | 2,286 | 1,717 | 9 | 10 |
| | | | | | |
| **Avg** | **180** | **2,270** | **1,653** | **9** | **10** |
| **Max** | **235** | **2,782** | **2,036** | **13** | **11** |
| **Min** | **151** | **1,918** | **1,393** | **6** | **8** |

## Aeration South Summary

| Month | South Flow (ML/day) | MLSS (mg/L) | MLVSS (mg/L) | SRT (days) | HRT (hrs) |
|---|---|---|---|---|---|
| Jan | 159 | 2,138 | 1,551 | 8 | 7 |
| Feb | 111 | 1,837 | 1,374 | 8 | 9 |
| Mar | 122 | 1,904 | 1,464 | 9 | 9 |
| Apr | 150 | 2,264 | 1,672 | 7 | 7 |
| May | 120 | 1,762 | 1,289 | 7 | 9 |
| Jun | 110 | 1,758 | 1,237 | 7 | 9 |
| Jul | 144 | 1,426 | 965 | 11 | 8 |
| Aug | 107 | 1,959 | 1,371 | 21 | 9 |
| Sep | 105 | 1,902 | 1,358 | 14 | 10 |
| Oct | 90 | 1,947 | 1,382 | 9 | 11 |
| Nov | 84 | 1,966 | 1,425 | 11 | 12 |
| Dec | 104 | 2,001 | 1,470 | 9 | 11 |
| | | | | | |
| **Avg** | **117** | **1,905** | **1,380** | **10** | **9** |
| **Max** | **159** | **2,264** | **1,672** | **21** | **12** |
| **Min** | **84** | **1,426** | **965** | **7** | **7** |

## RAS TSS

| Month | North TSS (mg/L) | South TSS (mg/L) |
|---|---|---|
| Jan | 7,188 | 5,285 |
| Feb | 6,477 | 4,229 |
| Mar | 6,785 | 4,370 |
| Apr | 7,294 | 5,847 |
| May | 6,125 | 4,150 |
| Jun | 5,757 | 3,898 |
| Jul | 5,867 | 3,603 |
| Aug | 5,401 | 4,368 |
| Sep | 5,786 | 4,085 |
| Oct | 5,882 | 4,258 |
| Nov | 5,001 | 4,441 |
| Dec | 5,624 | 6,075 |
| | | |
| **Avg** | **6,099** | **4,551** |
| **Max** | **7,294** | **6,075** |
| **Min** | **5,001** | **3,603** |

## Secondary Effluent Concentration Average

| Month | cBOD (mg/L) | TSS (mg/L) | SP (mg/L) | TP (mg/L) | $NH_3$ (mg/L) | TKN (mg/L) | $NO_3$ (mg/L) | $NO_2$ (mg/L) | Alkalinity (mg/L) | pH (Composite) |
|---|---|---|---|---|---|---|---|---|---|---|
| Jan | 9.15 | 26.56 | - | 0.545 | 0.16 | 2.50 | 17.23 | 0.51 | 116.65 | 7.41 |
| Feb | 10.92 | 29.27 | 0.166 | 0.628 | 0.17 | 2.50 | 21.68 | 0.32 | 103.37 | 7.45 |
| Mar | 5.65 | 17.11 | 0.263 | 0.503 | 0.26 | 1.63 | 21.68 | 0.22 | 107.46 | 7.46 |
| Apr | 12.95 | 45.04 | 0.199 | 0.871 | 0.32 | 4.53 | 18.25 | 0.13 | 125.01 | 7.47 |
| May | 17.39 | 48.59 | 0.211 | 0.916 | 0.25 | 4.65 | 17.29 | 0.14 | 107.60 | 7.42 |
| Jun | 12.47 | 36.67 | 0.137 | 0.685 | 0.25 | 3.80 | 15.81 | 0.18 | 110.40 | 7.64 |
| Jul | 10.35 | 32.26 | 0.162 | 0.641 | 0.46 | 3.25 | 15.20 | 0.19 | 108.06 | 7.67 |
| Aug | 7.23 | 17.71 | 0.191 | 0.479 | 0.42 | 2.33 | 16.35 | 0.17 | 106.25 | 7.70 |
| Sep | 5.93 | 17.35 | 0.138 | 0.454 | 0.26 | 2.23 | 17.28 | 0.13 | 88.21 | 7.58 |
| Oct | 10.54 | 29.56 | 0.150 | 0.646 | 0.65 | 3.73 | 16.38 | 0.12 | 109.71 | 7.62 |
| Nov | 8.57 | 25.36 | 0.183 | 0.616 | 0.71 | 3.06 | 18.17 | 0.12 | 107.27 | 7.57 |
| Dec | 10.00 | 29.61 | 0.186 | 0.724 | 0.47 | 3.80 | 18.78 | 0.13 | 107.10 | 7.50 |
| | | | | | | | | | | |
| **Avg** | **10.09** | **29.59** | **0.180** | **0.642** | **0.37** | **3.17** | **17.84** | **0.20** | **108.09** | **7.54** |
| **Max** | **17.39** | **48.59** | **0.263** | **0.916** | **0.71** | **4.65** | **21.68** | **0.51** | **125.01** | **7.70** |
| **Min** | **5.65** | **17.11** | **0.137** | **0.454** | **0.16** | **1.63** | **15.20** | **0.12** | **88.21** | **7.41** |

## Secondary Effluent Loadings

| Month | cBOD (kg/d) | TSS (kg/d) | SP (kg/d) | TP (kg/d) | $NH_3$ (kg/d) | TKN (kg/d) | $NO_3$ (kg/d) | $NO_2$ (kg/d) | Alkalinity (kg/d) |
|---|---|---|---|---|---|---|---|---|---|
| Jan | 2,151 | 6,488 | -- | 126 | 33 | 589 | 3,809 | 109 | 27,086 |
| Feb | 1,775 | 4,734 | 28 | 104 | 31 | 402 | 3,589 | 55 | 17,539 |
| Mar | 999 | 3,035 | 45 | 88 | 47 | 287 | 3,661 | 37 | 18,441 |
| Apr | 2,785 | 10,023 | 42 | 189 | 62 | 968 | 3,903 | 28 | 27,194 |
| May | 3,179 | 8,861 | 35 | 166 | 46 | 843 | 2,979 | 25 | 19,676 |
| Jun | 2,246 | 6,717 | 24 | 125 | 44 | 696 | 2,775 | 32 | 19,671 |
| Jul | 2,234 | 7,076 | 31 | 137 | 78 | 688 | 3,091 | 40 | 24,305 |
| Aug | 1,097 | 2,752 | 29 | 73 | 62 | 355 | 2,383 | 25 | 15,398 |
| Sep | 986 | 2,943 | 20 | 72 | 43 | 360 | 2,570 | 20 | 13,549 |
| Oct | 1,674 | 4,667 | 22 | 100 | 96 | 582 | 2,591 | 19 | 17,038 |
| Nov | 1,306 | 3,883 | 27 | 94 | 105 | 465 | 2,788 | 19 | 16,360 |
| Dec | 1,709 | 5,126 | 29 | 123 | 75 | 644 | 3,178 | 23 | 18,400 |
| | | | | | | | | | |
| **Avg** | **1,845** | **5,526** | **30** | **116** | **60** | **573** | **3,110** | **36** | **19,555** |
| **Max** | **3,179** | **10,023** | **45** | **189** | **105** | **968** | **3,903** | **109** | **27,194** |
| **Min** | **986** | **2,752** | **20** | **72** | **31** | **287** | **2,383** | **19** | **13,549** |

## Secondary Effluent Removals

| Month | TSS (%) | cBOD (%) | TP (%) |
|---|---|---|---|
| Jan | 91 | 94 | 86 |
| Feb | 95 | 95 | 89 |
| Mar | 96 | 97 | 94 |
| Apr | 92 | 93 | 90 |
| May | 90 | 91 | 88 |
| Jun | 93 | 94 | 92 |
| Jul | 92 | 93 | 89 |
| Aug | 95 | 96 | 92 |
| Sep | 96 | 97 | 94 |
| Oct | 93 | 95 | 92 |
| Nov | 94 | 96 | 92 |
| Dec | 94 | 95 | 90 |
| | | | |
| **Avg** | **94** | **95** | **91** |
| **Max** | **96** | **97** | **94** |
| **Min** | **90** | **91** | **86** |

## Final Effluent Concentrations

| Month | TSS (mg/L) | cBOD (mg/L) | TP (mg/L) | SP (mg/L) | Unionized $NH_3$ (ug/L) | $NH_3$ (mg/L) | TKN (mg/L) | $NO_3$ (mg/L) | $NO_2$ (mg/L) | Alkalinity (mg/L) | Temp (°C) | pH (Grab) | E. coli (MPN/ 100ml) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Jan | 5.05 | 2.73 | 0.176 | 0.034 | 0.84 | 0.27 | 0.87 | 17.52 | 0.28 | 111.89 | 15.36 | 7.05 | - |
| *Feb | 7.81 | 3.29 | 0.253 | 0.067 | 0.80 | 0.20 | 1.22 | 22.79 | 0.19 | 97.75 | 15.96 | 7.05 | - |
| *Mar | 4.84 | 3.15 | 0.326 | 0.157 | 0.38 | 0.31 | 1.24 | 22.47 | 0.15 | 103.39 | 15.43 | 6.90 | - |
| Apr | 6.18 | 2.79 | 0.224 | 0.045 | 0.63 | 0.55 | 1.60 | 18.20 | 0.12 | 122.98 | 15.49 | 7.00 | - |
| May | 5.64 | 3.30 | 0.226 | 0.048 | 1.14 | 0.39 | 1.41 | 19.26 | 0.10 | 100.27 | 18.06 | 7.04 | 5.00 |
| Jun | 4.63 | 3.34 | 0.185 | 0.043 | 1.73 | 0.44 | 1.32 | 17.92 | 0.10 | 97.02 | 20.06 | 7.05 | 1.00 |
| Jul | 4.59 | 2.57 | 0.197 | 0.052 | 4.44 | 0.69 | 1.45 | 16.49 | 0.12 | 98.77 | 22.29 | 7.07 | 2.00 |
| Aug | 3.19 | 2.45 | 0.181 | 0.067 | 4.03 | 0.59 | 1.49 | 17.81 | 0.12 | 94.25 | 21.79 | 7.21 | 1.00 |
| Sep | 5.17 | 2.31 | 0.170 | 0.046 | 1.89 | 0.46 | 1.30 | 19.24 | 0.10 | 78.05 | 21.26 | 7.00 | 1.00 |
| Oct | 5.43 | 2.63 | 0.185 | 0.046 | 5.47 | 0.99 | 1.94 | 18.37 | 0.11 | 101.35 | 21.07 | 7.11 | 1.00 |
| Nov | 5.17 | 2.52 | 0.190 | 0.045 | 2.79 | 1.07 | 1.91 | 19.54 | 0.15 | 102.71 | 17.55 | 7.10 | - |
| Dec | 4.45 | 2.43 | 0.204 | 0.051 | 5.11 | 0.88 | 1.99 | 19.80 | 0.14 | 99.70 | 15.00 | 7.04 | - |
| | | | | | | | | | | | | | |
| **Avg** | **5.18** | **2.79** | **0.210** | **0.058** | **2.44** | **0.57** | **1.48** | **19.12** | **0.14** | **100.68** | **18.28** | **7.05** | **1.83** |
| **Max** | **7.81** | **3.34** | **0.326** | **0.157** | **5.47** | **1.07** | **1.99** | **22.79** | **0.28** | **122.98** | **22.29** | **7.21** | **5.00** |
| **Min** | **3.19** | **2.31** | **0.170** | **0.034** | **0.38** | **0.20** | **0.87** | **16.49** | **0.10** | **78.05** | **15.00** | **6.90** | **1.00** |

* Indicates months impacted by planned Tertiary Bypass

## Final Effluent Loadings

| Month | TSS (kg/d) | cBOD (kg/d) | TP (kg/d) | SP (kg/d) | Unionized $NH_3$ (kg/d) | $NH_3$ (kg/d) | TKN (kg/d) | $NO_3$ (kg/d) | $NO_2$ (kg/d) | Alkalinity (kg/d) |
|---|---|---|---|---|---|---|---|---|---|---|
| Jan | 2,182.88 | 1,103.45 | 69.89 | 12.65 | 0.35 | 91.41 | 334.21 | 6,689.36 | 107.77 | 46,126.48 |
| *Feb | 2,172.98 | 908.55 | 70.96 | 19.74 | 0.24 | 55.73 | 336.97 | 6,182.08 | 55.73 | 27,360.11 |
| *Mar | 1,462.31 | 986.32 | 92.47 | 43.21 | 0.11 | 96.14 | 373.74 | 6,551.90 | 45.69 | 30,811.17 |
| Apr | 2,346.59 | 1,051.79 | 83.12 | 15.54 | 0.21 | 183.48 | 576.34 | 6,682.59 | 44.81 | 46,266.60 |
| May | 1,783.17 | 1,013.56 | 67.69 | 13.64 | 0.32 | 107.08 | 415.19 | 5,668.82 | 31.31 | 31,166.59 |
| Jun | 1,440.02 | 1,044.97 | 55.94 | 12.39 | 0.46 | 136.34 | 398.43 | 5,245.36 | 29.94 | 28,796.84 |
| Jul | 1,874.30 | 954.88 | 72.00 | 16.75 | 1.96 | 214.48 | 512.95 | 5,852.35 | 47.37 | 38,775.18 |
| Aug | 834.59 | 622.67 | 46.06 | 16.51 | 0.93 | 146.53 | 376.10 | 4,442.52 | 29.38 | 23,537.69 |
| Sep | 1,462.02 | 641.28 | 44.41 | 11.06 | 0.66 | 122.42 | 343.72 | 4,809.46 | 26.23 | 20,343.59 |
| Oct | 1,448.36 | 694.68 | 47.86 | 11.33 | 1.53 | 247.30 | 495.89 | 4,750.16 | 29.07 | 25,842.43 |
| Nov | 1,329.00 | 639.44 | 47.98 | 11.09 | 0.72 | 264.07 | 476.33 | 4,864.82 | 38.92 | 25,583.82 |
| Dec | 1,507.70 | 746.57 | 59.43 | 13.58 | 1.25 | 236.58 | 596.21 | 5,779.11 | 41.60 | 30,104.96 |
| | | | | | | | | | | |
| **Avg** | **1,653.66** | **867.35** | **63.15** | **16.46** | **0.73** | **158.46** | **436.34** | **5,626.54** | **43.99** | **31,226.29** |
| **Max** | **2,346.59** | **1,103.45** | **92.47** | **43.21** | **1.96** | **264.07** | **596.21** | **6,689.36** | **107.77** | **46,266.60** |
| **Min** | **834.59** | **622.67** | **44.41** | **11.06** | **0.11** | **55.73** | **334.21** | **4,442.52** | **26.23** | **20,343.59** |

* Indicates months impacted by planned Tertiary Bypass

## Final Effluent Removals

| Month | TSS (%) | cBOD (%) | TP (%) |
|---|---|---|---|
| Jan | 98 | 98 | 96 |
| Feb | 99 | 98 | 96 |
| Mar | 99 | 98 | 96 |
| Apr | 99 | 99 | 97 |
| May | 99 | 98 | 97 |
| Jun | 99 | 98 | 98 |
| Jul | 99 | 98 | 97 |
| Aug | 99 | 99 | 97 |
| Sep | 99 | 99 | 97 |
| Oct | 99 | 99 | 98 |
| Nov | 99 | 99 | 98 |
| Dec | 99 | 99 | 97 |
| | | | |
| **Avg** | **99** | **99** | **97** |
| **Max** | **99** | **99** | **98** |
| **Min** | **98** | **98** | **96** |

## Raw Sludge

| Month | Total RS to TSB ($m^3$) | TS (%) | VS (%) |
|---|---|---|---|
| Jan | 40,692 | 3.70 | 69.68 |
| Feb | 39,797 | 3.70 | 66.26 |
| Mar | 41,907 | 4.10 | 68.39 |
| Apr | 40,688 | 4.29 | 66.05 |
| May | 39,383 | 3.76 | 67.41 |
| Jun | 39,968 | 3.81 | 61.73 |
| Jul | 37,526 | 4.08 | 61.33 |
| Aug | 33,938 | 3.28 | 68.76 |
| Sep | 35,834 | 3.28 | 67.51 |
| Oct | 39,730 | 3.24 | 67.88 |
| Nov | 36,419 | 3.33 | 72.24 |
| Dec | 36,655 | 2.94 | 72.92 |
| | | | |
| **Total** | **462,537** | **-** | **-** |
| **Avg** | **38,545** | **3.63** | **67.51** |
| **Max** | **41,907** | **4.29** | **72.92** |
| **Min** | **33,938** | **2.94** | **61.33** |

## Thickened Raw Sludge

| Month | TRS Total ($m^3$) | Total TRS dry solids (t) | TRS TS (%) | TRS VS (%) |
|---|---|---|---|---|
| Jan | 22,909 | 1,605 | 6.96 | 71.44 |
| Feb | 24,797 | 1,744 | 7.01 | 68.70 |
| Mar | 35,118 | 2,194 | 6.32 | 68.32 |
| Apr | 35,197 | 2,388 | 6.81 | 67.03 |
| May | 29,099 | 1,943 | 6.75 | 68.75 |
| Jun | 30,363 | 2,022 | 6.72 | 62.52 |
| Jul | 28,496 | 1,911 | 6.74 | 61.28 |
| Aug | 25,925 | 1,742 | 6.84 | 69.76 |
| Sep | 24,590 | 1,671 | 6.89 | 68.41 |
| Oct | 23,374 | 1,578 | 6.78 | 69.24 |
| Nov | 26,995 | 1,647 | 6.27 | 72.74 |
| Dec | 24,129 | 1,638 | 6.79 | 75.96 |
| | | | | |
| **Total** | **330,990** | **22,083** | **-** | **-** |
| **Avg** | **27,583** | **1,840** | **6.74** | **68.68** |
| **Max** | **35,197** | **2,388** | **7.01** | **75.96** |
| **Min** | **22,909** | **1,578** | **6.27** | **61.28** |

## Thickened Waste Activated Sludge

| Month | TWAS Total ($m^3$) | TWAS TS (%) | TWAS VS (%) | TWAS Dry Solids (t) |
|---|---|---|---|---|
| Jan | 17,923 | 5.40 | 73.44 | 13,162 |
| Feb | 12,922 | 4.78 | 73.48 | 9,495 |
| Mar | 22,157 | 5.03 | 74.68 | 16,546 |
| Apr | 19,194 | 4.70 | 72.62 | 13,939 |
| May | 15,878 | 4.63 | 71.25 | 11,313 |
| Jun | 18,834 | 4.45 | 67.70 | 12,750 |
| Jul | 14,505 | 4.28 | 65.32 | 9,475 |
| Aug | 11,684 | 4.13 | 67.63 | 7,902 |
| Sep | 14,522 | 4.05 | 69.95 | 10,158 |
| Oct | 20,877 | 4.68 | 70.16 | 14,647 |
| Nov | 22,182 | 4.17 | 72.10 | 15,993 |
| Dec | 15,787 | 5.38 | 73.16 | 11,550 |
| | | | | |
| **Total** | **206,465** | **-** | **-** | **146,930** |
| **Avg** | **17,205** | **4.64** | **70.96** | **12,244** |
| **Max** | **22,182** | **5.40** | **74.68** | **16,546** |
| **Min** | **11,684** | **4.05** | **65.32** | **7,902** |

## Primary Digesters

| Month | Total Feed ($m^3$) | Primary Retention Time (Avg. d) | TS (%) | VS (%) |
|---|---|---|---|---|
| Jan | 40,832 | 12.44 | 3.28 | 56.86 |
| Feb | 37,719 | 12.16 | 3.89 | 55.45 |
| Mar | 57,275 | 8.44 | 3.59 | 58.13 |
| Apr | 54,391 | 8.56 | 3.44 | 57.66 |
| May | 44,977 | 10.76 | 3.44 | 56.76 |
| Jun | 49,197 | 9.61 | 3.68 | 52.70 |
| Jul | 43,001 | 11.35 | 3.83 | 49.70 |
| Aug | 37,609 | 12.92 | 3.30 | 49.36 |
| Sep | 39,112 | 12.40 | 3.18 | 54.96 |
| Oct | 44,251 | 10.93 | 3.42 | 56.00 |
| Nov | 49,176 | 9.64 | 2.96 | 57.43 |
| Dec | 39,916 | 13.22 | 2.91 | 58.88 |
| | | | | |
| **Total** | **537,455** | **-** | **-** | **-** |
| **Avg** | **44,788** | **11.04** | **3.41** | **55.32** |
| **Max** | **57,275** | **13.22** | **3.89** | **58.88** |
| **Min** | **37,609** | **8.44** | **2.91** | **49.36** |

## Secondary Digesters

| Month | Secondary TS (%) | Secondary VS (%) | VS Reduction #3 SD (%) |
|---|---|---|---|
| Jan | 3.02 | 55.32 | 54.34 |
| Feb | 3.78 | 55.15 | 51.72 |
| Mar | 3.58 | 58.15 | 43.44 |
| Apr | 3.70 | 57.74 | 42.41 |
| May | 3.40 | 56.70 | 44.78 |
| Jun | 3.63 | 53.23 | 35.74 |
| Jul | 3.52 | 49.74 | 46.20 |
| Aug | 2.93 | 49.13 | 53.89 |
| Sep | 3.13 | 55.10 | 44.55 |
| Oct | 3.22 | 56.44 | 45.02 |
| Nov | 2.98 | 57.70 | 50.08 |
| Dec | 2.84 | 58.86 | 48.55 |
| | | | |
| **Avg** | **3.31** | **55.27** | **46.73** |
| **Max** | **3.78** | **58.86** | **54.34** |
| **Min** | **2.84** | **49.13** | **35.74** |

## Biogas Production

| Month | Biogas ($m^3$/day) | Cogen Total ($m^3$/day) | BPU Total ($m^3$/day) | Waste Gas Total ($m^3$/day) |
|---|---|---|---|---|
| Jan | 629,016 | 245,862 | 102,589 | 280,565 |
| Feb | 601,191 | 294,166 | 134,009 | 173,016 |
| Mar | 573,494 | 296,237 | 203,769 | 73,488 |
| Apr | 589,261 | 266,260 | 128,567 | 194,435 |
| May | 658,856 | 304,408 | 6,042 | 348,406 |
| Jun | 497,493 | 207,949 | 12,025 | 277,518 |
| Jul | 565,519 | 336,986 | 5,154 | 223,379 |
| Aug | 546,982 | 318,481 | 17,692 | 210,810 |
| Sep | 511,718 | 300,818 | 2,584 | 208,316 |
| Oct | 551,873 | 292,578 | 1,816 | 257,479 |
| Nov | 586,264 | 290,215 | 136 | 295,913 |
| Dec | 669,214 | 327,201 | 11,312 | 330,701 |
| | | | | |
| **Total** | **6,980,880** | **3,481,159** | **625,694** | **2,874,027** |
| **Avg** | **581,740** | **290,097** | **52,141** | **239,502** |
| **Max** | **669,214** | **336,986** | **203,769** | **348,406** |
| **Min** | **497,493** | **207,949** | **136** | **73,488** |

## Biosolids to Synagro

| Month | Sludge Cake (t) | Cake Solids (%) |
|---|---|---|
| Jan | 4,611 | 26.18 |
| Feb | 4,778 | 26.10 |
| Mar | 5,694 | 25.48 |
| Apr | 4,750 | 27.18 |
| May | 4,520 | 27.36 |
| Jun | 5,228 | 26.64 |
| Jul | 5,093 | 29.70 |
| Aug | 4,322 | 29.72 |
| Sep | 4,161 | 26.65 |
| Oct | 5,642 | 24.29 |
| Nov | 4,510 | 25.80 |
| Dec | 4,109 | 25.38 |
| | | |
| **Total** | **57,418** | **-** |
| **Avg** | **4,785** | **26.71** |
| **Max** | **5,694** | **29.72** |
| **Min** | **4,109** | **24.29** |

## Chlorination/Dechlorination

| Chlorination | | | | Dechlorination | |
|---|---|---|---|---|---|
| Month | Chlorine Used (kg) | Chlorine Dosage (mg/L) | Disinfection Total Chlorine Residual (mg/L) | SBS Used (L) | Total Residual Chlorine (mg/L) |
| Jan | - | - | - | 0 | - |
| Feb | - | - | - | 20 | - |
| Mar | - | - | - | 6 | - |
| Apr | - | - | - | 186 | - |
| May | 8,435 | 1.31 | 0.46 | 32,620 | 0.02 |
| Jun | 11,453 | 1.29 | 0.44 | 31,081 | 0.01 |
| Jul | 21,472 | 1.80 | 0.44 | 74,204 | 0.01 |
| Aug | 11,905 | 1.50 | 0.50 | 34,815 | 0.01 |
| Sep | 12,538 | 1.60 | 0.50 | 46,663 | 0.01 |
| Oct | 5,436 | 1.36 | 0.47 | 21,045 | 0.01 |
| Nov | - | - | - | 0 | - |
| Dec | - | - | - | 1 | - |
| | | | | | |
| **Total** | **71,239** | **-** | **-** | **240,640** | **-** |
| **Avg** | **11,873** | **1.48** | **0.47** | **20,053** | **0.01** |
| **Max** | **21,472** | **1.80** | **0.50** | **74,204** | **0.02** |
| **Min** | **5,436** | **1.29** | **0.44** | **0** | **0.01** |

## Ferric Sulphate

| Month | Dosage as Iron (mg/L) | Total Consumption (L) |
|---|---|---|
| Jan | 7.04 | 425,387 |
| Feb | 7.67 | 300,231 |
| Mar | 6.35 | 299,848 |
| Apr | 6.99 | 386,973 |
| May | 9.24 | 428,070 |
| Jun | 8.47 | 379,086 |
| Jul | 7.68 | 428,490 |
| Aug | 10.86 | 429,534 |
| Sep | 11.00 | 427,335 |
| Oct | 9.79 | 389,068 |
| Nov | 9.62 | 371,757 |
| Dec | 8.51 | 384,930 |
| | | |
| **Total** | **-** | **4,650,708** |
| **Avg** | **8.60** | **387,559** |
| **Max** | **11.00** | **429,534** |
| **Min** | **6.35** | **299,848** |

## Liquid Waste Hauler

| Month | Dundas Sludge ($m^3$) | Septic Haulers ($m^3$) |
|---|---|---|
| Jan | 3,417 | 5,658 |
| Feb | 3,109 | 3,577 |
| Mar | 3,041 | 5,359 |
| Apr | 3,182 | 5,586 |
| May | 3,346 | 6,096 |
| Jun | 2,640 | 4,825 |
| Jul | 2,868 | 4,922 |
| Aug | 2,593 | 3,702 |
| Sep | 2,438 | 5,473 |
| Oct | 2,350 | 5,499 |
| Nov | 2,285 | 5,169 |
| Dec | 2,936 | 1,121 |
| | | |
| **Total** | **34,207** | **56,988** |
| **Avg** | **2,851** | **4,749** |
| **Max** | **3,417** | **6,096** |
| **Min** | **2,285** | **1,121** |

## 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) |
| 2 | 2024-01-09 | 195 | 310 | 115 | 129 | 41.0% | 58.4% |
| | 2024-01-10 | 115 | 172 | 65 | 113 | 43.5% | 34.3% |
| 8 | 2024-01-13 | 127 | 285 | 51 | 92 | 59.8% | 67.7% |
| 10 | 2024-01-24 | 237 | 358 | 85 | 84 | 64.1% | 76.5% |
| | 2024-01-25 | 196 | 165 | 66 | 103 | 66.2% | 37.4% |
| 15 | 2024-01-26 | 121 | 279 | 51 | 121 | 57.9% | 56.6% |
| | 2024-01-27 | 161 | 294 | 40 | 73 | 75.2% | 75.1% |
| 26 | 2024-03-14 | 318 | 715 | 117 | 78 | 63.2% | 89.1% |
| | 2024-03-15 | 175 | 369 | 55 | 102 | 68.6% | 72.4% |
| 32 | 2024-04-11 | 268 | 776 | 73 | 113 | 72.7% | 85.4% |
| | 2024-04-12 | 169 | 496 | 43 | 107 | 74.6% | 78.4% |
| | 2024-04-13 | 181 | 461 | 34 | 70 | 81.2% | 84.8% |
| 48 | 2024-05-27 | 202 | 666 | 64 | 127 | 68.2% | 80.9% |
| 51 | 2024-05-28 | 219 | 615 | 67 | 114 | 69.4% | 81.5% |
| | 2024-05-29 | 190 | 699 | 64 | 112 | 66.2% | 84.0% |
| 69 | 2024-07-10 | 258 | 634 | 87 | 141 | 66.3% | 77.7% |
| | 2024-07-11 | 131 | 344 | 51 | 111 | 61.1% | 67.7% |
| 76 | 2024-07-14 | 151 | 416 | 97 | 183 | 35.5% | 56.0% |
| | 2024-07-15 | 114 | 295 | 45 | 89 | 60.5% | 69.8% |
| 90 | 2024-07-16 | 75 | 171 | 32 | 75 | 57.0% | 56.3% |
| | 2024-07-17 | 107 | 228 | 34 | 66 | 68.2% | 71.1% |
| 95 | 2024-07-24 | 180 | 274 | 65 | 65 | 63.9% | 76.3% |
| 114 | 2024-09-23 | 182 | 426 | 86 | 99 | 52.6% | 76.8% |
| 116 | 2024-09-25 | 183 | 425 | 65 | 74 | 64.5% | 82.6% |
| 124 | 2024-10-29 | 195 | 455 | 94 | 118 | 51.8% | 74.1% |
| 136 | 2024-12-29 | 176 | 365 | 65 | 97 | 63.0% | 73.4% |
| | 2024-12-30 | 161 | 355 | 57 | 88 | 64.5% | 75.2% |
| | 2024-12-31 | 260 | 598 | 66 | 69 | 74.6% | 88.5% |
| | | | | | | | |
| **Annual Average** | | | | | | **63%** | **72%** |
| **Objective** | | | | | | **>30%** | **>50%** |

## Appendix B – Maintenance Activities

Historically, the City of Hamilton provides a table summarizing major maintenance activities with expenditures to the City's vertical infrastructure for a reporting year. However, on February 25, 2024, the City of Hamilton experienced a cybersecurity incident that led to the loss of all computerized maintenance management systems and the loss of the ability to provide these expenditures.

### Significant Works

System-wide Vibration Analysis

### Dundas Wastewater Treatment Plant

Dundas Plant Chlorination – Install New Hypo Pumps in "B" Plant

Dundas Plant Chlorination – Install New Piping for "B" Plant hypo injection system

### Hamilton Wastewater Pumping Stations

Install new level sensor and transmitter at Calvin Street Pumping Station

Replace Pump Rails at Beach Strip Pumping Stations

### Hamilton Wastewater Treatment Plant

Installed new Primary bypass flow meter at Woodward Primaries

High voltage system Preventative Maintenance

Transfer Switch battery chargers

Seimens H.V. Maintenance (Switchgear)

Schneider H.V. Maintenance (Switchgear)

Eaton H.V. Maintenance (EPC Switchgear/Relays)

Toromont Generator Preventative Maintenance (EPC)

C-Can H.V. Loop Batteries (EPC)

Headworks Bar Screen #1 overhaul

Headworks Conveyor screw liners replacement

Primary tanks #10, 11, 12 overhaul

Cake pump #2 overhaul

Centrifuge #2, 4 overhaul

Blower #2, 3 overhaul

## Appendix C – Calibration and Maintenance of Monitoring Equipment

### Calibration and Maintenance of Monitoring Equipment

| *Work Order | Description | Equipment | Equipment Description | Date Completed |
|---|---|---|---|---|
| - | I-6M-POD-VERIFICATION HCG14 LIT03 INTERCEPTOR LEVEL TRANSMITTER | 107330 | HCG14 LIT03 INTERCEPTOR LEVEL TRANSMITTER | 2024-03-23 |
| - | I-6M-POD-VERIFICATION HCG14 LIT02 INFLOW 2 LEVEL TRANSMITTER | 107329 | HCG14 LIT02 INFLOW 2 LEVEL TRANSMITTER | 2024-03-23 |
| - | I-6M-POD-VERIFICATION HCG14 LIT01 INFLOW 1 LEVEL TRANSMITTER | 107328 | HCG14 LIT01 INFLOW 1 LEVEL TRANSMITTER | 2024-03-23 |
| - | I-6M-POD-VERIFICATION HCG14 LAKE LEVEL TRANSMITTER | 107331 | HCG14 LIT04 LAKE LEVEL TRANSMITTER | 2024-03-23 |
| - | I-6M-POD-VERIFICATION HCG14 WSIN LEVEL TRANSMITTER | 116112 | HCG14, WSIN LEVEL TRANSMITTER | 2024-03-23 |
| - | I-6M-POD-VERIFICATION HCG14 UPSTREAM LEVEL TRANSMITTER | 116110 | HCG14, LEVEL TRANSMITTER, BURLINGTON/WELLINGTON UPSTREAM LEVEL | 2024-03-23 |
| - | I-WW-1Y-MOE-FLOW METER-CALIBRATION | 210989 | HCS05, CSO OVERFLOW TRANSMITTER | 2024-05-11 |
| - | I-WW-1Y-POD-LEVEL TRANSMITTER-CALIBRATION | 001583 | HC018, WET WELL LEVEL TRANSMITTER | **Cancelled |
| - | I-Y1-MOE- ANNUAL CALIBRATION HCS01 CHAMBER OUTLET LEVEL TRANSMITTER | 106165 | HCS01, OUTLET CHAMBER LEVEL TRANSMITTER | 2024-08-12 |
| - | I-WW-1Y-MOE-FLOW METER-CALIBRATION | 001664 | HCS04, OVERFLOW CHANNEL LEVEL | 2024-09-10 |
| - | I-6M-POD-VERIFICATION HCG14 LIT01 INFLOW 1 LEVEL TRANSMITTER | 107328 | HCG14 LIT01 INFLOW 1 LEVEL TRANSMITTER | 2024-03-23 |
| - | I-WW-1Y-POD-LEVEL TRANSMITTER-CALIBRATION | 107293 | HC019, WET WELL #1 LEVEL TRANSMITTER | 2024-07-30 |
| - | I-WW-1Y-POD-LEVEL TRANSMITTER-CALIBRATION | 107294 | HC019, WET WELL #2 LEVEL TRANSMITTER | 2024-07-30 |
| - | I-WW-1Y-MOE-FLOW METER-CALIBRATION | 004686 | HCS01, OVERFLOW TO CREEK TRANSMITTER | 2024-09-04 |
| - | I-WW-1Y-MOE-FLOW METER-CALIBRATION | 002839 | HCS08, CHANNEL OVERFLOW FLOW TRANSMITTER | 2024-09-10 |

* Work Order numbers were not available for the 2024 reporting year due to the cybersecurity incident
** Could not complete due to staffing resources

| *Work Order | Description | Equipment | Equipment Description | Date Completed |
|---|---|---|---|---|
| - | I-Y1-POD- HCS06 TANK #2 LEVEL TRANSMITTER CALIBRATION | 106156 | HCS06, CELL #2 LEVEL TRANSMITTER | 2024-09-06 |
| - | I-Y1-POD- HCS06 TANK #1 LEVEL TRANSMITTER CALIBRATION | 106155 | HCS06, CELL #1 LEVEL TRANSMITTER | 2024-09-06 |
| - | I-Y1-POD- HCS01 CELL #2 LEVEL TRANSMITTER CALIBRATION | 107067 | HCS01, CELL 2 LEVEL TRANSMITTER | 2024-10-02 |
| - | I-Y1-POD- HCS01 CELL #1 LEVEL TRANSMITTER CALIBRATION | 106174 | HCS01, CELL #1 LEVEL TRANSMITTER | 2024-10-02 |
| - | I-WW-1Y-MOE-FLOW METER-CALIBRATION | 107303 | HCS03, OVERFLOW CHANNEL FLOW TRANSMITTER | 2024-10-10 |
| - | I-WW-1Y-MOE-FLOW METER-CALIBRATION | 013158 | HCS09, OVER FLOW LEVEL TRANSMITTER | 2024-10-31 |
| - | I-Y1-POD- ANNUAL CALIBRATION TANK CELL LEVEL TRANSMITTER | 013157 | HCS09, TANK #2 LEVEL TRANSMITTER | 2024-12-09 |
| - | I-Y1-POD- ANNUAL CALIBRATION TANK CELL LEVEL TRANSMITTER | - | HCS08, WET WELL LEVEL TRANSMITTER | 2024-10-09 |
| - | I-Y1-POD- ANNUAL CALIBRATION TANK CELL LEVEL TRANSMITTER | 013891 | HCS08, CSO TANK LEVEL TRANSMITTER | 2024-10-09 |
| - | I-Y1-POD- ANNUAL CALIBRATION WET WELL LEVEL TRANSMITTER | 013156 | HCS09, TANK #1 LEVEL TRANSMITTER | 2024-12-09 |
| - | I-6M-POD-VERIFICATION HCG14 WSIN LEVEL TRANSMITTER | 116112 | HCG14, WSIN LEVEL TRANSMITTER | 2024-03-23 |
| - | I-6M-POD-VERIFICATION HCG14 LAKE LEVEL TRANSMITTER | 107331 | HCG14 LIT04 LAKE LEVEL TRANSMITTER | 2024-03-23 |
| - | I-6M-POD-VERIFICATION HCG14 LIT03 INTERCEPTOR LEVEL TRANSMITTER | 107330 | HCG14 LIT03 INTERCEPTOR LEVEL TRANSMITTER | 2024-03-23 |
| - | I-6M-POD-VERIFICATION HCG14 LIT02 INFLOW 2 LEVEL TRANSMITTER | 107329 | HCG14 LIT02 INFLOW 2 LEVEL TRANSMITTER | 2024-03-23 |
| - | I-6M-POD-VERIFICATION HCG14 UPSTREAM LEVEL TRANSMITTER | 116110 | HCG14, LEVEL TRANSMITTER, BURLINGTON/WELLINGTON UPSTREAM LEVEL | 2024-03-23 |

* Work Order numbers were not available for the 2024 reporting year due to the cybersecurity incident
** Could not complete due to staffing resources

| *Work Order | Description | Equipment | Equipment Description | Date Completed |
|---|---|---|---|---|
| - | I-WW-1Y-POD-LEVEL TRANSMITTER-CALIBRATION | 118171 | HC058, WET WELL LEVEL TRANSMITTER | 2024-10-08 |
| - | I-WW-1Y-POD-LEVEL TRANSMITTER-CALIBRATION | 118171 | HC058, WET WELL LEVEL TRANSMITTER | 2024-10-08 |
| - | I-Y1-POD- ANNUAL CALIBRATION WET WELL LEVEL TRANSMITTER | - | HCS05, wet well LEVEL TRANSMITTER | 2024-10-01 |
| - | I-Y1-POD- ANNUAL CALIBRATION WET WELL LEVEL TRANSMITTER | 010722 | HCS05, CSO TANK LEVEL TRANSMITTER | 2024-09-25 |
| - | I-Y1-POD- ANNUAL CALIBRATION WET WELL LEVEL TRANSMITTER | 118107 | HCS02, CELL #1 LEVEL TRANSMITTER (HYDROSTATIC) | **Cancelled |
| - | I-Y1-POD- ANNUAL CALIBRATION TANK CELL LEVEL TRANSMITTER | 108560 | HCS02, CELL #2 LEVEL TRANSMITTER (HYDROSTATIC) | **Cancelled |
| - | I-Y1-POD- ANNUAL VERIFICATION OVERFLOW LEVEL TRANSMITTER | 108561 | HCS02, OVERFLOW OUTLET CHANNEL LEVEL TRANSMITTER (HYDROSTATIC) | **Cancelled |
| - | I-Y1-POD- ANNUAL CALIBRATION TANK CELL LEVEL TRANSMITTER | 108565 | HCS04, TANK CELL #2 LEVEL TRANSMITTER (HYDROSTATIC) | 2024-08-12 |
| - | I-Y1-POD- ANNUAL CALIBRATION TANK CELL LEVEL TRANSMITTER | 108564 | HCS04, TANK CELL #1 LEVEL TRANSMITTER (HYDROSTATIC) | 2024-08-12 |
| - | I-Y1-POD- ANNUAL VERIFICATION CHAMBER LEVEL TRANSMITTER | 115222 | HCG03, UPSTREAM LEVEL TRANSMITTER | 2024-11-05 |
| - | I-Y1 ANNUAL CALIBRATION HCG08 WSIS LEVEL TRANSMITTER | 108231 | HCG08, WSIS LEVEL TRANSMITTER | **Cancelled |

* Work Order numbers were not available for the 2024 reporting year due to the cybersecurity incident
** Could not complete due to staffing resources

## Appendix D – Woodward Avenue WWTP Summary of Complaints

### 2024 Complaints at Woodward Avenue WWTP

| Date | Time Call Received | Reason for Complaint | Odour Control System In Service | Investigator Observations and Actions Taken |
|---|---|---|---|---|
| 2024-02-02 | 17:30 | Odour | Yes | On February 2, 2024, at 5:30 p.m., a resident reported odours coming from the Woodward Avenue WWTP. Investigation revealed smoke and noise from the South screw building, traced to the belts on Archimedes screw #5. The load on the screw was reduced, and a millwright was called to repair the pump. By 6:21 p.m., the resident confirmed the odour was no longer detectable, and a final check at 6:55 p.m. found no odours at the plant's south perimeter |
| 2024-05-13 | 1:00 | Noise | NA | On May 13, 2024, a noise complaint from a resident on Glow Ave. was reported to the Process Supervisor. The noise, ongoing for two weeks, was traced to a smoke alarm in the Main Pump Station penthouse, first identified on May 5. The maintenance team successfully silenced the alarm at 1:52 p.m. on May 13. Further information was being sought from the project engineer and the smoke alarm vendor. |
| 2024-06-12 | 20:30 | Odour | Yes | On June 12, 2024, odour complaints were reported around Woodward Ave/Glow Ave at 6:35 a.m., 3:30 p.m., and 5:30 p.m. At 8:30 p.m., the area around the Main Pump House and Synagro was inspected, but no sewage-like smell was detected. The south odour control system was switched to continuous operation, and odour control misting systems on the east side of the Main Pump House and the south side of Synagro were activated. All doors at Synagro were closed to mitigate any potential odours. |

## Appendix E – Dundas WWTP Operating Data Summary

### Plant Flows – Plant A

| Month | Monthly Volume ($m^3$/mth) | Percent of Flow (%) | Daily Average ($m^3$/day) | Daily Maximum ($m^3$/day) | Daily Minimum ($m^3$/day) |
|---|---|---|---|---|---|
| Jan | 151,071 | 36.1% | 4,873 | 5,720 | 4,304 |
| Feb | 128,386 | 35.6% | 4,585 | 5,300 | 4,124 |
| Mar | 134,284 | 34.9% | 4,332 | 5,075 | 2,394 |
| Apr | 134,227 | 35.0% | 4,474 | 5,071 | 3,834 |
| May | 141,625 | 36.7% | 4,569 | 4,886 | 3,821 |
| Jun | 130,834 | 32.4% | 4,361 | 4,979 | 3,932 |
| Jul | 144,419 | 35.0% | 4,659 | 5,741 | 3,699 |
| Aug | 137,386 | 35.6% | 4,432 | 5,106 | 3,732 |
| Sep | 126,852 | 38.1% | 4,228 | 5,043 | 3,027 |
| Oct | 154,645 | 43.0% | 4,989 | 5,686 | 4,673 |
| Nov | 129,530 | 39.5% | 4,318 | 4,853 | 3,872 |
| Dec | 133,714 | 39.8% | 4,313 | 5,941 | 3,923 |
| | | | | | |
| **Total** | **1,646,973** | **-** | **-** | **-** | **-** |
| **Avg** | **137,248** | **36.8%** | **4,511** | **-** | **-** |
| **Max** | **154,645** | **43.0%** | **4,989** | **5,941** | **-** |
| **Min** | **126,852** | **32.4%** | **4,228** | **-** | **2,394** |

### Plant Flows – Plant B

| Month | Monthly Volume ($m^3$/mth) | Percent of Flow (%) | Daily Average ($m^3$/day) | Daily Maximum ($m^3$/day) | Daily Minimum ($m^3$/day) |
|---|---|---|---|---|---|
| Jan | 267,777 | 63.9% | 8,638 | 11,114 | 7,018 |
| Feb | 219,381 | 60.9% | 7,835 | 9,988 | 6,487 |
| Mar | 250,828 | 65.1% | 8,091 | 10,444 | 4,447 |
| Apr | 249,280 | 65.0% | 8,309 | 10,523 | 6,640 |
| May | 244,598 | 63.3% | 7,890 | 10,896 | 6,288 |
| Jun | 273,488 | 67.6% | 9,116 | 10,310 | 8,075 |
| Jul | 268,340 | 65.0% | 8,656 | 12,952 | 5,397 |
| Aug | 248,359 | 64.4% | 8,012 | 9,077 | 7,252 |
| Sep | 206,060 | 61.9% | 6,869 | 9,039 | 5,813 |
| Oct | 205,345 | 57.0% | 6,624 | 8,526 | 5,947 |
| Nov | 198,521 | 60.5% | 6,617 | 8,286 | 5,688 |
| Dec | 208,989 | 62.2% | 6,742 | 9,023 | 5,542 |
| | | | | | |
| **Total** | **2,840,964** | **-** | **-** | **-** | **-** |
| **Avg** | **236,747** | **63.1%** | **7,783** | **-** | **-** |
| **Max** | **273,488** | **67.6%** | **9,116** | **12,952** | **-** |
| **Min** | **198,521** | **57.0%** | **6,617** | **-** | **4,447** |

## Combined Plant Flows

| Month | Monthly Volume ($m^3$/mth) | Daily Average ($m^3$/day) | Daily Maximum ($m^3$/day) | Daily Minimum ($m^3$/day) |
|---|---|---|---|---|
| Jan | 418,848 | 13,511 | 16,834 | 11,336 |
| Feb | 360,187 | 12,420 | 15,287 | 10,611 |
| Mar | 385,112 | 12,423 | 15,492 | 6,841 |
| Apr | 383,506 | 12,784 | 15,555 | 10,568 |
| May | 386,223 | 12,459 | 15,548 | 10,179 |
| Jun | 404,322 | 13,477 | 14,818 | 12,116 |
| Jul | 412,759 | 13,315 | 18,693 | 9,097 |
| Aug | 385,745 | 12,443 | 13,585 | 10,984 |
| Sep | 332,912 | 11,097 | 14,082 | 9,486 |
| Oct | 359,990 | 11,613 | 14,213 | 10,839 |
| Nov | 328,051 | 10,935 | 13,024 | 9,559 |
| Dec | 335,962 | 11,055 | 14,964 | 4,167 |
| | | | | |
| **Total** | **4,493,616** | **-** | **-** | **-** |
| **Avg** | **374,468** | **12,294** | **15,175** | **9,649** |
| **Max** | **418,848** | **13,511** | **18,693** | **12,116** |
| **Min** | **328,051** | **10,935** | **13,024** | **4,167** |

## Dundas Diversion Tank

| Month | Monthly Volume ($m^3$/mth) |
|---|---|
| Jan | 99,000 |
| Feb | 1,415 |
| Mar | 10,663 |
| Apr | 79,756 |
| May | 24,549 |
| Jun | 7,333 |
| Jul | 113,421 |
| Aug | 3,914 |
| Sep | 2,404 |
| Oct | 5,245 |
| Nov | 2,456 |
| Dec | 18,637 |
| | |
| **Total** | **368,793** |
| **Avg** | **30,733** |
| **Max** | **113,421** |
| **Min** | **1,415** |

## Redland Brow Landfill Leachate

| Month | Monthly Volume ($m^3$/mth) | Proportion of Plant Flow (%) |
|---|---|---|
| Jan | 4,084.00 | 0.98% |
| Feb | 3,344.00 | 0.93% |
| Mar | 3,664.00 | 0.95% |
| Apr | 4,639.00 | 1.21% |
| May | 5,982.00 | 1.55% |
| Jun | 4,475.00 | 1.11% |
| Jul | 7,509.00 | 1.82% |
| Aug | 8,427.00 | 2.18% |
| Sep | 6,765.00 | 2.03% |
| Oct | 5,663.00 | 1.57% |
| Nov | 3,145.00 | 0.96% |
| Dec | 2,744.00 | 0.82% |
| | | |
| **Total** | **60,441** | **-** |
| **Avg** | **5,037** | **1.34%** |
| **Max** | **8,427** | **2.18%** |
| **Min** | **2,744** | **0.82%** |

## Raw Influent – Concentrations

| Month | pH | TSS (mg/L) | tBOD (mg/L) | cBOD (mg/L) | TP (mg/L) | SP (mg/L) | TKN (mg/L) | $NH_3$ (mg/L) | COD (mg/L) | Temp $^oC$ |
|---|---|---|---|---|---|---|---|---|---|---|
| Jan | 7.63 | 131.00 | 130.00 | 90.20 | 3.24 | 1.52 | 22.46 | 16.46 | 236.80 | 12.39 |
| Feb | 7.55 | 228.75 | 132.75 | 115.25 | 4.18 | 1.79 | 28.68 | 21.50 | 302.75 | 11.39 |
| Mar | 7.54 | 116.00 | 112.00 | 92.25 | 3.42 | 1.63 | 26.18 | 20.00 | 249.00 | 11.78 |
| Apr | 7.57 | 146.50 | 106.50 | 90.00 | 3.27 | 1.32 | 24.63 | 17.23 | 287.25 | 12.12 |
| May | 7.55 | 161.20 | 126.00 | 120.40 | 4.10 | 1.76 | 29.04 | 21.52 | 340.60 | 14.69 |
| Jun | 7.47 | 130.25 | 92.75 | 88.50 | 3.39 | 1.42 | 24.40 | 21.60 | 243.00 | 16.83 |
| Jul | 7.49 | 120.68 | 90.40 | 85.40 | 3.07 | 1.48 | 20.50 | 15.75 | 267.80 | 17.53 |
| Aug | 7.43 | 118.38 | 95.25 | 92.75 | 3.64 | 1.87 | 25.25 | 19.93 | 304.25 | 19.23 |
| Sep | 7.44 | 185.75 | 132.50 | 113.75 | 4.79 | 2.35 | 32.75 | 23.08 | 363.50 | 20.01 |
| Oct | 7.56 | 166.60 | 127.60 | 107.00 | 4.40 | 1.99 | 30.78 | 21.98 | 375.40 | 19.13 |
| Nov | 7.53 | 241.25 | 138.25 | 118.00 | 4.38 | 1.99 | 29.83 | 23.23 | 338.75 | 17.55 |
| Dec | 7.53 | 134.50 | 118.75 | 95.00 | 3.52 | 1.42 | 26.70 | 19.50 | 251.50 | 14.59 |
| | | | | | | | | | | |
| **Avg** | **7.52** | **156.74** | **116.90** | **100.71** | **3.78** | **1.71** | **26.77** | **20.15** | **296.72** | **15.60** |
| **Max** | **7.63** | **241.25** | **138.25** | **120.40** | **4.79** | **2.35** | **32.75** | **23.23** | **375.40** | **20.01** |
| **Min** | **7.43** | **116.00** | **90.40** | **85.40** | **3.07** | **1.32** | **20.50** | **15.75** | **236.80** | **11.39** |

## Raw Influent – Daily Loadings

| Month | TSS (kg/day) | tBOD (kg/day) | cBOD (kg/day) | TP (kg/day) | SP (kg/day) | TKN (kg/day) | $NH_3$ (kg/day) |
|---|---|---|---|---|---|---|---|
| Jan | 1,770 | 1,756 | 1,219 | 44 | 21 | 303 | 222 |
| Feb | 2,841 | 1,649 | 1,431 | 52 | 22 | 356 | 267 |
| Mar | 1,441 | 1,391 | 1,146 | 42 | 20 | 325 | 248 |
| Apr | 1,873 | 1,361 | 1,151 | 42 | 17 | 315 | 220 |
| May | 2,008 | 1,570 | 1,500 | 51 | 22 | 362 | 268 |
| Jun | 1,755 | 1,250 | 1,193 | 46 | 19 | 329 | 291 |
| Jul | 1,607 | 1,204 | 1,137 | 41 | 20 | 273 | 210 |
| Aug | 1,473 | 1,185 | 1,154 | 45 | 23 | 314 | 248 |
| Sep | 2,061 | 1,470 | 1,262 | 53 | 26 | 363 | 256 |
| Oct | 1,935 | 1,482 | 1,243 | 51 | 23 | 357 | 255 |
| Nov | 2,638 | 1,512 | 1,290 | 48 | 22 | 326 | 254 |
| Dec | 1,487 | 1,313 | 1,050 | 39 | 16 | 295 | 216 |
| | | | | | | | |
| **Avg** | **1,907** | **1,429** | **1,231** | **46** | **21** | **327** | **246** |
| **Max** | **2,841** | **1,756** | **1,500** | **53** | **26** | **363** | **291** |
| **Min** | **1,441** | **1,185** | **1,050** | **39** | **16** | **273** | **210** |

## Primary Effluent – Concentrations for Plant A

| Month | TSS (mg/L) | cBOD (mg/L) | TKN (mg/L) | $NH_3$ (mg/L) |
|---|---|---|---|---|
| Jan | 98.32 | 49.60 | 17.38 | 10.98 |
| Feb | 111.50 | 68.75 | 24.33 | 15.00 |
| Mar | 133.38 | 64.50 | 23.95 | 14.58 |
| Apr | 156.88 | 62.50 | 26.70 | 13.50 |
| May | 61.32 | 39.00 | 20.98 | 15.21 |
| Jun | 49.75 | 32.50 | 19.08 | 16.90 |
| Jul | 46.82 | 27.60 | 14.12 | 12.02 |
| Aug | 37.18 | 27.25 | 16.45 | 14.50 |
| Sep | 53.83 | 39.00 | 20.93 | 17.23 |
| Oct | 172.90 | 80.00 | 30.88 | 20.70 |
| Nov | 111.25 | 61.50 | 28.53 | 23.20 |
| Dec | 61.63 | 43.25 | 20.75 | 16.13 |
| | | | | |
| **Avg** | **91.23** | **49.62** | **22.01** | **15.83** |
| **Max** | **172.9** | **80.0** | **30.88** | **23.2** |
| **Min** | **37.2** | **27.3** | **14.12** | **11.0** |

## Primary Effluent – Concentrations for Plant B

| Month | TSS (mg/L) | cBOD (mg/L) | TKN (mg/L) | $NH_3$ (mg/L) |
|---|---|---|---|---|
| Jan | 55.1 | 31.6 | 14.9 | 10.7 |
| Feb | 86.7 | 48.5 | 22.0 | 14.4 |
| Mar | 28.5 | 32.0 | 17.6 | 13.6 |
| Apr | 19.2 | 20.5 | 17.3 | 12.1 |
| May | 21.8 | 24.0 | 18.8 | 14.5 |
| Jun | 20.4 | 21.5 | 18.8 | 17.4 |
| Jul | 20.3 | 17.0 | 14.3 | 11.8 |
| Aug | 24.7 | 24.5 | 15.8 | 14.3 |
| Sep | 32.0 | 29.5 | 20.3 | 16.9 |
| Oct | 51.5 | 37.6 | 22.7 | 19.0 |
| Nov | 41.1 | 34.8 | 23.1 | 19.8 |
| Dec | 55.7 | 42.5 | 22.6 | 18.6 |
| | | | | |
| **Avg** | **38.1** | **30.3** | **19.00** | **15.2** |
| **Max** | **86.7** | **48.5** | **23.10** | **19.8** |
| **Min** | **19.2** | **17.0** | **14.28** | **10.7** |

## Primary Effluent – Daily Loadings for Plant A

| MONTH | TSS (kg/day) | cBOD (kg/day) | TKN (kg/day) | $NH_3$ (kg/day) |
|---|---|---|---|---|
| Jan | 479 | 242 | 85 | 54 |
| Feb | 511 | 315 | 112 | 69 |
| Mar | 578 | 279 | 104 | 63 |
| Apr | 702 | 280 | 119 | 60 |
| May | 280 | 178 | 96 | 69 |
| Jun | 217 | 142 | 83 | 74 |
| Jul | 218 | 129 | 66 | 56 |
| Aug | 165 | 121 | 73 | 64 |
| Sep | 228 | 165 | 89 | 73 |
| Oct | 863 | 399 | 154 | 103 |
| Nov | 480 | 266 | 123 | 100 |
| Dec | 266 | 187 | 90 | 70 |
| | | | | |
| **Avg** | **416** | **225** | **99** | **71** |
| **Max** | **863** | **399** | **154** | **103** |
| **Min** | **165** | **121** | **66** | **54** |

## Primary Effluent – Daily Loadings for Plant B

| Month | TSS (kg/day) | cBOD (kg/day) | TKN (kg/day) | $NH_3$ (kg/day) |
|---|---|---|---|---|
| Jan | 476 | 273 | 129 | 92 |
| Feb | 679 | 380 | 173 | 113 |
| Mar | 231 | 259 | 143 | 110 |
| Apr | 160 | 170 | 144 | 100 |
| May | 172 | 189 | 148 | 115 |
| Jun | 186 | 196 | 171 | 158 |
| Jul | 176 | 147 | 124 | 102 |
| Aug | 198 | 196 | 126 | 115 |
| Sep | 220 | 203 | 139 | 116 |
| Oct | 341 | 249 | 150 | 126 |
| Nov | 272 | 230 | 153 | 131 |
| Dec | 375 | 287 | 152 | 125 |
| | | | | |
| **Avg** | **290** | **232** | **146** | **117** |
| **Max** | **679** | **380** | **173** | **158** |
| **Min** | **160** | **147** | **124** | **92** |

## Raw Sludge Pumped*

| Month | Plant A ($m^3$/mth) | Plant B ($m^3$/mth) | Total ($m^3$/mth) |
|---|---|---|---|
| Jan | 1,195 | 2,390 | 3,584 |
| Feb | 1,022 | 2,045 | 3,067 |
| Mar | 1,014 | 2,027 | 3,041 |
| Apr | 1,074 | 2,147 | 3,221 |
| May | 1,061 | 2,122 | 3,183 |
| Jun | 922 | 1,844 | 2,765 |
| Jul | 942 | 1,884 | 2,826 |
| Aug | 837 | 1,673 | 2,510 |
| Sep | 865 | 1,730 | 2,595 |
| Oct | 784 | 1,568 | 2,352 |
| Nov | 709 | 1,418 | 2,126 |
| Dec | 979 | 1,958 | 2,936 |
| | | | |
| **Total** | **11,402** | **22,805** | **34,207** |
| **Avg** | **950** | **1,900** | **2,851** |
| **Max** | **1,195** | **2,390** | **3,584** |
| **Min** | **709** | **1,418** | **2,126** |

* Estimates based on pump runtime and capacity

## Raw Sludge Solids Content

| Month | Plant A Total Solids (%) | Plant A Volatile Solids (%) | Plant B Total Solids (%) | Plant B Volatile Solids (%) |
|---|---|---|---|---|
| Jan | 2.10 | 72.64 | 1.66 | 71.12 |
| Feb | 2.60 | 73.23 | 1.90 | 72.65 |
| Mar | 1.35 | 69.30 | 1.33 | 72.98 |
| Apr | 2.35 | 68.50 | 1.88 | 70.23 |
| May | 1.88 | 69.34 | 2.12 | 71.84 |
| Jun | 1.78 | 68.95 | 2.70 | 73.60 |
| Jul | 3.00 | 69.58 | 1.54 | 64.98 |
| Aug | 2.60 | 67.85 | 2.53 | 70.18 |
| Sep | 2.73 | 73.38 | 2.83 | 76.08 |
| Oct | 2.38 | 74.04 | 2.58 | 75.98 |
| Nov | 2.70 | 75.23 | 2.53 | 77.25 |
| Dec | 3.50 | 75.05 | 2.75 | 75.93 |
| | | | | |
| **Avg** | **2.41** | **71.42** | **2.20** | **72.74** |
| **Max** | **3.50** | **75.23** | **2.83** | **77.25** |
| **Min** | **1.35** | **67.85** | **1.33** | **64.98** |

## Sludge Hauled to Woodward

| Month | Volume (Tonnes/mth) | Anticipated 2025 Volume (Tonnes/mth) |
|---|---|---|
| Jan | 3,584 | 3,167 |
| Feb | 3,067 | 3,167 |
| Mar | 3,041 | 3,167 |
| Apr | 3,221 | 3,167 |
| May | 3,183 | 3,167 |
| Jun | 2,765 | 3,167 |
| Jul | 2,826 | 3,167 |
| Aug | 2,510 | 3,167 |
| Sep | 2,595 | 3,167 |
| Oct | 2,352 | 3,167 |
| Nov | 2,126 | 3,167 |
| Dec | 2,936 | 3,167 |
| | | |
| **Total** | **34,207** | **38,004** |
| **Avg** | **2,851** | **3,167** |
| **Max** | **3,584** | **3,167** |
| **Min** | **2,126** | **3,167** |

Aeration – Plant A

| Month | MLSS (mg/L) | MLVSS (mg/L) | SVI (mL/g) | F/M (Ratio) | SRT (Days) |
|---|---|---|---|---|---|
| Jan | 1,640.00 | 1,193.00 | 123.72 | 0.12 | 7.37 |
| Feb | 1,705.00 | 1,255.00 | 118.94 | 0.15 | 6.06 |
| Mar | 1,640.00 | 1,227.50 | 79.27 | 0.14 | 7.68 |
| Apr | 2,182.50 | 1,552.50 | 79.73 | 0.11 | 6.25 |
| May | 1,620.00 | 1,172.40 | 97.16 | 0.09 | 10.50 |
| Jun | 1,537.50 | 1,077.00 | 115.97 | 0.08 | 11.64 |
| Jul | 1,075.60 | 736.40 | 89.35 | 0.10 | 28.30 |
| Aug | 1,795.00 | 1,264.00 | 88.97 | 0.06 | 8.43 |
| Sep | 1,622.50 | 1,125.75 | 91.65 | 0.09 | 10.61 |
| Oct | 1,616.00 | 1,159.40 | 100.43 | 0.21 | 6.36 |
| Nov | 1,552.50 | 1,122.00 | 102.42 | 0.14 | 6.08 |
| Dec | 1,705.00 | 1,265.00 | 73.43 | 0.09 | 7.40 |
| | | | | | |
| **Avg** | **1,640.97** | **1,179.16** | **96.75** | **0.11** | **9.72** |
| **Max** | **2,182.50** | **1,552.50** | **123.72** | **0.21** | **28.30** |
| **Min** | **1,075.60** | **736.40** | **73.43** | **0.06** | **6.06** |

Aeration – Plant A

| Month | MLSS (mg/L) | MLVSS (mg/L) | SVI (mL/g) | F/M (Ratio) | SRT (Days) |
|---|---|---|---|---|---|
| Jan | 1,852.00 | 1,426.00 | 336.50 | 0.06 | 29.34 |
| Feb | 1,897.50 | 1,492.50 | 439.05 | 0.08 | 24.86 |
| Mar | 1,875.00 | 1,475.00 | 482.40 | 0.05 | 27.23 |
| Apr | 1,772.50 | 1,402.50 | 514.92 | 0.04 | 24.53 |
| May | 1,702.00 | 1,342.00 | 523.09 | 0.04 | 29.50 |
| Jun | 1,687.50 | 1,305.00 | 532.74 | 0.05 | 24.24 |
| Jul | 1,596.00 | 1,202.00 | 547.12 | 0.04 | 50.61 |
| Aug | 2,052.50 | 1,442.50 | 450.43 | 0.04 | 31.92 |
| Sep | 2,085.00 | 1,530.00 | 430.36 | 0.04 | 32.35 |
| Oct | 1,824.00 | 1,434.00 | 397.75 | 0.05 | 29.81 |
| Nov | 1,930.00 | 1,452.50 | 404.66 | 0.05 | 25.41 |
| Dec | 1,717.50 | 1,340.00 | 510.86 | 0.07 | 22.99 |
| **Avg** | **1,832.63** | **1,403.67** | **464.16** | **0.05** | **29.40** |
| **Max** | **2,085.00** | **1,530.00** | **547.12** | **0.08** | **50.61** |
| **Min** | **1,596.00** | **1,202.00** | **336.50** | **0.04** | **22.99** |

## Final Effluent Concentrations

| Month | pH | Alkalinity (mg/L) | TSS (mg/L) | cBOD (mg/L) | TP (mg/L) | SP (mg/L) | TKN (mg/L) | $NH_3$ (mg/L) | $NO_3$ (mg/L) | $NO_2$ (mg/L) | E Coli (CFU/100ml) | Chlorine Residual (mg/L) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Jan | 7.33 | 118.60 | 0.84 | 1.00 | 0.050 | 0.040 | 0.30 | 0.03 | 15.16 | 0.22 | - | - |
| Feb | 7.16 | 93.25 | 0.88 | 1.00 | 0.060 | 0.050 | 0.53 | 0.02 | 17.65 | 0.10 | - | - |
| Mar | 7.17 | 105.00 | 0.80 | 1.25 | 0.070 | 0.050 | 0.45 | 0.13 | 16.53 | 0.10 | - | - |
| Apr | 7.27 | 109.75 | 0.78 | 1.00 | 0.070 | 0.050 | 0.55 | 0.03 | 15.85 | 0.10 | - | - |
| May | 7.10 | 93.80 | 1.08 | 1.40 | 0.080 | 0.050 | 0.46 | 0.05 | 15.38 | 0.10 | 2 | 0.02 |
| Jun | 7.09 | 87.75 | 1.43 | 2.75 | 0.070 | 0.040 | 0.58 | 0.05 | 15.58 | 0.10 | 1 | 0.01 |
| Jul | 7.42 | 132.00 | 1.06 | 2.40 | 0.090 | 0.060 | 1.30 | 0.92 | 11.47 | 0.26 | 1 | 0.01 |
| Aug | 7.35 | 105.50 | 0.95 | 1.50 | 0.130 | 0.090 | 0.53 | 0.05 | 14.40 | 0.11 | 1 | 0.01 |
| Sep | 7.25 | 78.75 | 1.40 | 1.00 | 0.140 | 0.120 | 0.33 | 0.04 | 15.83 | 0.14 | 1 | 0.02 |
| Oct | 7.15 | 73.60 | 0.92 | 1.40 | 0.120 | 0.090 | 0.74 | 0.11 | 16.34 | 0.13 | 24 | 0.01 |
| Nov | 7.22 | 79.25 | 0.75 | 1.25 | 0.120 | 0.100 | 0.68 | 0.03 | 18.88 | 0.14 | - | - |
| Dec | 7.23 | 90.25 | 0.75 | 1.00 | 0.110 | 0.100 | 0.70 | 0.14 | 17.98 | 0.13 | - | - |
| | | | | | | | | | | | | |
| **Avg** | **7.23** | **97.29** | **0.97** | **1.41** | **0.093** | **0.070** | **0.60** | **0.13** | **15.92** | **0.14** | **5** | **0.01** |
| **Max** | **7.42** | **132.00** | **1.43** | **2.75** | **0.140** | **0.120** | **1.30** | **0.92** | **18.88** | **0.26** | **24** | **0.02** |
| **Min** | **7.09** | **73.60** | **0.75** | **1.00** | **0.050** | **0.040** | **0.30** | **0.02** | **11.47** | **0.10** | **1** | **0.01** |

## Final Effluent Loadings

| Month | TSS (kg/day) | cBOD (kg/day) | TP (kg/day) | SP (kg/day) | TKN (kg/day) | $NH_3$ (kg/day) | $NO_3$ (kg/day) | $NO_2$ (kg/day) |
|---|---|---|---|---|---|---|---|---|
| Jan | 11.3 | 13.5 | 0.68 | 0.54 | 4.05 | 0.41 | 204.83 | 2.97 |
| Feb | 10.9 | 12.4 | 0.75 | 0.62 | 6.58 | 0.25 | 219.22 | 1.24 |
| Mar | 9.9 | 15.5 | 0.87 | 0.62 | 5.59 | 1.61 | 205.35 | 1.24 |
| Apr | 10.0 | 12.8 | 0.89 | 0.64 | 7.03 | 0.38 | 202.62 | 1.28 |
| May | 13.5 | 17.4 | 1.00 | 0.62 | 5.73 | 0.62 | 191.62 | 1.25 |
| Jun | 19.3 | 37.1 | 0.94 | 0.54 | 7.82 | 0.67 | 209.98 | 1.35 |
| Jul | 14.1 | 32.0 | 1.20 | 0.80 | 17.31 | 12.25 | 152.72 | 3.46 |
| Aug | 11.8 | 18.7 | 1.62 | 1.12 | 6.59 | 0.62 | 179.18 | 1.37 |
| Sep | 15.5 | 11.1 | 1.55 | 1.33 | 3.66 | 0.44 | 175.67 | 1.55 |
| Oct | 10.7 | 16.3 | 1.39 | 1.05 | 8.59 | 1.28 | 189.75 | 1.51 |
| Nov | 8.2 | 13.7 | 1.31 | 1.09 | 7.44 | 0.33 | 206.45 | 1.53 |
| Dec | 8.3 | 11.1 | 1.22 | 1.11 | 7.74 | 1.55 | 198.77 | 1.44 |
| | | | | | | | | |
| **Avg** | **12.0** | **17.6** | **1.12** | **0.84** | **7.3** | **1.7** | **194.7** | **1.68** |
| **Max** | **19.3** | **37.1** | **1.62** | **1.33** | **17.3** | **12.2** | **219.2** | **3.46** |
| **Min** | **8.2** | **11.1** | **0.68** | **0.54** | **3.7** | **0.2** | **152.7** | **1.24** |

## Removal Efficiency

| Month | TSS (%) | cBOD (%) | TP (%) | SP (%) | TKN (%) | $NH_3$ (%) |
|---|---|---|---|---|---|---|
| Jan | 99.4% | 98.9% | 98.5% | 97.4% | 98.7% | 99.8% |
| Feb | 99.6% | 99.1% | 98.6% | 97.2% | 98.2% | 99.9% |
| Mar | 99.3% | 98.6% | 98.0% | 96.9% | 98.3% | 99.4% |
| Apr | 99.5% | 98.9% | 97.9% | 96.2% | 97.8% | 99.8% |
| May | 99.3% | 98.8% | 98.0% | 97.2% | 98.4% | 99.8% |
| Jun | 98.9% | 96.9% | 97.9% | 97.2% | 97.6% | 99.8% |
| Jul | 99.1% | 97.2% | 97.1% | 95.9% | 93.7% | 94.2% |
| Aug | 99.2% | 98.4% | 96.4% | 95.2% | 97.9% | 99.7% |
| Sep | 99.2% | 99.1% | 97.1% | 94.9% | 99.0% | 99.8% |
| Oct | 99.4% | 98.7% | 97.3% | 95.5% | 97.6% | 99.5% |
| Nov | 99.7% | 98.9% | 97.3% | 95.0% | 97.7% | 99.9% |
| Dec | 99.4% | 98.9% | 96.9% | 93.0% | 97.4% | 99.3% |
| | | | | | | |
| **Avg** | **99.3%** | **98.5%** | **97.6%** | **96.0%** | **97.7%** | **99.2%** |
| **Max** | **99.7%** | **99.1%** | **98.6%** | **97.4%** | **99.0%** | **99.9%** |
| **Min** | **98.9%** | **96.9%** | **96.4%** | **93.0%** | **93.7%** | **94.2%** |

## Liquid Stream Contaminate Removal

| Month | TSS (kg/mth) | cBOD (kg/mth) | TP (kg/mth) | SP (kg/mth) | TKN (kg/mth) | $NH_3$ (kg/mth) |
|---|---|---|---|---|---|---|
| Jan | 54,517 | 37,361 | 1,336 | 620 | 9,282 | 6,882 |
| Feb | 79,246 | 39,732 | 1,433 | 605 | 9,790 | 7,470 |
| Mar | 44,365 | 35,045 | 1,290 | 608 | 9,909 | 7,652 |
| Apr | 55,885 | 34,132 | 1,227 | 487 | 9,235 | 6,596 |
| May | 61,842 | 45,961 | 1,553 | 660 | 11,038 | 8,292 |
| Jun | 52,085 | 34,671 | 1,342 | 558 | 9,631 | 8,713 |
| Jul | 49,374 | 34,259 | 1,230 | 586 | 7,925 | 6,121 |
| Aug | 45,298 | 35,199 | 1,354 | 687 | 9,536 | 7,669 |
| Sep | 61,372 | 37,536 | 1,548 | 742 | 10,793 | 7,670 |
| Oct | 59,643 | 38,015 | 1,541 | 684 | 10,814 | 7,873 |
| Nov | 78,896 | 38,300 | 1,397 | 620 | 9,563 | 7,611 |
| Dec | 45,837 | 32,214 | 1,169 | 452 | 8,910 | 6,635 |
| | | | | | | |
| **Total** | **688,359** | **442,425** | **16,420** | **7,310** | **116,425** | **89,184** |
| **Avg** | **57,363** | **36,869** | **1,368** | **609** | **9,702** | **7,432** |
| **Max** | **79,246** | **45,961** | **1,553** | **742** | **11,038** | **8,713** |
| **Min** | **44,365** | **32,214** | **1,169** | **452** | **7,925** | **6,121** |

## Chemical Addition – Disinfection

| Month | Sodium Hypochlorite (kg/mth) | Dosage (mg/L) | Residual Level (mg/L) |
|---|---|---|---|
| Jan | - | - | - |
| Feb | - | - | - |
| Mar | - | - | - |
| Apr | - | - | - |
| May | 21,046 | 3.5 | 7.21 |
| Jun | 14,323 | 3.5 | 4.96 |
| Jul | 13,512 | 3.5 | 4.69 |
| Aug | 13,816 | 3.5 | 5.03 |
| Sep | 11,545 | 3.5 | 4.89 |
| Oct | 13,728 | 3.8 | 5.35 |
| Nov | - | - | - |
| Dec | - | - | - |
| | | | |
| **Total** | **87,970** | **-** | **-** |
| **Avg** | **14,661.6** | **3.5** | **5.36** |
| **Max** | **21,046** | **3.8** | **7.21** |
| **Min** | **11,545** | **3.5** | **4.69** |

Sodium hypochlorite added from May 1 to October 31

## Chemical Addition – Dechlorination

| Month | Sodium Bisulfite ($m^3$/mth) | Outfall Residual (mg/L) |
|---|---|---|
| Jan | - | - |
| Feb | - | - |
| Mar | - | - |
| Apr | - | - |
| May | 1,699 | 0.02 |
| Jun | 4,351 | 0.01 |
| Jul | 4,332 | 0.01 |
| Aug | 4,128 | 0.01 |
| Sep | 3,043 | 0.02 |
| Oct | 6,008 | 0.01 |
| Nov | - | - |
| Dec | - | - |
| | | |
| **Total** | **23,560.7** | |
| **Avg** | **3,926.8** | **0.01** |
| **Max** | **6,007.8** | **0.02** |
| **Min** | **1,699.1** | **0.01** |

## Chemical Addition – Ferric Sulphate

| Month | Ferric Sulphate (L/mth) | Dosage (mg/L) |
|---|---|---|
| Jan | 26,945 | 11.84 |
| Feb | 24,874 | 12.68 |
| Mar | 24,417 | 11.72 |
| Apr | 26,400 | 12.77 |
| May | 29,007 | 13.82 |
| Jun | 31,181 | 14.16 |
| Jul | 29,348 | 13.28 |
| Aug | 21,980 | 10.46 |
| Sep | 21,441 | 11.82 |
| Oct | 23,522 | 12.06 |
| Nov | 18,513 | 10.31 |
| Dec | 16,972 | 9.49 |
| | | |
| **Total** | **294,602** | **-** |
| **Avg** | **24,550** | **12.03** |
| **Max** | **31,181** | **14.16** |
| **Min** | **16,972** | **9.49** |

## 2024 Redland Brow Landfill Sampling Results

| Parameter List (Dundas WWTP C of A) | RDL | Units | 1st Quarter | 2nd Quarter | 3rd Quarter | 4th Quarter |
|---|---|---|---|---|---|---|
| cBOD | 2 | mg/L | 14 | 15 | 18 | <20 |
| COD | 4 | mg/L | 100 | 94 | 140 | 370 |
| Dissolved Organic Carbon | 0.2 | mg/L | 34 | 28 | 46 | 89 |
| Oil and Grease | 0.5 | mg/L | 1.6 | <0.5 | 1.6 | 1.0 |
| Total Dissolved Solids | 10 | mg/L | 1,120 | 915 | 1,410 | 1,680 |
| Total Kjeldahl Nitrogen | 0.5 | mg/L | 17 | 12 | 18 | 28 |
| Phosphorus | 0.004 | mg/L | 0.057 | 0.12 | 0.066 | 0.17 |
| Total Suspended Solids | 10 | mg/L | 140 | 300 | 38 | 68 |
| Alkalinity (as $CaCO_3$) | 1 | mg/L | 270 | 200 | 460 | 620 |
| Conductivity | 1 | µmho/cm | 2,000 | 1,500 | 400 | 2,900 |
| pH (20°C) | - | - | 7.99 | 8.48 | 8.23 | 8.62 |
| Aluminium | 0.005 | mg/L | 0.011 | 0.032 | 0.0087 | 0.0011 |
| Ammonia (as N) | 0.25 | mg/L | 15 | 12 | 12 | 27 |
| Unionized Ammonia | - | mg/L | 0.172 | 1.757 | 0.248 | 2.426 |
| Arsenic | 0.001 | mg/L | 0.013 | 0.012 | 0.0097 | 0.0017 |
| Beryllium | 0.0005 | mg/L | <0.0004 | <0.0004 | <0.0004 | <0.0004 |
| Boron | 0.01 | mg/L | 2.3 | 1.9 | 3 | 3.8 |
| Cadmium | 0.0001 | mg/L | <0.00009 | <0.00009 | <0.00009 | <0.00009 |
| Calcium | 0.2 | mg/L | 100 | 130 | 120 | 41 |
| Chloride | 2 | mg/L | 290 | 180 | 320 | 400 |
| Chromium | 0.005 | mg/L | <0.0005 | <0.0005 | <0.0005 | 0.0067 |
| Copper | 0.001 | mg/L | 0.0014 | 0.0031 | 0.0033 | 0.0012 |
| Sulphide | 0.02 | mg/L | 0.27 | 0.14 | 0.075 | 0.25 |
| Iron | 0.1 | mg/L | 0.18 | 0.8 | 0.23 | 0.12 |
| Lead | 0.0005 | mg/L | 0.0016 | 0.027 | 0.00099 | 0.00061 |
| Magnesium | 0.05 | mg/L | 20 | 22 | 32 | 19 |
| Nitrate (as N) | 0.1 | mg/L | <0.1 | 0.15 | 0.19 | <0.1 |
| Nitrite (as N) | 0.01 | mg/L | 0.103 | 0.17 | 0.139 | 0.078 |
| Phenols | 0.002 | mg/L | 0.033 | 0.049 | 0.067 | 0.099 |
| Potassium | 0.2 | mg/L | 48 | 48 | 54 | 52 |
| Selenium | 0.002 | mg/L | <0.002 | <0.002 | <0.002 | <0.002 |
| Silver | 0.0001 | mg/L | <0.00009 | <0.00009 | <0.00009 | <0.00009 |
| Sulphate (as $SO_4$) | 1 | mg/L | 260 | 240 | 250 | 210 |
| Zinc | 0.005 | mg/L | 0.0059 | 0.021 | 0.058 | 0.021 |

1. 1st Quarter sample collected on February 28, 2024.
2. 2nd Quarter sample collected on April 24, 2024
3. 3rd Quarter sample collected on August 21, 2024
4. 4th Quarter sample collected on November 26, 2024
5. Unionized Ammonia calculated from field pH, Field Temperature and total ammonia results

## Appendix F – CSO Tank Analytical Data

For statistical purposes, average, minimum and maximum results are reported with 2 decimal places for E. Coli & inorganics, and 4 decimal places for metals.

When the result is <MDL (Method Detection Limit), the MDL is used.

## Eastwood Effluent*

| Eastwood Effluent | Aluminum (mg/L) | Arsenic (mg/L) | Barium (mg/L) | Beryllium (mg/L) | Bismuth (mg/L) | Cadmium (mg/L) | Chromium (mg/L) | Cobalt (mg/L) | Copper (mg/L) | Iron (mg/L) |
|---|---|---|---|---|---|---|---|---|---|---|
| 2024-01-10 10:20:00 | 0.609 | <0.020 | 0.019 | <0.0001 | <0.020 | <0.0005 | 0.004 | <0.0009 | 0.016 | 1.06 |
| 2024-07-17 08:31:00 | 0.347 | <0.020 | 0.017 | <0.0001 | <0.020 | <0.0005 | 0.001 | <0.0009 | 0.012 | 0.635 |
| 2024-07-17 17:13:00 | 0.162 | <0.020 | 0.016 | <0.0001 | <0.020 | <0.0005 | <0.001 | <0.0009 | 0.009 | 0.316 |
| | | | | | | | | | | |
| **Avg** | **0.3727** | **0.0200** | **0.0173** | **0.0001** | **0.0200** | **0.0005** | **0.0020** | **0.0009** | **0.0123** | **0.6703** |
| **Max** | **0.6090** | **0.0200** | **0.0190** | **0.0001** | **0.0200** | **0.0005** | **0.0040** | **0.0009** | **0.0160** | **1.0600** |
| **Min** | **0.1620** | **0.0200** | **0.0160** | **0.0001** | **0.0200** | **0.0005** | **0.0010** | **0.0009** | **0.0090** | **0.3160** |

| Eastwood Effluent | Lead (mg/L) | Manganese (mg/L) | Molybdenum (mg/L) | Nickel (mg/L) | Phosphorus Total (mg/L) | Selenium (mg/L) | Silver (mg/L) | Strontium (mg/L) | Thallium (mg/L) | Tin (mg/L) |
|---|---|---|---|---|---|---|---|---|---|---|
| 2024-01-10 10:20:00 | <0.020 | 0.076 | <0.005 | <0.005 | 0.591 | <0.020 | <0.005 | 0.153 | <0.010 | <0.020 |
| 2024-07-17 08:31:00 | <0.020 | 0.106 | <0.005 | <0.005 | 0.600 | <0.020 | <0.005 | 0.147 | <0.010 | <0.020 |
| 2024-07-17 17:13:00 | <0.020 | 0.083 | <0.005 | <0.005 | 0.529 | <0.020 | <0.005 | 0.178 | <0.010 | <0.020 |
| | | | | | | | | | | |
| **Avg** | **0.0200** | **0.0883** | **0.0050** | **0.0050** | **0.5733** | **0.0200** | **0.0050** | **0.1593** | **0.0100** | **0.0200** |
| **Max** | **0.0200** | **0.1060** | **0.0050** | **0.0050** | **0.6000** | **0.0200** | **0.0050** | **0.1780** | **0.0100** | **0.0200** |
| **Min** | **0.0200** | **0.0760** | **0.0050** | **0.0050** | **0.5290** | **0.0200** | **0.0050** | **0.1470** | **0.0100** | **0.0200** |

| Eastwood Effluent | Titanium (mg/L) | Vanadium (mg/L) | Zinc (mg/L) | Ammonia + Ammonium as N (mg/L) | cBiochemical Oxygen Demand (mg/L) | Escherichia coli (MPN/100mL) | Nitrate as N (mg/L) | Total Kjeldahl Nitrogen as N (mg/L) | Total Suspended Solids (mg/L) |
|---|---|---|---|---|---|---|---|---|---|
| 2024-01-10 10:20:00 | 0.029 | 0.003 | 0.086 | 2.13 | 17 | 510,000 | 0.63 | 4.1 | 29.7 |
| 2024-07-17 08:31:00 | 0.010 | 0.002 | 0.053 | 2.43 | 10 | 326,000 | <0.2 | 3.4 | 20.0 |
| 2024-07-17 17:13:00 | 0.004 | <0.002 | 0.033 | 3.02 | 6 | 980,000 | <0.2 | 4.3 | 11.0 |
| | | | | | | | | | |
| **Avg** | **0.0143** | **0.0023** | **0.0573** | **2.53** | **11.00** | **605,333.33** | **0.34** | **3.93** | **20.23** |
| **Max** | **0.0290** | **0.0030** | **0.0860** | **3.02** | **17.00** | **980,000.00** | **0.63** | **4.30** | **29.70** |
| **Min** | **0.0040** | **0.0020** | **0.0330** | **2.13** | **6.00** | **326,000.00** | **0.20** | **3.40** | **11.00** |

*Eastwood CSO Tank Raw Influent sampling could not be completed due to autosampler malfunction

## Royal Effluent*

| Royal Effluent* | Aluminum (mg/L) | Arsenic (mg/L) | Barium (mg/L) | Beryllium (mg/L) | Bismuth (mg/L) | Cadmium (mg/L) | Chromium (mg/L) | Cobalt (mg/L) | Copper (mg/L) | Iron (mg/L) |
|---|---|---|---|---|---|---|---|---|---|---|
| 2024-01-26 09:49:00 | 10.4 | <0.020 | 0.072 | 0.0004 | <0.020 | <0.0005 | 0.013 | 0.0060 | 0.024 | 12.8 |
| 2024-05-29 03:07:00 | 8.84 | <0.020 | 0.065 | 0.0002 | <0.020 | <0.0005 | 0.011 | 0.0034 | 0.016 | 7.36 |
| 2024-07-14 18:00:00 | 3.00 | <0.020 | 0.030 | <0.0001 | <0.020 | <0.0005 | 0.006 | 0.0016 | 0.015 | 4.19 |
| 2024-07-17 02:23:00 | 17.5 | <0.020 | 0.113 | 0.0006 | <0.020 | <0.0005 | 0.022 | 0.0092 | 0.034 | 21.5 |
| | | | | | | | | | | |
| **Avg** | **9.9350** | **0.0200** | **0.0700** | **0.0003** | **0.0200** | **0.0005** | **0.0130** | **0.0051** | **0.0223** | **11.4625** |
| **Max** | **17.5000** | **0.0200** | **0.1130** | **0.0006** | **0.0200** | **0.0005** | **0.0220** | **0.0092** | **0.0340** | **21.5000** |
| **Min** | **3.0000** | **0.0200** | **0.0300** | **0.0001** | **0.0200** | **0.0005** | **0.0060** | **0.0016** | **0.0150** | **4.1900** |

| Royal Effluent | Lead (mg/L) | Manganese (mg/L) | Molybdenum (mg/L) | Nickel (mg/L) | Phosphorus Total (mg/L) | Selenium (mg/L) | Silver (mg/L) | Strontium (mg/L) | Thallium (mg/L) | Tin (mg/L) |
|---|---|---|---|---|---|---|---|---|---|---|
| 2024-01-26 09:49:00 | <0.020 | 0.288 | <0.005 | 0.014 | 0.497 | <0.020 | <0.005 | 0.286 | <0.010 | <0.020 |
| 2024-05-29 03:07:00 | <0.020 | 0.194 | <0.005 | 0.010 | 0.360 | <0.020 | <0.005 | 0.297 | <0.010 | <0.020 |
| 2024-07-14 18:00:00 | <0.020 | 0.189 | <0.005 | 0.007 | 0.493 | <0.020 | <0.005 | 0.127 | <0.010 | <0.020 |
| 2024-07-17 02:23:00 | <0.020 | 0.511 | <0.005 | 0.024 | 0.675 | <0.020 | <0.005 | 0.359 | <0.010 | <0.020 |
| | | | | | | | | | | |
| **Avg** | **0.0200** | **0.2955** | **0.0050** | **0.0138** | **0.5063** | **0.0200** | **0.0050** | **0.2673** | **0.0100** | **0.0200** |
| **Max** | **0.0200** | **0.5110** | **0.0050** | **0.0240** | **0.6750** | **0.0200** | **0.0050** | **0.3590** | **0.0100** | **0.0200** |
| **Min** | **0.0200** | **0.1890** | **0.0050** | **0.0070** | **0.3600** | **0.0200** | **0.0050** | **0.1270** | **0.0100** | **0.0200** |

| Royal Effluent | Titanium (mg/L) | Vanadium (mg/L) | Zinc (mg/L) | Ammonia + Ammonium as N (mg/L) | cBiochemical Oxygen Demand mg/L | Escherichia coli (MPN/100mL) | Nitrate as N (mg/L) | Total Kjeldahl Nitrogen as N (mg/L) | Total Suspended Solids (mg/L) |
|---|---|---|---|---|---|---|---|---|---|
| 2024-01-26 09:49:00 | 0.143 | 0.019 | 0.115 | 0.17 | <6 | 3,5000 | 0.52 | 1.5 | 271 |
| 2024-05-29 03:07:00 | 0.359 | 0.015 | 0.114 | 0.39 | <6 | 120,000 | 0.37 | 1.6 | 159 |
| 2024-07-14 18:00:00 | 0.054 | 0.006 | 0.110 | 0.77 | 9 | 220,000 | 0.34 | 2.0 | 104 |
| 2024-07-17 02:23:00 | 0.243 | 0.031 | 0.167 | 0.20 | <6 | 127,000 | 0.64 | 1.7 | 480 |
| | | | | | | | | | |
| **Avg** | **0.1998** | **0.0178** | **0.1265** | **0.38** | **6.75** | **125,500.00** | **0.47** | **1.70** | **253.50** |
| **Max** | **0.3590** | **0.0310** | **0.1670** | **0.77** | **9.00** | **220,000.00** | **0.64** | **2.00** | **480.00** |
| **Min** | **0.0540** | **0.0060** | **0.1100** | **0.17** | **6.00** | **35,000.00** | **0.34** | **1.50** | **104.00** |

*Royal CSO Tank Raw Influent sampling could not be completed due to autosampler malfunction

Notes:
2024-01-26 09:49:00 - TKN QC recovery was high; actual result may be lower.

## Strachan Influent 24 Hour

| Strachan Influent 24 Hour | Aluminum (mg/L) | Arsenic (mg/L) | Barium (mg/L) | Beryllium (mg/L) | Bismuth (mg/L) | Cadmium (mg/L) | Chromium (mg/L) | Cobalt (mg/L) | Copper (mg/L) |
|---|---|---|---|---|---|---|---|---|---|
| 24 Hr 2024-10-30 04:12:00 | 0.166 | <0.020 | 0.106 | <0.0001 | <0.020 | <0.0005 | 0.001 | <0.0009 | 0.003 |
| Composite 2024-01-11 03:09:00 | 0.022 | <0.020 | 0.102 | <0.0001 | <0.020 | <0.0005 | <0.001 | <0.0009 | 0.004 |
| Composite 2024-01-26 04:45:00 | 7.23 | <0.020 | 0.092 | 0.0002 | <0.020 | <0.0005 | 0.032 | 0.0053 | 0.064 |
| Composite 2024-05-28 08:41:00 | 0.260 | <0.020 | 0.076 | <0.0001 | <0.020 | <0.0005 | 0.002 | <0.0009 | 0.004 |
| Composite 2024-05-28 22:54:00 | 3.19 | <0.020 | 0.048 | <0.0001 | <0.020 | <0.0005 | 0.098 | 0.0020 | 0.031 |
| Composite 2024-06-17 21:47:00 | 0.108 | <0.020 | 0.049 | <0.0001 | <0.020 | <0.0005 | <0.001 | <0.0009 | <0.002 |
| Composite 2024-06-20 09:45:00 | 0.230 | <0.020 | 0.068 | <0.0001 | <0.020 | <0.0005 | 0.002 | <0.0009 | 0.005 |
| Composite 2024-07-11 09:39:00 | 0.625 | <0.020 | 0.026 | <0.0001 | <0.020 | <0.0005 | 0.004 | 0.0010 | 0.010 |
| Composite 2024-07-15 03:25:00 | 0.427 | <0.020 | 0.092 | <0.0001 | <0.020 | <0.0005 | <0.001 | <0.0009 | 0.004 |
| Composite 2024-07-17 04:45:00 | 1.35 | <0.020 | 0.038 | <0.0001 | <0.020 | <0.0005 | 0.005 | 0.0010 | 0.012 |
| Composite 2024-09-23 05:16:00 | 0.819 | <0.020 | 0.016 | <0.0001 | <0.020 | <0.0005 | 0.003 | <0.0009 | 0.008 |
| Composite 2024-09-25 10:45:00 | 0.986 | <0.020 | 0.077 | <0.0001 | <0.020 | <0.0005 | 0.004 | <0.0009 | 0.006 |
| Composite 2024-10-14 11:31:00 | 0.044 | <0.020 | 0.084 | <0.0001 | <0.020 | <0.0005 | <0.001 | <0.0009 | <0.002 |
| Composite 2024-11-21 06:59:00 | 0.116 | <0.020 | 0.097 | <0.0001 | <0.020 | <0.0005 | <0.001 | <0.0009 | 0.003 |
| Composite 2024-12-29 19:15:00 | 1.05 | <0.020 | 0.035 | <0.0001 | <0.020 | <0.0005 | 0.004 | <0.0009 | 0.013 |
| **Avg** | **1.1082** | **0.0200** | **0.0671** | **0.0001** | **0.0200** | **0.0005** | **0.0107** | **0.0013** | **0.0114** |
| **Max** | **7.2300** | **0.0200** | **0.1060** | **0.0002** | **0.0200** | **0.0005** | **0.0980** | **0.0053** | **0.0640** |
| **Min** | **0.0220** | **0.0200** | **0.0160** | **0.0001** | **0.0200** | **0.0005** | **0.0010** | **0.0009** | **0.0020** |

| Strachan Influent 24 Hour | Iron (mg/L) | Lead (mg/L) | Manganese (mg/L) | Molybdenum (mg/L) | Nickel (mg/L) | Phosphorus Total (mg/L) | Selenium (mg/L) | Silver (mg/L) |
|---|---|---|---|---|---|---|---|---|
| 24 Hr 2024-10-30 04:12:00 | 1.28 | <0.020 | 0.384 | 0.009 | <0.005 | 0.247 | <0.020 | <0.005 |
| Composite 2024-01-11 03:09:00 | 0.804 | <0.020 | 0.323 | <0.005 | <0.005 | 0.138 | <0.020 | <0.005 |
| Composite 2024-01-26 04:45:00 | 12.7 | 0.079 | 0.698 | <0.005 | 0.015 | 1.20 | <0.020 | <0.005 |
| Composite 2024-05-28 08:41:00 | 1.15 | <0.020 | 0.281 | <0.005 | <0.005 | 0.204 | <0.020 | <0.005 |
| Composite 2024-05-28 22:54:00 | 7.08 | 0.034 | 0.320 | <0.005 | 0.030 | 0.693 | <0.020 | <0.005 |
| Composite 2024-06-17 21:47:00 | 0.787 | <0.020 | 0.224 | <0.005 | <0.005 | 0.524 | <0.020 | <0.005 |
| Composite 2024-06-20 09:45:00 | 1.34 | <0.020 | 0.318 | <0.005 | <0.005 | 0.320 | <0.020 | <0.005 |
| Composite 2024-07-11 09:39:00 | 1.26 | <0.020 | 0.115 | <0.005 | <0.005 | 0.265 | <0.020 | <0.005 |
| Composite 2024-07-15 03:25:00 | 1.43 | <0.020 | 0.282 | <0.005 | <0.005 | 0.202 | <0.020 | <0.005 |
| Composite 2024-07-17 04:45:00 | 2.40 | <0.020 | 0.156 | <0.005 | <0.005 | 0.293 | <0.020 | <0.005 |
| Composite 2024-09-23 05:16:00 | 1.15 | <0.020 | 0.066 | <0.005 | <0.005 | 0.280 | <0.020 | <0.005 |
| Composite 2024-09-25 10:45:00 | 1.81 | <0.020 | 0.262 | <0.005 | <0.005 | 0.274 | <0.020 | <0.005 |
| Composite 2024-10-14 11:31:00 | 0.980 | <0.020 | 0.290 | <0.005 | <0.005 | 0.276 | <0.020 | <0.005 |
| Composite 2024-11-21 06:59:00 | 1.28 | <0.020 | 0.338 | <0.005 | <0.005 | 0.235 | <0.020 | <0.005 |
| Composite 2024-12-29 19:15:00 | 2.21 | <0.020 | 0.130 | <0.005 | <0.005 | 0.409 | <0.020 | <0.005 |
| | | | | | | | | |
| **Avg** | **2.5107** | **0.0249** | **0.2791** | **0.0053** | **0.0073** | **0.3707** | **0.0200** | **0.0050** |
| **Max** | **12.7000** | **0.0790** | **0.6980** | **0.0090** | **0.0300** | **1.2000** | **0.0200** | **0.0050** |
| **Min** | **0.7870** | **0.0200** | **0.0660** | **0.0050** | **0.0050** | **0.1380** | **0.0200** | **0.0050** |

| Strachan Influent 24 Hour | Strontium (mg/L) | Thallium (mg/L) | Tin (mg/L) | Titanium (mg/L) | Vanadium (mg/L) | Zinc (mg/L) |
|---|---|---|---|---|---|---|
| 24 Hr 2024-10-30 04:12:00 | 2.08 | <0.010 | <0.020 | 0.006 | 0.002 | 0.022 |
| Composite 2024-01-11 03:09:00 | 1.88 | <0.010 | <0.020 | <0.001 | <0.002 | 0.022 |
| Composite 2024-01-26 04:45:00 | 0.250 | <0.010 | <0.020 | 0.325 | 0.022 | 0.331 |
| Composite 2024-05-28 08:41:00 | 1.29 | <0.010 | <0.020 | 0.010 | <0.002 | 0.030 |
| Composite 2024-05-28 22:54:00 | 0.183 | <0.010 | <0.020 | 0.132 | 0.009 | 0.141 |
| Composite 2024-06-17 21:47:00 | 0.752 | <0.010 | <0.020 | 0.005 | <0.002 | 0.025 |
| Composite 2024-06-20 09:45:00 | 1.43 | <0.010 | <0.020 | 0.010 | <0.002 | 0.040 |
| Composite 2024-07-11 09:39:00 | 0.322 | <0.010 | <0.020 | 0.025 | 0.003 | 0.058 |
| Composite 2024-07-15 03:25:00 | 1.91 | <0.010 | <0.020 | 0.014 | <0.002 | 0.041 |
| Composite 2024-07-17 04:45:00 | 0.550 | <0.010 | <0.020 | 0.037 | 0.004 | 0.074 |
| Composite 2024-09-23 05:16:00 | 0.089 | <0.010 | <0.020 | 0.028 | 0.002 | 0.044 |
| Composite 2024-09-25 10:45:00 | 1.77 | <0.010 | <0.020 | 0.040 | 0.003 | 0.060 |
| Composite 2024-10-14 11:31:00 | 1.76 | <0.010 | <0.020 | 0.001 | <0.002 | 0.043 |
| Composite 2024-11-21 06:59:00 | 2.13 | <0.010 | <0.020 | 0.004 | <0.002 | 0.015 |
| Composite 2024-12-29 19:15:00 | 0.275 | <0.010 | <0.020 | 0.033 | 0.003 | 0.071 |
| | | | | | | |
| **Avg** | **1.1114** | **0.0100** | **0.0200** | **0.0447** | **0.0041** | **0.0678** |
| **Max** | **2.1300** | **0.0100** | **0.0200** | **0.3250** | **0.0220** | **0.3310** |
| **Min** | **0.0890** | **0.0100** | **0.0200** | **0.0010** | **0.0020** | **0.0150** |

| Strachan Influent 24 Hour | Ammonia + Ammonium as N (mg/L) | cBiochemical Oxygen Demand (mg/L) | Escherichia coli (MPN/100mL) | Nitrate as N (mg/L) | Total Kjeldahl Nitrogen as N (mg/L) | Total Suspended Solids (mg/L) |
|---|---|---|---|---|---|---|
| 24 Hr 2024-10-30 04:12:00 | 1.28 | <5 | 13,000 | 1.17 | 2.0 | 13.9 |
| Composite 2024-01-11 03:09:00 | 0.97 | <6 | 57,900 | 1.15 | 1.1 | 2.4 |
| Composite 2024-01-26 04:45:00 | 0.33 | 16 | 86,600 | 0.24 | 5.1 | 429 |
| Composite 2024-05-28 08:41:00 | 0.92 | <6 | 100,000 | 0.92 | 1.9 | 15.0 |
| Composite 2024-05-28 22:54:00 | 0.08 | 11 | 40,000 | 0.23 | 2.1 | 173 |
| Composite 2024-06-17 21:47:00 | 1.00 | 6 | 54,800 | 1.08 | 2.0 | 11.5 |
| Composite 2024-06-20 09:45:00 | 1.25 | 6 | 70,000 | 1.16 | 1.8 | 16.0 |
| Composite 2024-07-11 09:39:00 | 0.53 | 6 | 210,000 | 0.39 | 1.6 | 33.3 |
| Composite 2024-07-15 03:25:00 | 0.50 | <6 | 60,000 | 1.46 | 1.0 | 26.0 |
| Composite 2024-07-17 04:45:00 | 0.32 | <6 | 88,000 | 0.63 | 1.4 | 63.0 |
| Composite 2024-09-23 05:16:00 | 0.37 | <5 | 190,000 | 0.36 | 1.1 | 27.0 |
| Composite 2024-09-25 10:45:00 | 1.06 | <5 | 90,000 | 1.02 | 1.2 | 28.0 |
| Composite 2024-10-14 11:31:00 | 0.99 | <5 | 19,900 | 1.05 | 1.7 | 7.5 |
| Composite 2024-11-21 06:59:00 | 1.10 | <5 | 40,000 | 1.24 | 1.7 | 6.6 |
| Composite 2024-12-29 19:15:00 | 0.46 | 7 | 24,200 | 0.33 | 2.0 | 55.6 |
| | | | | | | |
| **Avg** | **0.74** | **6.73** | **76,293.33** | **0.83** | **1.85** | **60.52** |
| **Max** | **1.28** | **16.00** | **210,000.00** | **1.46** | **5.10** | **429.00** |
| **Min** | **0.08** | **5.00** | **13,000.00** | **0.23** | **1.00** | **2.40** |

Note: 2024-01-26 04:45:00 - TKN QC recovery was high; actual result may be lower.

## Main and King Effluent

| Main and King Effluent | Aluminum (mg/L) | Arsenic (mg/L) | Barium (mg/L) | Beryllium (mg/L) | Bismuth (mg/L) | Cadmium (mg/L) | Chromium (mg/L) | Cobalt (mg/L) | Copper mg/L | Iron (mg/L) | Lead (mg/L) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 2024-01-10 12:58:00 | 0.814 | <0.020 | 0.047 | <0.0001 | <0.020 | <0.0005 | 0.003 | <0.0009 | 0.016 | 1.76 | <0.020 |
| 2024-05-28 21:35:00 | 0.159 | <0.020 | 0.087 | <0.0001 | <0.020 | <0.0005 | <0.001 | <0.0009 | 0.007 | 1.59 | <0.020 |
| 2024-05-29 05:51:00 | 1.05 | <0.020 | 0.026 | <0.0001 | <0.020 | <0.0005 | 0.004 | <0.0009 | 0.026 | 1.56 | <0.020 |
| 2024-07-11 08:07:00 | 0.669 | <0.020 | 0.041 | <0.0001 | <0.020 | <0.0005 | 0.002 | <0.0009 | 0.016 | 1.78 | <0.020 |
| 2024-07-15 17:51:00 | 0.505 | <0.020 | 0.043 | <0.0001 | <0.020 | <0.0005 | 0.001 | <0.0009 | 0.011 | 0.823 | <0.020 |
| 2024-07-16 16:33:00 | 0.228 | <0.020 | 0.019 | <0.0001 | <0.020 | <0.0005 | <0.001 | <0.0009 | 0.004 | 0.451 | <0.020 |
| 2024-07-24 11:54:00 | 2.48 | <0.020 | 0.169 | <0.0001 | <0.020 | <0.0005 | 0.004 | 0.0014 | 0.014 | 8.41 | <0.020 |
| | | | | | | | | | | | |
| **Avg** | **0.8436** | **0.0200** | **0.0617** | **0.0001** | **0.0200** | **0.0005** | **0.0023** | **0.0010** | **0.0134** | **2.3391** | **0.0200** |
| **Max** | **2.4800** | **0.0200** | **0.1690** | **0.0001** | **0.0200** | **0.0005** | **0.0040** | **0.0014** | **0.0260** | **8.4100** | **0.0200** |
| **Min** | **0.1590** | **0.0200** | **0.0190** | **0.0001** | **0.0200** | **0.0005** | **0.0010** | **0.0009** | **0.0040** | **0.4510** | **0.0200** |

| Main and King Effluent | Manganese (mg/L) | Molybdenum (mg/L) | Nickel (mg/L) | Phosphorus Total (mg/L) | Selenium (mg/L) | Silver (mg/L) | Strontium (mg/L) | Thallium (mg/L) | Tin (mg/L) | Titanium (mg/L) |
|---|---|---|---|---|---|---|---|---|---|---|
| 2024-01-10 12:58:00 | 0.069 | <0.005 | <0.005 | 0.672 | <0.020 | <0.005 | 0.575 | <0.010 | <0.020 | 0.034 |
| 2024-05-28 21:35:00 | 0.018 | <0.005 | <0.005 | 0.350 | <0.020 | <0.005 | 0.772 | <0.010 | <0.020 | 0.005 |
| 2024-05-29 05:51:00 | 0.091 | <0.005 | <0.005 | 0.841 | <0.020 | <0.005 | 0.243 | <0.010 | <0.020 | 0.048 |
| 2024-07-11 08:07:00 | 0.059 | <0.005 | <0.005 | 0.887 | <0.020 | <0.005 | 0.383 | <0.010 | <0.020 | 0.036 |
| 2024-07-15 17:51:00 | 0.032 | <0.005 | <0.005 | 0.654 | <0.020 | <0.005 | 0.677 | <0.010 | <0.020 | 0.019 |
| 2024-07-16 16:33:00 | 0.077 | <0.005 | <0.005 | 0.454 | <0.020 | <0.005 | 0.248 | 0.010 | <0.020 | 0.006 |
| 2024-07-24 11:54:00 | 0.154 | <0.005 | <0.005 | 0.751 | <0.020 | <0.005 | 1.98 | <0.010 | <0.020 | 0.092 |
| | | | | | | | | | | |
| **Avg** | **0.0714** | **0.0050** | **0.0050** | **0.6584** | **0.0200** | **0.0050** | **0.6969** | **0.0100** | **0.0200** | **0.0343** |
| **Max** | **0.1540** | **0.0050** | **0.0050** | **0.8870** | **0.0200** | **0.0050** | **1.9800** | **0.0100** | **0.0200** | **0.0920** |
| **Min** | **0.0180** | **0.0050** | **0.0050** | **0.3500** | **0.0200** | **0.0050** | **0.2430** | **0.0100** | **0.0200** | **0.0050** |

| Main and King Effluent | Vanadium (mg/L) | Zinc (mg/L) | Ammonia + Ammonium as N (mg/L) | cBiochemical Oxygen Demand (mg/L) | Escherichia coli (MPN/100mL) | Fecal Coliform (CFU/100mL) | Nitrate as N (mg/L) | Total Kjeldahl Nitrogen as N (mg/L) | Total Suspended Solids (mg/L) |
|---|---|---|---|---|---|---|---|---|---|
| 2024-01-10 12:58:00 | 0.003 | 0.065 | 2.75 | 14 | 710,000 | 84,000 | 1.01 | 4.6 | 39.2 |
| 2024-05-28 21:35:00 | <0.002 | 0.028 | 2.86 | <6 | 100,000 | 17,600 | 1.11 | 4.8 | 9.0 |
| 2024-05-29 05:51:00 | 0.003 | 0.069 | 2.65 | 18 | 17,300 | 56,000 | 0.23 | 5.1 | 61.3 |
| 2024-07-11 08:07:00 | 0.002 | 0.068 | 2.78 | 16 | 1,480,000 | 20,800 | 0.45 | 5.3 | 42.0 |
| 2024-07-15 17:51:00 | <0.002 | 0.058 | 0.50 | <6 | 88,000 | NDOGFC | 0.53 | 3.7 | 27.0 |
| 2024-07-16 16:33:00 | <0.002 | 0.026 | 2.28 | <6 | 28,000 | NDOGFC | <0.2 | 2.8 | 10.0 |
| 2024-07-24 11:54:00 | 0.005 | 0.109 | 0.19 | 8 | 30,000 | NDOGFC | 1.40 | 1.7 | 105 |
| | | | | | | | | | |
| **Avg** | **0.0027** | **0.0604** | **2.00** | **10.57** | **35,0471.43** | **25,485.71** | **0.70** | **4.00** | **41.93** |
| **Max** | **0.0050** | **0.1090** | **2.86** | **18.00** | **1,480,000.00** | **84,000.00** | **1.40** | **5.30** | **105.00** |
| **Min** | **0.0020** | **0.0260** | **0.19** | **6.00** | **17,300.00** | **0.00** | **0.20** | **1.70** | **9.00** |

Notes:

2024-05-28 21:35:00 - Sample was past the 48h holding time for fecal coliform analysis when received at the Subcontract lab; result may be unreliable.

2024-05-29 05:51:00 - Sample was past the 48h holding time for fecal coliform analysis when received at the Subcontract lab; result may be unreliable.

2024-07-15 17:51:00 - NDOGFC: No data, plate overgrown with target bacteria - Fecal coliforms. Sample was past the 48h holding time for fecal coliform analysis when received at the Subcontract lab; result may be unreliable.

2024-07-16 16:33:00 - NDOGFC: No data, plate overgrown with target bacteria - Fecal coliforms.

2024-07-24 11:54:00 - Sample was past the 48h holding time for fecal coliform analysis when received at the Subcontract lab; result may be unreliable. NDOGFC = No Data: Overgrown with Fecal Coliforms.