# MOUNT BRYDGES WASTEWATER TREATMENT FACILITY

# 2023 ANNUAL REPORT

**as per ECA # 5933-C37KWJ Section 12.(4)**
**Works # 110001441**

STRATHROY-CARADOC
URBAN OPPORTUNITY – RURAL HOSPITALITY

## 1. Influent Monitoring and Compliance Summary (Certificate of Approval 12. 4. (a))

The annual influent laboratory results for carbonaceous biochemical oxygen demand, total suspended solids, total phosphorus and total kjeldahl nitrogen can be found in Appendix A. The incoming sewage characteristics are similar to the previous year.

## 2. Effluent Monitoring and Compliance Summary (Certificate of Approval 12. 4. (b))

The Mt Brydges WWTF has a design rated capacity of 825 $m^3$/day, with a peak flow rate of 1,650 $m^3$/day. During 2023, the annual average daily flow was 331 $m^3$/day, which is 40% of the design rated capacity for the treatment facility. The maximum daily flow was recorded at 602 $m^3$/day, which is 36% of the peak flow rate. Flow rates are higher than the previous year.

The summary of the annual effluent laboratory results for carbonaceous biochemical oxygen demand, total suspended solids, total phosphorus, nitrogen, DO and pH is found in Appendix A. The comparison of these results to the compliance criteria can be found in Table 1 below. Parameters that did not meet effluent limits were reported to the MECP.

**Table 1**
**Mt Brydges WWTF – Effluent Quality Summary**

| Description | Range of Monthly Averages mg/L | Effluent Limits mg/L | # Months Limits Achieved/ # Months |
|---|---|---|---|
| CBOD5 (non-freezing period April-Nov) | 2.50 - 4.00 | 10 | 8/8 |
| CBOD5 (freeze period Dec - Mar) | 2.00 - 5.80 | 15 | 4/4 |
| Suspended Solids (non-freezing period April-Nov) | 7.00 - 17.75 | 10 | 2/8 |
| Suspended Solids (freeze period Dec - Mar) | 5.5 - 12.75 | 15 | 4/4 |
| Total Phosphorus (non-freezing period April-Nov) | 0.20 - 0.52 | 0.5 | 7/8 |
| Total Phosphorus (freeze period Dec - Mar) | 0.08 - 0.32 | 1 | 4/4 |

| | | | |
|---|---|---|---|
| Total Ammonia Nitrogen (non-freezing period April-Nov) | 1.75 - 9.75 | 3 | 1/8 |
| Total Ammonia Nitrogen (freeze period Dec-March) | 6.90 - 14.18 | 5 | 0/4 |
| E.Coli (counts/100mL) | 0.2 - 9.3 | 200 (geometric mean) | 8/8 |
| DO (min) | 6 | >5 | 12/12 |
| pH | 6.2-7.80 | 6.0 - 9.5 | 12/12 |

## 3. Operating Issues and Corrective Actions (Certificate of Approval 12. 4. (c))

During the year, there were several exceedances of the Environmental Compliance Approval final effluent limits. These exceedances were reported to the MECP.

In 2022, Council had approved a budget of $5 million dollars to upgrade the Mt Brydges WWTF. In the 2023 capital budget there is an additional $1,000,000 added to the capital budget. In May 2022, the Municipality submitted an ECA application for an interim solution of adding equalization to the Mt Brydges WWTF in an attempt to improve the final effluent results. The Municipality received a new ECA for the implementation of the interim solution December 20th 2023. The work for the interim solution has been tendered for construction and is anticipated to be awarded in March of 2024.

The Municipality has also submitted an ECA (January 2023) for the conversion to an extended aeration process, which includes the addition of a headworks structure and the necessary equipment at the wastewater facility. It is anticipated that the tendering for construction of these upgrades will occur in late 2024.

The Mt Brydges WWTF did experience mechanical failures during the year which included the media supports and bearings. These have all been repaired.

## 4. Maintenance Summary (Certificate of Approval 12. 4. (d))

The operators performed the routine maintenance throughout the year. In addition to the routine maintenance, which includes greasing and oiling, a detailed list is included in Appendix B.

## 5. Quality Assurance/Quality Control (Certificate of Approval 12. 4. (e))

On a monthly basis, the operator collected and submitted influent samples to SGS Canada Inc for total suspended solids, biochemical oxygen demand, TKN and total phosphorus analysis.

On a weekly basis, the operator collected effluent samples for analysis by SGS Canada Inc for total suspended solids, carbonaceous biochemical oxygen demand, total phosphorus, ammonia and E. Coli analyses. The operator performed analysis for pH, DO and temperature in-house.

In-house laboratory testing also included monitoring of reactive phosphorus, total suspended solids, and ammonia in the effluent.

## 6. Calibration/Maintenance Summary (Certificate of Approval 12. 4. (f))

Flow meter calibrations were carried out by SCG in February 2023. The laboratory, SGS Canada Inc was used for all the required analytical chemical and biological testing of influent and effluent from the wastewater treatment facility.

## 7. Effluent Objectives (Certificate of Approval 12. 4. (g))

The Municipality attempted to meet the objectives in the Environmental Compliance Approval (ECA) through regular testing and monitoring of the treatment system.

As mentioned in item #3 the Municipality has submitted two ECA applications and have dedicated capital funding for upgrades. The first ECA is for an interim solution is the conversion of an existing tank to act as a equalization tank with the associated necessary equipment. It is expected that the tender for construction of these upgrades will be awarded in March of 2024.

The second ECA application is for a medium term solution that involves the changing of the process from an RBC to an extended aeration. The associated ECA application for the medium term solution was submitted in January 2023. This upgrade will include the transition to an extended aeration treatment along with other process improvements.

The advantages moving towards extended aeration include:

- More robust system
- Remove materials before they enter the treatment process (headworks facility)
- Superior handling of uneven plant flows
- Recovers much quicker to process upsets
- Staff's confidence in the process
- Proven treatment method

The upgrade to an extended aeration process will involve the following:

- Addition of a headworks/blower building
- Facility updates to meet current building/fire codes
- Reuse of existing tanks by removing the RBCs
- Installation of diffused air system
- Chemical system upgrades
- SCADA upgrades
- Waste activate sludge tank
- Site upgrades to accommodate the changes including lab facilities

In the table below, monitoring data and analytical results are compared to the Effluent Objectives as listed in the ECA.

**Table 2**
**Mt Brydges WWTF – Effluent Objective Summary**

| Description | Range of Monthly Averages mg/L | Effluent Objectives mg/L | # Months Objectives Achieved/# Months |
|---|---|---|---|
| CBOD5 (non-freezing period April-Nov) | 2.50 - 4.00 | 5 | 8/8 |
| CBOD5 (freeze period Dec - Mar) | 2.00 - 5.80 | 10 | 4/4 |
| Suspended Solids (non-freezing period April-Nov) | 7.00 - 17.75 | 5 | 0/8 |
| Suspended Solids (freeze period Dec - Mar) | 5.5 - 12.75 | 10 | 1/4 |
| Total Phosphorus (non-freezing period April-Nov) | 0.20 - 0.52 | 0.3 | 6/8 |
| Total Phosphorus (freeze period Dec - Mar) | 0.08 - 0.32 | 0.8 | 4/4 |
| Total Ammonia Nitrogen (non-freezing period April-Nov) | 1.75 - 9.75 | 1 | 0/8 |
| Total Ammonia Nitrogen (freeze period Dec - Mar) | 6.90 - 14.18 | 3 | 0/4 |
| E.Coli (counts/100mL) | 0.2 - 9.3 | 150 (geometric mean) | 8/8 |
| pH | 6.2 - 7.80 | 6.5 - 8.5 | 4/12 |

## 8. Sludge Management (Certificate of Approval 12. 4. (h))

Waste activated sludge is discharged into the tank located beneath the RBC. Sludge the majority of the sludge was pumped out and hauled to the City of London. The remaining amounts were taken to the Strathroy sludge lagoon for disposal when the City of London was not accepting sludge. Each load is approximately 12 $m^3$. The table below summarizes the sludge removed from the plant:

**Table 3**
**Mt Brydges WWTF – Sludge Removal**

| Month | Sludge Volume ($m^3$) | Month | Sludge Volume ($m^3$) |
|---|---|---|---|
| January | 10 Loads | July | 5 Loads |
| February | 8 Loads | August | 9 loads |
| March | 8 Loads | September | 9 loads |
| April | 8 Loads | October | 10 Loads |
| May | 10 Loads | November | 9 Loads |
| June | 7 Loads | December | 8 loads |

The sludge production and sludge handling methods for 2024 is estimated to be the same as in 2023.

## 9. Complaints Summary (Certificate of Approval 12. 4. (i))

There were noise complaints related to the vacuum trucks at the Mt Brydges WWTP in 2023. The vacuum trucks are used for routine sludge removal and maintenance as well as some diversion of flows.

## 10. Summary of By-pass, Spill or Abnormal Events (Certificate of Approval 12. 4. (j))

There were no by-pass, spills or abnormal events to report.

## 11. Notice, Modifications/Summary of Alterations (Certificate of Approval 12. 4. (k & l))

There were no modifications to the Sewage Works completed under the Limited Operational Flexibility provisions in the ECA.

The following list details alterations, extensions or replacements that were implemented or in process in 2023 and continuing into 2024.

- Mt Brydges WWTF Process Upgrades - $399,562
- Sanitary Masterplan and PPCP (Strathroy/Mt Brydges) - $60,430

For 2024, the 2023 projects are continuing. Also the following are proposed and are awaiting Council approval that will provide a benefit to the operation of the Mt Brydges WWTF.

- PLC Upgrades Budget - $750,000

## 12. Changes/Updates in Schedule (Certificate of Approval 12. 4. (m))

It is anticipated the interim solution will be installed by end of 2024. Once the second ECA is approved for the process changes to extended aeration, timing for this work can be determined.

## 13. Summary of Monitoring Schedule (Certificate of Approval 12. 4. (n))

Routine weekly effluent sampling was conducted on Mondays for 2023. This sampling will be complete on Thursdays for 2024.

# APPENDIX A

**Mt Brydges WWTF**

**Year: 2023**

| | | January | February | March | April | May | June | July | August | September | October | November | December | Average | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Flows, Average Daily Flow 825 m3/day** | | | | | | | | | | | | | | | |
| Effluent Total | $m^3$ | 8,039 | 7,552 | 9,431 | 12,861 | 10,585 | 10,105 | 10,040 | 10,083 | 10,014 | 10,362 | 10,145 | 11,544 | 10,063 | 120,761 |
| Effluent Average | $m^3$/day | 259 | 270 | 304 | 429 | 341 | 337 | 324 | 325 | 334 | 334 | 338 | 372 | 331 | |
| Effluent Max | $m^3$/day | 324 | 310 | 424 | 602 | 396 | 387 | 365 | 375 | 378 | 375 | 381 | 431 | 396 | |
| **cBOD, Monthly Average Concentration Limits Freezing 15mg/L, Non-Freezing 10mg/L,** | | | | | | | | | | | | | | | |
| Raw Average BOD | mg/L | 278 | 408 | 347 | 148 | 235 | 256 | 230 | 140 | 220 | 261 | 431 | 255 | 267 | |
| Eff cBOD Avg (BOD5) | mg/L | 5.80 | 2.00 | 2.75 | 3.25 | 3.40 | 2.50 | 3.00 | 2.50 | 2.75 | 2.60 | 4.00 | 3.75 | 3.19 | |
| **Suspended Solids, Monthly Average Concentration Limits Freezing 15mg/L, Non Freezing Limit 10mg/L** | | | | | | | | | | | | | | | |
| Raw Average | mg/L | 173.0 | 208.0 | 255.0 | 100.0 | 180.0 | 188.0 | 81.0 | 88.0 | 284.0 | 200.0 | 368.0 | 185.0 | 192.5 | |
| Eff Avg SS | mg/L | 11.80 | 5.50 | 12.75 | 11.25 | 10.80 | 7.00 | 9.20 | 17.75 | 12.75 | 11.20 | 12.50 | 12.00 | 11.21 | |
| **Total Phosphorus, Monthly Average Concentration Limits Freezing 1mg/L, Non Freezing 0.5mg/L** | | | | | | | | | | | | | | | |
| Raw Average | mg/L | 5.3 | 5.5 | 6.2 | 4.4 | 6.4 | 5.5 | 5.1 | 5.2 | 5.3 | 5.8 | 6.7 | 4.6 | 5.5 | |
| Effluent Average TP | mg/L | 0.32 | 0.08 | 0.32 | 0.29 | 0.29 | 0.20 | 0.27 | 0.52 | 0.34 | 0.27 | 0.26 | 0.12 | 0.27 | |
| **Nitrogen, Monthly Average Concentration Limits Freezing 5mg/L, Non Freezing 3mg/L** | | | | | | | | | | | | | | | |
| Raw Average TKN | mg/L | 51.10 | 51.50 | 57.40 | 46.20 | 53.00 | 47.40 | 45.80 | 44.50 | 31.20 | 46.00 | 55.70 | 46.40 | 48.02 | |
| Eff Avg Total N | mg/L | 14.18 | 6.90 | 7.00 | 6.30 | 7.92 | 8.88 | 3.52 | 1.75 | 5.15 | 7.22 | 9.75 | 11.33 | 7.49 | |
| Unionized Ammonia Avg | mg/L | 0.10 | 0.01 | 0.01 | 0.01 | 0.01 | 0.02 | 0.01 | 0.00 | 0.01 | 0.01 | 0.01 | 0.01 | 0.02 | |
| Unionized Ammonia Min | mg/L | 0.01 | 0.0050 | 0.0050 | 0.0090 | 0.0050 | 0.0120 | 0.0030 | 0.0010 | 0.0040 | 0.0070 | 0.0070 | 0.0070 | 0.01 | |
| Unionized Ammonia Max | mg/L | 0.38 | 0.0070 | 0.0110 | 0.0170 | 0.0150 | 0.0270 | 0.0080 | 0.0080 | 0.0090 | 0.0170 | 0.0240 | 0.0190 | 0.04 | |
| **E. Coli, Monthly Geometric Average Limit Non Freezing 200 Counts/mL** | | | | | | | | | | | | | | | |
| E.Coli Geo Mean | CFU/ 100mL | 2.3 | 2.6 | 0.5 | 2.0 | 0.2 | 3.3 | 0.7 | 3.0 | 9.3 | 1.6 | 2.4 | 2.0 | 2.5 | |
| **pH 6.0 -9.5, DO > 5.0** | | | | | | | | | | | | | | | |
| pH Min | SU | 6.50 | 6.20 | 6.40 | 6.70 | 6.40 | 6.50 | 6.50 | 6.40 | 6.30 | 6.30 | 6.40 | 6.40 | 6.42 | |
| pH Max | SU | 7.10 | 7.60 | 7.80 | 7.00 | 6.90 | 7.10 | 6.80 | 6.80 | 6.70 | 6.80 | 6.81 | 6.70 | 7.01 | |
| pH Average | SU | 6.90 | 6.60 | 6.90 | 6.90 | 6.60 | 6.80 | 6.60 | 6.60 | 6.50 | 6.60 | 6.65 | 6.60 | 6.69 | |
| Temperature MIN | $^oC$ | 10.80 | 9.70 | 9.50 | 10.70 | 11.90 | 15.00 | 17.20 | 17.90 | 17.70 | 16.10 | 13.60 | 13.00 | 13.6 | |
| Temperature MAX | $^oC$ | 15.40 | 12.10 | 10.90 | 12.70 | 15.80 | 16.90 | 18.90 | 18.90 | 19.30 | 18.50 | 16.00 | 14.30 | 15.8 | |
| DO Min | mg/L | 6.0 | 7.8 | 7.9 | 7.3 | 7.2 | 6.5 | 6.2 | 6.9 | 6.6 | 6.7 | 7.2 | 7.3 | 7.0 | |
| Non-Freezing (N) Freezing (F) | | F | F | F | N | N | N | N | N | N | N | N | F | | |

# APPENDIX B

# 2023 Annual Maintenance Summary for:
# MOUNT BRYDGES WWTF

**January**
- Added a new gate to splitter box, flow control
- Added 220 receptacle outlet at RBC 3
- Run generators
- RBC's and clarifiers greased weekly

**February**
- Replaced UV ballast in bank B
- Run generators
- RBC's and clarifiers greased weekly

**March**
- Preventative maintenance on air compressor
- Clean out reject well
- Repair work done on RBC 2 media
- Replaced UPS in phoenix panel
- Run generators
- RBC's and clarifiers greased weekly

**April**
- Replace fuses in phoenix panel
- RBC1 bearing replaced
- Wire in pump 2 replacement on clarifier 2
- Trouble shooting sludge pump issue in clarifier 1
- New overload swicth installed for desludge pump 2 clarifier 2
- Run generators
- RBC's and clarifiers greased weekly

**May**
- Replace RBC 1 gear box
- Run generators
- RBC's and clarifiers greased weekly

**June**
- Bracket installed to hold RBC 2 from moving
- Install new sampler head
- Run generators
- RBC's and clarifiers greased weekly

**July**
- Bearing adjustment RBC 1
- Bearing replacement RBC 1
- Run generators
- RBC's and clarifiers greased weekly

**August**
- Cleaned RBC 1
- Replace PH probe salt bridge
- Run generators
- RBC's and clarifiers greased weekly

**September**
- Replace bearing on drive end RBC 1
- Change oil in clarifier 1 gear drive
- Run generators
- RBC's and clarifiers greased weekly

**October**
- RBC 1 shaft repair preparation
- Run generators
- RBC's and clarifiers greased weekly

**November**
- Replace O ring alum pump 2
- Repair work to RBC 2 media
- Service work air compressor 1 and 2
- Run generators
- RBC's and clarifiers greased weekly

**December**
- Disconnect filter feed pump 2
- Lifting device being installed RBC 1
- Filter feed pump put back into well
- Run generators
- RBC's and clarifiers greased weekly