

STRATHROY WASTEWATER TREATMENT FACILITY

2022 ANNUAL REPORT

as per ECA # 5933-C37KWJ Section 11.(4)
Works # 12000827



1. Influent Monitoring and Compliance Summary (Certificate of Approval 11. 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 11. 4. (b))

The Strathroy WWTF has a design rated capacity of 10,000 m³/day, with a peak flow rate of 23,280 m³/day. During 2022, the annual average daily flow was 4,497 m³/day, which is 45% of the design rated capacity for the treatment facility. The maximum daily flow was recorded at 9,979 m³/day, which is 43% of the peak flow rate. Flow rates are similar to 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 and Table 2 below. All parameters met effluent limits except for one nitrogen exceedance in 2022. This was reported to the MECP.

Table 1
Strathroy WWTF – Effluent Quality Summary

| Description | Range of Monthly Averages mg/L | Effluent Limits mg/L | # Months Limits Achieved/ # Months |
|---|-----------------------------------|-------------------------|---------------------------------------|
| CBOD5 (non-freezing period April - Oct) | 2.0 – 2.3 | 10 | 7/7 |
| CBOD5 (freezing period Nov-Mar) | 2.4 – 6.3 | 15 | 5/5 |
| Suspended Solids (non-freezing period April - Oct) | 2.8 – 4.6 | 10 | 7/7 |
| Suspended Solids (freezing period Nov-Mar) | 2.2 – 13.8 | 15 | 5/5 |
| Total Phosphorus (non-freezing period April - Oct) | 0.10 – 0.46 | 0.5 | 7/7 |

| | | | |
|---|--------------|-------------------------|-------|
| Total Phosphorus (freezing period Nov-Mar) | 0.07 – 0.58 | 1 | 5/5 |
| Total Ammonia Nitrogen (non-freezing period April - Oct) | 0.14 – 0.40 | 2 | 7/7 |
| Total Ammonia Nitrogen (freezing period Nov-Mar) | 0.34 – 6.41 | 5 | 4/5 |
| E.Coli (counts/100mL) | 0.14 – 136.0 | 200 (geometric mean) | 12/12 |
| pH | 6.2 – 7.5 | 6.0 - 9.5 | 12/12 |
| DO (min) | 4.1 | >4.0 | 12/12 |

Table 2
Strathroy WWTF – Effluent Loading Summary

| Description | Annual Average Loading kg/d | Effluent Loading Limits kg/d | Achieved Yes/No |
|------------------------|-----------------------------------|---------------------------------------|------------------------|
| CBOD5 | 12.92 | 103.4 | Yes |
| Suspended Solids | 20.79 | 103.4 | Yes |
| Total Phosphorus | 1.24 | 6.1 | Yes |
| Total Ammonia Nitrogen | 5.63 | 27.8 | Yes |

3. Operating Issues and Corrective Actions (Certificate of Approval 11. 4. (c))

During the year, there was one exceedance for Total Ammonia Nitrogen, of the Environmental Compliance Approval final effluent limits. This exceedance was reported to the MECP.

Construction for the installation of new filters was completed in 2022. The second phase of the upgrades, is currently being designed and a second ECA application has been submitted for approval by the MECP.

4. Maintenance Summary (Certificate of Approval 11. 4. (d))

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

5. Quality Assurance/Quality Control (Certificate of Approval 11. 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 MLSS, reactive phosphorus, total suspended solids, and ammonia in the effluent.

6. Calibration/Maintenance Summary (Certificate of Approval 11. 4. (f))

Flow meter calibrations were carried out by SCG in February 2022.

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 11. 4. (g))

Strathroy-Caradoc attempted to meet the objectives in the Environmental Compliance Approval (ECA) through regular testing and monitoring of the treatment system. The installation of the new filters in 2022 will help improve the WWTF treatment process.

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

Table 3
Strathroy WWTF – Effluent Objective Summary

| Description | Range of Monthly Averages mg/L | Effluent Objectives mg/L | # Months Objectives Achieved/# Months |
|---|-----------------------------------|-----------------------------|---------------------------------------|
| CBOD5 (non-freezing period April - Oct) | 2.0 – 2.3 | 5 | 7/7 |
| CBOD5 (freezing period Nov-Mar) | 2.4 – 6.3 | 10 | 5/5 |
| Suspended Solids (non-freezing period April - Oct) | 2.8 – 4.6 | 5 | 7/7 |
| Suspended Solids (freezing period Nov-Mar) | 2.2 – 13.8 | 10 | 4/5 |
| Total Phosphorus (non-freezing period April - Oct) | 0.10 – 0.46 | 0.3 | 4/7 |

| | | | |
|---|--------------|-------------------------|-------|
| Total Phosphorus (freezing period Nov-Mar) | 0.07 – 0.58 | 0.5 | 4/5 |
| Total Ammonia Nitrogen (non-freezing period April - Oct) | 0.14 – 0.40 | 1 | 7/7 |
| Total Ammonia Nitrogen (freezing period Nov-Mar) | 0.34 – 6.41 | 3 | 3/5 |
| E.Coli (counts/100mL) | 0.14 – 136.0 | 150 (geometric mean) | 12/12 |
| pH | 6.2 - 7.60 | 6.5 - 8.5 | 11/12 |

7. Sludge Management (Certificate of Approval 11. 4. (h))

Supernatant from this lagoon is transferred to the aeration section of the sewage treatment plant for treatment as needed. Staff monitor the lagoon levels to ensure adequate reserve capacity is in place to accommodate waste activated sludge along with precipitation events and will implement supernatant pumping as required.

In 2022, the Municipality hired a contractor that removed 447.49 dry tones of sludge from the storage lagoon.

The sludge production and sludge handling methods for 2023 (with exception of the removal of sludge) is expected to be the same as in 2022.

8. Complaints Summary (Certificate of Approval 11. 4. (i))

There were no complaints related to the Strathroy WWTF in 2022.

9. Summary of By-pass, Spill or Abnormal Events (Certificate of Approval 11. 4. (j))

For the construction period, the Municipality obtained approval from the MECP to bypass the old filters while the new filters were being installed. Once the new filters were operational, they were put into service.

10. Notice, Modifications/Summary of Alterations (Certificate of Approval 11. 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 2022

- Strathroy WWTF Process Upgrades - \$4,9560,000 Spent \$2,309,242
- Albert St Pumping Station - \$500,000 Spent \$53,822
- Lagoon Sludge Handling- \$243,500 Spent \$218,780

For 2023, the following upgrades have been proposed and are awaiting Council approval that will provide a benefit to the operation of the Strathroy WWTF.

- Strathroy WWTF Process Upgrades - Budget \$10,143,787
- Albert St Pumping Station Design - Budget \$380,000
- Albert St Electrical and Mechanical Upgrades \$2,500,000
- Lagoon Sludge Handling- Budget \$250,000
- Sanitary Master Plan \$200,000
- Drury Lane Reconstruction (includes sanitary sewers) \$1,400,000
- Queen St Reconstruction (includes sanitary sewers) \$1,036,000
- Sanitary Sewer Repairs \$150,000
- PPCP \$150,000

11. Changes/Updates in Schedule (Certificate of Approval 11. 4. (m))

The replacement of the existing tertiary filters at the Strathroy Wastewater Treatment Plant did experience delays due to COVID-19 and supply chain issues. The filters were operational before the end of 2022.

12. Summary of Monitoring Schedule (Certificate of Approval 11. 4. (n))

Routine weekly effluent sampling was conducted on Wednesdays for 2022. This sampling will be completed on Mondays for 2023.

APPENDIX A

Strathroy WWTF

 Year: **2022**

| | | January | February | March | April | May | June | July | August | September | October | November | December | Average | Total |
|---|---------------------|---------|----------|---------|---------|---------|---------|---------|---------|-----------|---------|----------|----------|---------|-----------|
| Flows, Average Daily Flow 10,000 m3/day | | | | | | | | | | | | | | | |
| Effluent Total | m ³ | 129,630 | 128,792 | 136,515 | 139,667 | 149,924 | 142,586 | 136,902 | 140,446 | 142,089 | 136,295 | 130,298 | 127,399 | 136,712 | 1,640,543 |
| Effluent Average | m ³ /day | 4,181.6 | 4,599.7 | 4,403.7 | 4,655.6 | 4,836.3 | 4,752.9 | 4,416.2 | 4,530.5 | 4,736.3 | 4,396.6 | 4,343.3 | 4,109.6 | 4,496.9 | |
| Effluent Max | m ³ /day | 5,015 | 9,979 | 4,841 | 5,227 | 5,365 | 6,332 | 5,531 | 5,657 | 5,416 | 5,019 | 5,988 | 5,414 | 5,815 | |
| cBOD, Monthly Average Concentration Limits Apr 1 - Oct 31 10mg/L, Nov 1 - Mar 31 15mg/L | | | | | | | | | | | | | | | |
| Raw Average cBOD | mg/L | 323 | 302 | 270 | 326.0 | 279 | 345 | 828 | 308 | 420 | 343 | 1420 | 421 | 465.4 | |
| Effluent Average cBOD | mg/L | 3.5 | 4.3 | 3.8 | 2.3 | 2.1 | 2.0 | 2.0 | 2.0 | 2.2 | 2.0 | 2.4 | 6.3 | 2.91 | |
| Effluent cBOD Loading | kg/D | 14.64 | 19.93 | 16.64 | 10.9 | 10.36 | 9.51 | 8.83 | 9.06 | 10.33 | 8.79 | 10.42 | 25.69 | 12.92 | |
| Suspended Solids, Monthly Average Concentration Limits Apr 1 - Oct 31 10 mg/L, Nov 1 - Mar 31 15mg/L | | | | | | | | | | | | | | | |
| Raw Average | mg/L | 448 | 362 | 328 | 367.0 | 150 | 690 | 1000 | 551 | 114 | 76 | 2220 | 521 | 568.9 | |
| Effluent Average | mg/L | 3.0 | 6.1 | 4.0 | 4.3 | 4.6 | 4.4 | 3.4 | 3.1 | 4.4 | 2.8 | 2.2 | 13.8 | 4.67 | |
| SS Loading | kg/D | 12.54 | 28.11 | 17.61 | 20.2 | 22.11 | 20.91 | 14.90 | 14.24 | 20.67 | 12.09 | 9.56 | 56.51 | 20.79 | |
| Total Phosphorus, Monthly Average Concentration Limits Apr 1 - Oct 31 0.5mg/L, Nov 1 - Mar 31 1 mg/L | | | | | | | | | | | | | | | |
| Raw Average | mg/L | 5.4 | 4.7 | 4.2 | 5.1 | 5.5 | 8.2 | 23.1 | 15.5 | 5.8 | 6.6 | 31.9 | 10.1 | 10.51 | |
| Effluent Average | mg/L | 0.07 | 0.15 | 0.58 | 0.46 | 0.41 | 0.27 | 0.24 | 0.40 | 0.19 | 0.10 | 0.08 | 0.33 | 0.27 | |
| Phosphorus Loading | kg/D | 0.29 | 0.71 | 2.57 | 2.2 | 1.98 | 1.28 | 1.04 | 1.81 | 0.89 | 0.42 | 0.36 | 1.34 | 1.24 | |
| Nitrogen, Monthly Average Concentration Limits Apr 1 - Oct 31 2mg/L, Nov 1 - Mar 31 5mg/L | | | | | | | | | | | | | | | |
| Raw Average TKN | mg/L | 49.00 | 42.90 | 23.60 | 41.5 | 45.50 | 39.40 | 185.00 | 73.60 | 26.40 | 35.60 | 268.00 | 67.70 | 74.9 | |
| Effluent Average Total N | mg/L | 1.85 | 6.41 | 0.34 | 0.14 | 0.23 | 0.24 | 0.20 | 0.23 | 0.35 | 0.40 | 0.72 | 4.25 | 1.28 | |
| Nitrogen Loading | kg/D | 7.74 | 29.49 | 1.52 | 0.7 | 1.11 | 1.14 | 0.88 | 1.04 | 1.64 | 1.76 | 3.13 | 17.47 | 5.63 | |
| Effluent TKN | mg/L | 3.20 | 7.50 | 1.57 | 1.0 | 1.05 | 0.74 | 1.49 | 1.07 | 1.39 | 1.58 | 1.80 | 5.95 | 2.36 | |
| Nitrate as Nitrogen | mg/L | 21.80 | 20.36 | 27.28 | 22.8 | 17.90 | 15.98 | 18.14 | 12.99 | 11.76 | 6.37 | 2.24 | 1.66 | 14.94 | |
| Nitrite as Nitrogen | mg/L | 3.15 | 0.75 | 0.26 | 0.3 | 0.44 | 0.37 | 0.27 | 0.22 | 0.26 | 0.27 | 0.20 | 2.77 | 0.77 | |
| Unionized Ammonia Avg | mg/L | 0.0488 | 0.0097 | 0.0011 | 0.0010 | 0.0010 | 0.0010 | 0.0011 | 0.0016 | 0.0023 | 0.0018 | 0.0026 | 0.1908 | | |
| Unionized Ammonia Min | mg/L | 0.0010 | 0.0020 | 0.0010 | 0.0010 | 0.0010 | 0.0010 | 0.0010 | 0.0010 | 0.0010 | 0.0010 | 0.0010 | 0.0030 | | |
| Unionized Ammonia Max | mg/L | 0.1750 | 0.0170 | 0.0020 | 0.0010 | 0.0010 | 0.0010 | 0.0020 | 0.0030 | 0.0060 | 0.0030 | 0.0060 | 0.7200 | | |
| E. Coli, Monthly Geometric Average 200 Counts/mL | | | | | | | | | | | | | | | |
| Geo Mean | CFU/ 100mL | 3.87 | 36.58 | 136.00 | 4.08 | 17.35 | 13.15 | 2.00 | 7.54 | 18.46 | 0.14 | 2.00 | 5.45 | 20.55 | |
| pH 6.0 -9.5, DO > 4.0 | | | | | | | | | | | | | | | |
| pH Min | SU | 6.7 | 6.6 | 6.7 | 6.6 | 6.2 | 6.6 | 6.8 | 6.6 | 6.7 | 6.9 | 6.9 | 6.5 | 6.65 | |
| pH Max | SU | 7.0 | 7.2 | 7.0 | 7.0 | 7.0 | 7.3 | 7.2 | 7.3 | 7.4 | 7.5 | 7.4 | 7.4 | 7.23 | |
| Temperature MIN | °C | 7.0 | 5.8 | 7.8 | 10.1 | 12.2 | 17.3 | 21.0 | 21.2 | 18.2 | 14.8 | 11.1 | 5.7 | 12.7 | |
| Temperature MAX | °C | 10.4 | 9.8 | 12.2 | 15.0 | 19.3 | 21.3 | 23.5 | 24.2 | 23.0 | 19.9 | 17.8 | 13.9 | 17.5 | |
| DO Min | mg/L | 7.7 | 7.4 | 7.2 | 7.1 | 6.5 | 6.5 | 4.6 | 4.1 | 4.7 | 5.8 | 5.9 | 4.6 | 6.0 | |
| Non-Freezing (N) Freezing (F) | | F | F | F | N | N | N | N | N | N | N | F | F | | |

APPENDIX B

2022 Annual Maintenance Summary for STRATHROY WWTF

January

- Installed new RAS pump 1
- Installed new VFD drive for RAS pump 2
- Wiring of RAS pump to VFD

February

- Eramosa SCADA updates
- Calibrated flow meters
- Replaced air filters for the blower
- Treatment plant generator repair

March

- Cleaned and replaced UV lights and bulbs
- Repaired aeration diffusers
- Cleaned clarifiers
- Repaired battery charger for generator
- Cleaned exhaust fan on screen room
- Replaced battery backup to PLC

April

- Cleaned UV lights
- Cleaned clarifiers

May

- Repaired scum pump
- Cleaned RAS pumps
- Cleaned WAS pumps
- Cleaned UV lights and clarifiers
- Replaced check valve springs on RAS pumps

June

- Installation of new RAS panel
- Installation of new pump in scum pit
- Cleaned clarifiers
- Installation of new WAS pump
- Cleaned RAS pumps

July

- Cleaned clarifiers
- Cleaned UV lights

August

- Removal of sludge from storage pond
- Cleaned and replaced UV bulbs

September

- Cleaned clarifiers
- Cleaned UV lights
- Changed oil in clarifiers drive unit

October

- Routine Maintenance

November

- Replaced Turbo Blower batteries
- Replaced blower filters
- Repaired broken WAS pipe
- Repaired air diffusers on aeration pond

December

- Repaired water line at RAS pit
- Cleaned RAS and WAS pumps