

**PUBLIC UTILITIES COMMISSION
FOR THE MUNICIPALITY OF CHATHAM-KENT**

MERLIN LAGOON

2019 PERFORMANCE REPORT

January 1 to December 31, 2019

Amended Certificate of Approval # 1-0192-69-753576

Plant Description

The Merlin Sewage Lagoons provide treatment of wastewater for the community of Merlin. Wastewater is collected by a separate sanitary sewer system and conveyed by one raw pump station to the Sewage Lagoons. The final effluent is subsequently discharged to the Foxtan Drain.

Approval was received from the Ministry of the Environment in 1975 for construction of sanitary sewers, a force main, a sewage pumping station, and two waste stabilisation ponds.

According to a capacity assessment prepared by R. V. Anderson Associates Limited, average daily flow of sewage into the treatment plant should not exceed 464m³/day.

The present treatment system consists of:

- One raw pumping station
- Two waste stabilisation cells
- Two effluent chambers

The effluent chambers discharge to the Foxtan Drain.

REPORTING

Summary and Interpretation of Monitoring and Comparison to the Effluent Limits & Objectives

The following Ministry Procedures / Guidelines apply:

| | |
|-------------------|---|
| Procedure F-5-1: | Minimum effluent limits BOD ₅ , Suspended Solids |
| Guideline F-8: | Effluent limits Phosphorus |
| Procedure F-10-1: | Minimum monitoring program |
| Table C-1: | Monitoring, recording and reporting bypasses |

Table 1 on the following page outlines monthly average results of parameters tested compared to the Effluent Guidelines & Effluent Design Objectives set out in one or more of the above Ministry Procedures /Guidelines.

There were no non compliance issues.

Success and Adequacy of the Works

During the reporting period, the annual average daily flow was 146 m³/day, which represents approximately 32% of the rated capacity of 464 m³/day.

There were no flow exceedances based on the Average Daily Flow during this reporting period.

Table 1: Summary of Monitoring Data and Comparison to Effluent Guidelines & Effluent Design Objectives - Concentrations as well as rated capacity to the sewage works

Rated capacity: 464 m³/day

Total sewage flow to the works during a calendar year divided by the number of days during which sewage was flowing to the works that year

| Month | Total Monthly Flow m ³ | Average Daily Flow /Month m ³ /day | Avg Daily Flow/Year m ³ /day | % of Plant Capacity | BOD ₅ mg/L | Total S.S. mg/L | Total P mg/L |
|--------------------------------------|--|---|---|---------------------|-----------------------|-----------------|--------------|
| Limits: without batch TP removal | None | None | 464 | 100 | 30 | 40 | 1.0 |
| Objectives: without batch TP removal | None | None | 464 | 100 | 25 | 30 | 0.5 - 1.0 |
| Limits: with batch TP removal | None | None | 464 | 100 | 25 | 25 | 1.0 |
| Objectives: with batch TP removal | None | None | 464 | 100 | 15 | 20 | 0.5 - 1.0 |
| Jan | 4,806 | 155 | | | | | |
| Feb | 4,697 | 168 | | | | | |
| Mar | 5,315 | 171 | | | | | |
| Apr | 6,102 | 203 | | | 3.5 | 7 | 0.40 |
| May | 5,046 | 163 | | | | | |
| Jun | 4,326 | 144 | | | | | |
| Jul | 4,010 | 129 | | | | | |
| Aug | 3,656 | 118 | | | | | |
| Sept | 3,424 | 114 | | | | | |
| Oct | 4,343 | 140 | | | | | |
| Nov | 3,684 | 123 | | | | | |
| Dec | 4,061 | 131 | | | | | |
| Year | | | 146 | 32 | | | |
| | Yearly Total Flow m³ | Yearly Maximums | | | | | |
| | 53,471 | 203 | | | 3.5 | 7 | 0.40 |

Batch TP removal was not performed for the April discharge period.

Operating Problems and Corrective Action:

There were no significant operating problems encountered during this reporting period.

Summary of Maintenance Activities:

Routine maintenance was performed throughout the reporting period. Chatham-Kent PUC utilises an electronic preventative maintenance program to track preventative maintenance. In addition to the routine maintenance, the following additional maintenance activities and equipment replacement was completed for the reporting period:

- Standby Diesel Electrical Upgrade \$ 24,000

Quality Assurance and Control Measures:

The Chatham-Kent Public Utilities Commission followed a sampling schedule developed in accordance with the Certificate of Approval and applicable regulations for this reporting period.

Chemistry samples of the raw flow were collected by grab samples. Chemistry samples were submitted monthly to an accredited laboratory for analysis of BOD₅, Total Suspended Solids, Total Kjeldhal Nitrogen and Total Phosphorus.

Chemistry samples of the final effluent were collected by grab samples. Chemistry samples were collected and submitted during the discharge period to an accredited laboratory for analysis of BOD₅, CBOD₅, Total Suspended Solids, Total Kjeldhal Nitrogen, Total Phosphorus, Free Ammonia as N, Alkalinity, pH, Nitrite, Nitrate and Unionized Ammonia.

Bacteriological samples of the effluent were collected during the discharge period according to the Sampling Program. Bacteriological samples were submitted during discharge periods to an accredited laboratory for analysis.

In house samples were analysed by a licensed operator for pH and temperature.

Calibration and Maintenance on Effluent Monitoring Equipment

Monitoring equipment calibration/verification report(s) included for the following:

- Influent flow meter

Community Complaints:

There were no Customer Complaints received regarding during the reporting period.

By-pass, Spill, or Abnormal Discharge Events:

There were no by-pass, spill, or abnormal discharge events for the reporting period.

Other Information the District Manager Requires:

No other information was required from the District Manager during this reporting period.

APPENDIX A

Yearly Operational Data Summary for the Reporting Period

CHATHAM-KENT PUC

Merlin Lagoon System
Operational Data Yearly Summary

Works # 110000935

YEAR

2019

| DESCRIPTION | TOTAL | | | | | | | | | | | | LOW | HIGH | AVERAGE | Winter MOE Objective | Summer Non-Compliance | Winter Non-Compliance |
|--|-------|---------|----------|-------|-------|-------|-------|-------|--------|-----------|---------|----------|--------|-------|---------|----------------------|-----------------------|-----------------------|
| | MONTH | JANUARY | FEBRUARY | MARCH | APRIL | MAY | JUNE | JULY | AUGUST | SEPTEMBER | OCTOBER | NOVEMBER | | | | | | |
| RAW FLOW DATA | | | | | | | | | | | | | | | | | | |
| MERLIN FLOW MONTH TOTAL 1000 cu. m. | 4.806 | 4.897 | 5.315 | 6.102 | 5.046 | 4.326 | 4.010 | 3.656 | 3.424 | 4.343 | 3.684 | 4.061 | 53.471 | 4.456 | 6.102 | 3.424 | | |
| MERLIN FLOW MONTH AVG. 1000 cu. m. | 0.155 | 0.168 | 0.171 | 0.203 | 0.163 | 0.144 | 0.129 | 0.118 | 0.114 | 0.140 | 0.123 | 0.131 | | 0.146 | 0.203 | 0.114 | | |
| MERLIN FLOW MONTH PEAK 1000 cu. m. | 0.327 | 0.337 | 0.375 | 0.828 | 0.289 | 0.341 | 0.254 | 0.150 | 0.170 | 0.422 | 0.209 | 0.197 | | 0.828 | 0.150 | | | |

| RAW SEWAGE CHEMICAL | TOTAL | | | | | | | | | | | | LOW | HIGH | AVERAGE | Winter MOE Objective | Summer Non-Compliance | Winter Non-Compliance |
|----------------------------|-------|---------|----------|-------|-------|-----|------|------|--------|-----------|---------|----------|-----|------|---------|----------------------|-----------------------|-----------------------|
| | MONTH | JANUARY | FEBRUARY | MARCH | APRIL | MAY | JUNE | JULY | AUGUST | SEPTEMBER | OCTOBER | NOVEMBER | | | | | | |
| BOD5 mg/l | 300 | 690 | 260 | 110 | 180 | 180 | 520 | 180 | 130 | 180 | 190 | 190 | 98 | 252 | 690 | 98 | | |
| TKN mg/l | 48 | 39 | 50 | 23 | 41 | 47 | 57 | 51 | 56 | 59 | 59 | 42 | 48 | 48 | 59 | 23 | | |
| TOTAL P mg/l | 5.4 | 5.6 | 6.5 | 3.0 | 6.6 | 6.2 | 6.2 | 6.3 | 6.7 | 7.2 | 7.6 | 4.4 | 6.0 | 6.0 | 7.6 | 3.0 | | |
| SS mg/l | 150 | 660 | 190 | 160 | 180 | 260 | 120 | 180 | 220 | 170 | 290 | 200 | 232 | 660 | 120 | | | |
| AIR USED 1000 cu. m. | | | | | | | | | | | | | | | | | | |

| FINAL EFFLUENT CHEMICAL | TOTAL | | | | | | | | | | | | LOW | HIGH | AVERAGE | Winter MOE Objective | Summer Non-Compliance | Winter Non-Compliance |
|--------------------------------------|-------|---------|----------|-------|--------|-----|------|------|--------|-----------|---------|----------|-----|---------|---------|----------------------|-----------------------|-----------------------|
| | MONTH | JANUARY | FEBRUARY | MARCH | APRIL | MAY | JUNE | JULY | AUGUST | SEPTEMBER | OCTOBER | NOVEMBER | | | | | | |
| AMMONIA mg/l | | | | | 0.48 | | | | | | | | | 0.48 | 0.48 | 0.48 | | |
| UN-IONIZED AMMONIA mg/l | | | | | 0.0445 | | | | | | | | | 0.0445 | 0.0445 | 0.0445 | | |
| UN-IONIZED AMMONIA (FEDERAL) mg/l | | | | | | | | | | | | | | #DIV/0! | #NUM! | #NUM! | | |
| BOD5 mg/l | | | | | 3.5 | | | | | | | | | 3.45 | 3.5 | 3.5 | | |
| CBOD5 mg/l | | | | | 3.3 | | | | | | | | | 3.27 | 3 | 3 | | |
| TKN mg/l | | | | | 1.4 | | | | | | | | | 1.4 | 1.4 | 1.4 | | |
| pH (IN HOUSE) | | | | | 8.77 | | | | | | | | | 8.77 | 8.77 | 8.77 | | |
| pH (LABORATORY) | | | | | 8.50 | | | | | | | | | 8.50 | 8.50 | 8.50 | | |
| TOTAL P mg/l | | | | | 0.40 | | | | | | | | | 0.40 | 0.40 | 0.40 | | |
| SS mg/l | | | | | 7 | | | | | | | | | 7.3 | 7 | 7 | | |
| ALKALINITY mg/l | | | | | 172 | | | | | | | | | 172 | 172 | 172 | | |
| NITRITE mg/l | | | | | 0.011 | | | | | | | | | 0.011 | 0.011 | 0.011 | | |
| NITRATE mg/l | | | | | 0.10 | | | | | | | | | 0.10 | 0.10 | 0.10 | | |
| TEMPERATURE °C | | | | | 11.3 | | | | | | | | | 11.3 | 11.3 | 11.3 | | |

| FINAL EFFLUENT (BACTERIOLOGICAL) | TOTAL | | | | | | | | | | | | LOW | HIGH | AVERAGE | Winter MOE Objective | Summer Non-Compliance | Winter Non-Compliance |
|---|-------|---------|----------|-------|-------|-----|------|------|--------|-----------|---------|----------|-----|------|---------|----------------------|-----------------------|-----------------------|
| | MONTH | JANUARY | FEBRUARY | MARCH | APRIL | MAY | JUNE | JULY | AUGUST | SEPTEMBER | OCTOBER | NOVEMBER | | | | | | |
| E. COLI # / 100ml | | | | | 70 | | | | | | | | | 70 | 70 | 70 | | |

| FINAL EFFLUENT FLOW | TOTAL | | | | | | | | | | | | LOW | HIGH | AVERAGE | Winter MOE Objective | Summer Non-Compliance | Winter Non-Compliance |
|------------------------------------|-------|---------|----------|-------|--------|-----|------|------|--------|-----------|---------|----------|-----|--------|---------|----------------------|-----------------------|-----------------------|
| | MONTH | JANUARY | FEBRUARY | MARCH | APRIL | MAY | JUNE | JULY | AUGUST | SEPTEMBER | OCTOBER | NOVEMBER | | | | | | |
| TOTAL MONTH FLOW 1000 cu. m. | | | | | 61.028 | | | | | | | | | 61.028 | 61.028 | 61.028 | | |
| MONTH AVG. DAY FLOW 1000 cu. m. | | | | | 5.548 | | | | | | | | | 5.548 | 5.548 | 5.548 | | |
| MONTH MAX DAY FLOW 1000 cu. m. | | | | | 6.784 | | | | | | | | | 6.784 | 6.784 | 6.784 | | |

| FEDERAL (Annually) | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sept | Oct | Nov | Dec |
|---------------------------|---------|-----|-----|-----|-----|-----|-----|-----|------|-----|-----|-----|
| Effluent Flow per Month | No | No | No | Yes | No | No | No | No | No | No | No | No |
| Final Flow Qtr. m3 | 61028.0 | | | | | | | | | | | |
| CBOD Qtr. mg/L | 3.3 | | | | | | | | | | | |
| SS Qtr. mg/L | 7.3 | | | | | | | | | | | |
| Number of Days | 11 | | | | | | | | | | | |

FEDERAL WSR Acute Lethality
Average Daily Volume Effluent (m³): 167

APPENDIX B

Calibration Reports for the Reporting Period



AS FOUND CERTIFICATION
FORWARD FLOW DIRECTION
PASS

| CLIENT DETAIL | | EQUIPMENT DETAIL | |
|---|-------------------------------------|--------------------|------------------------|
| CUSTOMER | CK - Blenheim | [MUT] MANUFACTURER | ENDRESS & HAUSER |
| CONTACT | DJ Degelas, Chief Operator | MODEL | Prosonic 93W |
| | 18970 Charing Cross Rd., POnBox 460 | CONVERTER S/N: | EC102C02000 |
| | Blenheim, ON, N0P 1A0 | FUSE | Pull Plug at Outlet |
| | Ph:519-6768543 | | |
| | Cell: 519-359-0236 | PLANT ID | Merlin Pumping Station |
| | E-mail: djd@chatham-kent.ca | METER ID | Station Flow |
| | | FIT ID | n/a |
| | | CLIENT TAG | n/a |
| | | OTHER | JDE Tag#: 275207 |
| | | GPS COORDINATES | N42 14.799 W082 13.420 |
| VER. BY - FM | Paris Machuk | VERIFICATION DATE | March 19, 2019 |
| Quality Management Standards Information - Reference equipment and instrumentation used to conduct this verification test is found in our AC- QMS document at the time this test was | | CAL. FREQUENCY | Annual |
| | | CAL. DUE DATE | March, 2020 |

| PROGRAMMING PARAMETERS | | | FORWARD TOTALIZER INFORMATION | | |
|------------------------|------|----------|--|----------|--------------------------|
| DIAMETER (DN) | mm | 100 | AS FOUND | 349694.5 | M3 |
| F.S. FLOW - MAG | M3/D | 6785.640 | AS LEFT | 349712.3 | M3 |
| F.S. RANGE - O/P | M3/D | 2500.000 | DIFFERENCE | 17.8 | M3 |
| TUBE k-FACTOR | | 1.00000 | | | |
| TUBE zero | | 0.00000 | | | |
| | | | | | TEST CRITERIA |
| | | | AS FOUND CERTIFICATION TEST | | Yes |
| | | | FORWARD FLOW DIRECTION | | Yes |
| | | | ALLOWABLE [%] ERROR | | 5 |
| | | | | | COMPONENTS TESTED |
| | | | CONVERTER DISPLAY | | yes |
| | | | mA OUTPUT | | yes |
| | | | TOTALIZER | | yes |
| | | | ACCURACY BASED ON [% o.r.] | | yes |
| | | | ERROR DOCUMENTED IN THIS REPORT; BASED ON % o.r. | | |

| FLOW TUBE SIMULATION | | | | | | | |
|-----------------------------------|--|--------------|----------------|-----------------|-----------------|-----------------|--------------|
| | | 0.0 | 625.0 | 1250.0 | 1875.0 | 2500.0 | M3/D |
| | | 0.0 | 9.2 | 18.4 | 27.6 | 36.8 | % F.S. Flow |
| | | 0.0 | 25.0 | 50.0 | 75.0 | 100.0 | % F.S. Range |
| REF. FLOW RATE | | 0.000 | 625.000 | 1250.000 | 1875.000 | 2500.000 | M3/D |
| MUT [Reading] | | 0.000 | 624.080 | 1248.000 | 1871.700 | 2494.400 | M3/D |
| MUT [Difference] | | 0.000 | -0.920 | -2.000 | -3.300 | -5.600 | M3/D |
| MUT [% Error] | | n/a | -0.15 | -0.16 | -0.18 | -0.22 | % O.R |
| mA OUTPUT | | 4.000 | 8.000 | 12.000 | 16.000 | 20.000 | mA |
| MUT [Reading] | | min. 4 mA | 3.997 | 7.990 | 11.982 | 15.973 | 19.957 |
| MUT [Difference] | | max. 20 mA | -0.003 | -0.010 | -0.018 | -0.027 | -0.043 |
| MUT [% Error] | | | -0.08 | -0.12 | -0.15 | -0.17 | -0.21 |
| TOTALIZER - REF. FLOW RATE | | | | | | 2500.000 | M3/D |
| TOTALIZER [MUT] | | | | | | 3.6 | M3 |
| TEST TIME | | | | | | 125.14 | SECONDS |
| CALC. TOTALIZER | | | | | | 3.621 | M3 |
| ERROR | | | | | | -0.58 | % |

| COMMENTS | QUALITY MANAGEMENT STANDARDS INFO. | | | RESULTS | | |
|----------|--|-----------------|----------|---------------|------------|-----------|
| | [QMS] INFORMATION | IDENT. | ID # | TEST | AVG % o.r. | PASS FAIL |
| | NOTE: this verification does not verify the install/setup of equipment which directly effect the accuracy of the flow | [REFERENCE] FTS | E&H (FC) | 1 | DISPLAY | -0.18 |
| | PROCESS METER | PM | 11 | mA OUTPUT | -0.15 | PASS |
| | ANALOG METER | AM | n/a | TOTALIZER - R | -0.58 | PASS |
| | STOP WATCH | SW | Yes | | | |

This report reflects the test results of the overall accuracy for the above flow converter using the specified manufacturers flow tube simulator to within the specified tolerance as identified within this report.