

# Winchester Wastewater System

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Sewage Works # 110001202

## Annual Report

Prepared for: Township of North Dundas

Reporting Period of January 1<sup>st</sup> – December 31<sup>st</sup> 2021

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Revision: 0

Operating Authority:



This report has been prepared to meet the requirements of Certificate of Approval #5312-88TK5R

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## Operations and Compliance Reliability Indices

| Compliance Event                    | # of Events |
|-------------------------------------|-------------|
| Ministry of Environment Inspections | 0           |
| Ministry of Labour Inspections      | 0           |
| Non-Compliance                      | 1           |
| Spills/Overflows/Bypasses           | 0           |
| Sewer Main Blockages                | 1           |

## System Process Description

Winchester's wastewater system consists of a gravity fed sanitary sewage collection system, four pumping stations and a wastewater treatment lagoon. The main sewage pumping station is located on Ottawa Street and discharges directly to the lagoons. There are also two pumping stations located on Main Street and one on St. Lawrence Street which pump wastewater to the Ottawa St. SPS.

The wastewater treatment system consists of a seasonally discharged five cell lagoon system with a rated capacity of 2,220 m<sup>3</sup>/d. The three primary facultative treatment cells are operated in parallel (Cells 1, 2 and 3). Wastewater flows from the primary cells to the polishing cell (Cell No. 4), and finally to the post-aeration cell (Cell No. 5). Aeration within Cell No. 5 is supplied by centrifugal air blowers to control odours and strip hydrogen sulphide (H<sub>2</sub>S) prior to discharge. Aluminum sulphate is dosed continuously for phosphorus control as wastewater is pumped to the lagoons. Seasonal discharge of effluent from the lagoons is permitted at specified times during the spring and fall each year. Effluent is pumped from Cell No. 5 over a distance of 7.3 kilometers to an outlet in the South Nation River.

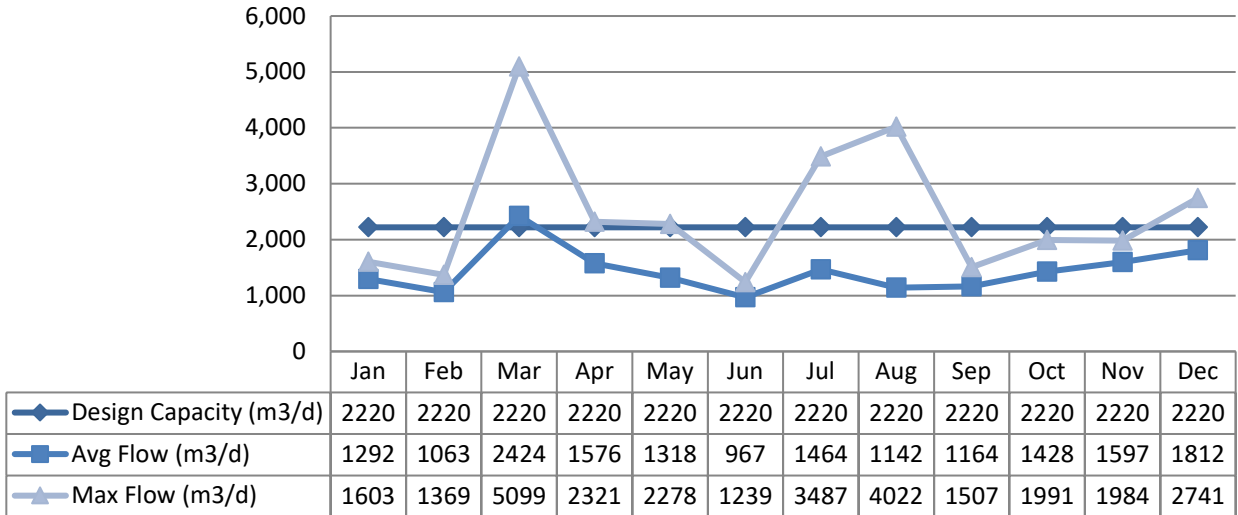
The Township of North Dundas initiated a Class Environmental Assessment of Winchester's wastewater treatment system in 2017 to address various operational challenges, such as hydraulic capacity, discharge constraints and treatment capabilities in order to ensure that increased wastewater flows from future growth can be effectively accommodated. To date, Phase 2 of the EA process has been completed.

## Wastewater System Flows

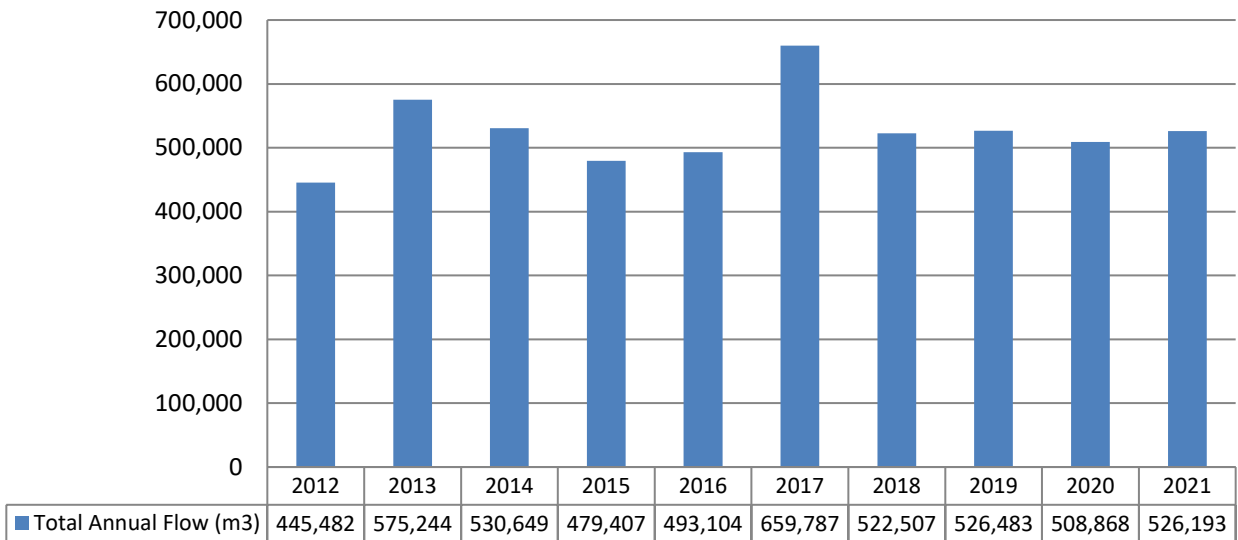
The hydraulic flows reaching the sewage lagoons in 2021 averaged 1,437 m<sup>3</sup>/day which represents 64.7% of the 2,220 m<sup>3</sup>/day design capacity.

### Raw Flows

2020 Raw Flows:



Annual Raw Flow Comparison:



### Effluent Flow

A total of 449,075 m<sup>3</sup> of effluent was discharged from Winchester’s sewage lagoons in 2021 with 154,446 m<sup>3</sup> discharged in the spring and 294,629 m<sup>3</sup> discharged in the fall.

## Effluent Quality Assurance or Control Measures

Effluent control measures include pre-discharge sampling and testing of lagoon cell contents prior to seasonal discharges. The samples are collected by OCWA's competent and licensed staff using approved methods and protocols for sampling including those specified in the Ministry's Procedure F-10-1, "Procedures for Sampling and Analysis Requirements for Municipal and Private Sewage Treatment Works", the Ministry's publication, "Protocol for the Sampling and Analysis of Industrial/Municipal Wastewater" and the publication, "Standard Methods for the Examination of Water and Wastewater".

All effluent samples collected during the reporting period were submitted to Caduceon in Ottawa for analysis, with the exception of pH, temperature and unionized ammonia. Caduceon is accredited by the Canadian Association for Laboratory Accreditation (CALA). Accredited labs must meet strict provincial guidelines including an extensive quality assurance/quality control program. By choosing these laboratories, OCWA is ensuring appropriate control measures are undertaken during sample analysis.

The pH and temperature parameters were analyzed in the field at the time of sample collection by certified operators to ensure accuracy and precision of the results obtained. Un-ionized ammonia was calculated using the total ammonia nitrogen concentration, pH and temperature as required by the facility's Certificate of Approval.

## Effluent Quality

During the reporting period, the average concentrations of carbonaceous biochemical oxygen demand (CBOD<sub>5</sub>), total phosphorus (TP), and pH remained below the effluent limits and objectives outlined in the ECA. In addition, the Dissolved Oxygen (D.O.) measured above the allowable minimum concentration throughout both the spring and fall discharge periods. The objective level of non-detectable was exceeded for undissociated hydrogen sulphide (H<sub>2</sub>S) during both discharge periods, although the measured concentrations remained quite low.

The total suspended solids and total ammonia nitrogen (TAN) remained below both the effluent objective and limit during the fall discharge. During the spring discharge, the TSS exceeded the limit and the TAN exceeded the objective. Please refer to the non-compliance correspondence submitted to the Ministry for more information (Appendix C) and the 'Operating Issues' section of this report for details.

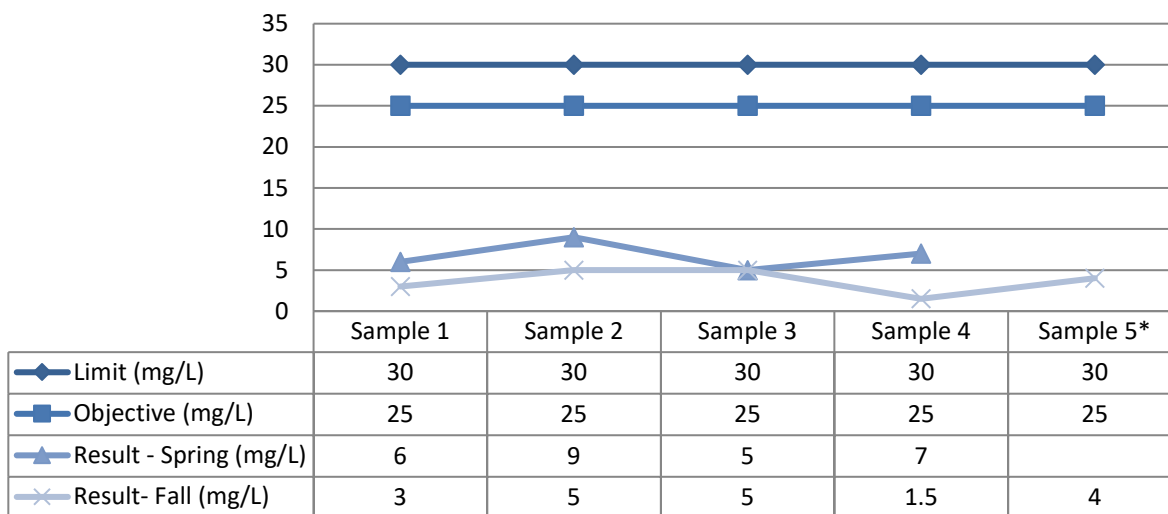
Effluent during both the spring and fall discharge periods remained essentially free of floating or settleable solids and did not contain substances that would cause a film, sheen, foam or discoloration to the receiving stream.

The results from the spring and fall discharge periods are tabulated below. Please refer to the Performance Reports in Appendix A and the 'Operational Issues' section of this report for further information.

**Carbonaceous Biochemical Oxygen Demand (5-Day)**

| Discharge Period | Seasonal Average Concentration (mg/L) | Limit (mg/L) | Objective (mg/L) | Exceedance |
|------------------|---------------------------------------|--------------|------------------|------------|
| Spring           | 6.8                                   | 30           | 25               | No         |
| Fall             | 3.7                                   | 30           | 25               | No         |

Effluent CBOD<sub>5</sub> Results:



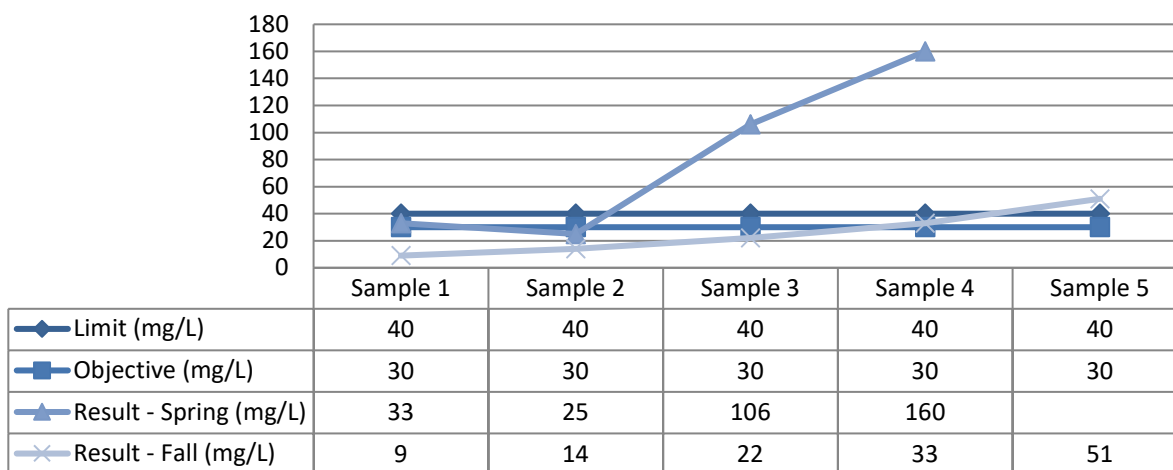
\*No Sample 5 during Spring discharge – terminated sooner than expected due to insufficient stream flow

**Total Suspended Solids**

| Discharge Period | Seasonal Average Concentration (mg/L) | Limit (mg/L) | Objective (mg/L) | Exceedance |
|------------------|---------------------------------------|--------------|------------------|------------|
| Spring           | 81                                    | 40           | 30               | Yes*       |
| Fall             | 26                                    | 40           | 30               | No         |

\*Please see the non-compliance correspondence to the Ministry attached in Appendix C.

Effluent TSS Results:

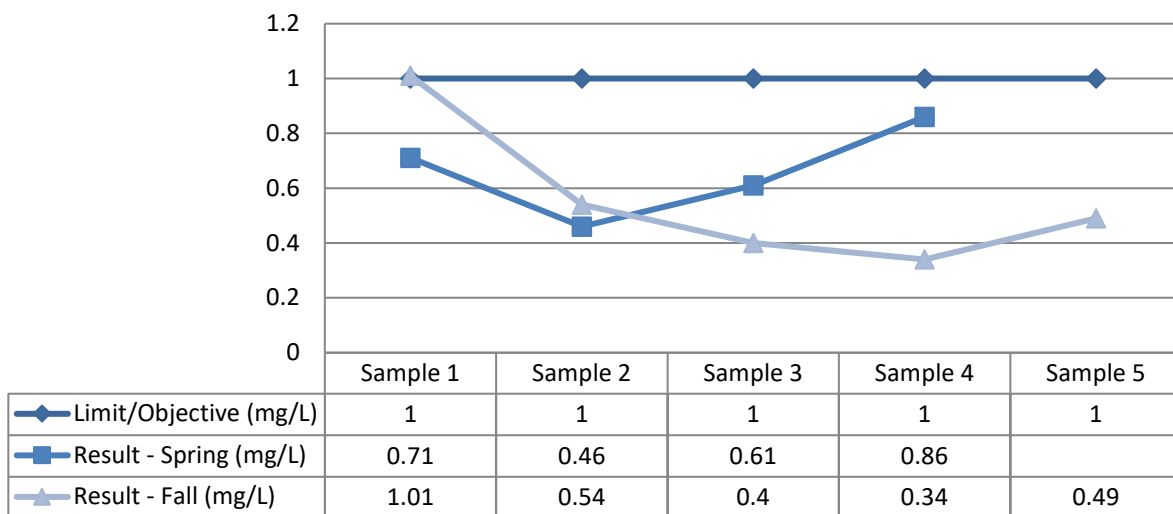


\*No Sample 5 during Spring discharge – terminated sooner than expected due to insufficient stream flow

### Total Phosphorus

| Discharge Period | Seasonal Average Concentration (mg/L) | Limit (mg/L) | Objective (mg/L) | Exceedance |
|------------------|---------------------------------------|--------------|------------------|------------|
| Spring           | 0.66                                  | 1.0          | 1.0              | No         |
| Fall             | 0.56                                  | 1.0          | 1.0              | No         |

Effluent TP Results:



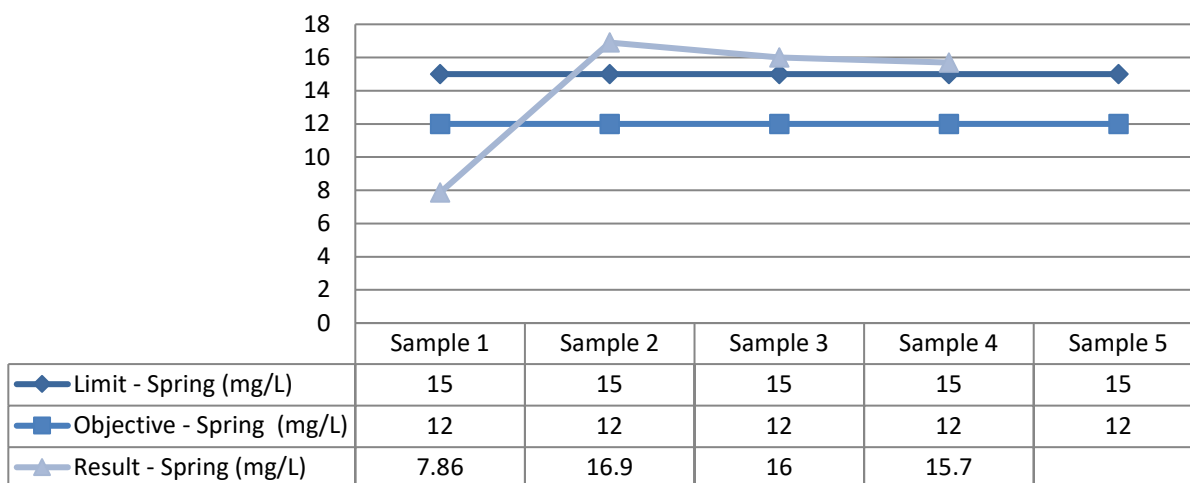
\*No Sample 5 during Spring discharge – terminated earlier than expected due to insufficient stream flow

### Total Ammonia Nitrogen

| Discharge Period | Seasonal Average Concentration (mg/L) | Limit (mg/L) | Objective (mg/L) | Exceedance       |
|------------------|---------------------------------------|--------------|------------------|------------------|
| Spring           | 14.1                                  | 15           | 12               | Yes – Objective* |
| Fall             | 3.98                                  | 7            | 4                | No               |

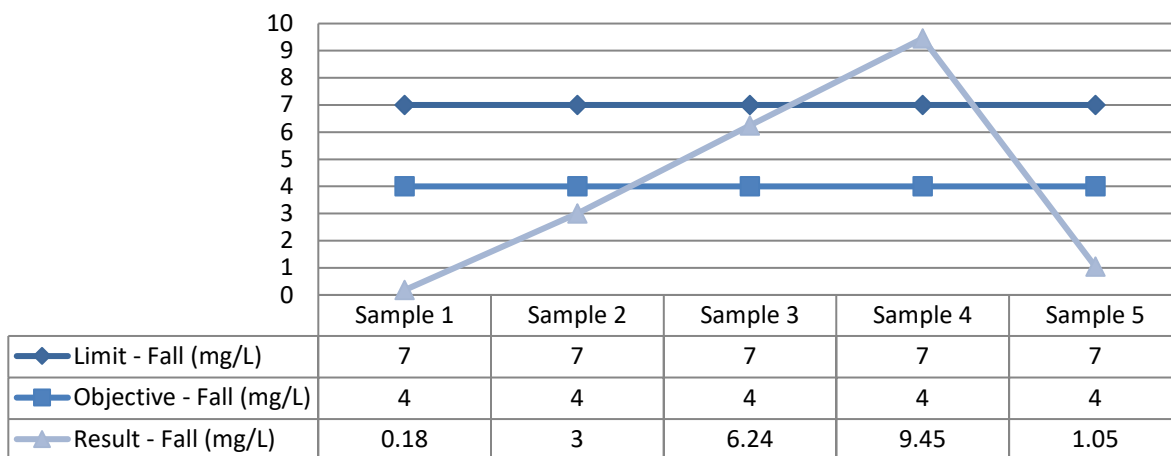
\*Please refer to the 'Operating Issues' section of this report for details.

Effluent TAN Results for Spring Discharge Period:



\*No Sample 5 during Spring discharge – terminated earlier than expected due to insufficient stream flow

Effluent TAN Results for Fall Discharge Period:



### Hydrogen Sulphide

| Discharge Period | Seasonal Average Concentration (mg/L) | Limit (mg/L) | Objective (mg/L) | Exceedance      |
|------------------|---------------------------------------|--------------|------------------|-----------------|
| Spring           | 0.0043                                | 0.02         | Non-detectable   | Yes – Objective |
| Fall             | 0.0068                                | 0.02         | Non-detectable   | Yes – Objective |

Effluent Undissociated H<sub>2</sub>S Results for Spring Discharge Period:

|   | 30-Mar | 04-Apr | 15-Apr | 19-Apr | No 5th Sample* | Average |
|---|--------|--------|--------|--------|----------------|---------|
| S <sup>2-</sup> (mg/L)                        | 0.09   | 0.06   | <0.05  | <0.05  | -              | 0.075   |
| pH  | 8.4    | 7.9    | 8.2    | 8.4    | -              | 8.22    |
| Temp  | 4.0    | 6.4    | 12.0   | 13.0   | -              | N/A     |
| % Undissociated H <sub>2</sub> S (from table) | 7.14   | 18.0   | 8.4    | 5.3    | -              | N/A     |
| Undissociated H <sub>2</sub> S (mg/L)         | 0.006  | 0.011  | ND     | ND     | -              | 0.0043  |

\*No Sample 5 during Spring discharge – terminated earlier than expected due to insufficient stream flow

Effluent Undissociated H<sub>2</sub>S Results for Fall Discharge Period:

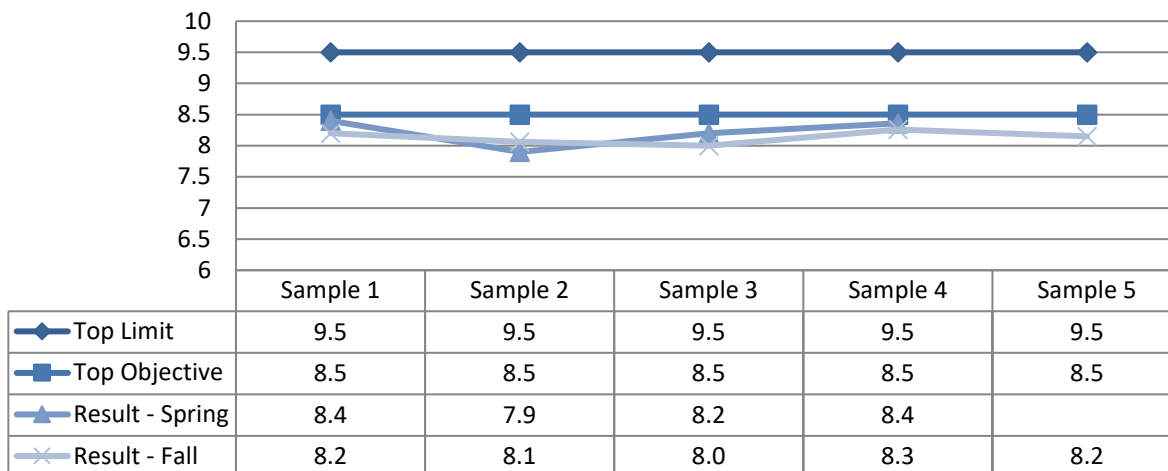
|   | 02-Nov | 05-Nov | 12-Nov | 18-Nov | 24-Nov | Average |
|---|--------|--------|--------|--------|--------|---------|
| S <sup>2-</sup> (mg/L)                        | 0.01   | 0.02   | <0.1   | <0.1   | 0.12   | 0.05    |
| pH  | 8.2    | 8.06   | 8      | 8.26   | 8.15   | 8.13    |
| Temp  | 9      | 8      | 7      | 4.6    | 1.7    | N/A     |
| % Undissociated H <sub>2</sub> S (from table) | 9.161  | 14.203 | 14.652 | 10.664 | 14.621 | N/A     |
| Undissociated H <sub>2</sub> S (mg/L)         | 0.001  | 0.003  | 0.007  | 0.005  | 0.018  | 0.0068  |



**pH**

| Discharge Period | Seasonal Average | Limit     | Objective | Exceedance |
|------------------|------------------|-----------|-----------|------------|
| Spring           | 8.22             | 6.0 – 9.5 | 6.5 – 8.5 | No         |
| Fall             | 8.13             | 6.0 – 9.5 | 6.5 – 8.5 | No         |

Effluent pH Results:

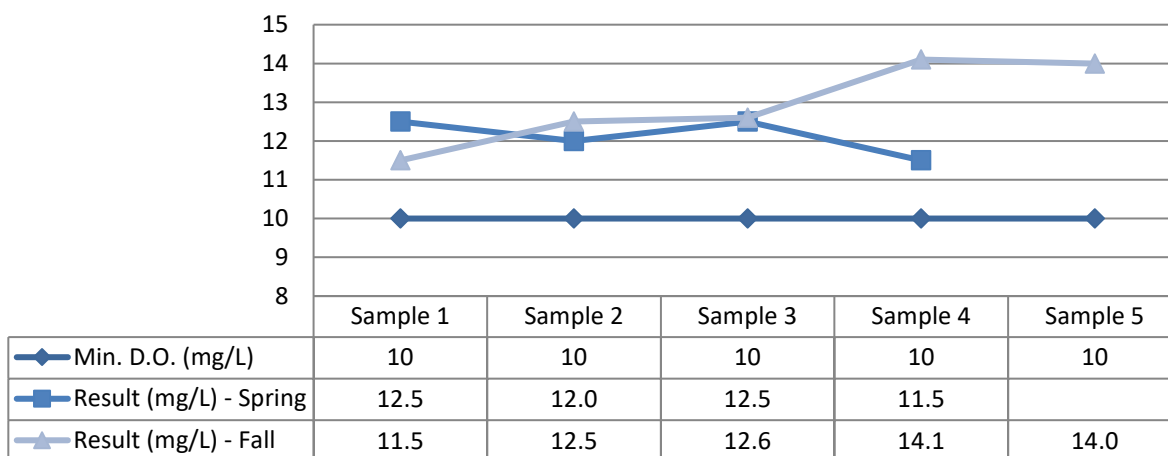


*\*No Sample 5 during Spring discharge – terminated earlier then expected due to insufficient stream flow*

**Dissolved Oxygen**

| Discharge Period | Seasonal Average Concentration (mg/L) | Limit (mg/L) | Objective (mg/L) | Compliant |
|------------------|---------------------------------------|--------------|------------------|-----------|
| Spring           | 12.1                                  | 10           | n/a              | Yes       |
| Fall             | 12.9                                  | 10           | n/a              | Yes       |

Effluent D.O. Results:



*\*No Sample 5 during Spring discharge – terminated earlier then expected due to insufficient stream flow*

## Operating Issues

The ECA limit for total suspended solids was exceeded during the spring discharge in 2021. An unusually large flock of geese contributed to the elevated TSS in the third and fourth effluent sample as the liquid levels in the lagoon cells decreased. In addition, the discharge period lasted only 20 days (minimum 21). The discharge was terminated sooner than expected due to insufficient flows in the receiving stream.

The objective for total ammonia nitrogen (TAN) was exceeded during the spring discharge in 2021. The last three samples were above the limit. The elevated TAN concentration in the samples appears to have been caused by reduced nitrification due to prolonged ice cover which diminished the amount of oxygen available for nitrification in the lagoons.

During spring the discharge in 2021, no fifth sample was taken due to early termination of discharge caused by insufficient South Nation River flows. Please refer to the Request for Relief correspondence submitted to the Ministry for more information (Appendix C).

## Maintenance

### Flow Meter Calibration and Maintenance

Copies of the flow meter calibration certificates for 2021 are attached in Appendix B.

### Maintenance Summary

| Description   |
|---|
| - Performed routine sewer flushing and wet well cleaning                      |
| - Repaired/upgraded manholes in collection system                             |
| - Installed new 600V heater at main SPS                                       |
| - Sewer backup – 541 Henderson Crescent – caused by lateral blockage          |
| - Sewer main backup – Meadows subdivision – caused by sewer main blockage     |
| - Sewer lateral plugged at the main – 438 Main St – caused by sump in lateral |
| - Repairs to lagoon splitter box valve extensions (Cell 3-4 and Cell 4-5)     |
| - Cleaned wet wells – 475 Ottawa St   |
| - Sanitary service dig 541 Henderson St & 438 Main St                         |
| - Multiranger with transducer spare   |
| - Replacement sump pump at lagoon to be installed                             |
| - Windmill Kits   |
| - Replaced pump #1 at Ottawa St SPS   |
| - Removed vegetation and brush from lagoon                                    |

### Notice of Modifications

| Date            | Process | Modification | Status |
|-----------------|---------|--------------|--------|
| None to report. |         |              |        |

## Sludge Generation

Sludge depth is monitored periodically, and plans for sludge removal are made as required for optimal operation of the lagoon system.

## Summary of Complaints

| Location       | Date | Nature of Complaint | Actions Taken |
|----------------|------|---------------------|---------------|
| None to report |      |                     |               |

## Summary of Abnormal Discharge Events

### Bypass/Overflow/Spills

No bypasses, overflows, or spills occurred during the reporting period.

# Appendix A

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## Performance Assessment Reports

# ONTARIO CLEAN WATER AGENCY PERFORMANCE ASSESSMENT REPORT

MUNICIPALITY: TOWNSHIP OF NORTH DUNDAS  
PROJECT: WINCHESTER WASTEWATER TREATMENT PLANT

YEAR: 2021  
WATER COURSE: SOUTH NATION RIVER  
DESIGN CAPACITY: 2220 m<sup>3</sup>/day

PROJECT NUM.: 5679  
WORKS NUM.: 110001202  
DESCRIPTION: A FIVE CELL LAGOON (#5 CELL POST AERATION) CELL #1 - 3.95 HA, CELL #2 - 2.75 HA,  
CELL #3 - 4.1 HA, CELL #4 - 6.3 HA, CELL #5 - 2.0 HA

| MONTH    | FLOWS                     |                             |                             |                              |                           | Avg. Alum Dosage (mg/L) | CBOD5               |                      |                     | TOTAL SUSPENDED SOLIDS |                    |                     | PHOSPHORUS           |                      |                     | TKN AVG RAW TKN (mg/L) |
|----------|---------------------------|-----------------------------|-----------------------------|------------------------------|---------------------------|-------------------------|---------------------|----------------------|---------------------|------------------------|--------------------|---------------------|----------------------|----------------------|---------------------|------------------------|
|          | TOTAL FLOW m <sup>3</sup> | AVG DAY FLOW m <sup>3</sup> | MAX DAY FLOW m <sup>3</sup> | EFFLUENT FLOW m <sup>3</sup> | DISCHARGE DURATION (days) |                         | AVG RAW BOD5 (mg/L) | AVG EFF CBOD5 (mg/L) | PERCENT REMOVAL (%) | AVG RAW TSS (mg/L)     | AVG EFF TSS (mg/L) | PERCENT REMOVAL (%) | AVG RAW PHOS. (mg/L) | AVG EFF PHOS. (mg/L) | PERCENT REMOVAL (%) |                        |
| JAN      | 40,063                    | 1,292                       | 1,603                       |                              |                           | 109.5                   | 58                  |                      | 60                  |                        |                    | 2.80                |                      |                      | 26.6                |                        |
| FEB      | 29,764                    | 1,063                       | 1,369                       |                              |                           | 108.7                   | 76                  |                      | 75                  |                        |                    | 3.47                |                      |                      | 32.3                |                        |
| MAR      | 75,152                    | 2,424                       | 5,099                       | 22,022                       | 2                         | 108.4                   | 53                  | 6.0                  | 52                  | 33.0                   |                    | 2.63                | 0.71                 |                      | 25.2                |                        |
| APR      | 47,286                    | 1,576                       | 2,321                       | 132,424                      | 18                        | 109.0                   | 45                  | 8.0                  | 36                  | 97.0                   |                    | 2.30                | 0.64                 |                      | 22.2                |                        |
| MAY      | 40,847                    | 1,318                       | 2,278                       |                              |                           | 107.2                   | 29                  |                      | 40                  |                        |                    | 6.20                |                      |                      | 60.0                |                        |
| JUN      | 28,997                    | 967                         | 1,239                       |                              |                           | 110.7                   | 82                  |                      | 64                  |                        |                    | 4.00                |                      |                      | 34.1                |                        |
| JUL      | 45,387                    | 1,464                       | 3,487                       |                              |                           | 113.9                   | 45                  |                      | 58                  |                        |                    | 3.08                |                      |                      | 31.1                |                        |
| AUG      | 35,417                    | 1,142                       | 4,022                       |                              |                           | 108.9                   | 53                  |                      | 56                  |                        |                    | 2.80                |                      |                      | 27.7                |                        |
| SEP      | 34,915                    | 1,164                       | 1,507                       |                              |                           | 111.2                   | 36                  |                      | 43                  |                        |                    | 2.43                |                      |                      | 28.2                |                        |
| OCT      | 44,278                    | 1,428                       | 1,991                       |                              |                           | 111.0                   | 14                  |                      | 20                  |                        |                    | 2.23                |                      |                      | 25.9                |                        |
| NOV      | 47,914                    | 1,597                       | 1,984                       | 294,629                      | 23                        | 116.1                   | 29                  | 3.7                  | 34                  | 26.0                   |                    | 2.29                | 0.56                 |                      | 25.2                |                        |
| DEC      | 56,173                    | 1,812                       | 2,741                       |                              |                           | 113.5                   | 45                  |                      | 205                 |                        |                    | 4.55                |                      |                      | 35.1                |                        |
| TOTAL    | 526,193                   |                             | SPRING                      | 154,446                      | 20                        |                         |                     |                      |                     |                        |                    |                     |                      |                      |                     |                        |
| TOTAL    |                           |                             | FALL                        | 294,629                      | 23                        |                         |                     |                      |                     |                        |                    |                     |                      |                      |                     |                        |
| AVG      |                           | 1,437                       |                             |                              |                           | 110.7                   | 47                  | 5.1                  | 89.3                | 62                     | 50.3               | 18.7                | 3.23                 | 0.60                 | 81.4                |                        |
| MAX      |                           |                             | 5,099                       |                              |                           |                         | 82                  |                      |                     | 205                    |                    | 6.20                |                      |                      | 60.0                |                        |
| CRITERIA |                           | <b>2,220</b>                |                             | SPRING                       | <b>21</b>                 |                         |                     | <b>30</b>            |                     |                        | <b>40</b>          |                     |                      | <b>1</b>             |                     |                        |
| CRITERIA |                           |                             |                             | FALL                         | <b>21</b>                 |                         |                     | <b>30</b>            |                     |                        | <b>40</b>          |                     |                      | <b>1</b>             |                     |                        |

Note: PERCENT REMOVAL BASED ON 12 MONTHS OF RAW SEWAGE COMPOSITE SAMPLES  
Lab analyzed CBOD in July instead of BOD.

**ONTARIO CLEAN WATER AGENCY  
LAGOON PERFORMANCE ASSESSMENT REPORT**

MUNICIPALITY: TOWNSHIP OF NORTH DUNDAS  
 PROJECT: WINCHESTER WASTEWATER TREATMENT LAGOONS  
 PROJECT NUM.: 5673  
 WORKS NUM.: 110901202  
 DESCRIPTION: A FIVE CELL LAGOON (#5 CELL POST AERATION) CELL #1 - 3.95 HA, CELL #2 - 2.75 HA  
 CELL #3 - 4.1 HA, CELL #4 - 6.3 HA, CELL #5 - 2.0 HA

YEAR: 2021  
 WATER COURSE: SOUTH NATION RIVER  
 DESIGN CAPACITY: 2220 m<sup>3</sup>/day

| SAMPLE RESULTS                                    | SPRING                      |        |        |        |        |               | 154,446 m <sup>3</sup> |                  |              |
|---|-----------------------------|--------|--------|--------|--------|---------------|------------------------|------------------|--------------|
|   | DATE                        | 30-Mar | 04-Apr | 15-Apr | 19-Apr | No 5th Sample | Average                | C of A Objective | C of A Limit |
| SAMPLE 5X/DISCH.<br><br>START, 25%, 50%, 75%, END | CBOD (mg/L)                 | 6      | 9      | <10    | 7      | **            | 6.8                    | 25               | 30           |
|   | TSS (mg/L)                  | 33     | 25     | 106    | 160    | **            | 81.0                   | 30               | 40           |
|   | TP (mg/L)                   | 0.71   | 0.46   | 0.61   | 0.86   | **            | 0.66                   | 1                | 1            |
|   | DO (mg/L)                   | 12.5   | 12.0   | 12.5   | 11.5   | **            | 12.1                   | -                | 10           |
|   | N-NH <sub>3</sub> (mg/L)    | 7.86   | 16.9   | 16     | 15.7   | **            | 14.12                  | 12               | 15           |
|   | unionized NH <sub>3</sub> * | 0.22   | 0.19   | 0.53   | 0.80   | **            | 0.43                   |                  |              |
|   | NO <sub>2</sub> (mg/L)      | <0.1   | 0.10   | <0.1   | <0.1   | **            |                        |                  |              |
|   | NO <sub>3</sub> (mg/L)      | 0.2    | <0.1   | 0.40   | 0.30   | **            |                        |                  |              |
|   | TKN (mg/L)                  | 11.3   | 18.8   | 20.2   | 21.1   | **            |                        |                  |              |
|   | <i>E.coli</i> (cfu/100 mL)  | 0      | 0      | 97     | 3000   | **            |                        |                  |              |

\* un-ionized NH<sub>3</sub> based on in-house calculation  
 \*\* Discharge terminated sooner than expected due to insufficient stream flow

|                                  | 30-Mar | 04-Apr | 15-Apr | 19-Apr | No 5th Sample | Average | Objective | Limit     |
|----------------------------------|--------|--------|--------|--------|---------------|---------|-----------|-----------|
| S <sub>2</sub> (mg/L)            | 0.09   | 0.06   | <0.05  | <0.05  | **            | 0.075   | N/A       | N/A       |
| pH                               | 8.4    | 7.9    | 8.2    | 8.4    | **            | 8.215   | 6.5 - 8.5 | 6.0 - 9.5 |
| Temp                             | 4.0    | 6.4    | 12.0   | 13.0   | **            | N/A     | N/A       | N/A       |
| % Undissociated H <sub>2</sub> S | 7.14   | 18.0   | 8.4    | 5.3    | **            | N/A     | N/A       | N/A       |
| Undissociated H <sub>2</sub> S   | 0.006  | 0.011  | ND     | ND     | **            | 0.0043  | ND        | 0.02      |

|                            | 22-Mar-21 | Cell 1 | Cell 2 | Cell 3 | Cell 4 | Cell 5 |
|----------------------------|-----------|--------|--------|--------|--------|--------|
| CBOD (mg/L)                | 5         | 5      | 12     | 8      | 3      |        |
| TSS (mg/L)                 | 10        | 8      | 17     | 35     | 17     |        |
| TP (mg/L)                  | 0.32      | 0.24   | 0.32   | 0.55   | 0.36   |        |
| NH <sub>3</sub> (mg/L)     | 6.28      | 10.20  | 12.70  | 4.63   | 4.36   |        |
| S <sub>2</sub> (mg/L)      | 1.38      | 7.81   | 0.04   | 0.83   | 0.04   |        |
| <i>E.coli</i> (cfu/100 mL) | 300       | 480    | 260    | 1300   | 2      |        |

COMMENTS: H<sub>2</sub>S, TP, *E.coli* sampled prior to discharge  
 Dilution ratio as per operations manual

| TOTAL LOADING        | SPRING | FALL  | TOTAL  | ECA LIMIT |
|----------------------|--------|-------|--------|-----------|
| CBOD (kg)            | 1,043  | 1,090 | 2,133  | 24,309    |
| SS (kg)              | 12,510 | 7,601 | 20,112 | 32,412    |
| TP (kg)              | 102    | 164   | 266    | 810.3     |
| NH <sub>3</sub> (kg) | 2,180  | 1,174 | 3,354  | -         |

| SAMPLE RESULTS                                    | FALL                             |        |        |        |        |        | 294,629 m <sup>3</sup> |                  |              |
|---|----------------------------------|--------|--------|--------|--------|--------|------------------------|------------------|--------------|
|   | DATE                             | 02-Nov | 05-Nov | 12-Nov | 18-Nov | 24-Nov | Average                | C of A Objective | C of A Limit |
| SAMPLE 5X/DISCH.<br><br>START, 25%, 50%, 75%, END | CBOD (mg/L)                      | 3      | 5      | 5      | <3     | 4      | 3.7                    | 25               | 30           |
|   | TSS (mg/L)                       | 9      | 14     | 22     | 33     | 51     | 26                     | 30               | 40           |
|   | TP (mg/L)                        | 1.01   | 0.54   | 0.4    | 0.34   | 0.49   | 0.56                   | 1                | 1            |
|   | DO (mg/L)                        | 11.5   | 12.5   | 12.6   | 14.1   | 14.0   | 12.9                   | -                | 10           |
|   | N-NH <sub>3</sub> (mg/L)         | 0.18   | 3      | 6.24   | 9.45   | 1.05   | 3.98                   | 4                | 7            |
|   | unionized NH <sub>3</sub> (mg/L) | 0.005  | 0.05   | 0.09   | 0.20   | 0.01   | 0.07                   |                  |              |
|   | NO <sub>2</sub> (mg/L)           | <0.1   | <0.1   | <0.2   | 0.2    | <1     |                        |                  |              |
|   | NO <sub>3</sub> (mg/L)           | <0.1   | 0.2    | 0.5    | 0.7    | 1.1    |                        |                  |              |
|   | TKN (mg/L)                       | 1.6    | 5.2    | 10.3   | 13.90  | 17.6   |                        |                  |              |
|   | <i>E.coli</i> (cfu/100 mL)       | 131    | 133    | 2100   | <1000  | 480    |                        |                  |              |

\*\* un-ionized NH<sub>3</sub> based on in-house calculation (Excel TAB NH3 2021)

|                                  | 02-Nov | 05-Nov | 12-Nov | 18-Nov | 24-Nov | Average | Objective | Limit     |
|----------------------------------|--------|--------|--------|--------|--------|---------|-----------|-----------|
| S <sub>2</sub> (mg/L)            | 0.01   | 0.02   | <0.1   | <0.1   | 0.12   | 0.05    | N/A       | N/A       |
| pH                               | 8.2    | 8.06   | 8      | 8.26   | 8.15   | 8.134   | 6.5 - 8.5 | 6.0 - 9.5 |
| Temp                             | 9      | 8      | 7      | 4.6    | 1.7    | N/A     | N/A       | N/A       |
| % Undissociated H <sub>2</sub> S | 9.161  | 14.203 | 14.652 | 10.664 | 14.621 | N/A     | N/A       | N/A       |
| Undissociated H <sub>2</sub> S   | 0.001  | 0.003  | 0.007  | 0.005  | 0.018  | 0.0068  | ND        | -         |

|                            | Cell 1 | Cell 2 | Cell 3 | Cell 4 | Cell 5 |
|----------------------------|--------|--------|--------|--------|--------|
| CBOD (mg/L)                | 8      | 4      | 7      | <3     | <3     |
| TSS                        | 17     | 30     | 22     | 32     | 8      |
| TP (mg/L)                  | 0.41   | 0.41   | 0.44   | 0.56   | 1.07   |
| NH <sub>3</sub> (mg/L)     | 10.20  | 8.28   | 10.30  | 0.53   | 0.11   |
| TKN (mg/L)                 | 15.7   | 14.6   | 16.4   | 2.3    | 1.5    |
| H <sub>2</sub> S (mg/L)    | <0.1   | <0.1   | <0.1   | 0.530  | 0.010  |
| <i>E.coli</i> (cfu/100 mL) | 480    | 420    | 560    | 166    | 150    |

COMMENTS: H<sub>2</sub>S, TP, *E.coli* sampled prior to discharge  
 Dilution ratio as per operations manual

**ONTARIO CLEAN WATER AGENCY  
WINCHESTER SEWAGE LAGOON 2021**

**DETERMINATION OF UN-IONIZED AMMONIA (NH<sub>3</sub>) IN WASTEWATER EFFLUENT**

| Sample Date | Temperature (°C) | Degrees Kelvin | Dissociation Constant pKa | Sample pH on-site | Fraction of Un-ionized Ammonia | Total Ammonia (mg/L) (NH <sub>3</sub> +NH <sub>4</sub> +as N) | Un-ionized Ammonia (mg/L) |
|-------------|------------------|----------------|---------------------------|-------------------|--------------------------------|---|---------------------------|
| 30-Mar      | 4.0              | 277.15         | 9.94                      | 8.4               | 0.0280                         | 7.9   | 0.220                     |
| 04-Apr      | 6.4              | 279.55         | 9.86                      | 7.9               | 0.0110                         | 16.9  | 0.185                     |
| 15-Apr      | 12.0             | 285.15         | 9.66                      | 8.2               | 0.0332                         | 16.0  | 0.532                     |
| 19-Apr      | 13.0             | 286.15         | 9.63                      | 8.4               | 0.0509                         | 15.7  | 0.800                     |
| 02-Nov      | 9.0              | 282.15         | 9.77                      | 8.2               | 0.0265                         | 0.18  | 0.005                     |
| 05-Nov      | 8.0              | 281.15         | 9.80                      | 8.06              | 0.0179                         | 3   | 0.054                     |
| 12-Nov      | 7.0              | 280.15         | 9.83                      | 8                 | 0.0144                         | 6.24  | 0.090                     |
| 18-Nov      | 4.6              | 277.75         | 9.92                      | 8.26              | 0.0215                         | 9.45  | 0.203                     |
| 24-Nov      | 1.7              | 274.85         | 10.02                     | 8.15              | 0.0132                         | 1.05  | 0.014                     |

# Appendix B

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## Flow Meter Calibration Reports



|                     |                 |                                   |                                       |
|---------------------|-----------------|-----------------------------------|---------------------------------------|
| <b>Work Order #</b> | 2173253         | Meter Flow Verification (1y) 5679 | <b>Status</b> COMP                    |
| <b>Job Plan #</b>   | METFLO01-A      | METER FLOW ANNUAL GENERIC         |                                       |
| <b>Project</b>      | NORDUY5679-M100 |                                   |                                       |
| <b>Type</b>         | PM              |                                   | <b>Scheduled Start Date</b> 03-Mar-21 |
| <b>Criticality</b>  | 3               |                                   |                                       |
| <b>Class</b>        | Calibration     |                                   |                                       |

|                 |  |
|-----------------|--|
| <b>Location</b> | 5679, Winchester Wastewater Lagoon & CS, Process, Process Control & Monitoring |
|-----------------|--|

|                            |   |                   |                                   |
|----------------------------|---|-------------------|-----------------------------------|
| <b>Asset</b>               | 0000073400  | METER FLOW LAGOON | <b>Status</b> OPERATING           |
| <b>Building</b>            | PUMPING STATION BUILDING  |                   |                                   |
| <b>Level</b>               | G   |                   |                                   |
| <b>Qualifier</b>           | WINCHESTER LAGOON AT PUMP HOUSE   |                   |                                   |
| <b>Manufacturer</b>        | ENDRESS & HAUSER  |                   |                                   |
| <b>Model</b>               | 33FH4H MA1FD81F21A  |                   |                                   |
| <b>Serial Number</b>       | 5M 627538   |                   |                                   |
| <b>Warranty Expiration</b> |   |                   |                                   |
| <b>Install Date</b>        | 01-Jan-00   |                   | <b>Purchase Price</b> \$ 1,800.00 |
| <b>Asset Comments</b>      | Calibrated Range0-378.54 l/sec0-32705.9 m3/daycal factor 1.0907PERCENT OF ACCURACY - CLASS - RANGE - CALIBRATION RANGE - DATE CODE - TYPE/FORM - MAGCAPACITY/RATING - M3/DAYCATALOG NUMBER - LAYING LENGTH - OUTPUT AMPERAGE - 4-20MAOUTPUT TYPE (PULSE/MILLIAMPS) - MILLAMPDESIGN PRESSURE - SCADA TAG # - |                   |                                   |

|                        |  |
|------------------------|--|
| <b>Reported By</b>     | MAXADMIN   |
| <b>Lead</b>            |  |
| <b>Crew Work Group</b> | 1225 Meter Flow Verification Team 2 Chesterville |

| Asset #    | Meter   | Last Reading            | Date | Current Reading | Date |
|------------|---------|-------------------------|------|-----------------|------|
| 0000073400 | AS LEFT | AS LEFT ASSET CONDITION |      |                 |      |

**Safety Message**

This Work Order (and accompanying Maintenance Procedure) have been developed to aid field personnel in the care and maintenance of the specified equipment. However, maintenance personnel are expected to look for and correct any defects which are not anticipated in the procedure. This document may not provide all the technical information that may be required, and it may be necessary to refer to the manufacturer's manual for further details.

The "As Found" and "As Left" readings, as well as any abnormalities found and any repairs carried out, are to be recorded in the Maximo WMS System.

Isolate and de-energize equipment in accordance with the lock-out procedure.

Take time to identify hazards and plan how each hazard will be eliminated or controlled. Work practices must be in accordance with the Occupational Health & Safety Act and the Ontario Clean Water Agency safety manual.

Ensure direct supervisor or their designate have been notified of entry into the site. This notification should provide approximate time and duration. On completion of duties notification is to be given that site has been vacated and secured.

| <b>Task</b> | <b>Description</b>   |
|-------------|--|
| 10          | <p><b>RUNNING CHECKS</b></p> <ol style="list-style-type: none"> <li>1) Verify calibration parameters and programming parameters where applicable.</li> <li>2) Ensure proper connections and grounding.</li> <li>3) Check display for any alarm or error codes.</li> </ol>  |
| 20          | <p><b>HAVE QUALIFIED TECHNICIAN CALIBRATE UNIT</b></p> <ol style="list-style-type: none"> <li>1. Have a qualified technician calibrate the unit, using actual flow method or flow simulator.</li> <li>2. Calibration records must be kept for a period of five years.</li> <li>3. Records shall include the level of accuracy of the equipment as found and as left.</li> <li>4. Calibration test equipment shall be certified annually and certification dates recorded on the calibration record. Some test equipment may not require calibration</li> </ol> |
| 30          | <p><b>RECORD ADJUSTMENTS AND VERIFY OUTPUTS</b></p> <ol style="list-style-type: none"> <li>1. Record any adjustments, modifications or replacements made to the equipment during the calibration.</li> <li>2. Verify accuracy of electronic outputs to the end device as required based on theoretical versus actual values .{Chart recorders, SCADA, Outpost 5}.</li> <li>3. Ensure all nameplate data is recorded and entered in WMS.</li> </ol>   |
| 40          | <p><b>COMPLETE A VERIFICATION SHEET FOR EACH FLOW METER, POST IT AND ATTACH TO WORK ORDER</b></p> <p>Note: Calibration sheet must be signed and original kept on site in the SOP binder.</p>   |

**For Field-Use Only - Completion Elements:**



# Appendix C

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## Ministry Correspondence

May 5, 2021

Ms. Tracy Hart  
District Manager, Ministry of the Environment, Conservation and Parks  
Ottawa District Office  
[tracy.hart@ontario.ca](mailto:tracy.hart@ontario.ca)

**Subject: Winchester Sewage Lagoon - Notification of Non-Compliance – Spring Discharge 2021**

This letter provides written notification of non-compliance with three of the Terms and Conditions specified in Certificate of Approval # 5312-88TK5R for the spring discharge of Winchester’s sewage lagoon. This notification includes non-compliance with an effluent concentration limit as well non-compliances with the total number of days for the lagoon discharge and the total number of samples collected over the course of the discharge. This letter confirms the verbal notification of non-compliance provided by OCWA to the Ontario Ministry of the Environment, Conservation and Parks’ Spills Action Centre on April 28, 2021 (SAC Reference # 4827-C2HJMV).

The spring discharge of Winchester’s sewage lagoon began on March 30, 2021 shortly after the ice had come off the surface of the lagoon cells. At the time, unusually warm temperatures caused a rapid melt of the snow pack and stream flows peaked and receded more quickly than normal over the following weeks. Originally, OCWA had planned to discharge approximately 250,000 m<sup>3</sup> from the lagoon in total; however, because of the spring dilution ratio of 110:1 (stream flow to effluent flow) required under Condition 9(1), and the rapid decrease in river flow that occurred, this was not possible.

Sample collection for Winchester’s discharge is based on the projected total volume to discharge. In accordance with Condition 10(2)(b), five samples are collected per discharge season, at the start and end of the discharge, and when approximately 25%, 50%, and 75% of the planned quantity has been discharged. Under Condition 9(1), the discharge is also required to continue for a minimum of 21 days. Over the course of the spring discharge period the effluent flow rate was reduced until the dilution ratio could no longer be met, and the discharge was terminated, sooner than expected. As a result, only four out of the five required samples were collected, and the discharge took place over 20 days rather than 21.

When the discharge was shut down on April 19<sup>th</sup> due to insufficient stream flow, it was anticipated that if river flows picked up before the end of the month, more effluent would be discharged. However, OCWA verified at this point that there was enough capacity until the fall discharge window, so it would not be necessary to continue if conditions did not improve. Since no increase in river flow was observed prior to April 30<sup>th</sup> and effluent sample results were received in the meantime indicating an elevated concentration of total suspended solids (TSS), the spring discharge was not resumed after the April 19<sup>th</sup> shut down.

The following effluent parameter was exceeded during the spring discharge (Condition 7(1) - Table 2):

| Parameter              | Type of Limit                  | Type of Sample | Result    | ECA Limit |
|------------------------|--------------------------------|----------------|-----------|-----------|
| Total Suspended Solids | Seasonal Average Concentration | Grab           | 81.0 mg/L | 40.0 mg/L |

The concentration of TSS in the samples measured 33, 25, 106, and 160 mg/L respectively. An unusually large flock of geese contributed to the elevated TSS in the third and fourth effluent samples collected as the liquid levels in the lagoon cells decreased. Although the TSS limit was exceeded, all other parameters remained below the seasonal limits for the discharge period. A complete listing of all sample results obtained during the spring discharge can be found in the Lagoon Discharge PAR, attached.

If you have any questions or concerns, please do not hesitate to contact me at (613) 448-3098.

Sincerely,



Dawn Crump  
Process & Compliance Technician  
Seaway Valley Cluster

Cc: Angela Rutley, CAO, Township of North Dundas  
Khurram Tunio, Director of Public Works, Township of North Dundas  
Stephane Barbarie, Senior Operations Manager, OCWA  
Patrick Lalonde, Provincial Officer, MECP

**ONTARIO CLEAN WATER AGENCY  
LAGOON PERFORMANCE ASSESSMENT REPORT**

MUNICIPALITY: TOWNSHIP OF NORTH DUNDAS  
 PROJECT: WINCHESTER WASTEWATER TREATMENT LAGOONS  
 PROJECT NUM.: 5679  
 WORKS NUM.: 110001202  
 DESCRIPTION: A FIVE CELL LAGOON (#5 CELL POST AERATION) CELL #1 - 3.95 HA, CELL #2 - 2.75 HA, CELL #3 - 4.1 HA, CELL #4 - 6.3 HA, CELL #5 - 2.0 HA

YEAR: 2021  
 WATER COURSE: SOUTH NATION RIVER  
 DESIGN CAPACITY: 2220 m<sup>3</sup>/day

| SAMPLE<br>SX/DISCH.       | SAMPLE RESULTS              |        | SPRING |        |        |               | 154,450 m <sup>3</sup> |                  |              |  |
|---------------------------|-----------------------------|--------|--------|--------|--------|---------------|------------------------|------------------|--------------|--|
|                           | DATE                        | 30-Mar | 04-Apr | 15-Apr | 19-Apr | No 5th Sample | Average                | C of A Objective | C of A Limit |  |
| START, 25%, 50%, 75%, END | CBOD (mg/L)                 | 6      | 9      | <10    | 7      | **            | 6.8                    | 25               | 30           |  |
|                           | TSS (mg/L)                  | 33     | 25     | 106    | 160    | **            | 81.0                   | 30               | 40           |  |
|                           | TP (mg/L)                   | 0.71   | 0.46   | 0.61   | 0.86   | **            | 0.66                   | 1                | 1            |  |
|                           | DO (mg/L)                   | 12.5   | 12.0   | 12.5   | 11.5   | **            | 12.1                   | -                | 10           |  |
|                           | N-NH <sub>3</sub> (mg/L)    | 7.86   | 16.9   | 16     | 15.7   | **            | 14.1                   | 12               | 15           |  |
|                           | unionized NH <sub>3</sub> * | 0.22   | 0.19   | 0.53   | 0.80   | **            | 0.43                   |                  |              |  |
|                           | NO <sub>2</sub> (mg/L)      | <0.1   | 0.10   | <0.1   | <0.1   | **            |                        |                  |              |  |
|                           | NO <sub>3</sub> (mg/L)      | 0.2    | <0.1   | 0.40   | 0.30   | **            |                        |                  |              |  |
|                           | TKN (mg/L)                  | 11.3   | 18.8   | 20.2   | 21.1   | **            |                        |                  |              |  |
|                           | <i>E.coli</i> (cfu/100 mL)  | 0      | 0      | 97     | 3000   | **            |                        |                  |              |  |

\* un-ionized NH<sub>3</sub> based on in-house calculation  
 \*\* Discharge terminated sooner than expected due to insufficient stream flow

|                                  | 30-Mar | 04-Apr | 15-Apr | 19-Apr | No 5th Sample | Average | Objective | Limit     |
|----------------------------------|--------|--------|--------|--------|---------------|---------|-----------|-----------|
| S <sub>2</sub> (mg/L)            | 0.09   | 0.06   | <0.05  | <0.05  | **            | 0.075   | N/A       | N/A       |
| pH                               | 8.4    | 7.9    | 8.2    | 8.4    | **            | N/A     | 6.5 - 8.5 | 6.0 - 9.5 |
| Temp                             | 4.0    | 6.4    | 12.0   | 13.0   | **            | N/A     | N/A       | N/A       |
| % Undissociated H <sub>2</sub> S | 7.14   | 18.0   | 8.4    | 5.3    | **            | N/A     | N/A       | N/A       |
| Undissociated H <sub>2</sub> S   | 0.006  | 0.011  | ND     | ND     | **            | 0.0043  | ND        | 0.02      |

| PRE-DISCHARGE RESULTS      | 22-Mar-21              | Cell 1 | Cell 2 | Cell 3 | Cell 4 | Cell 5 |
|----------------------------|------------------------|--------|--------|--------|--------|--------|
|                            | CBOD (mg/L)            | 5      | 5      | 12     | 8      | 3      |
|                            | TSS (mg/L)             | 10     | 8      | 17     | 35     | 17     |
|                            | TP (mg/L)              | 0.32   | 0.24   | 0.32   | 0.55   | 0.36   |
|                            | NH <sub>3</sub> (mg/L) | 6.28   | 10.20  | 12.70  | 4.63   | 4.36   |
|                            | S <sub>2</sub> (mg/L)  | 1.38   | 7.81   | 0.04   | 0.83   | 0.04   |
| <i>E.coli</i> (cfu/100 mL) | 300                    | 480    | 260    | 1300   | 2      |        |

COMMENTS: H<sub>2</sub>S, TP, *E.coli* sampled prior to discharge  
 Dilution ratio as per operations manual

| TOTAL LOADING        | SPRING | FALL    | TOTAL   | ECA LIMIT |
|----------------------|--------|---------|---------|-----------|
| CBOD (kg)            | 1,043  | #DIV/0! | #DIV/0! | 24,399    |
| SS (kg)              | 12,510 | #DIV/0! | #DIV/0! | 32,412    |
| TP (kg)              | 102    | #DIV/0! | #DIV/0! | 810.3     |
| NH <sub>3</sub> (kg) | 2,180  | #DIV/0! | #DIV/0! | -         |

| SAMPLE<br>SX/DISCH.       | SAMPLE RESULTS                   |  | FALL |  |  |  | m <sup>3</sup> |                  |              |
|---------------------------|----------------------------------|--|------|--|--|--|----------------|------------------|--------------|
|                           | DATE                             |  |      |  |  |  | Average        | C of A Objective | C of A Limit |
| START, 25%, 50%, 75%, END | CBOD (mg/L)                      |  |      |  |  |  | #DIV/0!        | 25               | 30           |
|                           | TSS (mg/L)                       |  |      |  |  |  | #DIV/0!        | 30               | 40           |
|                           | TP (mg/L)                        |  |      |  |  |  | #DIV/0!        | 1                | 1            |
|                           | DO (mg/L)                        |  |      |  |  |  | #DIV/0!        | -                | 10           |
|                           | N-NH <sub>3</sub> (mg/L)         |  |      |  |  |  | #DIV/0!        | 4                | 7            |
|                           | unionized NH <sub>3</sub> (mg/L) |  |      |  |  |  | #DIV/0!        |                  |              |
|                           | NO <sub>2</sub> (mg/L)           |  |      |  |  |  |                |                  |              |
|                           | NO <sub>3</sub> (mg/L)           |  |      |  |  |  |                |                  |              |
|                           | TKN (mg/L)                       |  |      |  |  |  |                |                  |              |
|                           | <i>E.coli</i> (cfu/100 mL)       |  |      |  |  |  |                |                  |              |

\*\* un-ionized NH<sub>3</sub> based on in-house calculation

|                                  |  |  |  |  |  | Average | Objective | Limit     |
|----------------------------------|--|--|--|--|--|---------|-----------|-----------|
| S <sub>2</sub> (mg/L)            |  |  |  |  |  | N/A     | N/A       | N/A       |
| pH                               |  |  |  |  |  | N/A     | 6.5 - 8.5 | 6.0 - 9.5 |
| Temp                             |  |  |  |  |  | N/A     | N/A       | N/A       |
| % Undissociated H <sub>2</sub> S |  |  |  |  |  | N/A     | N/A       | N/A       |
| Undissociated H <sub>2</sub> S   |  |  |  |  |  | #DIV/0! | ND        | -         |

| PRE-DISCHARGE RESULTS      | Cell 1                 | Cell 2 | Cell 3 | Cell 4 | Cell 5 |  |
|----------------------------|------------------------|--------|--------|--------|--------|--|
|                            | CBOD (mg/L)            |        |        |        |        |  |
|                            | TSS                    |        |        |        |        |  |
|                            | TP (mg/L)              |        |        |        |        |  |
|                            | NH <sub>3</sub> (mg/L) |        |        |        |        |  |
|                            | TKN (mg/L)             |        |        |        |        |  |
| H <sub>2</sub> S (mg/L)    |                        |        |        |        |        |  |
| <i>E.coli</i> (cfu/100 mL) |                        |        |        |        |        |  |

COMMENTS: H<sub>2</sub>S, TP, *E.coli* sampled prior to discharge  
 Dilution ratio as per operations manual

April 13, 2021

Ms. Tracy Hart  
District Manager, Ministry of the Environment, Conservation and Parks  
Ottawa District Office  
[tracy.hart@ontario.ca](mailto:tracy.hart@ontario.ca)

**Subject: Winchester Sewage Lagoon Discharge Spring 2021 – Request for Relief**

Low flow conditions in the South Nation River have caused concerns regarding the spring discharge of Winchester's Sewage Lagoon. It appears that the spring dilution ratio of 110:1 (stream flow to effluent flow) specified in the facility's Certificate of Approval may not be able to be maintained for the entire 21 day discharge period as river flows have dropped off rapidly over the past couple of weeks. Winchester's lagoon discharge commenced March 30<sup>th</sup> and would terminate at the earliest on Monday, April 19<sup>th</sup>, in order to meet the minimum 21 day discharge required in Certificate of Approval #5312-88TK5R.

After 15 days of discharging the lagoons, approximately 120,000 m<sup>3</sup> have been released. Because of the low flow conditions, the effluent pumps are being operated at the low end of their range. The pumps are not designed to operate below a rate of approximately 50 L/sec, and 60 L/s is the current rate of pumping based on river flow. The pumps have been tripping out due to the low flow.

Based on our calculations, another 150,000 m<sup>3</sup> remains to be released in order to avoid overflow conditions prior to the fall discharge window which opens November 1<sup>st</sup>

If you have any questions or concerns, please do not hesitate to contact me at (613) 448-3098.

Sincerely,



Dawn Crump  
Process & Compliance Technician  
Seaway Valley Cluster

Cc: Stephane Barbarie, Senior Operations Manager, OCWA  
Jena Leavoy, Senior Environmental Officer, MECP