# Water Pollution Control Plant
## (ECA # 0589-AXZPCW)

## *2019 - PERFORMANCE REPORT*

322 Water Street
Deseronto, Ontario
K0K 1X0

March 2020

## Executive Summary

The Deseronto Water Pollution Control Plant performed very well throughout 2019. Effluent quality from the process consistently complied with the prescribed limits in the Ministry of the Environment and Climate Change issued Environmental Compliance Approval #0589-AXZPCW (ECA).

On one occasion in 2019 there was a bypass event. March 31,2019 due to rainfall and snow melt, $6m^3$ of diluted wastewater bypassed over a five-minute period. Effluent concentrations and loadings remained compliant.

A total of 1560 $m^3$ of liquid biosolids and 249 tonnes of dewatered biosolid material were beneficially applied to agricultural land during June, August, and November of 2019. The land application program was conducted by Terrapure Organic Solutions in accordance with the requirements of the Nutrient Management Act.

No major upgrades were performed over the past year.

# 1 Introduction

The Deseronto Water Pollution Control Plant treats wastewater from the Town of Deseronto and from the eastern serviced area of the neighbouring Tyendinaga Mohawk Territory. Originally constructed in the early 1970's, the aging facility underwent extensive upgrading and expansion throughout 2015 with the new process fully operational since January 2016. The data presented in this annual report reflects the fourth year of operation of the upgraded facility.

# 2 Flow Monitoring Data Summary

The total volume of wastewater treated during 2019 was similar when compared to 2018.

**Table 1 - Flow Data**

| Month | Treated Flow | | | |
|---|---|---|---|---|
| | Total ($m^3$) | Average ($m^3$/day) | Maximum ($m^3$/day) | Minimum ($m^3$/day) |
| January | 46353 | 1495 | 2205 | 1089 |
| February | 42293 | 1510 | 2766 | 1094 |
| March | 64045 | 2066 | 7150 | 1100 |
| April | 72446 | 2415 | 4161 | 1691 |
| May | 78828 | 2543 | 4721 | 1542 |
| June | 44085 | 1470 | 2637 | 1025 |
| July | 27055 | 873 | 1056 | 711 |
| August | 22778 | 735 | 853 | 662 |
| September | 21204 | 707 | 863 | 621 |
| October | 28195 | 910 | 2233 | 634 |
| November | 35093 | 1170 | 2642 | 996 |
| December | 48314 | 1559 | 3429 | 955 |
| **Year Total** | **530689** | | | |
| **Average** | | **1454** | | |
| **Min / Max** | | | **7150** | **621** |
| **Design* ADF/Peak** | | **2,400 / 10,050** | | |

* Design ADF/Peak refers to the design average day and peak flow capacities of the upgraded facility

Average day flow was 1454 $m^3$/d, representing approximately 61 percent of the design rated average day flow capacity of 2400 $m^3$/d. The maximum day treated flow in 2019 was 7150 $m^3$/day approximately 71% of the peak capacity.

Calibration of all flow monitoring equipment was completed in September by Tower Electronics Canada.

**Bypass / Overflow Events:** One overflow event was reported during 2019; occurring on March 31/2019.

A significant rainfall event occurred, causing influent flow to increase rapidly beyond the set-point limit of the raw sewage pumps. The pump speed was limited to avoid overloading the headworks screen with rapid flow changes. The pump speed was immediately increased by the on-call operator however a volume of 6 $m^3$ was measured on the overflow meter before the adjustment. A sample of the bypass was collected.

The quality of the wastewater plant effluent was monitored during the overflow event. All results met ECA limits and objectives except for TSS that was slightly over 10 mg/l at 12 mg/l.

The analytical results are provided in Table 2.

**Table 2 – Bypass Data**

| Dates | Volume ($m^3$) | *E. Coli.* (cfu/100mL) | CBOD5 (mg/L) | TSS (mg/L) | TP (mg/L) | TKN (mg/L) | TAN (mg/L) | pH |
|---|---|---|---|---|---|---|---|---|
| March 31 | 6 | N/A | <3.0 | 12 | 0.14 | 1.2 | | 7.4 |
| Month | | 1.0 | <3.0 | 3.6 | 0.08 | 1.18 | 0.14 | 7.3 |
| ECA Limit | | 200 | 15 | 15 | 0.20 | n/a | 8 / 16 | 6.0 – 9.5 |
| ECA Obj. | | 100 | 10 | 10 | 0.15 | n/a | 5 / 12 | 6.5 – 8.5 |

The bypass events were reported to the Spills Action Centre and local Health Unit.

To decrease inflow and infiltration:

- Manhole sealing dishes have been installed in low elevation areas.
- The collection system is flushed and inspected every three years to identify problem areas.
- Manhole structures are inspected and repaired as needed.

## 3 Analytical Monitoring Data Summary

Indicators used to determine treatment process efficiency and regulatory compliance include: the five-day carbonaceous biochemical oxygen demand ($CBOD_5$), total suspended solids (TSS), total phosphorus (TP), total ammonia nitrogen (TAN), pH, *Escherichia Coliforms* (*E.Coli*.), and Rainbow Trout / *Daphnia Magna* lethality testing. The ECA for the plant prescribes effluent limits and objectives for the above noted parameters. All required monitoring for 2019 was completed. The 2020 monitoring schedule is attached as Appendix A.

Effluent quality that meets the ECA effluent objectives indicates optimal process performance. Operators strive to achieve the effluent objectives by active solids control (i.e. waste activated sludge schedule, step-feed under high flow conditions) and by making appropriate adjustments to chemical dosages based on current analytical test results.

**$CBOD_5$ & TSS:** Samples of raw sewage and final effluent are collected weekly and submitted to an accredited laboratory for analysis. A summary of $BOD_5$, $CBOD_5$, and TSS concentrations in raw sewage entering the plant and in effluent discharged to the Bay of Quinte is provided as Table 3.

Raw sewage entering the plant during 2019 was of relatively low strength, having $BOD_5$ and TSS concentrations averaging 120 mg/L and 227 mg/L respectively. Based on monthly averages, the calculated rates of pollutant removal through the treatment process ranged from 95 to 98 percent for $BOD_5$ and from 95 to 99 percent for total suspended solids. Removal efficiency is consistent with that observed in previous years.

Non-compliance with respect to $CBOD_5$ and TSS is deemed to have occurred when the monthly arithmetic mean of all sample results exceeds the ECA concentration or loading limits. Monthly average $CBOD_5$ and TSS values remained compliant throughout 2019.

Effluent objectives reflect quality that exceeds that required for compliance and indicates optimal performance of the treatment process. Based on 2019 monthly averages, effluent concentration consistently met the ECA objective for both $CBOD_5$ and TSS.

**Table 3 - $CBOD_5$ and Total Suspended Solids Data**

| Month | $BOD_5$ / $CBOD_5$ | | | | Total Suspended Solids | | | |
|---|---|---|---|---|---|---|---|---|
| | Raw Sewage (mg/L) | Final Effluent (mg/L) | Final Effluent (kg/d) | Removal % | Raw Sewage (mg/L) | Final Effluent (mg/L) | Final Effluent (kg/d) | Removal % |
| January | 107.2 | 3.0 | 4.5 | 97.2 | 143 | 3.0 | 4.5 | 97.9 |
| February | 127.8 | 3.0 | 4.5 | 97.7 | 164 | 4.8 | 7.3 | 97.1 |
| March | 100.3 | 3.0 | 6.2 | 97.0 | 266 | 7.0 | 14.5 | 97.4 |
| April | 60.4 | 3.0 | 7.2 | 95.0 | 118 | 5.4 | 9.2 | 95.4 |
| May | 96.0 | 3.0 | 7.6 | 96.9 | 245 | 3.3 | 8.4 | 98.7 |
| June | 87.5 | 3.0 | 4.4 | 96.6 | 133 | 6.5 | 9.6 | 95.1 |
| July | 153.0 | 3.0 | 2.6 | 98.0 | 222 | 3.0 | 2.6 | 98.6 |
| August | 157.5 | 3.0 | 2.2 | 98.1 | 285 | 3.5 | 2.6 | 98.8 |
| September | 164.3 | 3.0 | 2.1 | 98.2 | 295 | 3.3 | 2.3 | 98.9 |
| October | 140.6 | 3.0 | 2.7 | 97.9 | 278 | 3.4 | 3.1 | 98.8 |
| November | 123.8 | 3.0 | 3.5 | 97.6 | 310 | 3.3 | 3.9 | 98.9 |
| December | 123.8 | 3.0 | 4.7 | 97.6 | 262 | 3.0 | 4.7 | 98.9 |
| Yr. Avg. | 120.2 | 3.0 | 4.4 | | 227 | 4.1 | 6.1 | |
| Max. Mo. Avg. | | **3.0** | **7.6** | | | **7.0** | **14.5** | |
| **ECA Limit** | | **15** | **60** | | | **15** | **60** | |
| **ECA Objective** | | **10** | | | | **10** | | |

**NOTES:** **Results represent monthly averages of samples collected at least weekly**

**Phosphorus:** Phosphorous is removed from raw sewage in the treatment process by chemical precipitation (alum addition), and by enhanced solids removal in the tertiary filter. Total phosphorus concentration and loading as well as alum dosages measured monthly through 2019 are summarized in Table 4.

Non-compliance is deemed to have occurred when the monthly average total phosphorus (TP) concentration or loading exceeds the prescribed limits. During 2019, effluent TP concentration remained compliant with the ECA concentration limit of 0.2 mg/L and below the more stringent objective concentration of 0.15 mg/L. Consistent optimal process performance was demonstrated as removal efficiency ranged from 96 to 99 percent throughout 2019. Similarly, effluent TP loading remained below the ECA limit.

**Alum Dosage:** Average alum dosage to the secondary process was 47 mg/L, representing an approximate 7 percent increase from 2018 (44 mg/L). The 2019 annual average dosage to the tertiary process was decreased by approximately 25 percent when compared to 2018. Total alum dosage (secondary + tertiary) was relatively consistent, averaging 56 mg/L versus 57 mg/L in 2018.

**Table 4 - Phosphorus Data**

| Month | Total Phosphorus | | | | Secondary Alum | | Tertiary Alum | | Total Alum |
|---|---|---|---|---|---|---|---|---|---|
| | Raw Sewage (mg/L) | Final Eff. (mg/L) | Final Eff. (kg/d) | Removal % | Volume (Litres) | Dosage (mg/L) | Volume (Litres) | Dosage (mg/L) | Dosage (mg/L) |
| January | 2.86 | 0.04 | 0.05 | 98.7 | 3675 | 48.3 | 676 | 8.9 | 57.2 |
| February | 3.10 | 0.06 | 0.09 | 98.1 | 3116 | 44.8 | 639 | 9.3 | 54.1 |
| March | 2.93 | 0.08 | 0.17 | 97.1 | 5004 | 47.7 | 911 | 8.8 | 46.5 |
| April | 1.75 | 0.08 | 0.18 | 95.7 | 5924 | 52.0 | 1000 | 8.9 | 60.9 |
| May | 5.30 | 0.14 | 0.35 | 97.4 | 6562 | 52.1 | 1117 | 8.8 | 60.9 |
| June | 3.09 | 0.08 | 0.11 | 97.6 | 3316 | 45.0 | 698 | 9.7 | 54.7 |
| July | 4.08 | 0.03 | 0.03 | 99.2 | 2223 | 49.0 | 448 | 10.0 | 59.0 |
| August | 5.40 | 0.06 | 0.04 | 98.9 | 1642 | 44.8 | 382 | 10.7 | 55.5 |
| September | 5.32 | 0.04 | 0.03 | 99.2 | 1522 | 44.9 | 350 | 11.2 | 56.1 |
| October | 5.29 | 0.08 | 0.07 | 98.5 | 1964 | 43.1 | 456 | 10.0 | 53.1 |
| November | 4.71 | 0.05 | 0.06 | 99.0 | 2497 | 45.6 | 492 | 9.0 | 54.6 |
| December | 3.46 | 0.03 | 0.05 | 99.1 | 3415 | 44.6 | 669 | 8.8 | 53.4 |
| Yr. Avg. | 3.94 | 0.06 | 0.10 | 98.2 | 3405 | 46.8 | 653 | 9.5 | 56.3 |
| Max. Mo. Avg. | | 0.14 | 0.35 | | | | | | |
| **ECA Limit** | | 0.2 | 0.48 | | | | | | |
| **ECA OBJ** | | 0.15 | | | | | | | |

**Nitrogen:** Effluent nitrogen is reported in Table 5 as TKN, TAN (total ammonia nitrogen), and as $NH_3$ (un-ionized ammonia). Ammonia is removed from the wastewater in the activated sludge process by biological nitrification.

The ECA specifies seasonal concentration and loading limits for TAN with the lower limits applying from June through October and the higher from November through May. The process performed well throughout 2019 as both concentration and loading remained below the ECA limits. Further, effluent TAN concentration reflected optimal process performance, consistently remaining below the ECA seasonal objective concentrations. The maximum effluent TAN concentration detected in a single sample during 2019 was 0.18 mg/L in March.

Un-ionized ammonia is the form most toxic to aquatic life. The un-ionized fraction depends on the pH and temperature of the sample and typically represents a very small portion of the total ammonia concentration. All sample for un-ionized ammonia

concentration observed in 2019 were <0.01 mg/L, well below the federal limit of 1.25 mg/L.

**Table 5 - Nitrogen, pH, and Temperature Data**

| Month | TKN | | TAN | | $NH_3$ | pH | Temp. |
|---|---|---|---|---|---|---|---|
| | Raw Sewage (mg/L) | Final Eff. (mg/L) | Final Eff. (mg/L) | Final Eff. (kg/d) | Final Eff. (mg/L) | Final Eff. | Final Eff. (C) |
| January | 22.2 | 1.00 | 0.08 | 0.12 | 0.01 | 7.41 | 7.3 |
| February | 23.1 | 1.20 | 0.12 | 0.19 | 0.01 | 7.36 | 6.2 |
| March | 20.1 | 1.18 | 0.14 | 0.28 | 0.01 | 7.32 | 6.4 |
| April | 12.5 | 0.98 | 0.11 | 0.26 | 0.01 | 7.41 | 8.2 |
| May | 19.6 | 0.83 | 0.07 | 0.18 | 0.01 | 7.40 | 11.4 |
| June | 15.4 | 0.90 | 0.06 | 0.09 | 0.01 | 7.33 | 15.3 |
| July | 33.3 | 1.04 | 0.11 | 0.10 | 0.01 | 6.88 | 19.7 |
| August | 39.0 | 1.20 | 0.11 | 0.08 | 0.01 | 6.69 | 21.2 |
| September | 41.7 | 1.15 | 0.10 | 0.07 | 0.01 | 6.86 | 20.4 |
| October | 42.9 | 1.56 | 0.11 | 0.10 | 0.01 | 6.70 | 16.8 |
| November | 28.5 | 0.98 | 0.08 | 0.09 | 0.01 | 7.12 | 13.2 |
| December | 24.9 | 0.98 | 0.07 | 0.11 | 0.01 | 7.07 | 10.3 |
| Yr. Avg. | 26.9 | 1.1 | 0.10 | 0.14 | 0.01 | 7.13 | 13.0 |
| Max. Mo. Avg. | | | 0.14 | 0.28 | 0.01 | | |
| ECA Limit* | | | 8.0 / 16.0 | 19.2 / 38.4 | | | |
| ECA OBJ | | | 5.0 / 12.0 | | | 6.5 – 8.5 | |
| EC Limit** | | | | | 1.25 | 6.0 - 9.5 | |

* seasonal limits for TAN - lower applies Jun thru Oct, higher Nov thru May

** Environment Canada - Federal Wastewater Effluent Regulation limit

Reported values are monthly averages calculated from weekly (or more frequent) samples

**Temperature and pH:** Based on measurements of effluent samples taken through 2019, pH remained within the ECA prescribed range of 6.0 to 9.5 and within the more stringent objective range of 6.5 to 8.5. Discrete pH measurements recorded in 2019 ranged from 6.7 to 7.4. Effluent temperature varied seasonally with a month average low of 6.2 C in February and a maximum month average of 21.2 C in August.

**Disinfection:** Ultraviolet light (UV) is used to disinfect the treated effluent prior to discharge to the Bay of Quinte. The performance of the UV disinfection system is verified by bacteriological testing (*Escherichia Coliforms)* of weekly effluent grab samples. Testing results are summarized in Table 6.

Of the 53 samples collected through 2019, *E. Coli.* was not detected in over 80 percent. The geometric mean value for all months was well below both the ECA limit of 200 CFU/100 mL and the objective of 100 CFU/100mL.

**Table 6 – Effluent *E. Coli.* (CFU/100mL) Monthly Geomean and Maximum Values**

| Month | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Geometric mean** | **1.0** | **1.0** | **1.0** | **1.0** | **1.2** | **1.0** | **1.0** | **1.0** | **1.3** | **1.1** | **1.0** | **1.1** |
| Maximum | <1 | <1 | <1 | 1.0 | 2.0 | <1 | <1 | <1 | 3.0 | 2.0 | <1 | 2.0 |
| # of samples | 5 | 4 | 4 | 5 | 4 | 4 | 5 | 4 | 4 | 5 | 4 | 5 |

**NOTES:**

**ECA limit is 200 CFU/100mL based on monthly geometric mean**

**ECA objective is 100 CFU/100mL based on monthly geometric mean**

**Geometric mean calculated using the method detection limit (MDL) for results reported as 0 or <MDL.**

**Acute Lethality:** The ECA requires that effluent from the facility is non-acutely lethal to Rainbow Trout and *Daphnia Magna.* Monitoring is required annually. During 2019, a sample was collected on August 13th. Non-acute lethality was reported for both test organisms.

**Septage:** The septage receiving station was utilized during the months of January through May and in October, November and December. The ECA requires collection and testing of weekly samples when the station is in use. Table 7 provides a summary of volume and analytical quality of septage received in 2019.

A total of 230 loads were received in 2019, each averaging 9.2 $m^3$. Septage is high in strength, with $BOD_5$ and TSS averaging 2163 mg/L and 10028 mg/L respectively. Nutrient loading from septage is also significant. Total phosphorus averaged 86 mg/L while TKN averaged 390 mg/L.

**Table 7 - Septage Receiving Station**

| Month | Weeks in use | Loads | Month Volume | $BOD_5$ | TSS | TP | TKN |
|---|---|---|---|---|---|---|---|
| | # | # | $m^3$ | mg/L | mg/L | mg/L | mg/L |
| January | 5 | 37 | 282 | 2759 | 7100 | 58 | 317 |
| February | 4 | 37 | 351 | 2175 | 5620 | 64 | 286 |
| March | 5 | 49 | 469 | 1505 | 11960 | 78 | 409 |
| April | 5 | 25 | 241 | 1527 | 7895 | 61 | 300 |
| May | 5 | 27 | 264 | 2370 | 10605 | 99 | 385 |
| | | | | | | | |
| October | 1 | 1 | 12 | 791 | 5800 | 92 | 490 |
| November | 3 | 18 | 177 | 4524 | 14625 | 170 | 727 |
| December | 4 | 36 | 321 | 3763 | 21475 | 145 | 589 |
| Total | 32 | 230 | 2117 | | | | |
| Average | | | | 2163 | 10028 | 86 | 390 |

## 4 Biosolids

Excess biological sludge wasted from the extended aeration activated sludge process is directed to an aerobic digester for further stabilization. Following the digestion process the thickened liquid biosolids can either be de-watered in geo-synthetic bags or loaded into a tanker for transport off-site. Ultimately, the de-watered or liquid biosolids are beneficially applied to approved agricultural land during summer and autumn. Land applied biosolids improves the moisture retaining capacity of soil and adds valuable macro and micro nutrients needed for crop growth.

**Production:** Waste activated sludge (WAS) from the extended aeration process is pumped to the aerobic digester in batches several times each day based on a programmed volume and time sequence. Operators adjust the rate of wasting based on mixed liquor suspended solids and extended aeration solids retention time.

When the digester is full, the blower is turned off and the sludge is given time to settle. After approximately 24 hours of settling, the clear supernatant above the settled sludge is decanted back through the treatment process, creating more room in the digester for additional WAS.

During 2019, a total of 7,354 $m^3$ of WAS was transferred to the digester. Supernatant decanted from the digester totaled 4,437 $m^3$, and there was 740 $m^3$ additional volume in the digester at the end of the year resulting in a total year volume of digested sludge of:

7354 $m^3$ – 4437 $m^3$ + 740 $m^3$ = 3657 $m^3$.

Waste sludge and volumes pumped or decanted from the digester are summarized in Table 8.

**Table 8 - Aerobic Digester Operation**

| Month | WAS $m^3$ | Decant $m^3$ | Liquid Hauled $m^3$ | De-watered $m^3$ | De-watered Hauled tonne |
|---|---|---|---|---|---|
| January | 805 | 571 | 0 | 0 | 0 |
| February | 669 | 220 | 0 | 580 | 0 |
| March | 595 | 578 | 0 | 0 | 0 |
| April | 718 | 497 | 0 | 40 | 0 |
| May | 776 | 497 | 160 | 197 | 0 |
| June | 737 | 125 | 640 | 0 | 0 |
| July | 648 | 457 | 0 | 0 | 0 |
| August | 306 | 362 | 0 | 0 | 249 |
| September | 443 | 357 | 0 | 0 | 0 |
| October | 395 | 353 | 0 | 0 | 0 |
| November | 572 | 305 | 760 | 0 | 0 |
| December | 690 | 115 | 0 | 0 | 0 |
| Total | 7354 | 4437 | 1560 | 817 | 249 |

**Biosolids Land Application:** During 2019, 1560 $m^3$ of liquid biosolids were hauled from the Deseronto aerobic digester and applied to approved agricultural land by Terratec Environmental. Dates of application were June 7th and 8th and November 22nd and 23rd.

The aerobic digester is not large enough to store all the biosolids produced at the Deseronto facility each year, therefore additional storage capacity is provided in geo-synthetic bags. The large porous synthetic bags, with the assistance of polymer addition, are designed to retain solids while allowing water to pass through. An additional 249 tonnes of de-watered biosolids from two geo-synthetic bags was similarly land applied on August 29th. The total volume of digester sludge pumped to the de-watering process in 2019 was 817 $m^3$.

**Analytical Quality of Processed Biosolids:** Samples of liquid biosolids collected during May, September, October and November were analyzed for solids, nutrients, regulated metals, and pathogens to confirm suitability for agricultural use. De-watered biosolids were also sampled and similarly tested in July and August. Summary tables showing the analytical quality of the biosolids and details of the application sites are provided below.

**Table 9 - Deseronto WPCP Digester Biosolids – Analytical Results**

| **Metals** | **Maximum Permitted Metal Concentrations (mg/kg)** | **Avg. Metal Concentration in Biosolids (mg/kg)** |
|---|---|---|
| Arsenic | 170 | 4.91 |
| Cadmium | 34 | 1.19 |
| Cobalt | 340 | 1.67 |
| Chromium | 2800 | 13.30 |
| Copper | 1700 | 520.93 |
| Lead | 1100 | 14.69 |
| Mercury | 11 | 0.44 |
| Molybdenum | 94 | 5.21 |
| Nickel | 420 | 12.87 |
| Selenium | 34 | 3.51 |
| Zinc | 4200 | 491.56 |
| **Nutrients** | | **(mg/L)** |
| Total Phosphorus | | 800.6 |
| Ammonia + Ammonium | | 35.02 |
| Nitrate+Nitrite | | 20.3 |
| Total Kjheldahl Nitrogen | | 1204.2 |
| Potassium | | 53.3 |
| **Bacteria / Total Solids** | | **CFU/g / (mg/L)** |
| *E. Coli.* | 2,000,000 | 32,715 |
| Total Solids (mg/L) | | 28,760 |

**Table 10 - Deseronto WPCP De-watered Biosolids – Analytical Results**

| **Metals** | **Maximum Permitted Metal Concentrations (mg/kg)** | **Avg. Metal Concentration in Biosolids (mg/kg)** |
|---|---|---|
| Arsenic | 170 | 3.17 |
| Cadmium | 34 | 1.20 |
| Cobalt | 340 | 1.67 |
| Chromium | 2800 | 18.50 |
| Copper | 1700 | 669.33 |
| Lead | 1100 | 19.00 |
| Mercury | 11 | 0.49 |

| | | |
|---|---|---|
| Molybdenum | 94 | 4.50 |
| Nickel | 420 | 16.0 |
| Selenium | 34 | 3.0 |
| Zinc | 4200 | 675.5 |
| **Nutrients** | | **(mg/kg)** |
| Total Phosphorus | | 27,260 |
| Ammonia + Ammonium | | 3,456 |
| Nitrate+Nitrite | | 702.5 |
| Total Kjheldahl Nitrogen | | 47,120 |
| Potassium | | 1,418 |
| **Bacteria / Total Solids** | | **CFU/g / (mg/kg)** |
| *E. Coli.* | 2000000 | 1,307 |
| Total Solids (mg/L) | | 152,167 |

**Future Production / Land Application:** A similar volume of biosolids production is anticipated for 2020. Land application will include both liquid and de-watered material.

Nineteen sites totaling over 470 hectares are approved to receive Deseronto biosolids through to the end of 2022.

**Table 11 - 2019 Deseronto WPCP Biosolids – Land Application Rates**

| Date | NASM # | Farm/Source | Location | Field # | Total Volume ($m^3$) | Total Tonnes (t) | Area Spread (ha) | Application Method |
|---|---|---|---|---|---|---|---|---|
| May 21,23 | ECA#S-3708-42 | Terrapure Storage | Lot 19, Conc 6, Loyalist Township | N/A | 80 & 80 | | | N/A |
| June 7,8 | 23875 | **Walsh - South** Digester Liquid | Lot 20, Conc.6, Township of Tyendinaga, Tyendinaga Ward | 2 | 320 | | 2.47 | Surface – Standing Crop |
| June 7 | | | | 5 | 320 | | 2.44 | |
| Aug 8 | 23950 | **McCracken - Home** Digested – De-watered | Lot 19, Conc. 3 South, Greater Napanee, Fredricksburgh | South - 2 | | 249.16 | 6.92 | Incorporated |
| Nov 22,23 | 23774 | **DeVries - Home** Digester Liquid | Lots 4-5, Conc.3, Municipality of Centre Hastings, Huntingdon Ward | 1 & 3 | 200 & 560 | | 1.76 & 4.59 | Incorporated |
| | | | | **TOTAL** | **1560** | **249.16** | **18.18** | |

## 4 Operational Problems / Equipment Maintenance

**Operational Problems:** The treatment process performed very well throughout 2019 despite periodic high flow rates due to inflow during extreme weather events. Compliance was maintained through varying flow conditions.

The performance of the biosolids de-watering process continued to be problematic. An alternate polymer has been jar tested with promising results. The new polymer was used on the full scale system 2019 with the goal of improved dewatering to optimize storage space and decrease transportation costs. Two geo-synthetic bags were opened and transferred to agricultural land in August. The solid content of the de-watered material was transported by dump trailer at approximately 15.2% solids slightly better than 2018 of 11.5%.

We are continuing to improve this process by working with our polymer supplier and making process adjustments accordingly.

## Maintenance / Upgrading:

Routine maintenance is summarized below.

| **Equipment** | **Action – Frequency (D-daily, W-weekly, M-monthly, Q-quarterly, S-semi-annually, A-annually** |
|---|---|
| Wet Well | Inspect (D), flush (W) |
| Raw Sewage Pumps | Inspect, check current, flow, VFD temp (D) |
| Screen | Inspect, check run-time, cycles (D), change auto greaser (A) |
| De-watering screw | Inspect, check run-time, cycles (D) |
| Grit tank | Inspect, check blower current (D) |
| Grit augers | Inspect, check current, cycles (D) |
| Chain and Flight | Inspect (D), grease (A) |
| Aeration Tanks and Clarifiers | Drain, clean and inspect equipment in one of two extended air trains (A) |
| RAS pumps | Check flow, current, VFD temp, speed (D) |
| Blowers | Inspect, check current, VFD temp, pressures (D), change oil, check belts/filters (A) |
| Tertiary Filter | Check headloss and backwash cycles (D), change media (as needed) |
| UV lights | Check intensity, lamp hours, (D), clean quartz sleeves (S), change bulbs (as req'd) |
| Flow Meters | Calibration (A) |
| Lift Stations | Check pump operation, station condition, and pump hours (W)X2, check pump currents (Q)X2, clean station wet well as needed. |

Non-routine maintenance / upgrades included the following:

- Replaced cooling fans for Raw sewage and Digester blower VFD cabinets
- Repair 2" wash water line for aeration/clarifier tanks
- Upgraded water service line and polymer feed system for geotube digested sludge feed system

- New septage pump #4 installed
- New stainless steel Victaulic couplings installed on return activated sludge line
- Continued changing out UV bulbs as required and as of the end of 2019 all originals have been replaced

## 5 Complaints

There were no reported complaints regarding the operation of the wastewater treatment plant, wastewater collection system, or biosolids program during 2019.

## Appendix A – 2019 Deseronto Wastewater Treatment Plant Monitoring Schedule

| Sample Description | JAN | | | | FEB | | | | MAR | | | | | APR | | | | MAY | | | | JUN | | | | JUL | | | | AUG | | | | SEP | | | | | OCT | | | | NOV | | | | DEC | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 07-Jan-20 | 14-Jan-20 | 21-Jan-20 | 28-Jan-20 | 04-Feb-20 | 11-Feb-20 | 18-Feb-20 | 25-Feb-20 | 03-Mar-20 | 10-Mar-20 | 17-Mar-20 | 24-Mar-20 | 31-Mar-20 | 07-Apr-20 | 14-Apr-20 | 21-Apr-20 | 28-Apr-20 | 05-May-20 | 12-May-20 | 19-May-20 | 26-May-20 | 02-Jun-20 | 09-Jun-20 | 16-Jun-20 | 23-Jun-20 | 30-Jun-20 | 07-Jul-20 | 14-Jul-20 | 21-Jul-20 | 28-Jul-20 | 04-Aug-20 | 11-Aug-20 | 18-Aug-20 | 25-Aug-20 | 01-Sep-20 | 08-Sep-20 | 15-Sep-20 | 22-Sep-20 | 29-Sep-20 | 06-Oct-20 | 13-Oct-20 | 20-Oct-20 | 27-Oct-20 | 03-Nov-20 | 10-Nov-20 | 17-Nov-20 | 24-Nov-20 | 01-Dec-20 | 08-Dec-20 | 15-Dec-20 | 22-Dec-20 | 29-Dec-20 |
| **WEEKLY** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Raw Sewage | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Secondary Effluent | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Final Effluent | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Final Effluent (Bact) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Septage Receving | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **MONTHLY** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Waste Clarifier | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Biosolids (if req'd) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **ANNUAL** | | | | | | | | | | | | | | | | | | | | | | ANNUAL | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

| **Sampling Notes** | **WEEKLY** | **MONTHLY** | **ANNUALLY** | **OTHER** (min. 2 sples, within 2 mths with 1 sple within |
|---|---|---|---|---|
| | Raw Sewage: $BOD_5$, TSS, TP, TKN | Waste Clar.: TSS | Final Eff.: Acute Toxicity | 30 days of land application) |
| | Final Eff: $CBOD_5$, TSS, TP, TKN, TAN, $NH_3$, pH | | | GeoTube or Digester: |
| | Final Eff.: *Escherichia Coliforms* | | | -11 Heavy Metals |
| | S. Eff.: $CBOD_5$, TSS, TP, TKN | | | -Total Solids, Total Volatile Solids |
| | | | | -$NH_3$, $NH_4$, $NO_3$, $NO_2$, TKN |
| | Septage Receiving (if used): | | | -TP, K |
| | $BOD_5$, TSS, TP, TKN | | | *-Escherichia Coliforms* |