Greater Napanee

GREATER FOR MANY REASONS

# 2021

# Annual Report

## Napanee Water Pollution Control Plant

300 Water Street W.
Napanee, Ontario
K7R 1X3

Prepared: January 2022

# Executive Summary

The quality of effluent released to the Napanee River from the Napanee Water Pollution Control Plant (WPCP) during 2020 complied with the limits stipulated in the plant Environmental Compliance Approval (ECA). The effluent bacteriological quality measured as *E. Coli.* also met the ECA operational objective (<200 CFU/100mL) in all months except for June 2021 when the monthly geometric mean was 266 CFU/100mL.

Total annual flow measured in 2021 decreased by approximately 8.4 percent when compared to the previous year, with the average day flow representing 69 percent of the plant design capacity. Efforts to detect the inflow and infiltration of storm and ground water sources will continue throughout 2022.

Biosolids generated at the facility were temporarily stored at the Sutcliffe Lagoon and were applied to agricultural land during April, July, August and November by Terrapure Environmental, all in accordance with the sites Certificates of Approval and Ontario Regulation 267/03.

Maintenance and upgrading activities during 2021 included gearbox repairs, blower maintenance, drive motor and flight enhancements and the rebuild of a methane gas booster. In addition to these projects, the sanitary sewer main on portions of Mill and Graham Streets were replaced which included sanitary services to individual property lines. The department also completed five sewer service repairs in 2021.

Planning for the upgrade and expansion of the aging and hydraulically limited Water Pollution Control Plant continued in 2021. Preliminary design and geotechnical studies for a new-build concept was halted in August when the engineer reported a significantly increased construction cost estimate. Due to budget limitations, a revised RFP, limiting design to a retrofit project that maximizes use of existing infrastructure, was released in December. Award of a new design contract is anticipated in early March 2022 with construction beginning early in 2024.

# Table of Contents

# List of Tables



# List of Figures

# 1 Wastewater Flows and Effluent Quality

## *Wastewater Flow Data*

The Napanee Water Pollution Control Plant (WPCP) is a conventional activated sludge process, with an average day design flow rate of 9087 $m^3$/d, and a peak flow rate of 21,370 $m^3$/d. The average flow during 2021 was 6297 $m^3$/d, which is approximately 69 percent of the design capacity. Non-compliance with respect to treatment capacity is defined in the Environmental Compliance Approval as:

*"…the introduction of sewage flows in excess of the average daily flow (9087 $m^3$/d) for any consecutive period of time greater than one year."*

The plant design capacity of 9087 $m^3$/d was exceeded on 27 days in 2021 which was decreased when compared to the 62 days experienced in 2020. WPCP flow data collected during 2021 is presented in Table 1.

The hydraulic capacity of the plant continues to be stressed as a result of high flow experienced during heavy precipitation events or during periods of rapid ice and snow melting. The maximum daily flow during 2021 was 14,620 $m^3$/d. Although the Town of Napanee has a separate storm water collection system, improper connections, broken pipes, or faulty joints in sanitary sewers can result in the introduction of ground and storm water into the sanitary collection system. This misdirected hydraulic load on the sanitary system is collectively referred to as inflow and infiltration. Inflow and infiltration is problematic because it occupies treatment capacity that could otherwise be used to treat sanitary wastewater.

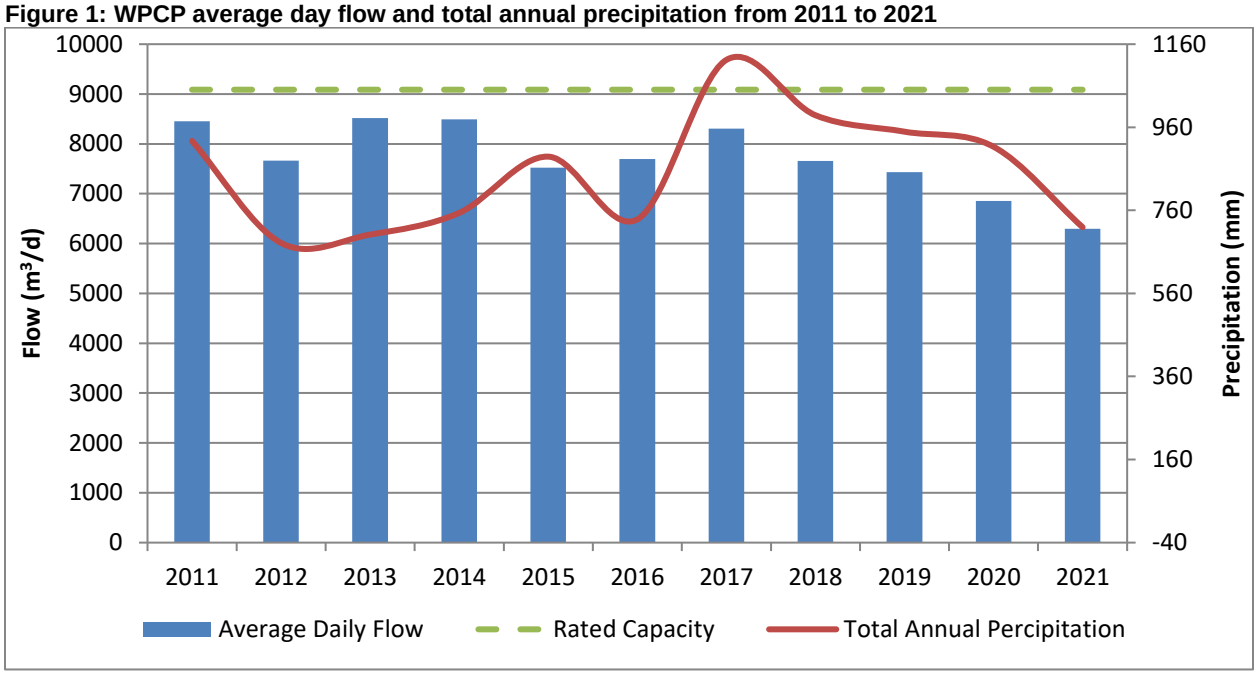
**Table 1: Summary of flow data for 2021**

| Month | Influent Flow (Volume of Wastewater Treated) | | | |
|---|---|---|---|---|
| | **Total** $m^3$ | **Avg.** $m^3$/day | **Max.** $m^3$/day | **Min.** $m^3$/day |
| **January** | 232088 | 7487 | 11581 | 5679 |
| **February** | 144281 | 5153 | 7236 | 4573 |
| **March** | 250789 | 8090 | 13130 | 5820 |
| **April** | 204073 | 6802 | 10680 | 5641 |
| **May** | 196832 | 6349 | 9024 | 4416 |
| **June** | 144355 | 4812 | 7016 | 4024 |
| **July** | 196763 | 6347 | 10482 | 4473 |
| **August** | 140291 | 4526 | 6289 | 3906 |
| **September** | 173611 | 5787 | 14620 | 3869 |
| **October** | 188222 | 6072 | 13538 | 4503 |
| **November** | 195570 | 6519 | 8548 | 5297 |
| **December** | 236364 | 7625 | 12052 | 5696 |
| **Year Total** | 2303239 | | | |
| **Average** | | 6297 | | |
| **Min / Max** | | | 14620 | 3869 |
| **ECA Limit** | | **9087** | **21370** | |

The apparent impact of inflow and infiltration over the past several years on the Napanee system is highlighted by trending annual average day flow with total precipitation as shown below in Figure 1.

Dry weather flow, typically experienced during summer months (July through September), is an approximate representation of sanitary wastewater flows exclusive of the effects of inflow and infiltration. Minimum daily flow rates recorded during those months indicate that dry weather flow accounts for 43 percent of the average day design capacity. The 2021 average day flow was 69 percent of the design capacity, down from the 75 percent in 2020. Inflow and infiltration continue to be problematic and repairs to identified issues will continue throughout 2022.

**Figure 1: WPCP average day flow and total annual precipitation from 2011 to 2021**




Efforts to identify and control sources of inflow and infiltration have included the following:

- Greater Napanee Utilities retained a consultant in early 2012 to conduct an inflow and infiltration study. Using this study, collection system deficiencies were corrected in 2013 and 2014.
- Flow meters are installed at six of seven sewage lift stations to determine areas of the collection system most impacted by inflow and infiltration.
- Restoration work has been conducted on manhole joints, connections, and benching as problem areas are identified.
- Covers (dishes) have been installed under the lids of manholes to prevent surface water from entering through holes in the manhole lids.
- Local construction specifications require that new manhole installations include rubber seals.
- A municipal bylaw prohibits the connection of sump pumps and rain leaders to the sanitary sewer. Staff have had great success in removing existing connections

through education and outreach, with 58% of known connections disconnected since 2016.

- Annual capital infrastructure renewal continued in 2021 with sanitary mains and services on Town property replaced on sections of Mill Street and Graham Street.

Efforts to reduce inflow and infiltration to optimize treatment reserve capacity will be ongoing.

## *Primary Bypass / Sewage Spills / Lift Station Bypass*

Under all but the most extreme conditions, wastewater entering the plant undergoes preliminary treatment (screening and grit removal), primary treatment (gravity separation of solids by sedimentation), and disinfection. In the event that the influent flow rate exceeds 38,000 $m^3$/d, the excess will bypass the primary clarifiers, mixing with the primary clarifier effluent prior to flowing to the aeration basins. Bypassing of the primary clarifiers did not occur in 2021.

The discharge of untreated sanitary sewage from the collection system can occur at any of the seven sewage lift stations and/or collection system manholes as the result of flooding events, power outages, pump failures, or sewer blockages. Measures are in place to prevent bypassing/spills which include: multiple (backup) pumps at all lift stations, high level alarms, backup power generation capability, and readily available vacuum truck service.

## *Secondary Bypass*

If the flow of wastewater directed to the aeration basins exceeds approximately 16,000 $m^3$/d, the excess will pass over a flat weir (located immediately upstream from the aeration tanks), bypassing the secondary treatment process. Secondary bypassing limits the hydraulic loading on the secondary treatment process (aeration tanks and secondary clarifiers) to prevent washout of activated sludge which is essential for maintaining treatment process performance. Wastewater that bypasses the secondary process (which tends to be weak in strength due to dilution from inflow and infiltration) is

blended with the ~16,000 $m^3$/d of secondary clarifier effluent, prior to disinfection and is discharged to the Napanee River.

The volume of secondary bypass discharged during 2021 was approximately 93% less than the volume observed in 2020. This decreased volume follows the decrease in annual precipitation but may also be related to sewer repairs and replacements completed in 2021. A summary of the secondary bypass events during 2021 is provided below in Table 2.

**Table 2: Summary of secondary bypass events during 2021**

| Month | Secondary Bypass Events | | |
|---|---|---|---|
| | **Total** $m^3$ | **Events** # | **Duration** hours |
| **January** | 0 | 0 | 0.0 |
| **February** | 0 | 0 | 0.0 |
| **March** | 1013 | 1 | 77.3 |
| **April** | 0 | 0 | 0.0 |
| **May** | 0 | 0 | 0.0 |
| **June** | 5 | 1 | 0.1 |
| **July** | 164 | 3 | 7.6 |
| **August** | 0 | 0 | 0.0 |
| **September** | 1230 | 2 | 34.7 |
| **October** | 1530 | 1 | 28.0 |
| **November** | 0 | 0 | 0.0 |
| **December** | 136 | 2 | 21.1 |
| **Annual Total** | 4078 | 10 | 168.7 |

*Ministry policy defines a bypass event as an occurrence separated by a period of more than 12 hours from another occurrence. When a bypass stops, it is considered to be the end of the event. If, however, a bypass begins again within 12 hours, it is considered to be the same event.

The relationship between precipitation and secondary bypass volume is illustrated in Figure 2. Staff will continue to follow trends as more inflow and infiltration issues in the wastewater collection system are addressed.

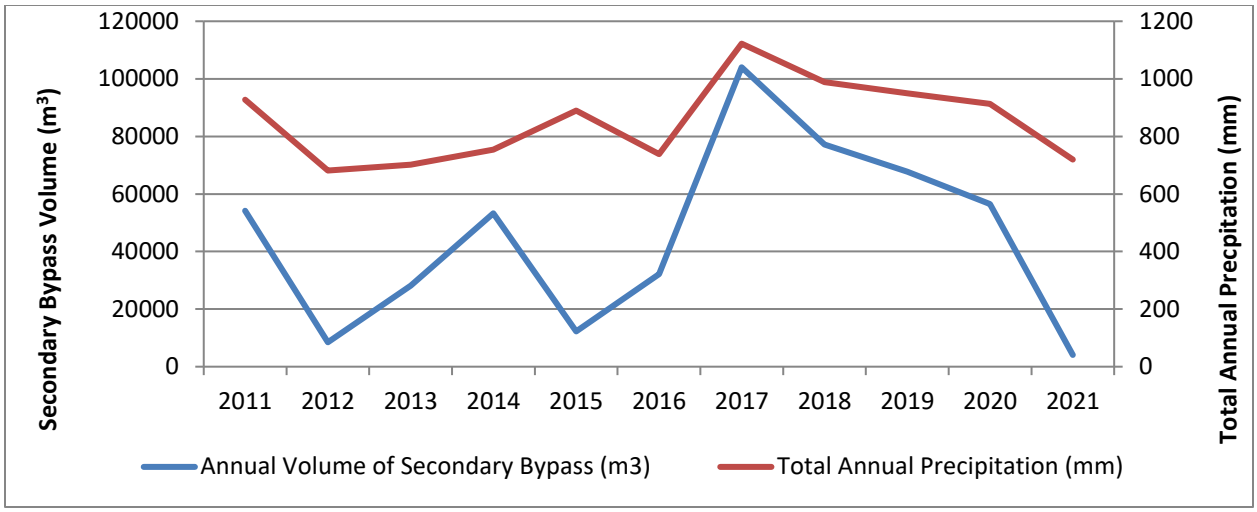



**Figure 2: Total annual precipitation and volume of secondary bypass for 2021**

In 2011, a Municipal Class Environmental Assessment was completed to assess capacity limitations and to plan for the upgrade and/or expansion of the facility over a 20 to 30-year design horizon. The Environmental Study Report concluded that an additional 25 percent average day flow capacity and approximate doubling of peak capacity is required to meet future needs. Following the announcement of federal funding assistance in 2019, the Town has completed preliminary design studies exploring both retrofit and new-build design concepts. Detailed design of a retrofit project focused on the mitigation of process bypassing and renewal of aging equipment will commence in 2022.

## *$BOD_5$ and Total Suspended Solids Analytical Data*

The removal of biochemical oxygen demand ($BOD_5$) and suspended solids from municipal wastewater is the primary design function of the Napanee WPCP, which utilizes a conventional activated sludge process. The principal mechanisms of removal include screening, sedimentation, and biodegradation. $BOD_5$ and suspended solids data collected during 2021 are summarized in Table 3.

Raw sewage entering the treatment process during 2021 was of moderate strength, having $BOD_5$ and total suspended solids concentrations averaging 103 mg/L and 162

mg/L respectively. The pollutant removal efficiency of the plant is typical of the conventional activated sludge process with $BOD_5$ and total suspended solids removals averaging 93 and 96 percent. Annual average effluent concentrations and mass loadings of both $BOD_5$ and total suspended solids were well below the compliance limits of 25 mg/L and 227 kg/d.

**Table 3: Summary of average monthly $BOD_5$ and suspended solids results for 2021**

| Month | $BOD_5$ | | | Suspended Solids | | |
|---|---|---|---|---|---|---|
| | Raw Sewage (mg/L) | Final Effluent (mg/L) | Removal (%) | Raw Sewage (mg/L) | Final Effluent (mg/L) | Removal (%) |
| **January** | 88 | 6.8 | 92.4 | 141 | 5.0 | 96.5 |
| **February** | 92 | 8.8 | 90.5 | 151 | 8.9 | 94.1 |
| **March** | 77 | 4.0 | 94.8 | 120 | 6.4 | 94.7 |
| **April** | 102 | 6.3 | 93.8 | 171 | 6.5 | 96.2 |
| **May** | 108 | 7.5 | 93.1 | 190 | 6.5 | 96.6 |
| **June** | 107 | 9.6 | 91.0 | 202 | 7.5 | 96.3 |
| **July** | 119 | 7.8 | 93.5 | 152 | 6.2 | 95.9 |
| **August** | 114 | 8.4 | 92.7 | 195 | 4.7 | 97.6 |
| **September** | 167 | 4.5 | 97.3 | 210 | 5.0 | 97.6 |
| **October** | 88 | 4.8 | 94.6 | 123 | 6.2 | 95.0 |
| **November** | 95 | 8.4 | 91.2 | 161 | 3.7 | 97.7 |
| **December** | 73 | 4.8 | 94.3 | 127 | 4.8 | 96.2 |
| **Average** (mg/L)* | 103 | 6.8 | 93.3 | 162 | 5.9 | 96.2 |
| **Average** (kg/d)* | | 31.6 | | | 28.2 | |

*****Environmental Compliance Approval limits: 25mg/L and 227 kg/d

## *Phosphorus and Nitrogen Analytical Data*

Phosphorus is a nutrient that is essential to biological growth. It is typically present in raw sewage at concentrations sufficient to cause excessive plant and algae growth in natural surface waters if released untreated. Excessive growth in surface water deteriorates the aquatic environment when the plants / algae decompose.

Phosphorus is removed from sewage at the WPCP by the addition of ferric sulfate which forms an insoluble precipitate when it combines with phosphorus in the wastewater. The precipitate is then removed by sedimentation. Ferric sulfate is added to

the process immediately downstream from the pre-treatment process but can also be added at the aeration tank influent channel, or at the tail end of the aeration tanks.

The annual average concentration of phosphorus in the raw sewage was 3.72 mg/L, while the average effluent concentration was 0.14 mg/L. Effluent quality consistently met the Environmental Compliance Approval Limit of 1.0 mg/L throughout 2021.

Total Kjeldahl Nitrogen (TKN) represents the total quantity of organically bound nitrogen plus ammonia nitrogen which are the forms that most commonly occur in raw sewage. Removal or conversion of the nitrogen species is important because if released in the form of un-ionized ammonia, it can be toxic to aquatic organisms.

In 2021, the annual average concentration of un-ionized ammonia in the process effluent was 0.05 µg/L, which is well under the Provincial Water Quality Objective concentration of 20 µg/L.

Analytical data for phosphorus, nitrogen, pH, temperature, and alkalinity are summarized in Tables 4 and 5.

**Table 4: Summary of nutrient data for 2021**

| Month | Total Phosphorus | | | TKN | | $NH_3$ (Effluent Only) | |
|---|---|---|---|---|---|---|---|
| | Raw Sewage (mg/L) | Final Effluent (mg/L) | Removal (%) | Raw Sewage (mg/L) | Final Effluent (mg/L) | Total (mg/L) | Un-ionized (µg /L) |
| **January** | 3.45 | 0.10 | 97.1 | 27.45 | 12.43 | 10.43 | 0.049 |
| **February** | 3.92 | 0.19 | 95.1 | 28.80 | 24.75 | 21.65 | 0.045 |
| **March** | 3.03 | 0.15 | 95.0 | 22.46 | 15.56 | 13.46 | 0.033 |
| **April** | 3.98 | 0.12 | 97.0 | 27.20 | 18.93 | 17.13 | 0.040 |
| **May** | 3.81 | 0.15 | 96.2 | 25.73 | 12.83 | 11.21 | 0.026 |
| **June** | 4.30 | 0.19 | 95.6 | 28.24 | 27.54 | 22.02 | 0.076 |
| **July** | 3.32 | 0.12 | 96.4 | 19.78 | 14.35 | 13.58 | 0.055 |
| **August** | 4.34 | 0.14 | 96.8 | 32.24 | 23.66 | 21.84 | 0.090 |
| **September** | 3.68 | 0.15 | 96.8 | 33.58 | 18.83 | 18.28 | 0.069 |
| **October** | 3.21 | 0.13 | 96.1 | 27.85 | 27.60 | 24.85 | 0.110 |
| **November** | 3.47 | 0.15 | 95.8 | 19.26 | 12.32 | 9.38 | 0.029 |
| **December** | 3.19 | 0.09 | 97.3 | 21.35 | 10.73 | 9.33 | 0.033 |
| **Annual Average** | 3.72 | 0.14 | 96.3 | 26.16 | 18.29 | 16.10 | 0.055 |

*Environmental Compliance Approval limit: 1 mg/L and Bay of Quinte Remedial Action Plan Objective: 0.3 mg/L
Note: All samples were collected as 24-hour composite samples

**Table 5: Summary of temperature, pH and alkalinity data for 2021**

| Month | Final Effluent | | |
|---|---|---|---|
| | **Temperature** (°C) | **pH** (pH) | **Alkalinity** (mg/L) |
| **January** | 10.58 | 7.41 | 218 |
| **February** | 9.76 | 7.10 | 215 |
| **March** | 9.43 | 7.16 | 228 |
| **April** | 11.35 | 7.06 | 246 |
| **May** | 13.22 | 7.00 | 228 |
| **June** | 17.12 | 7.05 | 243 |
| **July** | 18.68 | 7.06 | 230 |
| **August** | 20.55 | 7.00 | 212 |
| **September** | 20.15 | 6.94 | 202 |
| **October** | 18.71 | 7.07 | 209 |
| **November** | 15.55 | 7.00 | 213 |
| **December** | 13.01 | 7.16 | 234 |
| **Average** | 14.84 | 7.08 | 223 |

Note: All measurements were conducted on daily grab samples, typically collected 5 times per week

## *Disinfection / Bacteriological Testing*

Prior to discharge to the Napanee River, the treated effluent is dosed with a disinfectant (chlorine) to inactivate any potential pathogenic organisms that may remain. Bacteriological testing is conducted each week to evaluate the effectiveness of the disinfection process. Grab samples for bacteriological testing (*E. Coli.*) were collected immediately downstream from the chlorine contact chamber, normally during peak flow conditions (between 8am and 10am) when the treatment process is typically most heavily burdened.

During 2021, all but one of the monthly geometric mean[1] values calculated from weekly analyses were below the operational objective of 200 CFU/100mL. The geometric mean value for all samples collected during 2021 was 67 CFU/100mL.

In response to the Federal regulation requiring the elimination of total chlorine residual from municipal wastewater treatment plant effluents, de-chlorination using sulfur dioxide

[1] Statistical reduction using geometric mean is consistent with the *Ontario Provincial Water Quality Objectives* and with the U.S. EPA *Bacterial Water Quality Standards for Recreational Waters*.

was introduced at the Napanee facility in January 2010. Total chlorine residual concentration in effluent discharged to the Napanee River has remained at or below 0.02 mg/L since the process was commissioned.

A summary of disinfectant residuals and bacteriological results for 2021 is provided in Table 6.

**Table 6: Summary of disinfection and bacteriological data for 2020**

| Month | Chlorination | | | | De-chlorination | | | E. Coli. |
|---|---|---|---|---|---|---|---|---|
| | Mass Applied (kg/mo) | Dosage (mg/L) | Residual (mg/L) | Demand (mg/L) | Mass Applied (kg/mo) | Dosage (mg/L) | Residual (mg/L) | Geo. Mean (CFU/100mL) |
| **January** | 215 | 0.92 | 0.46 | 0.47 | 189.6 | 1.06 | 0.00 | 56 |
| **February** | 157 | 1.08 | 0.49 | 0.59 | 127.2 | 1.23 | 0.00 | 34 |
| **March** | 254 | 0.99 | 0.58 | 0.40 | 212.3 | 1.13 | 0.00 | 32 |
| **April** | 186 | 0.91 | 0.56 | 0.35 | 142.8 | 0.93 | 0.00 | 22 |
| **May** | 218 | 1.13 | 0.44 | 0.69 | 138.2 | 0.94 | 0.00 | 138 |
| **June** | 268 | 1.86 | 0.33 | 1.54 | 121.3 | 1.11 | 0.00 | 266 |
| **July** | 282 | 1.45 | 0.46 | 0.99 | 126.5 | 0.82 | 0.00 | 83 |
| **August** | 248 | 1.75 | 0.50 | 1.25 | 115.6 | 1.06 | 0.00 | 12 |
| **September** | 241 | 1.39 | 0.57 | 0.82 | 135.6 | 1.04 | 0.01 | 6 |
| **October** | 200 | 1.11 | 0.48 | 0.63 | 131.4 | 0.95 | 0.00 | 90 |
| **November** | 218 | 1.11 | 0.51 | 0.61 | 129.4 | 0.88 | 0.00 | 32 |
| **December** | 258 | 1.08 | 0.56 | 0.52 | 143.9 | 0.83 | 0.01 | 39 |
| **Average** | 229 | 1.23 | 0.49 | 0.74 | 142.8 | 1.00 | 0.00 | 67 |
| **Total** | 2745 | | | | 1713.8 | | | |
| **Objective** | | | **<=0.5** | | | | **<=0.02** | **<=200** |

Notes: Chlorine is measured as total chlorine residual. All samples are collected as grab samples

# 2 Maintenance / Improvements & Plant Upsets

## *Maintenance / Improvements*

Maintenance activities and process improvements during 2021 included the following:

- Efforts to detect and reduce inflow and infiltration are ongoing. Flushing and camera inspections of approximately 25% of the collection system takes place each year.
- The 2012 Inflow and Infiltration Study identified several key areas of concern. The

targeted areas include infrastructure that has been in service for over 100 years. A considerable amount of infrastructure renewal occurred between 2014 and 2019 with portions of the targeted areas addressed each year. The study has become an integral part of our 10-year capital planning process.

- The sanitary sewer main was replaced on portions of Mill and Graham Streets. The replacement included sanitary services up to individual property lines.
- Repairs were made to the escalator screen and a gearbox was repaired on the compactor in the headworks.
- A gear box was repaired on the primary clarifier #2 sludge collector rake mechanism.
- Soft starts were replaced on both Aeration #1 and #2 Blowers.
- Secondary Clarifier #2 collection drive motor was replaced, as were some of the flights within the clarifier.
- The Methane Gas Booster was rebuilt.

### *Process Upsets*

During 2021 there were no observed significant upsets to plant performance other than the decreased level of treatment experienced during high flow events when heavy precipitation or melting is occurring. Although inflow and infiltration continues to be problematic, efforts to regain hydraulic capacity by monitoring, repairing, and maintaining the collection system are ongoing and appear to be effective.

# 3 Biosolids

### *Biosolids Quality and WPCP Output (Lagoon Input) Volumes*

Accumulated solids (sludge), removed from the municipal wastewater through the treatment process are stabilized in the anaerobic digestion process. The digestion

process reduces the quantity of solids requiring disposal by converting the volatile fraction to methane gas. The methane gas is then beneficially used in the plant boiler for process and building heat.

Following the digestion process, the resulting stabilized sludge (referred to as biosolids) is hauled to an off-site storage lagoon owned and operated by Mr. Fred Sutcliffe Jr. (Provisional Environmental Compliance Approval S-3712-39) and located on part lots 5 & 6, Concession IV, in the Town of Greater Napanee. The lagoon is leased by The Town of Greater Napanee for the exclusive temporary storage of biosolids generated at the Napanee WPCP.

An average of 18 $m^3$ of biosolids were hauled from the WPCP by Sutcliffe's Septic Service to the Sutcliffe Storage Lagoon each day in 2021. A summary of the volumes hauled during 2021 is provided in Table 7.

**Table 7: Summary of biosolids hauled to the storage lagoons for 2021**

| MONTH | LAGOON | |
|---|---|---|
| | Loads # | Volume $m^3$ |
| **January** | 31 | 421.6 |
| **February** | 36 | 489.6 |
| **March** | 30 | 408.0 |
| **April** | 42 | 571.2 |
| **May** | 37 | 503.2 |
| **June** | 47 | 639.2 |
| **July** | 37 | 503.2 |
| **August** | 50 | 680.0 |
| **September** | 50 | 680.0 |
| **October** | 50 | 680.0 |
| **November** | 39 | 530.4 |
| **December** | 37 | 503.2 |
| **Total** | **486** | **6609.6** |

## *Agricultural Land Application of Biosolids*

In 2021, the land application of biosolids took place on April 20th & 24th, July 28th, August 3rd, 4th, 5th & 9th, November 17th, 20th, 23rd, 24th & 30th. Total volumes of 5776 $m^3$

of biosolids were applied by Terrapure Environmental on 254.7 acres of land, under the supervision of the Town of Greater Napanee. Terrapure is contracted to conduct and administer the land application program.

Samples of biosolids were collected each month from the WPCP digester to determine appropriate, compliant rates of application.

The following Tables 8 and 9, provided by Terrapure Environmental, summarizes the 2021 land application program.

**Table 8: Sites applied with biosolids in 2021**

| *Date 2021* | Farmer/ Landowner Farm Name | NASM # | Lot | Con | Municipality | Field # | Total Volume ($m^3$) | Area Spread (ha) |
|---|---|---|---|---|---|---|---|---|
| Apr 20 | MacLean - Perry Rd. | 23425 | 25-27 | 5 | Town of Greater Napanee | 1 | 320 | 36.68 |
| Apr 24 | | | | | | 1 | 496 | |
| Jul 28 | Prins - Lloyds | 24776 | 17 | 5 | City of Belleville | 1 | 800 | 21.89 |
| Aug 3 | | | | | | 1 | 640 | |
| Aug 4 | | | | | | 1 | 160 | |
| Aug 5 | | | | | | 1 | 440 | |
| Aug 9 | | | | | | 1 | 560 | |
| Nov 17 | MacLean - Perry Rd. | 23425 | 25-27 | 5 | Town of Greater Napanee | 1 | 480 | 36.68 |
| Nov 20 | | | | | | 1 | 600 | |
| Nov 23 | | | | | | 1 | 520 | |
| Nov 24 | | | | | | 1 | 440 | |
| Nov 30 | Donohue – Way Pasture | 24445 | 3 | 2 | Township of Stone Mills | 1 & 3 | 320 | 7.81 |
| | | | | | **TOTAL** | | **5776** | **103.06** |

**Table 9: Average biosolids quality for 2021**

| Metals | Maximum Acceptable Concentration (mg/kg) | 2021 Average |
|---|---|---|
| **As** | 170 | 5.1 |
| **Cd** | 34 | 2.4 |
| **Co** | 340 | 5.8 |
| **Cr** | 2800 | 21.2 |
| **Cu** | 1700 | 622.2 |
| **Hg** | 11 | 0.46 |
| **Mo** | 94 | 11.1 |
| **Ni** | 420 | 24.3 |
| **Pb** | 1100 | 26.6 |
| **Se** | 34 | 4.3 |
| **Zn** | 4200 | 1004.5 |
| **E. Coli** | **Maximum Acceptable Concentration (CFU/g)** | |
| | 2,000,000 | 3,822 |
| **Liquid Biosolids** | | |
| **Total P (mg/L)** | | 1,090 |
| **Ammonia+Ammonium (mg/L)** | | 555 |
| **Nitrate+Nitrites (mg/L)** | | 3.0 |
| **TKN (mg/L)** | | 1,690 |
| **Potassium (mg/L)** | | 57 |
| **Solids (mg/L)** | | 38,809 |