2021/2022 ANNUAL PERFORMANCE REPORT

ARTHUR WASTEWATER TREATMENT PLANT

For the period of
October 1st, 2021 to May 31st, 2022

Prepared for the Township of Wellington North by the Ontario Clean Water Agency

ONTARIO CLEAN WATER AGENCY
AGENCE ONTARIENNE DES EAUX

Table of Contents

Appendix A: Performance Assessment Report

Appendix B: Sampling Schedule

Appendix C: Golden Valley Farms – Laboratory Analysis Summary

Appendix D: Calibration Reports

Appendix E: Sludge Quality Analysis

Appendix F: Daily Streamflow Measurements

Appendix G: Grand River Conservation Authority Discharge Measurements and TAN Concentrations

1. System Description

Phase 1 – Substantial completion December 2020

S**anitary Sewage Pumping Stations**

Frederick Street Pumping Station and Forcemain

Upgrade to the existing Frederick Street Pumping Station having a firm capacity of 110 L/s, located at 176 Frederick Street West, comprising;

- Construction of a new wet well having dimension of 5.5m x 5.3m x 7.2m, having an active storage volume of 90 m3, equipped with three variable speed controlled sewage pumps, two for duty and one for standby, each with a rated capacity of 55 L/s under 30m TDH, discharging through a common header to Arthur Wastewater Treatment Plant through an existing 755m long 250mm diameter forcemain, complete with a MCC, a new PLC based control system, high level floats and alarms;
- Conversion of existing wet well in to a bypass chamber, complete with one (1) sewage drain pump, located in the existing wet well, with a capacity of 10 L/s under 8m TDH, receiving sewage overflow from the inlet sewer under extreme flow events with an Emergency Overflow to the Conestogo River;

Arthur Wastewater Treatment Plant (WWTP)

Equalization Tank (to be upgraded to Extended Aeration Plant B during Phase 2)

- Construction of the equalization tank 1 (to be used as the future secondary treatment/extended aeration tank during Phase 2), having a total capacity of 2,100 m3, and operated in a manner to allow the flows entering the secondary treatment in Phase 1 to be reduced to 5,270 m3/d, comprising of two cells and a central future secondary clarifier tank, receiving diverted peak flow through a weir located in the headworks building outlet pipe under peak flow conditions, complete with a sewer line connecting a new hopper adjacent to the existing Headworks to a new Headworks channel upstream of Plant B;
- One (1) submersible drain pump, to be located in a precast manhole (to be converted to a scum collection pit and transfer pump in Phase 2), connected to the equalization tank, with a capacity of 10 L/s under a TDH of 8m, discharging to Headworks channel;

Secondary Treatment System

Biological Treatment

Aeration Blowers (for future use in Plant B/Treatment Train B in Phase 2)

- Three (3) variable speed controlled blowers (one standby), each with a capacity of 944 m3/h, with a common discharge line connected to the existing aeration system and tie-in to future secondary treatment plant;

Return Activated Sludge (RAS) and Waste Activated Sludge (WAS) pumping system

- Two (2) variable speed controlled RAS and WAS pumps (one standby), to be located in the existing RAS and WAS hopper, with a capacity of 20.9 L/s;
- Flow meter for RAS lines to each aeration tank and WAS transfer line to Aerobic digesters;

Supplementary Treatment Systems Phosphorous Removal (Alum)

- Four (4) variable speed dosing pumps, three for duty and one for standby, each having a capacity of 5.5 L/hr under a TDH of 50 psi; One of the pumps providing flexibility for secondary injection point prior to filters and remaining two duty pumps dedicated to two primary injection points upstream of the existing and New clarifier Plant A and Plant B;

Sludge Management System Sludge Digestion

- Replacement of existing blowers with two (2) blowers, one for duty and one for standby, each having a rated capacity of 540 m3/h at 45 kPa, discharging through a common discharge line to the existing aeration system of digesters and sludge holding tanks;
- Installation of flow metering for on the existing discharge line of sludge pumps;
- Installation of Pump and barrel decanting system in the secondary digester;

Secondary Effluent Holding Ponds (Offsite Lagoon)

Lagoon Level Monitoring through SCADA and Valve Replacement

- Installation of a solar powered lagoon level monitoring system integrated with the existing SCADA system to monitor existing and new processes at the Arthur WWTP;

Existing Works

Sanitary Sewers

Sanitary sewers located on Wells Street, from approximately 150 South of Highway No. 6 to Wells Street Pumping Station;

Sanitary Sewage Pumping Stations

Wells Street Pumping Station and Forcemain

Wells Street Pumping Station located at Wells Street approximately 675 m South of Highway No. 6, and a forcemain, consisting of;

- an oversized reinforced concrete wet well with a liquid retention volume of approximately 120 m3:
- two submersible sewage pumps, one as standby, each rated at 16 L/s at 31 m TDH;
- weatherproof control panel mounted outside the wet well;
- 150 mm diameter forcemain from the pumping station to the existing forcemain at Wells Street approximately 150 m South of Highway No. 6;
- three (3) flushing connections constructed on the discharge forcemain from the Wells Street Sewage Pumping Station on Wells Street;

Frederick Street Pumping Station and Forcemain

Frederick Street sewage pumping station located at 176 Frederick Street West, consisting of;

- one (1) reinforced concrete wet well measuring approximately 5.3m x 5.3m x 6.2 m deep;
- two (2) submersible pumps with variable speed drives, one (1) as standby, each rated at a maximum flow of 58.4 L/s against 14 m TDH;
- one (1) 60 kW standby diesel generator set complete with a 450 L fuel tank, installed in an adjoining building measuring approximately 6.0 m x 4.6 m in plan;
- mechanical ventilation system;
- wet well of the existing pumping station retained as an overflow chamber;
- two (2) 250mm diameter forcemains, in easement, from the pumping station to the sewage treatment plant;

Inlet Works Inlet Sewers

- 450 mm diameter sanitary sewer in Preston Street from Smith Street to the sewage treatment plant;

Biological Treatment

Aeration Tank and Air Diffusion System (Existing Treatment Train A)

A two (2) cell annular ring type aeration tank with a total liquid storage volume of 1,073 m 3 to provide a minimum hydraulic retention time of 17.5 hours at the average flow of 1,465 m 3 /d, complete with two (2) fine bubble aeration systems for two (2) biological treatment aeration tanks including all in-tank piping, diffusers and all other appurtenances necessary to complete the aeration systems of an extended aeration process, having;

- Aeration cell No. 1 - 27.95 m effective length (centreline of annulus) x 4.65 m width x 4.18 m SWD;
- Aeration cell No. 2 - 27.26 effective length (centreline of annulus) x 4.65 m width x 4.18 m SWD
- Flow meters on return activated sludge piping to each of the aeration tanks, including associated appurtenances;

Final Clarifier (Existing Treatment Train A)

One (1) 13.5 m diameter centre inlet clarifier with 3.8 m SWD, having a maximum surface settling rate of 0.41 L/m 3 .s and a weir loading of approximately 1.38 L/m.s at a peak flow of 5,045 m 3 /d and equipped with;

- sludge collector mechanism including a centre support column, collector arms, gear assembly, drive unit and other accessories:
- inlet well;
- scum skimming mechanism;

Return Sludge and Waste Sludge Pumping

Return Sludge and waste sludge pumping system consisting of;

- one (1) sludge hopper with liquid volume of approximately 50 m3;
- two (2) variable speed submersible sludge pumps, each rated at a maximum capacity of 34 L/s for pumping either return sludge to the aeration cells or waste sludge to the digester;

Supplementary Treatment Systems

Phosphorus Removal

Chemical storage and feeding facilities including;

- one (1), twenty three (23) m3 double FRP shell insulated tank furnished with

- heating taps, to be installed outside in a concrete spill containment structure, for the storage of liquid alum or ferric chloride;
- two (2) metering pumps, one as a standby, each having a minimum rated output of 250 L/d, with at least 10:1 turndown capability to be installed in a chemical room;
- one (1) 450 L plastic "day tank" in the Chemical room;

Post-Secondary Treatment System

Effluent Filters (serving existing Plant A and future Plant B) Effluent filter system consisting of;

- one (1), six (6) continuous backwash, upflow, deep bed (1000 mm) granular media filter modules with total filtration area of 27.9 m2 and a loading rate of 9.7 m/h when treating a peak flow of 6,500 m3/d;
- six (6) air lift/filtrate dispersion modules;
- two (2) air compressors, each having a capacity of 38 L/s (standard) at 690 kpa pressure, mounted on approximately 300 L air receiver tank;
- two (2) wash water reject pumps, one (1) installed and one (1) kept on site as standby, each rated at 6.1 L/s against 3.5m TDH;
- filter bypass to the disinfection basin, to allow the effluent to bypass the filters and overflow (over the stop gate) to the disinfection basin when flows exceed 65 L/s;

Sludge Management System

Sludge Digestion and Storage

Sludge digestion and storage facilities consisting of;

- One (1) primary aerobic digester tank measuring approximately 9.4 m x 6.5 m x 5.0 m SWD;
- One (1) secondary aerobic digester tank measuring approximately 5.0 m x 6.5 m x 5.0 m SWD;
- Four (4) sludge storage tanks, each measuring approximately 6.0 m x 5.0 m x 5.0 m SWD;

Coarse bubble air diffusion system including:

- air header with approximately 48 diffusers in the primary digester tank;
- air header with approximately 24 diffusers in the secondary digester tank:
- air header with approximately 36 diffusers in each of the sludge storage tanks;
- two (2) blowers, each rated at 150 L/s against 45 kPa discharge pressure at standard conditions to supply air to the digesters and sludge storage tanks;
- two (2) horizontally mounted end suction sludge transfer pumps, each rated at 38 L/s against 12 m TDH;
- two (2) horizontally mounted digester supernatant pumps, each rated at 7.5 L/s against 6 m TDH;
- one (1) submersible decant pump assembly rated at 6 L/s against 4 m TDH for installation in secondary digester;
- three (3) submersible non-clog mechanical mixers, guide rail mounted, two (2) in the primary digester and one (1) in the secondary digester, each having a minimum motor power of 1.1 kW;
- four (4) submersible non-clog mechanical mixers, guide rail mounted, one (1) in each sludge storage tank, with a minimum motor power of 2.4 kW each;

Disinfection

Ultraviolet irradiation system sized to treat a peak flow of 6,500 m 3 /d and including;

- one (1) flow channel measuring approximately 7.9 m long x 0.5 m wide x 0.9 m deep;
- two (2) banks of ultraviolet lamps in series, each bank containing 8 modules with 4 lamps per module, providing a dose of approximately 25.9 watts. sec/cm 2 at 65 percent transmission;

- one (1) automatic level controller to maintain an average liquid depth of 250 mm in the flow channel;
- power control modules, control panels and other accessories;

Utility Buildings

Utility Buildings at the sewage treatment plant site consisting of;

- one (1) administration and control building accommodating an office, a laboratory, a lunch room, a workshop/garage, a generator room, a washroom, a storage room, a mechanical room, a blower room to house the aeration blowers and air compressors and a pump room to house the effluent pumps;
- one (1) filter building to house the effluent filters, ultraviolet disinfection facilities and the Parshall flume;

Parshall flume

- One (1) sludge treatment building containing a blower room to house sludge digester and sludge storage tank blowers, and a pump room to house the sludge transfer pumps and the supernatant pumps;

Final Effluent Pumping, Storage and Disposal Facilities

Effluent Pumps

Effluent pumping systems consisting of;

- two (2) centrifugal submersible pumps installed in the effluent trough, each rated at 6 L/s against 61 m TDH to supply utility and lawn water at the plant;
- two (2) horizontal split case pumps, installed in the effluent pump room, each rated at 58.5 L/s against 64 m TDH to pump the effluent outside the approved discharge period, from the plant to Holding Ponds;
- one (1) wet well measuring approximately 7.8 m x 2.6 m x 1.7 m SWD for the horizontal split case pumps;
- one (1) magnetic flow meter and accessories to monitor and record the quantity of effluent pumped to the Holding Ponds;

Holding Ponds (Secondary Effluent Storage Facilities)

Holding Ponds consisting of;

- Three (3) Sewage lagoons having volumes of 133,300 m3, 87,200 m3, and 122,500 m3, for a total storage volume of 343,000 m3 including the structures and piping so that the lagoons can be used as effluent Holding Ponds;
- a reinforced concrete flow distribution structure;

Stream Gauging Station

- Conestogo River at Arthur hydrometric station (17T 536350E 4853113N) near the outfall to monitor and record flow in Conestogo River;

Outfall Sewer

- 400 mm diameter outfall sewer from the sewage treatment plant to Conestogo River; including all other mechanical system, electrical system, instrumentation and control system, standby power system, piping, pumps, valves and appurtenances essential for he proper, safe and reliable operation of the Works in accordance with this Approval, in the context of process performance and general principles of wastewater engineering only;

An overview of the Arthur Wastewater Treatment System can be found in the following table:

Table 1: Arthur WWTP System Overview

Facility Name	Arthur Wastewater Treatment Plant
Facility Type	Extended Aeration, Sand Filtration, Chemical Phosphorus Removal, and UV Treatment
Plant Classification	III
Works Number	110000882
Rated Capacity	1,860 m^3/d
Discharge Point	Conestogo River
Environmental Compliance Approval	7654-BEMKVD (September 10, 2019)

2. Monitoring Data Influent

ECA 7654-BEMKVD, Section 13 (4)(a):

"a summary and interpretation of all Influent, Processed Organic Waste monitoring data, and a review of the historical trend of the sewage characteristics and flow rates;"

2.1 Monitoring Program Influent

The following tables outline the monitoring programs at the Arthur Wastewater Treatment Plant (WWTP) as required by the ECA that was issued for the reporting period. There are additional in-house samples taken and analyzed in-house throughout the year in order to help with process performance monitoring, adjustment, and optimization. The parameters were analyzed by an accredited analytical laboratory (SGS Canada Inc., Lakefield, Ontario).

Table 2: Influent Monitoring Program – Discharge of Inlet Sewer

Parameters	Sample Type	Frequency
Biochemical Oxygen Demand (BOD_5)	24-hour Composite	Monthly
Total Suspended Solids (TSS)	24-hour Composite	Monthly
Total Phosphorous (TP)	24-hour Composite	Monthly
Total Kjeldahl Nitrogen (TKN)	24-hour Composite	Monthly

2.2 Sewage Characteristics

A summary of the influent laboratory results can be seen in the following tables:

Table 3: Influent Laboratory Analysis – Discharge of Inlet Sewer

Month & Year	BOD_5 (mg/L)	TSS (mg/L)	TP (mg/L)	TKN (mg/L)
October 2021	269.00	285.00	6.97	32.40
November 2021	238.00	244.00	5.06	27.80
December 2021	229.00	203.00	5.70	22.70
January 2022	220.00	127.00	5.09	43.90
February 2022	262.00	209.00	6.03	40.00
March 2022	128.00	159.00	3.78	34.60
April 2022	143.00	198.00	3.80	21.80
May 2022	222.00	153.00	3.62	26.10
Annual Average	**213.88**	**197.25**	**5.01**	**31.16**

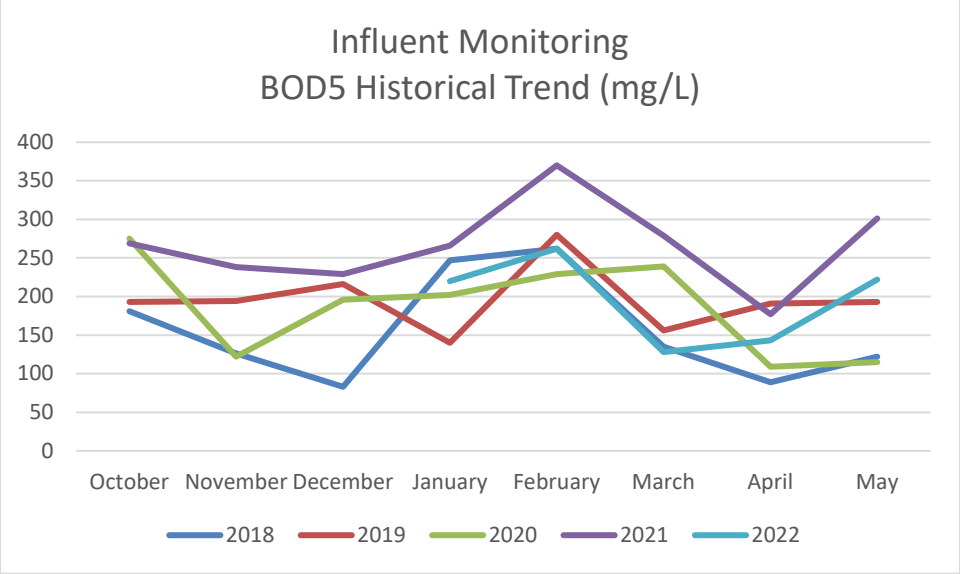
Inlet Sewer laboratory analysis throughout this reporting period averaged a Biochemical Oxygen Demand concentration of 213.88 mg/L, a Total Suspended Solids (TSS) concentration of 197.25 mg/L, a Total Phosphorus (TP) concentration of 5.01 mg/L and a Total Kjeldahl Nitrogen concentration of 31.16 mg/L.

2.3 Historical Trend of Sewage Characteristics

A review of historical trend of the influent sewage characteristics are shown below in the following graphs 1-4:

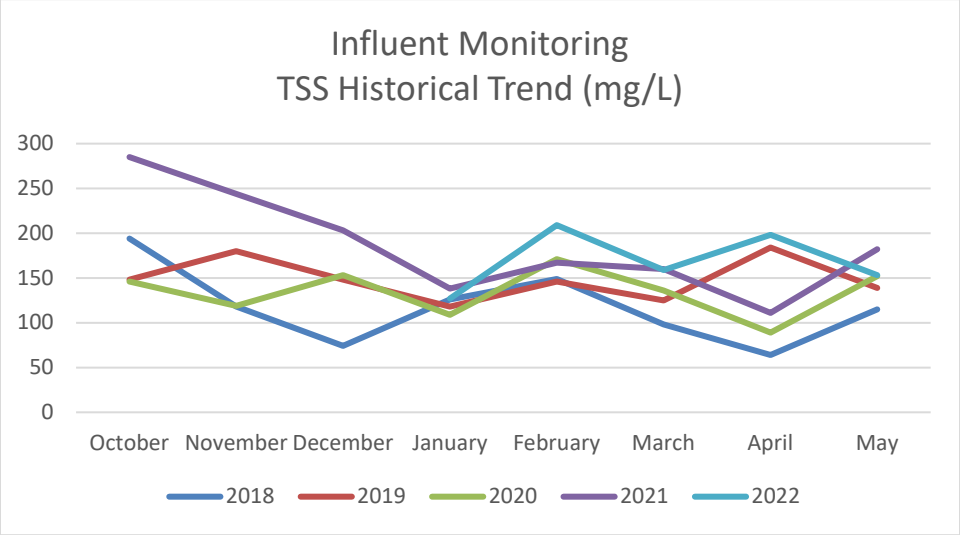
The below graph shows historical raw Biochemical Oxygen Demand (BOD_5) trending from 2018 to 2022. A review of the trends from the last 5 years for BOD_5 shows that the average BOD_5 concentration in the raw sewage has fluctuated year per year.

Graph 1: BOD5 Historical Trending Laboratory Results (Influent) – Discharge of Inlet Sewer



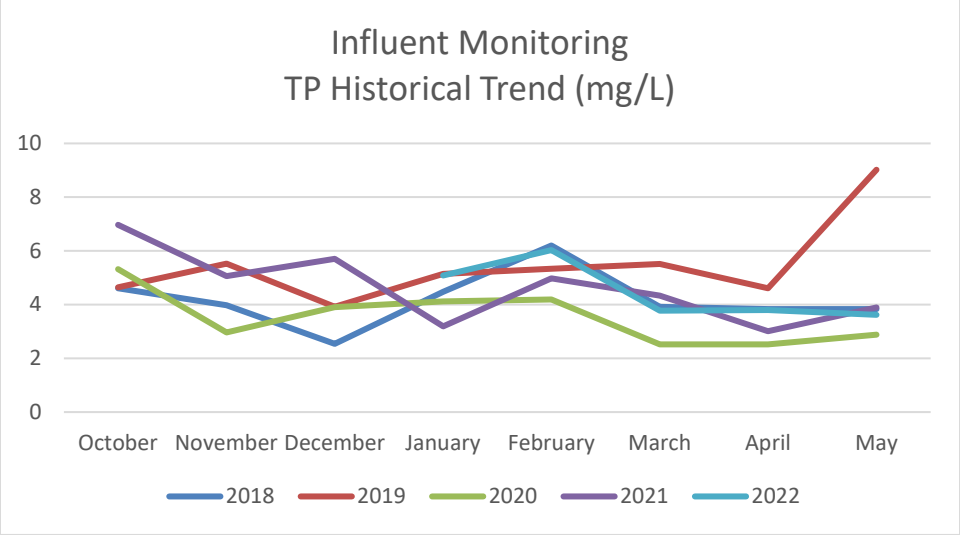
The below graph shows the historical raw Total Suspended Solids trending from 2018 to 2022. A review of the trends from the last 5 years for TSS has shown similar concentrations to previous years.

Graph 2: TSS Historical Trending Laboratory Results (Influent) – Discharge of Inlet Sewer



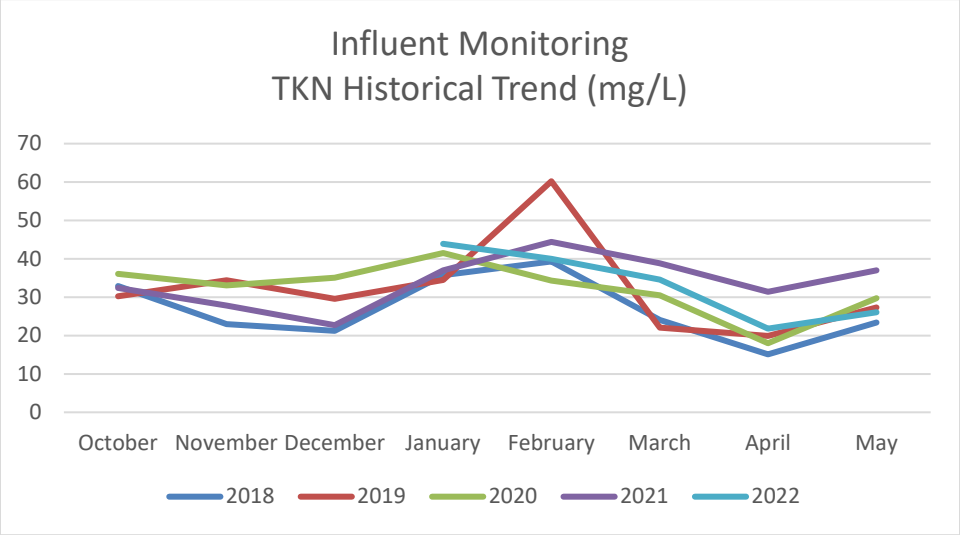
The below graph shows the historical raw Total Phosphorus trending from 2018 to 2022. A review of the trends from the last 5 years for TP has shown similar concentrations to previous years.

Graph 3: TP Historical Trending Laboratory Results (Influent) – Discharge of Inlet Sewer



The below graph shows the historical raw Total Kjeldahl Nitrogen trending from 2018 to 2022. A review of the trends from the last 5 years for TP has shown similar concentrations to previous years.

Graph 4: TKN Historical Trending Laboratory Results (Influent) – Discharge of Inlet Sewer



2.4 Influent Flows

A summary of Influent Flows during the reporting period is included in the following table:

Table 4: Influent Flows

Month	Average Daily Flow (m^3/day)	Peak Flow (m^3/day)	Total Flow (m^3)
October 2021	1223.19	2052.00	37919.00
November 2021	1340.15	1793.00	40204.48
December 2021	1608.58	2452.00	49866.00
January 2022	1162.13	1660.00	36026.00
February 2022	1467.68	3855.00	41095.00
March 2022	2061.56	3381.90	63908.50
April 2022	1505.14	2120.80	45154.20
May 2022	1200.89	1816.30	37227.60
Annual Average	**1446.09**	-	-
Annual Max	-	**3855.00**	-
Annual Total	-	-	**351400.78**

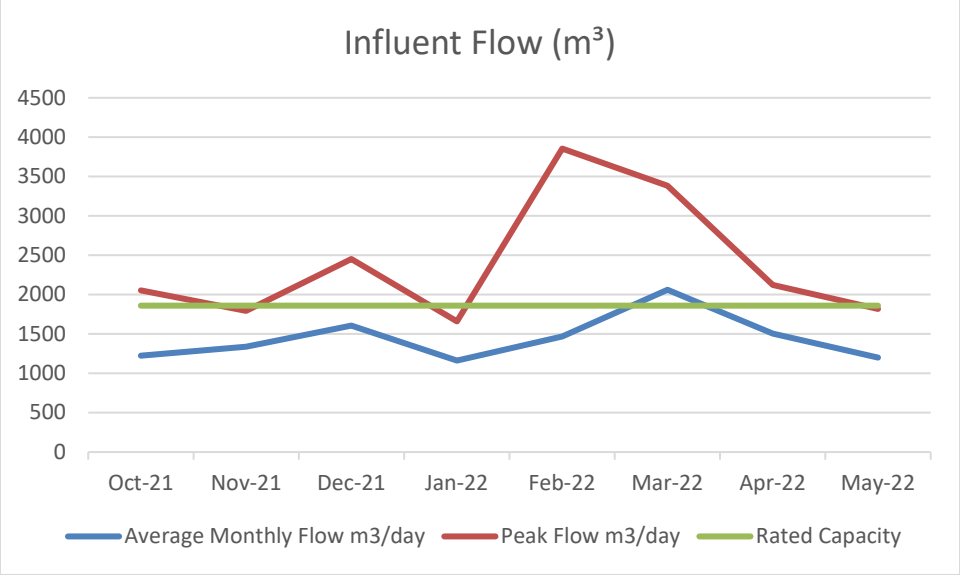
*Influent flow is calculated based on River Discharge Flow along with Lagoon Flow as there is no Raw Flow Meter

The average daily flow for the reporting period was 1,446.09 m^3, which is approximately 77.75% of the specified design flow of 1,860.00 m^3/day. The highest recorded Monthly Average Daily Flow was in February at 3,855.00 m^3 and was due to heavy rain and increased inflows from the seasonal melt. The total precipitation for February was highest for the reporting period based on data from Environment Canada.

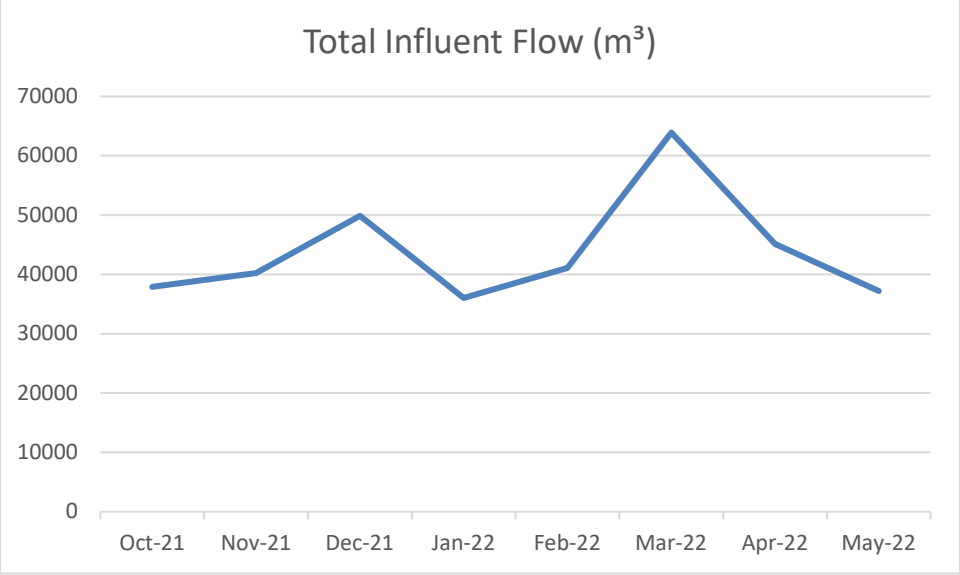
There were no instances when the daily peak of 6,500 m³ was exceeded. The highest recorded peak flow of 3,855.00 m³/day occurred in February 2022. This maximum peak flow is approximately 59.31% of the approved Peak Flow Rating for the Works.

Please refer to below for graphical representation of influent flows for the reporting period:

Graph 5: Influent: Average Daily Flows & Peak Flows Versus Designed Limits for Reporting Period



Graph 6: Influent: Total Flows for the Reporting Period

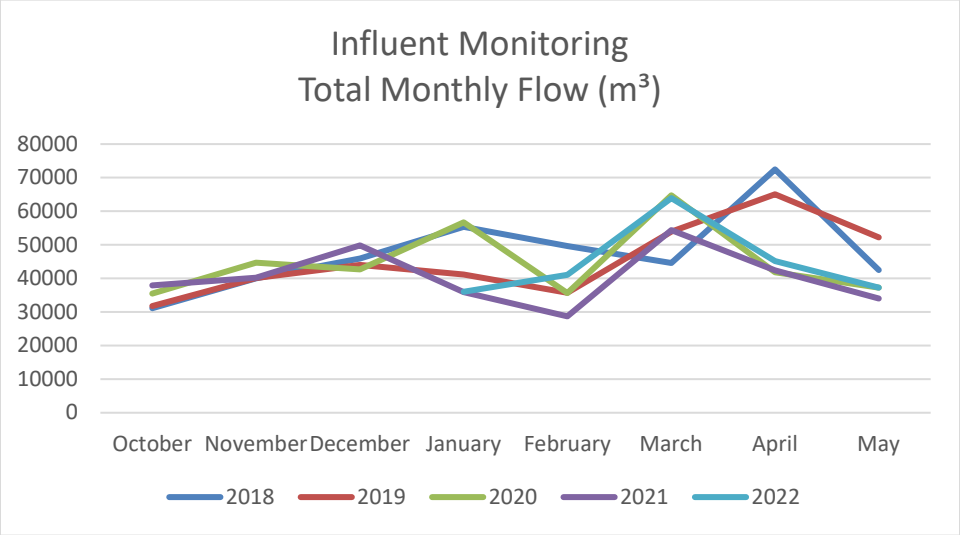


2.5 Historical Trend of Influent Flows

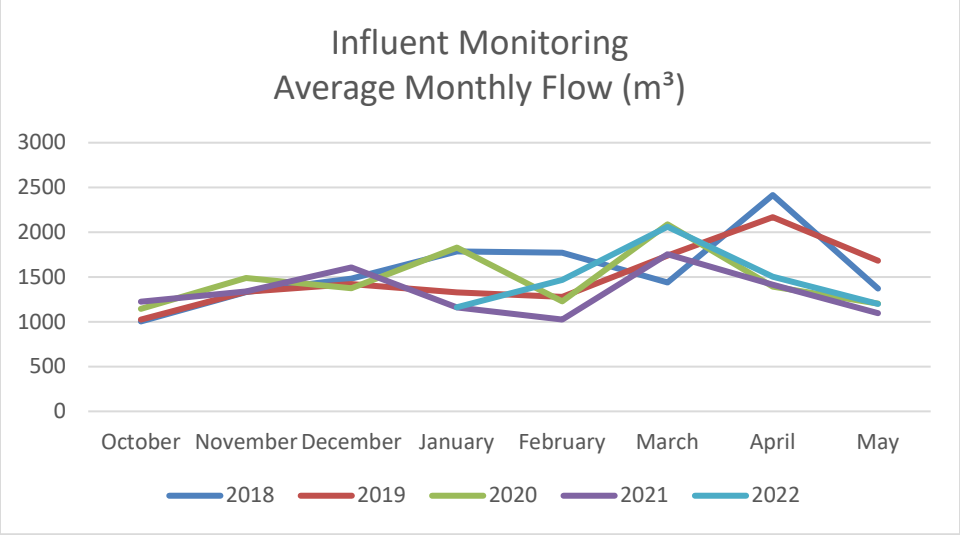
A review of historical trend of the influent flows are shown below in the following graphs 7-9:

The below graphs (7-9) show the historical monthly influent flow trending from 2018 to 2022. A review of the trends from the last 5 years has shown similar flows in the months of September-December and a fluctuations of flow in the months of January-May.

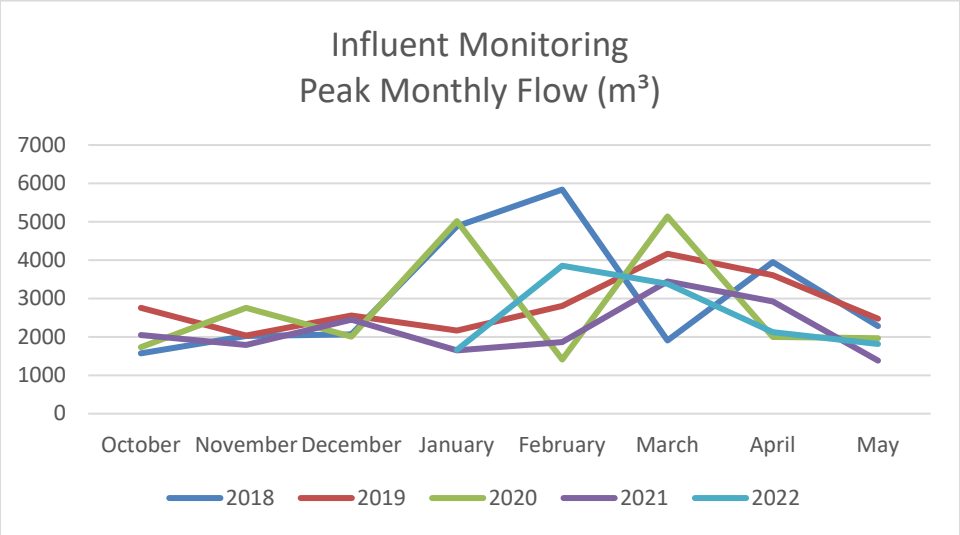
Graph 7: Monthly Total Influent Flow Historical Trend



Graph 8: Monthly Average Influent Flow Historical Trend



Graph 9: Monthly Peak Influent Flow Historical Trend



3. Monitoring Data Effluent

ECA 7654-BEMKVD, Section 13 (4)(b):

"a summary and interpretation of all Final Effluent monitoring data, including concentration, flow rates, loading and a comparison to the design objectives and compliance limits in this Approval, including an overview of the success and adequacy of the Works;"

3.1 Monitoring Program Effluent

The following table outlines the monitoring programs at the Arthur Wastewater Treatment Plant (WWTP) as required by the ECA that was issued for the reporting period. The parameters were analyzed by an accredited analytical laboratory (SGS Canada Inc., Lakefield, Ontario). Additional in-house samples are taken and analyzed in-house throughout the year to assist with process performance monitoring, adjustment, and optimization.

Table 5: Effluent Monitoring Program – Plant Outfall Pipe - Weekly during approved discharge period

Parameters	Sample Type	Frequency
Carbonaceous Biochemical Oxygen Demand ($CBOD_5$)	24-hour Composite	Weekly
Total Suspended Solids (TSS)	24-hour Composite	Weekly
Total Phosphorous (TP)	24-hour Composite	Weekly
Total Ammonia Nitrogen	24-hour Composite	Weekly
Total Kjeldahl Nitrogen (TKN)	24-hour Composite	Weekly
Nitrate as Nitrogen	24-hour Composite	Weekly
Nitrite as Nitrogen	24-hour Composite	Weekly
Unionized Ammonia	As Calculated	Weekly
E.Coli	Grab	Weekly
Dissolved Oxygen	Grab/Probe	Weekly
pH	Grab/Probe	Weekly
Temperature	Grab/Probe	Weekly

3.2 Monitoring Final Effluent Design Objectives, Limits and Loadings

The following tables outline the final effluent objectives, limits and loadings at the Arthur Wastewater Treatment Plant as per its ECA. The applicable effluent parameters are either "concentrations" expressed as milligrams per litre or "loadings" expressed as kilograms per day, and they are reportable either "Monthly" or "Seasonally."

Table 6: Arthur WWTP Final Effluent Design Objectives and Limits upon completion of construction of all Proposed Works in Phase 1 as per Schedule B in ECA:

Source	Parameter	Objective Monthly Average Concentration (mg/L)	Limit Monthly Average Concentration (mg/L)	Limit Seasonal Average Waste Loading (Kg/d)
Final Effluent	$CBOD_5$	6.0	10.0	18.6
	Total Suspended Solids	6.0	10.0	18.6
	Total Phosphorus	0.21	0.25	0.47
	Total Ammonia Nitrogen	0.6	3.5 (Jan 01-May 31) 2.8 (Oct 01-Oct 31) 3.5 (Nov 01-Dec 31)	6.5 (Jan 01-May 31) 5.2 (Oct 01-Oct 31) 6.5 (Nov 01-Dec 31)
	E. coli	100 CFU/100 mL	100 CFU/100 mL	n/a
	pH	6 to 8, inclusive		

3.3 Effluent Results During Discharge Period

The following tables 7- 12 outline the Monthly and Seasonal Average effluent results for the October 1, 2021 – May 31, 2022 reporting period at the Arthur WWTP:

Table 7: Carbonaceous Biochemical Demand Concentrations versus ECA Limits

	Monthly Average Concentration (mg/L)	Within Monthly Objective? (6.0 mg/L)	Within Monthly Limit? (10.0 mg/L)	Seasonal Average Loading (kg/d)	Within Seasonal Limit? (18.6 kg/d)
October 2021	2.75	Yes	Yes	1.89	-
November 2021	2.20	Yes	Yes	4.73	-
December 2021	2.60	Yes	Yes	6.72	-
January 2022	3.50	Yes	Yes	12.74	-
February 2022	2.25	Yes	Yes	7.48	-
March 2022	3.00	Yes	Yes	11.19	-
April 2022	3.50	Yes	Yes	9.23	-
May 2022	5.00	Yes	Yes	4.07	-
Seasonal Average	-	-	-	7.26	Yes

Table 8: Total Suspended Solids Concentrations versus ECA Limits

	Monthly Average Concentration (mg/L)	Within Monthly Average Objective? (6.0 mg/L)	Within Monthly Average Limits? (10.0 mg/L)	Seasonal Average Loading (kg/d)	Within Seasonal Limit? (18.6 kg/d)
October 2021	5.00	Yes	Yes	3.44	-
November 2021	7.00	**No**	Yes	15.06	-
December 2021	5.60	Yes	Yes	14.48	-
January 2022	4.75	Yes	Yes	17.29	-
February 2022	5.50	Yes	Yes	18.29	-
March 2022	5.80	Yes	Yes	21.64	-
April 2022	11.00	**No**	**No**	29.02	-
May 2022	7.00	**No**	Yes	5.70	-
Seasonal Average	-	-	-	15.62	Yes

*For instance in April 2022 where the Total Suspended Solids Monthly Average Limit was exceeded notification was provided.

Table 9: Total Phosphorus Concentrations versus ECA Limits

	Monthly Average Concentration (mg/L)	Within Monthly Average Objective? (0.21 mg/L)	Within Monthly Average Limits? (0.25 mg/L)	Seasonal Average Loading (kg/d)	Within Seasonal Limit? (0.47 kg/d)
October 2021	0.18	Yes	Yes	0.13	-
November 2021	0.18	Yes	Yes	0.40	-
December 2021	0.13	Yes	Yes	0.34	-
January 2022	0.20	Yes	Yes	0.71	-
February 2022	0.20	Yes	Yes	0.66	-
March 2022	0.12	Yes	Yes	0.44	-
April 2022	0.06	Yes	Yes	0.16	-
May 2022	0.05	Yes	Yes	0.04	-
Seasonal Average	-	-	-	0.36	Yes

Table 10: Total Ammonia Nitrogen Concentrations versus ECA Limits

	Monthly Average Concentration (mg/L)	Within Monthly Average Objective? (0.6 mg/L)	Within Monthly Average Limits? 3.5 mg/L (Jan 1-May 31) 2.8 mg/L (Oct 1-Oct 31) 3.5 mg/L (Nov 1-Dec 31)	Seasonal Average Loading (kg/d)	Within Seasonal Limit? 6.5 mg/L (Jan 1-May 31) 5.2 mg/L (Oct 1-Oct 31) 6.5 mg/L (Nov 1-Dec 31)
October 2021	0.15	Yes	Yes	0.10	-
November 2021	0.24	Yes	Yes	0.52	-
December 2021	0.38	Yes	Yes	0.98	-
January 2022	0.50	Yes	Yes	1.82	-
February 2022	1.13	**No**	Yes	3.74	-
March 2022	1.48	**No**	Yes	5.52	-
April 2022	2.32	**No**	Yes	6.11	-
May 2022	0.82	**No**	Yes	0.67	-
Seasonal Average	-	-	-	2.43	Yes

Table 11: *E. coli* Concentrations versus ECA Limits

	Monthly Average Concentration (CFU/100mL)	Within Monthly Objective/Limits? (100 CFU/ 100mL)
October 2021	2.00	Yes
November 2021	35.70	Yes
December 2021	10.98	Yes
January 2022	23.98	Yes
February 2022	28.25	Yes
March 2022	30.62	Yes
April 2022	5.63	Yes
May 2022	2.35	Yes

Table 12: pH Ranges versus ECA Limits

	pH Ranges	Within Objective/Limits? (6 – 8)
October 2021	8-8	Yes
November 2021	8-8	Yes
December 2021	8-8	Yes
January 2022	8-8	Yes
February 2022	8-8	Yes
March 2022	8-8	Yes
April 2022	8-8	Yes
May 2022	7-8	Yes

3.4 Success & Adequacy of the System

The parameter cBOD5 objective for the seasonal discharge was not exceeded during the reporting period. There were no limit exceedances.

The parameter TSS objective for the seasonal discharge was exceeded for the months of November 2021, April 2022 and May 2022. There was a limit exceedance in the month of April 2022 which was due to higher solids from lagoon effluent mixing with plant effluent and higher plant ammonia mixing with lower lagoon ammonia. Continued monitoring of TSS was completed by in-house lab while trying to maximize the return flow to ensure adequate room in the lagoon during non-discharge period.

The parameter TP objective for the seasonal discharge no exceeded during the reporting period. There were no limit exceedances.

The parameter TAN objective for the seasonal discharge was exceeded for the months of February, March, April and May 2022. There were no limit exceedances.

E. coli concentrations reached a maximum of 35.70 CFU/100mL in November 2021, which did not exceed the compliance objective and limit of 100 CFU/100mL. During the seasonal discharge period, there were no exceedances.

Please refer to **Section 3** of this report for more details regarding the discharge period exceedances.

Refer to Appendix A for a detailed Performance Assessment Report.

3.5 Effluent Flows - Discharges

The below chart summarizes the effluent discharged during the discharge period:

Table 13: Effluent Discharge Summary

Month	Average Daily Flow (m^3/day)	Peak Flow (m^3/day)	Total Flow (m^3)	Max Daily Effluent Flow (m^3)	Within Limit
October 2021	688.72	1303.70	21350.40	1400	Yes
November 2021	2151.74	3229.50	64552.10	4600	Yes
December 2021	2586.15	3130.40	80170.70	3800	Yes
January 2022	3639.65	3958.30	112829.20	5000	Yes
February 2022	3324.81	3923.00	93094.80	5000	Yes
March 2022	3730.61	4607.80	115648.80	5500	Yes
April 2022	2638.20	3071.40	79145.90	3200	Yes
May 2022	814.42	1250.20	25247.10	1300	Yes
Annual Average	2438.37	-	-		
Annual Max	-	4607.80	-		
Annual Total	-	-	592039.00		

4. Annual Update to the Stage-Discharge Curve

ECA 7654-BEMKVD, Section 13 (4)(c):

"a summary of the annual update to the stage-discharge curve as required in Paragraph 9 (e);"

9(e). The Owner shall operate, calibrate and maintain the Conestogo River at Arthur hydrometric station (17T 536350E 4853113N) and collect and record daily streamflow measurements for that station or for any replacement gauging station approved by the District Manager.

The Conestogo River Arthur hydrometric station equipment is calibrated as per manufacturer's recommendations. Monitoring and metering equipment is also calibrated by a third party on an annual basis. Preventative maintenance is scheduled for all equipment at the sewage treatment plant and pumping stations at regular frequency (frequency depends on the equipment and type of maintenance). Maintenance activities are scheduled within the work management system Maximo, upon completion, Operators set the work order to complete. On a monthly basis, preventative work orders are reviewed for completion.

Indus Control successfully calibrated the hydrometric station measuring equipment on September 13, 2021.

Refer to Appendix D for the Calibration Reports.

Operators collect and record daily streamflow measurements for the Conestogo River hydrometric station on their daily check sheets and entered in OCWA's PDM (WISKI) Management System.

Table 14: Conestogo River Streamflow Measurements

Month	Monthly Minimum Daily River Height (cm)	Monthly Average Daily River Height (cm)	Monthly Max Daily River Height (cm)
October 2021	19.08	33.07	84.65
November 2021	23.26	37.01	55.77
December 2021	24.38	43.32	101.57
January 2022	17.75	23.42	34.71
February 2022	17.50	61.32	85.45
March 2022	36.65	72.82	97.40
April 2022	23.15	35.78	48.22
May 2022	15.12	24.12	56.86
Annual Minimum	**15.12**	**-**	**-**
Annual Average	**-**	**38.08**	**-**
Annual Max	**-**	**-**	**101.57**

Refer to Appendix F for Report of Daily Streamflow Measurements

Refer to Appendix G for the Grand River Conservation Authority Manual Discharge Measurements and TAN Concentrations

5. Monitoring Schedule

ECA 7654-BEMKVD, Section 13 (4)(d):

"a summary of any deviation from the monitoring schedule and reasons for the current reporting year and a schedule for the next reporting year;"

Operations staff at the Arthur WWTP maintained a sampling schedule where samples were taken on Thursdays for the majority of the 2021 reporting period. Fluctuations on sample dates were due to the additional raw sampling being taken a week plus one day for influent monitoring of TP, TAN and TKN. For 2022 reporting period the sampling schedule was revised and updated to rotate the day of the week to Wednesday as per the ECA requirement in section 11 (b). Operations staff at the Arthur WWTP maintained a sampling schedule where samples were taken on Wednesdays for the majority of the 2022 reporting period. Any fluctuations on sample dates were due to any operational issues.

Table 15: Summary of dates deviated from monitoring schedule

Sample	Scheduled Date	Date Sample Taken
Monthly Raw	October 7, 2021	October 6, 2021
Monthly Raw	November 4, 2021	November 10, 2021
Weekly Effluent	November 10, 2021	November 11, 2021
Monthly Raw	December 2, 2021	December 15, 2021
Monthly Raw	January 5, 2022	January 19, 2022
Monthly Raw	February 2, 2022	February 3, 2022
Monthly Raw	March 2, 2022	March 3, 2022
Monthly Raw	April 6, 2022	April 7, 2022

Please find the attached Sampling Calendar prepared for 2021/2022 in Appendix B

6. Operating Problems & Corrective Actions

ECA 7654-BEMKVD, Section 13 (4)(e):

"a summary of all operating issues encountered and corrective actions taken;"

6.1 Golden Valley Farms and Influent Loading

Starting in January 2019, it was noted that Total Ammonia Nitrogen levels were exceeding the ECA limit due to abnormally concentrated influent, which disrupted the nitrification processes at the plant.

Golden Valley Farms, an industrial meat processing plant, has been discharging into the Sewage Collection Systems since its establishment. It was suspected that the processing plant had been contributing higher than normal loadings to the plant, causing process upsets. Further investigations with regular extra raw sampling confirmed abnormally concentrated influent from the processing plant.

On September 23 2020, a composite sampler was purchased by Golden Valley Farms and installed to replace a defective composite sampler. Since then Golden Valley Farms has been sampling on a bi-weekly basis for the following parameters pH, Total Ammonia Nitrogen, Biochemical Oxygen Demand and Total Phosphorus. These sample results are being shared with The Township and tracked by OCWA.

For the current reporting period OCWA and the Township continue to monitor the 3rd party laboratory results for sewer use by-law loading parameters. During the reporting period the laboratory results were within the bylaw limits for the parameters BOD_5, Total Phosphorus and pH. The bylaw limits for Total Ammonia Nitrogen was exceeded for five of the fourteen samples during the reporting period.

Refer to Appendix C for Summary of Golden Valley Laboratory Results and a Copy of the Township of Wellington North Sewer Use By-Law.

7. Major Maintenance Activities

ECA 7654-BEMKVD, Section 13 (4)(f):

"a summary of all normal and emergency repairs and maintenance activities carried out on any major structure, equipment, apparatus or mechanism forming part of the Works;"

7.1 Work Management System

Planned maintenance, including scheduled and non-scheduled maintenance activities are scheduled using a computerized Work Management System (WMS) that allows user to:

- Enter detailed asset information
- Generate and process work orders
- Access maintenance and inspection procedures
- Plan, schedule, and document all asset related tasks and activities
- Access maintenance records and asset histories

Work Orders are automatically generated by the WMS program and are assigned to the applicable Operations staff accordingly.

7.2 Preventative Maintenance

There were a number of major maintenance tasks throughout 2021/22 reporting period. They are as follows:

- Monthly Lagoon Inspection (May-Oct)
- Monthly panel alarm, float and generator testing
- Annual sewage pumping station cleanouts
- Annual generator inspections and load testing
- Annual calibrations
- Annual lifting device inspection
- UV inspection and servicing
- Alum Tank and Lagoon Chamber cleanout
- Semi-annual Lagoon Perimeter Inspection

7.3 Repairs & Improvements

There were a number of repairs and/or improvements made in the 2021/2022 reporting period. As referred within the ECA (7654-BEMKVD) proposed work for Phase 1.

Phase 1

Sanitary Sewage Pumping Stations

Frederick Street Pumping Station and Forcemain

Upgrade to the existing Frederick Street Pumping Station having a firm capacity of 110 L/s, located at 176 Frederick Street West, comprising;

- Construction of a new wet well having dimension of 5.5m x 5.3m x 7.2m, having an active storage volume of 90 m3, equipped with three variable speed controlled sewage pumps, two for duty and one for standby, each with a rated capacity of 55 L/s under 30m TDH, discharging through a common header to Arthur Wastewater Treatment Plant through an existing 755m long 250mm diameter forcemain, complete with a MCC, a new PLC based control system, high level floats and alarms;
- Conversion of existing wet well in to a bypass chamber, complete with one (1) sewage drain pump, located in the existing wet well, with a capacity of 10 L/s under 8m TDH, receiving sewage overflow from the inlet sewer under extreme flow events with an Emergency Overflow to the Conestogo River;

Arthur Wastewater Treatment Plant (WWTP)

Equalization Tank (to be upgraded to Extended Aeration Plant B during Phase 2)

- Construction of the equalization tank 1 (to be used as the future secondary treatment/extended aeration tank during Phase 2), having a total capacity of 2,100 m3, and operated in a manner to allow the flows entering the secondary treatment in Phase 1 to be reduced to 5,270 m3/d, comprising of two cells and a central future secondary clarifier tank, receiving diverted peak flow through a weir located in the headworks building outlet pipe under peak flow conditions, complete with a sewer line connecting a new hopper adjacent to the existing Headworks to a new Headworks channel upstream of Plant B;
- One (1) submersible drain pump, to be located in a precast manhole (to be converted to a scum collection pit and transfer pump in Phase 2), connected to the equalization tank, with a capacity of 10 L/s under a TDH of 8m, discharging to Headworks channel;

Secondary Treatment System

Biological Treatment

Aeration Blowers (for future use in Plant B/Treatment Train B in Phase 2)

- Three (3) variable speed controlled blowers (one standby), each with a capacity of 944 m3/h, with a common discharge line connected to the existing aeration system and tie-in to future secondary treatment plant;

Return Activated Sludge (RAS) and Waste Activated Sludge (WAS) pumping system

- Two (2) variable speed controlled RAS and WAS pumps (one standby), to be located in the existing RAS and WAS hopper, with a capacity of 20.9 L/s;
- Flow meter for RAS lines to each aeration tank and WAS transfer line to Aerobic digesters;

Supplementary Treatment Systems Phosphorous Removal (Alum)

- Four (4) variable speed dosing pumps, three for duty and one for standby, each having a capacity of 5.5 L/hr under a TDH of 50 psi; One of the pumps providing flexibility for secondary injection point prior to

filters and remaining two duty pumps dedicated to two primary injection points upstream of the existing and New clarifier Plant A and Plant B;

Sludge Management System Sludge Digestion

- Replacement of existing blowers with two (2) blowers, one for duty and one for standby, each having a rated capacity of 540 m3/h at 45 kPa, discharging through a common discharge line to the existing aeration system of digesters and sludge holding tanks;
- Installation of flow metering for on the existing discharge line of sludge pumps;
- Installation of Pump and barrel decanting system in the secondary digester;

Secondary Effluent Holding Ponds (Offsite Lagoon)

Lagoon Level Monitoring through SCADA and Valve Replacement

- Installation of a solar powered lagoon level monitoring system integrated with the existing SCADA system to monitor existing and new processes at the Arthur WWTP;

8. Effluent Quality Assurance & Control

ECA 7654-BEMKVD, Section 13 (4)(g):

"a summary of any effluent quality assurance or control measures undertaken;"

The Ontario Clean Water Agency (OCWA) operates the Arthur Wastewater Treatment Plant in accordance with provincial regulations.

- Use of Accredited Laboratories: analytical tests to monitor the effluent quality are conducted by a laboratory audited by the Canadian Association for Laboratory Accreditation Inc. (CALA) and accredited by the Standards Council of Canada (SCC). Accreditation ensures that the laboratory has acceptable laboratory protocols and test methods in place. It also requires the laboratory to provide evidence and assurances of the proficiency of the analysts performing the test methods. During this monitoring period (October 1, 2021 to May 31, 2022), all chemical sample analyses were conducted by SGS (Lakefield) Canada Inc.

- Operation by Licensed Operators: Arthur WWTP is operated and maintained by the Ontario Clean Water Agency's licensed Operation Staff. The mandatory licensing program for operators of sewage treatment facilities in Ontario is regulated under the Ontario Water Resources Act (OWRA) Regulation 435/93 and Ontario Regulation 129/04. Licensing means that an individual meets the education and experience requirements and has successfully passed the certification exam. Refer to the following table summarizing current Operations staff licensing for the Arthur WWTP:

Table 16: Operator Licensing for the Arthur WWTP

Operator	Level	Certificate #	Expiry Date
Dwight Hallahan	WWT 2 WWC 1	15499 16002	Apr 30, 2025 Oct 31, 2022
Dan Yake	WWT 2 WWC 1	57390 69121	July 31, 2025 Jan 31, 2023
Steve Miller	WWT 4 WWC 2	15422 17899	Jan 31, 2025 Jan 31, 2025
William Smith	WWT 2	65685	Jan 31, 2025
Suhail Auzam	OIT	OT66863	Mar 31, 2024

- Sampling and Analytical Requirements: OCWA followed a sampling and analysis schedule required by the Environmental Compliance Approval.

- Use of In-House Laboratory: in-house tests are conducted by Licensed Operators for monitoring purposes using Standard Methods. The data generated from these tests is used to determine the treatment efficiency while maintaining process control. All in-house monitoring equipment is calibrated based on the manufacturer's recommendations. The Operators of the facility will continue to use their expertise in order to meet our objective of no exceedances of the ECA Effluent Compliance Limits and future Compliance Objectives.

9. Calibration & Maintenance Procedures

ECA 7654-BEMKVD, Section 13 (4)(h):

"a summary of the calibration and maintenance carried out on all Influent and Final Effluent monitoring equipment to ensure that the accuracy is within the tolerance of that equipment as required in this Approval or recommended by the manufacturer;"

All in-house monitoring equipment is calibrated as per manufacturer's recommendations. Monitoring and metering equipment is also calibrated by a third party on an annual basis. Preventative maintenance is scheduled for all equipment at the sewage treatment plant and pumping stations at regular frequency (frequency depends on the equipment and type of maintenance). Maintenance activities are scheduled within the work management system Maximo, upon completion, Operators set the work order to complete. On a monthly basis, preventative work orders are reviewed for completion.

Indus Control successfully calibrated flow measuring equipment on September 13, 2021.

Refer to Appendix D for the Calibration Reports.

10. Design Objective Requirements

ECA 7654-BEMKVD, Section 13 (4)(i):

"a summary of efforts made to achieve the design objectives in this Approval, including an assessment of the issues and recommendations for pro-active actions if any are required under the following situations":

i. When any of the design objectives are not achieved more than 50% of the time in a year, or there is an increasing trend of deterioration of Final Effluent quality;

ii. When Annual Average Daily Influent Flow reaches 80% of the Rated Capacity;"

Best efforts will be made to meet the objectives under the new ECA 7654-BEMKVD (September 10, 2019) once Phase 1 construction onwards improves plant performance and output effluent quality. Phase 2 design is completed and currently being review by the Municipalities Engineer on Record.

The design objective for TAN was exceeded four of the eight months for the reporting period. It is a possibility this is due to the TAN loadings received from Golden Valley Farms and is continuously monitored by OCWA and the Municipality. Also due to cold weather during this time the nitrification process was unable to reproduce nitrification bacteria.

The average daily flow for the reporting period was 1,446.09 m³, which is approximately 77.75% of the specified design flow of 1,860.00 m³/day. The highest recorded Monthly Average Daily Flow was in February at 3,855.00 m³ and was due to heavy rain and increased inflows from the seasonal melt.

There were no instances when the daily peak of 6,500 m³ was exceeded. The highest recorded peak flow of 3,855.00 m³/day occurred in February 2022. This maximum peak flow is approximately 59.31% of the approved Peak Flow Rating for the Works.

Refer to Appendix A for detailed Performance Assessment Report.

11. Sludge Generation

ECA 7654-BEMKVD, Section 13 (4)(j):

"a tabulation of the volume of sludge generated, an outline of anticipated volumes to be generated in the next reporting period and a summary of the locations to where the sludge was disposed;"

The table below shows a summary of sludge haulage for the October 1, 2021 – May 31, 2022 reporting period:

Table 17: Sludge Haulage

Date	NASM #	Volume Hauled (m^3)	Comments
November 2, 2021	N/A	139.00	Hauled by Saugeen Agri. to Lystek International Inc.
November 3, 2021			
December 7, 2021	N/A	100.00	
December 8, 2021			
January 5, 2022	N/A	268.00	
January 6, 2022			
January 18, 2022			
January 19, 2022			
February 15, 2022	N/A	180.00	
February 16, 2022			
February 17, 2022			
March 4, 2022	N/A	90.00	
March 11, 2022			
May 12, 2022	23730	798.70	Hauled by Saugeen Agri. for Land Application
	Total:	**1,575.70**	

Digested sludge produced at the Arthur Wastewater Treatment Plant is land-applied in accordance with the Nutrient Management Act 2002 and Ontario Regulation 267/03. Additional sludge haulage is directed towards Lystek International Inc., located in Dundalk, Ontario. This facility converts biosolids into "market ready" fertilizer products.

Grab samples of digested (aerobic) sludge are collected and tested as per these guidelines. During the reporting period, sludge sample analysis was carried out by SGS Lakefield Research Limited. A summary of sludge sample results is provided in **Appendix E.**

Two haulers were used during the reporting period October 1, 2021 – May 31, 2022 reporting period:

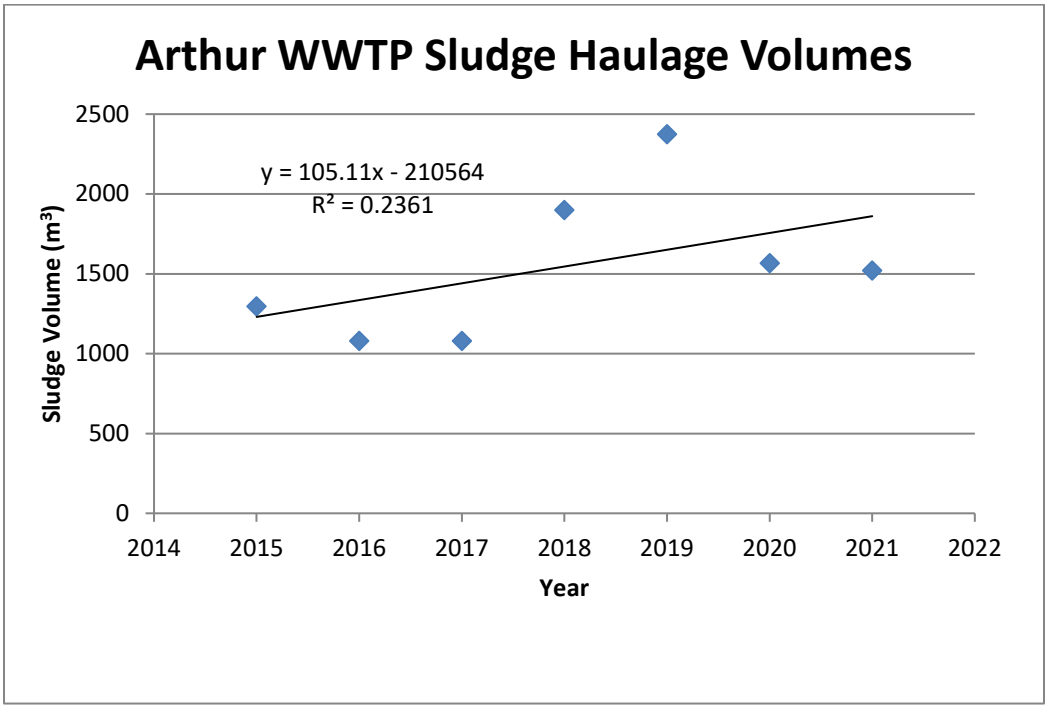
- Saugeen Agri. - Certificate of Approval: Waste Management System # 9566-6HYKC3

The Certificate of Approval for the Mount Forest Sludge Storage Facility #6134-73FHHU allows the storage of sludge from the Arthur WWTP. There was no sludge stored at the Mount Forest facility for this reporting period.

Trending sludge production can be seen in Graph 10. Please note: the reporting year noted on the X-axis is the first year of the reporting period, meaning 2021 would include the period from October 1, 2021 to May 31, 2022.

Based on the design flow, predicted sludge haulage, average wastewater quality and a linear regression with an R^2 value of 23.61%, the anticipated volume to be generated in the next reporting period is approximately 1900 m^3.

Graph 10: Arthur WWTP Sludge Haulage Trending



12. Community Complaints

ECA 7654-BEMKVD, Section 13 (4)(k):

"a summary of any complaints received and any steps taken to address the complaints;"

There is a standard operating procedure (SOP) in place that outlines the steps required for receiving and addressing community complaints. All complaints are to be discussed and/or investigated, and resolved as required. The community complaint is logged in detail in the facility logbook and then various details are entered into OCWA's electronic database system "Maximo." This database contains the history of all complaints with the relevant information enclosed.

There were no complaints received for the Arthur WWTP during the October 1, 2021 – May 31, 2022 reporting period.

13. By-pass, Spill or Abnormal Discharge Events

ECA 7654-BEMKVD, Section 13 (4)(l):

"a summary of all By-pass, Overflows, other situations outside Normal Operating Conditions and spills within the meaning of Part X of EPA and abnormal discharge events;"

13.1 By-pass events

There were no bypass events during the reporting period.

13.2 Overflow events

There were no overflow events during the reporting period.

13.3 Spills

There were no spills during the reporting period.

13.4 Abnormal Discharge Events

There were no abnormal discharge events during the reporting period.

14. Notice of Modifications

ECA 7654-BEMKVD, Section 13 (4)(m):

"a summary of all Notice of Modifications to the Sewage Works completed under Paragraph 1.d. of Condition 10, including a report on status of implementation of all modification;"

There were no Notice of Modifications under Schedule B, Section 1 submitted during this reporting period.

14.1 Modification Completion Reports

There were no modifications completed under Schedule B, Section 3 during this reporting period.

15. Conformance with Procedure F-5-1

ECA 7654-BEMKVD, Section 13 (4)(n):

"a summary of efforts made to achieve conformance with Procedure F-5-1 including but not limited to projects undertaken and completed in the sanitary sewer system that result in overall Bypass/Overflow elimination including expenditures and proposed projects to eliminate Bypass/Overflows with estimated budget forecast for the year following that for which the report is submitted;"

Sanitary Sewage Pumping Stations
Frederick Street Pumping Station and Forcemain
Upgrade to the existing Frederick Street Pumping Station having a firm capacity of 110 L/s, located at 176 Frederick Street West, comprising;

- Construction of a new wet well having dimension of 5.5m x 5.3m x 7.2m, having an active storage volume of 90 m3, equipped with three variable speed controlled sewage pumps, two for duty and one for standby, each with a rated capacity of 55 L/s under 30m TDH, discharging through a common header to Arthur Wastewater Treatment Plant through an existing 755m long 250mm diameter forcemain, complete with a MCC, a new PLC based control system, high level floats and alarms;
- Conversion of existing wet well in to a bypass chamber, complete with one (1) sewage drain pump, located in the existing wet well, with a capacity of 10 L/s under 8m TDH, receiving sewage overflow from the inlet sewer under extreme flow events with an Emergency Overflow to the Conestogo River;

Arthur Wastewater Treatment Plant (WWTP)
Equalization Tank (to be upgraded to Extended Aeration Plant B during Phase 2)

- Construction of the equalization tank 1 (to be used as the future secondary treatment/extended aeration tank during Phase 2), having a total capacity of 2,100 m3, and operated in a manner to allow the flows entering the secondary treatment in Phase 1 to be reduced to 5,270 m3/d, comprising of two cells and a central future secondary clarifier tank, receiving diverted peak flow through a weir located in the headworks building outlet pipe under peak flow conditions, complete with a sewer line connecting a new hopper adjacent to the existing Headworks to a new Headworks channel upstream of Plant B;
- One (1) submersible drain pump, to be located in a precast manhole (to be converted to a scum collection pit and transfer pump in Phase 2), connected to the equalization tank, with a capacity of 10 L/s under a TDH of 8m, discharging to Headworks channel;

Proposed Works - Phase 2

Inlet Works

- Diversion of existing sanitary Sewers from Preston Street to the new Headworks building of sewage treatment plant;
- Diversion of existing sanitary sewage forcemain from Frederick Street Sewage Pumping Station in to the new Headworks building of sewage treatment plant;

Headworks Building
Inlet Channels

- One (1) duty inlet channel 0.8m wide, 1.2m deep, equipped with an inclined mechanically cleaned screen with 6mm spacing, designed to handle an average daily flow of 2,300 m3/d and a maximum daily flow of 12,700 m3/d, equipped with washer/compactor conveyor for screenings, complete with diffusers for intermittent channel aeration;
- one (1) back-up channel 0.8m wide, 1.2m deep, equipped with an inclined manual bar screen having 50mm spacing, complete with diffusers for intermittent channel aeration;

Grit Removal

- A Grit removal system with by-pass capability, comprising of a Vortex Grit Tank 2.5m in diameter with a 0.37 kW vortex drive, a Vortex Grit Classifier Unit designed for a peak flow rate of 12,700 m3/d, screenings/grit disposal bin in the Screen room;

Flow Channels and Parshall Flume

- Two flow splitting channels, complete with flow control weirs and two Parshall Flume flowmeters, one in each channel, downstream of the Vortex Tank, with duty channel discharging to the existing and new treatment units (Plant A and Plant B);

The increased capacity and upgrade to the Sewage Pump Station will aid in directing influent flows to the plant more effectively and efficiently. In addition to having an additional pump and all pumps being upsized with Variable Frequency Drives (VFD) this will allow the pumps to adjust to the required pumping speeds in increments as needed, increasing overall pump efficiency. This upgrade will further reduce the chance of potential future bypass/overflow events through increased reliability and capacity.

During high flow events, the increased flows from the pump station will be split at the head of the plant and will allow part of the flow to go through treatment and a portion to be captured in the equalization tank to not overwhelm the treatment system and be pumped back to the Headworks at a later time.

There are no estimated budget forecasts at this time as the current construction upgrades has mitigated the bypass/overflow events at the plant and at the pump station.

16. Construction and Commissioning Schedule Updates

ECA 7654-BEMKVD, Section 13 (4)(o):

"any changes or updates to the schedule for the completion of construction and commissioning operation of major process(es)/equipment groups in the Proposed Works;"

Substantial completion of all Phase 1 construction was achieved in December 2020. Phase 2 design is completed and currently being review by the Municipalities Engineer on Record.

17. Water Supervisor Information Request

ECA 7654-BEMKVD

"any other information from the Water Supervisor requires from time to time."

There were no requests from the Water Supervisor for any other information during the reporting period.

2021 – 2022 Annual Performance Report
Arthur Wastewater Treatment Plant
ECA 7654-BEMKVD

Appendix A

Performance Assessment Report

October 2021 – May 2022

Ontario Clean Water Agency
Agence Ontarienne Des Eaux

Performance Assessment Report Standard ECA

From 10/1/2021 to 5/31/2022

5767 ARTHUR WASTEWATER TREATMENT PLANT 110000882

	10 / 2021	11/ 2021	12/ 2021	1/ 2022	2/ 2022	3/ 2022	4/ 2022	5/ 2022	<--Total-->	<--Avg-->	<--Max-->	<-Criteria->
Flows												
Raw Flow: Total - Raw Sewage m³/d	37,919.00	40,204.48	49,866.00	36,026.00	41,095.00	63,908.50	45,154.20	37,227.60	351,400.78			0.00
Raw Flow: Avg - Raw Sewage m³/d	1,223.19	1,340.15	1,608.58	1,162.13	1,467.68	2,061.56	1,505.14	1,200.89		1,446.09		1,465.00
Raw Flow: Max - Raw Sewage m³/d	2,052.00	1,793.00	2,452.00	1,660.00	3,855.00	3,381.90	2,120.80	1,816.30			3,855.00	0.00
Raw Flow: Count - Raw Sewage m³/d	31.00	30.00	31.00	31.00	28.00	31.00	30.00	31.00	243.00			0.00
Eff. Flow: Total - Final Effluent m³/d	21,350.40	64,552.10	80,170.70	112,829.20	93,094.80	115,648.80	79,145.90	25,247.10	592,039.00			0.00
Eff. Flow: Avg - Final Effluent m³/d	688.72	2,151.74	2,586.15	3,639.65	3,324.81	3,730.61	2,638.20	814.42		2,436.37		
Eff. Flow: Max - Final Effluent m³/d	1,303.70	3,229.50	3,130.40	3,958.30	3,923.00	4,607.80	3,071.40	1,250.20			4,607.80	0.00
Eff Flow: Count - Final Effluent m³/d	31.00	30.00	31.00	31.00	28.00	31.00	30.00	31.00	243.00			0.00
Biochemical Oxygen Demand: BOD5												
Raw: Avg BOD5 - Raw Sewage mg/L	269.00	238.00	229.00	220.00	262.00	128.00	143.00	222.00		213.88	269.00	0.00
Raw: Avg BOD5 - Raw Extra mg/L	259.00	180.25	210.67	214.00	183.33	160.50	198.67	326.33		216.59	326.33	0.00
Raw: # of samples of BOD5 - Raw Sewage mg/L	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	8.00			0.00
Raw: # of samples of BOD5 - Raw Extra mg/L	3.00	4.00	3.00	3.00	3.00	4.00	3.00	3.00	26.00			0.00
Carbonaceous Biochemical Oxygen Demand: CBOD												
Eff: Avg cBOD5 - Final Effluent including Bypass mg/L	< 2.75	< 2.20	< 2.60	< 3.50	< 2.25	< 3.00	< 3.50	< 5.00		< 2.97	< 5.00	
Eff: # of samples of cBOD5 - Final Effluent including Bypass mg/L	4.00	5.00	5.00	4.00	4.00	5.00	4.00	5.00	36.00			0.00

Performance Assessment Report Standard ECA

From 10/1/2021 to 5/31/2022

Loading: cBOD5 - Final Effluent including Bypass kg/d	<	1.894	<	4.734	<	6.724	<	12.739	<	7.481	<	11.192	<	9.234	<	4.072		<	7.24	<	12.74	0.000
Total Suspended Solids: TSS																								
Raw: Avg TSS - Raw Extra mg/L		239.33		128.75		147.00		154.00		158.33		120.25		158.33		201.33			163.42		239.33	0.00
Raw: Avg TSS - Raw Sewage mg/L		285.00		244.00		203.00		127.00		209.00		159.00		198.00		153.00			197.25		285.00	0.00
Raw: # of samples of TSS - Raw Extra mg/L		3.00		4.00		3.00		3.00		3.00		4.00		3.00		3.00	26.00					0.00
Raw: # of samples of TSS - Raw Sewage mg/L		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00	8.00					0.00
Eff: Avg TSS - Final Effluent including Bypass mg/L		5.00		7.00		5.60	<	4.75		5.50		5.80		11.00		7.00			6.47		11.00	
Eff: # of samples of TSS - Final Effluent including Bypass mg/L		4.00		5.00		5.00		4.00		4.00		5.00		6.00		5.00	38.00					0.00
Loading: TSS - Final Effluent including Bypass kg/d		3.444		15.062		14.482	<	17.288		18.286		21.638		29.020		5.701			15.77		29.02	0.000
Total Phosphorus: TP																								
Raw: Avg TP - Raw Sewage mg/L		6.97		5.06		5.70		5.09		6.03		3.78		3.80		3.62			5.01		6.97	0.00
Raw: Avg TP - Raw Extra mg/L		5.06		3.38		4.34		4.52		5.41		3.56		4.12		4.78			4.40		5.41	0.00
Raw: # of samples of TP - Raw Sewage mg/L		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00	8.00					0.00
Raw: # of samples of TP - Raw Extra mg/L		3.00		4.00		3.00		3.00		3.00		4.00		3.00		3.00	26.00					0.00
Eff: Avg TP - Final Effluent including Bypass mg/L		0.18		0.18		0.13		0.20		0.20		0.12		0.06	<	0.05			0.14		0.20	
Eff: # of samples of TP - Final Effluent including Bypass mg/L		4.00		5.00		5.00		4.00		4.00		5.00		4.00		5.00	36.00					0.00
Loading: TP - Final Effluent including Bypass kg/d		0.124		0.396		0.341		0.710		0.657		0.440		0.158	<	0.044			0.36		0.71	0.000

Ontario Clean Water Agency
Agence Ontarienne Des Eaux

Performance Assessment Report Standard ECA

From 10/1/2021 to 5/31/2022

Nitrogen Series

Raw: Avg TKN - Raw Sewage mg/L		32.40		27.80		22.70		43.90		40.00		34.60		21.80		26.10				31.16		43.90	0.00
Raw: Avg TKN - Raw Extra mg/L		33.57		29.98		35.93		39.90		41.30		31.00		29.83		37.10				34.83		41.30	0.00
Raw: # of samples of TKN - Raw Sewage mg/L		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00		8.00					0.00
Raw: # of samples of TKN - Raw Extra mg/L		3.00		4.00		3.00		3.00		3.00		4.00		3.00		3.00		26.00					0.00
Eff: Avg TAN - Final Effluent including Bypass mg/L	<	0.15	<	0.24	<	0.38		0.50		1.13		1.48		2.32	<	0.82			<	0.91	<	2.32	
Eff: # of samples of TAN - Final Effluent including Bypass mg/L		4.00		5.00		5.00		4.00		4.00		5.00		6.00		5.00		38.00					0.00
Loading: TAN - Final Effluent including Bypass kg/d	<	0.103	<	0.516	<	0.983		1.820		3.740		5.521		6.112	<	0.668			<	2.22	<	6.11	0.000
Eff: Avg NO3-N - Final Effluent mg/L		16.03		9.83		7.16		4.52		4.84		2.93		3.62		7.30				7.03		16.03	0.00
Eff: # of samples of NO3-N - Final Effluent mg/L		4.00		5.00		5.00		4.00		4.00		5.00		6.00		5.00		38.00					0.00
Eff: Avg NO2-N - Final Effluent mg/L	<	0.03	<	0.04	<	0.08	<	0.12		0.20	<	0.21		0.30	<	0.05			<	0.13	<	0.30	0.00
Eff: # of samples of NO2-N - Final Effluent mg/L		4.00		5.00		5.00		4.00		4.00		5.00		6.00		5.00		38.00					0.00

Disinfection

Eff: GMD E. Coli - Final Effluent cfu/100mL		2.00		35.70		10.98		23.98		28.25		30.62		5.63		2.35				17.44		35.70	200.00
Eff: # of samples of E. Coli - Final Effluent cfu/100mL		4.00		4.00		5.00		4.00		8.00		5.00		4.00		5.00		39.00					0.00

2021 – 2022 Annual Performance Report
Arthur Wastewater Treatment Plant
ECA 7654-BEMKVD

Appendix B

Sampling Schedules

2021 Arthur Sampling Schedule

JANUARY

S	M	T	W	T	F	S
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30
31						

FEBRUARY

S	M	T	W	T	F	S
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28						

MARCH

S	M	T	W	T	F	S
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31			

APRIL

S	M	T	W	T	F	S
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	

MAY

S	M	T	W	T	F	S
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30	31					

JUNE

S	M	T	W	T	F	S
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30			

JULY

S	M	T	W	T	F	S
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31

AUGUST

S	M	T	W	T	F	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31				

SEPTEMBER

S	M	T	W	T	F	S
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30		

OCTOBER

S	M	T	W	T	F	S
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30
31						

NOVEMBER

S	M	T	W	T	F	S
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30				

DECEMBER

S	M	T	W	T	F	S
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	31	

Discharge Period October 1 to May 31 - Weekly Effluent CBOD5, TSS, TP, TAN, TKN, Nitrate, Nitrite, Unionized Ammonia, E. Coli, Dissolved Oxygen, pH, Temperature.

Every other week WSER Weekly Effluent Sampling - Weekly Effluent + BOD5, Alkalinity, pH @ 15 C, and Unionized Ammonia.

*****Discharge to start October 4, 2021**

Monthly Influent BOD5, TSS, TKN, TP + Weekly Effluent / WSER Weekly Effluent

Monthly Raw BOD5, TSS, TKN, TP

Extra Raw - Sampled 1 week + 1 day from the last RAW sample taken

Monthly Sludge

2022 Arthur Sampling Schedule

JANUARY						
S	M	T	W	T	F	S
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30	31					

FEBRUARY						
S	M	T	W	T	F	S
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28					

MARCH						
S	M	T	W	T	F	S
		1	3	3	4	5
6	7	8	10	10	11	12
13	14	15	17	17	18	19
20	21	22	24	24	25	26
27	28	29	30	31		

APRIL						
S	M	T	W	T	F	S
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30

MAY						
S	M	T	W	T	F	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31				

JUNE						
S	M	T	W	T	F	S
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30		

JULY						
S	M	T	W	T	F	S
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30
31						

AUGUST						
S	M	T	W	T	F	S
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31			

SEPTEMBER						
S	M	T	W	T	F	S
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	

OCTOBER						
S	M	T	W	T	F	S
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30	31					

NOVEMBER						
S	M	T	W	T	F	S
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30			

DECEMBER						
S	M	T	W	T	F	S
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31

Discharge Period October 1 to May 31 - Weekly Effluent CBOD5, TSS, TP, TAN, TKN, Nitrate, Nitrite, Unionized Ammonia (WSER), E. Coli, Dissolved Oxygen, pH, Temperature.
*****Discharge to start October 4, 2021**

Monthly Influent BOD5, TSS, TKN, TP + Weekly Effluent / WSER Weekly Effluent

Monthly Raw BOD5, TSS, TKN, TP

Extra Raw - Sampled 1 week + 1 day from the last RAW sample taken (During discharge)

Extra Raw - Sampled 1 week + 1 day from the last RAW sample taken & includes Secondary Effluent CBOD5, BOD, TSS, TP, TAN, ALK, TKN, Nitrates, Nitrites, pH, Temp, DO (During non-discharge)

Monthly Sludge

2021 – 2022 Annual Performance Report
Arthur Wastewater Treatment Plant
ECA 7654-BEMKVD

Appendix C

Golden Valley Farms – Lab Analysis Summary

Golden Valley Composite Samples (October 1, 2021 - May 31, 2022)

Date	BOD5 <300mg/L	TP <10mg/L	TAN <9.5	pH >5.5 <9.5
10/04/21	77.20	0.99	12.40	8.63
10/12/21	138.00	2.76	6.39	9.40
10/18/21	132.00	1.03	6.97	7.35
10/25/21	167.00	1.49	6.26	9.24
11/01/21	90.50	1.21	5.94	8.20
11/30/21	135.00	1.33	4.72	7.84
12/17/21	106.00	1.07	0.97	7.89
01/24/22	139.00	1.20	12.00	7.91
02/09/22	138.00	4.09	9.47	8.61
02/23/22	49.10	1.28	9.95	7.65
03/02/22	137.00	3.34	22.00	7.98
04/06/22	88.30	0.35	6.58	8.04
04/22/22	137.00	1.08	7.76	7.67
05/02/22	133.00	0.89	12.10	7.69

SCHEDULE "B" RESTRICTED WASTES SANITARY AND COMBINED SEWER DISCHARGES

Table A - CONVENTIONAL CONTAMINANTS and PHYSICAL PARAMETERS

Substance	Concentration Limit– [mg/L, except as noted]
Biochemical oxygen demand	300
Chemical Oxygen Demand	600
Oil and grease - animal and vegetable	150
Oil and grease - mineral and synthetic/ hydrocarbon	15
Total Suspended Solids	300
pH	6.0 - 10.5 (unitless)
Temperature	60 Degrees Celsius

Table B - ORGANIC CONTAMINANTS

Substance	Concentration Limit– [mg/L, except as noted]
Benzene	0.01
Dichlorobenzene (1,2-)	0.05
Dichlorobenzene (1,4)	0.08
Ethylbenzene	0.06
Hexachlorobenzene	0.0001
PCBs (chlorobiphenyls)	0.004
**Phenols, Total (or Phenolic compounds)	0.1
Toluene	0.02
Xylenes, total	0.3

Table C - INORGANIC CONTAMINANTS

Substance	Concentration Limit– [mg/L, except as noted]
Arsenic, total	1.0
Cadmium, total	0.7
Chromium, total	3.0
Cobalt, total	5.0
Copper, total	2.0
Cyanide, total	1.2
Lead, total	3.0
Mercury	0.10
Molybdenum, total	5.0
Nickel, total	2.0
Nitrogen, Total Kjeldahl	50
Phosphorus, total	10
Selenium, total	2.0
Silver, total	1.0
Sulphide (as H2S)	1.0
Zinc, total	2.0

SCHEDULE "C"- MAXIMUM WASTEWATER STRENGTH LIMITS UNDER EXTRA STRENGTH SURCHARGE AGREEMENT

Substance	Maximum Concentration Limits under an Extra Strength Surcharge Agreement, mg/l	
	Mount Forest	**Arthur**
Biochemical Oxygen Demand (BOD)	1000	1000
Chemical Oxygen Demand (COD)	1200	1200
Total Suspended Solids (TSS)	1200	1200
Oil and grease - animal and vegetable (O&G)	450	450
Total Phosphorus (TP)	20	15
Total Kjeldahl Nitrogen (TKN)	100	75

2021 – 2022 Annual Performance Report
Arthur Wastewater Treatment Plant
ECA 7654-BEMKVD

Appendix D

Calibration Reports

Verification report Promag 400

Endress+Hauser
People for Process Automation

Plant operator: IndusControl

Device information

Location	Arthur WWTP
Device tag	Promag
Module name	K323-00
Nominal diameter	DN150 / 6"
Device name	Promag 400
Order code	5W4C1F-16LA0/0
Serial number	R701CC16000
Firmware version	02.01.00

Heartbeat Technology

Calibration

Calibration factor	1.0683
Zero point	-1.6

Verification information

Operating time (counter)	284d20h31m54s
Date/time (manually recorded)	13.09.21 10:17
Verification ID	14
Verification mode	Standard verification

Overall verification result*

☑ Passed	Details see next page

*Result of the complete device functionality test via Heartbeat Technology

Confirmation

Heartbeat Verification verifies the function of the flowmeter within the specified measuring tolerance, over the useful lifetime of the device, with a total test coverage > 94 %, and complies with the requirements for traceable verification according to DIN EN ISO 9001:2008 – Section 7.6 a. (attested by TÜV-SÜD Industrieservices GmbH)

Notes

13.09.21		
Date	Operator's signature	Inspector's signature

Verification report Promag 400

Endress+Hauser
People for Process Automation

Plant operator: IndusControl

Device identification and verification identification

Serial number	R701CC16000
Device tag	Promag
Verification ID	14

Heartbeat Technology

Sensor	☑ **Passed**
Shot time symmetry	☑ Passed
Hold voltage symmetry	☑ Passed
Coil current loss	☑ Passed
Coil current stability	☑ Passed
Coil resistance	☑ Passed
E1 electrode cable	☑ Passed
E2 electrode cable	☑ Passed
EPD electrode cable	☑ Passed
Sensor electronic module (ISEM)	☑ **Passed**
Supply voltage	☑ Passed
Internal voltages	☑ Passed
Linearity and reference voltage	☑ Passed
Offset of electrode measuring circuit	☑ Passed
Hold voltage feedback	☑ Passed
Shot voltage feedback	☑ Passed
Electronic current loss	☑ Passed
Coil circuit measurement	☑ Passed
Shot control circuit	☑ Passed
Electrode signal integrity	☑ Passed
System status	☑ **Passed**
I/O module	☑ **Passed**
Input/output 1	☑ Passed
Input/output 2	? Not done
Input/output 3	? Not done

Plant operator: IndusControl

Device identification and verification identification

Serial number	R701CC16000
Device tag	Promag
Verification ID	14

Heartbeat Technology

Test item with value	Unit	Actual	Min.	Max.	Visualization
Sensor					
Shot time symmetry deviation		1.0007	0.9000	1.1000	
Hold voltage symmetry deviation		1.0000	0.9000	1.1000	
Coil current loss deviation	%	0.1393	-10.0000	10.0000	
Coil current offset	%	-0.008123	-0.1000	0.1000	
Coil current deviation	%	0.0000	-0.1000	0.1000	
Coil resistance value	Ohm	125.1	50.0	240.0	
E1 electrode impedance	Ohm	168.94			
E2 electrode impedance	Ohm	169.12			
EPD electrode impedance	Ohm	169.65			
E1/E2 electrode impedance on E1	Ohm	170.92			
E1/E2 electrode impedance on E2	Ohm	171.09			
Sensor electronic module (ISEM)					
Supply voltage 30.0V	V	31.23	27.000	35.000	
Linearity and reference voltage 1		0.9998	0.9900	1.0100	
Linearity and reference voltage 2		0.9997	0.9900	1.0100	
Measuring point offset		-8.3652	-100.0000	100.0000	
Hold voltage feedback value	%	0.93	-10.0	10.0	
Shot voltage feedback value	%	-0.70	-20.0	20.0	
Electronic current loss deviation	%	0.46	-10.0000	10.0000	
Coil circuit value	%	0.00	-1.0	1.0	
Shot control circuit value	%	-0.17	-10.0	10.0	
Electrode signal integrity deviation	%	0.33	-40.0	40.0	

Test item with value	Unit	Actual	Min.	Max.	Visualization
I/O module					
Output 1 value 1	mA	4.0048	3.8600	4.1400	
Output 1 value 2		0.0000	0.0000	0.0000	
Output 2 value 1		0.0000	0.0000	0.0000	
Output 3 value 1		0.0000	0.0000	0.0000	

Plant operator: IndusControl

Device identification and verification identification

Serial number	R701CC16000
Device tag	Promag
Verification ID	14

Heartbeat Technology

Test item with value	Unit	Actual
Process conditions		
Volume flow value verification	l/s	0.0000
Conductivity value verification	µS/cm	-nan
Electronic temperature	°F	98.5
Current difference potential	V	-0.005090
Current potential electrode 1	V	0.03368
Current potential electrode 2	V	0.03926
Current potential electrode Pipe GND	V	-0.0004898

IndusControl Inc.
151 Superior Blvd, Unit #13
Mississauga, ON, L5T 2L1.

VERIFICATION REPORT - **ROSEMOUNT** ELECTRO-MAGNETIC FLOW MEASUREMENT

Customer Name:	OCWA-Georgian Highlands Region	Site/Plant Address:	160 preston St,
Plant Name:	Arthur WPCP		Arthur, ON, N0G 1A0

Device Information		Service Information	
Make:	Rosemount	Date:	September 13, 2021
Model:	8712D	Report No:	CO1264-2108-38
Order Code:	NA	Job No:	CO1264-2108
Serial No.:	860220959		
Tag:	EP000-FI01		
Job Location:	Plant Effluent		
OCWA ID:	0000205612		

Sensor Details		Flow Details	
Line size:	6"	Unit:	l/sec
Flow Cal Tube No.:	0916605509025005	Flow Range:	0-100
Mounting:	Remote	Current Output:	4-20 mA
		4 mA Set Point	0
		20 mA Set Point	100

Inst. Reading	AS FOUND	AS LEFT
TOTALIZER (m)	1806006	1806020
FLOW (l/sec)	28.2	0.00

Maintenance Checklist			Remarks
Visual Inspection:	☑ OK	☐ NOT OK	
Electrical Inspection:	☑ OK	☐ NOT OK	
Sensor Installation:	☑ OK	☐ NOT OK	
Transmitter Installation:	☑ OK	☐ NOT OK	

Instrument Test Information and Results

Test-Point as Per Calibration KIT	Calculated Flow (FPS)	Calculated O/P (mA)	UUT Display (FPS)	UUT Measured Output (mA)	Deviation (FPS)
0.00	0.00	4.00	0.01	3.99	0.01
3.00	3.00	5.60	2.99	5.55	-0.01
10.00	10.00	9.33	10.01	9.29	0.01
30.00	30.00	20.00	30.00	20.01	0.00

Information of Tools used for Verification of the Instruments

Details	Tool/Kit 1	Tool/Kit 2	Tool/Kit 3
Device Description:	Calibrator	Electrical Multimeter	N/A
Manufacturer:	Rosemount	Fluke	N/A
Model No:	8714D	179	N/A

* Refer Calibration Tools Certificates submittal for more Information

Verification Test Result:	☑ Passed	☐ Fail	☐ Not Verified

Overall Remarks:	Measurement Works within Specification.

Service Technician :	Tushar Patel	Stamp/Signature	
Printed Date:	September 13, 2021		

End of Report

Version: 19-12

IndusControl Inc.
151 Superior Blvd, Unit #13
Mississauga, ON, L5T 2L1.

VERIFICATION REPORT - **OCM III**
OPEN CHANNEL FLOW MEASUREMENT

Customer Name:	OCWA-Georgian Highlands Region	Site/Plant Address:	160 preston St,
Plant Name:	Arthur WPCP		Arthur, ON, N0G 1A0

Device Information		Service Information	
Make:	Milltronics	Date:	September 13, 2021
Model:	OCM III	Report No:	CO1264-2108-39
SIN:	PBD1W3100009	Job No:	CO1264-2108
Job Location:	Plant effluent		

Flow Details	
Unit:	l/sec
Flow Range:	0-100
Current Output:	4-20 mA
4 mA Set Point	0
20 mA Set Point	100

Inst. Reading	AS FOUND	AS LEFT
TOTALIZER (m3)	3548042 X 1000	3548042 X 1000
FLOW (l/sec)	0.00	0.00

Maintenance Checklist				Remarks
Visual Inspection:	☑	OK	☐ NOT OK	
Electrical Inspection:	☑	OK	☐ NOT OK	

Programming Parameter of Instrument

Parameter	Discription	Value	Parameter	Discription	Value
F0	Access Code	2.71828	P7	Height of Max. Head	33.4 cm
P1	Dimension Unit (cm)	0	P32	Totalizer Multiplier	6*1000
P3	Exponential Device	0	P42	Head by OCM III	0
P4	Cal. Method -Ratiometric	1	P45	Low Flow Cut-off	2.2 cm
P5	Flow Unit - l/sec	0	P46	Range at Zero Head	95.34 cm
P6	Max Flow rate	100	P47	Blanking Distance	30.482 cm

Test Point Report

Reference Distance (cm)	Measured Distance (cm)	Calculated Flow (l/sec)	UUT Flow Display (l/sec)	Calculated (mA)	Measured (mA)	Deviaiton Full Scale (l/sec)
0.00	0.00	0.00	0.00	4.00	4.00	0.00

Calculations

Flow Calculations

$Q = q_{cal} (h/h_{cal})^{Exp}$ **Where, Q= Discharge Flow, qcal = max flow, h = head, hcal = max head**

Exp = 2.5 , Hence,

$Q = 100 (0/33.4)^{1.53}$

Q = 0

Instrument Test Information and Results

Input (%)	Calculated Flow(l/sec)	Calculated Input (mA)	Flow on UUT (l/sec)	UUT Measured Output (mA)	Deviation (l/sec)
0	0.00	4.00	0.02	4.01	0.02
25	25.00	8.00	24.90	7.98	-0.10
50	50.00	12.00	49.96	12.02	-0.04
75	75.00	16.00	75.10	16.00	0.10
100	100.00	20.00	99.94	19.97	-0.06

Information of Tools used for Verification of the Instruments

Device Description:	Manufacturer	Model
Electrical Multimeter	Fluke	179

* Refer Calibration Tools Certificates submittal for more Information

Verification Test Result:	☑ Passed	☐ Fail	☐ Not Verified

Overall Remarks:	Program parameters verified.

Service Technician :	Tushar Patel	Stamp/Signature	
Printed Date:	September 13, 2021		

End of Report

Version: 19-12

IndusControl Inc.
151 Superior Blvd, Unit #13
Mississauga, ON, L5T 2L1.

VERIFICATION REPORT- **MULTIRANGER 200** LEVEL MEASUREMENT

Customer Name:	OCWA-Georgian Highlands Region	Site/Plant Address:	160 preston St,
Plant Name:	Arthur WPCP		Arthur, ON, N0G 1A0

Device Information		Service Information	
Make:	Siemens	Date:	September 13, 2021
Model:	Multiranger 100	Report No:	CO1264-2108-40
Order Code:	NA	Job No:	CO1264-2108
Serial No.:	PBD/V9180052		
Tag:	LIT-201	Flow Details	
Job Location:	River Guage	Unit:	cm
		Range:	0-167.66
		Current Output:	4-20 mA
		4 mA Set Point	0
		20 mA Set Point	167.66

Inst. Reading	AS FOUND	AS LEFT
Level (cm)	15.59	15.28

Maintenance Checklist			Remarks
Visual Inspection:	☑ OK	☐ NOT OK	
Electrical Inspection:	☑ OK	☐ NOT OK	

Programming Parameter of Instrument

Parameter	Discription	Value	Parameter	Discription	Value
P001	Operation	1.00000	P006	unit	2.00
P002	Material	1.000	P006	Empty	200.66 cm
P004	Transducer	112	P007	Span	167.66 cm

Instrument Test Information and Results

Input (%)	Calculated Level(cm)	Calculated Input (mA)	Level on UUT (cm)	UUT Measured Output (mA)	Deviation (cm)
0	0.00	4.00	0.12	3.98	0.12
25	41.91	8.00	41.98	7.99	-0.07
50	83.83	12.00	83.81	12.00	0.02
75	125.74	16.00	125.72	15.96	0.02
100	167.66	20.00	167.48	19.93	0.18

Information of Tools used for Verification of the Instruments

Device Description:	Manufacturer	Model
Electrical Multimeter	Fluke	179

* Refer Calibration Tools Certificates submittal for more Information

Verification Test Result:	☑ Passed	☐ Fail	☐ Not Verified

Overall Remarks:	Program parameters verified

Service Technician :	Tushar Patel	Stamp/Signature	
Printed Date:	September 13, 2021		

End of Report

Version: 19-12

Report No:CO1264-2108-41

DTM Version: 3.31.00

Flowmeter Verification Certificate Transmitter

Georgian Highlands Region	Arthur WPCP
Customer	Plant
Order code	Tag Name
PROMAG 53 W DN100	1.3323 - 1.3323
Device type	K-Factor
M4053919000	4
Serial number	Zero point
V2.03.00	V1.06.00
Software Version Transmitter	Software Version I/O-Module
13.09.2021	11:36
Verification date	Verification time

Verification result Transmitter: Passed

Test item	Result	Applied Limits
Amplifier	Passed	Basis: 0.55 %
Current Output 1	Passed	0.05 mA
Pulse Output 1	Not tested	0 P
Test Sensor	Passed	

FieldCheck Details	**Simubox Details**
551063	8818965
Production number	Production number
1.07.10	1.00.01
Software Version	Software Version
07/2021	07/2021
Last Calibration Date	Last Calibration Date

13.09.2021		
Date	Operator's Sign	Inspector's Sign

Overall results:

The achieved test results show that the instrumment is completely functional, and the measuring results lie within +/- 1% of the original calibration. [1)]

The calibration of the Fieldcheck test system is fully traceable to national standards.

1) Prerequisite is an additional proof of electrode integrity with a high voltage test.

Endress+Hauser
People for Process Automation

FieldCheck - Result Tab Transmitter

Customer	**Georgian Highlands Region**		Plant	**Arthur WPCP**
Order code			Tag Name	**RAS WEST FLOW**
Device type	**PROMAG 53 W DN100**		K-Factor	**1.3323 - 1.3323**
Serial number	**M4053919000**		Zero point	**4**
Software Version Transmitter	**V2.03.00**		Software Version I/O-Module	**V1.06.00**
Verification date	**13.09.2021**		Verification time	**11:36**

Verification Flow end value (100 %): 31.416 l/s
Flow speed 4.00 m/s

Passed / Failed	Test item	Simul. Signal	Limit Value	Deviation
	Test Transmitter			
✓	Amplifier	1.571 l/s (5%)	1.50 %	0.14 %
✓		3.142 l/s (10.0%)	1.00 %	0.14 %
✓		15.708 l/s (50.0%)	0.60 %	0.09 %
✓		31.416 l/s (100%)	0.55 %	0.08 %
✓	Current Output 1	4.000 mA (0%)	0.05 mA	-0.002 mA
✓		4.800 mA (5%)	0.05 mA	-0.003 mA
✓		5.600 mA (10.0%)	0.05 mA	-0.014 mA
✓		12.000 mA (50.0%)	0.05 mA	-0.001 mA
✓		20.000 mA (100%)	0.05 mA	0.004 mA
–	Pulse Output 1	---	---	---
		Start value	**Limits range**	**Measured value**
	Test Sensor			
✓	Coil Curr. Rise	5.000 ms	0.000..14.250 ms	7.952 ms
✓	Coil Curr. Stability		---	---
✓	Electrode Integrity	mV	0.0..300.000 mV	0.000 mV

Legend of symbols

✓	✗	–	?	!
Passed	Failed	not tested	not testable	Attention

FieldCheck: Parameters Transmitter

Customer	**Georgian Highlands Region**	Plant	**Arthur WPCP**
Order code		Tag Name	**RAS West Flow**
Device type	**PROMAG 53 W DN100**	K-Factor	**1.3323 - 1.3323**
Serial number	**M4053919000**	Zero point	**4**
Software Version Transmitter	**V2.03.00**	Software Version I/O-Module	**V1.06.00**
Verification date	**13.09.2021**	Verification time	**11:36**

Curent Output	**Assign**	**Current Range**	**Value 0_4mA**	**Value 20 mA**		
Terminal 26/27	VOLUME FLOW	4-20 mA activ	0.0 l/s	20.00 l/s		
Pulse Output	**Assign**	**Pulse Value**	**Output signal**	**Pulse width**		
Terminal 24/25	VOLUME FLOW	1000.000 l/P	Passive/Positive	100.00 ms		

Actual System Ident. 121.0

DTM Version: 3.31.00

Flowmeter Verification Certificate Transmitter

Georgian Highlands Region	Arthur WPCP
Customer	Plant
	FIT 001
Order code	Tag Name
PROMAG 53 W DN100	1.3156 - 1.3156
Device type	K-Factor
M4053819000	4
Serial number	Zero point
V2.03.00	V1.06.00
Software Version Transmitter	Software Version I/O-Module
13.09.2021	11:52
Verification date	Verification time

Verification result Transmitter: Passed

Test item	Result	Applied Limits
Amplifier	Passed	Basis: 0.55 %
Current Output 1	Passed	0.05 mA
Pulse Output 1	Not tested	0 P
Test Sensor	Passed	

FieldCheck Details	**Simubox Details**
551063	8818965
Production number	Production number
1.07.10	1.00.01
Software Version	Software Version
07/2021	07/2021
Last Calibration Date	Last Calibration Date

13.09.2021		
Date	Operator's Sign	Inspector's Sign

Overall results:

The achieved test results show that the instrumment is completely functional, and the measuring results lie within +/- 1% of the original calibration. [1)]

The calibration of the Fieldcheck test system is fully traceable to national standards.

1) Prerequisite is an additional proof of electrode integrity with a high voltage test.

Endress+Hauser
People for Process Automation

FieldCheck - Result Tab Transmitter

Customer	**Georgian Highlands Region**		Plant	**Arthur WPCP**
Order code			Tag Name	**FIT 001**
Device type	**PROMAG 53 W DN100**		K-Factor	**1.3156 - 1.3156**
Serial number	**M4053819000**		Zero point	**4**
Software Version Transmitter	**V2.03.00**		Software Version I/O-Module	**V1.06.00**
Verification date	**13.09.2021**		Verification time	**11:52**

Verification Flow end value (100 %): 31.416 l/s
Flow speed 4.00 m/s

Passed / Failed	Test item	Simul. Signal	Limit Value	Deviation
	Test Transmitter			
✓	Amplifier	1.571 l/s (5%)	1.50 %	0.05 %
✓		3.142 l/s (10.0%)	1.00 %	0.01 %
✓		15.708 l/s (50.0%)	0.60 %	0.00 %
✓		31.416 l/s (100%)	0.55 %	-0.02 %
✓	Current Output 1	4.000 mA (0%)	0.05 mA	-0.001 mA
✓		4.800 mA (5%)	0.05 mA	-0.001 mA
✓		5.600 mA (10.0%)	0.05 mA	-0.014 mA
✓		12.000 mA (50.0%)	0.05 mA	-0.001 mA
✓		20.000 mA (100%)	0.05 mA	0.000 mA
–	Pulse Output 1	---	---	---
		Start value	**Limits range**	**Measured value**
	Test Sensor			
✓	Coil Curr. Rise	5.000 ms	0.000..14.250 ms	7.982 ms
✓	Coil Curr. Stability		---	---
✓	Electrode Integrity	mV	0.0..300.000 mV	3.289 mV

Legend of symbols

✓	✘	–	?	!
Passed	Failed	not tested	not testable	Attention

FieldCheck: Parameters Transmitter

Customer	**Georgian Highlands Region**		Plant	**Arthur WPCP**
Order code			Tag Name	**FIT 001**
Device type	**PROMAG 53 W DN100**		K-Factor	**1.3156 - 1.3156**
Serial number	**M4053819000**		Zero point	**4**
Software Version Transmitter	**V2.03.00**		Software Version I/O-Module	**V1.06.00**
Verification date	**13.09.2021**		Verification time	**11:52**

Curent Output	**Assign**	**Current Range**	**Value 0_4mA**	**Value 20 mA**		
Terminal 26/27	VOLUME FLOW	4-20 mA activ	0.0 l/s	20.00 l/s		
Pulse Output	**Assign**	**Pulse Value**	**Output signal**	**Pulse width**		
Terminal 24/25	OFF	---	---	---		

Actual System Ident. 125.0

Verification report Promag 400

Endress+Hauser
People for Process Automation

Plant operator: ENDRESS+HAUSER

Heartbeat Technology

Device information

Location	ARTHUR WWTP
Device tag	SSTP0-FI01
Module name	Promag L
Nominal diameter	DN150 / 6"
Device name	Promag 400
Order code	5L4C1F-LKF3/0
Serial number	R109EB16000
Firmware version	02.00.01

Calibration

Calibration factor	1.0563
Zero point	-1

Verification information

Operating time (counter)	321d01h36m15s
Date/time (manually recorded)	13.09.21 10:44
Verification ID	16

Overall verification result

☑ Passed	Details see next page

*Result of the complete device functionality test via Heartbeat Technology

Confirmation

Heartbeat Verification verifies the function of the flowmeter within the specified measuring tolerance, over the useful lifetime of the device, with a total test coverage > 94 %, and complies with the requirements for traceable verification according to DIN EN ISO 9001:2008 Section 7.6 a.

Notes

13.09.21		
Date	Operator's signature	Inspector's signature

Verification report Promag 400

Endress+Hauser
People for Process Automation

Plant operator: ENDRESS+HAUSER

Device identification and verification identification	
Serial number	R109EB16000
Device tag	SSTP0-FI01
Verification ID	16

Heartbeat Technology

Sensor	**Passed**
Shot time symmetry	Passed
Hold voltage symmetry	Passed
Coil current loss	Passed
Coil current stability	Passed
Coil resistance	Passed
Cable defect	Passed
Cable defect	Passed
Cable defect	Passed

Sensor electronic module (ISEM)	**Passed**
External reference voltage	Passed
Linearity of electrode measuring circuit	Passed
Offset of electrode measuring circuit	Passed

System status	**Passed**

I/O module	**Passed**
Input/output 1	Passed
Input/output 2	Not done
Input/output 3	Not done

2021 – 2022 Annual Performance Report
Arthur Wastewater Treatment Plant
ECA 7654-BEMKVD

Appendix E

Sludge Quality Analysis

ARTHUR WASTEWATER TREATMENT PLANT
SLUDGE QUALITY DATA

October 2021 - May 2022

	Month/Year	Oct-21	Nov-21	Dec-21	Jan-22	Feb-22	Mar-22	Apr-22	May-22	AVERAGE
Nutrients										
TS	(mg/L)	20400	37000	35400	29500	23500	19200	31200	39400	**29450**
Ammonia+Ammonium	(mg/L)	123.0	189.0	211	158	148	86.9	130.0	236.0	**160.2**
Nitrate	(mg/L)	3.60	0.60	0.50	0.30	0.30	0.3	0.30	2.0	**0.99**
Ammonia + Nitrate	(mg/L)	126.6	189.6	211.5	158.3	148.3	87.2	130.3	238.0	**161.2**
TKN	(mg/L)	1280	1760	1950	1770	1470	1240	1860	2260	**1699**
Phosphorus	(mg/L)	680	1200	1600	940	820	650	801	1400	**1011**
Metal Concentrations										
Arsenic	(mg/L)	0.10	0.20	0.20	0.20	0.10	0.10	0.10	0.20	**0.15**
Cadmium	(mg/L)	0.006	0.010	0.010	0.008	0.016	0.005	0.007	0.013	**0.01**
Cobalt	(mg/L)	0.05	0.09	0.09	0.06	0.030	0.04	0.06	0.10	**0.07**
Chromium	(mg/L)	0.48	0.98	1.30	1.50	0.29	1.20	1.70	2.20	**1.21**
Copper	(mg/L)	10.00	18.00	18.00	13.00	14.00	8.50	12.00	20.00	**14.19**
Mercury	(mg/L)	0.004	0.007	0.009	0.006	0.0510	0.0040	0.005	0.007	**0.012**
Potassium	(mg/L)	72	93.0	140.0	120.0	59.0	104.0	118.0	150.0	**107**
Molybdenum	(mg/L)	0.10	0.20	0.26	0.13	0.11	0.09	0.11	0.22	**0.15**
Nickel	(mg/L)	0.30	0.58	0.74	0.83	0.23	0.58	0.86	1.10	**0.65**
Lead	(mg/L)	0.20	0.30	0.30	0.20	0.20	0.10	0.20	0.30	**0.23**
Selenium	(mg/L)	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	**0.10**
Zinc	(mg/L)	9.00	16.00	16.00	10.00	11.00	6.00	8.00	15.00	**11.38**
Bacti										
E. coli (cfu/1g dried wgt)		132,353	100,000	64,972	294,915	310,638	218,750	92,949	38,071	**156,581**
E. coli (cfu/100mL)		270,000	370,000	230,000	870,000	730,000	420,000	290,000	150,000	**416,250**
Metal/Solids Concentration										
Arsenic [170]	(mg/kg)	5	5	6	7	4	5	3	5	**5**
Cadmium [34]	(mg/kg)	0	0	0	0	1	0	0	0	**0**
Cobalt [340]	(mg/kg)	2	2	3	2	1	2	2	3	**2**
Chromium [2800]	(mg/kg)	24	26	37	51	12	63	54	56	**40**
Copper [1700]	(mg/kg)	490	486	508	441	596	443	385	508	**482**
Mercury [11]	(mg/kg)	0	0	0	0	2	0	0	0	**0**
Molybdenum [94]	(mg/kg)	5	5	7	4	5	5	4	6	**5**
Nickel [420]	(mg/kg)	15	16	21	28	10	30	28	28	**22**
Lead [1100]	(mg/kg)	10	8	8	7	9	5	6	8	**8**
Selenium [34]	(mg/kg)	5	3	3	3	4	5	3	3	**4**
Zinc [4200]	(mg/kg)	441	432	452	339	468	313	256	381	**385**

2021 – 2022 Annual Performance Report
Arthur Wastewater Treatment Plant
ECA 7654-BEMKVD

Appendix F

Daily Streamflow Measurements

Ontario Clean Water Agency
Time Series Info Report

Report extracted 09/02/2022 14:26

From: **01/10/2021 to 31/05/2022**

Facility Org Number: **5767**

Facility Works Number: **110000882**

Facility Name: **ARTHUR WASTEWATER TREATMENT PLANT**

Facility Owner: **Municipality: Township of Wellington North**

Facility Classification: **Class 3 Wastewater Treatment**

Receiver: **Conestoga River**

Service Population: **2500.0**

Total Design Capacity: **1860.0 m3/day**

	10/2021	11/2021	12/2021	01/2022	02/2022	03/2022	04/2022	05/2022	Total	Avg	Max	Min
Final Effluent / River Height - cm												
Count IH	31	30	31	31	28	31	30	31	243			
Total IH	1025.11	1110.22	1342.76	725.89	970.96	2257.28	1073.53	747.69	9253.44			
Max IH	84.65	55.77	101.57	34.71	85.45	97.4	48.22	56.86			101.57	
Mean IH	33.068	37.007	43.315	23.416	34.677	72.815	35.784	24.119		38.08		
Min IH	19.08	23.26	24.38	17.75	16.06	36.65	23.15	15.12				15.12

2021 – 2022 Annual Performance Report
Arthur Wastewater Treatment Plant
ECA 7654-BEMKVD

Appendix G

Grand River Conservation Authority Manual Discharge Measurements & TAN Concentrations

Arthur WWTP Stream Gauge
Tentative Rating Table

Last Updated:
Sept. 9, 2017

Level (cm)	Flow (m^3/s)	Level (cm)	Flow (m^3/s)	Level (cm)	Flow (m^3/s)	Level (cm)	Flow (m^3/s)
10.1	0.000	14.3	0.035	18.5	0.09	22.7	0.17
10.2	0.001	14.4	0.036	18.6	0.09	22.8	0.17
10.3	0.001	14.5	0.037	18.7	0.09	22.9	0.17
10.4	0.002	14.6	0.038	18.8	0.09	23.0	0.17
10.5	0.003	14.7	0.039	18.9	0.09	23.1	0.18
10.6	0.003	14.8	0.040	19.0	0.10	23.2	0.18
10.7	0.004	14.9	0.041	19.1	0.10	23.3	0.18
10.8	0.005	15.0	0.042	19.2	0.10	23.4	0.18
10.9	0.005	15.1	0.043	19.3	0.10	23.5	0.19
11.0	0.006	15.2	0.045	19.4	0.10	23.6	0.19
11.1	0.007	15.3	0.046	19.5	0.10	23.7	0.19
11.2	0.008	15.4	0.047	19.6	0.11	23.8	0.19
11.3	0.008	15.5	0.048	19.7	0.11	23.9	0.20
11.4	0.009	15.6	0.049	19.8	0.11	24.0	0.20
11.5	0.010	15.7	0.050	19.9	0.11	24.1	0.20
11.6	0.011	15.8	0.052	20.0	0.11	24.2	0.20
11.7	0.011	15.9	0.053	20.1	0.12	24.3	0.20
11.8	0.012	16.0	0.054	20.2	0.12	24.4	0.21
11.9	0.013	16.1	0.055	20.3	0.12	24.5	0.21
12.0	0.014	16.2	0.056	20.4	0.12	24.6	0.21
12.1	0.015	16.3	0.058	20.5	0.12	24.7	0.22
12.2	0.015	16.4	0.059	20.6	0.12	24.8	0.22
12.3	0.016	16.5	0.060	20.7	0.13	24.9	0.22
12.4	0.017	16.6	0.062	20.8	0.13	25.0	0.22
12.5	0.018	16.7	0.063	20.9	0.13	25.1	0.23
12.6	0.019	16.8	0.064	21.0	0.13	25.2	0.23
12.7	0.020	16.9	0.066	21.1	0.13	25.3	0.23
12.8	0.021	17.0	0.067	21.2	0.14	25.4	0.23
12.9	0.021	17.1	0.068	21.3	0.14	25.5	0.24
13.0	0.022	17.2	0.070	21.4	0.14	25.6	0.24
13.1	0.023	17.3	0.071	21.5	0.14	25.7	0.24
13.2	0.024	17.4	0.072	21.6	0.14	25.8	0.24
13.3	0.025	17.5	0.074	21.7	0.15	25.9	0.25
13.4	0.026	17.6	0.075	21.8	0.15	26.0	0.25
13.5	0.027	17.7	0.077	21.9	0.15	26.1	0.25
13.6	0.028	17.8	0.078	22.0	0.15	26.2	0.26
13.7	0.029	17.9	0.080	22.1	0.15	26.3	0.26
13.8	0.030	18.0	0.081	22.2	0.16	26.4	0.26
13.9	0.031	18.1	0.083	22.3	0.16	26.5	0.26
14.0	0.032	18.2	0.084	22.4	0.16	26.6	0.27
14.1	0.033	18.3	0.086	22.5	0.16	26.7	0.27
14.2	0.034	18.4	0.087	22.6	0.16	26.8	0.27

Source: GRCA Manual Discharge Measurements

Arthur WWTP Stream Gauge
Tentative Rating Table

Last Updated:
Sept. 9, 2017

Level (cm)	Flow (m3/s)	Level (cm)	Flow (m3/s)	Level (cm)	Flow (m3/s)	Level (cm)	Flow (m3/s)
26.9	0.28	31.1	0.42	35.3	0.61	39.5	0.85
27.0	0.28	31.2	0.43	35.4	0.62	39.6	0.86
27.1	0.28	31.3	0.43	35.5	0.62	39.7	0.87
27.2	0.29	31.4	0.44	35.6	0.63	39.8	0.87
27.3	0.29	31.5	0.44	35.7	0.63	39.9	0.88
27.4	0.29	31.6	0.44	35.8	0.64	40.0	0.89
27.5	0.30	31.7	0.45	35.9	0.65	40.1	0.89
27.6	0.30	31.8	0.45	36.0	0.65	40.2	0.90
27.7	0.30	31.9	0.46	36.1	0.66	40.3	0.91
27.8	0.31	32.0	0.46	36.2	0.66	40.4	0.91
27.9	0.31	32.1	0.47	36.3	0.67	40.5	0.92
28.0	0.31	32.2	0.47	36.4	0.67	40.6	0.93
28.1	0.31	32.3	0.47	36.5	0.68	40.7	0.93
28.2	0.32	32.4	0.48	36.6	0.68	40.8	0.94
28.3	0.32	32.5	0.48	36.7	0.69	40.9	0.95
28.4	0.32	32.6	0.49	36.8	0.69	41.0	0.95
28.5	0.33	32.7	0.49	36.9	0.70	41.1	0.96
28.6	0.33	32.8	0.50	37.0	0.71	41.2	0.97
28.7	0.33	32.9	0.50	37.1	0.71	41.3	0.97
28.8	0.34	33.0	0.50	37.2	0.72	41.4	0.98
28.9	0.34	33.1	0.51	37.3	0.72	41.5	0.99
29.0	0.35	33.2	0.51	37.4	0.73	41.6	1.00
29.1	0.35	33.3	0.52	37.5	0.73	41.7	1.00
29.2	0.35	33.4	0.52	37.6	0.74	41.8	1.01
29.3	0.36	33.5	0.53	37.7	0.75	41.9	1.02
29.4	0.36	33.6	0.53	37.8	0.75	42.0	1.02
29.5	0.36	33.7	0.54	37.9	0.76	42.1	1.03
29.6	0.37	33.8	0.54	38.0	0.76	42.2	1.04
29.7	0.37	33.9	0.55	38.1	0.77	42.3	1.05
29.8	0.37	34.0	0.55	38.2	0.77	42.4	1.05
29.9	0.38	34.1	0.56	38.3	0.78	42.5	1.06
30.0	0.38	34.2	0.56	38.4	0.79	42.6	1.07
30.1	0.39	34.3	0.56	38.5	0.79	42.7	1.07
30.2	0.39	34.4	0.57	38.6	0.80	42.8	1.08
30.3	0.39	34.5	0.57	38.7	0.80	42.9	1.09
30.4	0.40	34.6	0.58	38.8	0.81	43.0	1.10
30.5	0.40	34.7	0.58	38.9	0.82	43.1	1.10
30.6	0.40	34.8	0.59	39.0	0.82	43.2	1.11
30.7	0.41	34.9	0.59	39.1	0.83	43.3	1.12
30.8	0.41	35.0	0.60	39.2	0.84	43.4	1.13
30.9	0.42	35.1	0.60	39.3	0.84	43.5	1.14
31.0	0.42	35.2	0.61	39.4	0.85	43.6	1.14

Source: GRCA Manual Discharge Measurements

Arthur WWTP Stream Gauge
Tentative Rating Table

Last Updated:
Sept. 9, 2017

Level (cm)	Flow (m3/s)	Level (cm)	Flow (m3/s)	Level (cm)	Flow (m3/s)	Level (cm)	Flow (m3/s)
43.8	1.16	52.2	1.95	60.6	3.03	69.0	4.47
44.0	1.17	52.4	1.97	60.8	3.06	69.2	4.51
44.2	1.19	52.6	1.99	61.0	3.09	69.4	4.55
44.4	1.21	52.8	2.01	61.2	3.12	69.6	4.58
44.6	1.22	53.0	2.04	61.4	3.15	69.8	4.62
44.8	1.24	53.2	2.06	61.6	3.18	70.0	4.66
45.0	1.25	53.4	2.08	61.8	3.22	70.2	4.70
45.2	1.27	53.6	2.11	62.0	3.25	70.4	4.74
45.4	1.29	53.8	2.13	62.2	3.28	70.6	4.78
45.6	1.30	54.0	2.15	62.4	3.31	70.8	4.82
45.8	1.32	54.2	2.18	62.6	3.34	71.0	4.87
46.0	1.34	54.4	2.20	62.8	3.37	71.2	4.91
46.2	1.36	54.6	2.22	63.0	3.40	71.4	4.95
46.4	1.37	54.8	2.25	63.2	3.44	71.6	4.99
46.6	1.39	55.0	2.27	63.4	3.47	71.8	5.03
46.8	1.41	55.2	2.30	63.6	3.50	72.0	5.07
47.0	1.43	55.4	2.32	63.8	3.54	72.2	5.12
47.2	1.44	55.6	2.35	64.0	3.57	72.4	5.16
47.4	1.46	55.8	2.37	64.2	3.60	72.6	5.20
47.6	1.48	56.0	2.40	64.4	3.64	72.8	5.24
47.8	1.50	56.2	2.42	64.6	3.67	73.0	5.29
48.0	1.52	56.4	2.45	64.8	3.70	73.2	5.33
48.2	1.54	56.6	2.47	65.0	3.74	73.4	5.37
48.4	1.56	56.8	2.50	65.2	3.77	73.6	5.42
48.6	1.57	57.0	2.53	65.4	3.81	73.8	5.46
48.8	1.59	57.2	2.55	65.6	3.84	74.0	5.51
49.0	1.61	57.4	2.58	65.8	3.88	74.2	5.55
49.2	1.63	57.6	2.61	66.0	3.91	74.4	5.60
49.4	1.65	57.8	2.63	66.2	3.95	74.6	5.64
49.6	1.67	58.0	2.66	66.4	3.98	74.8	5.69
49.8	1.69	58.2	2.69	66.6	4.02	75.0	5.73
50.0	1.71	58.4	2.72	66.8	4.06	75.2	5.78
50.2	1.73	58.6	2.74	67.0	4.09	75.4	5.82
50.4	1.75	58.8	2.77	67.2	4.13	75.6	5.87
50.6	1.77	59.0	2.80	67.4	4.16	75.8	5.92
50.8	1.80	59.2	2.83	67.6	4.20	76.0	5.96
51.0	1.82	59.4	2.86	67.8	4.24	76.2	6.01
51.2	1.84	59.6	2.89	68.0	4.28	76.4	6.06
51.4	1.86	59.8	2.91	68.2	4.31	76.6	6.11
51.6	1.88	60.0	2.94	68.4	4.35	76.8	6.15
51.8	1.90	60.2	2.97	68.6	4.39	77.0	6.20
52.0	1.92	60.4	3.00	68.8	4.43	77.2	6.25

Source: GRCA Manual Discharge Measurements

Arthur WWTP Stream Gauge
Tentative Rating Table

Last Updated:
Sept. 9, 2017

Level (cm)	Flow (m3/s)	Level (cm)	Flow (m3/s)	Level (cm)	Flow (m3/s)	Level (cm)	Flow (m3/s)
77.5	6.3	98.5	13.0	119.5	23.2	140.5	38
78.0	6.4	99.0	13.2	120.0	23.5	141.0	38
78.5	6.6	99.5	13.4	120.5	23.8	141.5	39
79.0	6.7	100.0	13.6	121.0	24.1	142.0	39
79.5	6.8	100.5	13.8	121.5	24.4	142.5	39
80.0	7.0	101.0	14.0	122.0	24.7	143.0	40
80.5	7.1	101.5	14.2	122.5	25.0	143.5	40
81.0	7.2	102.0	14.4	123.0	25.3	144.0	41
81.5	7.4	102.5	14.6	123.5	25.6	144.5	41
82.0	7.5	103.0	14.9	124.0	26.0	145.0	42
82.5	7.6	103.5	15.1	124.5	26.3	145.5	42
83.0	7.8	104.0	15.3	125.0	26.6	146.0	42
83.5	7.9	104.5	15.5	125.5	26.9	146.5	43
84.0	8.1	105.0	15.7	126.0	27.2	147.0	43
84.5	8.2	105.5	16.0	126.5	27.6	147.5	44
85.0	8.3	106.0	16.2	127.0	27.9	148.0	44
85.5	8.5	106.5	16.4	127.5	28.2	148.5	45
86.0	8.6	107.0	16.7	128.0	28.6	149.0	45
86.5	8.8	107.5	16.9	128.5	28.9	149.5	46
87.0	8.9	108.0	17.1	129.0	29.2	150.0	46
87.5	9.1	108.5	17.4	129.5	29.6	150.5	47
88.0	9.3	109.0	17.6	130.0	29.9	151.0	47
88.5	9.4	109.5	17.9	130.5	30.3	151.5	47
89.0	9.6	110.0	18.1	131.0	30.6	152.0	48
89.5	9.7	110.5	18.3	131.5	31.0	152.5	48
90.0	9.9	111.0	18.6	132.0	31.3	153.0	49
90.5	10.1	111.5	18.9	132.5	31.7	153.5	49
91.0	10.2	112.0	19.1	133.0	32.1	154.0	50
91.5	10.4	112.5	19.4	133.5	32.4	154.5	50
92.0	10.6	113.0	19.6	134.0	32.8	155.0	51
92.5	10.8	113.5	19.9	134.5	33.2	155.5	51
93.0	10.9	114.0	20.2	135.0	33.5	156.0	52
93.5	11.1	114.5	20.4	135.5	33.9	156.5	52
94.0	11.3	115.0	20.7	136.0	34.3	157.0	53
94.5	11.5	115.5	21.0	136.5	34.7	157.5	53
95.0	11.6	116.0	21.2	137.0	35.0	158.0	54
95.5	11.8	116.5	21.5	137.5	35.4	158.5	54
96.0	12.0	117.0	21.8	138.0	35.8	159.0	55
96.5	12.2	117.5	22.1	138.5	36.2	159.5	55
97.0	12.4	118.0	22.4	139.0	36.6	160.0	56
97.5	12.6	118.5	22.6	139.5	37.0	160.5	56
98.0	12.8	119.0	22.9	140.0	37.4	161.0	57

Source: GRCA Manual Discharge Measurements

AMMONIA			
NH3-N	X 1.22	X 1.29	T.A.N.
0.01	0.01220	0.0129	0.0251
0.02	0.02440	0.0258	0.0502
0.03	0.03660	0.0387	0.0753
0.04	0.04880	0.0516	0.1004
0.05	0.06100	0.0645	0.1255
0.06	0.07320	0.0774	0.1506
0.07	0.08540	0.0903	0.1757
0.08	0.09760	0.1032	0.2008
0.09	0.10980	0.1161	0.2259
0.10	0.12200	0.1290	0.2510
0.11	0.13420	0.1419	0.2761
0.12	0.14640	0.1548	0.3012
0.13	0.15860	0.1677	0.3263
0.14	0.17080	0.1806	0.3514
0.15	0.18300	0.1935	0.3765
0.16	0.19520	0.2064	0.4016
0.17	0.20740	0.2193	0.4267
0.18	0.21960	0.2322	0.4518
0.19	0.23180	0.2451	0.4769
0.20	0.24400	0.2580	0.5020
0.21	0.25620	0.2709	0.5271
0.22	0.26840	0.2838	0.5522
0.23	0.28060	0.2967	0.5773
0.24	0.29280	0.3096	0.6024
0.25	0.30500	0.3225	0.6275
0.26	0.31720	0.3354	0.6526
0.27	0.32940	0.3483	0.6777
0.28	0.34160	0.3612	0.7028
0.29	0.35380	0.3741	0.7279
0.30	0.36600	0.3870	0.7530
0.31	0.37820	0.3999	0.7781
0.32	0.39040	0.4128	0.8032
0.33	0.40260	0.4257	0.8283
0.34	0.41480	0.4386	0.8534
0.35	0.42700	0.4515	0.8785
0.36	0.43920	0.4644	0.9036
0.37	0.45140	0.4773	0.9287
0.38	0.46360	0.4902	0.9538
0.39	0.47580	0.5031	0.9789
0.40	0.48800	0.5160	1.0040
0.41	0.50020	0.5289	1.0291
0.42	0.51240	0.5418	1.0542
0.43	0.52460	0.5547	1.0793

AMMONIA			
NH3-N	X 1.22	X 1.29	T.A.N.
0.44	0.54900	0.5805	1.1295
0.45	0.56120	0.5934	1.1546
0.46	0.57340	0.6063	1.1797
0.47	0.58560	0.6192	1.2048
0.48	0.59780	0.6321	1.2299
0.49	0.61000	0.6450	1.2550
0.50	0.62220	0.6579	1.2801
0.51	0.63440	0.6708	1.3052
0.52	0.64660	0.6837	1.3303
0.53	0.65880	0.6966	1.3554
0.54	0.67100	0.7095	1.3805
0.55	0.68320	0.7224	1.4056
0.56	0.69540	0.7353	1.4307
0.57	0.70760	0.7482	1.4558
0.58	0.71980	0.7611	1.4809
0.59	0.73200	0.7740	1.5060
0.60	0.74420	0.7869	1.5311
0.61	0.75640	0.7998	1.5562
0.62	0.76860	0.8127	1.5813
0.63	0.78080	0.8256	1.6064
0.64	0.79300	0.8385	1.6315
0.65	0.80520	0.8514	1.6566
0.66	0.81740	0.8643	1.6817
0.67	0.82960	0.8772	1.7068
0.68	0.84180	0.8901	1.7319
0.69	0.85400	0.9030	1.7570
0.70	0.86620	0.9159	1.7821
0.71	0.87840	0.9288	1.8072
0.72	0.89060	0.9417	1.8323
0.73	0.90280	0.9546	1.8574
0.74	0.91500	0.9675	1.8825
0.75	0.92720	0.9804	1.9076
0.76	0.93940	0.9933	1.9327
0.77	0.95160	1.0062	1.9578
0.78	0.96380	1.0191	1.9829
0.79	0.97600	1.0320	2.0080
0.80	0.98820	1.0449	2.0331
0.81	1.00040	1.0578	2.0582
0.82	1.01260	1.0707	2.0833
0.83	1.02480	1.0836	2.1084
0.84	1.03700	1.0965	2.1335
0.85	1.04920	1.1094	2.1586
0.86	0.00000	0.0000	0.0000