

2021

# Annual Performance Report



Wastewater Services  
Division, Environmental  
Services

March 25, 2022

# Wastewater Services

## 2021 Annual Performance Report

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### Executive Summary

The Guelph Wastewater Treatment Plant (WWTP), operating within the Wastewater Services Division, provides treatment of domestic, commercial, institutional and industrial wastewater collected from the City of Guelph and the neighbouring community of the Township of Guelph/Eramosa. The facility, located at 530 Wellington Street West, provides tertiary treatment of wastewater, with disinfected and dechlorinated effluent being discharged to the Speed River.

This report documents the performance of the sewage works as specified in the Amended Environmental Compliance Approval 8835-9QJKSD.

The WWTP provides preliminary screening and grit removal, primary treatment by sedimentation, secondary treatment by conventional and extended aeration activated sludge and two-stage tertiary treatment utilizing rotating biological contactors (RBC) followed by sand filtration. Dewatering filtrate is treated through a side stream treatment process called Anammox to reduce ammonia loading and waste activated sludge is thickened prior to being pumped to primary digesters. Disinfection of the final effluent is accomplished by the addition of sodium hypochlorite. De-chlorination is achieved by the addition of sodium bisulphite prior to discharge to the receiving water.

The City of Guelph operates six sewage pumping stations (SPS), described below. This report summarizes the monitoring and maintenance results for the Northern Heights SPS and the Kortright East SPS, as required by their respective ECAs, and describes the wastewater collection systems' overall operational performance.

Process loading to the facility in 2021 was within typical values and the sludge accountability for the facility closed at -6.3%. The average total daily wastewater flow for this reporting period was 52.076 megalitres per day (MLD). The maximum total daily flow, recorded on September 23, 2021, was 76.693 megalitres (ML). Overall, the WWTP performed satisfactorily during the reporting period and a summary of effluent quality data is presented in Table 5 of this report. The facility recorded the following annual removal efficiencies: carbonaceous biochemical oxygen demand (CBOD5) - 98.8%, total suspended solids (TSS) - 98.9%, total phosphorus (TP) - 97.9%, total Kjeldahl nitrogen (TKN) - 95.9% and total ammonia nitrogen (TAN) - 98.4%.

Solids generated during treatment were stabilized by anaerobic digestion and subsequently mechanically dewatered. During the reporting period a total of 3,522 dry tonnes of dewatered biosolids were generated. One hundred percent of that material was diverted from landfill and was beneficially land applied.

The facility has no provision for primary treatment or raw sewage bypass directly to the Speed River. The facility does have provision for secondary treatment bypass, complete tertiary bypass

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and partial sandfilter bypass. During this reporting period there were five partial sandfilter bypass events as reported below in Table 9.

The WWTP voluntarily participates annually in the Grand River Watershed-Wide Optimization Program, which aims to improve the water quality of the Grand River (see Appendix A). Through continual improvement processes, the WWTP team is committed to meeting the objectives of this Program.

The City of Guelph is committed to providing a high level of service in the collection, treatment and management of wastewater. The City of Guelph Wastewater Service's environmental policy outlines long-term commitments to provide reliable wastewater services and enhance environmental stewardship now and into the future.

**P**revent pollution and protect the environment;

**I**mprove our environmental performance;

**P**lan and review our objectives and targets; and,

**E**valuate and fulfill compliance requirements.

All efforts have been made to ensure the information presented in this report is accurate. If you have any questions or comments concerning the report, please contact the City of Guelph at the address listed below, or by email at [wastewater@guelph.ca](mailto:wastewater@guelph.ca).

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### Introduction

Wastewater Treatment Plants and Systems in Ontario are governed by the Ministry of the Environment, Conservation and Parks (MECP) and are also subject to federal legislation. The purpose of a wastewater treatment system is to remove solids and nutrients in order to minimize the impact of the effluent on the receiving waterbody. The Environmental Compliance Approval (ECA), issued under the Environmental Protection Act, is a facility-specific document through which the MECP sets discharge quality limits for that facility based on the sensitivity of the receiving waters. To comply with the ECA, the City of Guelph (the City) prepares an Annual Performance Report covering the operation and overall performance of the wastewater treatment plant and the associated vertical infrastructure of the wastewater collection system. The details for the WWTP and Sewage Pumping Stations covered in this report are outlined below. All are owned and operated by the City of Guelph, Wastewater Services, 1 Carden St, Guelph, ON, Canada, N1H 3A1, 519-822-1260.

This Annual Performance Report, for the period of January 1st to December 31st, 2021, is a legislative requirement under Condition 10 (6) of ECA number 8835-9QJKSD and Condition 8, subsection 4 of Certificate of Approval (C of A) #0510-7MKTNA and C of A #8602-76HPDC. This report must be forwarded to the MECP no later than March 31st.

### Wastewater Treatment Plant Information

Address: Guelph Wastewater Treatment Plant (WWTP) 530 Wellington St W,  
Guelph, ON, Canada, N1H 8L8

Plant Number: 120003094

ECA Number: 8835-9QJKSD

### Kortright East Sewage Pumping Station (SPS) Information

Address: Inlet Sanitary Trunk Sewer, and Outlet Forcemain, 1005 Victoria Rd S,  
Guelph City, County of Wellington, ON, Canada, N1L 1B3

ECA Number: 0510-7MKTNA

### Northern Heights Sewage Pumping Station (SPS) Information

Address: 68 Ingram Drive, Guelph City, County of Wellington, ON, Canada,  
N1E 7L6

ECA Number: 8602-76HPDC

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### Facility and Systems Overview

The Guelph WWTP, operating within the Wastewater Services Division provides treatment of domestic, commercial, institutional and industrial wastewater collected from the City and the neighbouring community of the Township of Guelph/Eramosa. The facility, located at 530 Wellington Street West, provides tertiary treatment of wastewater, with disinfected and dechlorinated effluent being discharged to the Speed River. The Guelph WWTP is classified as a Class IV plant (Certificate #718, dated July 15, 1988) and is rated at 64,000 m<sup>3</sup>/d.

Wastewater flows into the plant via two sanitary trunk sewers and is pumped up to the Headworks by Archimedes screw pumps for preliminary treatment (screening and grit removal). After Headworks, the flow is split between four plants. The plants, referred to as Plant 1, 2, 3 and 4, have a rated capacity of 16,000 m<sup>3</sup>/d, 13,000 m<sup>3</sup>/d, 13,000 m<sup>3</sup>/d and 22,000 m<sup>3</sup>/d, respectively. The wastewater then receives primary and secondary treatment in conventional activated sludge processes. Chemical phosphorous removal is achieved through a dual point ferric chloride injection system. The secondary effluent from Plants 1, 2, and 3 combines upstream of tertiary rotating biological contactors (RBCs), which provide ammonia removal via nitrification. Plant 4 is designed to provide ammonia removal in the secondary treatment process. The path of Plant 4 secondary effluent depends on the plant flow rate. Plant 4 effluent is pumped to the RBCs until the combined RBC flow reaches a flow rate of 55 MLD, with excess Plant 4 flows pumped directly to the tertiary sandfilters. Filtered effluent is disinfected using sodium hypochlorite, followed by dechlorination with sodium bisulphite added to the last pass of the chlorine contact chamber prior to discharging into the Speed River.

Primary sludge generated at the plant is thickened in the primary clarifiers, while waste activated sludge (WAS) that has settled in the secondary clarifiers is thickened in a rotating drum thickener (RDT). Following thickening, sludge is anaerobically digested in the primary digesters and gravity flows to the secondary digester. Digested sludge is then drawn from the secondary digester and dewatered by the belt filter presses. Dewatered sludge is treated by the Lystek process to enable the land application of a Canadian Food Inspection Agency approved fertilizer product.

The Guelph Wastewater Collection System is classified as a Class III system (Certificate #1160, dated January 10, 2020). The collection system is comprised of 530 km of sanitary sewer and five Sewage Pumping Stations (SPS): Barton Estates SPS (C of A #3-1019-93-006), Kortright East SPS (C of A #0510-7MKTNA), Northern Heights SPS (C of A #8602-76HPDC), Terraview SPS (C of A #2760-4MNHDB) and NiMa Trails SPS (to be commissioned in 2022, ECA #3147-ATDKS4).

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### Comprehensive Performance Evaluation

A key component of the Comprehensive Performance Evaluation (CPE) is a Process Loading Assessment. This evaluation examines the measured flow and mass loading for the population and compares it to typical per capita contributions.

As described in Table 1, the City of Guelph WWTP was largely typical in terms of process loading for 2021.

**Table 1: Process Loading Evaluation, 2021**

**Population: 143 740 (2021 Census)**

Parameter	Actual	Typical
<b>Per Capita Flows and Loads</b>		
Per Capita Wastewater Flow	362 L/d per person	350-500 L/d per person
Per Capita BOD5 Loading	93.1 g/d per person	80 g/d per person
Per Capita TSS Loading	88.8 g/d per person	90 g/d per person
Per Capita TKN Loading	13 g/d per person	13 g/d per person
<b>Ratios</b>		
Flows: Peak Day/Annual Average	1.47	2.5-4.0
Raw: TSS/BOD5	0.95	0.8-1.2
Raw: TKN/BOD5	0.14	0.1-0.2

Another important part of the CPE is a process Sludge Accountability Assessment. Sludge accountability compares measured sludge production from the data collected with projected sludge production results. This comparison, which has a best practice acceptable range of plus/minus 15%, is valuable in measuring the reliability of the data being collected to properly represent the facility performance. Contributing factors to successful sludge accountability include accurate sampling and knowledgeable facility staff to take care of the day to day process requirements.

For 2021, the City of Guelph sludge accountability assessment resulted in a -6.3% data accuracy, which is within the acceptable variability and therefore validates the reliability of the data collection and analysis. Please see Table 2 for details.



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**Table 2: Sludge Accountability Assessment for 2021**

<b>Reported Sludge</b>	<b>kg/d</b>
Intentional Wasting	14,387
Unintentional Wasting	135.4
Side Stream	988
<b>Total</b>	<b>13,535</b>
<b>Projected Sludge</b>	<b>kg/d</b>
Primary Sludge Production	7,890
Biological Sludge Production	3,523
Chemical Sludge Production	1,323
<b>Total</b>	<b>12,736</b>
Sludge Accountability	-6.3 %

Note: plus/minus 15% is best practice

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### Operational Performance

#### Wastewater Flow

This section summarizes the influent characteristics for the Guelph WWTP. Flow data for the 2021 reporting period is listed in Table 3 of this report and represented in Figure 1. Total flow for this reporting period was 19,020 ML, which was 2% less than in 2020.

A comparison of average flow per month between 2020 and 2021 can be seen in Figure 2.

The average total daily flow for the year 2021 was 52.076 MLD. A maximum total daily flow of 76.693 ML was recorded on September 23, 2021.

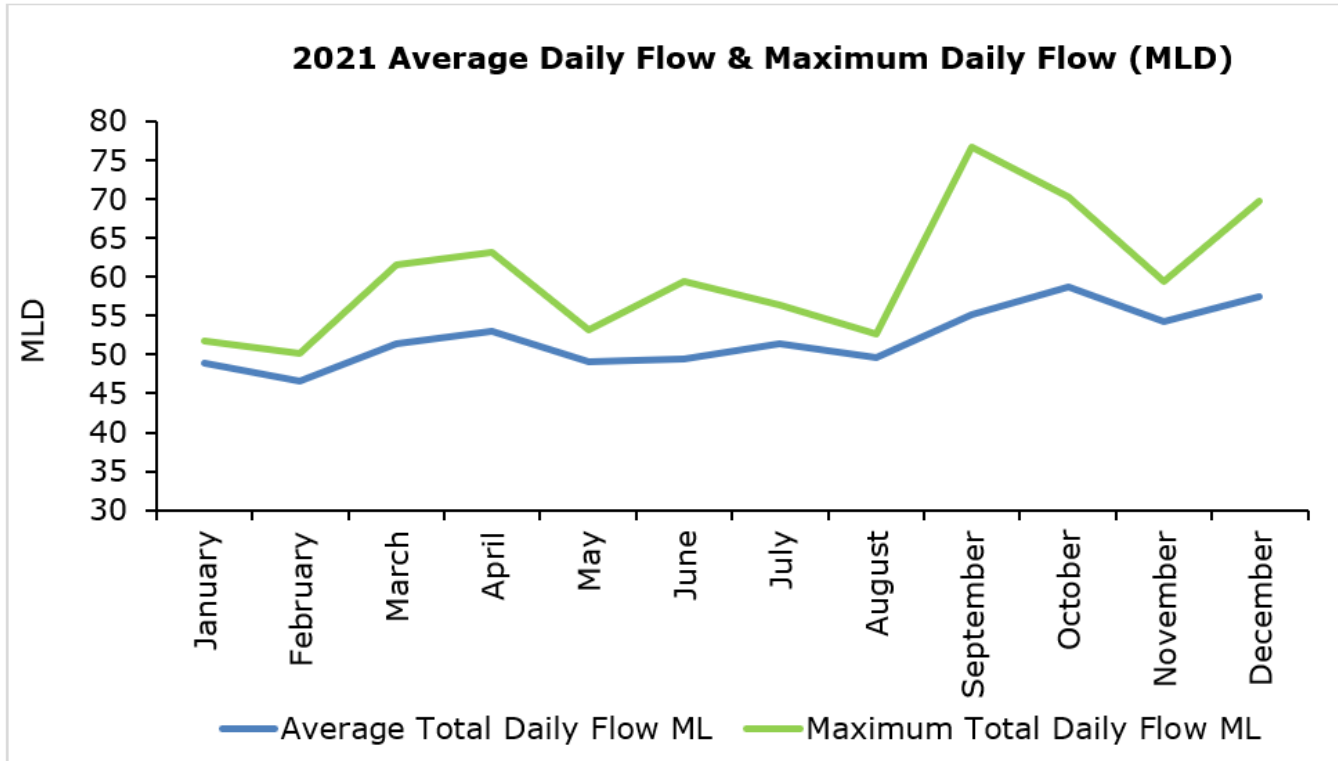
**Table 3: Wastewater Flow Data, 2021**

	<b>Average Total Flow (MLD)</b>	<b>Maximum Total Daily Flow (ML)</b>
<b>January</b>	48.925	51.736
<b>February</b>	46.596	50.125
<b>March</b>	51.382	61.634
<b>April</b>	52.970	63.249
<b>May</b>	49.135	53.245
<b>June</b>	49.531	59.508
<b>July</b>	51.399	56.457
<b>August</b>	49.584	52.715
<b>September</b>	55.106	76.693
<b>October</b>	58.622	70.261
<b>November</b>	54.265	59.421
<b>December</b>	57.391	69.670
<b>Annual Average</b>	52.076	-
<b>Winter Average</b>	51.712	-
<b>Summer Average</b>	52.335	-

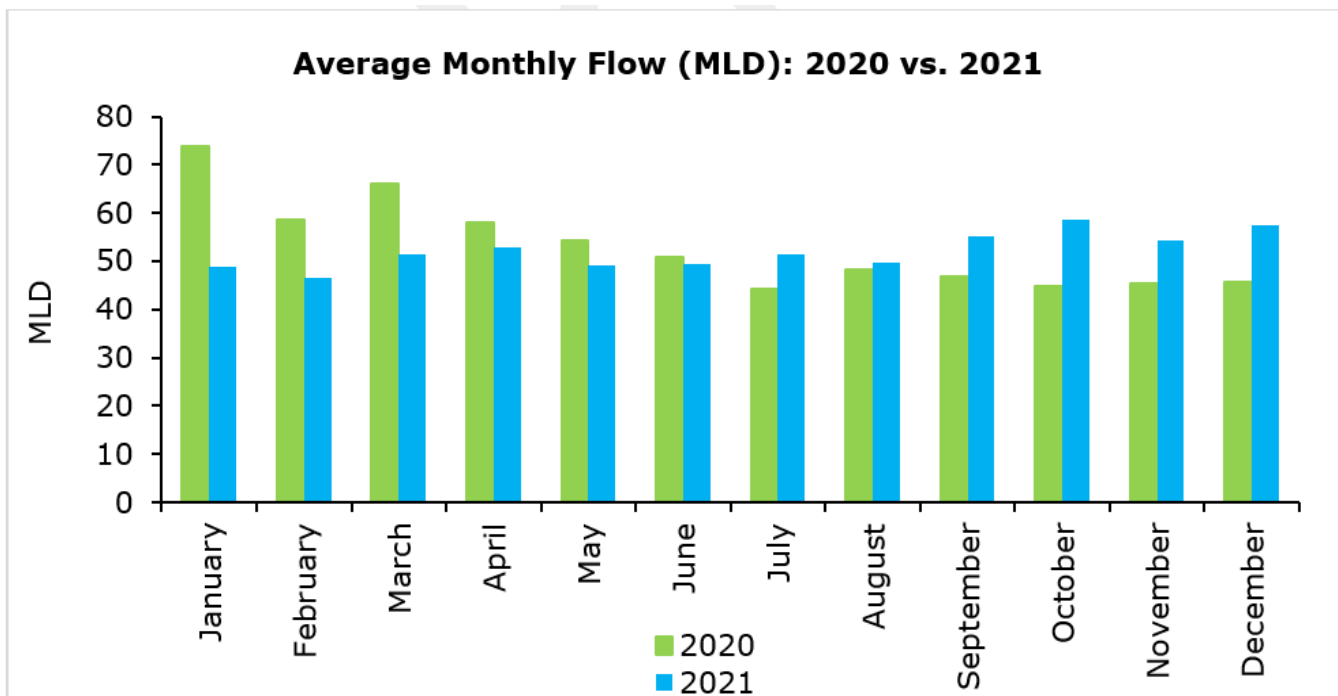
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**Figure 1: 2021 Average Daily Flow and Maximum Daily Flow**



**Figure 2: 2020 vs. 2021 Average Monthly Flow**



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### Raw Influent Wastewater Quality

Considerable effort goes into monitoring the characteristics of WWTP influent, effluent and intermediate process streams. This monitoring provides the necessary data for process optimization by plant staff and is required to meet the ECA monitoring and reporting conditions. Twenty-four hour flow proportional composite samples are routinely collected and analyzed. The raw influent wastewater data analyzed by the Guelph WWTP and Guelph Environmental Laboratory (GEL), which is ISO 17025 accredited by the Canadian Association for Laboratory Accreditation (CALA), is combined and a monthly summary is presented in Table 4.

**Table 4: Raw Influent Wastewater Quality Data, 2021**

	<b>pH</b>	<b>CBOD5</b> (mg/L)	<b>BOD5</b> (mg/L)	<b>TSS</b> (mg/L)	<b>TP</b> (mg/L)	<b>TKN</b> (mg/L)	<b>TAN</b> (mg/L)
<b>January</b>	7.50	194	212	241	5.32	43.0	25.6
<b>February</b>	7.50	199	204	193	5.42	43.0	28.1
<b>March</b>	7.50	209	229	272	5.45	38.0	23.9
<b>April</b>	7.50	168	188	240	4.97	37.0	21.7
<b>May</b>	7.50	159	173	229	5.03	38.0	23.0
<b>June</b>	7.50	199	219	296	5.74	41.0	20.8
<b>July</b>	7.50	149	189	227	5.01	38.0	22.6
<b>August</b>	7.40	208	325	237	5.25	39.0	21.1
<b>September</b>	7.50	189	270	262	5.16	35.0	20.7
<b>October</b>	7.60	130	186	217	4.51	31.0	19.9
<b>November</b>	7.60	168	178	259	5.17	34.0	25.6
<b>December</b>	7.60	188	197	261	4.90	28.0	22.6
<b>Annual Average</b>	7.52	180	214	245	5.16	37.1	23.0
<b>Winter Average</b>	7.54	192	204	245	5.25	37.2	25.2
<b>Summer Average</b>	7.50	172	221	244	5.10	37.0	21.4

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### Final Effluent Quality

Primary sedimentation and secondary activated sludge treatment are provided by four separate treatment trains, namely Plants 1, 2, 3 and 4. Plants 1, 2, and 3 incorporate conventional activated sludge with the secondary effluent from each of these three plants directed to a common pump well. The combined secondary effluent is lifted by vertical turbine pumps to the rotating biological contactors (RBC) influent distribution channel and evenly split to each of the four RBC trains. Each of the four trains consists of eight RBCs in series. The process objective of the RBCs is to provide additional biological treatment for the oxidation of ammonia. Effluent from the RBC trains is discharged to a common sand filter influent channel and distributed to the sand filters for additional suspended solids capture. The Plant 4 treatment train incorporates extended aeration activated sludge and is capable of complete nitrification. Plant 4 secondary effluent is directed through the RBCs but can also be directed to a separate pump well which discharges to the common sand filter influent channel. All effluent flows to the sand filters for additional suspended solids capture. The final treated effluent passes through a Parshall flume and is measured by an ultrasonic transmitter. The transmitter is calibrated yearly to ensure accuracy of total flows. A plant flow diagram is included as Appendix B.

Effluent quality requirements as specified in the ECA differ for summer and winter conditions. These limits and performance charts can be reviewed in Appendix C and the calibration records can be found in Appendix D.

An automatic sampling system collects a series of flow paced aliquots from the chlorine contact chamber and combines them in a container within a refrigerated compartment to produce a 24-hour flow proportional composite sample of the treated WWTP effluent. This composite sample is then analyzed by the Guelph Environmental Laboratory (GEL). The GEL received formal ISO/IEC 17025:2017 accreditation by the CALA in 2014 (Certificate #A3222, Appendix E) and has maintained this accreditation. The fulfillment of the requirements of ISO/IEC 17025:2017 means the laboratory meets both the technical competence requirements and management system requirements that are necessary for it to consistently deliver technically valid test results. A monthly summary of final effluent quality data provided by GEL is provided in Table 5. All ECA and GRCA limits and objectives were achieved for 2021.

Residual chlorine and sodium bisulphite are constantly monitored in the chlorine contact chamber in keeping with the year-round requirement for disinfection. Both sodium hypochlorite and sodium bisulphite application rates are determined by proportional flow control. The objective of 200 Escherichia coli (E. coli) CFU/100 mL of sample was met. This performance data is presented in Table 5.

As mandated by Environment Canada, the facility has optimized the chlorination/de-chlorination system to reduce the total residual chlorine to the speed river to 0.02 mg/L or less.

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**Table 5: Final Effluent Quality, 2021**

		Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Annual Avg.	Winter Avg.	Summer Avg.
<b>Min pH</b>		7.2	7.6	7.2	7.1	7.1	7.1	7.2	7.1	7.0	7.1	7.1	7.1	7.2	7.2	7.1
<b>Max pH</b>		7.4	7.8	7.3	7.3	7.3	7.3	7.3	7.4	7.2	7.3	7.3	7.3	7.4	7.4	7.3
<b>Average pH</b>		7.3	7.7	7.2	7.2	7.2	7.2	7.3	7.2	7.2	7.2	7.2	7.2	7.3	7.3	7.2
<b>Temp</b>	°C	13.7	12.5	13.2	14.4	16.0	18.8	20.2	21.3	20.9	19.5	17.2	15.0	16.9	14.3	18.7
<b>CBOD5</b>	Concentration (mg/L)	2.0	2.0	2.0	2.0	2.0	2.1	2.0	2.2	2.0	2.0	2.4	2.0	2.1	2.1	2.0
	Loading (kg/d)	98.2	93.1	103.4	108.7	99.2	105.3	103.3	112.7	116.3	123.7	130.4	117.2	109.3	108.5	109.9
<b>BOD5</b>	Concentration (mg/L)	2	2.0	2.0	2.0	2.0	2.3	2.0	2.6	2.1	2.0	2.0	2.0	2.1	2.0	2.1
	Loading (kg/d)	98.2	93.1	103.4	108.7	99.2	111.4	103.3	132.2	123.3	123.7	110.2	117.2	110.3	104.4	114.5
<b>TSS</b>	Concentration (mg/L)	2.0	2.0	2.0	2.0	2.0	3.0	3.0	4.0	3.0	2.0	2.0	4.0	2.6	2.4	2.7
	Loading (kg/d)	115	102	120	122	113	125	145	182	183	127	111	232	140	136	142
<b>TP</b>	Concentration (mg/L)	0.14	0.09	0.08	0.09	0.10	0.13	0.12	0.14	0.12	0.12	0.09	0.11	0.11	0.10	0.12
	Loading (kg/d)	6.6	4.2	4.0	5.0	5.2	6.6	6.4	6.9	6.7	6.8	4.8	6.5	5.8	5.2	6.2
<b>TKN</b>	Concentration (mg/L)	1.40	1.41	1.61	1.99	1.74	1.20	1.20	1.50	1.66	1.94	1.55	1.33	1.54	1.46	1.60
<b>TAN</b>	Concentration (mg/L)	0.35	0.29	0.57	0.70	0.27	0.11	0.08	0.34	0.53	0.52	0.15	0.50	0.37	0.37	0.36
	Loading (kg/d)	17.4	13.6	29.4	36.7	13.6	5.40	4.40	16.9	34.6	31.2	8.30	29.2	20.1	19.6	20.4
<b>NO3-N</b>	Concentration (mg/L)	29.2	32.3	27.9	24.8	28.8	27.6	28.7	25.3	26.8	25.8	29.7	29.6	28.0	29.7	26.8
<b>NO2-N</b>	Concentration (mg/L)	0.11	0.15	0.13	0.22	0.14	0.07	0.05	0.11	0.16	0.17	0.10	0.28	0.14	0.15	0.13
<b>E. Coli</b>	(CFU/100 mL)	11	10	10	10	10	13	11	12	10	11	1	2	9.3	6.8	11.0
<b>TCR</b>	(mg/L)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<b>SBR</b>	(mg/L)	2.56	1.28	1.28	1.92	1.07	1.28	0.96	1.54	1.28	2.24	1.71	1.07	1.52	1.58	1.47

**Notes:**

SBR: Sodium bisulphite residual.

TCR: Total chlorine residual.

All analyses based on 24-hr flow paced composite samples.

All CBOD5 and BOD5 analysis is conducted by an independent CALA accreditation laboratory only.

The summer period is April 1 to October 31. The winter period is November 1 to March 31.

Escherichia coli values are calculated geometric mean.

February pH values are from lab analysis instead of online probe.

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### Solids Handling and Disposal

The raw sludge produced at the WWTP is thickened in the primary clarifiers via gravity settling and pumped to the anaerobic digestion system which consists of four primary digesters and one secondary digester. The waste activated sludge from all plants are thickened in a rotary drum thickener and then transferred to one of the primary digesters.

Following stabilization by anaerobic digestion, biosolids are transferred from the secondary digester to the dewatering facility. The dewatering facility consists of four belt filter presses and associated auxiliary equipment. Dewatering filtrate is treated in the Anammox side stream process to reduce ammonia loading before being returned to headworks. Stabilized biosolids are dewatered and either transported from site as biosolids cake or further treated on site with both conditions utilizing the Lystek process. The resulting Lystek material is land applied as a Canadian Food Inspection Agency (CFIA) registered fertilizer. This results in a biosolids management program that is 100% landfill divergent and environmentally sustainable.

A simplified solids flow diagram of the WWTP is presented in Appendix B.

A summary of solids production, handling and disposal is presented Table 6 and a Lystek Fertilizer Management in Table 7.

The rotary drum thickener (to thicken waste activated sludge) is automated to run 24 hrs/day, provided sufficient waste activated sludge is available. The unit uses a combination of cationic and anionic polymers at a ratio of approximately 1.32:1 to assist in thickening the waste activated sludge to 3.9% solids. See Table 8 for details and monthly totals.

During this reporting period 3,522 dry tonnes of dewatered biosolids were generated, which is 4.4% less than in 2020. This reporting period resulted in 100% biosolids diversion from landfill. The dewatered biosolids were land applied during land application season or stored off site and processed for land application.

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**Table 6: Solid Handling and Disposal, 2021**

	<b>Avg. Digested Total Solids (%)</b>	<b>Digested Solids Pumped to Dewatering (m<sup>3</sup>/month)</b>	<b>Average Dewatered Cake Total Solids (%)</b>	<b>Cake Production (wet tonnes)</b>	<b>Cake Production (dry tonnes)</b>
<b>January</b>	1.70	24,195	24.45	1136.34	277.84
<b>February</b>	2.07	24,019	21.90	1241.35	271.86
<b>March</b>	1.61	24,702	24.04	1291.97	310.59
<b>April</b>	1.80	22,584	22.55	1308.58	295.08
<b>May</b>	1.77	24,444	22.20	1286.35	285.57
<b>June</b>	1.85	22,421	23.00	1272.80	292.74
<b>July</b>	1.98	23,471	22.13	1310.07	289.92
<b>August</b>	1.88	20,719	23.98	1210.05	290.17
<b>September</b>	2.14	20,102	23.94	1286.10	307.89
<b>October</b>	2.08	20,191	21.75	1276.37	277.61
<b>November</b>	1.70	21,845	24.83	1300.57	322.93
<b>December</b>	1.72	24,555	22.78	1315.16	299.59
<b>Average</b>	1.86	22,771	23.13	1269.64	293.48
<b>Total</b>	-	273,248	-	15,235.71	3521.80

Notes:

Total Volume for Land Application = 15,235.71 Wet Tonnes

Dundalk - Lystek International, 191 Eco Park Way, Dundalk, ON N0C 1B0



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**Table 7: Guelph Biosolid Volumes, 2021**

	<b>Unit of Measure</b>	<b>Estimated Quantity</b>	<b>Actual Quantity</b>	<b>Difference Between Estimated and Actual</b>
<b>Lystek (Non-Freezing)</b>	m <sup>3</sup>	8,000	-	-
<b>Cake (Non-Freezing)</b>	wet tonnes	8,000	10,251	28.14%
<b>Cake (Freezing)</b>	wet tonnes	6,000	4,970	-17.17%
<b>Lystek (Freezing)</b>	m <sup>3</sup>	1,000	-	-

On site Lystek was not operational in 2021.

Freezing: December to March.

Non-freezing: April to November.

# Wastewater Services

## 2021 Annual Performance Report

**Table 8: Thickened Waste Activated Sludge (TWAS), 2021**

	<b>Volume to Rotating Drum Thickener (m<sup>3</sup>)</b>	<b>Volume from Rotating Drum Thickener (m<sup>3</sup>)</b>	<b>% Reduction</b>	<b>% Dry Solids</b>	<b>Cationic Polymer Consumption (m<sup>3</sup>)</b>	<b>Anionic Polymer Consumption (m<sup>3</sup>)</b>
<b>January</b>	11,924	3,645	69	3.04	101	66
<b>February</b>	7,387	2,275	69	3.50	61	43
<b>March</b>	2,000	61	97	4.71	12	11
<b>April</b>	5,245	1,069	80	-	29	30
<b>May</b>	12,580	2,056	84	3.07	82	60
<b>June</b>	8,734	1,230	86	4.24	45	40
<b>July</b>	8	0	-	-	0	0
<b>August</b>	2,586	262	90	-	16	14
<b>September</b>	11,898	1,446	88	4.39	67	59
<b>October</b>	14,138	1,489	89	4.95	78	66
<b>November</b>	6,771	861	87	4.16	38	46
<b>December</b>	14,243	2,465	83	3.00	79	97
<b>Average</b>	8,126	1,405	84	3.90	51	44
<b>Totals</b>	97,514	16,859	-	-	608	532

Note:

In 2021 the waste activated sludge process experienced intermittent out of service challenges that were magnified by global supply chain issues affecting parts acquisition. This resulted in fluctuating monthly processing volumes.

# Wastewater Services

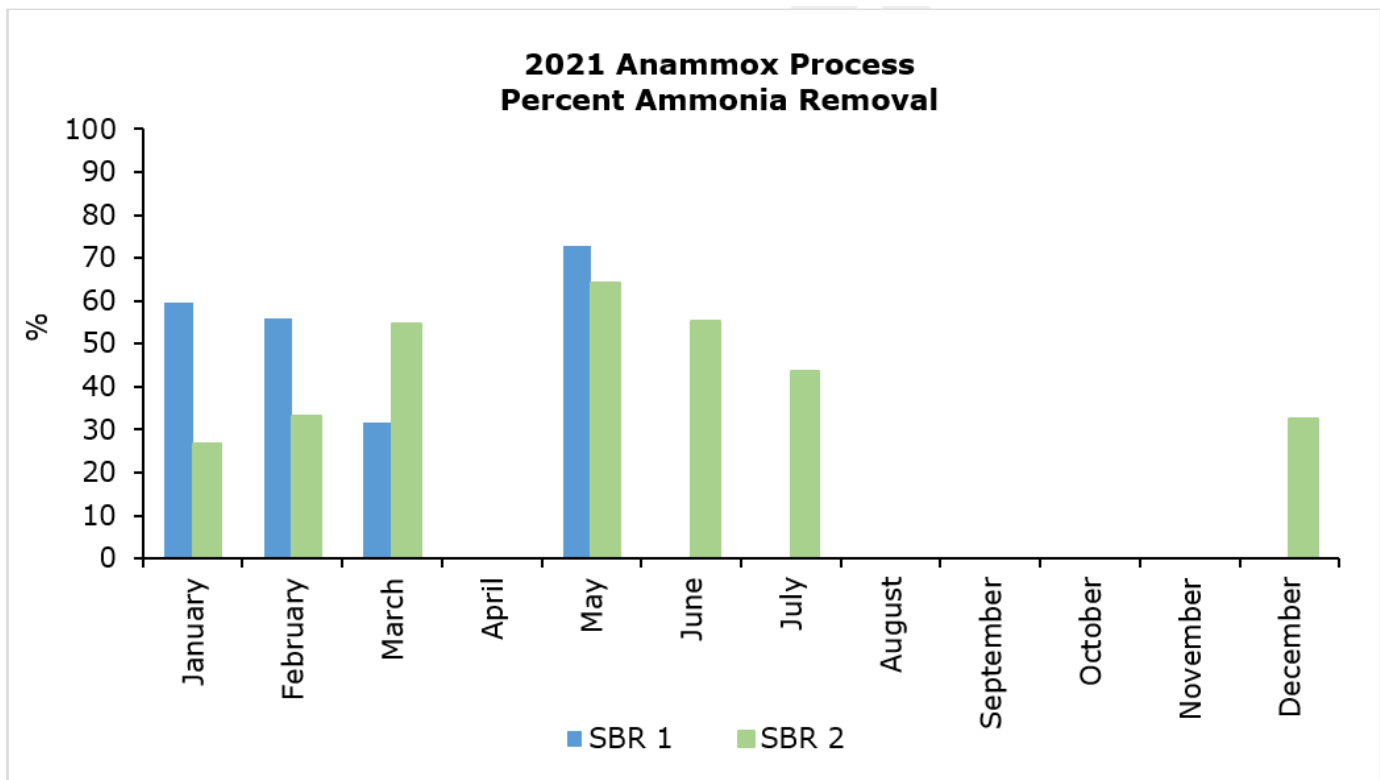
## 2021 Annual Performance Report

### Side Stream Process

#### Anammox

The Anammox process is a side stream treatment of filtrate from solids dewatering consisting of two sequencing batch reactors (SBR). Each SBR is designed to remove 173 kg/day of ammonia from the side stream filtrate. The annual average percent removal by SBR 1 is 55% and SBR 2 is 44%. Figure 3 represents the percent removed per month in each SBR. Both SBRs were out of service periodically throughout the year to address an aeration panel malfunction which was affecting percent ammonia removal efficiency and dewatering production rates.

**Figure 3: Percent Ammonia Removal via Anammox, 2021**



# Wastewater Services

## 2021 Annual Performance Report

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### Unusual Events/Process Upsets

#### Overflow

An overflow is a controlled discharge of wastewater to the environment from a designed location at the plant other than the approved final effluent outfall. There were no overflow events during the reporting period.

#### Spills

A spill is an unplanned discharge of wastewater to the environment from any location that is not specifically designed for this purpose. There were two spill events during the reporting period. These events were reported to the MECP Spills Action Centre (SAC) as per standard operating protocol.

#### Event 1

Date: April 28, 2021  
Occurrence: 1-E101W  
Event Description: Chlorine residual discharged to receiving water due to power outage.

#### Event 2:

Date: November 7, 2021  
Occurrence: 1-1DP3C6  
Event Description: Spill from Digester 2.

#### Bypasses

A bypass is an intentional diversion of excess wastewater around one or more wastewater treatment process(es). The bypassed portion of wastewater undergoes part of the treatment process followed by disinfection and gets re-combined with fully treated flow prior to release into the Speed River at the approved discharge location and sampling point. Final effluent is sampled and tested during bypass events to assess its quality.

Occasionally, a planned bypass is necessary in order to repair an essential part of the treatment process or during construction. In those cases, the City submits a request to the provincial governments to perform the bypass, including a plan to minimize its impact.

The Guelph WWTP has no provision for primary treatment or raw sewage bypass directly to the Speed River. The facility does have provision for secondary treatment bypass, complete tertiary bypass or partial sand filter bypass. During this reporting period there were five partial sand filter bypass events as reported below in Table 9. These events were reported to SAC as per standard operating protocol.

# Wastewater Services

## 2021 Annual Performance Report

### Significant Events

Table 9 summarizes the 2021 bypass events. Unusual industrial BOD loading resulted in process challenges beginning August 25<sup>th</sup>. Bulking in the secondary clarifiers led to a partial sand filter bypass at 23:10. As the process began to recover, the bypass continued intermittently over August 26<sup>th</sup> and 27<sup>th</sup>. On August 29<sup>th</sup> the WWTP was experiencing a rapid increase to plant flow due to heavy rain, resulting in a partial sand filter bypass beginning at 22:00.

On September 22 at 20:53 the WWTP began experiencing a partial sand filter bypass due to a wet weather event.

**Table 9: Bypass Summary, 2021**

SAC #	Start Date	Duration	Bypass Type	Reason	Volume (m <sup>3</sup> )	CBOD5 (mg/L)	TSS (mg/L)	TP (mg/L)	TAN (mg/L)
1-14AUBP	25-Aug	1 hr 8 min	Partial Tertiary	Process Upset	35	<2	3	0.18	1
1-14DF9X	26-Aug	8 hr 15 min	Partial Tertiary	Process Upset	8078	4	12	0.35	0.38
1-14DF9X con't	27-Aug	6 hr 15 min	Partial Tertiary	Process Upset	2036	3	9	0.27	0.23
1-14JZLX	29-Aug	2 hrs 0 min	Partial Tertiary	Weather Related	2414.7	<2	4	0.18	0.17
1-19VMAV	22-Sep	1 hr 30 min	Partial Tertiary	Weather Related	1306.9	<2	<2	0.13	1.3

# Wastewater Services

## 2021 Annual Performance Report

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### WWTP Projects and Upgrades

The following tables list the capital projects (including those falling under the ECA Limited Operational Flexibility (LOF) criteria), upgrades and major maintenance conducted or completed during the reporting period.

**Table 10: Capital Project Summary, 2021**

Project	Status
Digester 3 Refurbishment (Notice of Modification submitted May 1, 2019)	Completed
Lystek HVAC Odour Control	Completed
Standby Generators Installation	Completed
Digester 4 Condition Assessment & Feasibility Study	Completed
Facility Wide Aeration Equipment and Controls Upgrades (Notice of Modification submitted Aug 23, 2021, Appendix I)	Ongoing
Plant 2 Electrical Upgrades	Ongoing
Chain & Flight Plant 2 Primary & Secondary	Ongoing
Ferric Chloride & Sodium Bisulphite Project	Ongoing
Wastewater Services Generators Compliance Project	Ongoing

# Wastewater Services

## 2021 Annual Performance Report

**Table 11: Maintenance Project Summary, 2021**

<b>Project</b>	<b>Status</b>
Installed A/C unit in Plant 4 final MCC. No A/C was causing UPS to overheat.	Completed
Addressed guarding issues throughout RBC units.	Completed
Addressed and repaired CO issues in Cogen.	Completed
Added flame-retardant cabinets around the site as per health and safety requirements.	Completed
Installed a new engineered platform to allow access to the siloxane tanks to avoid injury to staff and comply with the MOL regulations.	Completed
Siloxane media replacement for Cogen gas system.	Completed
Installed coolant bypass in Cogen to allow for better temperature control of heating system.	Completed
Replaced the incoming water service main valve that supplies the 530-wellington site and repaired the waterline.	Completed
Painted all bollards and barriers around the site.	Completed
Plant 1 effluent flow meter replacement/calibration.	Completed
Final effluent flow meter replacement/calibration.	Completed
Replaced three of the four belt press belts.	Completed
Replaced draft tube mixer on Digester 4.	Completed
Approx. 50% lights replaced with new LED units on site.	Ongoing
New GFCI receptacles installed around the outdoor portions of the plant. Gives safe access to electricity for staff around the plant.	Completed
Extended the parking lot to the south of admin and added rubber curbs and markers.	Completed
Anammox Messner panel replacement on the south SBR.	Completed

# Wastewater Services

## 2021 Annual Performance Report

Project	Status
Installed a GPS time clock control to control site lighting rather than an adjustable manual timer.	Completed
Rewired TWAS control panel and replaced drives.	Completed
Annual substation maintenance on site.	Completed
Annual IR scanning done on site electrical and lift station electrical panels and feeders.	Completed
Plant collector/aeration maintenance: <ul style="list-style-type: none"> <li>• Plant 1 Final all shoes and wear strips replaced.</li> <li>• Plant 3 West primary rail repaired.</li> <li>• Plant 4 East primary all collectors scum trough replacement and scale removed.</li> <li>• Plant 4 East aeration stones were tested, and clogged stones replaced.</li> </ul>	Completed
Plant 4 Lowlift pump replaced and old pump rebuilt for spare.	Completed
Replacement of Dewatering Press #1 sludge feed pump VFD.	Completed
Replacement of Lowlift VFD #4.	Completed
Replacement of Dewatering Press #2 sludge feed pump VFD.	Completed
Replacement of the two VFD's on sludge bin augers.	Completed
Repurposed Benshaw soft start and installed on Plant 3 blower.	Completed
Replaced two soft starts, one main breaker and one blower motor in Plant 3 after power surge.	Completed
Installed laundry facility in admin for staff (Project Clean).	Completed
UPS battery change out on most of the site UPS units.	Ongoing
Repaired drainage around the compost building and applied new gravel to control water pooling on road.	Ongoing
Muffin monster replaced.	Complete
Replaced Instrumentation Building area UPS.	Complete



# Wastewater Services

## 2021 Annual Performance Report

**Table 12: SCADA and Security (Maintenance) Program (Activities) Summary**

Description	Status
Upgraded Plant 4 control panel network gear.	Completed
Added SCADA monitoring of UPS to CP-COMPOST1 (Compost #1 control panel).	Completed
Upgraded PLC firmware on Dewatering Compactlogix.	Completed
Upgrade PLC firmware on Plant 3 Controllogix.	Completed
Upgraded firmware on North Heights Quickpanel.	Completed
Upgrades to treatment staff main SCADA work area and SCADA workstations (Treatment Control Room).	Completed
Added SCADA Monitoring & Alarming of Old Admin Building area UPS.	Completed
Added SCADA alarming for Lystek and Sludge Bin area gas monitors (AIT201 & AIT202).	Completed
Major version upgrade for e.RIS v2.1 to v3.0.	Completed
Creation of electronic report export for MUMPS within e.RIS system (XML Export).	Ongoing
Creation and operator training of sampling schedule data entry program within e.RIS.	Completed
Replacement of both Plant 4 ferric pumps including re-programming for new ethernet based controls & alarms.	Completed
Addition of SCADA Ethernet Network into Ferric control panel.	Completed
Plant 1 effluent flow meter replacement/calibration.	Completed
Integration of Plant 1 effluent flow meter via Ethernet into SCADA Network.	Completed
Final effluent flow meter replacement/calibration.	Completed
Addition of SCADA Ethernet network into Bisulphite control panel (CP-04).	Completed
Integration of final effluent flow meter via Ethernet into SCADA Network.	Completed
Upgrade/replacement of all Win7 SCADA viewnodes to Win10.	Completed
Replacement/upgrade of SCADA servers from v4.0 to v5.9.	Completed
Addition of all SCADA viewnodes to SCADA domain controller.	Completed
Upgrade of Win911 Remote Alarm Monitoring Software from v7.3 to v2021.	Ongoing

# Wastewater Services

## 2021 Annual Performance Report

Description	Status
Replacement and integration of Sludge Bin Conveyor VFD 414.	Completed
Replacement of EOL network switch in Press #1 RIO Control Panel.	Completed
Replacement and integration of Dewatering Press #1 sludge feed pump VFD.	Completed
Replacement and integration of Dewatering Press #2 sludge feed pump VFD.	Completed
Clean-up/removal of obsolete network equipment in Lowlift control panel.	Completed
Replacement and integration of Lowlift VFD #4.	Ongoing
Replacement of Instrumentation Building area UPS with 2x Rackmount UPS.	Completed
Addition of SCADA monitoring/alarming of Annamox control panel UPS.	Completed
Addition of SCADA monitoring/alarming of Septage Receiving control panel UPS.	Completed
Installation of new UPS in Plant 3 Basement control panel (CP-PL3PRIPLC).	Completed
Addition of SCADA monitoring/alarming of Plant 3 Basement control panel (CP-PL3PRIPLC) UPS.	Completed
Addition of SCADA monitoring/alarming of Plant 3 control panel (CP-PL3SECCLX) UPS.	Completed
Installation/integration of new ethernet enabled YSI DO probe system in Plant 3 aeration basins.	Completed
Replacement of network switch in Plant 3 Control Panel (CP-PL3SECCLX).	Completed

# Wastewater Services

## 2021 Annual Performance Report

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### Performance Management Programs

#### Ministry Inspections

Wastewater treatment ECA's set effluent quality compliance limits (requirements) and objectives (targets). Compliance limits are mandatory and WWTP owners/operators must report when any limit is not met. WWTP's must also strive to achieve the plant design objectives.

Wastewater System inspections are performed by the MECP to ensure systems are operating as required and comply with the terms and conditions of their ECA. Performance data is reviewed against the compliance objectives and limits. The inspections also verify that the City meets sampling, testing and treatment standards, as well as staff competency requirements. This includes Ministry-approved Class 1-3 licences to operate the Class III wastewater collections system, and Class 1-4 licences to operate the Class IV wastewater treatment system. Additional inspections can be triggered through a variety of factors such as frequency of events or inconsistent system performance (e.g. increased number of overflow events or incidents reported), in response to a complaint or concern, or as part of a follow-up from prior violations.

In 2021, the MECP did not complete an inspection of the Guelph WWTP.

# Wastewater Services

## 2021 Annual Performance Report

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### Wastewater Collection System

The City of Guelph operates six sewage pumping stations (SPS), described below. This report summarizes the monitoring and maintenance results for the Northern Heights SPS and the Kortright East SPS, as required by their respective ECAs, and describes the wastewater collection systems' overall operational performance.

In 2021, the City met all regulatory requirements prescribed in the Approval's. In addition to assessing Approval compliance, an effort was made to identify indicators of performance such as flow monitoring, public complaints and inflow and infiltration. The City relies on flow monitoring at the SPS's to provide early warning before overflow conditions and system upsets occur.

#### Sewage Pumping Stations (SPS)

The following is a summary of monitoring data for Northern Heights SPS and Kortright East SPS, including an overview of the adequacy of the works.

All sewage pumping stations performed adequately and as designed throughout the reporting period. Figures 4 and 5 illustrate the monthly flow monitoring as per ECA requirements of these two sewage pumping stations.

Figure 4 shows that the monthly flow for Northern Heights SPS was higher in 2021 than in 2020 for 10 out of 12 months. In general, the average monthly flows were comparable between 2020 and 2021. Flows were generally stable from month to month, with February having the lowest flows.

# Wastewater Services

## 2021 Annual Performance Report

**Figure 4: 2020 vs. 2021 Monthly Flow for Northern Heights SPS**

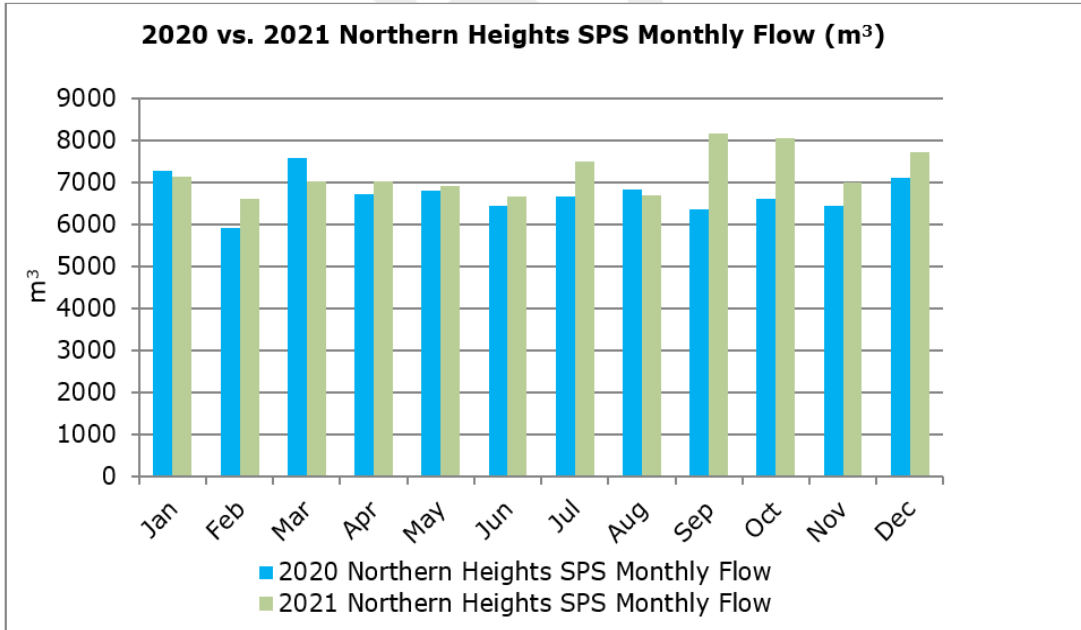
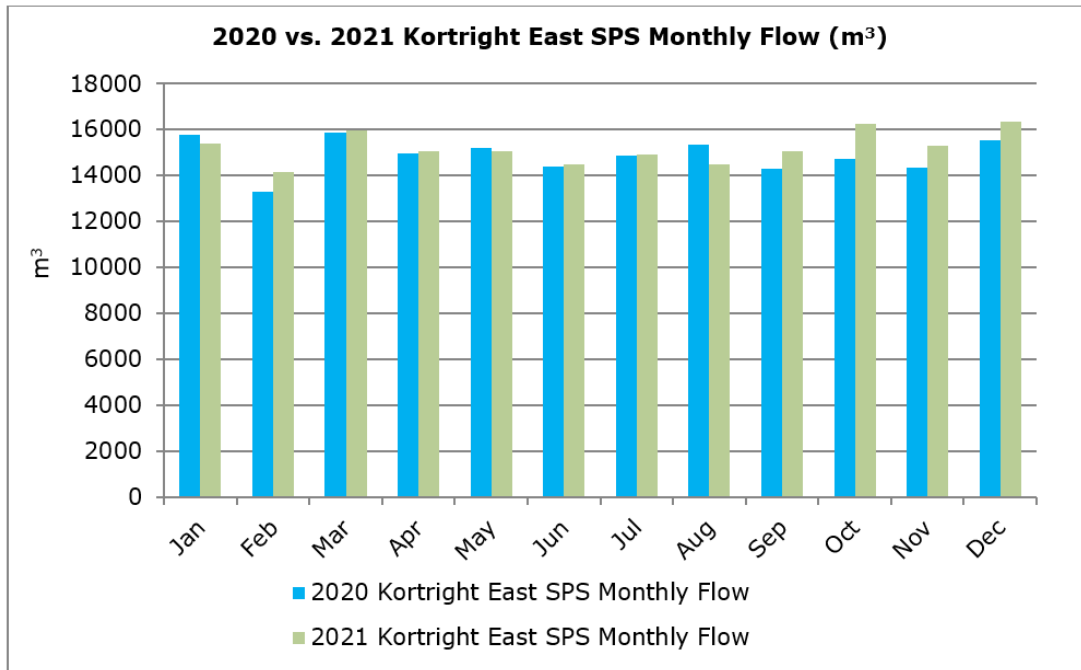


Figure 5 shows that the monthly flow for Kortright East SPS was higher in 2021 than in 2020 for 9 out of 12 months. In general, the average monthly flows were comparable between 2020 and 2021. Flows were generally stable from month to month, with February having the lowest flows.

**Figure 5: 2020 vs. 2021 Monthly Flow Kortright East SPS**



# Wastewater Services

## 2021 Annual Performance Report

### Sewage Pumping Station Operating Issues

Below is a description of operating problems encountered and the associated corrective actions taken.

**Table 13: Sewage Pumping Station Operating Issues**

Location	Operating Problems	Resolution
Kortright SPS	Fan 4 air makeup unit not working.	Repaired air makeup unit.
Kortright SPS	Yard hydrant leaking.	Isolated hydrant with ball valve inside building.
Kortright SPS	Pump #1 low level float not working.	Replaced float.
Kortright SPS	Odour control unit tripped during power failure.	Reset and restarted odour control unit.
Kortright SPS	Erroneous readings from level sensor.	Remove grease buildup on wall below sensor.
Kortright SPS	Pump #1 fail to operate alarm.	Alarms reset, remove grease buildup on wall.
Kortright SPS	Grinder in alarm.	Reset and verified there were no abnormal conditions.
Kortright SPS	Water heater failed.	Replaced water heater.
Kortright SPS	Minor water leak-interior piping.	Replaced ball valve.
Northern Heights SPS	Erroneous readings on level sensor.	Removed grease buildup from wall.
Northern Heights SPS	Difficulty starting generator.	Manually primed, fuel tank vent adjusted, hose connection replaced, injector pump rebuilt, started more frequently, temporary generator installed during investigation and repair.
Northern Heights SPS	Transfer Switch alarm.	Reset alarm.

# Wastewater Services

## 2021 Annual Performance Report

### Sewage Pumping Station Maintenance

Below is a summary of all maintenance carried out on any major structure, equipment, apparatus, mechanism or thing forming part of the Works.

**Table 14: Sewage Pumping Station Maintenance**

Location	Maintenance Performed
Kortright SPS	Annual generator inspection and load bank test.
Kortright SPS	Annual flow meter and overflow meter verifications.
Kortright SPS	Thermal imaging of electrical components.
Northern Heights SPS	Annual generator inspection and load bank test.
Northern Heights SPS	Annual flow meter and overflow meter verifications.
Northern Heights SPS	Thermal imaging of electrical components.

### Collection System Unusual Events

There was one complaint received during the reporting period.

**Location:** Northern Heights SPS.

**Complaint Received:** Nearby resident noticed a loud noise and vibration coming from station in the evening.

**Action Taken:** Investigated and unable to find noise or vibration. Resident advised to call back if heard again.

There were 3 spill and overflow events within the Collection System during the reporting period. Presented here is a summary of the spill or abnormal discharge events.

**Table 15: Collection System Unusual Events**

Date	Event Description	SAC #
4/2/2021	Spill to underground due to sanitary lateral missing 0.3 m section of pipe.	6583-BXWQXK
14/4/2021	Spill to trench during sanitary repair.	1-CD1BG
16/7/2021	Spill to Speed River, caused by sanitary infrastructure failure leaking into storm water system.	1-Y21T4

# Wastewater Services

## 2021 Annual Performance Report

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### Sewage Pumping Station Description of Works

#### Kortright Sewage Pumping Station

- 4.2 m X 3.6 m wet well
- 450 mm inlet sewer
- 450 mm emergency overflow
- Three (3) 46 hp non-clog submersible sewage pumps rated at 65.3 L/s
- Design capacity of 11,284 m<sup>3</sup>/d
- Inlet channel grinder
- Odour control system rated at 600 cfm
- 200 kW diesel generator
- One (1) 1,100 L fuel storage
- One (1) 400 m long 350 mm diameter PVC forcemain-peak flow of 130.6 L/s
- 350 mm forcemain bypass
- Two (2) automatic air and vacuum release valves

#### Northern Heights Sewage Pumping Station

- 3.8 m X 3.0 m wet well
- 250 mm inlet sewer
- 300 mm emergency overflow
- Two (2) 34 hp non-clog submersible sewage pumps rated at 33.0 L/s
- Design capacity of 2,851 m<sup>3</sup>/d
- Manually operated screen basket
- Odour control system rated at 400 cfm
- 125 kW diesel generator
- One (1) 1,100 L fuel storage
- 1,008 m long 150 mm diameter PVC forcemain-peak flow of 33 L/s
- 200 mm forcemain bypass
- One (1) automatic air and vacuum release valve

#### Terraview Sewage Pumping Station

- 3.0 m diameter wet well
- Two (2) submersible pumps rated at 13.0 L/s



# Wastewater Services

## 2021 Annual Performance Report

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- 30 kW diesel generator
- 680 L fuel storage
- 45 m<sup>3</sup> emergency storage in oversized upstream sanitary sewers

### **Barton Estates Sewage Pumping Station**

- 3.0 m diameter wet well
- Two (2) submersible pumps rated at 6.3 L/s
- 25 kW diesel generator
- 225 L fuel storage
- Emergency bypass connection

### **NiMa Trails Pumping Station (to be commissioned in 2022)**

- 3.6 m diameter precast concrete inlet chamber with:
  - 2.2 kW inlet sewage grinder
  - 3.6 m diameter reinforced concrete wet well
- Three (3) 6.5 hp (4.8 kW) pumps each rated at 13 L/s at 19.5 m TDH
- A standby 60 kW natural gas generator
- 250 mm emergency overflow
- Odour control system
- 242 m long, 150 mm diameter forcemain

### **Gazer Mooney Sewage Pumping Station**

- Owned by Guelph Eramosa Township, operated by the City
- Wet well capacity of 53,000 I.G.
- 1,400 feet long 4-inch forcemain
- Two (2) submersible sewage pumps rated at 30 IGPM
- One (1) peak flow pump rated at 156 IGPM
- Emergency forcemain bypass

# Wastewater Services

## 2021 Annual Performance Report

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### Appendix

Appendix A – GRCA Recognition Letter

Appendix B – Plant Flow Diagram

Appendix C – Facility Performance Charts

Appendix D – Calibration Records

Appendix E – GEL Accreditation Certificate

Appendix F – Summary of Existing Works

Appendix G – ECA and C of A's

Appendix H – Sludge Accountability Calculations

Appendix I – Notice of Modification to Sewage Works



# **Appendix A**

## **GRCA Recognition Letter**



November 25<sup>th</sup>, 2021

The City of Guelph  
1 Garden Street,  
Guelph, Ontario N1H 3A1

**Attention:** Tim Robertson, Division Manager, Wastewater Services

**Subject:** Thank you for participating in the GRWWOP (Guelph WWTP)

On behalf of the Grand River Watershed-Wide Wastewater Optimization Program (GRWWOP), we would like to thank you for your participation in the Program. The GRWWOP aims to improve the water quality of the Grand River and has developed a recognition program for wastewater treatment facilities in the watershed that meet the criteria outlined in the following table:

Table 1 – 2020 Summary of Recognition Program Criteria and Points Earned for Mechanical Plants

Earned/Available Points	Criteria
No	Was the plant in compliance with ECA effluent limits for all parameters in 2020?
0/25	Monthly average final effluent quality meets voluntary final targets for TP
5/25	Monthly average final effluent quality meets voluntary final targets for TAN
10/10	Include enhanced reporting in annual performance report (e.g. per capita flows and loads, sludge accountability, etc.)
20/20	Conduct sludge accountability
20/20	Sludge accountability closes within ±15%
55/100	Total points

\*Note: If compliance is not achieved in all months, the plant is not eligible for recognition.

A score of 70% to <80% will receive a Bronze level recognition, from 80% to <100% will receive Silver and 100% will receive Gold. Based on the 2020 data submitted to us, the Guelph plant has not achieved one of the program's recognition levels. We encourage you to review the attached recognition program criteria to help you in your efforts to achieve a level of recognition next year.

We thank you for your involvement in the GRWWOP and encourage you to continue your efforts to reduce pollutant discharges to the Speed River. A spreadsheet template will be sent to you from the GRCA at the beginning of 2022 to gather required data for the 2021 watershed annual report on wastewater treatment performance and support the GRWWOP recognition program.

Yours truly,

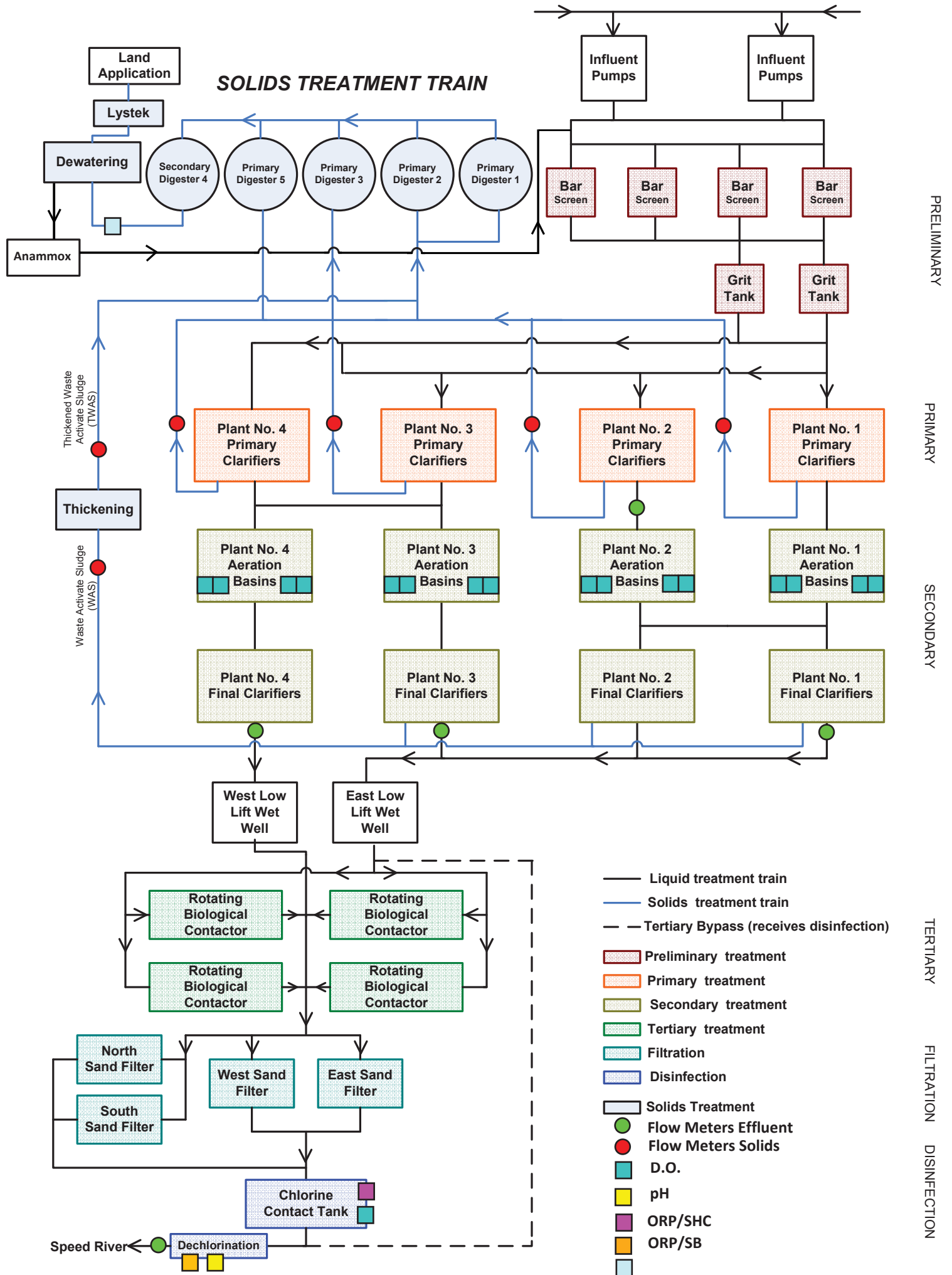
Mark Anderson  
Water Quality Engineer/GRWWOP Program Manager  
Grand River Conservation Authority

Kelly Hagan  
Optimization Extension Specialist  
Grand River Conservation Authority



# **Appendix B**

## **Plant Flow Diagram**



- Liquid treatment train
- Solids treatment train
- - Tertiary Bypass (receives disinfection)
- Preliminary treatment
- Primary treatment
- Secondary treatment
- Tertiary treatment
- Filtration
- Disinfection
- Solids Treatment
- Flow Meters Effluent
- Flow Meters Solids
- D.O.
- pH
- ORP/SHC
- ORP/SB

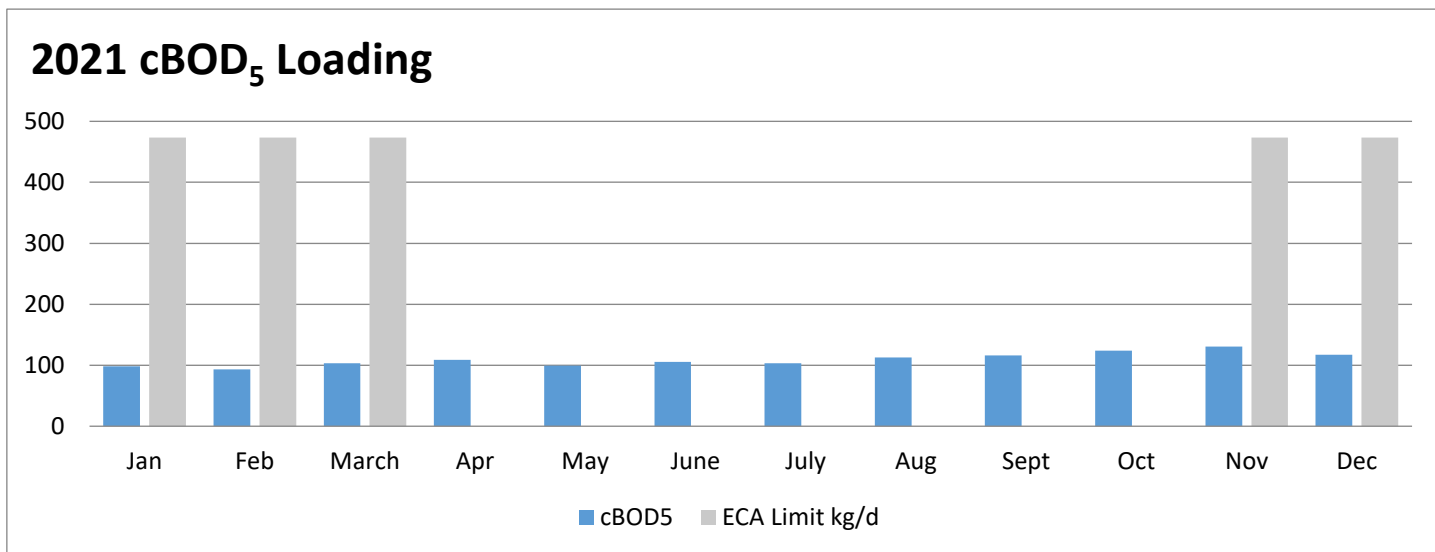
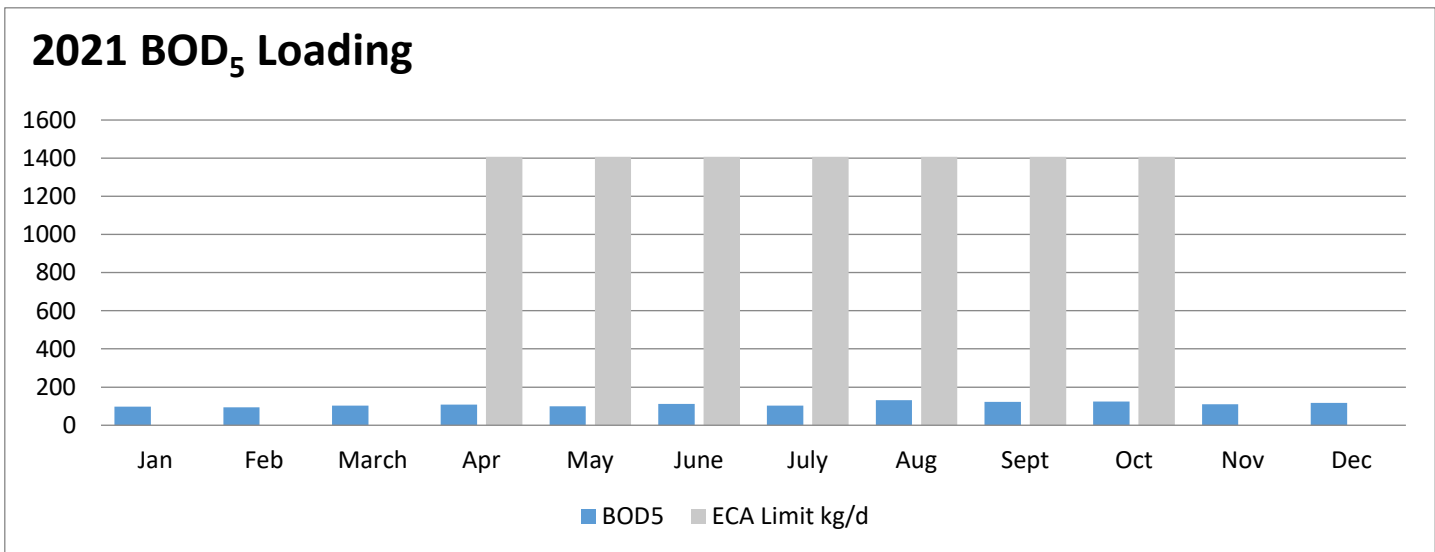


# **Appendix C**

## **Facility Performance Charts**

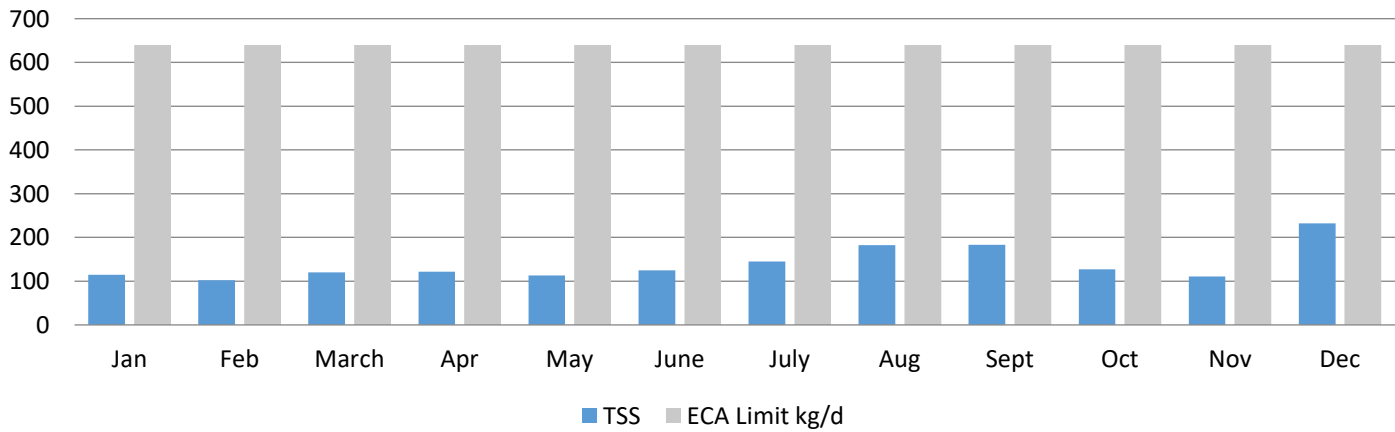
**City of Guelph Wastewater Treatment Plant  
Facility Performance Charts 2021**

<b>Table 2 - Effluent Limits</b>		
<b>Effluent Parameter</b>	<b>Average Concentration (milligrams per litre unless otherwise indicated)</b>	<b>Average Waste Loading (kilograms per day unless otherwise indicated)</b>
Column 1	Column 2	Column 3
BOD5	22 (Apr 1 to Oct 31)	1,408 (Apr 1 to Oct 31)0
CBOD5	7.4 (Nov 1 to Mar 31)	473.6 (Nov 1 to Mar 31)
Total Suspended Solids	10	640
Total Phosphorus	0.38 (Apr 1 to Oct 31) 0.7 (Nov 1 to Mar 31)	24.5 (Apr 1 to Oct 31) 44.8 (Nov 1 to Mar 31)
Total Ammonia Nitrogen	3.4 (Nov 1 to Mar 31)	217.6 (Nov 1 to Mar 31)
Total Residual Chlorine	0.02	-
pH of the effluent maintained between 6.0 to 9.5, inclusive, at all times		

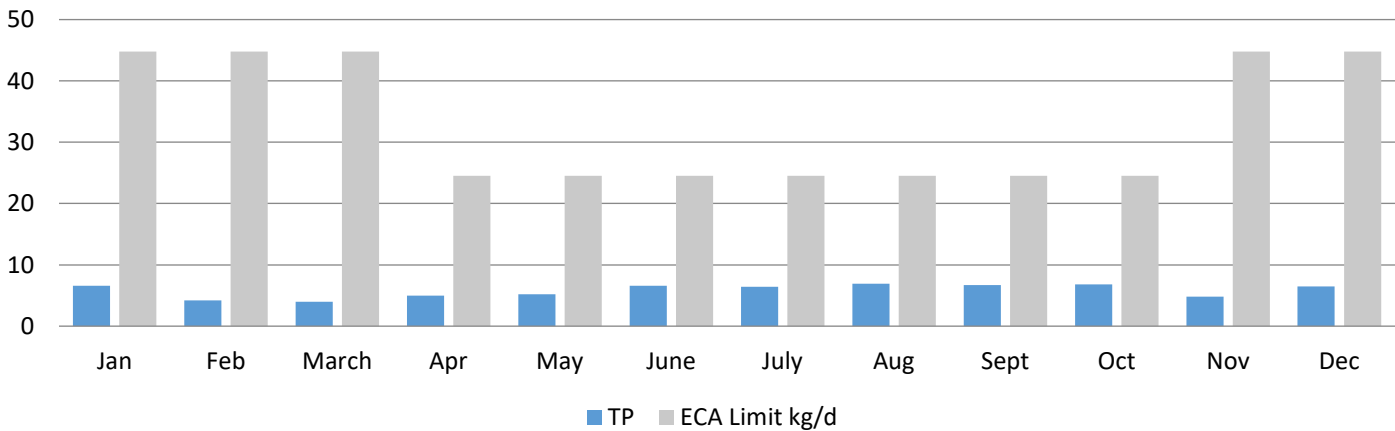




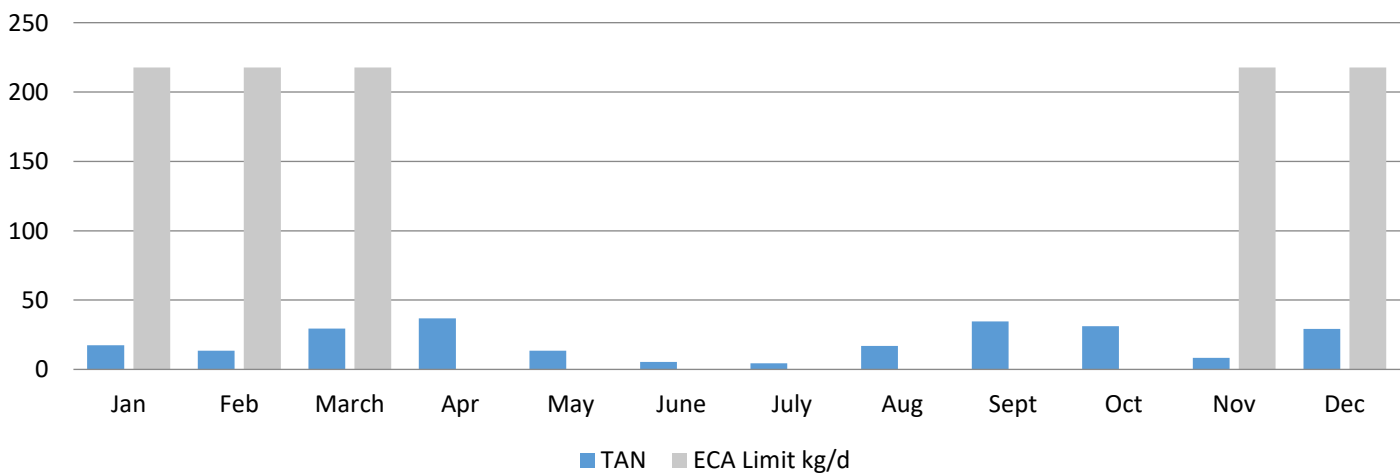
## 2021 Total Suspended Solids Loading



## 2021 Total Phosphorus Loading



## 2021 Total Ammonia Nitrogen Loading





# **Appendix D**

## **Calibration Records**



FLOWMETRIX | METCON | PROCESS

# FLOW, PRESSURE and LEVEL INSTRUMENTATION

## Verification/Calibration REPORT



JANUARY 2021



January 14, 2021

City of Guelph  
Travis Murray  
SCADA & Security Specialist  
530 Wellington Street  
Guelph, Ontario  
P: 226-332-3271  
E: [travis.murray@guelph.ca](mailto:travis.murray@guelph.ca)

---

**RE: VERIFICATION ON SIEMENS OCM III FINAL EFFLUENT FLUME FLOW METER**  
**January 7, 2021**

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Dear Travis,

SCG Flowmetrix appreciates the opportunity to complete your instrument verification/calibration services. This letter of transmittal confirms completion of this service project.

The following service report contains the individual instrument reports for all verification/calibrations as well as an Equipment List Summary.

Note: Equipment List Summary is only included where 5 or more instruments are verified/calibrated for the same client/area. Otherwise, only individual reports are provided.

In addition to the base report, relevant information related to standard approach and methodologies for various instruments verified and/or calibrated, and a statement of qualifications for all verification/calibrations completed by trained, knowledgeable and experienced personnel is found in the section Quality Assurance and Quality Control.

If you have any additional questions or concerns with regards to this report, please do not hesitate to contact me directly.

Kind Regards,

*Sheena Cooper*

Sheena Cooper  
Sales & Service Coordinator  
#3, 15 Connie Crescent  
Concord, ON L4K 1L3  
c. 519-281-9660  
[scooper@flowmetrix.ca](mailto:scooper@flowmetrix.ca)

## Quality Assurance/Quality Control

Flowmetrix adheres to a rigid scope of service and deliverables for each client and instrument verified, calibrated, and reported. We follow a standard guideline while performing verification and calibration procedures for each instrument, using original equipment manufacturer (OEM) tools, where possible. The values are field reported and entered in a standard report format for client review. A digital report is completed for each instrument and collated into a single document for client record.

### Approach & Methodology

Flowmetrix conducts verification of each instrument and subsequent calibrations on instruments that are outside the expected tolerance of the instrument response, where possible. Manufacturers OEM suggested testing guidelines are used to verify and/or calibrate each instrument. Where, unable to perform the verification or calibration as suggested by the manufacturer, a best management practice is performed to validate the performance of such instruments.

### **REPORTING**

Flowmetrix report is divided into (2) sections. Section (i) identifies an equipment summary of all instruments verified during this service project including instruments that PASS or FAIL; section (ii) identifies individual equipment reports for client review and record and identifies any comments and deficiencies that should be noted for client review and possible response.

#### Section (i) - Equipment Summary

An equipment summary sheet identifying all instruments; both PASSING and FAILING verification and/or calibration while completed during this service project.

The Summary Equipment List is only included where 5 or more instruments are verified/calibrated for the same client/area. Otherwise, only individual reports are provided.

#### Section (ii) - Individual Equipment Reports

Individual equipment reports are completed for easy review and are found in Appendix B. These reports outline all specific information pertaining to the equipment be tested; noted as meter under test (MUT). Date, time, location, meter make, model and serial number accompany this report for tracking and identification. Each report identifies a PASS or FAIL comment 'as found' and 'as left' upon completion of the verification and/or calibration.

Where possible, a verification is performed prior to calibration, if the OEM testing procedures allow, otherwise an 'as left' report is provided for such equipment.

**Note: If a meter under test (MUT) is (AS FOUND) to be operating outside of the allowable tolerance, the report will indicate "NA". The "NA" statement is NOT suggesting the MUT, or a component of the MUT is not functional or has failed; but simply indicates at the time the test was conducted the verification reported values are found outside the allowable tolerance.**

**Only if the MUT is failed due to equipment failure and not verification/calibration tolerances, the report will indicate "FAIL" (AS FOUND) and will be commented on in the individual equipment report.**

### **STATEMENT OF QUALIFICATIONS**

To comply with our clients DWQMS standards, Flowmetrix adheres to a rigid approach to conducting our equipment verification/calibration services including the training received by our company and our personnel conducting service. A Statement of Qualifications outlining Flowmetrix qualifications to conduct this level of service is available in a separate document upon request.



**APPENDIX B**  
INDIVIDUAL  
INSTRUMENT REPORTS



## AS FOUND CERTIFICATION

**PASS**

CLIENT DETAIL		EQUIPMENT DETAIL	
CUSTOMER	City of Guelph	[MUT] MANUFACTURER	Milltronics
CONTACT	Travis Murray	MODEL	OCM-III
	SCADA & Security Specialist	CONVERTER SERIAL NUMBER	NA
	Wastewater Services		
	P: 519-822-1260 Ext 3609		
	C: 226-332-3271	PLANT ID	Guelph WWTP
	E: travis.murray@guelph.ca	METER ID	Final Effluent Flow
		FIT ID	N/A
		CLIENT TAG	N/A
		OTHER	N/A
		GPS COORDINATES	N43°31.371 W080°15.842
VER. BY - FM	Travis Krayetski	VERIFICATION DATE	January 7th 2021
Quality Management Standards Information - Reference equipment and instrumentation used to conduct this verification test is found in our AC- QMS document at the time this test was		CAL. FREQUENCY	Annual
		CAL. DUE DATE	January 2022

PROGRAMMING PARAMETERS				TOTALIZER	
THROAT DIMENSION (DN)	inches	60		AS FOUND	81622448 M3
EMPTY DISTANCE	m	1.823		AS LEFT	81624958 M3
MAX. HEAD	m	0.740		DIFFERENCE	2510 M3
DEAD ZONE	m	1.083		<b>TEST CRITERIA</b>	
BLANKING DISTANCE	m	0.305		AS FOUND CERTIFICATION TEST	Yes
MAX. FLOW	M3/D	199952.2		ALLOWABLE [%] ERROR	15
F.S. RANGE - O/P	M3/D	200326.5		<b>COMPONENTS TESTED</b>	
				CONVERTER DISPLAY	yes
				mA OUTPUT	yes
				TOTALIZER	no
				ACCURACY BASED ON [% o.r.]	yes
				ERROR DOCUMENTED IN THIS REPORT; BASED ON % o.r.	

Ultrasonic sensor installed to ensure full scale flow condition

AS FOUND TEST RESULTS							
		0.0	4.2	12.5	23.9	30.5	% F.S. Range
		0.000	0.100	0.200	0.300	0.350	m
<b>REF. FLOW RATE</b>		<b>0.000</b>	<b>8346</b>	<b>25072</b>	<b>47714</b>	<b>60938</b>	M3/D
MUT [Reading]		0.000	8903	24851	47794	60262	M3/D
MUT [Difference]		0.000	557.442	-221.058	79.892	-676.444	M3/D
MUT [% Error]		n/a	6.68	-0.88	0.17	-1.11	%
<b>mA OUTPUT</b>		<b>4.000</b>	<b>4.668</b>	<b>6.006</b>	<b>7.818</b>	<b>8.876</b>	mA
MUT [Reading]	min. 4.000 mA	4.000	4.621	5.912	7.774	8.769	mA
MUT [Difference]	max. 20.000 mA	0.000	-0.047	-0.094	-0.044	-0.107	mA
MUT [% Error]		0.00	-1.00	-1.57	-0.56	-1.21	%
<b>TOTALIZER - REF. FLOW RATE</b>							
TOTALIZER [MUT]							
TEST TIME							
CALC. TOTALIZER							
ERROR							

COMMENTS	QUALITY MANAGEMENT STANDARDS INFO.			RESULTS		
	[QMS] INFORMATION	IDENT.	ID #	TEST	AVG % o.r.	PASS FAIL
	[REFERENCE] LEVEL	Sim. BOARD	n/a			
PROCESS METER	PM	2	DISPLAY	1.21	PASS	
STOP WATCH	SW	n/a	mA OUTPUT	-0.87	PASS	
			TOTALIZER	N/A	N/A	

This report reflects the test results of the overall accuracy for the above flow converter using our certified procedures to within the specified tolerance as identified within this report.



## AS FOUND CERTIFICATION

**PASS**

CLIENT DETAIL		EQUIPMENT DETAIL	
CUSTOMER	City of Guelph	[MUT] MANUFACTURER	Milltronics
CONTACT	Travis Murray SCADA & Security Specialist Wastewater Services P: 519-822-1260 Ext 3609 C: 226-332-3271 E: travis.murray@guelph.ca	MODEL	OCM-III
		CONVERTER SERIAL NUMBER	NA
		PLANT ID	Guelph WWTP
		METER ID	Final Effluent Flow
		FIT ID	N/A
		CLIENT TAG	N/A
		OTHER	N/A
		GPS COORDINATES	N43°31.371 W080°15.842
VER. BY - FM	Travis Krayetski	VERIFICATION DATE	January 7th 2021
Quality Management Standards Information - Reference equipment and instrumentation used to conduct this verification test is found in our AC- QMS document at the time this test was		CAL. FREQUENCY	Annual
		CAL. DUE DATE	January 2022

PROGRAMMING PARAMETERS				TOTALIZER	
THROAT DIMENSION (DN)	inches	60		AS FOUND	81622448 M3
EMPTY DISTANCE	m	1.823		AS LEFT	81624958 M3
MAX. HEAD	m	0.740		DIFFERENCE	2510 M3
DEAD ZONE	m	1.083		<b>TEST CRITERIA</b>	
BLANKING DISTANCE	m	0.305		AS FOUND CERTIFICATION TEST	Yes
MAX. FLOW	M3/D	199952.2		ALLOWABLE [%] ERROR	15
F.S. RANGE - O/P	M3/D	200326.5		<b>COMPONENTS TESTED</b>	
				CONVERTER DISPLAY	yes
				mA OUTPUT	yes
				TOTALIZER	no
				ACCURACY BASED ON [% o.r.]	yes
Ultrasonic sensor installed to ensure full scale flow condition				ERROR DOCUMENTED IN THIS REPORT; BASED ON % o.r.	

AS FOUND TEST RESULTS							
		0.0	37.7	53.7	71.7	100.0	% F.S. Range
		0.000	0.400	0.500	0.600	0.740	m
<b>REF. FLOW RATE</b>		<b>0</b>	<b>75322</b>	<b>107330</b>	<b>143345</b>	<b>199952</b>	M3/D
MUT [Reading]		0	74260	106449	142552	198663	M3/D
MUT [Difference]		0.000	-1062.475	-880.912	-792.625	-1289.168	M3/D
MUT [% Error]		n/a	-1.41	-0.82	-0.55	-0.64	%
<b>mA OUTPUT</b>		<b>4.000</b>	<b>10.027</b>	<b>12.588</b>	<b>15.470</b>	<b>20.000</b>	mA
MUT [Reading]	min. 4.000 mA	4.000	9.979	12.459	15.379	19.891	mA
MUT [Difference]	max. 20.000 mA	0.000	-0.048	-0.129	-0.091	-0.109	mA
MUT [% Error]		0.00	-0.48	-1.03	-0.59	-0.55	%
<b>TOTALIZER - REF. FLOW RATE</b>							
TOTALIZER [MUT]							
TEST TIME							
CALC. TOTALIZER							
ERROR							

COMMENTS	QUALITY MANAGEMENT STANDARDS INFO.			RESULTS		
	[QMS] INFORMATION	IDENT.	ID #	TEST	AVG % o.r.	PASS FAIL
	[REFERENCE] LEVEL	Sim. BOARD	n/a			
	PROCESS METER	PM	2	DISPLAY	-0.86	PASS
	STOP WATCH	SW	n/a	mA OUTPUT	-0.53	PASS
				TOTALIZER	N/A	N/A

This report reflects the test results of the overall accuracy for the above flow converter using our certified procedures to within the specified tolerance as identified within this report.





## FIELD SERVICES REPORT

**REPORT OF:** Mike Humphries

**DATE OF SERVICE:** June 09, 2021

**CUSTOMER / ADDRESS:**

City of Guelph  
WWTP  
530 Wellington St W,  
Guelph, Ontario

**CONTACT:** Peter Bucurca

**EMAIL:** [Peter.bucurca@guelph.ca](mailto:Peter.bucurca@guelph.ca)

**PURPOSE FOR SERVICE:**

Replace OCM III with Multiranger 200 HMI and verify operation of Meter reading Effluent Flow leaving the Plant.

**SYSTEM CONFIGURATION:**

Siemens Sitrans Multiranger 200 HMI (New)  
XRS-5 transducer (New)

**APPLICATION:**

Primary element: 5' Parshall Flume  
Maximum flow: 200326.5 m<sup>3</sup>/day  
Maximum head: 74.00 cm

**OBSERVATIONS / CHANGES MADE:**

Totalizer As Found	NA	m <sup>3</sup>
Totalizer As Left	NA	m <sup>3</sup>
Zero As Found	182.289600	cm
Zero As Left	192.400000	cm
Change in Zero	-10.110400	cm

OCM Flow Table

Head Applied (cm)	Head Displayed (cm)	Error (%)	Calculated Flow (m <sup>3</sup> /d)	Flow Displayed (m <sup>3</sup> /d)	Error (%)	Calculated MA Output	Measured mA Output	Error (%)
0.00	0.00	0.00	0.00	0.00	0.00	4.00	4.00	0.00
11.10	11.06	-0.36	9867	9802	-0.67	4.79	4.74	-1.01
30.65	30.66	0.03	49458	49521	0.13	7.95	7.91	-0.51
42.90	43.10	0.46	84329	84353	0.03	10.74	10.73	-0.05
67.10	67.23	0.19	171505	171938	0.25	17.70	17.71	0.07

**CONCLUSIONS / RECOMMENDATIONS:**

Multiranger 200 HMI replaced OCM III and is functioning as expected giving good accurate results.

**PASSED CALIBRATION**



## FIELD SERVICES REPORT

**REPORT OF:** Mike Humphries

**DATE OF SERVICE:** June 09, 2021

**CUSTOMER / ADDRESS:**

City of Guelph  
WWTP  
530 Wellington St W,  
Guelph, Ontario

**CONTACT:** Peter Bucurca

**EMAIL:** [Peter.bucurca@guelph.ca](mailto:Peter.bucurca@guelph.ca)

**PURPOSE FOR SERVICE:**

Replace OCM III with Multiranger 200 HMI and verify operation of Meter reading Flow.

**SYSTEM CONFIGURATION:**

Siemens Sitrans Multiranger 200 HMI (New)  
XPS-10 transducer

**APPLICATION:**

Primary element: 1.5m Rectangular Weir  
Maximum flow: 6448 m<sup>3</sup>/hr  
Maximum head: 75.00 cm

**OBSERVATIONS / CHANGES MADE:**

Totalizer As Found	NA	m <sup>3</sup>
Totalizer As Left	NA	m <sup>3</sup>
Zero As Found	153.100000	cm
Zero As Left	153.100000	cm
Change in Zero	0.000000	cm

OCM Flow Table

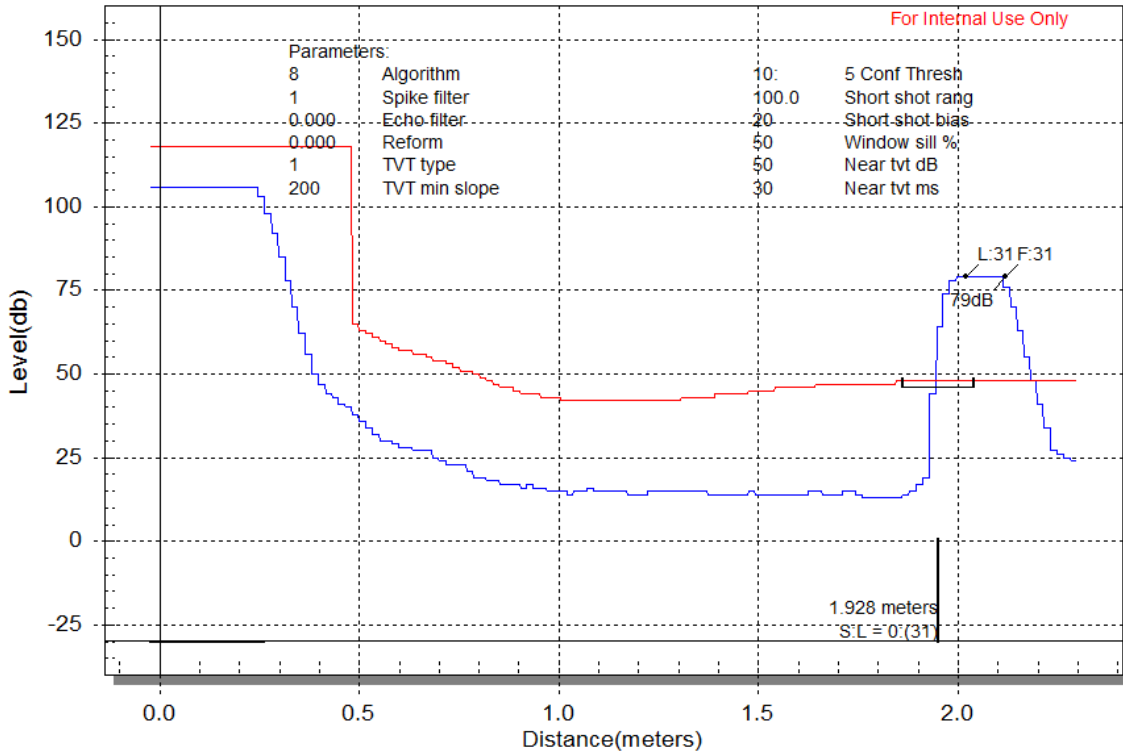
Head Applied (cm)	Head Displayed (cm)	Error (%)	Calculated Flow (m <sup>3</sup> /d)	Flow Displayed (m <sup>3</sup> /d)	Error (%)	Calculated MA Output	Measured mA Output	Error (%)
0.00	0.00	0.00	0	0.00	0.00	4.00	4.00	0.00
10.00	9.96	-0.40	314	312	-0.63	4.78	4.76	-0.40
20.00	19.95	-0.25	888	884	-0.45	6.20	6.18	-0.38
40.00	40.02	0.05	2512	2515	0.13	10.23	10.24	0.08
60.00	59.92	-0.13	4614	4606	-0.18	15.45	15.42	-0.19

**CONCLUSIONS / RECOMMENDATIONS:**

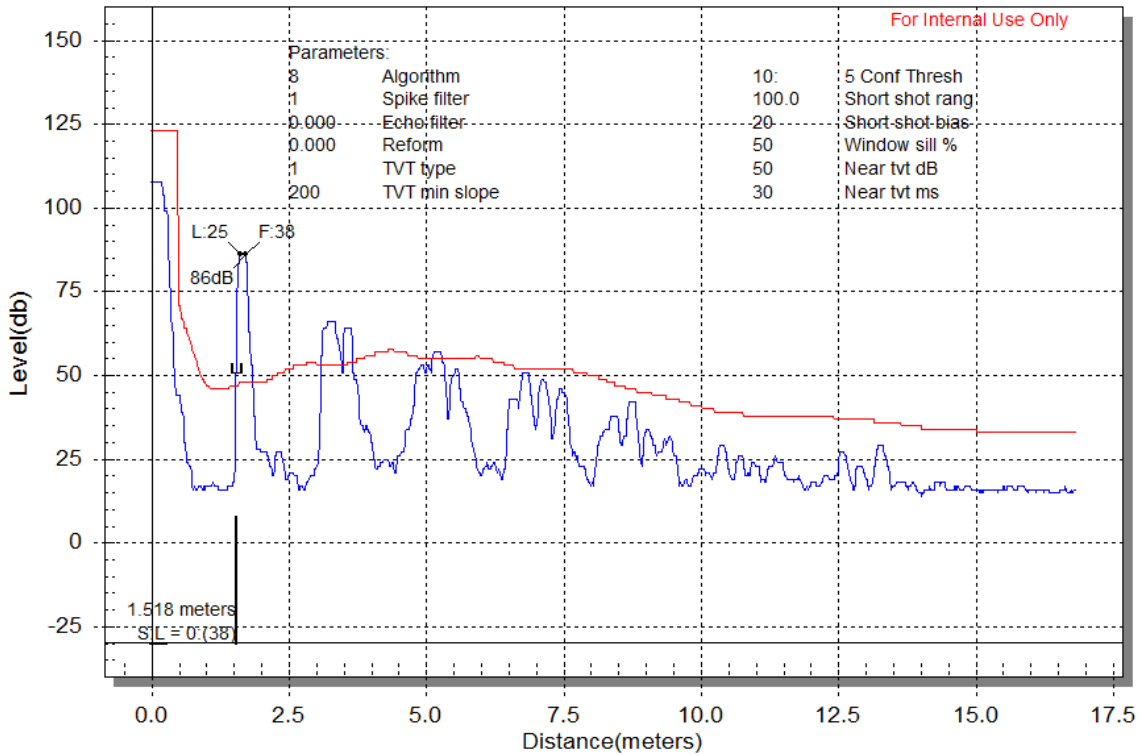
Multiranger 200 HMI replaced OCM III and is functioning as expected giving good accurate results.

**PASSED CALIBRATION**

### Plant Effluent



### 1-FIT-223





*Certificate of Instrument Performance*

**Instrument Name:** 8" EH MAG Meter  
**Serial Number:** 9904E516000  
**Service Ref #:** S006063  
**Configuration:** Open Channel Circular Pipe  
**Installation Location:** Kortright SPS

The above instrument was calibrated on Nov 25,21 by Lou Dinato and meets or exceeds Manufacturer's Specification. The flow was verified using a Greyline PDFM 5.0 S/N 70427. The % difference between the two meters was 0.1919. It is recommended to have the flow meter verified every 12-months.

A handwritten signature in black ink, appearing to read "Lou Dinato", with a stylized flourish at the end.

Lou Dinato  
Service Supervisor



*Certificate of Instrument Performance*

**Instrument Name:** Hach Flo-Station with Flo-Dar  
**Serial Number:** 00DA08390711  
**Service Ref #:** S006063  
**Configuration:** Open Channel Circular Pipe  
**Installation Location:** Kortright SPS

The above instrument was calibrated on Nov 25,21 by Lou Dinato and meets or exceeds Manufacturer's Specification. The level was calibrated at 0.00cm. An adjusted down of 3mm was made.

It is recommended to have the flow meter inspected and calibrated on a 12-month interval.

A handwritten signature in black ink, appearing to read "Lou Dinato", with a stylized flourish at the end.

Lou Dinato  
Service Supervisor



*Certificate of Instrument Performance*

**Instrument Name:** 8" EH MAG Meter  
**Serial Number:** 99001C16000  
**Service Ref #:** S006063  
**Configuration:** Open Channel Circular Pipe  
**Installation Location:** Northern Heights SPS

The above instrument was calibrated on Nov 25,21 by Lou Dinato and meets or exceeds Manufacturer's Specification. The flow was verified using a Greyline PDFM 5.0 S/N 70427. The % difference between the two meters was 0.5622. It is recommended to have the flow meter verified every 12-months.

A handwritten signature in black ink, appearing to read "Lou Dinato", with a stylized flourish at the end.

Lou Dinato  
Service Supervisor



*Certificate of Instrument Performance*

**Instrument Name:** Hach Flo-Station with Flo-Dar  
**Serial Number:** 00DA08370711  
**Service Ref #:** S006063  
**Configuration:** Open Channel Circular Pipe  
**Installation Location:** Northern Heights SPS

The above instrument was calibrated on Nov 25,21 by Lou Dinato and meets or exceeds Manufacturer's Specification. No level adjustment was needed as the meter was reading correctly. It is recommended to have the flow meter inspected and calibrated on a 12-month interval.

A handwritten signature in black ink, appearing to read "Lou Dinato", with a stylized flourish at the end.

Lou Dinato  
Service Supervisor



# Service Order

Can-Am Instruments  
 2851 Brighton Rd  
 Oakville, ON L6H 6C9  
 Canada  
 Can-Am Instruments

**Order Number:** S006063

**Order Date:** Nov 23-2021

**Service Technician:** Louie Dinato

**Customer Number:** 02-0003036

**Sold To:**

City of Guelph  
 City Hall Finance Dept  
 1 Carden Street  
 Guelph, ON N1H 3A1

**Ship To:**

City of Guelph  
 Waste Water Treatment Plant  
 530 Wellington St W  
 Guelph, ON N1H 3K5

**Confirm To:**

Adam Geldart

**Telephone -** 519-837-5629

Customer P.O.	Ship VIA	F.O.B.	Terms
2110207	CAN000	Our Plant	Net 30 Days

Item Code	Unit	Ordered	Price	Amount
-----------	------	---------	-------	--------

**Entry** 000002      **Description** Flo-Station      **Under Warranty - N**  
**Service Item** 1204-200      **Serial No** 00DA08370711      **Technician Name**  
**Svc Type** Standard      **Status** 55

**Problem:** Northern Heights SPS 68 Ingram Dr

Hach Flo-Station with Flo-Dar Sensor  
 As found: 0.0m/s, 0.0mm, 0.0lps, Total Flow 180.60m3  
 The level was measured at 0.0mm. The meter was showing 0mm. No level adjustment was made.  
 A hose was used to run water underneath the flow sensor. The sensor offset was changed from  
 52.8cm to 41.5cm The velocity was checked and the meter was showing 0.30-0.31m/s  
 As Left: 0.0m/s, 0.0mm, 0.0lps

**Entry** 000003      **Description** MAG Meter      **Under Warranty - N**  
**Service Item** PROMAG 53      **Serial No** 99001C16000      **Technician Name**  
**Svc Type** Standard      **Status** 55

**Problem:** Northern Heights SPS 68 Ingram Dr

8" EH Mag Meter - Verified with Grey Line Closed Pipe Doppler Flow Meter  
 MAG Meter    Greyline  
 33.52lps      33.33ps  
 33.67ps      33.30lps  
 33.99lps      33.47ps  
 32.58lps      32.72lps  
 32.25lps      32.28lps  
 36.49lps      36.17lps  
 34.73lps      34.61lps  
 AVG MAG Meter Reading 33.89lps  
 AVG Greyline Meter Reading 33.69ps  
 % Diff = 0.5622





# Service Order

Can-Am Instruments  
2851 Brighton Rd  
Oakville, ON L6H 6C9  
Canada  
Can-Am Instruments

**Order Number:** S006063

**Order Date:** Nov 23-2021

**Service Technician:** Louie Dinato

**Customer Number:** 02-0003036

**Sold To:**

City of Guelph  
City Hall Finance Dept  
1 Carden Street  
Guelph, ON N1H 3A1

**Ship To:**

City of Guelph  
Waste Water Treatment Plant  
530 Wellington St W  
Guelph, ON N1H 3K5

**Confirm To:**

Adam Geldart

**Telephone -** 519-837-5629

Customer P.O.	Ship VIA	F.O.B.	Terms
2110207	CAN000	Our Plant	Net 30 Days

Item Code	Unit	Ordered	Price	Amount
-----------	------	---------	-------	--------

<b>Entry</b> 000004	<b>Description</b> Flo-Station	<b>Under Warranty - N</b>
<b>Service Item</b> 1204-200	<b>Serial No</b> 00DA08390711	<b>Technician Name</b>
<b>Svc Type</b> Standard	<b>Status</b> 55	
<b>Problem:</b> Kortright SPS 1005 Victoria Rd S		

Hach Flo-Station with Flo-Dar Sensor  
 As found: 0.0m/s, 3.06mm, 0.0lps, Total Flow 171.76m3  
 Some sediment found in pipe underneath the sensor. It was removed Sensor offset was changed to 40cm from 59.5cm. The level was calibrated at 0.0cm. The memory battery was found low at 2.93V, a new battery was soldering on to the CPU PCB. The flow totalizer was reset as the unit had to be powered down. A hose was inserted in the upstream pipe to generate a flow under the sensor. The velocity was checked and the meter was showing 0.29-0.30m/s  
 As Left: 0.0m/s, 0.0mm, 0.0lps.

<b>Entry</b> 000005	<b>Description</b> MAG METER	<b>Under Warranty - N</b>
<b>Service Item</b> PROMAG 53	<b>Serial No</b> 9904E516000	<b>Technician Name</b>
<b>Svc Type</b> Standard	<b>Status</b> 55	
<b>Problem:</b> Kortright SPS 1005 Victoria Rd S		

8" EH Mag Meter - Verified with Grey Line Closed Pipe Doppler Flow Meter  
 MAG Meter Greyline  
 72.44lps 72.48ps  
 72.31lps 73.17ps  
 72.99lps 72.53ps  
 73.96lps 73.24ps  
 73.45ps 73.05ps  
 AVG MAG Meter Reading 73.03lps  
 AVG Greyline Meter Reading 72.89lps  
 % Diff = .1919%



*Certificate of Instrument Performance*

**Instrument Name:** 4" ABB MAG Meter  
**Serial Number:** V/36556/1/1  
**Service Ref #:** S006063  
**Configuration:** Open Channel Circular Pipe  
**Installation Location:** Terraview SPS

The above instrument was calibrated on Nov 26,21 by Lou Dinato and meets or exceeds Manufacturer's Specification. The flow was verified using a Greyline PDFM 5.0 S/N 70427. The % difference between the two meters was 0.0766. It is recommended to have the flow meter verified every 12-months.

A handwritten signature in black ink, appearing to read "Lou Dinato", with a stylized flourish at the end.

Lou Dinato  
Service Supervisor



**Appendix E**  
**Guelph Environmental Laboratory**  
**Accreditation Certificate**

# Canadian Association for Laboratory Accreditation Inc.

## Certificate of Accreditation

City Of Guelph Environmental Laboratory  
City of Guelph - Environmental Services Dept., Wastewater Services  
530 Wellington Street W  
Guelph, Ontario



This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017. %  
This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality %  
management system (refer to joint ISO-ILAC-IAF Communiqué dated April 2017). %



Accreditation No.: A3222  
Issued On: January 7, 2021  
Accreditation Date: March 4, 2014  
Expiry Date: July 8, 2023

A handwritten signature in black ink, reading "Andrew M. Adams". The signature is written in a cursive style and is positioned above a horizontal line.

President & CEO



This certificate is the property of the Canadian Association for Laboratory Accreditation Inc. and must be returned on request; reproduction must follow policy in place at date of issue.  
For the specific tests to which this accreditation applies, please refer to the laboratory's scope of accreditation at [www.cala.ca](http://www.cala.ca).



# **Appendix F**

## **Summary of Existing Works**

### Summary of Existing Works

---

#### Headworks

- Influent Wet Well receiving raw sewage from the 1,200 mm diameter west sewer and 1,650 mm diameter east truck sewers

#### Raw sewage Pumping Station

- Four (4) screw pumps, each rated at minimum capacity of 65 MLD

#### Screening collection and removal (bar screen)

- Four (4) multi-rake mechanical screens, each with 12 mm bar spacing, and each rated for a minimum flow of 48,900 m<sup>3</sup>/d
- Two (2) wash presses, three (3) shaftless screw screenings conveyors
- One (1) screenings washer/compactor, capable of processing a minimum of 70.8 L/min of solids with a maximum wash water flow of 90.8 L/min

#### Aerated grit removal

- Two (2) grit tanks, each 12 m X 5 m X 4 m (water depth)
- Two (2) variable speed grit pumps, torque flow recessed impeller type, with a minimum rated capacity of 12.5 L/s @ 18.2 m TDH, transferring grit slurry to two (2) cyclone and classifier grit separation systems, with a minimum rated capacity of 12.5 L/s
- One (1) shaftless screw grit conveyor, with a minimum rated capacity of 2 tonne/hr transporting grit from the classifier discharge to the waste disposal company's lugger bin
- One (1) positive displacement type channel air blower with a minimum nominal capacity 81.4 m<sup>3</sup>/min @ discharge pressure of 1 bar
- One (1) positive displacement type grit tank blower with a minimum nominal capacity of 16.9 m<sup>3</sup>/min @ discharge pressure of 1 bar

#### Plant 1

A two (2) train activated sludge plant with a rated capacity of 16 MLD and consisting of:

- Two (2) 30 m X 12.2 m X 3.5 m (water depth) primary settling tanks complete with chain and flight collector mechanisms
- Two (2) 30 m X 15.75 m X 4.6 m (water depth) aeration tanks, complete with fine bubble diffuser system
- Two (2) 38.4 m X 14.64 m X 3.65 m (water depth) final settling tanks complete with chain and flight collector mechanisms

- Two (2) raw sludge pumps, rotor type positive displacement, each pump a minimum rated capacity of 3.8 L/s @ 15.2 m TDH
- Two (2) aeration multistage centrifugal blowers each with a minimum rated capacity of 1,800 L/s at minimum 55 kPa
- One Lamson 250 hp centrifugal blower
- Three (3) variable speed return sludge pumps, each horizontal centrifugal type with a minimum rated capacity of 13,100 m<sup>3</sup>/d @ 9.0 ft TDH
- One (1) waste activated sludge (WAS) pump with a minimum rated capacity of 3.5 L/s, discharging to either the WAS distribution chamber or to the WAS Thickening Facility (note: standby for this pump is provided by the existing Plant 1 RAS flow splitting structure)
- One (1) secondary scum pump with a minimum rated capacity of 567 L/min
- One (1) primary two inch submersible scum pump with a minimum rated capacity of 567 L/min
- One (1) automated influent flow control gate

### **Plant 2**

A two (2) train activated sludge plant with a rated capacity of 13 MLD and consisting of:

- Two (2) 29.26 m X 9.76 m X 2.9 m (water depth) primary settling tanks complete with chain and flight collector mechanisms
- Two (2) 33.5 m X 20.1 m X 3.7 m (water depth) aeration tanks, complete with fine bubble diffuser system
- Two (2) 27.74 m X 9.76 m X 3.65 m (water depth) final settling tanks complete with chain and flight collector mechanisms
- Two (2) raw sludge pumps, rotor type positive displacement, each pump a minimum rated capacity of 2.5 L/s
- Two (2) variable speed return sludge pumps, each vertical centrifugal type with a minimum rated capacity of 3,900 m<sup>3</sup>/d @ 5.2 TDH
- One (1) constant speed return activated sludge (RAS) pump with a minimum rated capacity of 75 L/s @ 7.6 m head
- WAS wasting system comprising branch piping from the RAS discharge header and directing WAS by automated valves to either the WAS distribution chamber or to the WAS Thickening Facility
- One (1) primary two inch submersible scum pump with a minimum rated capacity of 567 L/min
- One (1) secondary two inch submersible scum pump with a minimum rated capacity of 567 L/min
- Two (2) automated influent flow control gates

### **Plant 3**

A two (2) train activated sludge plant with a rated capacity of 13 MLD and consisting of:

- Two (2) 14.8 m X 18.3 m X 3 m (water depth) primary settling tanks complete with chain and fight collector mechanisms
- Two (2) 25.9 m X 18.3 m X 4.3 m (water depth) aeration tanks, complete with fine bubble diffuser system
- Two (2) 23.16 m X 14.64 m X 3.65 m (water depth) final settling tanks complete with chain and fight collector mechanisms
- Two (2) raw sludge pumps, rotor type positive displacement, each with a minimum rated capacity of 3.5 L/s
- Three (3) air blowers, each multistage centrifugal type with a minimum rated capacity of 1,410 L/s at minimum 48 kPa
- Two (2) variable speed return sludge pumps, each horizontal centrifugal type with a minimum rated capacity of 8,280 m<sup>3</sup>/d @ 6.4 ft TDH
- One (1) constant speed return activated sludge (RAS) pump having a nominal minimum capacity of 47 L/s @ 7.6 m head (13 MLD)
- WAS wasting system comprising branch piping from the RAS discharge header and directing WAS to either automated valves is accomplished by diverting a portion of the WAS to either the WAS distribution chamber or to the WAS Thickening Facility
- One (1) primary two-inch submersible scum pump with a minimum rated capacity of 567 L/min
- Two (2) secondary two-inch submersible scum pump with a minimum rated capacity of 567 L/min

#### **Plant 4**

A two (2) train activated sludge plant with a rated capacity of 22 MLD and consisting of:

- Two (2) 21.25 m X 14.3 m X 4 m primary clarifiers complete with chain and fight collector mechanisms
- Two (2) 67.4 m X 21.7 m X 4.4 m aeration tanks (each 6,500 m<sup>3</sup> volume)
- Two (2) 30.55 m X 20.1 m X 4.4 m final clarifiers complete with chain and fight collector mechanisms
- Two (2) primary sludge pumps each with a minimum rated capacity of 3.8 L/s @ 7.9 m head to 7.8 L/s @ 13.7 m head
- Two (2) primary scum pumps each with a minimum rated capacity of 12.6 L/s
- Four (4) variable speed return activated sludge (RAS) pumps each with a minimum rated capacity of 69 L/s @ 0.6 m head to 127 L/s @ 2.0 m head
- One (1) secondary scum pump rated at a minimum capacity of 9.4 L/s
- One (1) secondary effluent pump rated at a minimum capacity of 110 L/s @ 8.8 m head to 510 L/s @ 5.1 m head
- Two (2) Hoffmann centrifugal blowers, each rated at a minimum nominal capacity of 250 m<sup>3</sup>/min @ 62 kPa pressure
- One Lamson 250 hp centrifugal blower
- One (1) channel air blower with a minimum rated capacity of 42.5 m<sup>3</sup>/min (10,111 Nm<sup>3</sup>/hr)



## **Chemical Facilities**

- Two (2) ferric chloride storage tanks in a concrete containment area, each with a maximum volume of 45.9 m<sup>3</sup>
- Two (2) ferric chloride peristaltic metering pumps rated at 198 L/hr serving Headworks North & South
- Six (6) ferric chloride peristaltic metering pumps servicing Plants 1, 2, 3 East, 3 West, 4 East and 4 West each rated at a maximum of 198 L/min (operating average 189 L/hr)

## **Chlorine storage**

- One (1) sodium hypochlorite day tank with a maximum capacity of 1.5 m<sup>3</sup>.
- Two (2) sodium hypochlorite storage tanks each with a maximum of 15.7 m<sup>3</sup> each chlorine pumps
- Five (5) sodium hypochlorite dosing pumps each rated at a minimum of 3.3 L/min

## **Tertiary Treatment**

### Secondary Effluent Pump Station:

- One (1) vertical turbine secondary effluent pump having a minimum rated capacity of approximately 69,000 m<sup>3</sup>/d discharging the combined secondary effluent from Plants 1-4 to the influent channel of the RBC's
- One (1) vertical turbine secondary effluent pump having a minimum rated capacity of approximately 55,000 m<sup>3</sup>/d discharging the combined secondary effluent from Plants 1-4 to the influent channel of the RBC's,
- One (1) vertical turbine secondary effluent pump having a minimum rated capacity of approximately 40,000 m<sup>3</sup>/d discharging the combined secondary effluent from Plants 1-4 to the influent channel of the RBC's,
- One (1) submersible centrifugal effluent pump having a minimum rated capacity of approximately 44,000 m<sup>3</sup>/d discharging the combined secondary effluent from Plants 1-4 to the influent channel of the RBC's.

## **Rotating Biological Contactors (RBCs)**

- Four (4) tanks, each 39.45 m X 8.03 m X 1.6 m (water depth)
- Thirty-two (32) contactors; eight (8) contactors per tank; each 3,600 mm media diameter, 7,600 mm shaft length, providing a surface area of 13,750 m<sup>2</sup>
- Three (3) centrifugal blowers, each with a minimum rated capacity of 1.43 m<sup>3</sup>/s

## **Filtration**

- Two (2) continuous backwash travelling bridge tertiary filters, each with a surface area of 263 m<sup>2</sup>
- Two (2), filter backwashing pumps each with a minimum rated capacity of 11 L/s @ 4.2 m head

- Two (2) low head, continuous backwash travelling bridge tertiary filters each with a surface area of 170 m<sup>2</sup>
- Two (2) filter backwashing pumps each with a minimum rated capacity of 62.5 L/s @ 4.2 m head

### **Two (2) Filter Buildings**

- Housing all filter equipment together with associated appurtenances, piping, heating and ventilation, electrical and controls systems, and site works

### **Disinfection and Dechlorination**

- One (1) contact tank, 3.7 m X 12 m X 2.5 m (water depth)
- Two (2) sodium bisulphite peristaltic pumps each rated at a maximum capacity of 3.3 L/min
- Two (2) sodium bisulphite storage tanks, with a maximum capacity of 5,800 L each

### **Effluent Outfall**

- One 1,520 mm Parshall flume rated for 0 to 15,000 m<sup>3</sup>/d
- One 1,830 diameter effluent outfall pipe, approximately 123 m in length terminating at the south bank of the Speed River

### **TWAS**

- Mechanical thickening System to thicken Waste Activated Sludge (WAS) from Plants 1 through 4 and discharging Thickened Waste Activated Sludge (TWAS) to Primary Digesters 1 and 2
- One (1) 1.2 m diameter mix tank with mixer
- One (1) rotary drum thickener with 2.25 kW motor drum drive, with a minimum rated hydraulic capacity of 50 m<sup>3</sup>/hr
- One Supply Pump (1) 7.5 kW rotary lobe pump WAS with a capacity of 15-50 m<sup>3</sup>/hr
- One Discharge Pump (1) 7.5 kW rotary lobe TWAS pump with a capacity of 18 m<sup>3</sup>/hr

### **Polymer system**

- One (1) emulsion polymer unit with multi-zone mixing chamber
- One (1) neat polymer diaphragm metering pump, with a minimum capacity of 0.19 L/hr
- One (1) static mixer
- One (1) dilution water control system with a minimum capacity of 114 L/hr of makeup water for primary mixing and 114 L/hr for post dilution

## **Digestion**

- Two-stage anaerobic digestion including four primary digesters and one secondary digester
- Four (4) primary digesters, each approximately 2,440 m<sup>3</sup> in volume and each mechanically mixed with four (4) 7.5 kW draft tube style mixers
- One (1) secondary digester, approximately 2,350 m<sup>3</sup> in volume

### **Control Building Number 1:**

- Two (2) Sludge Recirculation Pumps, each having a minimum rated capacity of 25.2 L/s @ 6.1 m TDH located in Control Building No. 1 and utilized to pump sludge from Digesters No. 1 and No. 2 through their associated Sludge Heat Exchangers
- Two (2) Sludge Transfer Pumps each having a minimum rated capacity of 18.9 L/s @ 10.7 m, TDH located in Control Building No. 1 and utilized to pump sludge from Digesters No. 1 or Digester No. 2 to the Dewatering Facility or to Control Building No. 2
- Two (2) sludge heat exchanger of the spiral type, using hot water and having one heating circuit each with a minimum rated capacity of 275 kW located servicing Digesters No. 1, & 2 and located in Control Building No.1

### **Control Building Number 2:**

- Two (2) Sludge Recirculation Pumps each having a minimum rated capacity of 19.4 L/s @ 6.1 m, TDH located in Control Building No. 2 and utilized to pump sludge from Digesters No. 3, 4 and 5 through their associated Sludge Heat Exchangers
- Two (2) Sludge Recirculation Pumps each having a minimum rated capacity of 13.14 L/s @ 9.5 m TDH located in Control Building No. 2 and utilized to pump sludge from Digesters No. 3, 4 and 5 through their associated Sludge Heat Exchangers
- One (1) Sludge Transfer Pump having a minimum rated capacity of 15.8 L/s @ 11.6 m TDH located in Control Building No. 2 and utilized to pump sludge from Digesters No. 3 or Digester No. 4 to the Dewatering Facility or to Control Building No. 1
- Two (2) sludge heat exchangers of the concentric tube, counter-flow type, using hot water and each having one heating circuit with a minimum rated capacity of 275 kW located servicing Digesters No. 3 and 5 and located in Control Building No. 2

## **Waste Gas Burner**

- Waste gas burner, having a capacity to combust approximately 1,450 m<sup>3</sup>/h of digester gas; complete with natural gas fired pilot, back pressure regulator, flame arrester and thermal check valve, combustion controls and burner alarms

connected to the plant SCADA system, digester gas piping, flow meter and structural steel platform

## **Energy Facility**

Energy facility, consisting of gas handling and utilization equipment, digester gas scrubber, cogeneration equipment including cogeneration engines, boilers and digester gas booster pumps

- Three (3) primed condensate moisture and sediment traps
- One (1) VAREC Gas Purifier H<sub>2</sub>S removal system
- One (1) emergency pressure relief valve complete with flame arrester
- Two (2) 18.7 kW gas boosters, each having a minimum capacity of 288 m<sup>3</sup>/hr at a discharge pressure of 48 kPa (gauge pressure)
- One (1) flame arrester
- Automatic low pressure drip traps
- Two (2) cogeneration digester gas or natural gas fired engines, each with a minimum electrical generator output capacity of 290 kilowatts (natural gas) 270 Kilowatts (digester gas)
- Two (2) Exhaust gas heat exchangers
- Two (2) closed-loop cooling system, one for each of the two (2) cogeneration engines, each including:
  - One (1) auxiliary air-cooled radiator with 7.5 kW motor
  - One (1) glycol/water piping system between the engine jacket, oil cooler and heat exchanger, complete with one (1) expansion tank
  - One (1) booster pump
  - One (1) plate-and-frame type heat exchanger, sized for minimum 300 kW at 15.8 L/s of flow, to exchange heat between the closed-loop cooling system and plant hot water system
  - One (1) 75 kW (100 hp) hot water boiler firing natural gas or digester gas
  - One (1) 111.855 kW (150 hp) hot water boiler firing natural gas or digester gas

## **Digester Gas Conditioning System, with a minimum capacity of 7,000 m<sup>3</sup>/d @ 35 kPa gauge pressure**

- One (1) refrigeration dryer, consisting of refrigerant system with compressor and air-cooled condenser with an and glycol loop with pump, a gas-to-chilled glycol heat exchanger, a high efficiency moisture separator, a gas-to-gas heat exchanger, and instrumentation
- One (1) dual carbon adsorption system consisting of two (2) approximately 1.2 m diameter cylindrical carbon towers with conical bottoms, arranged to operate in series, configured for refrigerated and dried gas to flow upwards through the media bed in each tower and then to a 0.3 micron coalescing filter building

- Building housing all cogeneration and boiler equipment, together with associated appurtenances, piping, heating and ventilation, electrical and controls systems, and site works

### **Dewatering**

- Two (2) belt filter presses, each with a capacity to handle a minimum of 9.5 L/s per unit of anaerobically digested sludge
- Two (2) belt filter presses, each with a capacity to handle a minimum of 12 L/s per unit of anaerobically digested sludge
- Two (2) washwater feed pumps, each rated at 25 L/s (minimum)
- Two (2) submersible centrifugal filtrate transfer pumps, each rated at 15.3 L/s (minimum) and one (1) submersible centrifugal filtrate transfer pump rated at 31.5 L/s (minimum)
- Two (2) belt filter feed sludge pumps, each rated at 9.5 L/s (minimum)
- Two (2) belt filter feed sludge pumps, each rated at 12 L/s (minimum)

### **Polymer Feed System**

- One (1) 800 kg capacity bulk bag dry polymer make down unit (uses liquid polymer never used dry polymer)
- Two (2) polymer mixing tanks, each with a minimum capacity of 11.4 m<sup>3</sup> and a 3.75 kW mixer
- Six (6) polymer metering pumps each with a minimum rated capacity of 0.57 L/s @ 17.4 TDH
- Four (4) in-line static mixers in the sludge line to facilitate polymer mixing prior to the belt filter press
- Four (4) 0.75 kW polymer supply pumps, each with a minimum capacity of 7.6 L/min

### **Conveyors**

- One (1) screw conveyor system to handle sludge cake from the filter presses, consisting of two (2) horizontal conveyors, one (1) cross conveyor, one (1) inclined conveyor, one (1) horizontal conveyor, which discharges to the sludge cake storage bin

### **Composting (Decommissioned)**

Sludge composting facility designed to compost 92.5 dry tones per week, consisting of the following:

- One (1) hammermill, designed to reduce in size approximately 12.2 tonnes of woodchips per hour, equipped with woodchip receiving hopper with discharge screw designed to deliver woodchip to the hammermill and one (1) blower and piping designed to convey the reduced woodchips (amendment) to the amendment storage silo

- One (1) amendment silo, complete with discharge sweep auger, having a nominal working volume of 825 m<sup>3</sup>
- One (1) amendment silo baghouse complete with air pulse cleaning and induced draft exhaust

### **Dewatered Biosolids Cake Storage Bin**

- One (1) dewatered sludge storage bin having a volume of 100 m<sup>3</sup> equipped with discharge screws designed to withdraw up to 36 m<sup>3</sup>/hr of dewatered sludge
- One (1) twin auger continuous flow type mixer, having a process capacity of 110 tonnes per hour, designed to blend proportions of dewatered sludge, recycled compost, woodchip amendments and recovered woodchips (Decommissioned)
- One (1) amendment/sludge transfer screw conveyor, with a rated capacity of 75 m<sup>3</sup>/h (Decommissioned)
- Two (2) Bio-Reactor Transfer screw conveyors, each with a rated capacity of 135 m<sup>3</sup>/h (Decommissioned)
- One (1) Cure Reactor Transfer screw conveyor, with a rated capacity of 150 m<sup>3</sup>/h (Decommissioned)
- One sandwich belt type elevating conveyor, with a rated capacity of 150 m<sup>3</sup>/h (Decommissioned)
- Three (3) reactor fill screw conveyors, each rated at 150 m<sup>3</sup>/h (Decommissioned)
- One (1) final discharge screw conveyor, rated at 150 m<sup>3</sup>/h

### **Compost Reactors (Decommissioned)**

- Three (3) enclosed compost reactor tanks, each having a nominal working capacity of 1,500 m<sup>3</sup> and equipped with compost discharge sweep auger and in-feed rotary distributor
- One (1) screen with a capacity of 60 m<sup>3</sup>/hr, designed to recover woodchips greater than 6 mm mesh size from the composter
- One (1) screening bin, 50 m<sup>3</sup> volume, with a discharge screw to convey recovered woodchips to the mixer
- One (1) screen infeed conveyor, rated at 43 m<sup>3</sup>/h
- One (1) fine transfer conveyor, rated at 25 m<sup>3</sup>/h
- One (1) recycle chip transfer screw, rated at 25 m<sup>3</sup>/h
- Three (3) reactor off-gas heat recovery units, each rated for 131 m<sup>3</sup>/min of reactor exhaust
- Building covering an approximate area of 1,800 m<sup>2</sup>, housing the sludge composting tanks and equipment, personnel facilities, mechanical, electrical and controls, together with associated appurtenances, piping, heating and ventilation, electrical and controls systems, and site works

### **Lystek Biosolids Treatment**

- One (1) dewatered biosolids off-take chute with slide gate in existing 20 m<sup>3</sup>/hr screw conveyor, discharging into a 42 m<sup>3</sup>/d capacity progressive cavity pump

- One (1) KOH chemical day tank with an approximate capacity of 6,430 L
- One (1) KOH Outdoor storage tank 4050 USG
- Two (2) chemical transfer pumps, each with a minimum rated capacity of 115 L/hr @ 1,034 kPa (gauge pressure)
- Two (2) 6,000 L processing tanks, each with a working volume not less than 5.0 m<sup>3</sup>, each equipped with a 37.5 kW disperser (mixer) and each with one (1) 25.2 L/s capacity centrifugal pump for product transfer
- One (1) 586 kW natural-fired gas steam boiler, equipped with a boiler feed water conditioning system and a flue vent, to supply steam to the processing tanks
- Above ground temporary storage tanks, to provide temporary storage of up to 1,000 m<sup>3</sup> of processed biosolids product

### **Septage Receiving Facility**

- Septage receiving consists of a Metacon IEA card access system for security of loads including a data logger, a 100 mm cam-lock connection fitting running to a rock trap and in-line grinder next to a magnetic flow meter as well to an auto sampler

### **Vacuum Truck Unloading Bay**

- Vacuum truck unloading bay, capable of dewatering solids from vacuum trucks with capacity of approximately 10,000 liters (80% in organic and 20% liquid), allowing dried solids to be removed to transfer station/landfill, liquids pass through to sanitary system to plant

### **Anammox –Side stream treatment process**

- One (1) Equalization tank
- Blower Building
- Two Sequencing batch reactors with Aeration panels, mixers, decanters and cyclones used to selectively retain Anammox organisms in the SBR's

### **Summary of Existing Works – Sewage Pumping Stations**

#### Kortright Sewage Pumping Station

- 4.2m X 3.6m wet well
- 450 mm inlet sewer
- 450 mm emergency overflow
- Three (3) 46hp non-clog submersible sewage pumps rated at 65.3 L/s
- Design capacity of 11,284 m<sup>3</sup>/d
- Inlet channel grinder
- Odour control system rated at 600 cfm
- 200 kW diesel generator
- One (1) 100 L fuel storage
- One (1) 400 m long 350 mm diameter PVC forcemain-peak flow of 130.6 L/s

- 350 mm forcemain bypass
- Two (2) automatic air and vacuum release valves

### **Northern Heights Sewage Pumping Station**

- 3.8m X 3.0 m wet well
- 250 mm inlet sewer
- 300 mm emergency overflow
- Two (2) 34hp non-clog submersible sewage pumps rated at 33.0 L/s
- Design capacity of 2,851 m<sup>3</sup>/d
- Manually operated screen basket
- Odour control system rated at 400 cfm
- 125 kW diesel generator
- One (1) 100 L fuel storage
- 1,008 m long 150 mm diameter PVC forcemain-peak flow of 33 L/s
- 200 mm forcemain bypass
- One (1) automatic air and vacuum release valve

### **Terraview Sewage Pumping Station**

- 3.0m diameter wet well
- Two (2) submersible pumps rated at 13.0 L/s
- 30 kW diesel generator
- 680 L fuel storage
- 45 m<sup>3</sup> emergency storage in oversized upstream sanitary sewers

### **Barton Estates Sewage Pumping Station**

- 3.0 m diameter wet well
- Two (2) submersible pumps rated at 6.3 L/s
- 25 kW diesel generator
- 225 L fuel storage
- Emergency bypass connection

### **Gordon Sewage Pumping Station**

- (3) submersible pumps rated at 15.4 L/s
- 180 m forcemain
- 15 kW diesel generator

### **Gazer Mooney Sewage Pumping Station**

- • Wet well capacity of 53,000 I.G.
- • 1,400 feet long 4-inch forcemain
- • Two (2) submersible sewage pumps rated at 30 IGPM
- • One (1) peak flow pump rated at 156 IGPM
- • Emergency forcemain bypass





**Appendix G**  
**Environmental Compliance Approval**  
**and Certificate of Approval's**

**AMENDED ENVIRONMENTAL COMPLIANCE APPROVAL**NUMBER 8835-9QJKSD  
Issue Date: November 21, 2014

The Corporation of the City of Guelph  
1 Carden St, City Hall  
Guelph, Ontario  
N1H 3A1

Site Location: Guelph Wastewater Treatment Plant  
530 Wellington Street West  
City of Guelph, County of Wellington

*You have applied under section 20.2 of Part II.1 of the Environmental Protection Act, R.S.O. 1990, c. E. 19 (Environmental Protection Act) for approval of:*

construction of biosolids storage facility and de-watered filtrate treatment system at the Guelph Wastewater Treatment Plant at the above site location (UTM coordinates 17N 559300, 4819200) for the treatment and disposal of sewage, having a Rated Capacity of 64,000 m<sup>3</sup>/d and consisting of the following Works:

**PROPOSED WORKS****Biosolids Storage Facility**

- two (2) 60m<sup>3</sup> capacity each, intermediate storage tanks;
- two (2) biosolids feed pumps, each pump rated at 6 m<sup>3</sup>/hr and equipped with variable frequency drives;
- two (2) above ground storage tanks;
- two (2) Rotary Lobe Pumps for tank mixing and truck loading, each pump rated at 400 m<sup>3</sup>/hr;
- one (1) ammonia scrubber type odour control system complete with a chemical dosing system;
- one (1) carbon bed scrubber type odour control system,

## De-watered Biosolids Filtrate Treatment System

A treatment system to treat the filtrate from the belt filter presses prior to being discharged to the head end of wastewater treatment plant, consisting of the following:

- a solids removal and equalization tank, overall dimensions of 8.1m long x 9.1m wide x 5m high with an operating depth of 4.6m plus 0.4m freeboard and a capacity of approximately 339 m<sup>3</sup>, having one (1) cell and equipped with two (2) feed pump (on duty) and one (1) standby pump rated at 100 m<sup>3</sup>/hr plus one(1) sump pump rated at 68.4 m<sup>3</sup>/hr;
- two (2) sequential batch reactors (SBR), operating in parallel on a 6 hour time basis, each SBR consisting of a 425 m<sup>3</sup> (max. water volume) tank with dimensions 10.2m long x 9.11m wide x 5.0m high with a minimum and maximum water depth of 3.5m and 4.6m respectively, with the decant from the SBR directed to the washwater sump and returned to the plant headworks by a 200mm diameter forcemain, and each SBR equipped with a 6.7 kW mixer and a cyclone feed pump rated at 10 m<sup>3</sup>/hr at 32m TDH;
- four (4) air blowers to supply to the SBRs (two blowers for each SBR), two blowers rated at 325 cfm and two blowers rated at 115 cfm, all to provide 27 kg oxygen/hr to each reactor at an air flow rate of 700 Nm<sup>3</sup>/hr;
- two (2) cyclones, one per reactor and rated at 10 m<sup>3</sup>/hr, with the separated feed returned to the SBR and the waste feed directed to the washwater sump and returned to the plant headworks by a 200mm diameter forcemain,

all in accordance with the supporting documents listed in Schedule 'B'.

## **EXISTING WORKS**

### **Influent Sewers**

- 1,200 mm diameter west and 1,650 mm diameter east trunk gravity sewers, discharging to the influent wet well of the raw sewage pumping station;

### **Septage Receiving Facility**

- septage receiving station with cam-lock connection, rock trap, in-line grinder, magnetic flowmeter and auto sampler;
- processed septage discharge pipe connected to the existing 1,200 mm diameter west trunk sewer at a location approximately 700 m upstream of the plant headworks;

### **Vacuum Truck Unloading Bay**

- a vacuum truck unloading bay connected to the inlet sewer;

## Headworks

### Raw sewage pumping Station

- four (4) screw pumps, each rated at 65,000 m<sup>3</sup>/d;

### Screens

- four (4) mechanical screens with 12 mm bar spacing and each with a Peak Flow Rate of 48,900 m<sup>3</sup>/d;
- two (2) wash presses, three (3) screenings conveyors, one (1) screenings washer/compactor;

### Grit Removal

- two (2) 12 m x 5 m x 4 m SWD grit tanks;
- two (2) grit pumps, each with rated at 12.5 L/s at 18.2 m TDH
- two (2) cyclone and classifier grit separation systems;
- one (1) grit conveyor;
- one (1) channel air blower rated at 81.4 m<sup>3</sup>/min at 101 kPa;
- one (1) grit tank blower rated at 16.9 m<sup>3</sup>/min at 101 kPa;

## Secondary Treatment

### Plant 1 (Rated Capacity 16,000 m<sup>3</sup>/d)

- two (2) 30 m x 12.2 m x 3.5 m SWD primary settling tanks complete with chain and flight collector mechanisms;
- two (2) 30 m x 15.75 m x 4.6 m SWD aeration tanks equipped with fine bubble diffuser system;
- two (2) 38.4 m x 14.64 m x 3.65 m SWD final settling tanks complete with chain and flight collector mechanisms;
- two (2) raw sludge pumps, each rated at 3.8 L/s at 15.2 m TDH;
- two (2) aeration blowers, each rated at 1,800 L/s at 55 kPa;
- three (3) return activated sludge (RAS) pumps, each rated at 13,100 m<sup>3</sup>/d at 9.0 m TDH;
- one (1) waste activated sludge (WAS) pump rated at 3.5 L/s, discharging to either the WAS distribution chamber or to the WAS Thickening Facility (standby for this pump provided by the Plant 1 RAS flow splitting structure);
- one (1) primary scum pump rated at 567 L/min;
- one (1) secondary scum pump rated at 567 L/min;

### Plant 2 (Rated Capacity 13,000 m<sup>3</sup>/d)

- two (2) 29.26 m x 9.76 m x 2.9 m SWD primary settling tanks complete with chain and flight collector mechanisms;
- two (2) 33.5 m x 20.1 m x 3.7 m SWD aeration tanks equipped with fine bubble diffuser system;

- two (2) 27.74 m x 9.76 m x 3.65 m SWD final settling tanks complete with chain and flight collector mechanisms;
- two (2) raw sludge pumps, each rated at 2.5 L/s;
- air pipings for air supply from either Plant 1 and/or Plant 3;
- two (2) return activated sludge (RAS) pumps, each rated at 3,900 m<sup>3</sup>/d at 5.2 m TDH and one (1) return activated sludge (RAS) pump rated at 75 L/s at 7.6 m TDH;
- WAS system comprising branch piping from the RAS discharge header and directing WAS by automated valves to either the WAS distribution chamber or to the WAS Thickening Facility;
- one (1) primary scum pump rated at 567 L/min;
- one (1) secondary scum pump rated at 567 L/min;

### **Plant 3 (Rated Capacity 13,000 m<sup>3</sup>/d)**

- two (2) 14.8 m x 18.3 m x 3 m SWD primary settling tanks complete with chain and flight collector mechanisms;
- two (2) 25.9 m x 18.3 m x 4.3 m SWD aeration tanks equipped with fine bubble diffuser system;
- two (2) 23.16 m x 14.64 m x 3.65 m SWD final settling tanks complete with chain and flight collector mechanisms;
- two (2) raw sludge pumps, each rated at 3.5 L/s;
- three (3) aeration blowers, each rated at 1,410 L/s at 48 kPa;
- two (2) return activated sludge (RAS) pumps, each rated at 8,280 m<sup>3</sup>/d at 6.4 m TDH and one (1) return activated sludge (RAS) pump rated at 47 L/s at 7.6 m TDH;
- WAS system comprising branch piping from the RAS discharge header and directing WAS by automated valves to either the WAS distribution chamber or to the WAS Thickening Facility;
- one (1) primary scum pump rated at 567 L/min;
- one (1) secondary scum pump rated at 567 L/min;

### **Plant 4 (Rated Capacity 22,000 m<sup>3</sup>/d)**

- two (2) 21.25 m x 14.3 m x 4 m SWD primary settling tanks complete with chain and flight collector mechanisms;
- two (2) 67.4 m x 21.7 m x 4.4 m SWD aeration tanks equipped with fine bubble diffuser system;
- two (2) 30.55 m x 20.1 m x 4.4 m SWD final settling tanks complete with chain and flight collector mechanisms;
- two (2) raw sludge pumps, each rated at 3.8 L/s at 7.9 m TDH to 7.8 L/s at 13.7 m;
- two (2) aeration blowers, each rated at 250 m<sup>3</sup>/min at 62 kPa;
- four (4) return activated sludge (RAS) pumps, each rated at 69 L/s at 0.6 m TDH to 127 L/s at 2.0 m TDH;
- WAS bleed-off piping from the RAS pump discharge header for return to the primary settling tanks or the waste activated sludge thickening facilities;
- two (2) primary scum pump rated at 12.6 L/s;
- one (1) secondary scum pump rated at 9.4 L/s;
- one (1) secondary effluent pump rated at 110 L/s at 8.8 m TDH to 510 L/s at 5.1 m TDH;
- one (1) channel air blower rated at 42.5 m<sup>3</sup>/min;

- two (2) ferric chloride pumps, each rated at 240 L/h;

## **Tertiary Treatment**

### **Secondary Effluent Pump Station**

- four (4) secondary effluent pumps discharging the combined secondary effluent from Plants 1 to 3 to the influent channel of the rotating biological contactors (RBC), one pump rated at 69,000 m<sup>3</sup>/d, two pumps rated at 55,000 m<sup>3</sup>/d and one pump rated at 40,000 m<sup>3</sup>/d;

### **Rotating Biological Contactors (RBCs)**

- four (4) 39.45 m x 8.03 m x 1.6 m SWD tanks, with eight (8) contactors per tank, each 3,600 mm media diameter, 7,600 mm shaft length, providing a surface area of 13,750 m<sup>2</sup>;
- three (3) blowers, each rated at 1.43 m<sup>3</sup>/s;

## **Filtration**

- two (2) continuous backwash travelling bridge tertiary filters, each with a surface area of 263 m<sup>2</sup>;
- two (2) filter backwashing pumps each rated at 11 L/s at 4.2 m TDH;
- two (2) continuous backwash travelling bridge tertiary filters, each with a surface area of 170 m<sup>2</sup>;
- two (2) filter backwashing pumps each rated at 62.511 L/s at 4.2 m TDH;

## **Phosphorus Removal**

- two (2) 45.9 m<sup>3</sup> chemical storage tanks in a concrete containment area;
- seven (7) chemical metering pumps servicing the Headworks facility and Plants 1, 2, 3, and 4, each rated at 78 L/h;

## **Disinfection and Dechlorination**

- one (1) 3.7 m X 12 m X 2.5 m SWD chlorine contact tank;
- two(2) 30 m<sup>3</sup> sodium hypochlorite storage tanks and one 1.5 m<sup>3</sup> day tank;
- four (4) sodium hypochlorite pumps, each rated at 3.3 L/min;
- two (2) 5,900 L sodium bisulphite storage tanks;
- two (2) sodium bisulphite pumps each rated at 3.3 L/min;

## **Effluent Outfall**

- one 1,520 mm Parshall flume;
- one 1,830 diameter effluent outfall pipe, approximately 123 m in length terminating at the south bank of the Speed River;

## **Waste Activated Sludge Thickening Facilities**

- one (1) 1.2 m diameter mix tank with mixer;
- one (1) rotary drum thickener with 2.25 kW motor and rated at 50 m<sup>3</sup>/h;
- one(1) WAS pump rated at 10 m<sup>3</sup>/h;
- one (1) thickened waste activated sludge (TWAS) pump rated at 2 m<sup>3</sup>/h;
- one (1) emulsion polymer make down unit with multi-zone mixing chamber;
- one (1) polymer pump rated at 0.19 L/h;
- one (1) static mixer;

### **Sludge Digestion Facilities**

- four (4) 19.88 m diameter x 7.92 m SWD primary anaerobic digesters, each having an active capacity of 2,440 m<sup>3</sup> and equipped with four (4) draft tube style mixers;
- one (1) 19.88 m diameter x 7.92 m SWD secondary anaerobic digester having an active capacity of 2,350m<sup>3</sup>;
- Control Building Number 1 with two (2) sludge recirculation pumps each rated at 25.2 L/s at 6.1 m TDH, two (2) sludge transfer pumps each rated at 18.9 L/s at 10.7 m TDH and two (2) sludge heat exchangers each rated at 275 kW;
- Control Building Number 2 with two (2) sludge recirculation pumps each rated at 19.4 L/s at 6.1 m TDH, two (2) sludge recirculation pumps each rated at 13.14 L/s at 9.5 m TDH, one (1) sludge transfer pump rated at 15.8 L/s at 11.6 m TDH and two (2) sludge heat exchangers each rated at 275 kW;

### **Waste Gas Burner**

- one (1) waste gas burner;

### **Co-generation Facility**

- two (2) 250 kW cogeneration digester gas or natural gas fired electrical engines;
- one (1) heat exchanger;

### **Sludge Dewatering**

- 200 mm diameter piping, complete with a gate valve on either end of the filtrate pipe, from the on-site dewatering facility at the Guelph Wastewater Treatment Plant to include a tee from the existing discharge point at the dewatering facility) to the North Channel headworks discharge and to the headworks Archimedes screw pumps (screw pump 110 and 111);
  - two (2) belt filter presses, each rated at 9.5 L/s;
  - two (2) belt filter presses, each rated at 12 L/s;
  - two (2) belt filter feed sludge pumps, each rated at 9.5 L/s;
  - two (2) belt filter feed sludge pumps, each rated at 12 L/s;
  - filter belt washing and drainage system with four (4) washwater feed pumps and two (2) filtrate transfer pumps;

- polymer feed system with one (1) bulk bag dry polymer make down unit, two (2) 11.4 m<sup>3</sup> polymer mixing tanks with mixer, five (5) polymer metering pumps each rated at 0.57 L/s at 17.4 m TDH, four (4) in-line static mixers in the sludge line and four (4) polymer supply pumps, each rated at 7.6 L/min;
- one (1) screw conveyor system to transfer sludge cake from the filter presses to the sludge cake storage bin;

### **Sludge Composting Facility**

- one (1) hammermill, one (1) 825 m<sup>3</sup> amendment silo, one (1) amendment silo baghouse;
- one (1) 100 m<sup>3</sup> dewatered sludge storage bin equipped with discharge screws, one (1) twin auger continuous flow type mixer;
- three (3) 1,500 m<sup>3</sup> enclosed compost reactor tanks with compost discharge sweep auger and in-feed rotary distributor, four (4) aeration blowers (one standby), each rated at 120 m<sup>3</sup>/min and four (4) exhaust blowers (one standby), each rated at 131 m<sup>3</sup>/min
- compost screening system with one (1) screen with 6 mm mesh size and rated at 60 m<sup>3</sup>/h;
- three (3) reactor off-gas heat recovery units;

### **Lystek Biosolids Treatment**

- one (1) capacity progressive cavity pump rated at 42 m<sup>3</sup>/d;
- one (1) 6,430 L KOH chemical storage tank;
- two (2) chemical transfer pumps, each rated at 115 L/h at 1,034 kPa;
- two (2) 5,000 L processing tanks, each equipped with one (1) 37.5 kW disperser (mixer) and each with one (1) transfer pump rated at 25.2 L/s;
- one (1) propane-fired gas steam boiler equipped with a boiler feed water conditioning system and a flue vent, to supply steam to the processing tanks;
- one (1) 1,362 L process water holding tank, equipped with a 0.75 kW mixer;
- above-ground temporary storage tanks, to provide temporary storage of up to 1,000 m<sup>3</sup> of processed biosolids product;
- one (1) 2.44 m diameter x 2.97 m high 15,329 L double-walled polyethylene KOH chemical storage tank;
- one (1) 227 L/min capacity chemical pump;

### **MISCELLANEOUS**

all other controls, electrical equipment, instrumentation, piping, pumps, valves and appurtenances essential for the proper operation of the aforementioned sewage works.



*For the purpose of this environmental compliance approval, the following definitions apply:*

"Approval" means this entire document and any schedules attached to it, and the application;

"Average Daily Flow" means the cumulative total sewage flow to the sewage works during a calendar year divided by the number of days during which sewage was flowing to the sewage works that year;

"BOD5" (also known as TBOD<sub>5</sub>) means five day biochemical oxygen demand measured in an unfiltered sample and includes carbonaceous and nitrogenous oxygen demand;

"By-pass" means diversion of sewage around one or more unit processes within the Sewage Treatment Plant with the diverted sewage flows being returned to the Sewage Treatment Plant treatment train upstream of the Final Effluent sampling location, and discharging to the environment through Sewage Treatment Plant outfall;

"CBOD5" means five day carbonaceous (nitrification inhibited) biochemical oxygen demand measured in an unfiltered sample;

"Daily Concentration" means the concentration of a contaminant in the effluent discharged over any single day, as measured by a composite or grab sample, whichever is required;

"Director" means a person appointed by the Minister pursuant to section 5 of the EPA for the purposes of Part II.1 of the EPA;

"*E. Coli* " refers to the thermally tolerant forms of *Escherichia* that can survive at 44.5 degrees Celsius;

"Emergency Situation" means a structural, mechanical or electrical failure that causes a temporary reduction in the capacity of the Sewage Treatment Plant or an unforeseen flow condition that may result in:

- a) danger to the health or safety of any person; or,
- b) injury or damage to any property, or serious risk of injury or damage to any property.
- c) treatment process biomass washout.

"Equivalent equipment" means a substituted equipment or like-for-like equipment that meets the required quality and performance standards of a named equipment;

"EPA" means the *Environmental Protection Act* , R.S.O. 1990, c.E.19, as amended;

"Event" means an action or occurrence, at a given location within the Sewage Treatment Plant that causes a Plant Bypass or Plant Overflow. An Event ends when there is no recurrence of a Bypass or Overflow in the 12-hour period following the last Bypass or Overflow. Two Events are separated by at least 12 hours during which there has been no recurrence of a Bypass or Overflow;

"Final Effluent" means sewage discharge via the Sewage Treatment Plant outfall after undergoing the full train of unit processes as listed in the Approval;

"Geometric Mean Density" is the nth root of the product of multiplication of the results of n number of samples over the period specified;

"Limited Operational Flexibility" (LOF) means any modifications that the Owner is permitted to make to the Works under this Approval;

"Ministry" means the ministry of the government of Ontario responsible for the EPA and OWRA and includes all officials, employees or other persons acting on its behalf;

"Monthly Average Concentration" means the arithmetic mean of all Daily Concentrations of a contaminant in the effluent sampled or measured, or both, during a calendar month;

"Monthly Average Daily Flow" means the cumulative total sewage flow to the sewage works during a calendar month divided by the number of days during which sewage was flowing to the sewage works that month;

"Monthly Average Loading" means the value obtained by multiplying the Monthly Average Concentration of a contaminant by the Monthly Average Daily Flow over the same calendar month;

"Notice of Modifications" means the form entitled "Notice of Modifications to Sewage Works";

"Owner" means The Corporation of the City of Guelph and its successors and assignees;

"OWRA" means the Ontario Water Resources Act , R.S.O. 1990, c. O.40, as amended

"Peak Flow Rate" means the maximum rate of sewage flow for which the plant or process unit was designed;

"Plant Overflow" means a discharge to the environment from the Sewage Treatment Plant at a location other than the plant outfall or into the plant outfall downstream of the Final Effluent sampling location;

"Previous Works" means portions of the sewage works previously constructed and approved under an Approval;

"Rated Capacity" means the Average Daily Flow for which the Works are approved to handle;

"Regional Water Compliance Manager" means the Regional Water Compliance Manager of the South-Western Region of the Ministry;

"Sewage Treatment Plant" means the entire sewage treatment and effluent discharge facility;

"Substantial Completion" has the same meaning as "substantial performance" in the Construction Lien Act ;

"Water Supervisor" means the Water Supervisor for the Guelph Office of the Ministry;

"Works" means the sewage works described in the Owner's application and this Approval, including the

Proposed Works, Previous Works and the modifications made under Limited Operational Flexibility.

*You are hereby notified that this environmental compliance approval is issued to you subject to the terms and conditions outlined below:*

## **TERMS AND CONDITIONS**

### **1. GENERAL PROVISIONS**

(1) The Owner shall ensure that any person authorized to carry out work on or operate any aspect of the Works is notified of this Approval and the conditions herein and shall take all reasonable measures to ensure any such person complies with the same.

(2) Except as otherwise provided by these Conditions, the Owner shall design, build, install, operate and maintain the Works in accordance with the description given in this Approval, the application for approval of the works and the submitted supporting documents and plans and specifications as listed in this Approval.

(3) Where there is a conflict between a provision of any submitted document referred to in this Approval and the Conditions of this Approval, the Conditions in this Approval shall take precedence, and where there is a conflict between the listed submitted documents, the document bearing the most recent date shall prevail.

(4) Where there is a conflict between the listed submitted documents, and the application, the application shall take precedence unless it is clear that the purpose of the document was to amend the application.

(5) The requirements of this Approval are severable. If any requirement of this Approval, or the application of any requirement of this Approval to any circumstance, is held invalid or unenforceable, the application of such requirement to other circumstances and the remainder of this Approval shall not be affected thereby.

### **2. EXPIRY OF APPROVAL**

This Approval will cease to apply to those parts of the Works which have not been constructed within five (5) years of the date of this Approval.

### **3. CHANGE OF OWNER**

(1) The Owner shall notify the Water Supervisor and the Director, in writing, of any of the following changes within **30 days** of the change occurring:

(a) change of Owner;

(b) change of address of the Owner;

(c) change of partners where the Owner is or at any time becomes a partnership, and a copy of the most recent declaration filed under the Business Names Act, R.S.O. 1990, c.B17 shall be included

- in the notification to the Water Supervisor;
- (d) change of name of the corporation where the Owner is or at any time becomes a corporation, and a copy of the most current information filed under the *Corporations Informations Act*, R.S.O. 1990, c. C39 shall be included in the notification to the Water Supervisor;

(2) In the event of any change in ownership of the Works, other than a change to a successor municipality, the Owner shall notify in writing the succeeding owner of the existence of this Approval, and a copy of such notice shall be forwarded to the Water Supervisor and the Director.

#### 4. UPON THE SUBSTANTIAL COMPLETION OF THE PROPOSED WORKS

(1) Upon the Substantial Completion of the Proposed Works, the Owner shall prepare a statement, certified by a Professional Engineer, that the works are constructed in accordance with this Approval, and upon request, shall make the written statement available for inspection by Ministry personnel.

(2) Within six (6) months of the Substantial Completion of the Proposed Works, a set of as-built drawings showing the works "as constructed" shall be prepared. These drawings shall be kept up to date through revisions undertaken from time to time and a copy shall be retained at the Works for the operational life of the Works.

#### 5. BYPASSES

(1) Any Bypass or Plant Overflow is prohibited, except:

- (a) in an Emergency Situation;
- (b) where the approved design and operation of the Works provides for Bypasses / Plant Overflows to be triggered under certain flow conditions and those conditions have been met;
- (c) where the Bypass / Plant Overflow is a direct and unavoidable result of a planned maintenance procedure, the Owner notified the Director **15 days** prior to the Bypass/Plant Overflow and the Director has given written consent of the Bypass/Plant Overflow; and
- (d) where the Bypass / Plant Overflow is planned for research or training purposes, the discharger notified the Director **15 days** prior to the Bypass / Plant Overflow and the Director has given written consent of the Bypass / Plant Overflow.

(2) The Owner shall forthwith notify the Spills Action Centre (SAC) and the Medical Officer of Health of all Bypass and Plant Overflow Events. This notice shall include, at a minimum, the following information:

- (a) the date, time, and duration of the Event;
- (b) the location of the Event;
- (c) the measured or estimated volume of the Event;
- (d) the reason for the Event; and
- (e) the level of treatment the Bypass(es) and/or Plant Overflow(s) received and disinfection status of same.

(3) The Owner shall submit Bypass and Plant Overflow Event Reports to the Water Supervisor on a quarterly basis, no later than each of the following dates for each calendar year: February 14, May 15, August 14, and November 15. Event Reports shall be in an electronic format specified by the Ministry. In each Event Report the Owner shall include, at a minimum, the following information on any Events that occurred during the preceding quarter:

- (a) the date of the Event(s);
- (b) the measured or estimated volume of the Event(s);
- (c) the duration of the Event(s);
- (d) the location of the Event(s);
- (e) the reason for the Event(s); and
- (f) the level of treatment the Bypass(es) and/or Plant Overflow(s) received and disinfection status of same.

(4) The Owner shall use best efforts to collect a representative sample consisting of a minimum of two (2) grab samples of the By-pass / Plant Overflow and have it analyzed for parameters outlined in Condition 7 using the protocols specified in Condition 9 (with BOD5 instead of CBOD5, preferably), one at the beginning of the Event and the second approximately near the end of the Event, to best reflect the effluent quality of such By-pass or Plant Overflow.

(5) The Owner shall maintain a logbook of all Plant Bypasses and Plant Overflows, which shall contain, at a minimum, the types of information set out in subsection 2(a) to 2(e) in respect of each Bypass and Plant Overflow.

6. EFFLUENT OBJECTIVES

(1) The Owner shall use best efforts to design, construct and operate the Works with the objective that the concentrations of the materials named below as effluent parameters are not exceeded in the effluent from the Works.

<b>Table 1 - Effluent Objectives</b>	
<b>Effluent Parameter</b>	<b>Concentration Objective</b> (milligrams per litre unless otherwise indicated)
CBOD5	19.8 (Apr 1 to Oct 31)
CBOD5	6.7 (Nov 1 to Mar 31)
Total Suspended Solids	7.0
Total Phosphorus	0.34 (Apr 1 to Oct 31) 0.63 (Nov 1 to Mar 31)
Total Ammonia Nitrogen	3.0 (Nov 1 to Mar 31)
Total Residual Chlorine	non-detectable
<i>E. Coli</i>	150 organisms/100 mL Monthly Geometric Mean Density

(2) The Owner shall use best efforts to:

- (a) maintain the pH of the effluent from the Works within the range of 6.5 - 9.0, inclusive, at all times;
- (b) operate the works within the Rated Capacity of the Works;
- (c) ensure that the effluent from the Works is essentially free of floating and settleable solids and does not contain oil or any other substance in amounts sufficient to create a visible film or sheen or foam or discolouration on the receiving waters;

(3) The Owner shall include in all reports submitted in accordance with Condition 10 a summary of the efforts made and results achieved under this Condition.

7. EFFLUENT LIMITS

(1) The Owner shall design and construct the Works and operate and maintain the Works such that the concentrations and waste loadings of the materials named below as effluent parameters are not exceeded in the effluent from the Works.

<b>Table 2 - Effluent Limits</b>		
<b>Effluent Parameter</b>	<b>Average Concentration</b> (milligrams per litre unless otherwise indicated)	<b>Average Waste Loading</b> (kilograms per day unless otherwise indicated)
Column 1	Column 2	Column 3
BOD5	22 (Apr 1 to Oct 31)	1,408 (Apr 1 to Oct 31)0
CBOD5	7.4 (Nov 1 to Mar 31)	473.6 (Nov 1 to Mar 31)
Total Suspended Solids	10	640
Total Phosphorus	0.38 (Apr 1 to Oct 31)	24.5 (Apr 1 to Oct 31)
	0.7 (Nov 1 to Mar 31)	44.8 (Nov 1 to Mar 31)
Total Ammonia Nitrogen	3.4 (Nov 1 to Mar 31)	217.6 (Nov 1 to Mar 31)
Total Residual Chlorine	0.02	-
pH of the effluent maintained between 6.0 to 9.5, inclusive, at all times		

(2) For the purposes of determining compliance with and enforcing subsection (1):

- (a) The Monthly Average Concentration of a parameter named in Column 1 of Table 2 shall not exceed the corresponding maximum concentration set out in Column 2 of Table 2.
- (b) The Monthly Average Loading of a parameter named in Column 1 of Table 2 shall not exceed the corresponding maximum waste loading set out in Column 3 of Table 2.
- (c) The pH of the effluent shall be maintained within the limits outlined in Table 2, at all times.

(3) Notwithstanding subsection (1), the Owner shall operate and maintain the Works such that the effluent is continuously disinfected so that the monthly Geometric Mean Density of *E. Coli* does not exceed 200 organisms per 100 millilitres of effluent discharged from the Works.

(4) The effluent requirements set out in this condition shall apply upon issuance of this Approval.

8. OPERATION AND MAINTENANCE

(1) The Owner shall exercise due diligence in ensuring that, at all times, the Works and the related equipment and appurtenances used to achieve compliance with this Approval are properly operated and maintained. Proper operation and maintenance shall include effective performance, adequate funding, adequate operator staffing and training, including training in all procedures and other requirements of this Approval and the Act and regulations, adequate laboratory facilities, process controls and alarms and the use of process chemicals and other substances used in the Works.

(2) The Owner shall maintain an operations manual that includes, but not necessarily limited to, the following information:

- (a) operating procedures for routine operation of the Works;
- (b) inspection programs, including frequency of inspection, for the Works and the methods or tests employed to detect when maintenance is necessary;
- (c) repair and maintenance programs, including the frequency of repair and maintenance for the Works;
- (d) procedures for the inspection and calibration of monitoring equipment;
- (e) a spill prevention control and countermeasures plan, consisting of contingency plans and procedures for dealing with equipment breakdowns, potential spills and any other abnormal situations, including notification of the Water Supervisor; and
- (f) procedures for receiving, responding and recording public complaints, including recording any follow-up actions taken.

(3) The Owner shall maintain the operations manual current and retain a copy at the location of the Works for the operational life of the Works. Upon request, the Owner shall make the manual available to Ministry staff.

(4) The Owner shall provide for the overall operation of the Works with an operator who holds a licence that is applicable to that type of facility and that is of the same class as or higher than the class of the facility in accordance with Ontario Regulation 129/04.

9. MONITORING AND RECORDING

The Owner shall, upon commencement of operation of the Works, carry out the following monitoring program:

(1) All samples and measurements taken for the purposes of this Approval are to be taken at a time and in a location characteristic of the quality and quantity of the effluent stream over the time period being monitored.

(2) For the purposes of this condition, the following definitions apply:

- (a) Weekly means once each week.

(3) Samples shall be collected at the following sampling points, at the frequency specified, by means of the specified sample type and analyzed for each parameter listed and all results recorded:

<b>Table 3 - Influent Monitoring</b>		
<b>Parameters</b>	<b>Sample Type</b>	<b>Frequency</b>
BOD5	Composite	Weekly
Total Suspended Solids	Composite	Weekly
Total Phosphorus	Composite	Weekly
Total Kjeldahl Nitrogen	Composite	Weekly

<b>Table 4 - Effluent Monitoring</b>		
<b>Parameters</b>	<b>Sample Type</b>	<b>Frequency</b>
BOD5	Composite	Weekly
CBOD5	Composite	Weekly
Total Suspended Solids	Composite	Weekly
Total Phosphorus	Composite	Weekly
Total Ammonia Nitrogen	Composite	Weekly
Total Residual Chlorine or Bisulphite Residual	Grab	Weekly
<i>E. Coli</i>	Grab	Weekly
pH	Grab	Weekly
Temperature	Grab	Weekly

(4) The methods and protocols for sampling, analysis and recording shall conform, in order of precedence, to the methods and protocols specified in the following:

- (a) the Ministry's Procedure F-10-1, "Procedures for Sampling and Analysis Requirements for Municipal and Private Sewage Treatment Works (Liquid Waste Streams Only), as amended from time to time by more recently published editions;
- (b) the Ministry's publication "Protocol for the Sampling and Analysis of Industrial/Municipal Wastewater" (January 1999), ISBN 0-7778-1880-9, as amended from time to time by more recently published editions;
- (c) the publication "Standard Methods for the Examination of Water and Wastewater" (21st edition), as amended from time to time by more recently published editions.

(5) If the Owner monitors Bisulphite Residual as a surrogate to Total Chlorine Residual, then detected levels of Bisulphite Residual in the sample shall be deemed to confirm absence or equivalent to 0.0 mg/L concentration level of Total Residual Chlorine.

(6) The temperature and pH of the effluent from the Works shall be determined in the field at the time of



sampling for Total Ammonia Nitrogen. The concentration of un-ionized ammonia shall be calculated using the total ammonia concentration, pH and temperature using the methodology stipulated in "Ontario's Provincial Water Quality Objectives" dated July 1994, as amended, for ammonia (un-ionized).

(7) The Owner shall install and maintain continuous flow measuring device(s), to measure the flowrate of the influent to and effluent from the Works with an accuracy to within plus or minus 15 per cent (+/- 15%) of the actual flowrate for the entire design range of the flow measuring device, and record the flowrate at a daily frequency.

## 10. REPORTING

(1) One week prior to the start up of the operation of the Proposed Works, the Owner shall notify the Water Supervisor (in writing) of the pending start up date.

(2) Ten (10) days prior to the date of a planned By-pass being conducted pursuant to Condition 5 and as soon as possible for an unplanned By-pass, the Owner shall notify the Water Supervisor (in writing) of the pending start date, in addition to an assessment of the potential adverse effects on the environment and the duration of the By-pass.

(3) The Owner shall report to the Water Supervisor or designate, any exceedence of any parameter specified in Condition 7 orally, as soon as reasonably possible, and in writing within seven (7) days of the exceedence.

(4) In addition to the obligations under Part X of the *Environmental Protection Act*, the Owner shall, within 10 working days of the occurrence of any reportable spill as defined in Ontario Regulation 675/98, bypass or loss of any product, by-product, intermediate product, oil, solvent, waste material or any other polluting substance into the environment, submit a full written report of the occurrence to the Water Supervisor describing the cause and discovery of the spill or loss, clean-up and recovery measures taken, preventative measures to be taken and schedule of implementation.

(5) The Owner shall, upon request, make all manuals, plans, records, data, procedures and supporting documentation available to Ministry staff.

(6) The Owner shall prepare, and submit to the Water Supervisor, a performance report, on an annual basis, within ninety (90) days following the end of the period being reported upon. The first such report shall cover the first annual period following the commencement of operation of the Works and subsequent reports shall be submitted to cover successive annual periods following thereafter. The reports shall contain, but shall not be limited to, the following information:

- (a) a summary and interpretation of all monitoring data and a comparison to the effluent limits outlined in Condition 7, including an overview of the success and adequacy of the Works;
- (b) a description of any operating problems encountered and corrective actions taken;
- (c) a summary of all maintenance carried out on any major structure, equipment, apparatus, mechanism or thing forming part of the Works;

- (d) a summary of any effluent quality assurance or control measures undertaken in the reporting period;
- (e) a summary of the calibration and maintenance carried out on all effluent monitoring equipment;
- (f) a description of efforts made and results achieved in meeting the Effluent Objectives of Condition 6.
- (g) a tabulation of the volume of sludge generated in the reporting period, 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;
- (h) a summary of any complaints received during the reporting period and any steps taken to address the complaints;
- (i) a summary of all By-pass, spill or abnormal discharge events;
- (j) a copy of all Notice of Modifications submitted to the Water Supervisor as a result of Schedule 'A', Section 1, with a status report on the implementation of each modification;
- (k) a report summarizing all modifications completed as a result of Schedule 'A', Section 3; and
- (l) any other information the Water Supervisor requires from time to time.

(7) The Owner shall, within thirty (30) calendar days of issuance of this Approval, submit a Municipal and Local Services Board Sewage Works Profile Information Form, and shall resubmit the updated document every time a notification is provided to the Water Supervisor in compliance with requirements of change of ownership under this Approval.

#### 11. LIMITED OPERATIONAL FLEXIBILITY

(1) The Owner may make modifications to the Works in accordance with the Terms and Conditions of this Approval and subject to the Ministry's "Limited Operational Flexibility Criteria for Modifications to Sewage Works", included under Schedule 'A' of this Approval, as amended.

(2) Sewage works proposed under Limited Operational Flexibility shall adhere to the design guidelines contained within the Ministry's publication "Design Guidelines for Sewage Works 2008", as amended.

(3) The Owner shall ensure at all times, that the Works, related equipment and appurtenances which are installed or used to achieve compliance are operated in accordance with all Terms and Conditions of this Approval.

(4) For greater certainty, the following are not permitted as part of Limited Operational Flexibility:

- (a) Modifications to the Works that result in an increase of the approved Rated Capacity of the Works;
- (b) Modifications to the Works that may adversely affect the approved effluent quality criteria or the location of the discharge/outfall;
- (c) Modifications to the treatment process technology of the Works, or modifications that involve construction of new reactors (tanks) or alter the treatment train process design;

(d) Modifications to the Works approved under s.9 of the EPA, and

(e) Modifications to the Works pursuant to an order issued by the Ministry.

(5) Implementation of Limited Operational Flexibility is not intended to be used for piecemeal measures that result in major alterations or expansions.

(6) If the implementation of Limited Operational Flexibility requires changes to be made to the Emergency Response, Spill Reporting and Contingency Plan, the Owner shall, as deemed necessary in consultation with the Water Supervisor, provide a revised copy of this plan to the local fire services authority prior to implementing Limited Operational Flexibility.

(7) For greater certainty, any modification made under the Limited Operational Flexibility may only be carried out after other legal obligations have been complied with, including those arising from the Environmental Protection Act, Niagara Escarpment Planning and Development Act, Oak Ridges Moraine Conservation Act, Lake Simcoe Protection Act and Greenbelt Act.

(8) Prior to implementing Limited Operational Flexibility, the Owner shall complete a Notice of Modifications describing any proposed modifications to the Works and submit it to the Water Supervisor.

## SCHEDULE 'A'

### **Limited Operational Flexibility Criteria for Modifications to Municipal Sewage Works**

1. The modifications to sewage works approved under an Environmental Compliance Approval (Approval) that are permitted under the Limited Operational Flexibility (LOF), are outlined below and are subject to the LOF conditions in the Approval, and require the submission of the Notice of Modifications. If there is a conflict between the sewage works listed below and the Terms and Conditions in the Approval, the Terms and Conditions in the Approval shall take precedence.

#### 1.1 Sewage Pumping Stations

- a. Alter pumping capacity by adding or replacing equipment where new equipment is located within an existing sewage treatment plant site or an existing sewage pumping station site, provided that the modifications do not result in an increase of the sewage treatment plant Rated Capacity and the existing flow process and/or treatment train are maintained, as applicable.
- b. Forcemain relining and replacement with similar pipe size where the nominal diameter is not greater than 1,200mm

#### 1.2 Sewage Treatment Process

- a. Installing additional chemical dosage equipment including replacing with alternative chemicals for pH adjustment or coagulants (non-toxic polymers) provided that there are no modifications of treatment processes or other modifications that may alter the intent of operations and may have negative impacts on the effluent quantity and quality.
- b. Expanding the buffer zone between a sanitary sewage lagoon facility or land treatment area and adjacent uses provided that the buffer zone is entirely on the proponent's land.
- c. Optimizing existing sanitary sewage lagoons with the purpose to increase efficiency of treatment operations provided that existing sewage treatment plant rated capacity is not exceeded and where no land acquisition is required.
- d. Optimizing existing sewage treatment plant equipment with the purpose to increase the efficiency of the existing treatment operations, provided that there are no modifications to the works that result in an increase of the approved Rated Capacity, and may have adverse effects to the effluent quality or location of the discharge.
- e. Replacement, refurbishment of previously approved equipment in whole or in part with Equivalent Equipment, like-for-like of different make and model, provided that the firm capacity, reliability, performance standard, level of quality and redundancy of the group of equipment is kept the same or exceeded. For clarity purposes, the following equipment can be considered under this provision: pumps, screens, grit separators, blowers, aeration equipment, sludge thickeners, dewatering

equipment, UV systems, chlorine contact equipment, bio-disks, and sludge digester systems.

### 1.3 Sewage Treatment Plant Outfall

- a. Replacement of discharge pipe with similar pipe size or diffusers provided that the outfall location is not changed.

### 1.4 Sanitary Sewers

- a. Pipe relining and replacement with similar pipe size within the Sewage Treatment Plant site, where the nominal diameter is not greater than 1,200mm.

### 1.5 Pilot Systems

- a. Installation of pilot systems for new or existing technologies provided that:
  - i. any effluent from the pilot system is discharged to the inlet of the sewage treatment plant or hauled off-site for proper disposal,
  - ii. any effluent from the pilot system discharged to the inlet of the sewage treatment plant or sewage conveyance system does not significantly alter the composition/concentration of the influent sewage to be treated in the downstream process; and that it does not add any inhibiting substances to the downstream process, and
  - iii. the pilot system's duration does not exceed a maximum of two years; and a report with results is submitted to the Director and Water Supervisor three months after completion of the pilot project.
2. Sewage works that are exempt from section 53 of the OWRA by O. Reg. 525/98 continue to be exempt and are not required to follow the notification process under this Limited Operational Flexibility.
3. Normal or emergency operational modifications, such as repairs, reconstructions, or other improvements that are part of maintenance activities, including cleaning, renovations to existing approved sewage works equipment, provided that the modification is made with Equivalent Equipment, are considered pre-approved.
4. The modifications noted in section (3) above are not required to follow the notification protocols under Limited Operational Flexibility, provided that the number of pieces and description of the equipment as described in the Approval does not change.

Schedule 'B' forms part of this Approval and contains a list of supporting documentation / information received, reviewed and relied upon in the issuance of this Approval.

**SCHEDULE 'B'**

1. Environmental Compliance Approval Application signed by Kiran Suresh, Project Manager, The Corporation of the City of Guelph and submitted by Michael Gundry, P. Eng., Principal, Stantec Consulting Inc., Consulting Engineers, together with final plans, specifications and supporting documentation prepared by Stantec Consulting Inc., Consulting Engineers.
  
2. Environmental Compliance Approval Application signed and submitted by Kiran Suresh, Project Manager, The Corporation of the City of Guelph via covering letter dated March 15, 2013 and supporting documentation and report entitled "Guelph WWTP Side-Stream Deammonification Treatment for Low Energy Ammonia Removal, Schematic Design Report" dated February 22, 2013 prepared by CH2M HILL Canada Limited, Consulting Engineers.

## Notice of Modification to Sewage Works

RETAIN COPY OF COMPLETED FORM AS PART OF THE ECA AND SEND A COPY TO THE WATER SUPERVISOR (FOR MUNICIPAL) OR DISTRICT MANAGER (FOR NON-MUNICIPAL SYSTEMS)

<b>Part 1 – Environmental Compliance Approval (ECA) with Limited Operational Flexibility</b> <i>(Insert the ECA's owner, number, issuance date and notice number, which should start with "01" and consecutive numbers thereafter)</i>		
ECA Number	Issuance Date (mm/dd/yy)	Notice number (if applicable)
ECA Owner		Municipality

<b>Part 2: Description of the modifications as part of the Limited Operational Flexibility</b> <i>(Attach a detailed description of the sewage works)</i>
<p>Description shall include:</p> <ol style="list-style-type: none"> <li>1. A detail description of the modifications and/or operations to the sewage works (e.g. sewage work component, location, size, equipment type/model, material, process name, etc.)</li> <li>2. Confirmation that the anticipated environmental effects are negligible.</li> <li>3. List of updated versions of, or amendments to, all relevant technical documents that are affected by the modifications as applicable, i.e. submission of documentation is not required, but the listing of updated documents is (design brief, drawings, emergency plan, etc.)</li> </ol>

<b>Part 3 – Declaration by Professional Engineer</b>	
<p>I hereby declare that I have verified the scope and technical aspects of this modification and confirm that the design:</p> <ol style="list-style-type: none"> <li>1. Has been prepared or reviewed by a Professional Engineer who is licensed to practice in the Province of Ontario;</li> <li>2. Conforms with the Limited Operational Flexibility as per the ECA;</li> <li>3. Has been designed consistent with Ministry's Design Guidelines, adhering to engineering standards, industry's best management practices, and demonstrating ongoing compliance with s.53 of the Ontario Water Resources Act; and other appropriate regulations.</li> </ol> <p>I hereby declare that to the best of my knowledge, information and belief the information contained in this form is complete and accurate.</p>	
Name (Print)	PEO License Number
Signature	Date (mm/dd/yy)
Name of Employer	

<b>Part 4 – Declaration by Owner</b>	
<p>I hereby declare that:</p> <ol style="list-style-type: none"> <li>1. I am authorized by the Owner to complete this Declaration;</li> <li>2. The Owner consents to the modification; and</li> <li>3. These modifications to the sewage works are proposed in accordance with the Limited Operational Flexibility as described in the ECA.</li> <li>4. The Owner has fulfilled all applicable requirements of the <i>Environmental Assessment Act</i>.</li> </ol> <p>I hereby declare that to the best of my knowledge, information and belief the information contained in this form is complete and accurate.</p>	
Name of Owner Representative (Print)	Owner representative's title (Print)
Owner Representative's Signature	Date (mm/dd/yy)

*The reasons for the imposition of these terms and conditions are as follows:*

1. Condition 1 is imposed to ensure that the Works are built and operated in the manner in which they were described for review and upon which approval was granted. This condition is also included to emphasize the precedence of Conditions in the Approval and the practice that the Approval is based on the most current document, if several conflicting documents are submitted for review. The condition also advises the Owners their responsibility to notify any person they authorized to carry out work pursuant to this Approval the existence of this Approval.
2. Condition 2 is included to ensure that the Works are constructed in a timely manner so that standards applicable at the time of Approval of the Works are still applicable at the time of construction, to ensure the ongoing protection of the environment.
3. Condition 3 is included to ensure that the Ministry records are kept accurate and current with respect to the approved works and to ensure that subsequent owners of the Works are made aware of the Approval and continue to operate the Works in compliance with it.
4. Condition 4 is included to ensure that the Works are constructed in accordance with the approval and that record drawings of the Works "as constructed" are maintained for future references.
5. Condition 5 is included to indicate that by-passes of untreated sewage to the receiving watercourse is prohibited, save in certain limited circumstances where the failure to Bypass could result in greater injury to the public interest than the Bypass itself where a Bypass will not violate the approved effluent requirements, or where the Bypass can be limited or otherwise mitigated by handling it in accordance with an approved contingency plan. The notification and documentation requirements allow the Ministry to take action in an informed manner and will ensure the Owner is aware of the extent and frequency of Bypass events.
6. Condition 6 is imposed to establish non-enforceable effluent quality objectives which the Owner is obligated to use best efforts to strive towards on an ongoing basis. These objectives are to be used as a mechanism to trigger corrective action proactively and voluntarily before environmental impairment occurs and before the compliance limits of Condition 7 are exceeded.
7. Condition 7 is imposed to ensure that the effluent discharged from the Works to the Speed River meets the Ministry's effluent quality requirements thus minimizing environmental impact on the receiver and to protect water quality, fish and other aquatic life in the receiving water body.
8. Condition 8 is included to require that the Works be properly operated, maintained, funded, staffed and equipped such that the environment is protected and deterioration, loss, injury or damage to any person or property is prevented. As well, the inclusion of a comprehensive operations manual governing all significant areas of operation, maintenance and repair is prepared, implemented and kept up-to-date by the owner and made available to the Ministry. Such a manual is an integral part of the operation of the Works. Its compilation and use should assist the Owner in staff training, in proper plant operation and in



identifying and planning for contingencies during possible abnormal conditions. The manual will also act as a benchmark for Ministry staff when reviewing the Owner's operation of the work.

9. Condition 9 is included to enable the Owner to evaluate and demonstrate the performance of the Works, on a continual basis, so that the Works are properly operated and maintained at a level which is consistent with the design objectives and effluent limits specified in the Approval and that the Works does not cause any impairment to Speed River.
10. Condition 10 is included to provide a performance record for future references, to ensure that the Ministry is made aware of problems as they arise, and to provide a compliance record for all the terms and conditions outlined in this Approval, so that the Ministry can work with the Owner in resolving any problems in a timely manner.
11. Condition 11 is included to ensure that the Works are operated in accordance with the application and supporting documentation submitted by the Owner, and not in a manner which the Director has not been asked to consider. These conditions are also included to ensure that a Professional Engineer has reviewed the proposed modifications and attests that the modifications are in line with that of Limited Operational Flexibility, and provide assurance that the proposed modifications comply with the Ministry's requirements stipulated in the terms and conditions of this Approval, MOE policies, guidelines, and industry engineering standards and best management practices.

**Upon issuance of the environmental compliance approval, I hereby revoke Approval No(s).  
0816-9AQP3C issued on December 17, 2013.**

*In accordance with Section 139 of the Environmental Protection Act, you may by written Notice served upon me and the Environmental Review Tribunal within 15 days after receipt of this Notice, require a hearing by the Tribunal. Section 142 of the Environmental Protection Act provides that the Notice requiring the hearing shall state:*

1. The portions of the environmental compliance approval or each term or condition in the environmental compliance approval in respect of which the hearing is required, and;
2. The grounds on which you intend to rely at the hearing in relation to each portion appealed.

*Pursuant to subsection 139(3) of the Environmental Protection Act, a hearing may not be required with respect to any terms and conditions in this environmental compliance approval, if the terms and conditions are substantially the same as those contained in an approval that is amended or revoked by this environmental compliance approval.*

*The Notice should also include:*

3. The name of the appellant;
4. The address of the appellant;
5. The environmental compliance approval number;
6. The date of the environmental compliance approval;
7. The name of the Director, and;
8. The municipality or municipalities within which the project is to be engaged in.

*And the Notice should be signed and dated by the appellant.*

*This Notice must be served upon:*

The Secretary\*  
Environmental Review Tribunal  
655 Bay Street, Suite 1500  
Toronto, Ontario  
M5G 1E5

AND

The Director appointed for the purposes of  
Part II.1 of the Environmental Protection Act  
Ministry of the Environment and  
Climate Change  
2 St. Clair Avenue West, Floor 12A  
Toronto, Ontario  
M4V 1L5

**\* Further information on the Environmental Review Tribunal's requirements for an appeal can be obtained directly from the Tribunal at: Tel: (416) 212-6349, Fax: (416) 314-4506 or [www.ert.gov.on.ca](http://www.ert.gov.on.ca)**

*The above noted activity is approved under s.20.3 of Part II.1 of the Environmental Protection Act.*

DATED AT TORONTO this 21st day of November, 2014



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Edgardo Tovilla  
Director  
appointed for the purposes of Part II.1 of the  
*Environmental Protection Act*

HV/  
c: DWMD Supervisor, MOECC Guelph District Office.  
Grant Ferguson, The Corporation of the City of Guelph.



# **Appendix H**

## **Sludge Accountability Calculations**

# Sludge Accountability Calculations



## Reported Sludge

Data:	<b>2021</b>		
Flow	52,076	m3/d	
Final Effluent TSS	2.6	mg/L	
Raw Sludge Flow	466	m3/d	
Raw Sludge Concentration	3.09	%	
Intentional Wasting	m3/d * %	14387	kg/d
Unintentional Wasting	m3/d * mg/L	135.4	kg/d
Total Reported Sludge =	Intentional wasting + Unintentional wasting - Side stream loading *		
		<b>13,535</b>	kg/d

## Projected Sludge

Data:			
Flow	52,076	m3/d	
Raw TSS	245	mg/L	
Primary Effluent TSS	93	mg/L	
Raw cBOD5	180	mg/L	
Primary Effluent cBOD5	99	mg/L	
Primary Removal Efficiency	62%		
Final Effluent cBOD5	2.1	mg/L	
SPR for CAS **	1	kg/TSS/kg BOD5 removed	
Primary Sludge			
Flow m3/d * (raw TSS-PE TSS) mg/L =	7,890	kg/d	
Biological Sludge Production			
Flow m3/d*(PE cBOD5 - FE cBOD5)*0.7 =	3,523	kg/d	
Chemical Sludge Production			
Ferric Chloride dose	4.1	L/min =	5.904 m3/d
Ferric Chloride Density	1,415	kg/m3	
Ferric chloride strength	40	%	
Percent ferric	13.8	%	
Ferric Chloride SPR***	2.87		
Dose m3/d * Density(kg/m3) * Strength (%) * Metal(%) *SPR =	1323		
Total Projected Sludge =	Primary Sludge+ Biological Sludge + Chemical Sludge		
		<b>12,736</b>	kg/d

<b>Reported Sludge</b>	kg/d	<b>Projected Sludge</b>	kg/d
Intentional Wasting	14387.04	Primary Sludge Production	7,890
Unintentional Wasting	135.4	Biological Sludge Production	3,523
Sidestream	988	Chemical Sludge Production	1323
<b>Total</b>	<b>13,535</b>		<b>12,736</b>
<b>Sludge Accountability</b>	<b>-6.3</b>		

Note: plus/minus 15% is best practice

<b>Side Stream Calculation</b>		
Filtrate Flow	1925	m3/d
TSS of filtrate	513	mg/L
	<b>988</b>	kg/d



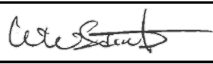
**Appendix I**  
**Notice of Modification to Sewage**  
**Works**


**Notice of Modification to Sewage Works**

RETAIN COPY OF COMPLETED FORM AS PART OF THE ECA AND SEND A COPY TO THE WATER SUPERVISOR (FOR MUNICIPAL) OR DISTRICT MANAGER (FOR NON-MUNICIPAL SYSTEMS)

<b>Part 1 – Environmental Compliance Approval (ECA) with Limited Operational Flexibility</b> <i>(Insert the ECA's owner, number, issuance date and notice number, which should start with "01" and consecutive numbers thereafter)</i>		
ECA Number 8835-9QJKSD	Issuance Date (mm/dd/yy) November 21, 2014	Notice number (if applicable)
ECA Owner The Corporation of the City of Guelph	Municipality Guelph, Ontario	

<b>Part 2: Description of the modifications as part of the Limited Operational Flexibility</b> <i>(Attach a detailed description of the sewage works)</i>
See attached.
<p>Description shall include:</p> <ol style="list-style-type: none"> <li>1. A detail description of the modifications and/or operations to the sewage works (e.g. sewage work component, location, size, equipment type/model, material, process name, etc.)</li> <li>2. Confirmation that the anticipated environmental effects are negligible.</li> <li>3. List of updated versions of, or amendments to, all relevant technical documents that are affected by the modifications as applicable, i.e. submission of documentation is not required, but the listing of updated documents is (design brief, drawings, emergency plan, etc.)</li> </ol>

<b>Part 3 – Declaration by Professional Engineer</b>	
<p>I hereby declare that I have verified the scope and technical aspects of this modification and confirm that the design:</p> <ol style="list-style-type: none"> <li>1. Has been prepared or reviewed by a Professional Engineer who is licensed to practice in the Province of Ontario;</li> <li>2. Conforms with the Limited Operational Flexibility as per the ECA;</li> <li>3. Has been designed consistent with Ministry's Design Guidelines, adhering to engineering standards, industry's best management practices, and demonstrating ongoing compliance with s.53 of the Ontario Water Resources Act; and other appropriate regulations.</li> </ol> <p>I hereby declare that to the best of my knowledge, information and belief the information contained in this form is complete and accurate.</p>	
Name (Print) William Warren Saint	PEO License Number 90233263
Signature 	Date (mm/dd/yy) 05/27/2021
Name of Employer CH2M HILL Canada Limited (A Jacobs Company)	

<b>Part 4 – Declaration by Owner</b>	
<p>I hereby declare that:</p> <ol style="list-style-type: none"> <li>1. I am authorized by the Owner to complete this Declaration;</li> <li>2. The Owner consents to the modification; and</li> <li>3. These modifications to the sewage works are proposed in accordance with the Limited Operational Flexibility as described in the ECA.</li> <li>4. The Owner has fulfilled all applicable requirements of the <i>Environmental Assessment Act</i>.</li> </ol> <p>I hereby declare that to the best of my knowledge, information and belief the information contained in this form is complete and accurate.</p>	
Name of Owner Representative (Print) Tim Robertson	Owner representative's title (Print) Division Manger
Owner Representative's Signature 	Date (mm/dd/yy) July 30 2021

# Notice of Modification to Sewage Works

City of Guelph, Guelph WWTP (ECA No. 8835-9QJKSD)

## Part 2 – Description of the modifications as part of the Limited Operational Flexibility

The Guelph Wastewater Treatment Plant (WWTP) is located at 530 Wellington Street West in the City of Guelph. The WWTP provides tertiary treatment, which services the City of Guelph and the neighbouring community of Rockwood. The WWTP produces high quality tertiary treatment and effluent is through an outfall to the Speed River after disinfection. The WWTP's current rated capacity is 64,000 m<sup>3</sup>/day.

This project specifically addresses the aeration blowers at each of the four treatment plants. The scope of this project is to replace the existing centrifugal blowers at each plant and replace them with new High-Speed Turbo Blowers (HSTB) and associated instrumentation and controls. As part of this upgrade, Plant 2 will receive dedicated blowers and no longer be required to have air supplied by either Plant 1 and/or Plant 3. Additional scope of this project includes upgrading the electrical power supply associated with the new HSTBs (New transformer, switchgear and associated MCCs), installing a Dissolved Oxygen (DO) and Ammonia (NH<sub>3</sub>) sensor in each of the three (3) passes of each aeration tank as well as replacing, where required by condition or configuration, portions of the air delivery piping and valves.

The proposed modifications include:

- Plant 1: replace existing centrifugal blowers with three (3) new 112.5 kW (150HP) HSTBs
- Plant 2: install three (3) new 75 kW (100 HP) HSTBs in Plant 3 Blower Building to service Plant 2
- Plant 3: replace existing centrifugal blowers with three (3) new 112.5 kW (150HP) HSTBs
- Plant 4: replace existing centrifugal blowers with three (3) new 187.5 (250HP) HSTBs
- Each new blower is designed with an integral Local Control panel (LCP)
- Install new Master Control Panel (MCP) at each Plant to control the operation of the blowers at each plant in response to dissolved oxygen and/or ammonia (NH<sub>3</sub>)
- Install new Harmonic Filter to condition and step down the power supply to 480V for each new blower
- Replace air distribution piping and valves as required due to condition or configuration
- Install new DO sensors in each pass of each train of each aeration tank
- Install new Ammonia sensors in each pass of each train of each aeration

During the construction, temporary rental blowers will be installed, where required, in order to avoid any extended shutdowns at the individual Plants. Construction will be sequenced in the order of: Plant 1, Plant 4, Plant 2 and Plant 3 with the aforementioned rental blowers used as required to maintain the treatment capacity of the WWTP. These modifications do not change the overall operation of the secondary treatment process. There are performance enhancements as part of this upgrade, including operational flexibility, redundancy and isolation capabilities for maintenance. The upgrades also allow for greater monitoring capabilities of air usage, DO levels, Ammonia targets and energy efficacy.

Pre-consultation correspondence took place between the MECP and Kristin Pressey (Compliance and Performance, Environmental Services) from the City of Guelph. The purpose of this correspondence was to delineate the upcoming project and confirm that the modifications were subject to the provisions of the ECA's Limited Operational Flexibility (LOF). Based on correspondence, the MECP agreed that the proposed modifications were allowable under the LOF, which has prompted this notice of modification.

With the implementation of the above proposed recommendations, that the ability for the Guelph WWTP to maintain its high level of treatment and consistent effluent quality will be enhanced. There should be no impact on the secondary effluent during the construction phase of this aeration upgrades project.



Supporting Documentation Attached:

- Pre-consultation e-mail correspondence with MECP
- Pre-Design Report

Supporting Documentation to be provided upon request:

- Issued for Tender and Record drawings for the Guelph WWTP Aeration Upgrades Project