

2022

Annual Performance Report



Wastewater Services
Division,
Environmental Services

March 25, 2023

Wastewater Services

2022 Annual Performance Report

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Executive Summary

The Guelph Water Resource Recovery Centre (formerly Wastewater Treatment Plant), 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. In addition, this report summarizes the monitoring and maintenance results for Northern Heights Sewage Pumping Station (SPS), NiMa Trails SPS and Kortright East SPS, as required by their respective ECAs, and describes the wastewater collection systems' overall operational performance.

The WRRRC 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.

Process loading to the facility in 2022 was largely within typical values and the sludge accountability for the facility closed within the industry best practice of +/- 15% at 9.6%. The average total daily wastewater flow for this reporting period was 50.651 megalitres per day (MLD), which is down 2.9% from 2021. A maximum total daily flow of 90.264 ML was recorded on February 17, 2022. As shown in Table 5 of this report, the effluent quality data clearly demonstrates that the WRRRC satisfied the compliance conditions of the ECA throughout the reporting period. The facility recorded the following annual removal efficiencies: carbonaceous biochemical oxygen demand (CBOD5) – 99.0%, total suspended solids (TSS) – 99.2%, total phosphorus (TP) – 97.6%, total Kjeldahl nitrogen (TKN) – 95.0% and total ammonia nitrogen (TAN) – 97.1%.

Solids generated during treatment were stabilized by anaerobic digestion and subsequently mechanically dewatered. During the reporting period a total of 3,646 dry tonnes of dewatered biosolids was generated, which is up 3.52% from 2021. One hundred percent of that material was diverted from landfill and was beneficially land applied as a Canadian Food Inspection Agency (CFIA) approved fertilizer.

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The facility has no provision for primary or raw sewage bypass directly to the Speed River. The facility does have provision for secondary bypass, complete tertiary bypass and partial sandfilter bypass. During this reporting period there was one partial sandfilter bypass event, as reported below in Table 9.

The WRRC voluntarily participates annually in the Grand River Watershed-Wide Optimization Program, which aims to improve the water quality of the Grand River. Through continual improvement processes, the WRRC team is committed to meeting the objectives of this Program. In 2022, the WRRC was honoured to be recognized by the Grand River Watershed Wide Optimization Program with a gold level award for the efforts in process control to improve the quality of the Grand River in 2021.

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.

Prevent pollution and protect the environment;

Improve our environmental performance;

Plan and review our objectives and targets; and,

Evaluate 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.

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Introduction

Wastewater treatment and collection 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's (ECAs), issued under the Environmental Protection Act, are facility or system-specific documents through which the MECP sets discharge quality limits for that facility based on the sensitivity of the receiving waters. To comply with the ECAs, the City of Guelph (the City) prepares an Annual Performance Report covering the operation and overall performance of the Water Resource Recovery Center (WRRC) and the associated vertical infrastructure of the wastewater collection system. The details for the WRRC and Sewage Pumping Stations (SPS) 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, 2022, 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, C of A #8602-76HPDC and ECA #3147-ATDKS4. This report must be forwarded to the MECP no later than March 31st.

Wastewater Treatment Plant Information

Address: Guelph Water Resource Recovery Centre (WRRC) 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 (CLI-ECA #017-W601 issued August 25th, 2022)

Northern Heights Sewage Pumping Station (SPS) Information

Address: 68 Ingram Drive, Guelph City, County of Wellington, ON, Canada, N1E 7L6
ECA Number: 8602-76HPDC (CLI-ECA #017-W601 issued August 25th, 2022)

NiMa Trails Sewage Pumping Station (SPS) Information

Address: 68 Ingram Drive, Guelph City, County of Wellington, ON, Canada,
N1E 7L6
ECA Number: 3147-ATDKS4 (CLI-ECA #017-W601 issued August 25th, 2022)

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Facility and Systems Overview

The Guelph WRRC, operating within the Wastewater Services Division provides treatment of domestic, commercial, institutional and industrial wastewater collected from the City and the neighboring 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 WRRC is classified as a Class IV plant (Certificate #718, dated July 15, 1988) and is rated at 64,000 m³/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 m³/d, 13,000 m³/d, 13,000 m³/d and 22,000 m³/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 sand filters. Filtered effluent is disinfected using sodium hypochlorite, followed by dichlorination with sodium bisulfite 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 approximately 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 (commissioned in 2022, ECA #3147-ATDKS4). A new CLI-ECA #017-W601 was issued on August 25th, 2022 and replaces the individual SPS ECAs as of that date. However, the annual reporting requirements of the CLI-ECA do not apply to the 2022 reporting period.

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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 WRRC was largely typical in terms of process loading for 2022.

Table 1: Process Loading Evaluation, 2022

Population: 143 740 (2021 Census)

Parameter	Actual	Typical
Per Capita Flows and Loads		
Per Capita Wastewater Flow	352 L/d per person	350-500 L/d per person
Per Capita BOD5 Loading	91 g/d per person	80 g/d per person
Per Capita TSS Loading	98 g/d per person	90 g/d per person
Per Capita TKN Loading	13 g/d per person	13 g/d per person
Per Capita TP Loading	1.8 g/d per person	2.1 g/d per person
Ratios		
Flows: Peak Day/Annual Average	1.78	2.5-4.0
Raw: TSS/BOD5	1.08	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 2022, the City of Guelph sludge accountability assessment resulted in a 9.6% 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 2022

Reported Sludge	kg/d
Intentional Wasting	13,394.2
Unintentional Wasting	116.5
Side Stream	822
Total	12,689

Projected Sludge	kg/d
Primary Sludge Production	8,661
Biological Sludge Production	4,109
Chemical Sludge Production	1,259
Total	14,030

Sludge Accountability	9.6 %
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Note: plus/minus 15% is best practice

Recognition

In 2022, the WRRC was honoured to be recognized by the Grand River Watershed Wide Optimization Program with a gold level award for the efforts in process control to improve the quality of the Grand River in 2021.

The demonstrated commitment of Wastewater Services to the optimization of all aspects of the process control has made the facility known as one of the leading wastewater treatment systems along the Grand River Watershed. The main objective of an optimization program is to work with staff, regulatory agencies, external partners and stakeholders to achieve exemplary, sustainable and economical performance from physical and human assets.

A copy of the letter received from Grand River Conservation Authority in 2022 to recognize the Guelph WWTP for the 2021 Performance is included as Appendix A.

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Operational Performance

Wastewater Flow

This section summarizes the influent characteristics for the Guelph WRRC. Flow data for the 2022 reporting period is listed in Table 3 of this report and represented in Figure 1. Total flow for this reporting period was 18,477 ML, which was 2.9% less than in 2021.

A comparison of average flow per month between 2021 and 2022 can be seen in Figure 2.

The average total daily flow for the year 2022 was 50.651 MLD. A maximum total daily flow of 90.264 ML was recorded on February 17, 2022.

Table 3: Wastewater Flow Data, 2022

	Average Total Flow (MLD)	Maximum Total Daily Flow (ML)
January	51.206	55.846
February	55.733	90.264
March	66.774	85.199
April	59.279	66.191
May	55.076	63.673
June	49.278	58.039
July	45.137	49.868
August	45.362	49.893
September	45.065	48.370
October	45.378	54.856
November	44.786	48.507
December	44.742	54.823
Annual Average	50.651	-
Winter Average	52.648	-
Summer Average	49.225	-

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Figure 1, 2022 Average Daily Flow and Maximum Daily Flow

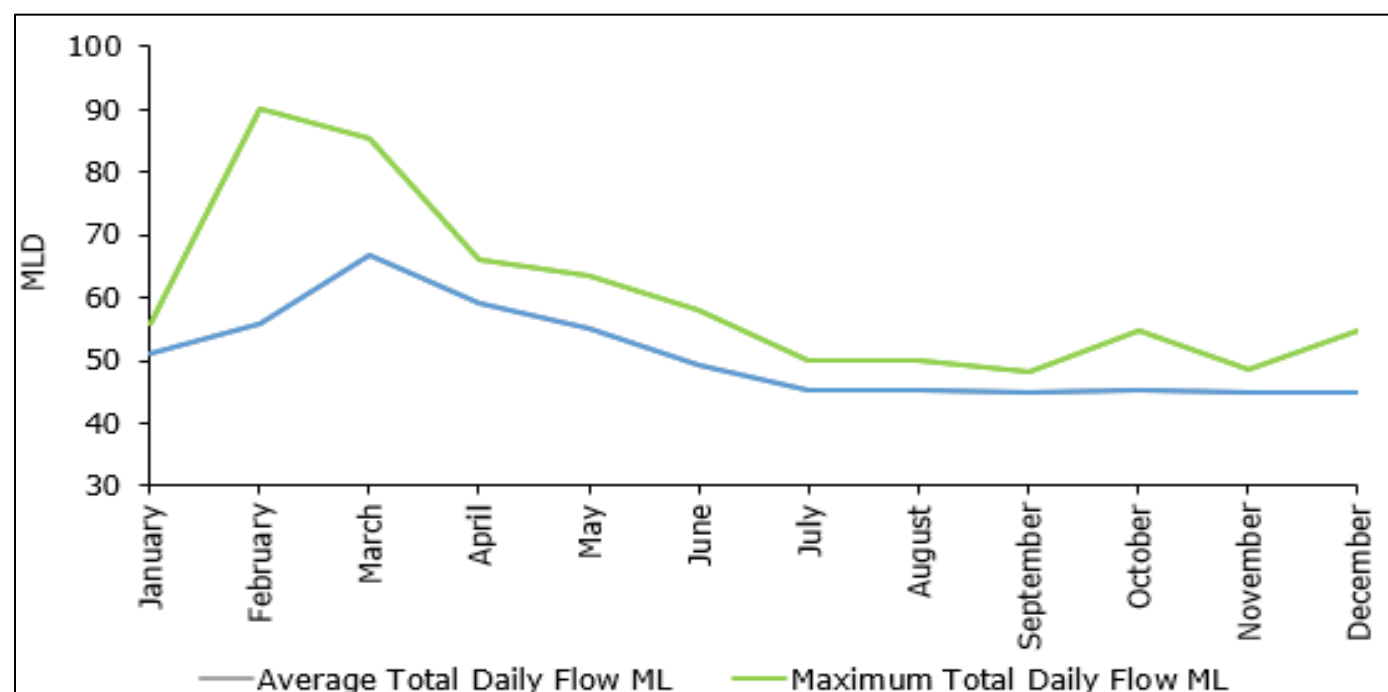
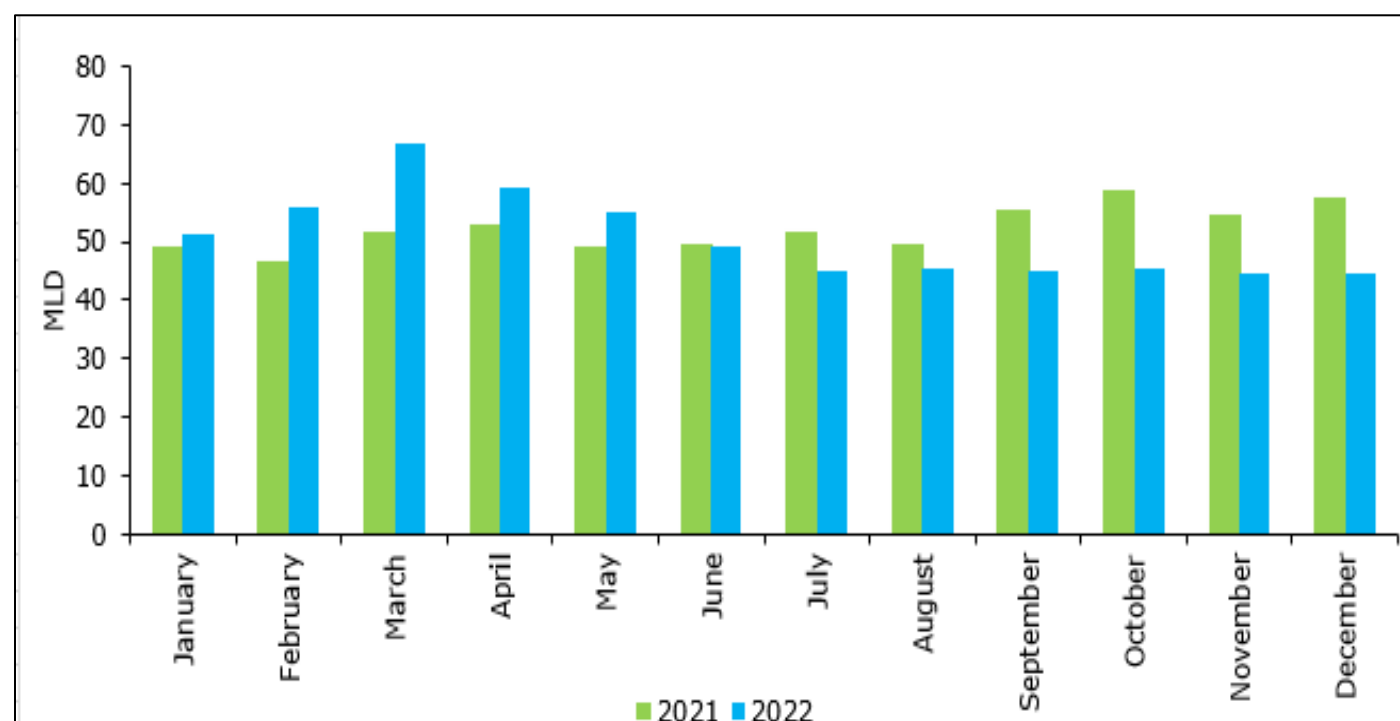


Figure 2, 2021 vs. 2022 Average Monthly Flow



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Raw Influent Wastewater Quality

Considerable effort goes into monitoring the characteristics of WRRC 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 WRRC 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, 2022

	pH	CBOD5 (mg/L)	BOD5 (mg/L)	TSS (mg/L)	TP (mg/L)	TKN (mg/L)	TAN (mg/L)
January	7.50	250	253	259	5.48	35.0	27.9
February	7.40	193	217	277	4.74	35.0	26.6
March	7.40	185	192	232	4.18	28.0	21.0
April	7.40	150	168	194	4.11	30.0	22.6
May	7.40	163	185	234	4.50	28.0	21.3
June	7.50	190	204	258	4.74	27.0	21.2
July	7.60	202	246	300	5.10	28.0	19.5
August	7.60	196	216	269	5.48	36.0	21.9
September	7.60	226	248	328	6.22	44.0	23.9
October	7.60	192	220	320	6.16	44.0	24.4
November	7.60	262	264	340	5.44	50.0	28.3
December	7.70	242	283	324	4.97	46.0	27.8
Annual Average	7.53	204	225	278	5.09	35.9	23.9
Winter Average	7.52	226	242	286	4.96	38.8	26.3
Summer Average	7.53	188	212	272	5.19	33.9	22.1

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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 WRC 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 limits and objectives were achieved for 2022. One weekly BOD/cBOD sample is missing for October 2022 due to a scheduling and sampling error. COD results are available for that week.

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.

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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. This is accomplished by measuring the concentration of sodium bisulphite as noted in Table 5.

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Table 5: Final Effluent Quality, 2022

		Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Annual Avg.	Winter Avg.	Summer Avg.
Min pH		7.1	6.9	7.0	6.9	6.9	6.9	7.1	7.0	6.7	6.6	6.6	7.2	6.9	7.0	6.9
Max pH		7.2	7.2	7.2	7.1	7.1	7.2	7.2	7.3	7.1	7.6	7.5	7.5	7.3	7.3	7.2
Average pH		7.2	7.1	7.0	7.0	7.0	7.1	7.2	7.2	6.8	6.9	7.4	7.4	7.1	7.2	7.0
Temp	°C	13.4	12.6	12.2	13.5	15.9	18.5	20.5	21.4	21.3	19.5	18.0	15.4	16.9	14.3	18.7
CBOD5	Concentration (mg/L)	2.0	2.4	2.0	2.7	2.0	2.0	2.0	2.0	2.0	2.1*	2.0	2.0	2.1	2.1	2.1
CBOD5	Loading (kg/d)	104.8	149.2	132.0	165.9	112.1	102.1	94.7	93.2	94.5	99.3	91.3	88.8	110.7	113.2	108.8
BOD5	Concentration (mg/L)	2.1	3.7	2.3	5.1	2.3	2.0	2.0	2.0	2.1	2.0*	2.3	2.0	2.5	2.5	2.5
BOD5	Loading (kg/d)	110.8	247.0	154.5	313.5	126.8	102.1	94.7	93.2	100.5	93.8	102.5	88.8	135.7	140.7	132.1
TSS	Concentration (mg/L)	2.0	2.0	2.0	3.0	2.0	2.0	2.0	2.0	4.0	2.0	2.0	2.0	2.3	2.0	2.4
TSS	Loading (kg/d)	105	125	123	164	136	109	107	109	160	94	101	93	118.8	109.4	125.6
TP	Concentration (mg/L)	0.09	0.09	0.10	0.12	0.10	0.13	0.18	0.13	0.15	0.12	0.14	0.11	0.12	0.11	0.13
TP	Loading (kg/d)	4.6	5.0	6.4	7.1	5.6	6.2	8.1	6.1	6.6	5.3	6.3	4.7	6.0	5.4	6.4
TKN	Concentration (mg/L)	2.10	2.06	3.08	2.09	1.43	1.96	2.08	1.26	1.41	1.25	1.75	1.03	1.79	2.00	1.64
TAN	Concentration (mg/L)	0.45	1.61	2.71	1.21	0.48	0.27	0.15	0.14	0.27	0.32	0.60	0.18	0.70	1.11	0.41
TAN	Loading (kg/d)	22.8	98.5	185.4	73.6	27.2	13.8	6.9	6.5	12.6	14.6	27.1	8.2	41.4	68.4	22.2
NO3-N	Concentration (mg/L)	31.8	28.0	23.1	26.7	27.9	27.9	30.9	27.7	26.6	28.3	31.5	35.7	28.8	30.0	28.0
NO2-N	Concentration (mg/L)	0.12	0.22	0.36	0.27	0.09	0.18	0.09	0.03	0.06	0.09	0.20	0.06	0.15	0.19	0.12
E. Coli	(CFU/100 mL)	17	10	10	10	11	16	37	30	24	11	14	23	17.8	14.8	19.9
TCR	(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	0.0	0.0	0.0
SBR	(mg/L)	1.09	1.25	1.25	1.30	1.27	1.41	1.10	1.33	1.42	1.33	1.17	1.17	1.26	1.19	1.31

Notes:

*All ECA limits and objectives were achieved for 2022. One weekly BOD/cBOD sample is missing for October 2022 due to a scheduling and sampling error. COD results are available.

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.

Oct 19 to Nov 3: pH values are from handheld meter instead of online probe.

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Solids Handling and Disposal

The raw sludge produced at the WRRRC 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 WRRRC is presented in Appendix B.

A summary of solids production, handling and disposal is presented Table 6 and biosolids 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 3.65% solids. See Table 8 for details and monthly totals.

During this reporting period 3,646 dry tonnes of dewatered biosolids were generated, which is 3.52% more than in 2021. 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.

We expect a similar volume of sludge to be generated in 2023 as was generated in 2022.

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Table 6: Solid Handling and Disposal, 2022

	Average Digested Total Solids (%)	Digested Solids Pumped to Dewatering (m³/month)	Average Dewatered Cake Total Solids (%)	Cake Production (wet tonnes)	Cake Production (dry tonnes)
January	1.95	23,638	23.00	1221.59	280.97
February	1.93	21,333	23.75	1170.80	278.07
March	1.81	29,028	22.00	1631.89	359.02
April	1.84	24,955	23.00	1442.67	331.81
May	1.59	20,422	24.00	1332.43	319.78
June	1.86	15,326	24.60	1108.59	272.71
July	1.56	20,388	22.98	1301.00	298.97
August	1.66	18,348	23.66	1264.50	299.18
September	1.78	21,074	24.85	1275.36	316.93
October	1.99	20,673	26.93	1242.05	334.48
November	2.51	21,272	22.53	1227.17	276.48
December	2.40	20,781	23.10	1203.82	278.08
Average	1.91	21437	23.70	1285.16	303.87
Total	-	257238	-	15421.87	3646.48

Notes:

Total Volume for Land Application = 15421.87 Wet Tonnes

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

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Table 7: Guelph Biosolid Volumes, 2022

	Unit of Measure	Estimated Quantity	Actual Quantity
On site Lystek production (April to November)	m ³	8,000	175*
Cake transported off site (April-November)	wet tonnes	8,000	10,019
Cake (December-March)	wet tonnes	7,500	6,543
Lystek (December-March)	m ³	1,000	0

*On site Lystek was only operational in September and October 2022.

Wastewater Services

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Table 8: Thickened Waste Activated Sludge (TWAS), 2022

	Volume to Rotating Drum Thickener (m³)	Volume from Rotating Drum Thickener (m³)	% Reduc- tion	% Dry Solids	Cationic Polymer Consumption (m³)	Anionic Polymer Consumption (m³)
January	3653	2252	38	4.45	20	35
February	5232	1562	70	4.22	29	33
March	4833	1031	79	-	27	30
April	10109	1584	84	2.89	47	67
May	0	0	-	2.10	0	0
June	32	44	-	-	0	0
July	6411	839	87	5.10	23	35
August	1903	29	98	-	13	15
September	-	-	-	-	0	0
October	2568	51	98	-	17	18
November	5963	110	98	-	37	43
December	9900	242	98	3.11	60	73
Average	4600	704	83	3.65	23	29
Totals	50604	7744	-	-	273	349

Note:

In 2022 the waste activated sludge thickening 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

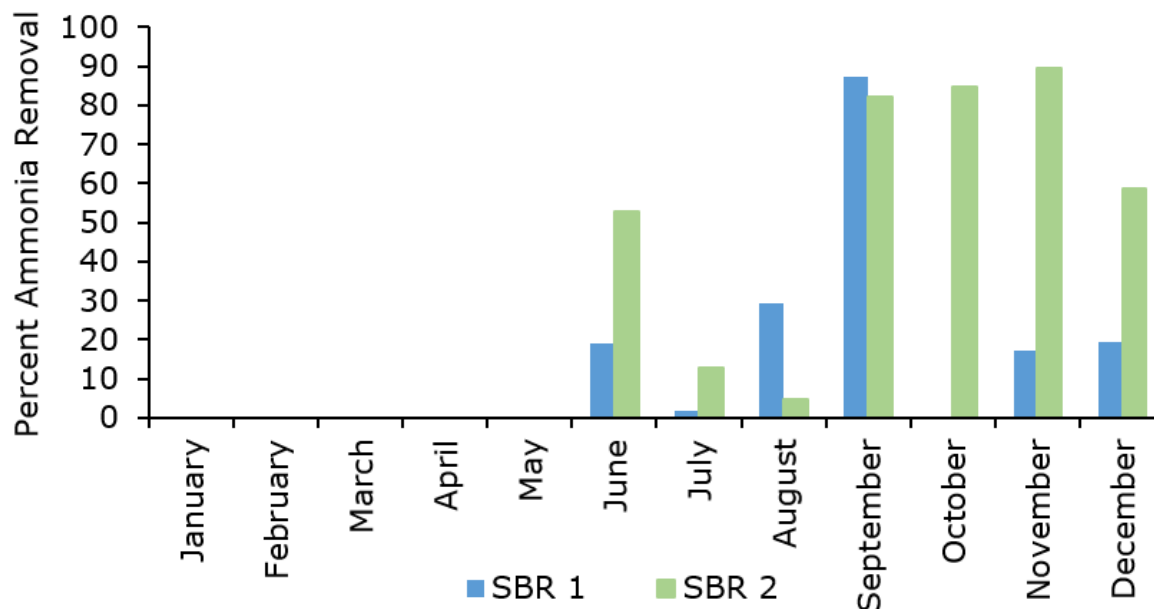
2022 Annual Performance Report

Side Stream Process

Anammox

The Anammox process is a side stream ammonia 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 29% and SBR 2 is 55%. 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. Aeration panel repairs were completed for SBR 2. SBR 1 repairs are scheduled for 2023.

Figure 3, Percent Ammonia Removal via Anammox, 2022



Wastewater Services

2022 Annual Performance Report

WRRC Unusual Events/Process Upsets

Complaints

There were 2 complaints made to the WRRC in 2022.

Complaint 1: Complaint made 2022/08/04. A loud rattling engine sound was heard at night.

Action Taken: The investigation found that Cogen 506 was the source of the metallic banging noise. The Cogen was running without a heat exchanger attached to its exhaust system. The required part was on order but delayed. Cogen was run during bylaw hours until the repair was made in January 2023.

Complaint 2: Complaint made 2022/10/26. The Complainant indicated that there was a strong smell coming from the WRRC.

Action Taken: The investigation found that a port on top of the one of the Lystek storage tanks was open. The port was shut and the issue resolved.

Overflows

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 four spill events during the reporting period. These events were reported to the MECP Spills Action Centre as per standard operating protocol.

Event 1

Date: January 23, 2022
Occurrence: 1-1K8HJW
Event Description: Digester gas release resulting from a frozen water line.

Event 2:

Date: April 19-21, 2022
Occurrence: 1-RUNSA
Event Description: Digester gas release due to flare stack pilot outage.

Event 3:

Date: May 21, 2022
Occurrence: 1-1TESEY
Event Description: Digester gas release due to flare stack pilot outage.

Wastewater Services

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Event 4:

Date: August 30, 2022
 Occurrence: 1-24LJKL
 Event Description: Digester sludge spill from draft tube.

Bypasses

A bypass is a 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 is mixed with fully treated flow prior to release to 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 MECP District Office to perform the bypass, including a plan to minimize its impact.

The Guelph WRRC 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 was one unplanned partial sand filter bypass event as reported below in Table 9. This event was reported to the Spills Action Center (SAC) as per standard operating protocol.

Significant Events

Table 9 summarizes the 2022 bypass event. On February 17 the WRRC was experiencing a rapid increase to plant flow due to a wet weather event, resulting in a partial sand filter bypass that lasted 5 hours and 38 minutes.

Table 9: Bypass Summary 2022

SAC #	Start Date	Duration	Bypass Type	Volume (m ³)	CBOD5 (mg/L)	TSS (mg/L)	TP (mg/L)	TAN (mg/L)	e. Coli (cfu/100 mL)
1-1M6WY7	Feb 17, 2022	5 h 38 m	Partial Tertiary	8114.3	3	7	0.16	5.1	0

Wastewater Services

2022 Annual Performance Report

WRRC 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, 2022

Project	Status
Annamox EQ Tank Overflow Pipe Installation (Notice of Modification submitted May 24, 2022, Appendix I)	Complete.
Facility Wide Aeration Equipment and Controls Upgrades (Notice of Modification submitted Aug 23, 2021, Appendix I)	Ongoing. Substantial completion scheduled for Q1 2024.
Plant 2 Electrical Upgrades	Ongoing. Substantial completion scheduled for Q2 2023.
Chain & Flight Plant 2 Primary & Secondary	Ongoing. Substantial completion scheduled for Q3 2023.
Ferric Chloride & Sodium Bisulphite Project	Ongoing. Substantial completion scheduled for Q2 2023.
Wastewater Services Generators Compliance Project	Complete.
WWTP Effluent - River Backflow Prevention Valve	Ongoing. Substantial completion scheduled for Q4 2023.
Digester #4 Structural Upgrades	Ongoing. Substantial completion scheduled for Q3 2025.
Supply & Installation of Roof Railing and Ladders	Ongoing. Substantial completion scheduled for Q4 2023.
Plant 1, 2 & 3 Splitter Gate Replacement	Ongoing, Substantial completion scheduled for Q3 2023.
Primary Influent Channel Isolation Gate Installation	Complete.

Wastewater Services

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Table 11: Maintenance Project Summary, 2022

Project	Status
Repair drainage around the compost building and apply new gravel to control water pooling on road.	Ongoing
Rebuilt Plant #1 final driveshaft with a custom fabricated unit that replaced an improperly installed driveshaft that was originally installed.	Complete
Removed and replaced all of the chlorine piping that was not captured in the chlorine tank capital project. This involved reconfiguring the piping to eliminate trip hazards, install isolation valves and mount pumps properly.	Complete
Tube boiler rebuild and certification completed in Cogen.	Complete
Added Flammable cabinets in the Cogen Facility and Collections Garage for flammable and explosive substances.	Complete
Repaired and installed new piping for the heating loop from Cogen to sand filters. New isolation valves installed for future troubleshooting and isolation needs.	Complete
Siloxane Media replacement for Cogen gas system Tank #2	Complete
Painted all blue storm water catch basins to support on site spills response program.	Complete
Replaced the incoming water service main pressure control valve that supplies the 530 Wellington Street site.	Complete
Repaired TWAS drum, rebuilt sprayer bars, replace solenoids.	Complete
Final Effluent Flow Meter replacement/calibration.	Complete
Repaired feed line to TWAS and installed water hammer arrestor and directional control valve with filtering screen to protect downstream equipment.	Complete
In support of the ongoing energy efficiency program 95% of facility lights were replaced with new LED units on site the 530 Wellington site.	Ongoing
Plant #3 East aeration has been completely inspected/rebuilt, acid treated and about 220 stones replaced with over 30 air leaks repaired.	Complete

Wastewater Services

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Project	Status
Plant #4 East primary was descaled, inspected and all worn shoes replaced.	Complete
Plant #4 West primary was repaired and cross collector chain and flight replaced.	Complete
Plant #4 guarding fabricated and installed on drives as per health and safety compliance.	Complete
Annual substation maintenance on site.	Complete
Annual IR scanning done on site electrical and lift station electrical panels and feeders.	Complete
Installed nucleolus exit light controller to demo system as part of a potential site upgrade and energy savings.	Complete
Repaired cooling fans for Cogen engines and updated the thermostat controls.	Complete
In response to digester gas release in April, Installed Flare stack alarming and tied it into SCADA.	Complete
Replaced and upgraded all Lystek piping and commissioned the system for operation to support Operations running the system.	Complete
Replaced multi-ranger flow meters with new up to date units in all plants. About 75% completed.	Ongoing
Replaced all DO probes in Plant #3 and installed new control and instrumentation system to manage this and sync with new blowers.	Complete
Installed safety interlock to shut down the conveyor system as per engineered requirement in Compost. Have been tied into Gas monitoring as per PSR.	Complete
Removal of old abandoned electrical and Mechanical equipment on site. Have completed digester 3,4,5 building.	Ongoing
Muffin monster replaced at the Septage Receiving station	Complete
Isolation gate installed between Headworks and channel to Plant #1.	Complete

Wastewater Services

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

Description	Status
Creation of electronic report export for MUMPS within e.RIS system (XML Export).	Ongoing
Upgraded Plant 1 remote I/O network gear (Plant 1 primary tunnel).	Complete
Upgraded PLC firmware on Plant 1 RIO network card.	Complete
Replaced digital power monitors on Cogen engines 506 & 507 fed into SCADA.	Complete
Added SCADA monitoring & alarming of Energy Building area UPS.	Complete
Major version upgrade for e.RIS v3.0 to v3.1.	Complete
Major version upgrade for WIN911 Remote Alarm Monitoring Software v2021 to v2022.	Complete
Replacement of controller and addition of SCADA monitoring to plant hot water disinfection system.	On-going
Plant effluent flow meter verification.	Complete
Clean-up/removal of obsolete network equipment in Cogen control panel.	Complete
Replacement of failed network switch in Press #1 RIO control panel.	Complete
Replacement of wireless radio equipment on East/West Sandfilter bridges.	Complete
Replacement of digester gas insertion flow meters.	On-going

Wastewater Services

2022 Annual Performance Report

Performance Management Programs

Ministry Inspections

Wastewater treatment ECA's set effluent quality compliance limits (requirements) and objectives (targets). Compliance limits are mandatory and WRRC owners/operators must report when any limit is not met. WWT systems 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 2022, the MECP did not complete an inspection of the Guelph WRRC.

Wastewater Services

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Wastewater Collection System

The City of Guelph owns and operates five sewage pumping stations (SPS), described below. This report summarizes the monitoring and maintenance results for the Northern Heights SPS, the Kortright East SPS and NiMa Trails SPS, as required by their respective ECAs, and describes the wastewater collection systems' overall operational performance. The City of Guelph began operation of the NiMa Trails SPS on July 6th, 2022. At the time of this report, NiMa Trails SPS is currently not servicing any homes.

Note: The individual ECAs were superseded by the CLI-ECA issued on August 25th, 2022. The annual report requirements of the CLI-ECA will apply to all linear infrastructure beginning in 2023.

In 2022 the City met all regulatory requirements prescribed in the ECAs. Due to scheduling conflicts on the part of the service provider the SPS flow meter calibrations, which were due in November, were delayed until early 2023. There were no issues with the calibrations. November 2023 calibrations have been scheduled to avoid this issue this year.

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, Kortright East SPS and NiMa Trails SPS, including an overview of the adequacy of the works.

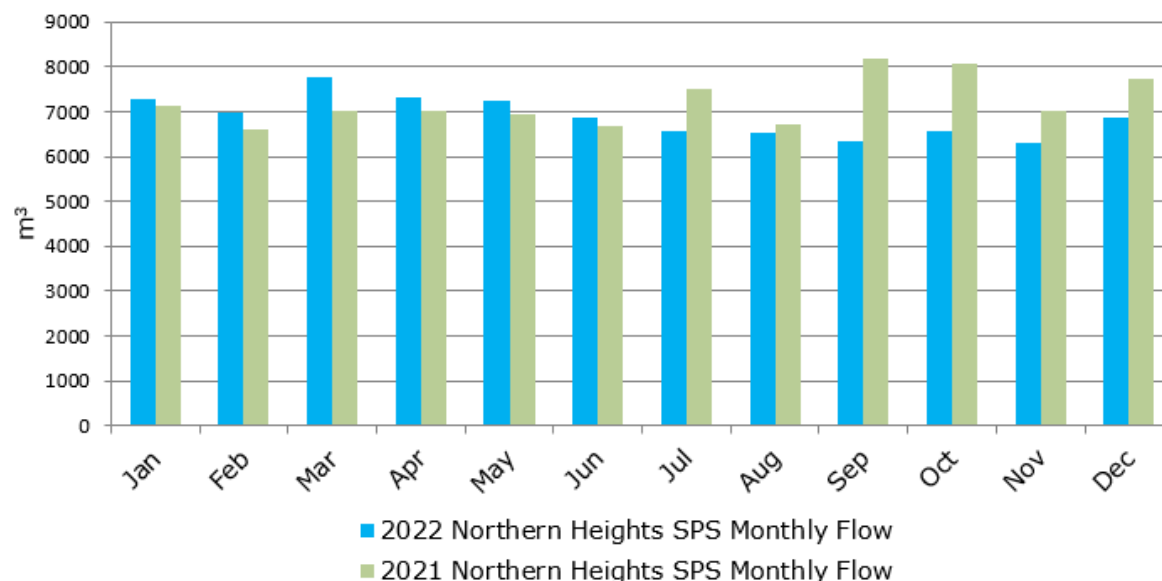
All sewage pumping stations performed as designed throughout the reporting period. Figures 4, 5 and 6 illustrate the monthly flow monitoring as per ECA requirements of these three sewage pumping stations.

Figure 4 shows that the monthly flow for Northern Heights SPS was higher in 2022 than in 2021 for the first half of the year and lower than in 2021 for the second half of the year.

Wastewater Services

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Figure 4, 2021 vs. 2022 Monthly Flow for Northern Heights SPS



As presented in Figure 5, Kortright SPS saw a 10% increase in wastewater inflow between January 2022 and Aug 2022. This increase in wastewater flow is possibly attributed to the expanding workforce working remotely from home as part many corporations Covid-19 workplace accommodations

Figure 5, 2022 vs. 2022 Monthly Flow Kortright East SPS

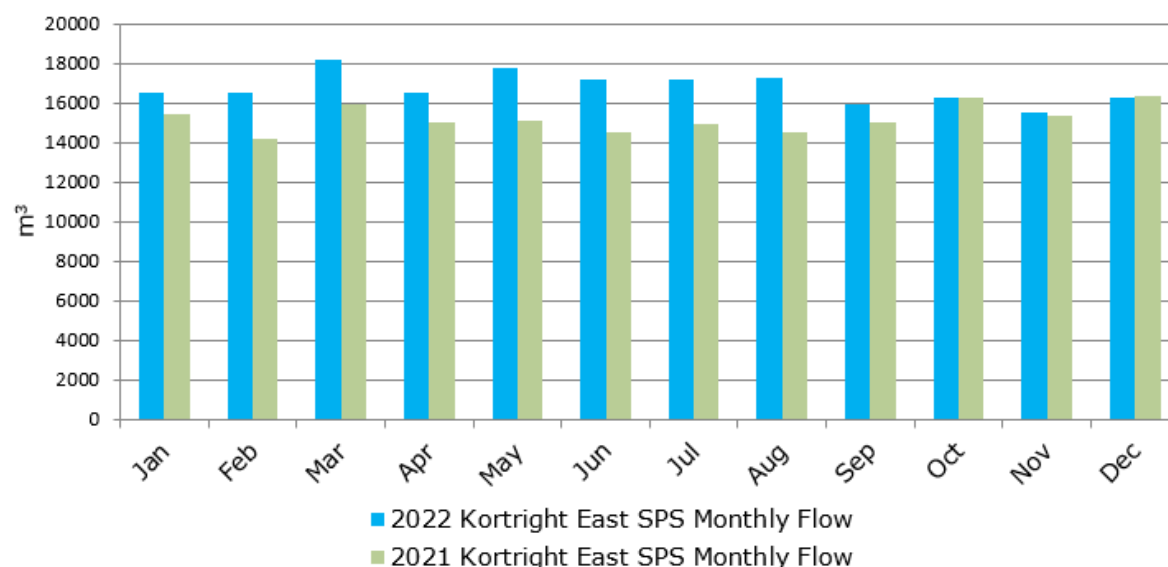


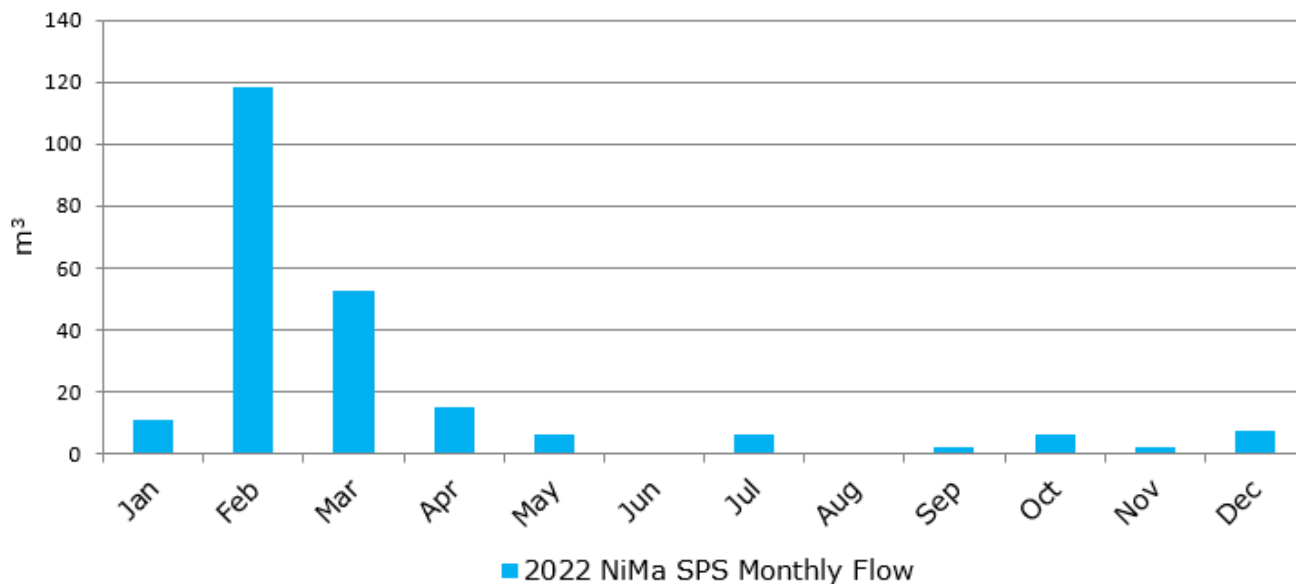
Figure 6 shows that 10 of 12 months saw a minor inflow of clear water into NiMa Trails SPS. This minor inflow is attributed to groundwater infiltration from uncapped laterals and sanitary

Wastewater Services

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infrastructure from the new housing development currently under construction. On Feb 23rd there was an all-day system training session held on-site to simulate station operation. The station discharge (water) was piped back to the inlet chamber which accounts for the high flows in February.

Figure 6, 2022 Monthly Flow NiMa SPS



Wastewater Services

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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
Northern Heights SPS	Pump 1 failed to respond to automated controls and in low level lock out alarm.	Blown fuse in panel replaced.
Northern Heights SPS	Level sensors blocked with grease and other debris causing false readings in SCADA.	Level sensor was cleaned. Alarms were reset and acknowledged.
NIMA Trails SPS	High level alarm.	Pumped wet well down. No connections to station yet. Adjusted alarm set points as high level alarm was set lower than the pump start set point therefore high level would trip before pumps would engage. I/I investigated for cause of increased volume at station.
NIMA Trails SPS	I/I investigation.	Investigated building for potential I/I. Inspected surrounding MHs for increased flow to station. Adjusted set points to match Standard operating guidelines set out from the O&M Manual.

Wastewater Services

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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	Portable generator was decommissioned and a stationary generator was connected and tested.
Kortright SPS	Alarms tested and added to SCADA.
Kortright SPS	Installed new breaker.
Kortright SPS	Autodialer was reprogramed and tested.
Kortright SPS	Performed standard generator maintenance.
Kortright SPS	Covers removed from fire alarm inside building. Inspected and reset alarms.
Kortright SPS	Upgrades to fuel tank performed.
Kortright SPS	In support of energy efficiencies the lights in station were replaced.
Kortright SPS	Performed load test on generator.
Kortright SPS	Performed maintenance on the FOB panel on the front gate.
Kortright SPS	Performed testing on backflow prevention.
Kortright SPS	Performed thermal imaging.
Kortright SPS	Filter in odour control unit was changed, old one was washed out and cleaned.
Kortright SPS	Performed standard generator maintenance.
Kortright SPS	Power connected from building to newly installed front gate.

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Location	Maintenance Performed
Kortright SPS	Confined space entry performed to clean wet well.
Kortright SPS	Backflow prevention tests and testing for cross connections performed.
Northern Heights SPS	In support of energy efficiencies the lights in station were replaced.
Northern Heights SPS	New lights in and around station installed.
Northern Heights SPS	Temporary generator installed and commissioned. Stationary generator taken offline for upgrades.
Northern Heights SPS	Concrete work inside station performed.
Northern Heights SPS	Thermal imaging of station performed.
Northern Heights SPS	Backflow prevention tests and testing for cross connections performed.
Northern Heights SPS	Full load test on generator and compliance inspections performed.
NIMA Trails SPS	SCADA Specialist notified and alarm will be cleared.
NIMA Trails SPS	Safety training session put on by Contractors as per station commissioning requirements.
NIMA Trails SPS	Pumped wet well down to clear high level alarm. No connections to station so volume likely cause from I/I.
NIMA Trails SPS	Backflow prevention testing performed.

Collection System Unusual Events

There were no complaints received during the reporting period.

There was 1 spill and no overflow events within the Collection System during the reporting period. Presented here is a summary of the spill/abnormal discharge event.

Wastewater Services

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Table 15: Collection System Unusual Events

Date	Event Description	SAC #
2022/08/25	Cross connection at 3 and 8 Davis Street, Guelph	1-24BZ9R

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 m³/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 m³/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

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Terraview Sewage Pumping Station

- 3.0 m diameter wet well
- Two (2) submersible pumps rated at 13.0 L/s
- 30 kW diesel generator
- 680 L fuel storage
- 45 m³ 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 of Guelph
- 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

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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



Administration Centre: 400 Clyde Road, P.O. Box 729 Cambridge, ON N1R 5W6

Phone: 519-621-2761 Toll free: 1-866-900-4722 Fax: 519-621-4844 www.grandriver.ca

December 7th, 2022

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

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

Subject: Recognition of the Guelph Water Resource Recovery Centre for 2021 performance

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

Table 1 - 2021 Summary of Recognition Program Criteria and Points Earned for Mechanical Plants

Earned/Available Points	Criteria
Yes	Was the plant in compliance with ECA effluent limits for all parameters in 2021?*
25/25	Monthly average final effluent quality meets voluntary final targets for TP
25/25	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 $\pm 15\%$
100/100 = 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 2021 data submitted to us, the Guelph plant achieved a total score of 100%.

I am pleased to inform you that the Guelph plant has achieved the **Gold** recognition level based on 2021 data. I congratulate you on this achievement 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 2023 to gather required data for the 2022 watershed annual report on wastewater treatment performance and support the GRWWOP recognition program.

Yours truly,

A handwritten signature in blue ink that reads "S. Lawson".

Samantha Lawson

Chief Administrative Officer

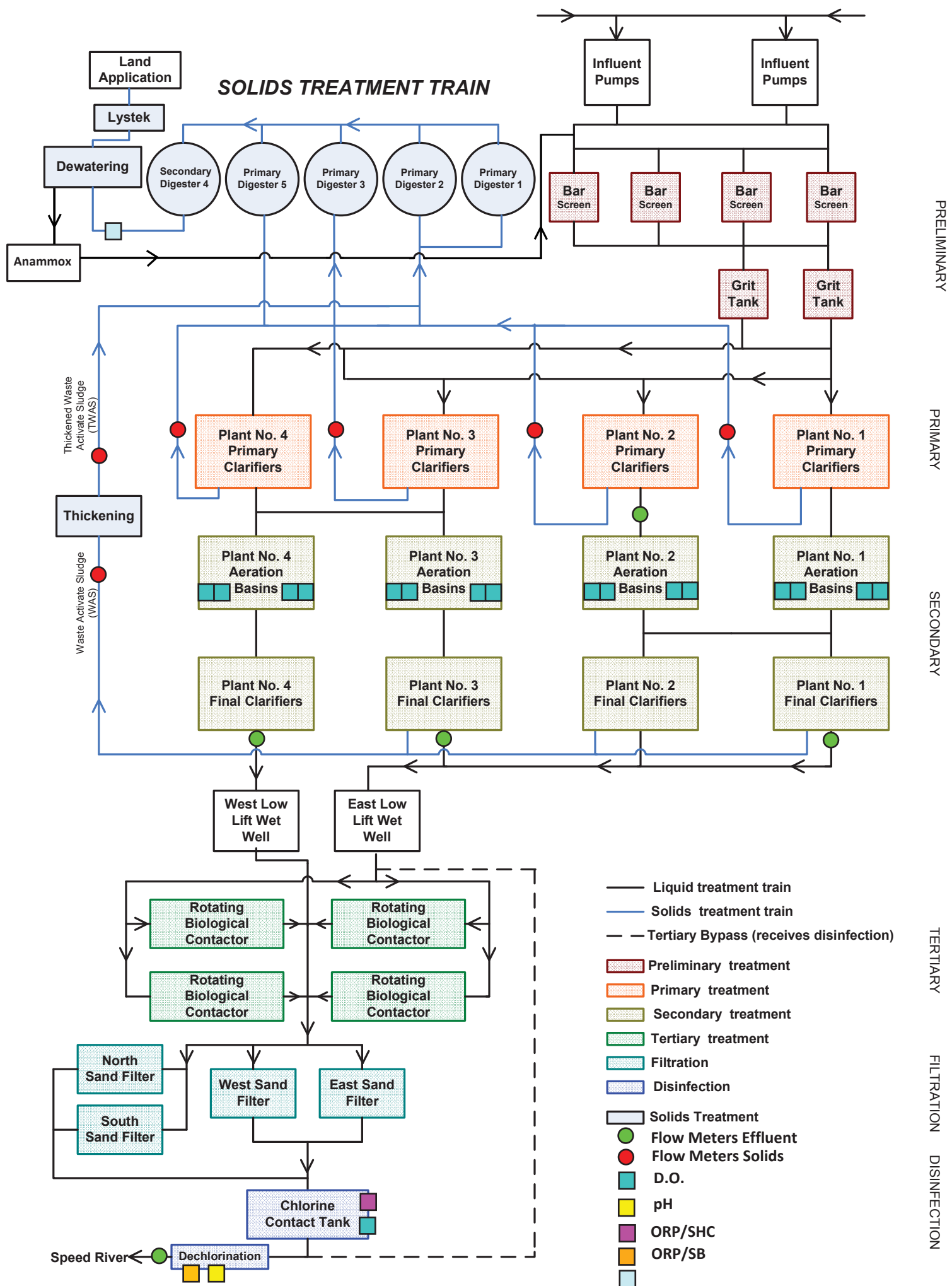
Grand River Conservation Authority



Appendix B

Plant Flow Diagram

LIQUID TREATMENT TRAIN





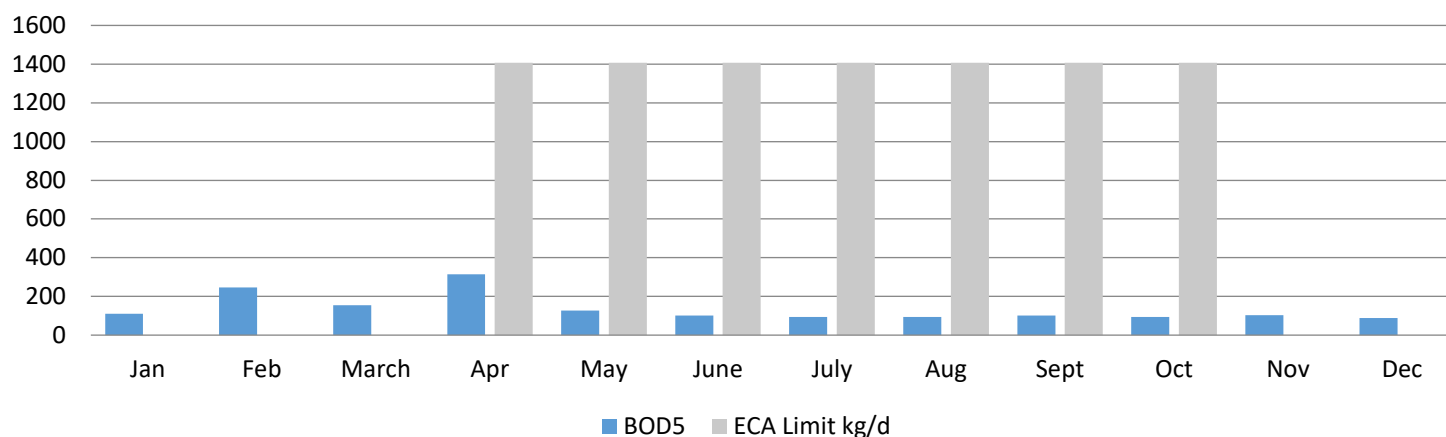
Appendix C

Facility Performance Charts

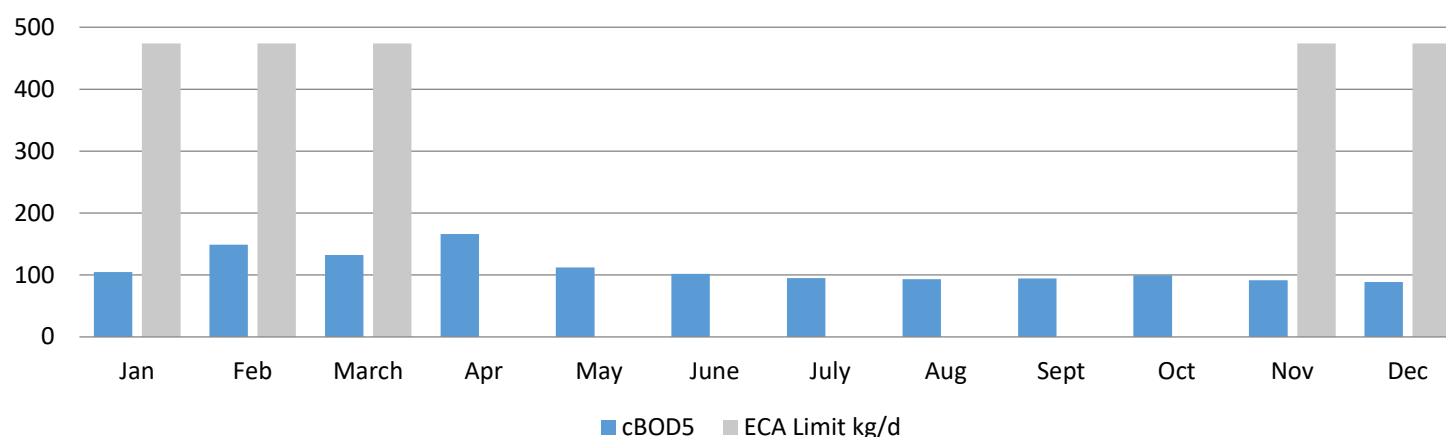
**City of Guelph Wastewater Treatment Plant
Facility Performance Charts 2022**

Table 2 - Effluent Limits		
Effluent Parameter	Average Concentration (milligrams per litre unless otherwise indicated)	Average Waste Loading (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) 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		

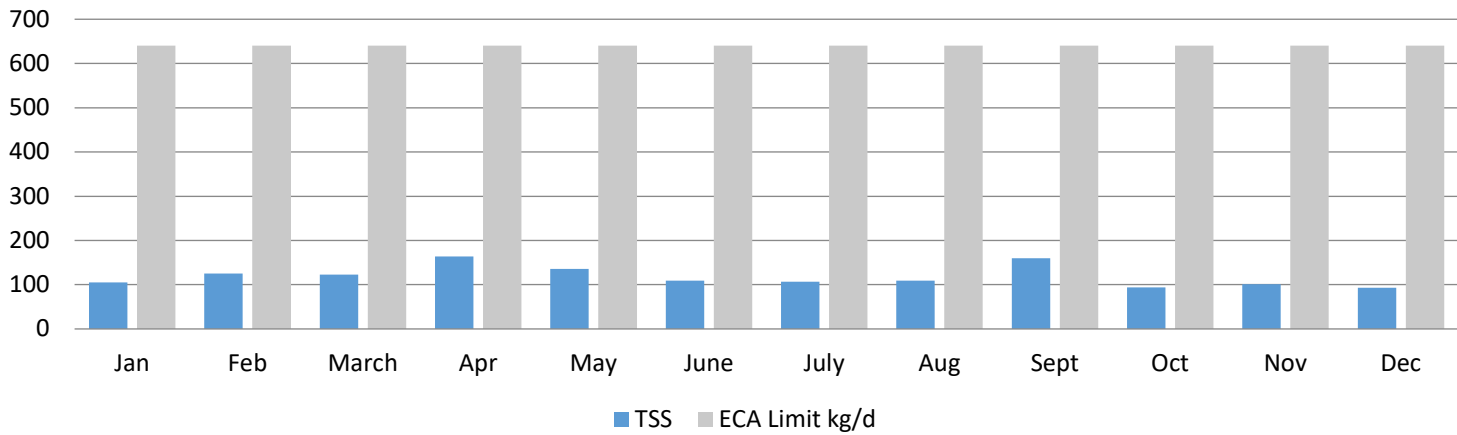
2022 BOD₅ Loading



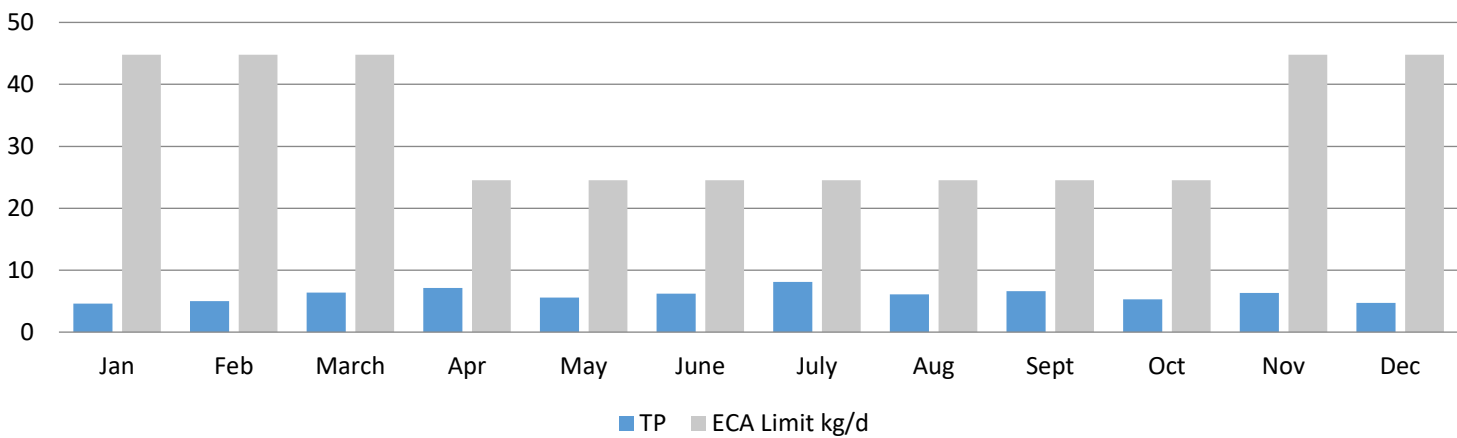
2022 cBOD₅ Loading



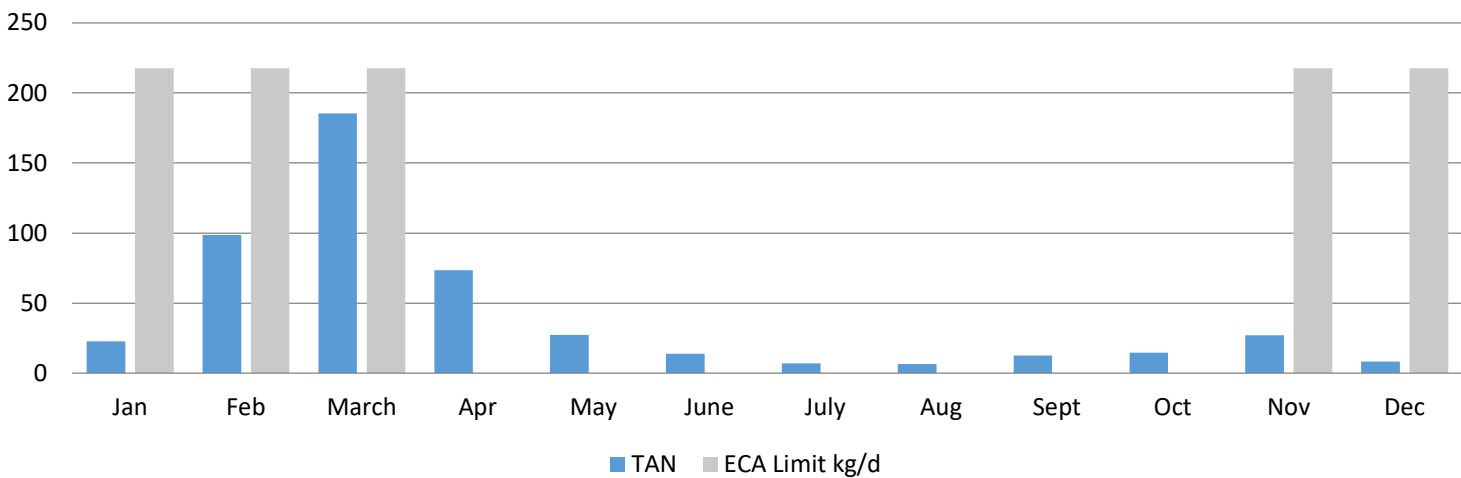
2022 Total Suspended Solids Loading



2022 Total Phosphorus Loading



2022 Total Ammonia Nitrogen Loading





Appendix D

Calibration Records



Franklin Empire Inc

550 Braidwood Ave., Unit #4

Peterborough, ON, K9J 1W1, CANADA

Tel: (705) 745-1626

Fax: (705) 745-3493

Website: www.franklinempire.com


Guelph WWTP

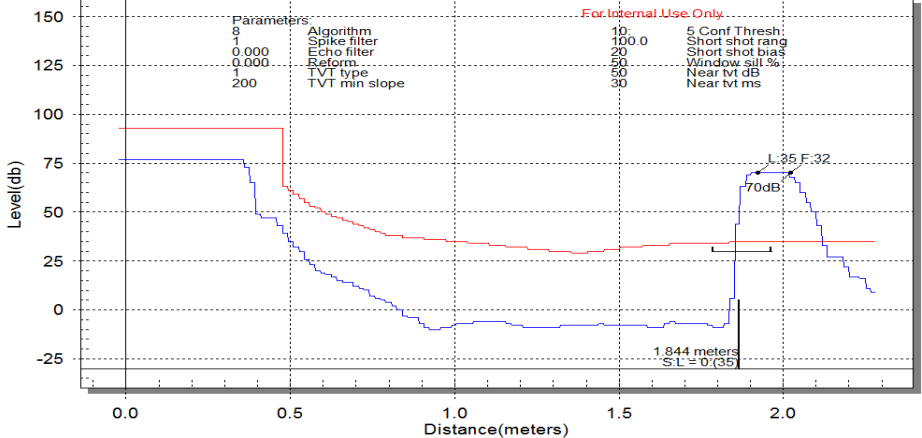
Open Channel Flow Calibrations

June 7, 8 & 9, 2022

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		<h1>CALIBRATION REPORT</h1>		TAG NO.: FIT-FINAL EFF REPORT NO.: 220607 DATE: 09-Jun-22	
SITE: Guelph WWTP PROCESS AREA: Final Effluent INSTR. TAG: FIT-FINAL EFF MANUFACTURER: Siemens MODEL: Sitrans Multiranger 200 HMI SERIAL No.: INSTR. RANGE: 0 to 200326.5m ³ /Day		DATE: June 9, 2022 TECHNICIAN: Mike Humphries REPORT NO.: 220607			

PRIMARY DEVICE: 5ft Parshall Flume		
MAX FLOW:	200326.5 m ³ /Day	
MAX HEAD:	74.00 cm	
CONSTANT:	323048.45	
EXPONENT:	1.587	
Output:	mA	Flow
Zero:	4	0.00
Max:	20	200326.5

OCM Flow Table								
Head Applied (cm)	Head Displayed (cm)	Error (%)	Calculated Flow (m ³ /d)	Flow Displayed (m ³ /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
15.00	15.08	0.53	15912	15923	0.07	5.27	5.27	-0.02
30.00	30.15	0.50	47803	47954	0.31	7.82	7.86	0.53
45.00	45.18	0.40	90974	91221	0.27	11.27	11.31	0.39
60.00	60.23	0.38	143613	144123	0.35	15.47	15.51	0.26
74.00	74.25	0.34	200326	200327	0.00	20.00	20.00	0.00

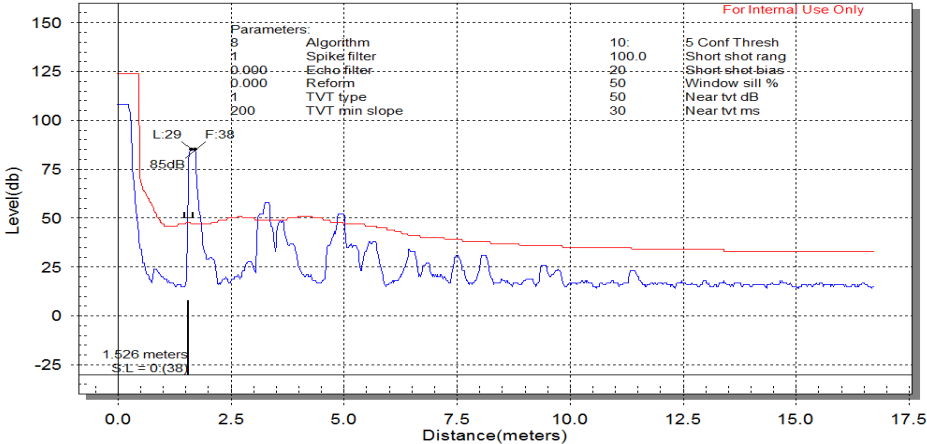
Totalizer As Found 833929.61 m ³ Totalizer As Left 834657.37 m ³		Comments The change in zero distance is due to a new transducer (XRS-5 (no collar) was replaced with an XRS-5C (with stainless collar)). Relay #1 set to LOE
Zero As Found 191.600 cm Zero As Left 184.590 cm Change in Zero 7.010 cm		

		<h1 style="text-align: center;">CALIBRATION REPORT</h1>		TAG NO.: FIT-FINAL EFF REPORT NO.: 220607 DATE: 08-Jun-22
SITE: PROCESS AREA: INSTR. TAG: MANUFACTURER: MODEL: SERIAL No.: INSTR. RANGE:	Guelph WWTP Final Effluent 1-FIT-223 Siemens Sitrans Multiranger 200 HMI PBD/M6020085 0 to 6448 m ³ /hr		DATE: June 8, 2022 TECHNICIAN: Mike Humphries REPORT NO.: 220607	

PRIMARY DEVICE: 5ft Parshall Flume

MAX FLOW:	6448	m ³ /hr
MAX HEAD:	75.00	cm
CONSTANT:	9928	
EXPONENT:	1.500	

Output:	mA	Flow
Zero:	4	0.00
Max:	20	6448.0



OCM Flow Table								
Head Applied (cm)	Head Displayed (cm)	Error (%)	Calculated Flow (m ³ /d)	Flow Displayed (m ³ /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
10.00	10.05	0.50	314	315	0.33	4.78	4.80	0.44
20.00	20.06	0.30	888	891	0.34	6.20	6.23	0.43
40.00	40.10	0.25	2512	2520	0.33	10.23	10.26	0.27
60.00	60.11	0.18	4614	4622	0.17	15.45	15.48	0.20
75.00		#DIV/0!	6448		#DIV/0!	20.00		#DIV/0!

Totalizer As Found	546032 m ³	<div>Comments</div> <div>Relay #1 set to LOE</div>
Totalizer As Left	546314 m ³	
Zero As Found	153.100 cm	
Zero As Left	152.240 cm	
Change in Zero	0.860 cm	

AS FOUND:


PASS

AS LEFT:

PASS

CERTIFIED BY:

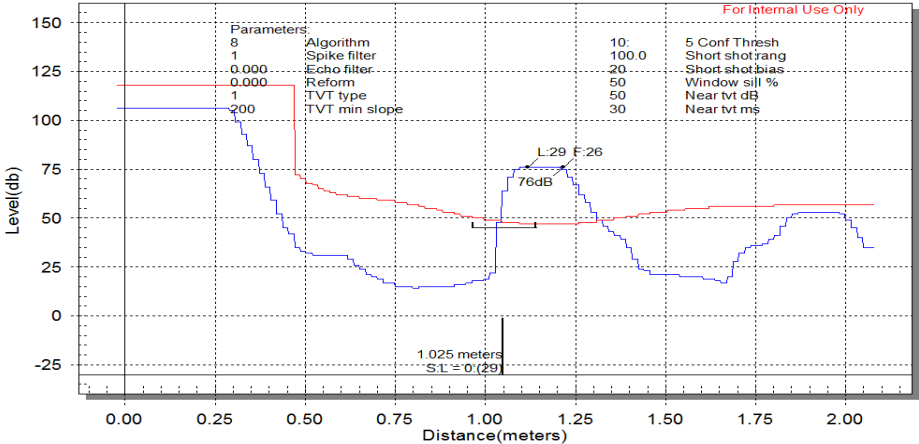
Mike Humphries

		<h1>CALIBRATION REPORT</h1>		TAG NO.: FIT-Plant #2 REPORT NO.: 220607 DATE: 07-Jun-22	
SITE: Guelph WWTP PROCESS AREA: Primary Sludge Flow Plant #2 INSTR. TAG: FIT-Plant #2 MANUFACTURER: Siemens MODEL: Sitrans Multiranger 200 HMI SERIAL No.: PBD/N6150050 INSTR. RANGE: 0 to 60000 m ³ /Day		DATE: June 7, 2022 TECHNICIAN: Mike Humphries REPORT NO.: 220607			

PRIMARY DEVICE: 5ft Parshall Flume

MAX FLOW:	60000	m ³ /Day
MAX HEAD:	76.00	cm
CONSTANT:	90559	
EXPONENT:	1.500	

Output:	mA	Flow
Zero:	4	0.00
Max:	20	60000.0



OCM Flow Table								
Head Applied (cm)	Head Displayed (cm)	Error (%)	Calculated Flow (m ³ /d)	Flow Displayed (m ³ /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
20.00	19.98	-0.10	8100	8070	-0.37	6.16	6.17	0.16
40.00	39.89	-0.28	22910	22755	-0.68	10.11	10.07	-0.39
60.00	59.90	-0.17	42088	41950	-0.33	15.22	15.19	-0.22
76.00	76.20	0.26	60000	60000	0.00	20.00	20.00	0.00
76.00	76.20	0.26	60000	60000	0.00	20.00	20.00	0.00

Totalizer As Found	NA	m ³	<div>Comments</div> <div>Replaced OCMIII with a Multiranger 200 HMI.</div> <div>Replaced ST-25 transducer with an XRS-5C.</div> <div>Relay #1 set to LOE</div>
Totalizer As Left	NA	m ³	
Zero As Found	NA	cm	
Zero As Left	127.000	cm	
Change in Zero	#VALUE!	cm	

	<h1>CALIBRATION REPORT</h1>	Report No.: 220607	Low Lift Level
		Date: 08-Jun-22	

SITE: Guelph WWTP
PROCESS AREA: Low Lift
INSTR. TAG: Low Lift Level
MANUFACTURER: Siemens
MODEL: Sitrans Multiranger 200
SERIAL No.:
TRANSDUCER: XRS-5C

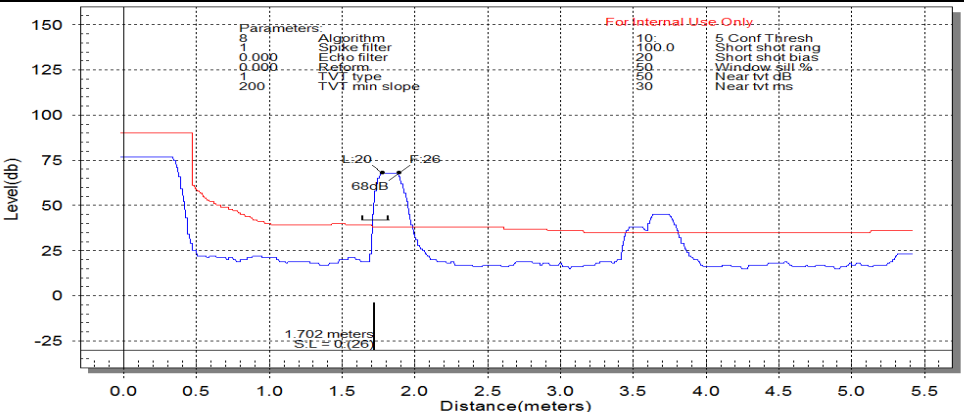
SERVICE DATE: June 8, 2022

TECHNICIAN: Mike Humphries

JOB REFERENCE: 220607

Measured Distance: (m)	MR200 Reading (m)	(Error) Calculated	Output Type or EGU: Min: Max:	(Signal) mA 4.00 20.00	(Process) cm 0.00 400.00
0.00	0.00	0.00%			

Main Parameters	
P001	1 (Level)
P002	1 (Liquids)
P003	2 (1.0m/min)
P004	112 (XRS-5)
P005	2 (units-cm)
P006	457.5 cm (Empty)
P007	400.0 cm (Span)
Confidence	26 db
Full Parameter list available	



Calibration Equipment			
Type:	DMM	Laser Distance Meter	Tape Measure
Manufacturer:	Fluke	Fluke	Stanley
Model:	Model 87	424D	5m/25ft
Serial No.:	94140067		
Last Cal. Date:	March 9, 2022		

Test Level (Sim)	MR200 Level	Error %	mA Expected	Fluke mA	Error %	PLC mA
0.0	0.0	0.00%	4.00		-100.00%	
100.0	100.0	0.00%	8.00		-100.00%	
200.0	200.0	0.00%	12.00		-100.00%	
300.0	300.0	0.00%	16.00		-100.00%	
400.0	400.0	0.00%	20.00		-100.00%	

Comments: Replace a Multiranger Plus / XPS-10 with a Multiranger 200 HMI / XRS-5C.

Relay #1 was set for LOE

AS FOUND: NA

AS LEFT: PASS

CERTIFIED BY: Mike Humphries



Certificate of Instrument Performance

Instrument Name: 8" EH MAG Meter
Serial Number: 9904E516000
Service Ref #: S008179
Configuration: 8" Circular Closed Pipe
Installation Location: Kortright SPS

The above instrument was calibrated on Feb 16,23 by Lou Dinato and meets or exceeds Manufacturer's Specification. The flow was verified using a Greyline PDFM 5.1 S/N 63559, Sensor S/N PD71988. The % difference between the two meters was 0.3966.

It is recommended to have the flow meter verified every 12-months.

A handwritten signature in dark 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 #: S008179
Configuration: Open Channel Circular Pipe
Installation Location: Kortright SPS

The above instrument was calibrated on Feb 16,23 by Lou Dinato and meets or exceeds Manufacturer's Specification. The level was adjusted down 2mm.

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

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

Lou Dinato
Service Supervisor



Certificate of Instrument Performance

Instrument Name: 6" E & H MAG Meter
Serial Number: S116BE19000
Service Ref #: S008179
Configuration: Open Channel Circular Pipe
Installation Location: Nima SPS

The above instrument was calibrated on March 3, 23 by Lou Dinato and meets or exceeds Manufacturer's Specification. The flow was verified using a Greyline PDFM 5.1 S/N 7042763559, Sensor S/N PD71988. The % difference between the two meters was 0.1184.

It is recommended to have the flow meter verified every 12-months.

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

Lou Dinato
Service Supervisor



Certificate of Instrument Performance

Instrument Name: 6" EH MAG Meter
Serial Number: 99001C16000
Service Ref #: S008179
Configuration: Open Channel Circular Pipe
Installation Location: Northern Heights SPS

The above instrument was calibrated on Feb 16,23 by Lou Dinato and meets or exceeds Manufacturer's Specification. The flow was verified using a Greyline PDFM 5.1 S/N 63559, Sensor S/N PD71988. The % difference between the two meters was 0.1516.

It is recommended to have the flow meter verified every 12-months.

A handwritten signature in dark 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 #: S008179
Configuration: Open Channel Circular Pipe
Installation Location: Northern Heights SPS

The above instrument was calibrated on Feb 16,23 by Lou Dinato and meets or exceeds Manufacturer's Specification. The level was adjusted down 1mm. 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: 4" ABB MAG Meter
Serial Number: V/36556/1/1
Service Ref #: S008179
Configuration: Open Channel Circular Pipe
Installation Location: Terraview SPS

The above instrument was calibrated on Feb 16, 23 by Lou Dinato and meets or exceeds Manufacturer's Specification. The flow was verified using a Greyline PDFM 5.1 S/N 7042763559, Sensor S/N PD71988. The % difference between the two meters was 0.7573.

It is recommended to have the flow meter verified every 12-months.

A handwritten signature in dark 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.: 1003222
Issued On: 11/23/2022
Accreditation Date: 3/4/2014
Expiry Date: 5/23/2025


President and 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.



Appendix F

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 m³/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 m³/min @ discharge pressure of 1 bar
- One (1) positive displacement type grit tank blower with a minimum nominal capacity of 16.9 m³/min @ discharge pressure of 1 bar
- One (1) manual effluent flow isolation gate

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

SUMMARY OF EXISTING WORKS

- 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 m³/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 fight 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 fight 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 m³/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

SUMMARY OF EXISTING WORKS

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 m³/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 m³ 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

SUMMARY OF EXISTING WORKS

- 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 m³/min @ 62 kPa pressure
- One Lamson 250 hp centrifugal blower
- One (1) channel air blower with a minimum rated capacity of 42.5 m³/min (10,111 Nm³/hr)

Chemical Facilities

- Two (2) ferric chloride storage tanks in a concrete containment area, each with a maximum volume of 45.9 m³
- 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 m³.
- Two (2) sodium hypochlorite storage tanks each with a maximum of 15.7 m³ 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 m³/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 m³/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 m³/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 m³/d discharging the combined secondary effluent from Plants 1-4 to the influent channel of the RBC's.

SUMMARY OF EXISTING WORKS

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 m²
- Three (3) centrifugal blowers, each with a minimum rated capacity of 1.43 m³/s

Filtration

- Two (2) continuous backwash travelling bridge tertiary filters, each with a surface area of 263 m²
- 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 m²
- 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 m³/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 m³/hr
- One Supply Pump (1) 7.5 kW rotary lobe pump WAS with a capacity of 15-50 m³/hr

SUMMARY OF EXISTING WORKS

- One Discharge Pump (1) 7.5 kW rotary lobe TWAS pump with a capacity of 18 m³/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 m³ in volume and each mechanically mixed with four (4) 7.5 kW draft tube style mixers
- One (1) secondary digester, approximately 2,350 m³ 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

SUMMARY OF EXISTING WORKS

Waste Gas Burner

- Waste gas burner, having a capacity to combust approximately 1,450 m³/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 H₂S 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 m³/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

SUMMARY OF EXISTING WORKS

Digester Gas Conditioning System, with a minimum capacity of 7,000 m³/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 m³ 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

SUMMARY OF EXISTING WORKS

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 m³
- 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 m³ equipped with discharge screws designed to withdraw up to 36 m³/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 m³/h (Decommissioned)
- Two (2) Bio-Reactor Transfer screw conveyors, each with a rated capacity of 135 m³/h (Decommissioned)
- One (1) Cure Reactor Transfer screw conveyor, with a rated capacity of 150 m³/h (Decommissioned)
- One sandwich belt type elevating conveyor, with a rated capacity of 150 m³/h (Decommissioned)
- Three (3) reactor fill screw conveyors, each rated at 150 m³/h (Decommissioned)
- One (1) final discharge screw conveyor, rated at 150 m³/h

SUMMARY OF EXISTING WORKS

Compost Reactors (**Decommissioned**)

- Three (3) enclosed compost reactor tanks, each having a nominal working capacity of 1,500 m³ and equipped with compost discharge sweep auger and in-feed rotary distributor
- One (1) screen with a capacity of 60 m³/hr, designed to recover woodchips greater than 6 mm mesh size from the composter
- One (1) screening bin, 50 m³ volume, with a discharge screw to convey recovered woodchips to the mixer
- One (1) screen infeed conveyor, rated at 43 m³/h
- One (1) fine transfer conveyor, rated at 25 m³/h
- One (1) recycle chip transfer screw, rated at 25 m³/h
- Three (3) reactor off-gas heat recovery units, each rated for 131 m³/min of reactor exhaust
- Building covering an approximate area of 1,800 m², 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 m³/hr screw conveyor, discharging into a 42 m³/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 m³, 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 m³ of processed biosolids product

SUMMARY OF EXISTING WORKS

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 m³/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

SUMMARY OF EXISTING WORKS

- Two (2) 34hp non-clog submersible sewage pumps rated at 33.0 L/s
- Design capacity of 2,851 m³/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 m³ 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 m³/d and consisting of the following Works:

PROPOSED WORKS**Biosolids Storage Facility**

- two (2) 60m³ capacity each, intermediate storage tanks;
- two (2) biosolids feed pumps, each pump rated at 6 m³/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 m³/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 m³, having one (1) cell and equipped with two (2) feed pump (on duty) and one (1) standby pump rated at 100 m³/hr plus one(1) sump pump rated at 68.4 m³/hr;
- two (2) sequential batch reactors (SBR), operating in parallel on a 6 hour time basis, each SBR consisting of a 425 m³ (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 m³/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 Nm³/hr;
- two (2) cyclones, one per reactor and rated at 10 m³/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 $65,000 \text{ m}^3/\text{d}$;

Screens

- four (4) mechanical screens with 12 mm bar spacing and each with a Peak Flow Rate of $48,900 \text{ m}^3/\text{d}$;
- 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 $81.4 \text{ m}^3/\text{min}$ at 101 kPa;
- one (1) grit tank blower rated at $16.9 \text{ m}^3/\text{min}$ at 101 kPa;

Secondary Treatment

Plant 1 (Rated Capacity $16,000 \text{ m}^3/\text{d}$)

- 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 $13,100 \text{ m}^3/\text{d}$ 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 $13,000 \text{ m}^3/\text{d}$)

- 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 m³/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 m³/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 m³/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 m³/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 m³/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 m³/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 m³/d, two pumps rated at 55,000 m³/d and one pump rated at 40,000 m³/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 m²;
- three (3) blowers, each rated at 1.43 m³/s;

Filtration

- two (2) continuous backwash travelling bridge tertiary filters, each with a surface area of 263 m²;
- 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 m²;
- two (2) filter backwashing pumps each rated at 62.511 L/s at 4.2 m TDH;

Phosphorus Removal

- two (2) 45.9 m³ 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 m³ sodium hypochlorite storage tanks and one 1.5 m³ 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 m³/h;
- one(1) WAS pump rated at 10 m³/h;
- one (1) thickened waste activated sludge (TWAS) pump rated at 2 m³/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 m³ 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 2,350m³;
- 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 m³ 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 m³ amendment silo, one (1) amendment silo baghouse;
- one (1) 100 m³ dewatered sludge storage bin equipped with discharge screws, one (1) twin auger continuous flow type mixer;
- three (3) 1,500 m³ enclosed compost reactor tanks with compost discharge sweep auger and in-feed rotary distributor, four (4) aeration blowers (one standby), each rated at 120 m³/min and four (4) exhaust blowers (one standby), each rated at 131 m³/min
- compost screening system with one (1) screen with 6 mm mesh size and rated at 60 m³/h;
- three (3) reactor off-gas heat recovery units;

Lystek Biosolids Treatment

- one (1) capacity progressive cavity pump rated at 42 m³/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 m³ 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 TBOD₅) 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.

Table 1 - Effluent Objectives	
Effluent Parameter	Concentration Objective (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.

Table 2 - Effluent Limits		
Effluent Parameter	Average Concentration (milligrams per litre unless otherwise indicated)	Average Waste Loading (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) 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		

(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:

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

Table 4 - Effluent Monitoring		
Parameters	Sample Type	Frequency
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)

Part 1 – Environmental Compliance Approval (ECA) with Limited Operational Flexibility

(Insert the ECA's owner, number, issuance date and notice number, which should start with "01" and consecutive numbers thereafter)

ECA Number	Issuance Date (mm/dd/yy)	Notice number (if applicable)
ECA Owner		Municipality

Part 2: Description of the modifications as part of the Limited Operational Flexibility

(Attach a detailed description of the sewage works)

Description shall include:

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.)
2. Confirmation that the anticipated environmental effects are negligible.
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.)

Part 3 – Declaration by Professional Engineer

I hereby declare that I have verified the scope and technical aspects of this modification and confirm that the design:

1. Has been prepared or reviewed by a Professional Engineer who is licensed to practice in the Province of Ontario;
 2. Conforms with the Limited Operational Flexibility as per the ECA;
 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.
- I hereby declare that to the best of my knowledge, information and belief the information contained in this form is complete and accurate.

Name (Print)	PEO License Number
Signature	Date (mm/dd/yy)
Name of Employer	

Part 4 – Declaration by Owner

I hereby declare that:

1. I am authorized by the Owner to complete this Declaration;
 2. The Owner consents to the modification; and
 3. These modifications to the sewage works are proposed in accordance with the Limited Operational Flexibility as described in the ECA.
 4. The Owner has fulfilled all applicable requirements of the *Environmental Assessment Act*.
- I hereby declare that to the best of my knowledge, information and belief the information contained in this form is complete and accurate.

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**

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



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:		2022
Flow		50,651 m ³ /d
Final Effluent TSS		2.3 mg/L
Raw Sludge Flow		386 m ³ /d
Raw Sludge Concentration		3.47 %
Intentional Wasting	m ³ /d * %	13394.2 kg/d
Unintentional Wasting	m ³ /d * mg/L	116.5 kg/d
Total Reported Sludge =	Intentional wasting + Unintentional wasting - Side stream loading *	12,689 kg/d

Projected Sludge

Data:		
Flow		50,651 m ³ /d
Raw TSS		277 mg/L
Primary Effluent TSS		106 mg/L
Raw cBOD ₅		225 mg/L
Primary Effluent cBOD ₅		118 mg/L
Primary Removal Efficiency		62%
Final Effluent cBOD ₅		2.1 mg/L
SPR for CAS **		1 kg/TSS/kg BOD ₅ removed
<i>Primary Sludge</i>		
Flow m ³ /d * (raw TSS-PE TSS) mg/L =		8,661 kg/d
<i>Biological Sludge Production</i>		
Flow m ³ /d * (PE cBOD ₅ - FE cBOD ₅) * 0.7 =		4,109 kg/d
<i>Chemical Sludge Production</i>		
Ferric Chloride dose	3.9 L/min =	5.616 m ³ /d
Ferric Chloride Density		1,415 kg/m ³
Ferric chloride strength		40 %
Percent ferric		13.8 %
Ferric Chloride SPR***		2.87
Dose m ³ /d * Density(kg/m ³) * Strength(%) * Metal(%) * SPR =		1259
Total Projected Sludge =	Primary Sludge+ Biological Sludge + Chemical Sludge	14,030 kg/d

* Side stream(dewatering filtrate) = 822 kg/d

** Sludge Production Ratio for Conventional Activated Sludge

*** Ferric Chloride Sludge Production Ratio

Reported Sludge	kg/d	Projected Sludge	kg/d
Intentional Wasting	13394.2	Primary Sludge Produc	8661.321
Unintentional Wasting	116.5	Biological Sludge Prodi	4109.316
Sidestream	822	Chemical Sludge Produ	1258.938
Total	12,689		14029.58
Sludge Accountability	9.6 %		

Note: plus/minus 15% is best practice

Side Stream Calculation

Filtrate Flow	1864 m3/d
TSS of filtrate	441 mg/L
	822 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)

Part 1 – Environmental Compliance Approval (ECA) with Limited Operational Flexibility

(Insert the ECA's owner, number, issuance date and notice number, which should start with "01" and consecutive numbers thereafter)

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

Part 2: Description of the modifications as part of the Limited Operational Flexibility

(Attach a detailed description of the sewage works)

See attached.

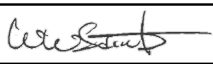
Description shall include:

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.)
2. Confirmation that the anticipated environmental effects are negligible.
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.)

Part 3 – Declaration by Professional Engineer

I hereby declare that I have verified the scope and technical aspects of this modification and confirm that the design:


1. Has been prepared or reviewed by a Professional Engineer who is licensed to practice in the Province of Ontario;
 2. Conforms with the Limited Operational Flexibility as per the ECA;
 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.
- I hereby declare that to the best of my knowledge, information and belief the information contained in this form is complete and accurate.

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)	

Part 4 – Declaration by Owner

I hereby declare that:

1. I am authorized by the Owner to complete this Declaration;
 2. The Owner consents to the modification; and
 3. These modifications to the sewage works are proposed in accordance with the Limited Operational Flexibility as described in the ECA.
 4. The Owner has fulfilled all applicable requirements of the *Environmental Assessment Act*.
- I hereby declare that to the best of my knowledge, information and belief the information contained in this form is complete and accurate.

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 m³/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 (NH₃) 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 (NH₃)
- 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

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)

Part 1 – Environmental Compliance Approval (ECA) with Limited Operational Flexibility

(Insert the ECA's owner, number, issuance date and notice number, which should start with "01" and consecutive numbers thereafter)

ECA Number 8835-9QJKSD	Issuance Date (mm/dd/yy) Nov.21, 2014	Notice number (if applicable)
ECA Owner Tim Robertson	Municipality City of Guelph	

Part 2: Description of the modifications as part of the Limited Operational Flexibility

(Attach a detailed description of the sewage works)

See Attached Word Document " Project Description".

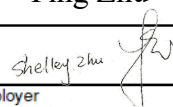
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Part 3 – Declaration by Professional Engineer

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1. Has been prepared or reviewed by a Professional Engineer who is licensed to practice in the Province of Ontario;
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 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.
- I hereby declare that to the best of my knowledge, information and belief the information contained in this form is complete and accurate.

Name (Print) Ying Zhu	PEO License Number 100213930
Signature 	Date (mm/dd/yy) April, 28, 2022
Name of Employer City of Guelph	

Part 4 – Declaration by Owner

I hereby declare that:

1. I am authorized by the Owner to complete this Declaration;
 2. The Owner consents to the modification; and
 3. These modifications to the sewage works are proposed in accordance with the Limited Operational Flexibility as described in the ECA.
 4. The Owner has fulfilled all applicable requirements of the *Environmental Assessment Act*.
- I hereby declare that to the best of my knowledge, information and belief the information contained in this form is complete and accurate.

Name of Owner Representative (Print) Tim Robertson	Owner representative's title (Print) Division Manager, Wastewater Services, Environmental Services
Owner Representative's Signature 	Date (mm/dd/yy) 05/18/2022

Part 2: Project Description

Adding a 150 mm diameter gravity pipeline connecting Anammox Equalization (EQ) Tank and the Washwater Sump. The gravity pipe will allow water pass from EQ tank to Washwater Sump Tank when the EQ Tank water level is high (about to overflow). The pipeline will consist of one hand valve and multiple flanges to allow for flow control and maintenance.

The EQ tank of the Anammox system is designed to store/stabilize the filtrates and washwater from sludge dewatering process. The water in the EQ tank is pumped to the SBR units for treatment periodically. As reported by WWTP operators, overflow from the Anammox EQ Tank happens from time to time, especially when only one SBR tank is in service. The existing design of EQ tank has considered the overflow issue and is planned to execute this way: "The EQ Tank sump pump is software interlocked with the level in the EQ Tank. If the EQ Tank Hi Level Setpoint is reached and the EQ Tank sump pump is in PLT-AUTO and the level in the washwater sump is below the Hi level setpoint, the EQ Tank sump pump will be called to RUN. The EQ Tank sump pump will turn OFF when the level in the EQ tank drops below the Hi Level Setpoint by a hard coded deadband." (O&M Manual, Chapter 84, Anammox, 2016-01-17, Page 16 of 35).

The EQ tank sump pump is either undersized comparing to the actual incoming flowrate or is not performing at its designed capacity. To cope with the overflow issue, a gravity overflow pipe is required to connecting EQ tank and washwater sump tank. Since this overflow pipe is a compensation to the inadequate EQ tank sump pump, it is not considered to add additional waterflow to the washwater sump, thus no adverse effect to the treatment process or environment would be caused by adding this overflow pipe.

List of documents to be updated after modification is done:

Document	Required
As-Build Drawings	Yes
O&M Manual	Yes
Process Flow Diagrams	Yes
Instrument O&M Manual	No
Emergency Response Plan	No
Work Instructions	No
Standard Operation Procedures	No
Summary of Works	No

Owner Representative's Signature:



Date: May 18 2022