Wastewater Services Division
2018 Annual Report

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Acronyms and Abbreviations

ADF	Average daily flow
TBOD	5 day biochemical oxygen demand
CALA	Canadian Association for Laboratory Accreditation
BOD5	Biochemical Oxygen Demand 5 day
CPE	Comprehensive Performance Evaluation
CCP	Composite Correction Program
CFU	Colony-forming unit
ECA	Environmental Compliance Approval (formerly called Certificate of Approval)
EPA	US Environmental Protection Agency
GRCA	Grand River Conservation Authority
I/I	Inflow/Infiltration
ISO/IEC	International Organization for Standardization (ISO) and the International Electrotechnical Commission
MLD	Millions Litres per Day
MOECC	Ontario Ministry of the Environment and Climate Change
NH3	Ammonia
NO3 – N	Nitrate - Nitrogen
NO2 – N	Nitrite - Nitrogen
OCWA	Ontario Clean Water Agency
Ptot	Total Phosphorous
PH	Scale of Acidity 0-14
RBC	Rotating biological contactors
SCADA	Supervisory Control and Data Acquisition System
SBR	Sodium Bisulphite Residual
TAN	Total ammonia nitrogen
TBOD	Total 5-day biochemical oxygen demand
TCR	Total Chlorine Residual
TKN	Total Kjeldahl nitrogen
TP	Total phosphorus
TSS	Total suspended solids
TWAS	Thickened Waste Activated Sludge
WWOP	Watershed-wide Wastewater Optimization Program
WWTP	Wastewater treatment plant

Executive Summary

The Guelph Wastewater Treatment Plant (WWTP) Operating within the Wastewater Services Department 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 with disinfected effluent being discharged to the Speed River.

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

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

Process loading to the facility in 2018 was within typical values and the sludge accountability for the facility closed at -13%. The average total daily wastewater flow for this reporting period was 54.076 ML/day. The maximum total daily flow was 88.876ML on April 25th 2018.

Overall, the WWTP performed satisfactorily during the reporting period. A summary of effluent quality data is included as Table 3.1 of this report. The data indicates that the facility recorded annual removal efficiencies for cBOD5 – 98.29%, TSS – 99.2%, TP – 97.1%, TKN – 96.2% and TAN – 93.8%.

Solids generated during treatment were stabilized by anaerobic digestion and subsequently mechanically dewatered. During the reporting period a total of 3496 dry tonnes of dewatered biosolids were generated. 95.9% of material was diverted from landfill and was beneficially land applied.

The facility has no provision for primary treatment or raw sewage bypass directly to the Speed River. The facility does have provision for secondary treatment bypass, complete tertiary bypass and partial tertiary bypass. In 2018, all flow through the facility received at a minimum complete secondary treatment. There was one partial sandfilter bypass and one full tertiary bypass in 2018 tertiary Please see section 5.0 for details.

In 2018, the facility was honoured to be recognized by the Grand River Watershed Wide Optimization Program with a Silver level award for the efforts in process control to improve the quality of the Grand River.

Introduction

A key component of a Comprehensive Performance Evaluation (CPE) is to perform 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 seen by the table below the City of Guelph WWTP was overall typical in terms of process loading for 2018.

Parameter	Actual	Typical
Per Capita Flows and Loads	**-**	**-**
Per Capita Wastewater Flow	401 L/d per person	350-500 L/d per person
Per Capita BOD_5 Loading	89 g/d per person	80 g/d per person
Per Capita TSS Loading	91 g/d per person	90 g/d per person
Per Capita TKN Loading	16 g/d per person	13 g/d per person
Ratios	**-**	**-**
Flows: Peak Day/Annual Average	1.21	2.5-4.0
Raw: TSS/BOD_5	1.02	0.8-1.2
Raw: TKN/BOD_5	.18	0.1-0.2

Another important part of the CPE is to conduct a Sludge Accountability on the process. Sludge accountability compares measured sludge production from the data collected and compares it to 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 a knowledgeable facility staff to take care of the day-to-day process requirements.

For 2018 the City of Guelph sludge accountability resulted in a 13% data accuracy which is well within the acceptable variability and therefore validates the reliability of the data collection and analysis.

Reported Sludge	**kg/d**
Intentional Wasting	14586
Unintentional Wasting	113.0
Sidestream	933
Total	13,766

Reported Sludge	**kg/d**
Projected Sludge	-
Primary Sludge Production	10,671
Biological Sludge Production	4,059
Chemical Sludge Production	839
Total	15,570
Sludge Accountability	-13%

Note: plus/minus 15% is best practice

Appendix E demonstrates the calculations that were made to obtain the above results.

1.0 Wastewater Flow

A Parshall flume complete with secondary instrumentation is provided immediately downstream of the facilities chlorine contact chamber. The effluent flow rate through the flume is continuously measured, integrated and totalized on a daily basis in the facilities Supervisory Control and Data Acquisition System (SCADA). This daily data is manipulated electronically in spreadsheet software to calculate and report the average total daily flow and maximum total daily flow for each month. Flow data for the 2018 reporting period is included as Table 1.1 of this report as well as represented in chart 1.0. A comparison of total flow per month between 2017 and 2018 can be seen in chart 1.2

The average total daily flow for the year 2018 is 54.076 MLD. A maximum total daily flow of 88.876 ML was recorded on April 25st 2018.

2018	Average Total Daily Flow ML	Maximum Total Daily Flow ML
January	52.422	68.204
February	57.391	86.539
March	54.293	62.475
April	65.704	88.876
May	60.965	74.332
June	51.381	57.784
July	48.955	54.286
August	48.863	55.303
September	49.577	53.698
October	50.587	59.059
November	55.488	66.261
December	53.289	61.432
Annual Average	54.076	X
Winter Average	53.719	X
Summer Average	54.577	X

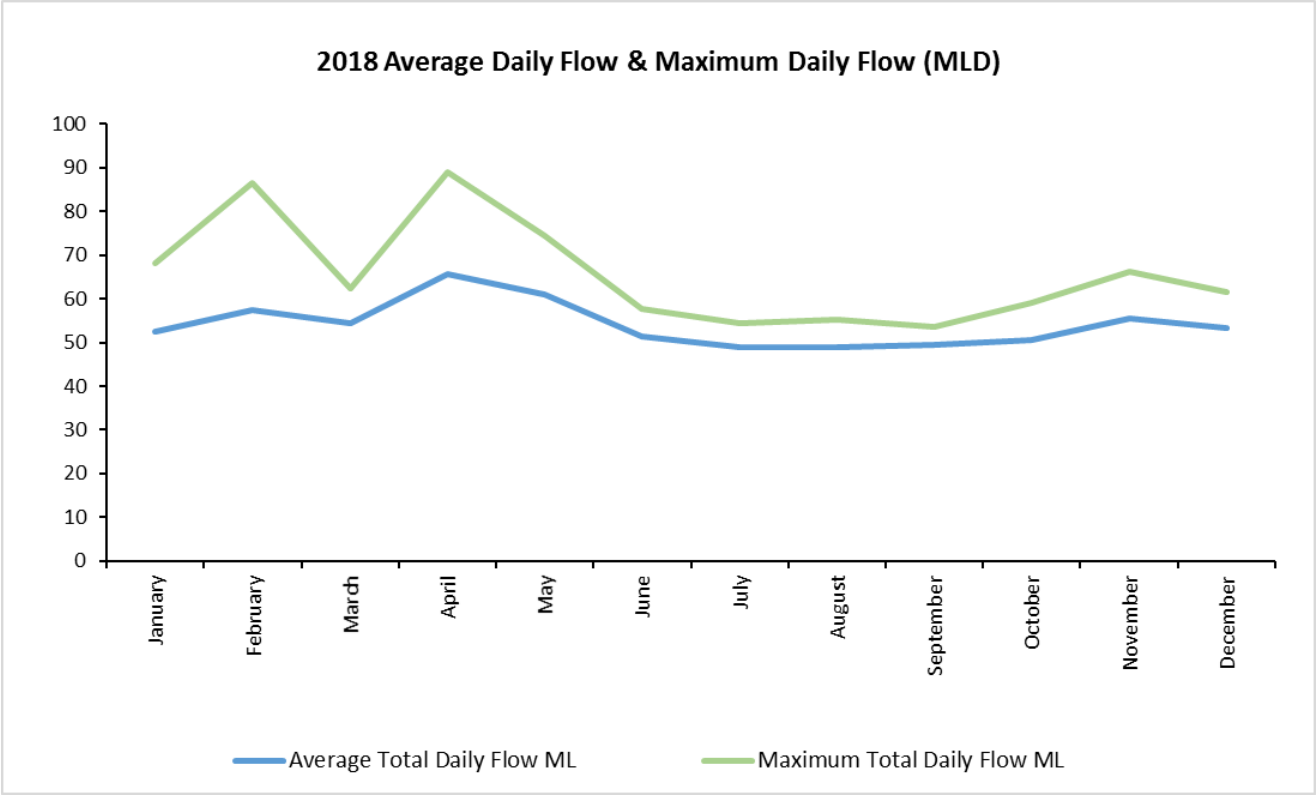
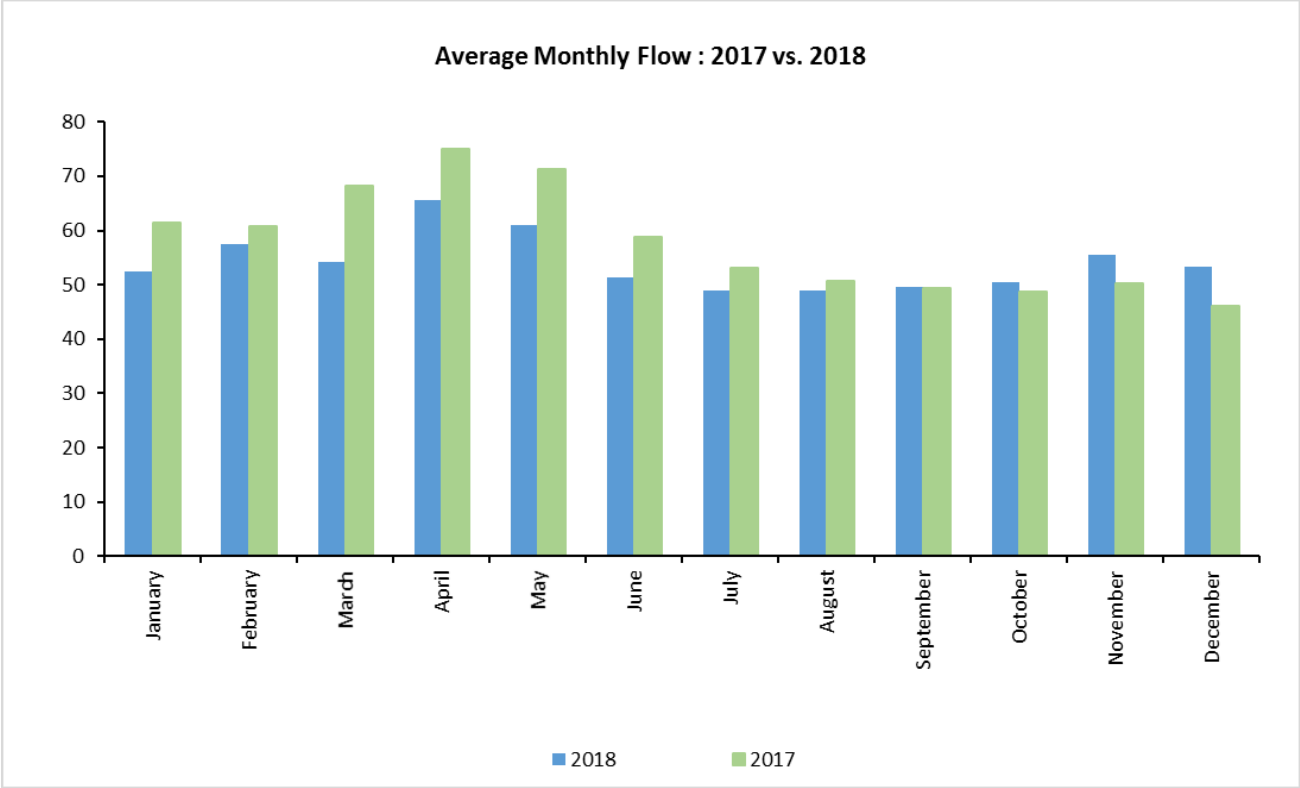


Figure 1: Chart 1.2 illustrates the total average monthly flow comparison between 2017 and 2018; to which the facility saw a 6.5% decrease in total flow



2.0 Raw Influent Wastewater Quality

Considerable effort is undertaken in monitoring the characteristics of WWTP influent, effluent and intermediate process streams to provide the necessary data for process optimization by plant staff and meet Environmental Compliance Approval monitoring and reporting requirements. Twenty-four hour flow proportional composite samples are routinely collected and analyzed. The raw influent wastewater data analyzed by the Guelph WWTP and CALA (Canadian Association for Laboratory Accreditation) certified outside laboratories is combined and a monthly summary is presented in Table 2.1.

2018	pH	[1]$cBOD_5$ (mg/L)	BOD_5 (mg/L)	TSS (mg/L)	P_{Tot} (mg/L)	TKN (mg/L)	TAN (mg/L)
January	7.7	260	275	295	5.23	42.5	26.9
February	7.6	224	264	244	4.90	44.2	27.0
March	7.7	215	274	261	4.99	41.2	26.8
April	7.7	137	175	213	4.05	35.6	21.3
May	7.7	127	163	252	4.38	32.7	18.4
June	7.7	176	207	310	5.08	32.2	20.8
July	7.7	179	218	282	5.16	36.9	19.9
August	7.6	210	230	244	5.16	38.6	21.0
September	7.6	187	223	270	5.15	35.4	23.4
October	7.6	188	203	298	5.33	40.9	24.2
November	7.6	204	183	243	4.94	46.0	26.9
December	7.6	212	235	279	4.95	39.3	25.9
Annual Average	7.64	193	221	266	4.94	38.8	23.5
Winter Average	7.62	223	246	264	5.00	42.6	26.7
Summer Average	7.66	172	203	267	4.90	36.0	21.3

3.0 Final Effluent Quality

Primary sedimentation and secondary activated sludge treatment is 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 RBC trains consists of eight shafts in series. The process objective of the RBC's 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. As such plant 4 secondary effluent can be directed to a separate pump well which discharges to the common sand filter influent channel for distribution to the sand filters for additional suspended solids capture. Plant 4 secondary effluent can also be directed through the RBC's as plants 1, 2 and 3.

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. (See appendix C) A Plant Flow Diagram is included as Appendix A. Design data for the treatment units are listed in Appendix B.

Effluent quality requirements as specified in the Environmental Compliance Approval differ for summer and winter conditions. These limits and performance charts can be reviewed in Appendix H.

An automatic sampling system collects a series of flow paced aliquots from the chlorine contact chamber and combines them in a container within a refrigerated compartment to produce a 24-hour flow proportional composite sample of the treated WWTP effluent. This composite sample is then analyzed by the Guelph WWTP laboratory, which is ISO 17025 accredited by the Canadian Association for Laboratory Accreditation (CALA). The results from the Guelph WWTP laboratory are tabulated in Table 3.1. This table provides a monthly summary of final effluent quality data.

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 and control is provided by ORP instrumentation. The objective of 200 E. Coli CFU/100mL of sample was met. Performance data is presented in Table 3.1.

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

In 2014, the Wastewater Services Laboratory received formal ISO/IEC 17025 Accreditation by CALA (certificate A3222) which is shown in Appendix I. The fulfillment of the requirements of ISO/IEC 17025 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.

In 2018 the Guelph Wastewater Laboratory successfully passed their CALA audit.

The scope of testing the laboratory provides includes; TSS/VSS, Ammonia, Total Phosphorus,

pH, Alkalinity, Nitrate + Nitrite, COD5, Total and Volatile Solids, TKN, BOD/cBOD5, Reactive Phosphorus. The formal scope of accreditation can be found in the CALA Directory of Laboratories under the membership number 3222 - CALA Accreditation Directory

The quality system measures and best practices that have been put in place that qualify the laboratory for formal accreditation include, but are not limited to the following:

- All test methods on the laboratory scope of testing have been validated to prove method performance on site and prove any modifications to test methods are technically valid.
- A quality control program has been instituted for all test methods that have undergone validation. Typical QC samples introduced in a batch of 20 samples includes as appropriate: a method blank, a quality control standard, a calibration check standard, and a sample duplicate. Matrix spike samples are also analysed to monitor sample matrix interferences. Control limits for QC samples are statistically determined. When control limits are exceeded, corrective action is taken and either the analysis is repeated or the data is qualified.
- Participation in an external proficiency testing regime provided by CALA or other proficiency testing providers.
- Internal training program to ensure laboratory analysts are adequately trained when performing a test method and have proven proficient at the test methods they perform.
- A Continual improvement program is in place to provide a systematic method of identifying and addressing issues that would bring about change and eventually impede the consistent production of valid test results.
- Annual ISO/IEC 17025 calibration of key measurement instruments for lab balances, pipettes, and thermometers. A daily monitoring program ensures verification of calibration for these instruments.
- A formal document control and records management program is in place to ensure changes to documents are authorized and controlled and laboratory records are managed to ensure integrity.

2018	pH	Temp ^0C	$cBOD_5$ Concentration (mg/L)	$cBOD_5$ Loading (kg/d)	BOD5 Concentration (mg/L)	BOD5 Loading (kg/d)	TSS Concentration (mg/L)	TSS Loading (kg/d)	P_{Tot} Concentration (mg/L)	P_{Tot} Loading (kg/d)	TKN (mg/L)	TAN Concentration (mg/L)	TAN Loading (kg/d)	NO_3-N (mg/L)	NO_2-N (mg/L)	E. Coli (CFU/100 mL)	TCR (mg/L)	SBR (mg/L)
January	7.80	10.7	2.00	107	2.00	107	2.00	104	0.11	6	1.72	0.69	37	30.4	0.15	12	0.00	0.98
February	7.80	12.7	3.00	171	4.50	272	2.00	128	0.09	6	2.44	1.47	102	29.0	0.20	12	0.00	1.54
March	7.80	14.2	2.00	107	4.50	240	2.00	108	0.09	5	1.25	0.34	19	31.8	0.19	10	0.00	1.75
April	7.70	13.5	2.20	169	4.90	381	2.00	159	0.11	8	2.21	1.02	84	21.3	0.25	10	0.00	1.13
May	7.90	15.5	2.30	146	3.50	238	2.00	122	0.10	6	1.24	0.18	12	24.3	0.07	10	0.00	1.40
June	8.00	18.5	2.10	109	2.20	117	2.00	105	0.13	7	1.17	0.08	4	27.7	0.08	28	0.00	1.49
July	8.00	20.6	2.20	107	2.30	114	2.00	109	0.15	7	1.29	0.08	4	26.5	0.04	16	0.00	1.65
August	8.10	21.6	2.10	104	2.10	104	2.00	102	0.24	12	1.17	0.08	4	26.5	0.04	19	0.00	1.67
September	8.00	21.5	2.00	100	2.00	100	2.00	90	0.28	14	1.13	0.14	7	28.0	0.06	15	0.00	1.35
October	7.90	19.0	2.00	103	2.00	103	2.00	97	0.18	9	1.40	0.21	11	27.7	0.11	19	0.00	1.46
November	7.70	16.5	2.10	116	2.00	116	2.10	116	0.15	8	1.39	0.21	12	24.7	0.13	12	0.00	1.53
December	7.90	17.9	2.10	110	3.50	166	3.00	136	0.11	6	1.12	0.13	7	26.2	0.20	34	0.00	1.80
Annual Average	7.88	16.85	2.18	120.61	2.96	171.31	2.09	114.48	0.15	7.80	1.46	0.39	25.21	27.00	0.13	16.42	0.00	1.48
Winter Average	7.80	14.40	2.24	122.18	3.30	180.02	2.22	118.24	0.11	6.18	1.58	0.57	35.34	28.41	0.17	16.00	0.00	1.52
Summer Average	7.94	18.60	2.13	119.49	2.71	165.09	2.00	111.80	0.17	8.96	1.37	0.26	17.97	26.00	0.09	16.71	0.00	1.45

Notes:

1. All cBOD5 and BOD5 analysis is conducted by independent CA ERL accredited laboratory only.
2. SBR, Sodium bisulphite residual
3. All analyses based on 24-hour flow paced composite samples.
4. The Summer period is April 1 to October 31. The Winter period is November 1 to March 31.
5. Escherichia Coli values are calculated geometric means.

4.0 Solids Handling and Disposal

The raw sludge produced at the WWTP is thickened in the primary clarifiers 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 process before being returned to headworks. Stabilized biosolids are either dewatered and removed from site as a cake to a non-landfill destination or further treated on site through the Lystek process. The Lystek material is then land applied as a Non-agricultural source material (NASM) or as a fertilizer as per the Canadian Food Inspection Agency (CFIA) fertilizer registration.

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

A summary of solids production, handling and disposal is presented in Table 4.1. The results of routine laboratory analysis of the dewatered biosolids are presented in Table 4.2. The results of routine E. coli analysis of the dewatered biosolids are presented in Table 4.3. In reference to Table 4.3 only biosolids that received the Lystek treatment were land applied.

The Rotary Drum Thickener (to thicken Waste Activated Sludge) is automated to run 24hrs/day, provided sufficient waste activated sludge is available. The unit used a combination of cationic and anionic polymers at a ratio of approximately 1.31:1 to assist in thickening the waste activated sludge to 3.84% solids. Table 4.4 will reveal in more detail the monthly totals.

During the reporting period 3496 dry tonnes of dewatered biosolids were generated. The facility anticipates a similar quantity of bio-solids generation for the next reporting period. This reporting period resulted in 95.9% biosolids diversion from landfill. The majority of dewatered biosolids were land applied during land application season or stored and processed for land application. The quality of the Lystek material can be found in Table 4.2.

The compost infrastructure was utilized as required to load trucks with dewatered biosolids cake to support the landfill diversion aspect of the biosolids program.

Tables 4.1 Solids Handling and Disposal, Year 2018

Month	Average Digested Solids Total Solids (%)	Digested Solids Pumped to Dewatering (m^3/month)	Average Dewatered Cake Total Solids (%)	Cake Production (wet tonne)	Cake Production (dry tonne)	Average Lystek Total Solids (%)	Lystek to Land Application (m3/month)	Cake Equivalent (dry tonne)	Cake to Lystek (wet tonne)	Cake & Bulking to Landfill (wet tonne)	Cake to Landfill (wet tonne)	Processed for Land Application (wet tonne)
Jan	1.51	21,535	22.33	1,370	306	-	-	-	-	-	187.09	1182.68
Feb	1.78	18,743	21.88	1,140	249	-	-	-	-	-	164.01	975.82
Mar	1.92	18,425	19.97	1,269	253	-	-	-	-	-	96.48	1172.04
Apr	2.02	20,431	20.23	1,238	251	-	-	-	-	-	133.02	1105.07
May	1.97	20,253	23.30	1,462	341	-	-	-	-	-	28.19	1434.00
Jun	2.00	18,210	22.78	1,156	263	-	-	-	-	-	37.28	1118.75
Jul	1.52	18,011	24.32	1,089	265	-	-	-	-	-	-	1089.28
Aug	3.75	18,444	25.22	1,196	302	-	-	-	-	-	-	1195.58
Sep	1.90	18,669	22.57	1,387	313	-	-	-	-	-	-	1387.36
Oct	2.33	18,915	21.98	1,524	335	-	-	-	-	-	-	1523.51
Nov	2.30	19,380	22.12	1,374	304	-	-	-	-	-	-	1190.64
Dec	1.94	20,803	21.08	1,491	314	-	-	-	-	-	-	1490.87
Totals	-	**231,818**	-	**15,695**	**3,496**	-	-	-	-	-	**646**	**14865.60**
Average	**2.08**	-	**22.32**	-	-	-	-	-	-	-	-	-

Total Volume for Procees Land Application	**8,401.92 Wet Tonnes**
Dundalk - Lystek International	
Lystek International Inc. 191 Eco Park Way Dundalk, Ontario, N0C 1B0	

Benifical Re-use	**6,646.59 Wet Tonnes**
Terratec Environmental	
Terratec Environmental 200 Eastport Bld. Hamilton, Ontario, L8H 7S4	

Total Volume to Landfill	**646.07 Wet Tonnes**
Terratec Environmental	
Terratec Environmental 200 Eastport Bld. Hamilton, Ontario, L8H 7S4	

Table 4.2 Biosolids Metal Analysis, Year 2018

2018	Total Solids (mg/L)		Total Volatile Solids (%)		pH (Units)		C:N Ratio		TKN (ug/g)		NH3 + NH4 as N (Total Ammonium Nitrogen) (ug/g)		NO3- + NO2- as N (Nitrate + Nitrite as Nitrogen) (ug/g)	
	Cake	Lystek	Cake	Lystek	Cake	Lystek	Cake	Lystek	Cake	Lystek	Cake	Lystek	Cake	Lystek
Jan	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Feb	22.4	-	63.6	-	7.6	-	26.0	-	12,025	-	8,738	-	20.0	-
Mar	21.1	-	60.5	-	7.8	-	28.0	-	11,100	-	9,170	-	30.0	-
Apr	21.0	-	63.7	-	7.4	-	28.5	-	10,950	-	1,950	-	18.5	-
May	21.6	-	-	-	-	-	-	-	-	-	-	-	-	-
Jun	22.5	-	60.9	-	7.7	-	26.4	-	11,040	-	2,300	-	30.0	-
Jul	23.4	14.40	59.7	53.1	7.8	9.5	24.0	45.5	11,700	5,350	2,650	2,050	30.0	65.0
Aug	24.3	-	58.7	-	8.0	-	24.0	-	11,600	-	1,400	-	30.0	-
Sep	17.0	-	-	-	-	-	-	-	-	-	-	-	-	-
Oct	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nov	21.2	-	63.6	-	7.8	-	25.5	-	12,400	-	1,650	-	30.0	-
Dec	19.4	-	64.5	-	8.2	-	30.0	-	10,700	-	2,100	-	30.0	-

2018	Organic N (mg/kg)		Total P (Total Phosphorous) (ug/g)		Total K (Potassium) (ug/g)		Cd (mg/kg) (Cadmium)		Cr (mg/kg) (Chromium)		Co (mg/kg) (Cobalt)		Cu (mg/kg) (Copper)	
	Cake	Lystek	Cake	Lystek	Cake	Lystek	Cake	Lystek	Cake	Lystek	Cake	Lystek	Cake	Lystek
Jan	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Feb	3,300	-	27,750	-	950	-	1.10	-	87	-	6.75	-	605	-
Mar	1,900	-	29,000	-	900	-	1.70	-	82	-	7.20	-	620	-
Apr	9,050	-	28,500	-	900	-	1.02	-	83	-	7.10	-	600	-
May	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Jun	8,760	-	29,200	-	840	-	1.10	-	80	-	8.64	-	622	-
Jul	9,000	3,300	28,500	29,000	750	52,000	1.15	1.03	74	72	9.55	8.85	655	590
Aug	10,000	-	31,000	-	600	-	1.00	-	76	-	9.00	-	570	-
Sep	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Oct	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nov	11,000	-	28,000	-	1,000	-	1.10	-	83	-	7.90	-	595	-
Dec	8,600	-	30,000	-	1,000	-	1.10	-	75	-	6.80	-	590	-

2018	Pb (mg/kg) (Lead)		Mo (mg/kg) (Molybdenum)		Ni (mg/kg) (Nickel)		Zn (mg/kg) (Zinc)		Hg (mg/kg) (Mercury)		As (mg/kg) (Aresenic)		Se (mg/kg) Selenium	
	Cake	Lystek	Cake	Lystek	Cake	Lystek	Cake	Lystek	Cake	Lystek	Cake	Lystek	Cake	Lystek
Jan	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Feb	15.8	-	12.5	-	34.8	-	895	-	0.40	-	3.2	-	3.55	-
Mar	19.0	-	12.0	-	34.0	-	950	-	0.44	-	4.0	-	3.70	-
Apr	14.0	-	11.0	-	30.0	-	815	-	0.36	-	3.2	-	3.55	-
May	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Jun	18.8	-	12.8	-	31.2	-	990	-	0.48	-	3.3	-	3.18	-
Jul	31.0	18.5	16.0	14.0	30.5	30.0	1,050	935	0.49	0.47	3.4	3.2	2.80	2.90
Aug	18.0	-	17.0	-	34.0	-	920	-	0.41	-	3.1	-	2.40	-
Sep	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Oct	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nov	18.0	-	13.5	-	39.5	-	990	-	0.44	-	3.6	-	3.20	-
Dec	17.0	-	11.0	-	30.0	-	950	-	0.27	-	2.7	-	3.20	-

Table 4.3 Dewatered Biosolids Analysis, Year 2018

E.coli DWCC (Presses)		4 Sample Geomean	E.coli DWCC (Presses)		4 Sample Geomean	E.coli DWCC (Presses)		4 Sample Geomean	E.coli DWCC (Presses)		4 Sample Geomean	E.coli DWCC (Presses)		4 Sample Geomean
Date	CFU/gm (dry weight)		Date	CFU/gm (dry weight)		Date	CFU/gm (dry weight)		Date	CFU/gm (dry weight)		Date	CFU/gm (dry weight)	
2018-Jan-05	6600	18176	2018-Apr-23	5900	9064	2018-Aug-10	12000	4012	2018-Nov-02	6300	10378	-	-	-
2018-Jan-12	39000	24404	2018-Apr-27	64000	15244	2018-Aug-13	25000	3224	2018-Nov-05	7200	13262	-	-	-
2018-Jan-15	33000	26000	2018-Apr-30	7900	14033	2018-Aug-13	24000	22564	2018-Nov-09	3600	6510	-	.	-
2018-Jan-19	17000	19494	2018-May-07	5800	11469	2018-Aug-20	19000	19232	2018-Nov-12	1600	4020	-	-	-
2018-Jan-22	46000	31674	2018-May-18	12000	13696	2018-Aug-24	80000	30903	2018-Nov-19	3500	3471	-	-	-
2018-Jan-26	24000	28053	2018-May-30	2100000	32780	2018-Aug-27	44000	35594	2018-Nov-23	12000	3944	-	-	-
2018-Jan-29	20000	24752	2018-Jun-04	5400	29806	2018-Aug-27	32000	38248	2018-Nov-26	8600	4903	-	-	-
2018-Feb-02	13000	23147	2018-Jun-06	310000	80591	2018-Sep-10	31000	43228	2018-Nov-30	21000	9332	-	-	-
2018-Feb-05	8600	15220	2018-Jun-08	31000	102173	2018-Sep-14	23000	31654	2018-Dec-03	8600	11684	-	-	-
2018-Feb-09	270000	27875	2018-Jun-11	5100	22682	2018-Sep-17	11000	22382	2018-Dec-07	14000	12143	-	-	-
2018-Feb-16	49000	34874	2018-Jun-15	31000	35109	2018-Sep-21	60000	26191	2018-Dec-17	13000	13465	-	-	-
2018-Feb-23	2400	22860	2018-Jun-18	41000	21172	2018-Sep-28	12000	20659	-	-	-	-	-	-
2018-Mar-05	2100	16069	2018-Jun-22	31000	21172	2018-Oct-01	26000	21302	-	-	-	-	-	-
2018-Mar-23	14000	7668	2018-Jul-06	130000	47573	2018-Oct-12	33000	28035	-	-	-	-	-	-
2018-Mar-26	20000	6129	2018-Jul-09	19000	42093	2018-Oct-19	110000	32622	-	-	-	-	-	-
2018-Apr-06	8000	8282	2018-Jul-13	60000	46297	2018-Oct-22	2700	22468	-	-	-	-	-	-
2018-Apr-09	11000	12529	2018-Jul-16	10	6205	2018-Oct-26	62000	27920	-	-	-	-	-	-
2018-Apr-13	13000	12299	2018-Jul-20	36000	4501	2018-Oct-29	11000	21215	-	-	-	-	-	-

E.coli Lystek		4 Sample Geomean
Date	CFU/gm (dry weight)	CFU/gm (dry weight)
2018-Jul-05	10	10
2018-Jul-06	10	10

Table 4.4 Thickened Waste Activated Sludge Report Year 2018

Month	Volume to TWAS m^3	Volume from TWAS m^3	Reduction %	Solids % D.S.	Polymer Consumption Cationic m^3	Polymer Consumption Anionic m^3
Jan	5	1	83	-	0.29	0.05
Feb	17,854	3,461	81	4.22	107.65	75.84
Mar	23,562	4,465	81	4.64	152.33	104.42
Apr	23,261	4,433	81	2.81	124.50	97.14
May	24,630	4,790	81	4.58	135.13	102.72
Jun	19,584	2,611	87	4.64	93.93	90.45
Jul	20,738	3,688	82	3.99	131.00	104.00
Aug	17,956	4,250	76	2.89	135.00	92.00
Sep	16,570	4,392	73	3.19	115.00	83.00
Oct	14,318	3,199	78	3.61	103.00	66.00
Nov	21,068	2,020	90	3.96	124.00	102.00
Dec	21,990	2,260	90	3.74	119.00	106.00
Average	-	-	82	3.84	-	-
Totals	108,897	39,571	-	-	1,341	1,024

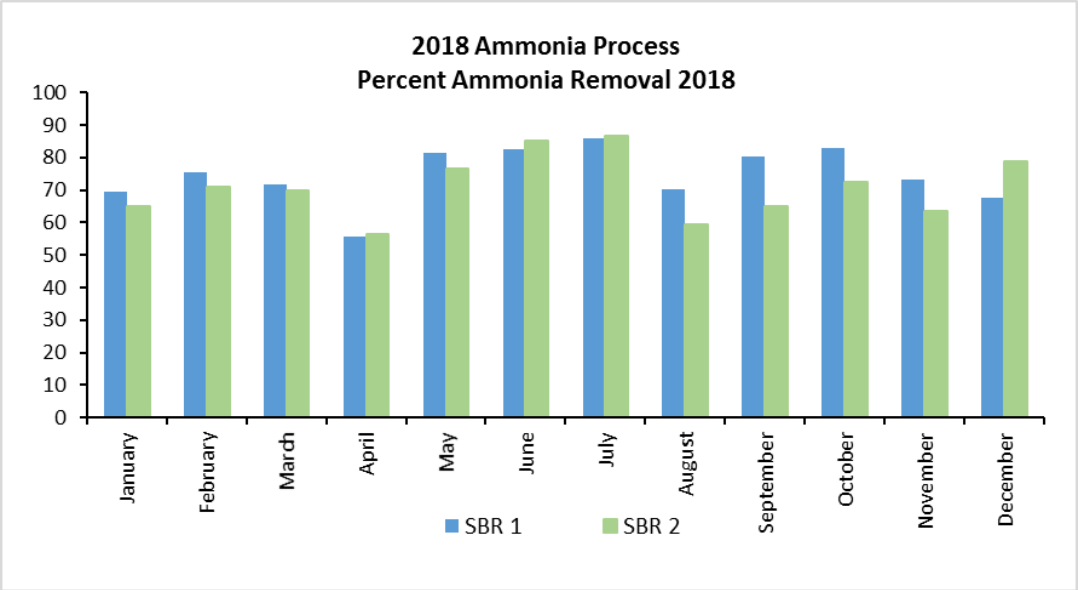
TWAS has been in full service as of February 2018. After the combination of high pressure cleaning of Plant #1 raw sludge lines and removal of grit from Plant #1 primary sludge hoppers the pumping restrictions have been eliminated

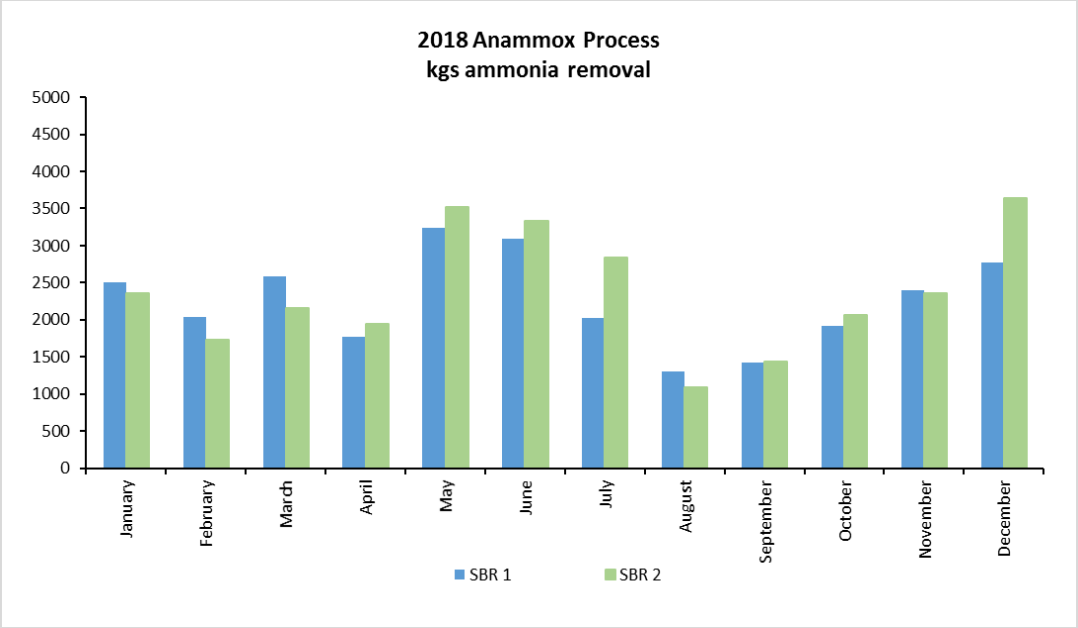
4.1 Side Stream Treatment

Anammox

The Anammox process is a side stream treatment of filtrate from solids dewatering consisting of two Sequencing Batch Reactors (SBR). Each is designed to remove 173 kg/day of ammonia from the side stream filtrate. SBR #1 was commissioned on May 26, 2017 and SBR #2 on May 30th 2017 both are currently in full operation. Chart 4.1 represents the kilograms removed per month in each SBR.

Chart 4.1





5.0 Unusual Events/Process Upsets

The facility has no provision for primary treatment or raw sewage bypass directly to the Speed River. The facility does have provision for secondary treatment bypass, complete tertiary bypass or partial tertiary bypass. During this reporting period there was one (1) partial sandfilter bypass and one (1) full tertiary bypass as reported below in Table 5.1. These events are listed in Table 5.1 and were reported to the MECP Spills Action Centre as per standard operating protocol.

Table 5.1 Bypass Summary 2018

Date	Occurrence Number	Duration hrs:min	m^3	$cBOD_5$ mg/L	TSS mg/L	NH_3-N mg/L	TP mg/L	Partial or Full Tertairy Bypass	Chlorinated
Apr 16	902131	2:10	965	4.0	2.5	4.48	0.25	Partial	yes
Apr 16	6600-AXVQ2L	0:15	12	<2	12.0	2.14	0.24	Full	yes

Notes:

Partial Sandfilter Bypass: All effluent receives RBC treatment, is chlorinated and de-chlorinated. The volumes listed indicate that amount that did not receive full sandfilter treatment.

Full Sandfilter Bypass: All effluent receives secondary treatment, is chlorinated. The volumes listed indicate the amount that did not receive tertiary treatment.

6.0 WWTP Projects and Upgrades

The following is a summary of Capital Projects, upgrades and major maintenance conducted during the reporting period.

Capital Project Summary, Year 2018

Project	Status
SCADA upgrade at the plant	Planning
Installation of backup generators	In progress
Digester 3 Gas proofing and repairs/refurbishment Project	In progress
Aeration Blower Efficiency Study	Completed
Aeration Blower Upgrades	Planning

Maintenance Project Summary, Year 2018

Project	Status
Installation of new scum troughs in Plant #2 & #3 East primary and secondary	Plant #3 East and West Completed
Chain & Flight Replacement Program	Planning

Optimization

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 plants along the Grand River Watershed. In 2018, the facility was honoured to be recognized by the Grand River Watershed Wide Optimization Program with a Silver level award for the efforts in process control to improve the quality of the Grand River. 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.

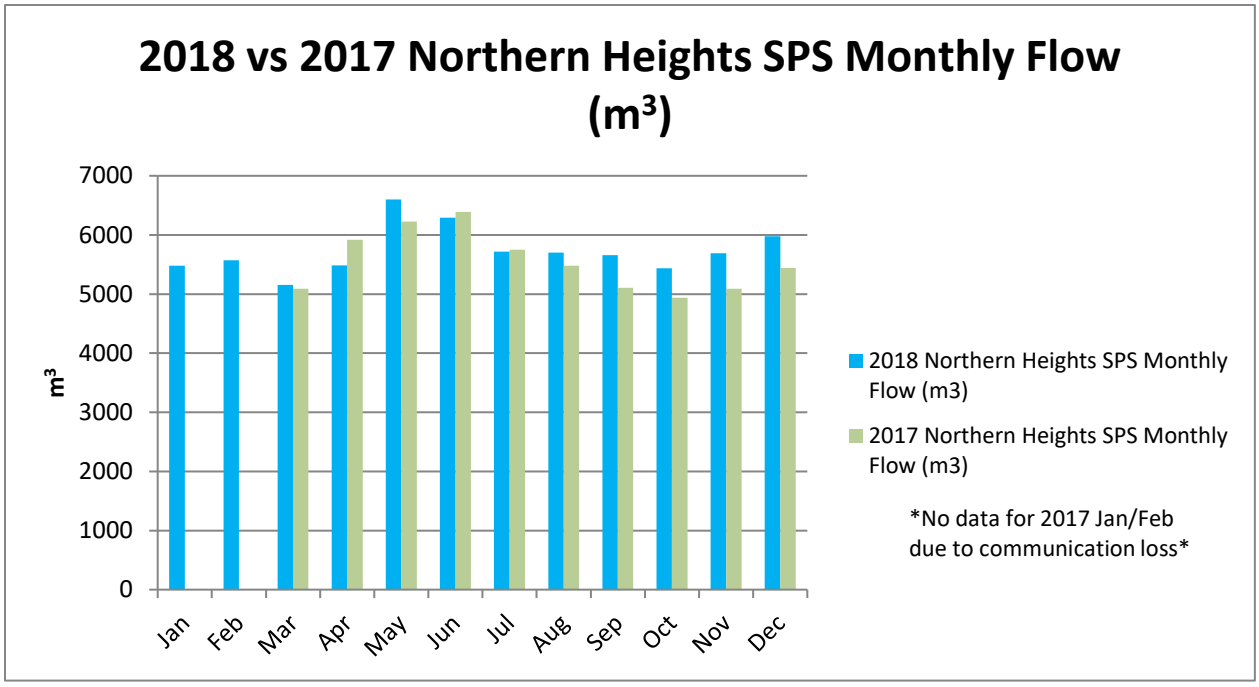
Through an optimized approach to process control, data has been generated to support an application to the MECP to re-rate the current capacity of the treatment plant. The existing four liquid trains have a combined nominal rated capacity of 64 MLD. Any approved additional capacity above the current 64MLD would extend the timelines of the current upgrade program and schedule. Such found capacity that results in either capital cost deferral or savings supports the City's Strategic Objective of the Corporate Administrative Plan.

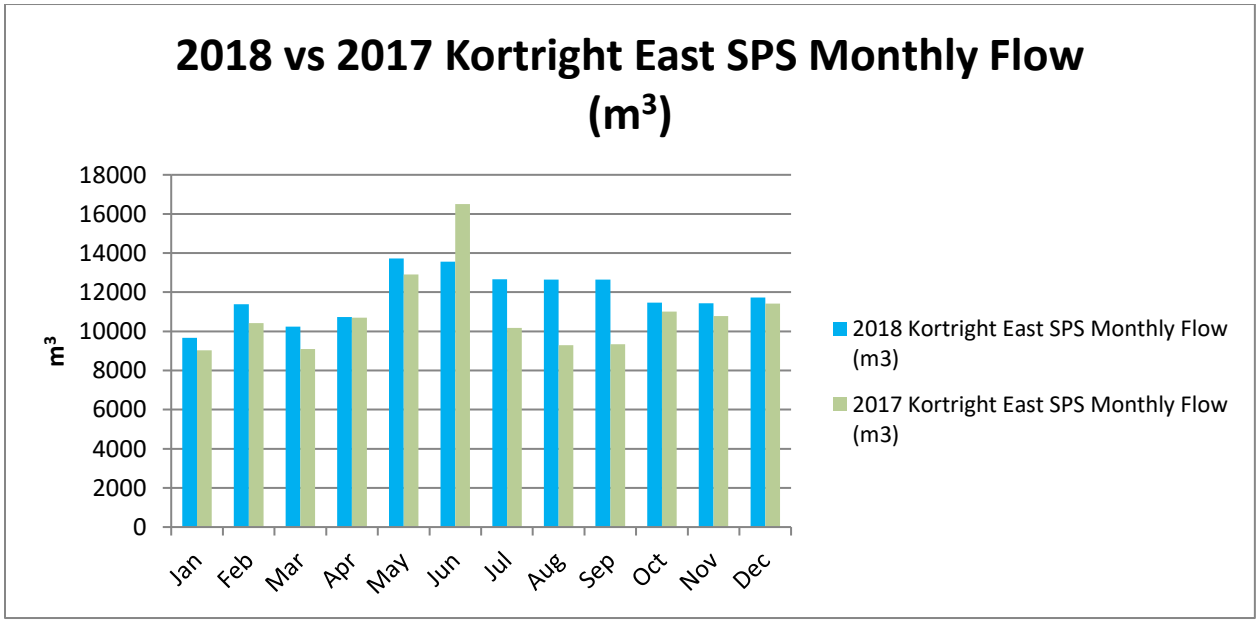
7.0 Sewage Pumping Stations

Summary and interpretation of monitoring data, including an overview of the adequacy of the works:

All sewage pumping stations performed adequately and as designed throughout the reporting period. The following are the flow values for Sewage Pumping Stations with flow tracking meters as part of the ECA requirements.

Chart1 Sewage Pumping Station Monthly Flow





A description of any operating problems encountered and corrective actions taken:

Date	Operating Problems	Resolution
June 6th, 2018	Existing Operator Interface Terminals (OIT) failed at Northern Heights and Kortright	Installed new OIT at Northern Heights and Kortright SPS
August 10, 2018	Kortright SPS Pump # 2 soft start failure	Soft start replaced for Pump # 2
November 20/21, 2018	Hoisting chains on Pump #1, #2, #3 at Kortright SPS found to be corroded	Replaced hoisting chains on three (3) pumps

A summary of all maintenance carried out on any major structure, equipment, apparatus, mechanism, or thing forming part of the Works:

Date	Maintenance Performed
June 4, 2018	Wet well cleanouts Kortright SPS, Northern Heights SPS

A summary of any complaints received during the reporting period and any steps taken to address the complaints:

Date	Location	Complaint	Resolution
April 4, 2018	Terraview SPS	Outside light shining into neighbouring house	Light adjusted and new switch installed

A summary of spill or abnormal discharge events:

Date	Event Description	MECP/SAC Reference Number
August 30, 2018	Sanitary spill to ditch after lateral damaged by utility company.	2125-B45TYH

Appendices

Appendix A - Guelph Process Schematic

Appendix B - Existing Works

Appendix C - Calibration Report

Appendix D - Pollution Prevention Plan

Appendix E - Sludge Accountability Calculations

Appendix F - Environmental Compliance Approval

Appendix G - Sewage Pumping Stations CofA

Appendix H - Facility Performance Charts

Appendix I - CALA Certificate

Accessible versions of these appendices are available by contacting Wastewater Services at 519-837-5627 or TTY 519-826-9771