Renfrew Wastewater System

2020 Annual Report

January 1, 2020 – December 31, 2020

Prepared By

Ontario Clean Water Agency
Agence Ontarienne Des Eaux

This report has been prepared to meet the requirements set out in the facility Environmental Compliance Certificate #4237-ACPJ6Y issued October 13, 2016.

Contents

Compliance Report Card

Compliance Event	# of Events	Details
Ministry of Environment Inspections	0	No Inspections during the reporting period
Ministry of Labour Inspections	0	No Inspections during the reporting period
Effluent Parameter Exceedances	0	No parameter was exceeded during the reporting period
Non-Compliance	0	No Non-Compliance during the reporting period
Bypass/Overflows	1	See summary of Bypass/Overflows
Community Complaints	0	No community complaints during the reporting period
Spills	0	No spills during the reporting period

System/Process Description

Wastewater enters the WPCP through two influent channels, one equipped with a mechanical screen and one with a manual bar screen for maintenance and emergency bypass. The screening system is equipped with one screenings washer/compactor. Influent then enters two aerated grit tanks where blowers, provide aeration. Two grit slurry pumps, two grit cyclones, and one grit classifier/dewatering unit transport and process particulate material.

Biological treatment is provided using two three-pass aeration tanks with fine bubble aeration systems and one anoxic intake zone. Flow is then directed to two, two-pass secondary clarifiers equipped with sludge and scum removal mechanisms. The phosphorus removal system uses ferric chloride. It is injected into the influent of the aeration process.

Disinfection of final effluent is achieved via ultraviolet (UV) light disinfection. The UV bulbs are cleaned via automated wipers.

Sludge digestion occurs via aerobic digester. Digested sludge is dewatered via one centrifuge and back-up system dewatering press. Polymers are added to aid in dewatering. Also present is a conveyer and loading facility for dewatered Bio-solids cake. There are no sludge storage facilities onsite at Renfrew WPCP.

The facility is equipped with back-up power.

An on-site tank and chopper pump are available for receiving imported wastewaters.

Effluent Quality Assurance or Control Measures

The Town of Renfrew facilities are part of OCWA's operational Mississippi Cluster. The facilities are supported by regional and corporate resources. Operational Services are delivered by OCWA staff that live and work in the community.

OCWA operates facilities in compliance with applicable regulations. The facility has comprehensive manuals detailing operations, maintenance, instrumentation, and emergency procedures. All procedures are treated as active documents, with annual reviews.

OCWA has additional "Value Added" and operational support services that the Town of Renfrew benefits from including:

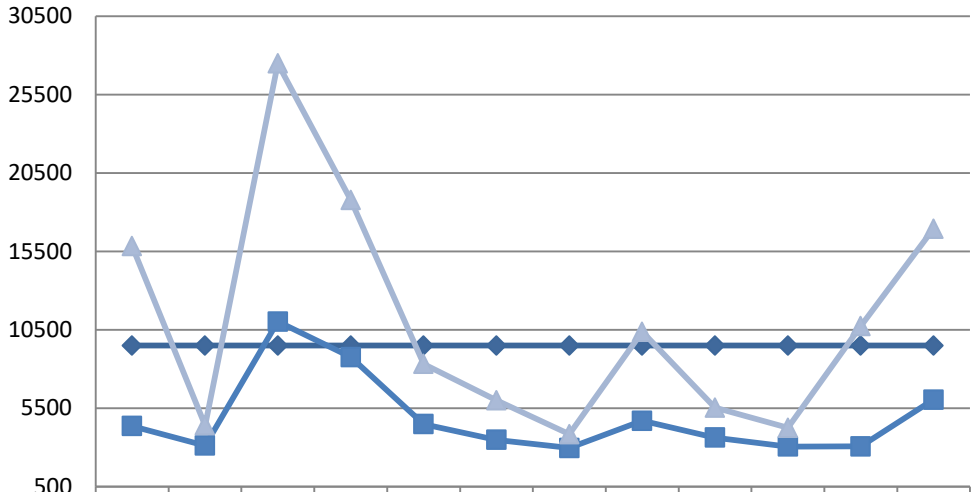
- Access to a network of operational compliance and support experts at the regional and corporate level, as well as affiliated programs that include the following:
- Quality & Environmental Management System, Occupational Health & Safety System and an internal compliance audit system.
- Process Data Management (PDM) facility operating information repository, which consolidates field data, online instrumentation, and electronic receipt of lab test results for reporting, tracking and analysis.
- Work Management System (WMS) that tracks and reports maintenance activity, and creates predictive and preventative reports.
- Outpost 5 wide-area SCADA system allows for process optimization and data logging, process trending, remote alarming and optimization of staff time.
- Client reporting which includes operational data, equipment inventory, financial statements, maintenance work orders, and capital status reports
- Site-Specific Contingency Plans and Standard Operating Procedures
- Use of accredited laboratories
- Additional support in response to unusual circumstances, and extra support in an emergency.
- Use of sampling schedules for external laboratory sampling

Treatment Flows

Raw Flow (m³/d)

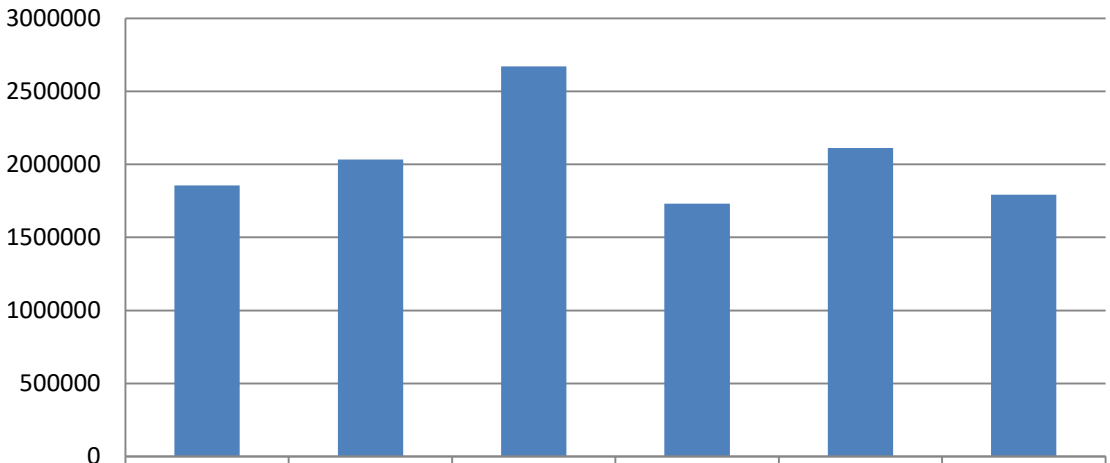
Compliance is based on an annual average flow. For 2020, the annual average flow was 4912.3 m³/d, which is compliance with the 9500 m³/d.

Note: Elevated flows above the rated capacity are directly related to snow melt and wet weather events.



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Rated Capacity	9500	9500	9500	9500	9500	9500	9500	9500	9500	9500	9500	9500
Avg Monthly Flow (m³/d)	4371	3119	11028	8765	4494	3487	2972	4706	3630	3065	3075	6050
Max Monthly Flow (m³/d)	15827	4409	27475	18777	8329	6006	3843	10370	5536	4260	10743	16947

Annual Comparison (m³)



	2015	2016	2017	2018	2019	2020
Total Annual Flow	1855735	2033547	2669781	1729973	2112540	1792972

Raw Sewage Quality

Results of raw sewage concentrations are available in the Facility Performance Assessment Report in Appendix A. A monthly loading summary is available in Appendix B.

Annual Average Loading Objectives

Parameter	Annual Average (kg/d)	Objective (kg/d)	Status
BOD5	426	712	Met Objective
Total Suspended Solids	488	801	Met Objective
Total Phosphorus	12	22	Met Objective
Total Kjeldahl Nitrogen (TKN)	27	125	Met Objective

Effluent Quality

The limits are based on current requirements in the facilities Environmental Compliance Approval. Laboratory samples are submitted to an accredited laboratory for regulatory analysis.

The Federal Government also regulates certain sewage effluent parameter under the Federal Fisheries Act. The results are submitted to Environment Canada on a quarterly basis.

Effluent Exceedance Summary

Limit

Sample	Date	Parameter	Exceedance of	Limit	Value
No limit exceedances during the reporting period					

Objective

Sample	Date	Parameter	Objective	Value
No objective exceedances during the reporting period				

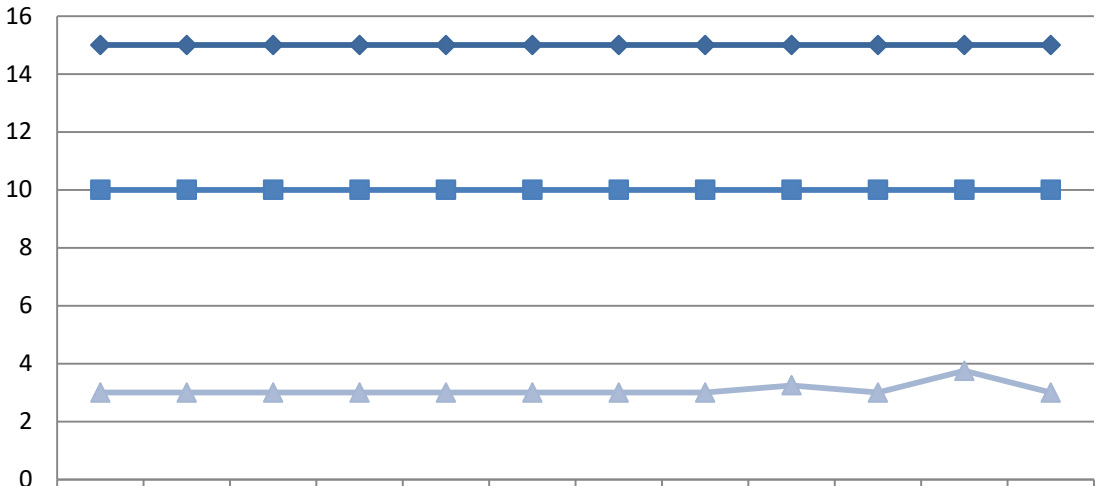
Other Effluent Issues

Sample	Legislation	Date	Details	Response
There were no other operational issues affecting effluent quality				

Effluent Parameter Summary

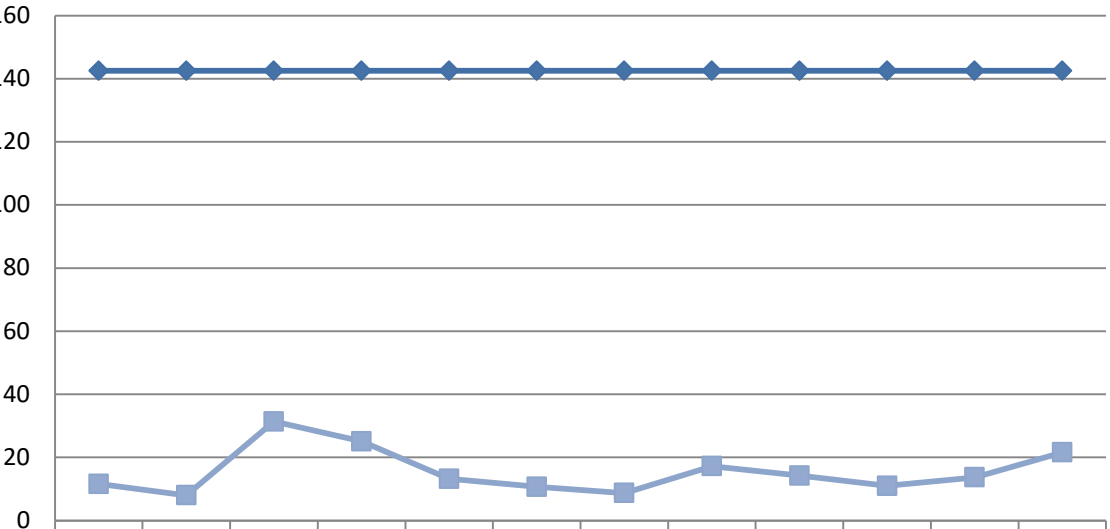
Carbonaceous Biological Oxygen Demand (CBOD5)

Concentration (mg/L)



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Limit	15	15	15	15	15	15	15	15	15	15	15	15
Objective	10	10	10	10	10	10	10	10	10	10	10	10
Average	3	3	3	3	3	3	3	3	3	3	4	3

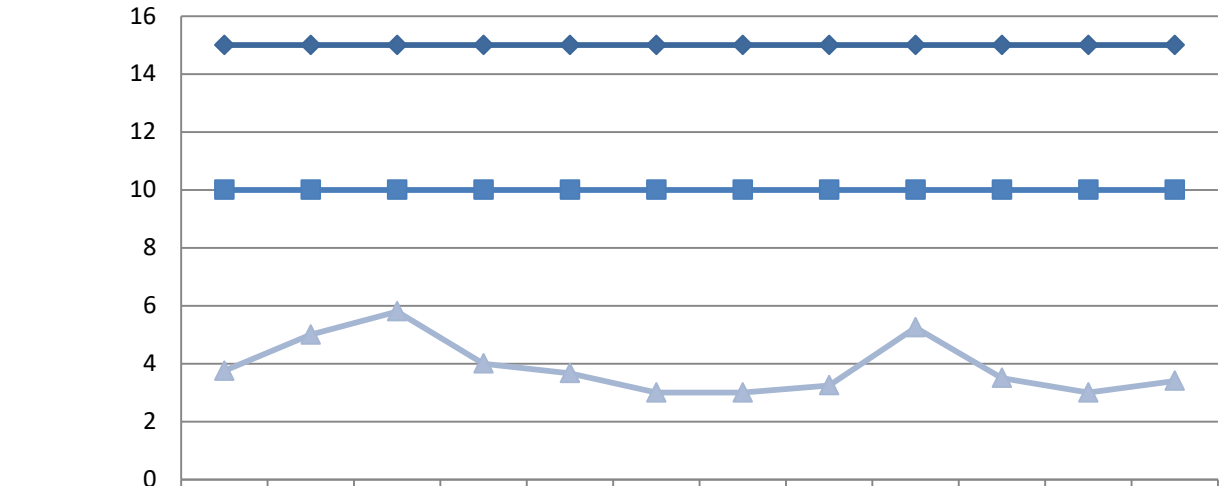
Loading (kg/d)



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Limit	142.5	142.5	142.5	142.5	142.5	142.5	142.5	142.5	142.5	142.5	142.5	142.5
Average	11.6	8.0	31.4	25.1	13.2	10.7	8.7	17.2	14.2	11.0	13.7	21.6

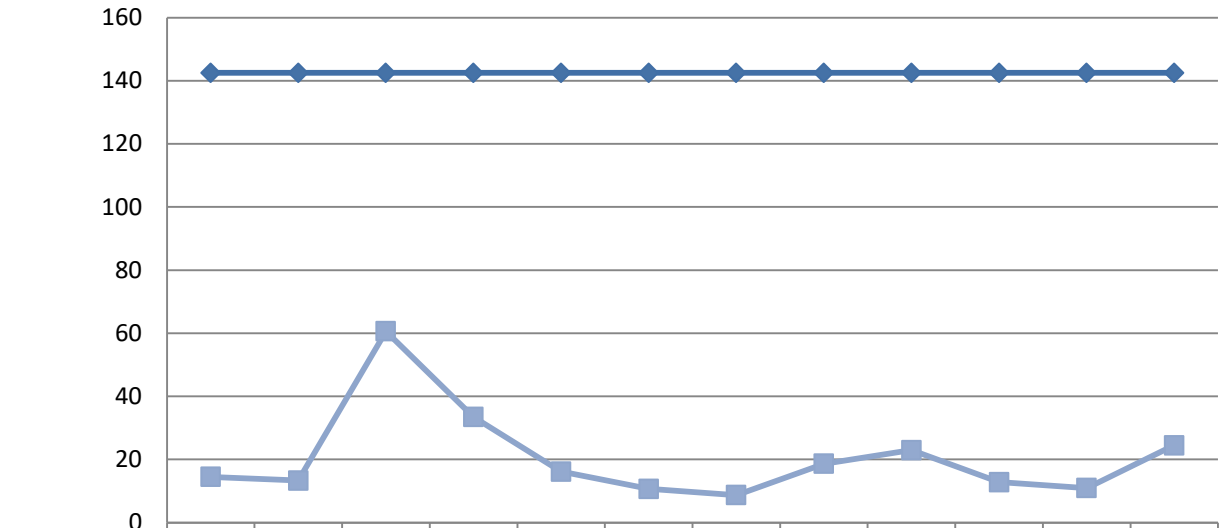
Total Suspended Solids

Concentration (mg/L)



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Limit	15	15	15	15	15	15	15	15	15	15	15	15
Objective	10	10	10	10	10	10	10	10	10	10	10	10
Average	4	5	6	4	4	3	3	3	5	4	3	3

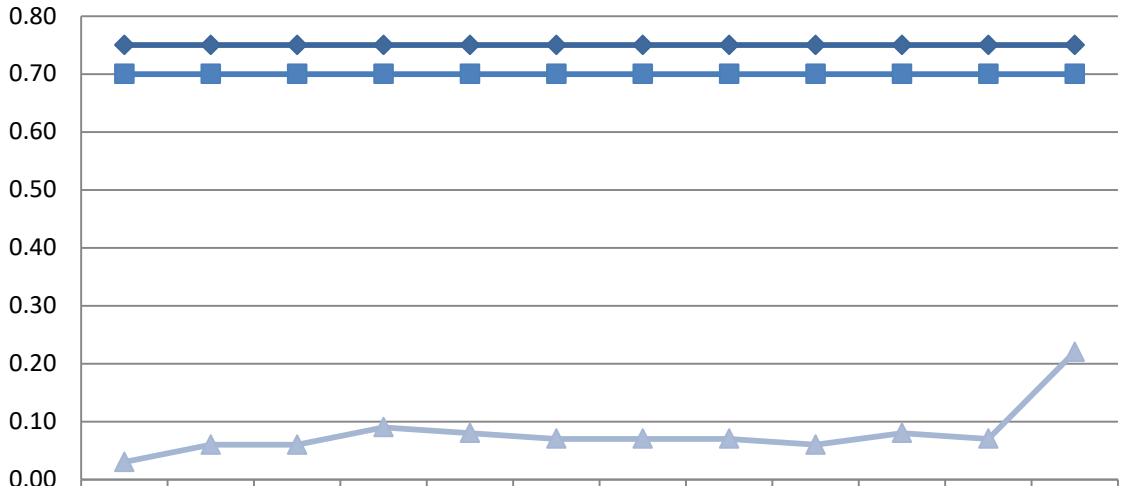
Loading (kg/d)



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Limit	142.5	142.5	142.5	142.5	142.5	142.5	142.5	142.5	142.5	142.5	142.5	142.5
Average	14.5	13.3	60.6	33.4	16.1	10.7	8.7	18.7	23.0	12.8	11.0	24.5

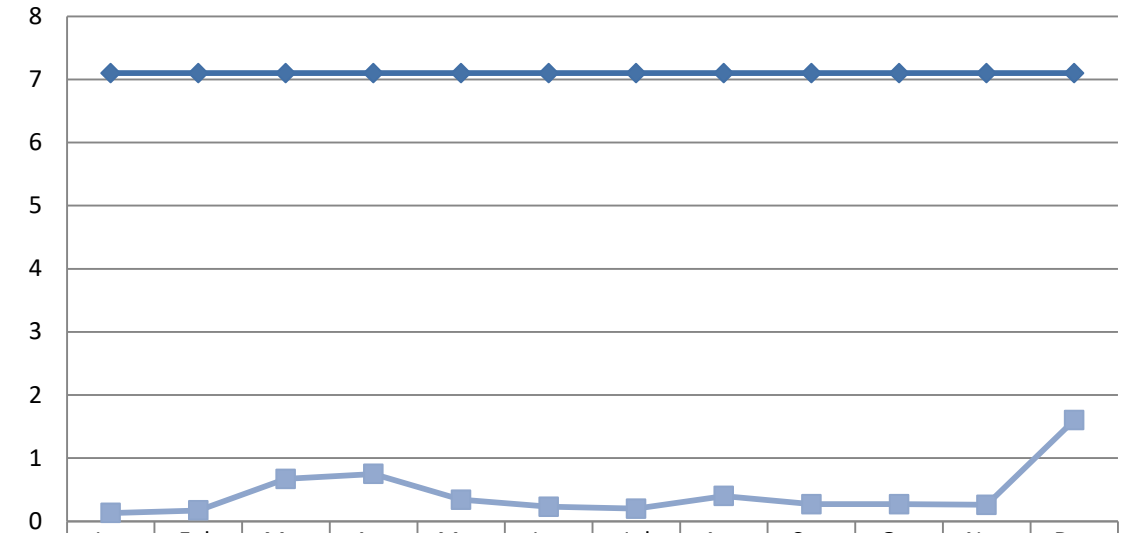
Total Phosphorus

Concentration (mg/L)



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Limit	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
Objective	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70
Average	0.03	0.06	0.06	0.09	0.08	0.07	0.07	0.07	0.06	0.08	0.07	0.22

Loading (kg/d)

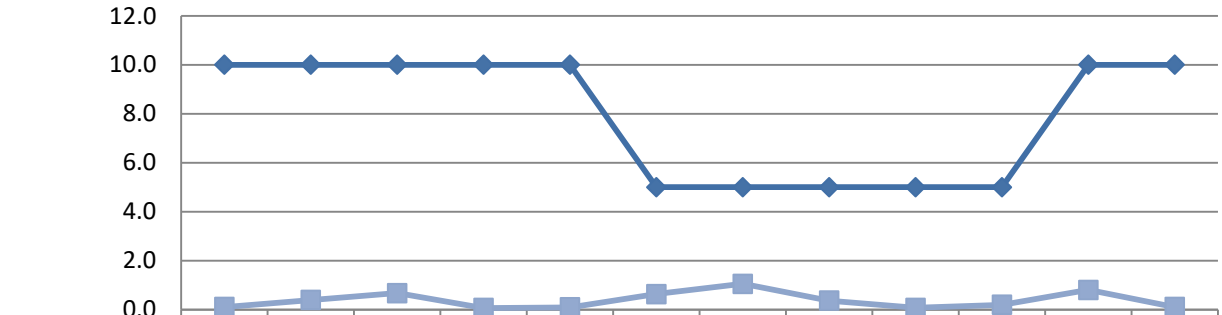


	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Limit	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1
Average	0.1	0.2	0.7	0.8	0.3	0.2	0.2	0.4	0.3	0.3	0.3	1.6

Ammonia Nitrogen Series

There are no limits regarding ammonia concentration or loading. Compliance is based on acute lethality.

Total Ammonia Nitrogen Concentration (mg/L)



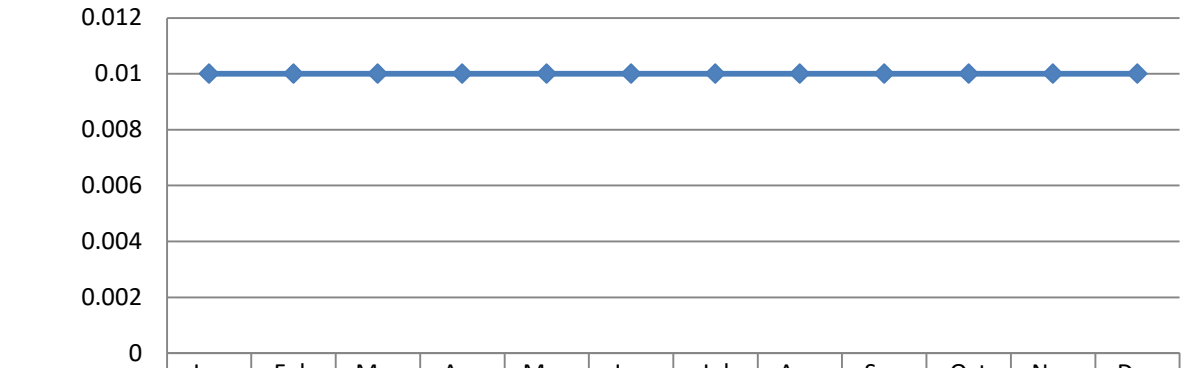
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Objective	10.0	10.0	10.0	10.0	10.0	5.0	5.0	5.0	5.0	5.0	10.0	10.0
Average	0.1	0.4	0.7	0.1	0.1	0.6	1.1	0.4	0.1	0.2	0.8	0.1

Acute Lethality

There were four (4) samples collected in 2020 and tested for acute lethality (Rainbow Trout and Daphnia Magna). Results are displayed as % mortality. Sampling has changed from annually to quarterly after the issue of the amended Environmental.

Quarter	Rainbow Trout	Daphnia Magna
1st Quarter	0%	0%
2nd Quarter	0%	0%
3rd Quarter	0%	0%
4th Quarter	0%	0%

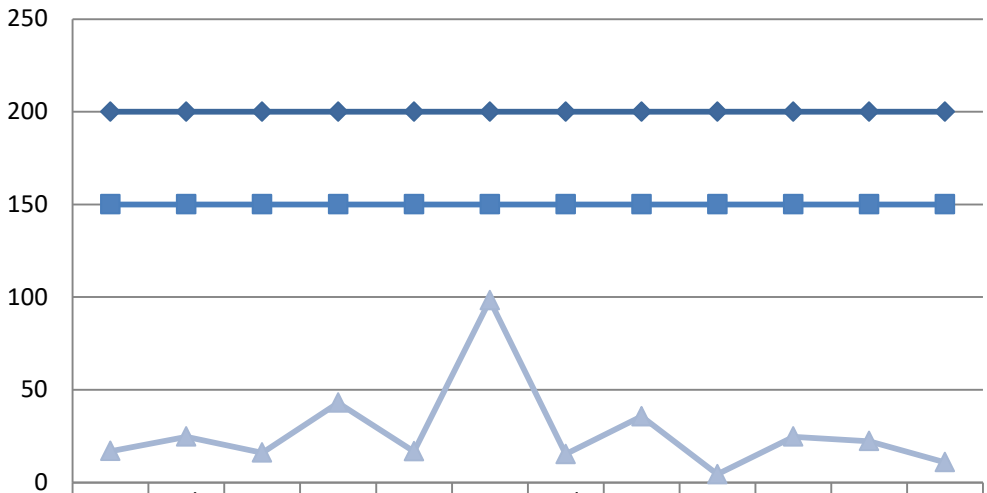
Un-Ionized Ammonia



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Average	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01

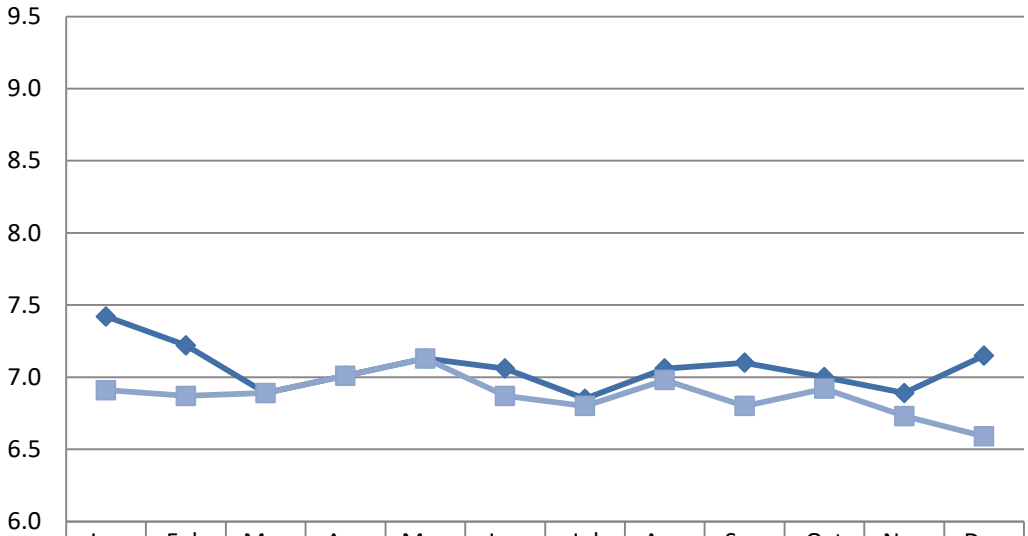
E-coli

Geometric Mean Average (cfu/100mL)



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Limit	200	200	200	200	200	200	200	200	200	200	200	200
Objective	150	150	150	150	150	150	150	150	150	150	150	150
Geometric Mean Avg	17	25	16	43	17	98	15	36	4	25	22	11

pH



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Max Monthly pH	7.4	7.2	6.9	7.0	7.1	7.1	6.9	7.1	7.1	7.0	6.9	7.2
Min Monthly pH	6.9	6.9	6.9	7.0	7.1	6.9	6.8	7.0	6.8	6.9	6.7	6.6

Imported Wastewater Quality

There were no imported wastewaters accepted into the treatment plant.

Biosolids

Please note Section 10.4 (g) of Environmental Compliance Approval 4237-ACPJ6Y asks to include discussion on lagoon cells. The Renfew Wastewater Treatment facility does not utilize a lagoon process.

The Renfrew WPCP uses aerobic sludge digestion followed by sludge dewatering. Dewatering is done using either centrifuge or Fournier press. The dewatered sludge is land filled.

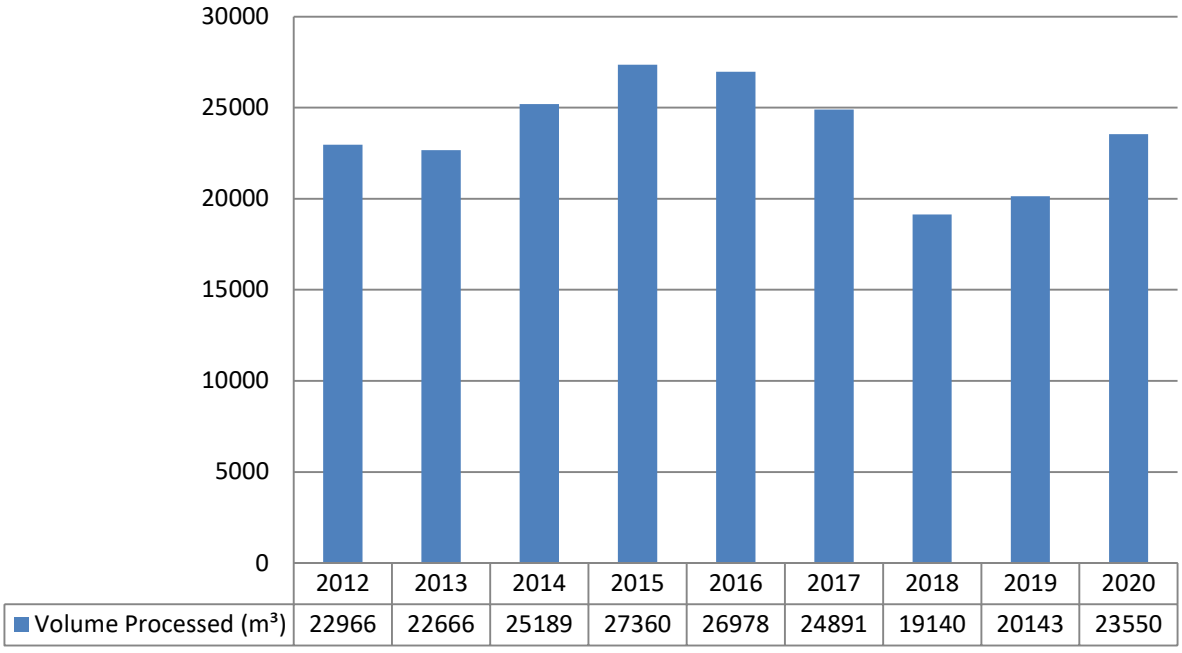
Centrifuge

Approximately 23,550 m^3 of liquid sludge were processed in 2020.

Fournier Press

The Fournier Press was not utilized in 2020.

Annual Comparison



	2012	2013	2014	2015	2016	2017	2018	2019	2020
Volume Processed (m^3)	22966	22666	25189	27360	26978	24891	19140	20143	23550

Quality

The biosolids sampling results are summarized in Appendix C. All results met the established guidelines.

Summary of Complaints

Date	Location	Details	Corrective Action Taken
There were no complaints received during the reporting period.			

Summary of Bypass/Overflows

Start Date	End Date	Details	Actions Taken	Volume (m^3)
August 23 2020 19:45	August 23 2020 19:50	Heavy rainfall hydraulically overloaded the facility	Samples taken	0.79

Summary of Spills/Abnormal Discharges

Date Start	Date End	Details	Corrective Action
There were no spills or abnormal discharges during the reporting period.			

Maintenance

OCWA uses a risk-based preventative maintenance framework that ensures assets are maintained to manufacturer's and/or industry standards. Maintenance is completed using various tools and operational supports. The Ottawa Valley Hub has specialized certified staff such as Millwrights, Electricians and Instrumentation Specialists to name a few.

OCWA uses a Workplace Maintenance System (WMS). WMS is a maintenance tracking system that can generate work orders as well as give summaries of completed and scheduled work. During the year, the operating authority at the facility generates scheduled work orders on a weekly, monthly and annual basis. The service work is recorded in the work order history. This ensures routine and preventive maintenance is carried out. Emergency and capital repair maintenance is completed and added to the system.

Capital projects are listed and provided to the Town of Renfrew in the form of a "Capital Forecast". This list is developed by facility staff and provides recommendations for facility components requiring upgrading or improvement.

Maintenance Highlights

WO #	Summary
1664663	Capital MCC cleanout by EATON
1790686	Capital S&I Eaton Device Net card replacement
1835869	Capital Centrifuge AHU VFD Shorted

WO #	Summary
1837082	Capital Install flange at end of compactor
1837254	Capital RAS pump #4 VFD failed
1918604	Capital Aeration blower performance review
1919072	Capital Replaced Raw and RAS Pump impellers
1962330	Capital Replacement Polymer system 2 VFD
1584595	Capital Blower/Motor replacement
1586579	Capital Replaced Heater Motors and blade
1587100	Capital VFD Raw sewage VFD failure
1621960	Capital Inlet Channel pump out by X-site
1623830	Capital Clarifier gearbox rebuilds
1624640	Capital Grit Bin Replacement
1661908	Capital Replace gearbox on compactor
1663117	Capital Raw sewage pump VFD installation
1751637	Capital Repaired Aeration mixer
1791319	Capital Replace leaking grit elbow
1833598	Capital Portable pH probe replacement
1835868	Capital Replaced RAS Pump 4 VFD
1874118	Capital PLC communication error for WAS pump failed on start up
1962329	Capital Installed alarm on SCADA for Centrifuge Run time alarm
2037674	Capital Compactor Rebuild
2039533	Capital Purchased Fractional and number drill sets

Submitted Notice of Modifications to Sewage Works

There were no notices submitted for 2020.

Calibration

The flow meters were calibrated on December 17, 2020. Records are attached in Appendix D. Analyzers are scheduled for monthly maintenance in the WMS program. Work is completed and logged in the logbook and in WMS.

Appendix A

Facility Assessment Report

Ontario Clean Water Agency
Performance Assessment Report Wastewater/Lagoon

From: **01/01/2020 to 31/12/2020**

Facility: **[5863] RENFREW WASTEWATER TREATMENT FACILITY**
Works: **[120000603]**

	01/2020	02/2020	03/2020	04/2020	05/2020	06/2020	07/2020	08/2020	09/2020	10/2020	11/2020	12/2020	<--Total-->	<--Avg-->	<--Max-->	<--Criteria-->
Flows:																
Raw Flow: Total - Raw Sewage Influent (m^3)	135512.00	90455.00	341874.00	262959.00	139310.00	101127.00	92140.00	145890.00	108890.00	95008.00	92251.00	187556.00	1792972.00			
Raw Flow: Avg - Raw Sewage Influent (m^3/d)	4371.35	3119.14	11028.19	8765.30	4493.87	3487.14	2972.26	4706.13	3629.67	3064.77	3075.03	6050.19		4896.92		
Raw Flow: Max - Raw Sewage Influent (m^3/d)	15827.00	4409.00	27475.00	18777.00	8329.00	6006.00	3843.00	10370.00	5536.00	4260.00	10743.00	16947.00			27475.00	
Eff. Flow: Total - Final Effluent (m^3)	119567.00	77181.00	324071.00	250677.00	136403.00	102980.00	89781.00	177891.00	131210.00	113515.00	109461.00	223073.00	1855810.00			
Eff. Flow: Avg - Final Effluent (m^3/d)	3857.00	2661.41	10453.90	8355.90	4400.10	3551.03	2896.16	5738.42	4373.67	3661.77	3648.70	7195.90		5066.16		
Eff. Flow: Max - Final Effluent (m^3/d)	15257.00	3964.00	27059.00	18055.00	8041.00	6009.00	3772.00	11402.00	11917.00	8967.00	10353.00	16324.00			27059.00	
Carbonaceous Biochemical Oxygen Demand: CBOD:																
Raw: Avg cBOD5 - Raw Sewage Influent (mg/L)	66.000	89.250	60.800	54.250	69.000	89.200	104.500	53.500	49.500	78.250	117.750	57.200		74.100	117.750	
Raw: # of samples of cBOD5 - Raw Sewage Influent (mg/l	4	4	5	4	3	5	4	4	4	4	4	5	50			
Eff: Avg cBOD5 - Final Effluent (mg/L)	< 3.000	< 3.000	< 3.000	< 3.000	< 3.000	< 3.000	< 3.000	< 3.000	< 3.250	< 3.000	< 3.750	< 3.000		< 3.083	< 3.750	15.0
Eff: # of samples of cBOD5 - Final Effluent (mg/L)	4	4	5	4	3	5	4	4	4	4	4	5	50			
Loading: cBOD5 - Final Effluent (kg/d)	< 11.571	< 7.984	< 31.362	< 25.068	< 13.200	< 10.653	< 8.688	< 17.215	< 14.214	< 10.985	< 13.683	< 21.588		< 15.518	< 31.362	
Percent Removal: cBOD5 - Raw Sewage Influent (mg/L)	95.455	96.639	95.066	94.470	95.652	96.637	97.129	94.393	93.434	96.166	96.815	94.755			97.129	
Biochemical Oxygen Demand: BOD5:																
Raw: Avg BOD5 - Raw Sewage Influent (mg/L)	85.000	115.750	103.400	71.750	99.000	116.600	127.750	67.750	61.250	91.500	139.500	62.400		95.138	139.500	
Raw: # of samples of BOD5 - Raw Sewage Influent (mg/L)	4	4	5	4	3	5	4	4	4	4	4	5	50			
Eff: Avg BOD5 - Final Effluent (mg/L)	< 3.000	< 3.000	< 3.800	< 3.000	< 3.333	< 3.000	< 3.000	< 3.000	< 3.250	< 3.000	< 3.000	< 3.000		< 3.115	< 3.800	
Loading: BOD5 - Final Effluent (kg/d)	< 11.571	< 7.984	< 39.725	< 25.068	< 14.667	< 10.653	< 8.688	< 17.215	< 14.214	< 10.985	< 10.946	< 21.588		< 16.109	< 39.725	
Percent Removal: BOD5 - Raw Sewage Influent (mg/L)	96.471	97.408	96.325	95.819	96.633	97.427	97.652	95.572	94.694	96.721	97.849	95.192			97.849	
Total Suspended Solids: TSS:																
Raw: Avg TSS - Raw Sewage Influent (mg/L)	80.000	131.250	82.000	84.000	140.000	153.800	110.000	66.000	57.500	78.750	175.000	114.200		106.042	175.000	
Raw: # of samples of TSS - Raw Sewage Influent (mg/L)	4	4	5	4	3	5	4	4	4	4	4	5	50			
Eff: Avg TSS - Final Effluent (mg/L)	< 3.750	5.000	< 5.800	< 4.000	< 3.667	< 3.000	< 3.000	< 3.250	< 5.250	< 3.500	< 3.000	< 3.400		< 3.885	5.800	15.0
Eff: # of samples of TSS - Final Effluent (mg/L)	4	4	5	4	3	5	4	4	4	4	4	5	50			
Loading: TSS - Final Effluent (kg/d)	< 14.464	13.307	< 60.633	< 33.424	< 16.134	< 10.653	< 8.688	< 18.650	< 22.962	< 12.816	< 10.946	< 24.466		< 20.595	60.633	
Percent Removal: TSS - Raw Sewage Influent (mg/L)	95.313	96.190	92.927	95.238	97.381	98.049	97.273	95.076	90.870	95.556	98.286	97.023			98.286	
Total Phosphorus: TP:																
Raw: Avg TP - Raw Sewage Influent (mg/L)	2.305	3.995	1.678	1.807	3.353	3.850	3.655	1.745	2.188	2.668	4.185	2.658		2.841	4.185	
Raw: # of samples of TP - Raw Sewage Influent (mg/L)	4	4	5	4	3	5	4	4	4	4	4	5	50			
Eff: Avg TP - Final Effluent (mg/L)	0.033	0.065	0.064	0.090	0.077	0.066	0.070	0.070	0.063	0.075	0.070	0.222		0.080	0.222	0.75
Eff: # of samples of TP - Final Effluent (mg/L)	4	4	5	4	3	5	4	4	4	4	4	5	50			
Loading: TP - Final Effluent (kg/d)	0.125	0.173	0.669	0.752	0.337	0.234	0.203	0.402	0.273	0.275	0.255	1.597		0.441	1.597	
Percent Removal: TP - Raw Sewage Influent (mg/L)	98.590	98.373	96.186	95.021	97.714	98.286	98.085	95.989	97.143	97.188	98.327	91.648			98.590	
Nitrogen Series:																
Raw: Avg TKN - Raw Sewage Influent (mg/L)	31.750	40.450	17.040	16.850	27.400	31.640	32.700	15.600	21.025	31.350	34.725	21.460		26.833	40.450	
Raw: # of samples of TKN - Raw Sewage Influent (mg/L)	4	4	5	4	3	5	4	4	4	4	4	5	50			
Eff: Avg TAN - Final Effluent (mg/L)	0.097	0.390	0.670	0.065	0.087	0.634	1.047	0.355	0.068	0.193	0.803	0.098		0.376	1.047	
Eff: # of samples of TAN - Final Effluent (mg/L)	4	4	5	4	3	5	4	4	4	4	4	5	50			
Loading: TAN - Final Effluent (kg/d)	0.376	1.038	7.004	0.543	0.381	2.251	3.034	2.037	0.295	0.705	2.928	0.705		1.775	7.004	
Disinfection:																
Eff: GMD E. Coli - Final Effluent (cfu/100mL)	76.406	11.012	28.039	31.815	5.785	3.554	17.795	13.689	4.380	30.249	5.180	4.497		19.367	76.406	
Eff: # of samples of E. Coli - Final Effluent (cfu/100mL)	4	4	5	4	4	5	4	4	4	4	4	5	51			

Appendix B

Raw Sewage Loading Summary

Ontario Clean Water Agency
Time Series Info Report

From: 01/01/2020 to 31/12/2020

Facility Org Number: 5863
Facility Works Number: 120000603
Facility Name: RENFREW WASTEWATER TREATMENT FACILITY
Facility Owner: Municipality: The Corporation of the Town of Renfrew
Facility Classification: Class 3 Wastewater Treatment
Receiver: Bonnechere River
Service Population:
Total Design Capacity: 9500.0 m3/day

	01/2020	02/2020	03/2020	04/2020	05/2020	06/2020	07/2020	08/2020	09/2020	10/2020	11/2020	12/2020	Total	Avg	Max	Min
Raw Sewage Influent / Loadings BOD - kg/d																
Count IH	4	4	5	4	3	5	4	4	4	4	4	5	50			
Max IH	411.556	506.08	1397.1	1312.632	518.592	490.518	515.04	699.309	293.408	379.155	644.49	813.456			1397.1	
Mean IH	325.462	371.596	794.713	578.239	421.188	385.606	385.848	356.575	216.696	319.473	428.602	440.341		425.936		
Min IH	234.455	317.148	443.884	238.224	237.649	196.21	297.891	102.652	81.09	230.086	300.248	250.11				81.09
Total IH	1301.846	1486.383	3973.564	2312.955	1263.565	1928.031	1543.391	1426.3	866.784	1277.893	1714.406	2201.704	21296.82			
Raw Sewage Influent / Loadings Suspended Solids - kg/d																
Count IH	4	4	5	4	3	5	4	4	4	4	4	5	50			
Max IH	421.935	838.195	1204.9	1215.4	1022.22	916.2	532.8	537.93	443.248	430.92	1171.8	1225.285			1225.285	
Mean IH	312.358	420.378	843.131	650.721	579.923	508.584	340.15	317.398	218.929	282.847	546.254	713.654		488.455		
Min IH	252.49	251.94	651.98	306.288	177.35	95.302	128.5	186.64	54.06	178.515	216.525	287.424				54.06
Total IH	1249.43	1681.51	4215.655	2602.883	1739.77	2542.922	1360.6	1269.592	875.716	1131.39	2185.015	3568.268	24422.75			
Raw Sewage Influent / Loadings TKN - kg/d																
Count IH	4	4	5	4	3	5	4	4	4	4	4	5	50			
Max IH	133.424	150.724	209.26	133.683	143.111	140.789	116.122	130.697	97.264	135.022	138.012	249.121			249.121	
Mean IH	122.817	130.995	149.143	115.205	112.133	103.721	100.226	83.312	70.463	112.143	105.896	145.466		113.846		
Min IH	114.473	111.654	110.34	105.689	89.03	72.317	82.497	19.131	34.598	90.056	84.589	108.057				19.131
Total IH	491.27	523.98	745.715	460.82	336.399	518.607	400.905	333.249	281.851	448.571	423.584	727.332	5692.281			
Raw Sewage Influent / Loadings Total Phosphorus - kg/d																
Count IH	4	4	5	4	3	5	4	4	4	4	4	5	50			
Max IH	10.46	16.1	19.28	15.304	21.353	20.95	13.794	14.405	11.46	12.957	21.32	38.3			38.3	
Mean IH	8.901	12.92	14.49	12.708	13.741	12.605	11.06	9.21	7.756	9.479	12.833	18.999		12.223		
Min IH	7.833	10.12	11.216	10.039	7.662	6.559	8.044	2.543	2.613	6.262	7.044	12.515				2.543
Total IH	35.603	51.682	72.451	50.833	41.223	63.026	44.239	36.841	31.023	37.915	51.331	94.997	611.164			

Appendix C

Biosolids Quality

Ontario Clean Water Agency
Biosolids Quality Report - Liquid
Digestor Type: AEROBIC
Solids and Nutrients

Facility: RENFREW WASTEWATER TREATMENT FACILITY
Works: 5863
Period: 01/01/2020 to 12/01/2020

Facility Works Number:
Facility Name: *RENFREW WASTEWATER TREATMENT FACILITY*
Facility Owner: *Municipality: The Corporation of the Town of Renfrew*
Facility Classification: *Class 3 Wastewater Treatment*
Receiver: *Bonnechere River*
Service Population:
Total Design Capacity: *9500.0 m3/day*
Period Being Reported: 01/01/2020 12/01/2020

Note: all parameters in this report will be derived from the Bslq Station

Month	Total Sludge Hauled (m3)	Avg. Total Solids (mg/L)	Avg. Volatile Solids (mg/L)	Avg. Total Phosphorus (mg/L)	Ammonia (mg/L)	Nitrate (mg/L)	Nitrite (mg/L)	TKN (mg/L)	Ammonia + Nitrate (mg/L)	Potassium (mg/L)
Site	**RENFREW WASTEWATER TREATMENT FACILITY**									
Station	**Bslq Station only**									
Parameter Short Name	**HauledVol**	**TS**	**VS**	**TP**	**NH3p_NH4p_N**	**NO3-N**	**NO2-N**	**TKN**	**calculation in report - no T/S**	**K**
T/s	**IH Month.Total**	**Lab Published Month Mean**	**Lab Published Month Mean**	**Lab Published Month Mean**	**Lab Published Month Mean**	**Lab Published Month Mean**	**Lab Published Month Mean**	**Lab Published Month Mean**		**Lab Published Month Mean**
Jan		10,700.000	8,000.000	311.000	6.770	23.800	0.100	825.000	15.285	41.700
Feb		11,500.000	7,000.000	348.000	12.500	10.200	0.100	1,090.000	11.350	52.500
Mar		11,700.000	6,700.000	303.000	12.100	15.500	0.100	886.000	13.800	46.500
Apr		15,800.000	9,200.000	37.700	7.530	0.100	0.100	91.100	3.815	72.500
May		11,800.000	6,500.000	306.000	9.260	0.100	0.100	1,000.000	4.680	61.000
Jun		10,200.000	5,300.000	267.000	5.140	19.500	0.100	526.000	12.320	47.000
Jul		11,000.000	5,800.000	273.000	2.690	72.500	3.300	454.000	37.595	36.300
Aug		10,300.000	6,000.000	197.000	4.150	50.800	0.100	369.000	27.475	41.900

Sep		11,200.000	6,000.000	263.000	2.380	99.700	0.100	395.000	51.040	28.400
Oct		11,900.000	6,600.000	268.000	6.580	53.300	7.600	478.000	29.940	45.900
Nov		9,300.000	4,600.000	1.100	10.000	21.000	1.000	100.000	15.500	35.900
Dec		12,400.000	7,900.000	273.000	8.230	1.800	0.100	612.000	5.015	45.100
Average		11,483.333	6,633.333	237.317	7.278	30.692	1.067	568.842	18.985	46.225
Total	0.000	137,800.000	79,600.000	2,847.800	87.330	368.300	12.800	6,826.100	227.815	554.700

Ontario Clean Water Agency
Biosolids Quality Report - Liquid
Digestor Type: AEROBIC
Metals and Criteria

Facility: RENFREW WASTEWATER TREATMENT FACILITY
Works: 5863
Period: 01/01/2020 to 12/01/2020

Note: all parameters in this report will be derived from the Bslq Station

Month	Arsenic (mg/L)	Cadmium (mg/L)	Cobalt (mg/L)	Chromium (mg/L)	Copper (mg/L)	Mercury (mg/L)	Molybdenum (mg/L)	Nickel (mg/L)	Lead (mg/L)	Selenium (mg/L)	Zinc (mg/L)
Site	**RENFREW WASTEWATER TREATMENT FACILITY**										
Station	**Bslq Station only**										
Parameter Short Name	**As**	**Cd**	**Co**	**Cr**	**Cu**	**Hg**	**Mo**	**Ni**	**Pb**	**Se**	**Zn**
T/s	**Lab Published Month Mean**	**Lab Published Month Mean**	**Lab Published Month Mean**	**Lab Published Month Mean**	**Lab Published Month Mean**	**Lab Published Month Mean**	**Lab Published Month Mean**	**Lab Published Month Mean**	**Lab Published Month Mean**	**Lab Published Month Mean**	**Lab Published Month Mean**
Jan	0.100	0.030	0.030	0.650	3.480	0.008	0.060	0.220	0.100	0.100	2.780
Feb	0.100	0.030	0.050	0.640	3.290	0.004	0.060	0.240	0.100	0.100	2.780
Mar	0.100	0.030	0.030	0.520	2.990	0.008	0.060	0.200	0.100	0.100	2.370
Apr	0.100	0.030	0.090	1.050	5.300	0.005	0.070	0.330	0.300	0.100	4.490
May	0.100	0.030	0.080	0.720	3.420	0.004	0.060	0.230	0.100	0.100	2.730
Jun	0.100	0.030	0.030	0.550	3.160	0.008	0.050	0.180	0.100	0.100	2.450
Jul	0.100	0.030	0.030	0.540	3.490	0.003	0.050	0.190	0.200	0.100	6.650
Aug	0.100	0.030	0.040	0.700	4.300	0.005	0.070	0.240	0.200	0.100	4.300
Sep	0.100	0.030	0.030	0.720	2.000	0.020	0.050	0.250	0.100	0.100	2.540
Oct	0.100	0.030	0.040	0.830	4.400	0.004	0.080	0.300	0.300	0.100	4.360
Nov	0.100	0.030	0.030	0.640	3.380	0.002	0.070	0.260	0.200	0.100	3.330
Dec	0.100	0.030	0.070	0.840	4.690	0.003	0.090	0.260	0.200	0.100	4.010
Average	0.100	0.030	0.046	0.700	3.658	0.006	0.064	0.242	0.167	0.100	3.566
Max. Permissible Metal Concentrations (mg/kg of Solids)	170.000	34.000	340.000	2,800.000	1,700.000	11.000	94.000	420.000	1,100.000	34.000	4,200.000
Metal Concentrations in Sludge (mg/kg)	8.708	2.612	3.991	60.958	318.578	0.537	5.588	21.045	14.514	8.708	310.522

Ontario Clean Water Agency
Biosolids Quality Report - Liquid - Based on Last 4 Samples
Digestor Type: AEROBIC

Facility: RENFREW WASTEWATER TREATMENT FACILITY
Works: 5863
Period: 01/01/2020 to 12/01/2020

Note: all parameters in this report will be derived from the Bslq Station

Parameter Short Name	Time Series	09/09/2020	10/19/2020	11/10/2020	12/01/2020	Average	Metal Concentrations in Sludge (mg/kg):	Max. Permissible Metal Concentrations (mg/kg of Solids):
As (mg/L)	Lab Published	0.100	0.100	0.100	0.100	0.100	8.929	170
Cd (mg/L)	Lab Published	0.030	0.030	0.030	0.030	0.030	2.679	34
Co (mg/L)	Lab Published	0.030	0.040	0.030	0.070	0.042	3.750	340
Cr (mg/L)	Lab Published	0.720	0.830	0.640	0.840	0.758	67.679	2800
Cu (mg/L)	Lab Published	2.000	4.400	3.380	4.690	3.617	322.946	1700
Hg (mg/L)	Lab Published	0.020	0.004	0.002	0.003	0.007	0.625	11
Mo (mg/L)	Lab Published	0.050	0.080	0.070	0.090	0.073	6.518	94
Ni (mg/L)	Lab Published	0.250	0.300	0.260	0.260	0.267	23.839	420
Pb (mg/L)	Lab Published	0.100	0.300	0.200	0.200	0.200	17.857	1100
Se (mg/L)	Lab Published	0.100	0.100	0.100	0.100	0.100	8.929	34
Zn (mg/L)	Lab Published	2.540	4.360	3.330	4.010	3.560	317.857	4200
E. Coli: Dry Wt (cfu/g)	Lab Published						E.Coli average is the GMD	
TS (mg/L)	Lab Published	11,200.000	11,900.000	9,300.000	12,400.000	11,200.000		
VS (mg/L)	Lab Published	6,000.000	6,600.000	4,600.000	7,900.000	6,275.000		
TP (mg/L)	Lab Published	263.000	268.000	1.100	273.000	201.275		
NO2-N (mg/L)	Lab Published	0.100	7.600	1.000	0.100	2.200		
TKN (mg/L)	Lab Published	395.000	478.000	100.000	612.000	396.250		
K (mg/L)	Lab Published	28.400	45.900	35.900	45.100	38.825		
NH3p_NH4p_N (mg/L)	Lab Published	2.380	6.580	10.000	8.230	6.798		
NO3-N (mg/L)	Lab Published	99.700	53.300	21.000	1.800	43.950		

Appendix D

Calibrations

Franklin Empire Inc
550 Braidwood Ave., Unit #4
Peterborough, ON, K9J 1W1, CANADA

Tel: (705) 745-1626
Fax: (705) 745-3493
E-mail:
Website: www.franklinempire.com

OCWA Renfrew

2020 WWTP Calibrations

CALIBRATION REPORT

Report No.: FIT-602001

Date: 17-Dec-20

SITE:	Renfrew WWTP	**SERVICE DATE:**	December 17, 2020
PROCESS AREA:	Digested Sludge		
INSTR. TAG:	FIT-602001	**TECHNICIAN:**	Mike Humphries
MANUFACTURER:	ROSEMOUNT		
MODEL:	8712DR12N0M4	**JOB REFERENCE:**	201217
SERIAL No.:	0860252720		
SENSOR No.:	870155551		

Input	**(Test)**	**Output**	**(Signal)**	**(Process)**
Type:	SIMULATOR	**Type or EGU:**	mA	m3/day
Min:	0.00	**Min:**	4.00	0.00
Max:	30 FEET/SEC.	**Max:**	20.00	1000.00
DN (mm):	2 INCH			

CALIBRATION # 0939005409368005

			Before Calibration		**After Calibration**	
Input (Y pos)	**Input %**	**Calc. O/P (mA)**	**Output (mA)**	**%Error**	**Output (mA)**	**%Error**
0.00	0.00%	4.00	4.00	0.00%	4.00	0.00%
3.00	10.00%	5.60	5.60	0.00%	5.60	0.00%
10.00	33.33%	9.33	9.33	-0.04%	9.33	-0.04%
30.00	100.00%	20.00	19.99	-0.05%	19.99	-0.05%

Calibration Equipment			
Type:	FLOWTUBE SIMULATOR	DMM	
Manufacturer:	ROSEMOUNT	Fluke	
Model:	8714D	Model 87	
Serial No.:	0332294	94140067	
Last Cal. Date:	December 7, 2020	April 2, 2020	

Comments:

1,2,GND, 17,18,19
W,B,S,S,W,B
coil resistance, 11.8 ohms, open to ground

AS FOUND: PASS **AS LEFT:** PASS

CERTIFIED BY:

CALIBRATION REPORT

Report No.: 201217 FIT-601001

Date: 17-Dec-20

SITE:	Renfrew WWTP
PROCESS AREA:	To Centrifuge
INSTR. TAG:	FIT-601001
MANUFACTURER:	ROSEMOUNT
MODEL:	8712DR12N0M4
SERIAL No.:	0860232719
SENSOR No.:	870155550

SERVICE DATE:	December 17, 2020
TECHNICIAN:	Mike Humphries
JOB REFERENCE:	201217

Input	**(Test)**
Type:	SIMULATOR
Min:	0.00
Max:	30 FEET/SEC.
DN (mm):	2 INCH

CALIBRATION # 0915405409132005

Output	**(Signal)**	**(Process)**
Type or EGU:	mA	m3/day
Min:	4.00	0.00
Max:	20.00	1000.00

			Before Calibration		**After Calibration**	
Input (Y pos)	**Input %**	**Calc. O/P (mA)**	**Output (mA)**	**%Error**	**Output (mA)**	**%Error**
0.00	0.00%	4.00	4.00	0.00%	4.00	0.00%
3.00	10.00%	5.60	5.60	0.00%	5.60	0.00%
10.00	33.33%	9.33	9.33	-0.04%	9.33	-0.04%
30.00	100.00%	20.00	20.00	0.00%	20.00	0.00%

Calibration Equipment

Type:	FLOWTUBE SIMULATOR	DMM
Manufacturer:	ROSEMOUNT	Fluke
Model:	8714D	Model 87
Serial No.:	0332294	94140067
Last Cal. Date:	December 7, 2020	April 2, 2020

Comments:

1,2,GND, 17,18,19
W,B,S,S,W,B
coil resistance, 12.7 ohms, open to ground

AS FOUND: PASS **AS LEFT:** PASS

CERTIFIED BY:

CALIBRATION REPORT

Report No.: FIT-721003

Date: 17-Dec-20

SITE:	Renfrew WWTP
PROCESS AREA:	Polymer
INSTR. TAG:	FIT-721003
MANUFACTURER:	ROSEMOUNT
MODEL:	8712DR12N0M4
SERIAL No.:	0860252878
SENSOR No.:	155699

SERVICE DATE:	December 17, 2020
TECHNICIAN:	Mike Humphries
JOB REFERENCE:	201217

Input	**(Test)**	**Output**	**(Signal)**	**(Process)**
Type:	SIMULATOR	**Type or EGU:**	mA	Liter/min
Min:	0.00	**Min:**	4.00	0.00
Max:	30 FEET/SEC.	**Max:**	20.00	160.00
DN (mm):	1.5 INCH			

CALIBRATION # 0926707109243005

			Before Calibration		**After Calibration**	
Input (Y pos)	**Input %**	**Calc. O/P (mA)**	**Output (mA)**	**%Error**	**Output (mA)**	**%Error**
0.00	0.00%	4.00	4.00	0.00%	4.00	0.00%
3.00	10.00%	5.60	5.60	0.00%	5.60	0.00%
10.00	33.33%	9.33	9.33	-0.04%	9.33	-0.04%
30.00	100.00%	20.00	20.00	0.00%	20.00	0.00%

Calibration Equipment			
Type:	FLOWTUBE SIMULATOR	DMM	
Manufacturer:	ROSEMOUNT	Fluke	
Model:	8714D	Model 87	
Serial No.:	0332294	94140067	
Last Cal. Date:	December 7, 2020	April 2, 2020	

Comments:

1,2,GND, 17,18,19
W,B,S,S,W,B
coil resistance, 11.6 ohms, open to ground

AS FOUND: PASS **AS LEFT:** PASS

CERTIFIED BY:

CALIBRATION REPORT

Report No.: 201217 FIT-722003

Date: 17-Dec-20

SITE:	Renfrew WWTP
PROCESS AREA:	Polymer
INSTR. TAG:	FIT-722003
MANUFACTURER:	ROSEMOUNT
MODEL:	8712DR12N0M4
SERIAL No.:	0860252879
SENSOR No.:	155700

SERVICE DATE:	December 17, 2020
TECHNICIAN:	Mike Humphries
JOB REFERENCE:	201217

Input	**(Test)**	**Output**	**(Signal)**	**(Process)**
Type:	SIMULATOR	**Type or EGU:**	mA	Liter/min
Min:	0.00	**Min:**	4.00	0.00
Max:	30 FEET/SEC.	**Max:**	20.00	160.00
DN (mm):	1.5 INCH			

CALIBRATION # 0963907209615005

			Before Calibration		**After Calibration**	
Input (Y pos)	**Input %**	**Calc. O/P (mA)**	**Output (mA)**	**%Error**	**Output (mA)**	**%Error**
0.00	0.00%	4.00	4.00	0.00%	4.00	0.00%
3.00	10.00%	5.60	5.60	0.00%	5.60	0.00%
10.00	33.33%	9.33	9.34	0.07%	9.34	0.07%
30.00	100.00%	20.00	20.00	0.00%	20.00	0.00%

Calibration Equipment			
Type:	FLOWTUBE SIMULATOR	DMM	
Manufacturer:	ROSEMOUNT	Fluke	
Model:	8714D	Model 87	
Serial No.:	0332294	94140067	
Last Cal. Date:	December 7, 2020	April 2, 2020	

Comments:

1,2,GND, 17,18,19
W,B,S,S,W,B
coil resistance, 11.1 ohms, open to ground

AS FOUND: PASS **AS LEFT:** PASS

CERTIFIED BY:

CALIBRATION REPORT

Report No.:	FIT-170000
Date:	17-Dec-20

SITE:	Renfrew WWTP	**SERVICE DATE:**	December 17, 2020
PROCESS AREA:	Raw	**TECHNICIAN:**	Mike Humphries
INSTR. TAG:	FIT-170000	**JOB REFERENCE:**	201217
MANUFACTURER:	ROSEMOUNT		
MODEL:	8712DR12N0M4		
SERIAL No.:	0860253445		
SENSOR No.:	156132		

Input	**(Test)**	**Output**	**(Signal)**	**(Process)**
Type:	SIMULATOR	**Type or EGU:**	mA	m3/day
Min:	0.00	**Min:**	4.00	0.00
Max:	30 FEET/SEC.	**Max:**	20.00	75000.00
DN (mm):	12 INCH			

CALIBRATION # 1061804910357005

			Before Calibration		**After Calibration**	
Input (Y pos)	**Input %**	**Calc. O/P (mA)**	**Output (mA)**	**%Error**	**Output (mA)**	**%Error**
0.00	0.00%	4.00	4.00	0.00%	4.00	0.00%
3.00	10.00%	5.60	5.60	0.00%	5.60	0.00%
10.00	33.33%	9.33	9.33	-0.04%	9.33	-0.04%
30.00	100.00%	20.00	19.98	-0.10%	19.98	-0.10%

Calibration Equipment			
Type:	FLOWTUBE SIMULATOR	DMM	
Manufacturer:	ROSEMOUNT	Fluke	
Model:	8714D	Model 87	
Serial No.:	0332294	94140067	
Last Cal. Date:	December 7, 2020	April 2, 2020	

Comments:

1,2,GND, 17,18,19
W,B,S,S,W,B
coil resistance, 8.9 ohms, open to ground
Total 24232228 m3

AS FOUND: PASS **AS LEFT:** PASS

CERTIFIED BY: 

CALIBRATION REPORT

Report No.:	FIT-260000
Date:	17-Dec-20

SITE:	Renfrew WWTP	**SERVICE DATE:**	December 17, 2020
PROCESS AREA:	Digested Sludge		
INSTR. TAG:	FIT-260000	**TECHNICIAN:**	Mike Humphries
MANUFACTURER:	ROSEMOUNT		
MODEL:	8712DR12N0M4	**JOB REFERENCE:**	201217
SERIAL No.:	0860252718		
SENSOR No.:	155549		

Input	**(Test)**	**Output**	**(Signal)**	**(Process)**
Type:	SIMULATOR	**Type or EGU:**	mA	m3/day
Min:	0.00	**Min:**	4.00	0.00
Max:	30 FEET/SEC.	**Max:**	20.00	1300.00
DN (mm):	2 INCH			

CALIBRATION # 0938005909358005

			Before Calibration		After Calibration	
Input (Y pos)	**Input %**	**Calc. O/P (mA)**	**Output (mA)**	**%Error**	**Output (mA)**	**%Error**
0.00	0.00%	4.00	4.00	0.00%	4.00	0.00%
3.00	10.00%	5.60	5.60	0.00%	5.60	0.00%
10.00	33.33%	9.33	9.33	-0.04%	9.33	-0.04%
30.00	100.00%	20.00	19.98	-0.10%	19.98	-0.10%

Calibration Equipment			
Type:	FLOWTUBE SIMULATOR	DMM	
Manufacturer:	ROSEMOUNT	Fluke	
Model:	8714D	Model 87	
Serial No.:	0332294	94140067	
Last Cal. Date:	December 7, 2020	April 2, 2020	

Comments:

1,2,GND, 17,18,19
W,B,S,S,W,B
coil resistance, 12.1 ohms, open to ground
578971 m3

AS FOUND: PASS **AS LEFT:** PASS

CERTIFIED BY:

CALIBRATION REPORT

Report No.:	FIT-254002
Date:	17-Dec-20

SITE:	Renfrew WWTP	**SERVICE DATE:**	December 17, 2020
PROCESS AREA:	Digested Sludge		
INSTR. TAG:	FIT-254002	**TECHNICIAN:**	Mike Humphries
MANUFACTURER:	ROSEMOUNT		
MODEL:	8712DR12N0M4	**JOB REFERENCE:**	201217
SERIAL No.:	0860252903		
SENSOR No.:	155715		

Input	**(Test)**	**Output**	**(Signal)**	**(Process)**
Type:	SIMULATOR	**Type or EGU:**	mA	m3/day
Min:	0.00	**Min:**	4.00	0.00
Max:	30 FEET/SEC.	**Max:**	20.00	15120.00
DN (mm):	8 INCH			

CALIBRATION # 1024705909988005

			Before Calibration		**After Calibration**	
Input (Y pos)	**Input %**	**Calc. O/P (mA)**	**Output (mA)**	**%Error**	**Output (mA)**	**%Error**
0.00	0.00%	4.00	4.00	0.00%	4.00	0.00%
3.00	10.00%	5.60	5.60	0.00%	5.60	0.00%
10.00	33.33%	9.33	9.33	-0.04%	9.33	-0.04%
30.00	100.00%	20.00	19.98	-0.10%	19.98	-0.10%

Calibration Equipment			
Type:	FLOWTUBE SIMULATOR	DMM	
Manufacturer:	ROSEMOUNT	Fluke	
Model:	8714D	Model 87	
Serial No.:	0332294	94140067	
Last Cal. Date:	December 7, 2020	April 2, 2020	

Comments:

1,2,GND, 17,18,19
W,B,S,S,W,B
coil resistance, 10.7 ohms, open to ground
Total 10192273 m3

AS FOUND: PASS **AS LEFT:** PASS

CERTIFIED BY:

CALIBRATION REPORT

Report No.:	FIT-251002
Date:	17-Dec-20

SITE:	Renfrew WWTP	**SERVICE DATE:**	December 17, 2020
PROCESS AREA:	Digested Sludge		
INSTR. TAG:	FIT-251002	**TECHNICIAN:**	Mike Humphries
MANUFACTURER:	ROSEMOUNT		
MODEL:	8712DR12N0M4	**JOB REFERENCE:**	201217
SERIAL No.:	0860252902		
SENSOR No.:	155714		

Input	**(Test)**	**Output**	**(Signal)**	**(Process)**
Type:	SIMULATOR \	**Type or EGU:**	mA	m3/day
Min:	0.00	**Min:**	4.00	0.00
Max:	30 FEET/SEC.	**Max:**	20.00	15120.00
DN (mm):	8 INCH			

CALIBRATION # 1043906310175005

			Before Calibration		**After Calibration**	
Input (Y pos)	**Input %**	**Calc. O/P (mA)**	**Output (mA)**	**%Error**	**Output (mA)**	**%Error**
0.00	0.00%	4.00	3.99	-0.25%	3.99	-0.25%
3.00	10.00%	5.60	5.59	-0.18%	5.59	-0.18%
10.00	33.33%	9.33	9.31	-0.25%	9.31	-0.25%
30.00	100.00%	20.00	19.95	-0.25%	19.95	-0.25%

Calibration Equipment			
Type:	FLOWTUBE SIMULATOR	DMM	
Manufacturer:	ROSEMOUNT	Fluke	
Model:	8714D	Model 87	
Serial No.:	0332294	94140067	
Last Cal. Date:	December 7, 2020	April 2, 2020	

Comments:

1,2,GND, 17,18,19
W,B,S,S,W,B
coil resistance, 10.4 ohms, open to ground
10509783 m3

AS FOUND: PASS **AS LEFT:** PASS

CERTIFIED BY:

CALIBRATION REPORT

Report No.:	201217 FIT-Final Effluent
Date:	17-Dec-20

SITE:	Renfrew WWTP	**SERVICE DATE:**	December 17, 2020
PROCESS AREA:	Final Effluent		
INSTR. TAG:	FIT-Final Effluent	**TECHNICIAN:**	Mike Humphries
MANUFACTURER:	Siemens		
MODEL:	Sitrans Multiranger 200 HMI	**JOB REFERENCE:**	201217
SERIAL No.:			
INSTR. RANGE:	0-50,000 m³/day		

Input	**(Test)**		**Output**	**(Signal)**	**(Process)**
Type:	Head cm		**Type or EGU:**	mA	m3/day
Min:	0.00		**Min:**	4.00	0.00
Max:	67.63		**Max:**	20.00	50000
Weir Width (in.)	18	**Parshall Flume**			
exponent	1.538				
constant	3803				

			Before Calibration		**After Calibration**	
Input (cm)	**m3/day**	**Calc. O/P (mA)**	**Output (mA)**	**Error (%FS)**	**Output (mA)**	**Error (%FS)**
0.00	0.00	4.00	4.00	0.00%	4.00	0.00%
27.46	12504	8.00	8.02	0.12%	8.02	0.12%
43.09	25004	12.00	12.02	0.12%	12.02	0.12%
56.08	37498	16.00	15.96	-0.25%	15.96	-0.25%
67.62	50003	20.00	19.98	-0.12%	19.98	-0.12%

Calibration Equipment			
Type:		DMM	Laser Distance Meter
Manufacturer:		Fluke	Hilti
Model:		Model 87	PD40
Serial No.:		94140067	347130181
Last Cal. Date:		April 2, 2020	

Comments:

AS FOUND: PASS **AS LEFT:** PASS

CERTIFIED BY: