

Iroquois Wastewater Treatment System

Sewage Works #120000159

Annual Report

Prepared for: Municipality of South Dundas

Reporting Period of January 1st – December 31st 2021

Issued: March 11, 2022

Revision: 0

This report has been prepared to meet the requirements of Certificate of Approval #9689-8MQHNK

Table of Contents

Operations and Compliance Reliability Indices	1
System Process Description.....	1
Wastewater System Flows	2
Raw Flows	2
Effluent Flow.....	3
Effluent Quality Assurance or Control Measures	3
Effluent Quality	3
Carbonaceous Biochemical Oxygen Demand (5-Day)	4
Total Suspended Solids.....	5
Total Phosphorus.....	6
Total Ammonia Nitrogen	7
pH.....	8
E. Coli	8
Acute Lethality.....	9
Operating Issues	9
Maintenance	9
Flow Meter Calibration and Maintenance	9
Maintenance Summary	9
Notice of Modifications	9
Sludge Generation	9
Summary of Complaints.....	10
Summary of Abnormal Discharge Events.....	10
Bypass/Overflow/Spills.....	10
Performance Assessment Report	A
Flow Meter Calibration Reports	B

Operations and Compliance Reliability Indices

Compliance Event	# of Events
Ministry of Environment Inspections	0
Ministry of Labour Inspections	0
Non-Compliance	0
Spills/Overflows/Bypasses	1
Sewer Main Blockages	1

System Process Description

Iroquois's sewage collection system is a gravity fed sanitary sewage collection system. There are two pumping stations which pump wastewater from the collection system to the wastewater treatment facility.

The Iroquois Wastewater Treatment Plant (WWTP) is a Class II wastewater treatment facility owned and operated by the Municipality of South Dundas. Raw sewage is pumped to the WWTP by the plant pumping station which is equipped with three submersible pumps. From the pumping station, wastewater passes through the inlet works, including mechanically cleaned fine screens and a grit removal and disposal system. Aluminum Sulphate is added to assist in phosphorous removal. The wastewater then moves through either of two parallel Sequencing Batch Reactors (SBRs) equipped with individual aeration systems, mixers, decanters and sludge removal pumps. Effluent decanted from the SBRs is treated by UV disinfection and subsequently passes through an outfall pipe to the St. Lawrence River.

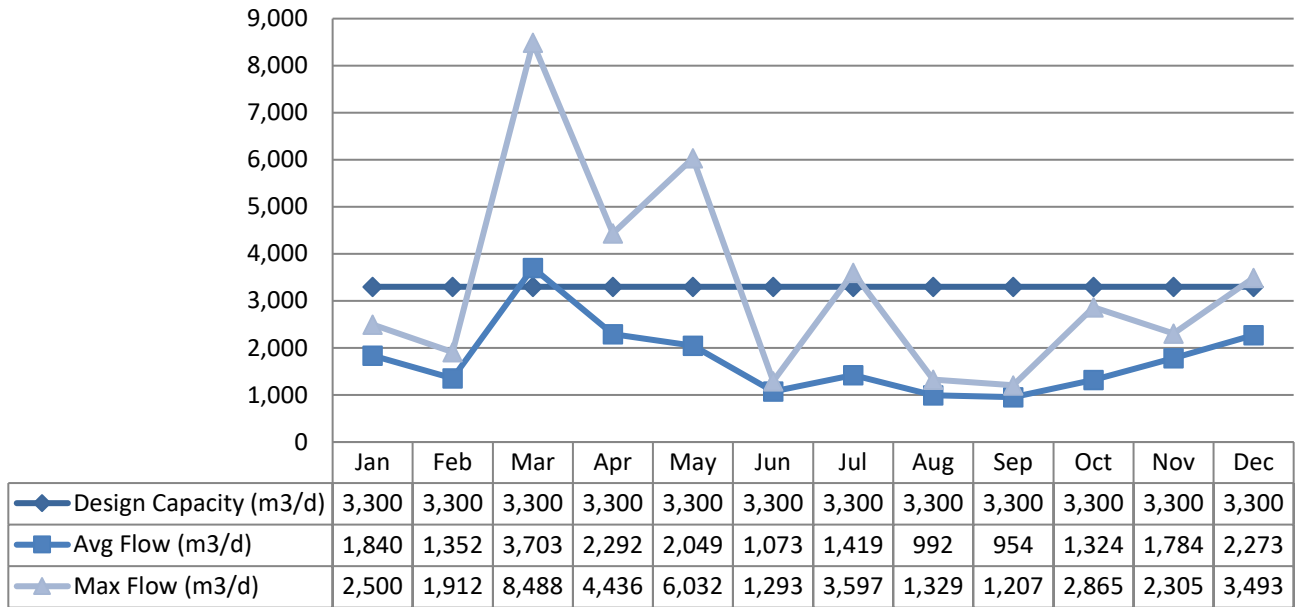
Sludge removed from the SBRs is transferred to a waste activated sludge tank. From the tank, the sludge enters a rotary drum thickener. Polymer is added to assist with the thickening process. Thickened sludge is pumped to an Autothermal Thermophilic Aerobic Digestion (ATAD) system for stabilization. The ATAD system is equipped with an off-gas scrubber and biofilter to provide odour control. The digested sludge is then pumped to one of three biosolids storage tanks. From the storage tanks, biosolids are hauled off site to be utilized as soil conditioner.

Wastewater System Flows

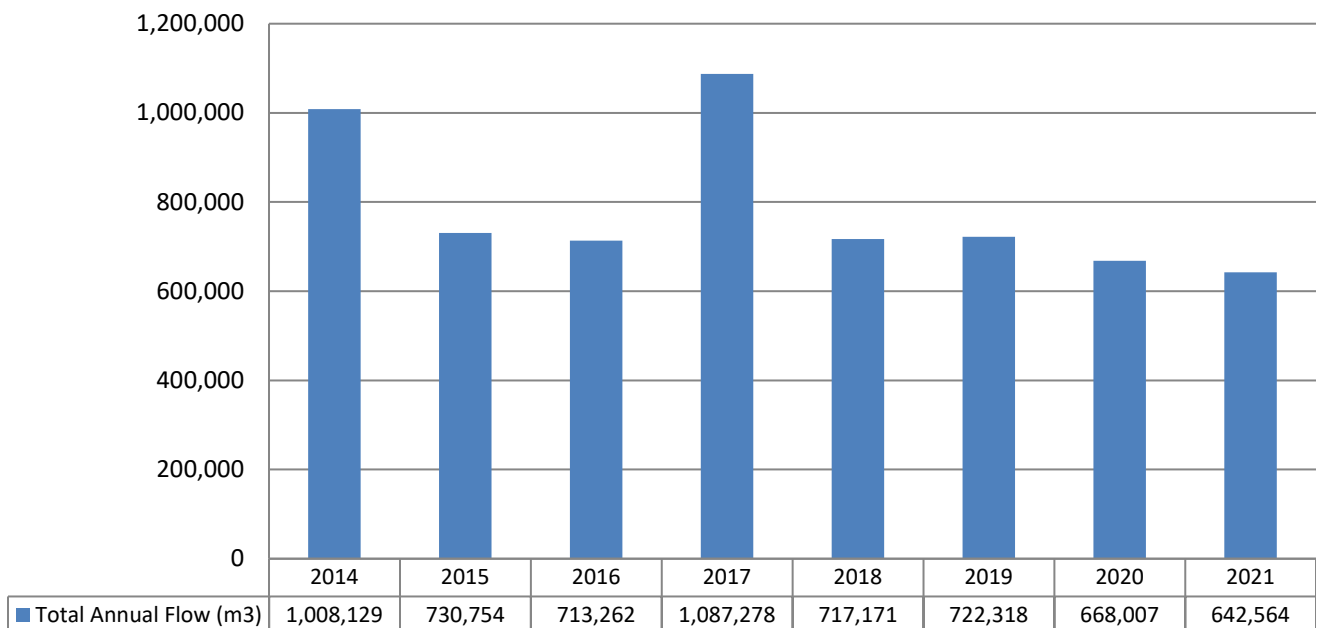
The hydraulic flows reaching the treatment facility in 2021 averaged 1,755 m³/day which represents 53% of the 3,300 m³/day design. Please see the Performance Assessment Reports attached in Appendix A for details.

Raw Flows

2021 Raw Flows:



Annual Raw Flow Comparison:



Effluent Flow

A total of 621,637 m³ of effluent was discharged from Iroquois' wastewater treatment facility in 2021.

Effluent Quality Assurance or Control Measures

Effluent control measures include in-house sampling and testing for operational parameters. In-house testing provides real time results which are then used to enhance process and operational performance. Samples are collected by the Municipality of South Dundas' competent and licensed staff using approved methods and protocols for sampling including those specified in the Ministry's Procedure F-10-1, "Procedures for Sampling and Analysis Requirements for Municipal and Private Sewage Treatment Works", the Ministry's publication, "Protocol for the Sampling and Analysis of Industrial/Municipal Wastewater" and the publication, "Standard Methods for the Examination of Water and Wastewater".

Effluent samples collected during the reporting period were submitted to Caduceon laboratory in Ottawa for analysis, with the exception of pH, temperature and unionized ammonia. Caduceon is accredited by the Canadian Association for Laboratory Accreditation (CALA). Accredited labs must meet strict provincial guidelines including an extensive quality assurance/quality control program. By choosing this laboratory, the Municipality of South Dundas is ensuring appropriate control measures are undertaken during sample analysis.

The pH and temperature parameters were analyzed in the field at the time of sample collection by certified operators to ensure accuracy and precision of the results obtained. Un-ionized ammonia was calculated using the total ammonia nitrogen concentration, pH and temperature as required by the facility's Certificate of Approval.

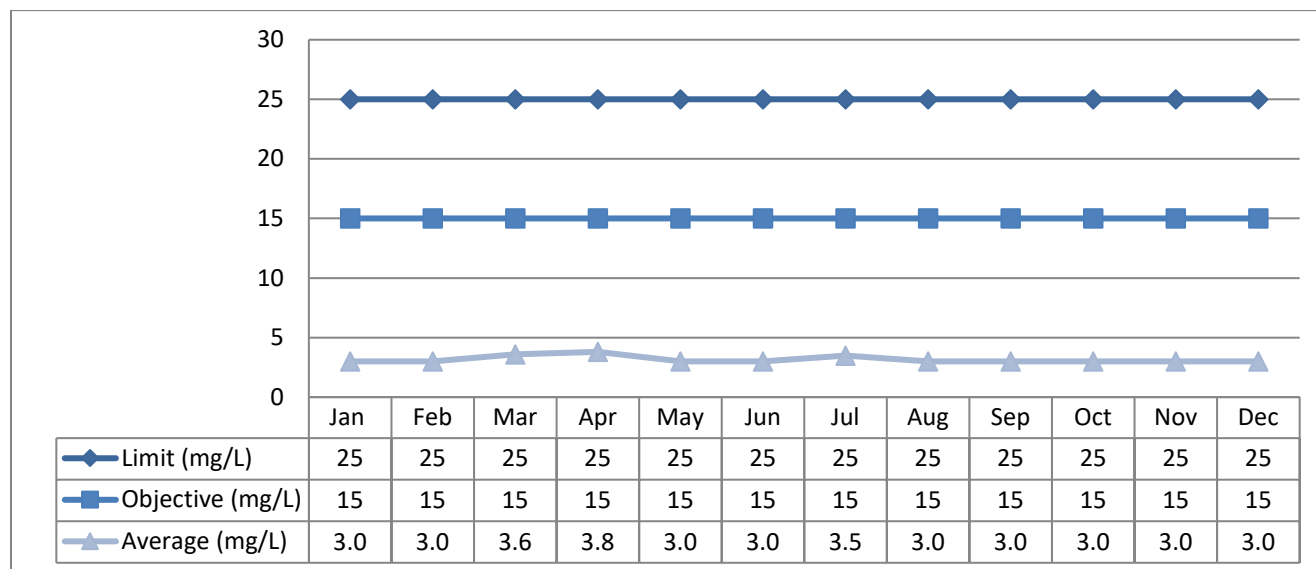
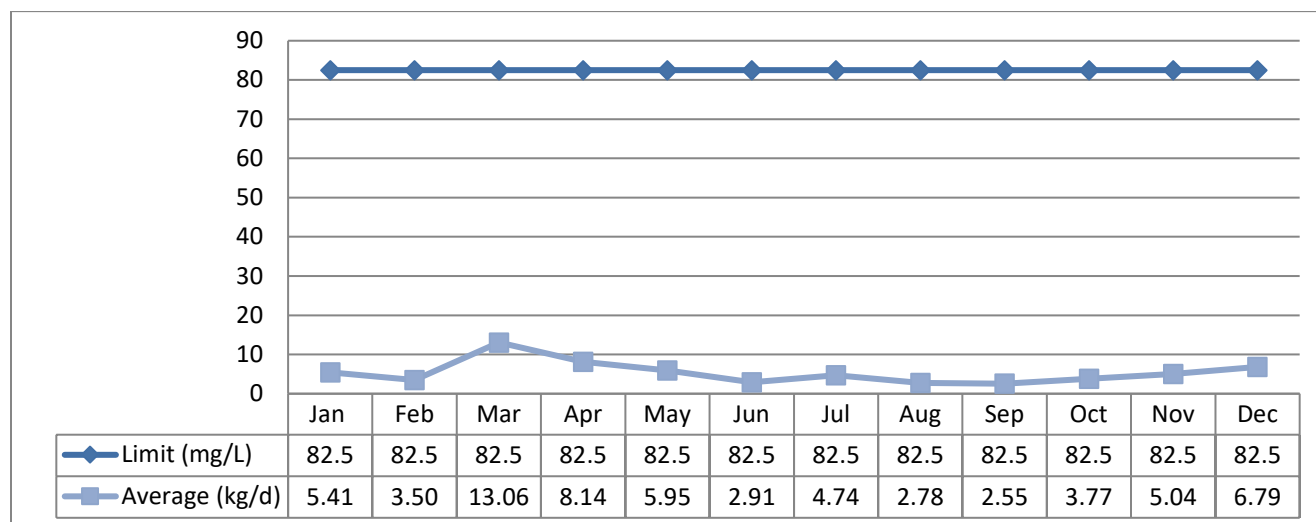
Effluent Quality

The monthly average concentrations of carbonaceous biochemical oxygen demand (CBOD₅), total suspended solids (TSS), total phosphorus (TP) and total ammonia nitrogen (TAN) remained below the effluent objectives and limits outlined in the facility's Certificate of Approval during 2021. The geometric mean density of E. coli in the effluent also remained below the ECA limit and objective in 2021. In addition the effluent pH remained within the limits and objectives throughout the year.

Effluent results from the WWTP for 2021 are tabulated below. Additional data can be found in the Performance Assessment Reports attached in Appendix A.

Carbonaceous Biochemical Oxygen Demand (5-Day)

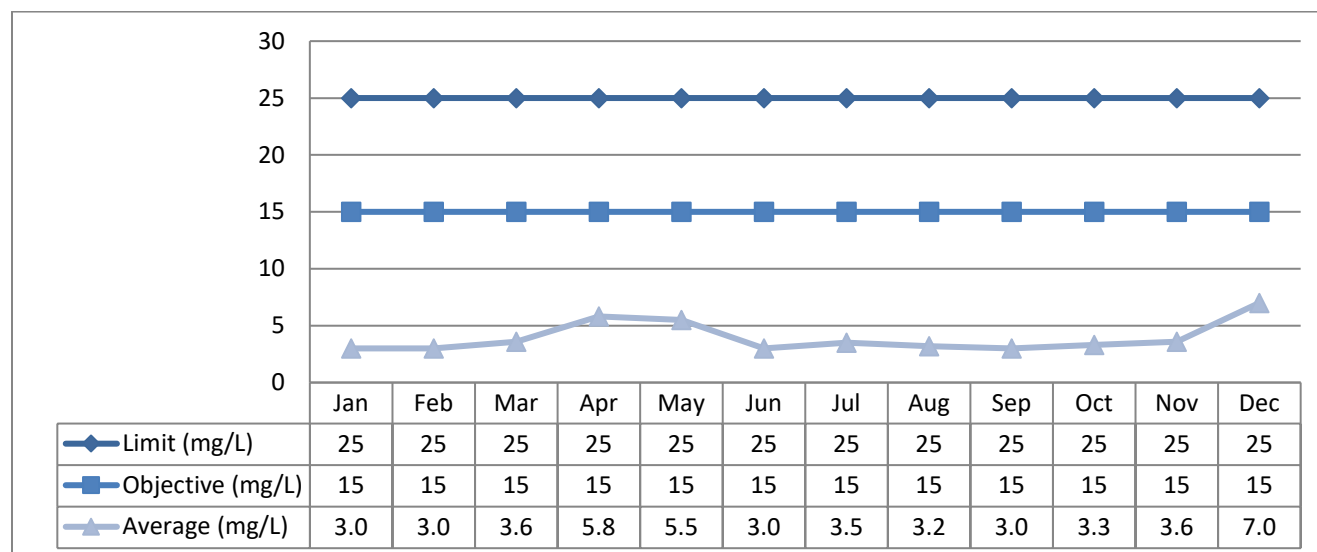
Monthly Average	C of A Limit	C of A Objective	Exceedance
Concentration (mg/L)	25	15	No
Loading (kg/d)	82.5	n/a	No

CBOD₅ Effluent Monthly Average Concentrations:CBOD₅ Monthly Average Loading:

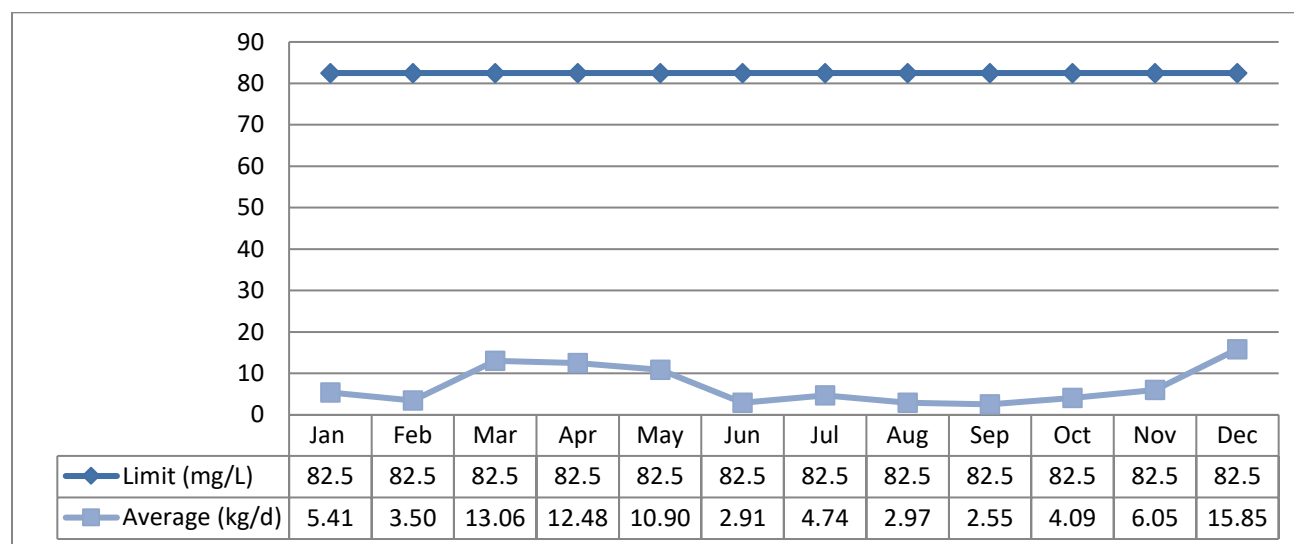
Total Suspended Solids

Monthly Average	C of A Limit	C of A Objective	Exceedance
Concentration (mg/L)	25	15	No
Loading (kg/d)	82.5	n/a	No

TSS Effluent Monthly Average Concentrations:



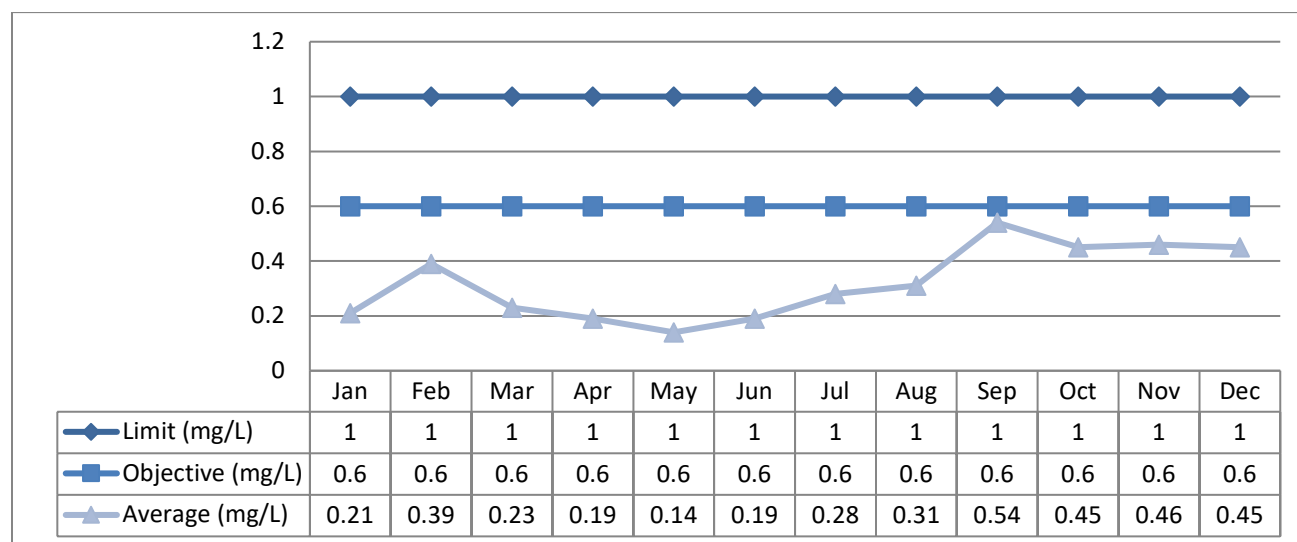
TSS Monthly Average Loading:



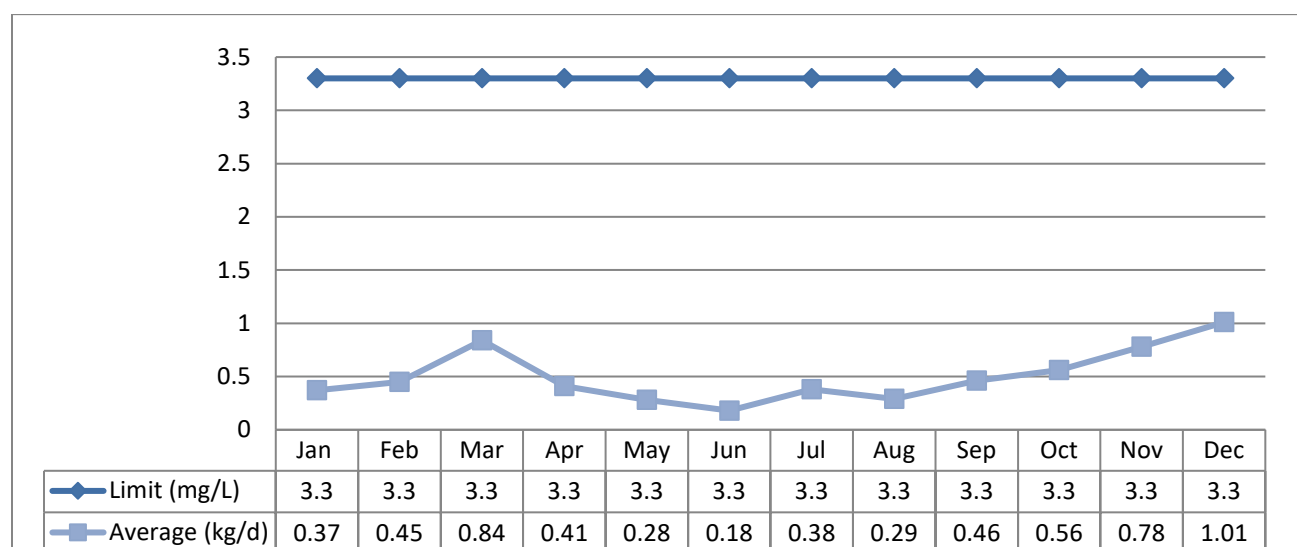
Total Phosphorus

Monthly Average	C of A Limit	C of A Objective	Exceedance
Concentration (mg/L)	1.0	0.6	No
Loading (kg/d)	3.3	n/a	No

TP Effluent Monthly Average Concentrations:

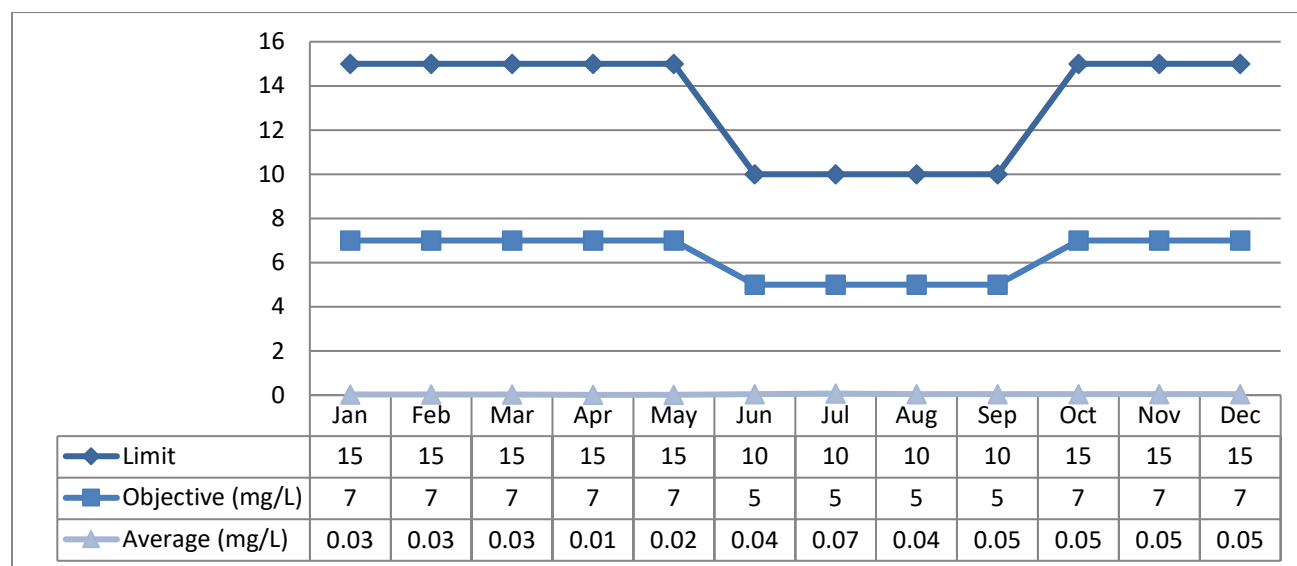
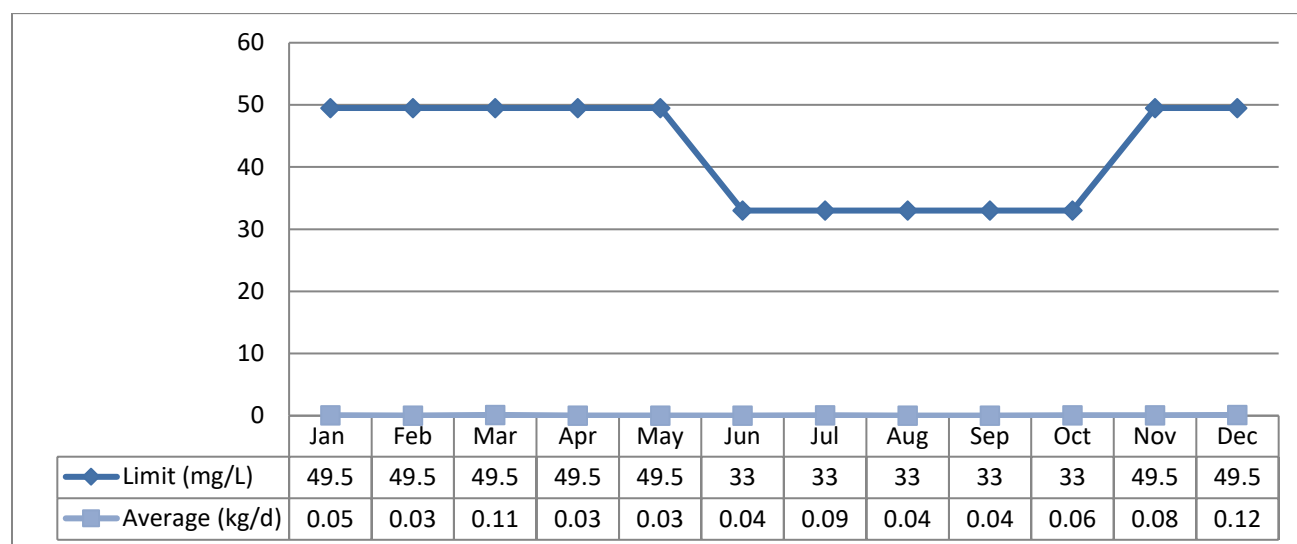


TP Monthly Average Loading:



Total Ammonia Nitrogen

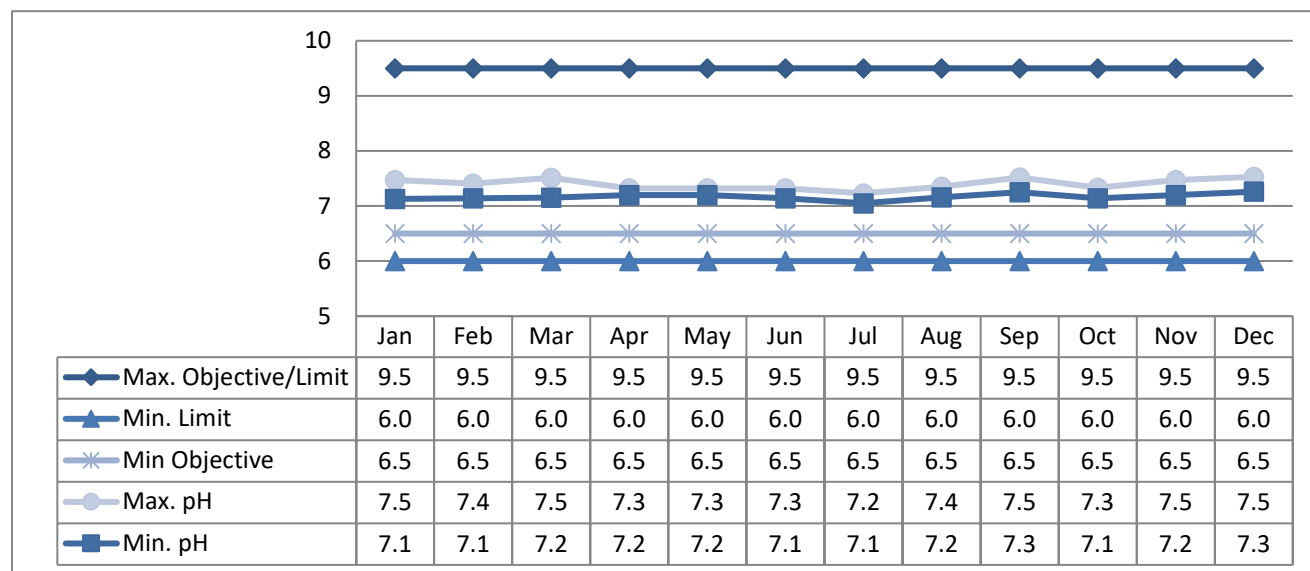
Monthly Average	Discharge Period	C of A Limit	C of A Objective	Exceedance
Concentration (mg/L)	Jun. 1 – Sept. 30	10	5	No
Loading (kg/d)		33	n/a	No
Concentration (mg/L)	Oct. 1 – May 31	15	7	No
Loading (kg/d)		49.5	n/a	No

TAN Effluent Monthly Average Concentrations:**TAN Monthly Average Loading:**

pH

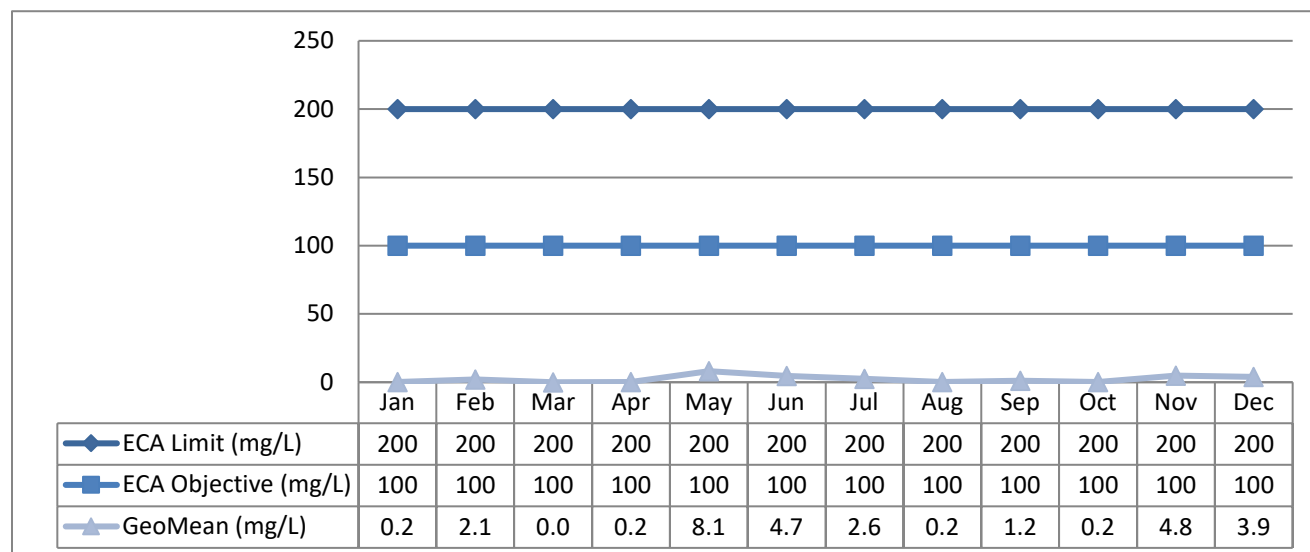
Reporting Period	C of A Limit	C of A Objective	Exceedance
All results	6.0 – 9.5	6.5 – 9.5	No

Monthly Minimum and Maximum pH Results:

**E. Coli**

Monthly Average	C of A Limit	C of A Objective	Exceedance
Geometric Mean Density	200	150	No

E. Coli Monthly Geometric Mean Density (cfu/100 mL):



Acute Lethality

One sample was collected in 2021 and tested for acute lethality to Rainbow Trout and Daphnia Magna. Results are displayed as % mortality. An adverse result is indicated by a > 50% mortality rate.

Date	Rainbow Trout	Daphnia Magna
01-12-2021	0 %	0 %

Operating Issues

The maximum recorded flows during the months of March, April, May, July and December exceeded the average day design for the Iroquois WWTP. Based on a historical review of flows, it appears this system is impacted by inflow and infiltration.

Maintenance

Flow Meter Calibration and Maintenance

Copies of the flow meter calibration certificates for 2021 are attached in Appendix B.

Maintenance Summary

Description
<ul style="list-style-type: none"> – ATAD Blower Repair – Replaced headworks roof drain – Changed UV lights and Ballast – Serviced sludge transfer pump – Hydrovac and cleaned pumping station well – Yearly generator maintenance – SCADA upgrades – Replaced filters on makeup air unit – Tightened belt on odor removal fan

Notice of Modifications

Date	Process	Modification	Status
None to report.			

Sludge Generation

In 2021, a total of 628 m³ of liquid sludge was removed from Iroquois' WWTP and was utilized as soil conditioner. The sludge was removed from the WWTP by Terrapure in August (NASM Plan #22432). It is anticipated that approximately the same volume of sludge will be generated in 2022.

Summary of Complaints

Location	Date	Nature of Complaint	Actions Taken
Iroquois Plaza	January 12, 2021	Sewer Grease Blockage	Flushed sewer main (manhole 79-88)
Iroquois WWTP	February 10, 2021	Noise	Temporarily turned fan down and tightened belt

Summary of Abnormal Discharge Events

Bypass/Overflow/Spills

Location	Date	Nature of Bypass/Overflow/Spill	Actions Taken
Iroquois WWTP	June 4, 2021	Foam had been released from the ATAD	Majority of foam contained on the roof, approximately 1 m ³ of foam collected on the ground. Operational staff called for a vacuum truck, arrived on site at 0740, spill fully cleaned by 0930.

Appendix A

Performance Assessment Report

IROQUOIS WWTP PERFORMANCE ASSESSMENT REPORT

MUNICIPALITY: SOUTH DUNDAS

PROJECT: IROQUOIS WWTP

WORKS NUM.: 120000159

DESCRIPTION: TWO SEQUENTIAL BATCH REACTORS AND AEROBIC SLUDGE DIGESTION

YEAR: 2021

WATER COURSE: ST. LAWRENCE

DESIGN CAPACITY: 3,300 m³/d

MONTH	RAW			TREATED			RAW				SLUDGE
	Total Flow m ³	Avg Day Flow m ³	Max Day Flow m ³	Total Flow m ³	Avg Day Flow m ³	Max Day Flow m ³	Raw BOD (mg/L)	Raw TSS (mg/L)	Raw PHOS. (mg/L)	Raw TKN (mg/L)	Liquid Sludge Hauled m ³
JAN	57,049	1,840	2,500	55,929	1,804	2,530	15	12	0.65	7.8	0
FEB	37,858	1,352	1,912	36,136	1,201	1,766	41	55	2.34	20.6	0
MAR	114,781	3,703	8,488	112,443	3,527	8,529	8	23	0.25	2.6	0
APR	68,753	2,292	4,436	67,262	2,242	4,161	9	6	0.53	4.5	0
MAY	63,520	2,049	6,032	61,435	1,982	5,749	15	30	4.61	13.9	0
JUN	32,201	1,073	1,293	30,036	1,001	1,221	98	90	8.43	68.7	0
JUL	44,001	1,419	3,597	41,989	1,354	3,568	204	18	0.78	4.8	0
AUG	30,754	992	1,329	28,764	928	1,257	59	46	3.37	29.8	628
SEPT	28,916	954	1,207	26,378	879	1,159	53	76	4.80	37.2	0
OCT	41,038	1,324	2,885	39,002	1,258	2,811	73	74	3.29	43.4	0
NOV	53,529	1,784	2,305	52,060	1,735	2,319	18	90	2.93	21.8	0
DEC	70,464	2,273	3,493	70,204	2,265	3,467	40	43	1.45	13.2	0
TOTAL	642,564			621,837							628
AVG		1,755			1,697		53	47	2.79	22.4	
MAX			8,488			8,529					
CRITERIA		3,300	16,800								
COMPLIANCE		YES	YES								

2021 - IROQUOIS WWTP EFFLUENT SAMPLING MONTHLY AVERAGES

MONTH	DATE	CBOD (mg/L)	TSS (mg/L)	TP (mg/L)	NH ₃ (mg/L)	E. Coli (CFU/100ml)
January	01/05/2021	< 3	< 3	0.15	0.02	0
	01/12/2021	< 3	< 3	0.23	0.02	3
	01/19/2021	< 3	< 3	0.20	0.05	3
	01/26/2021	< 3	< 3	0.25	0.03	2
	Monthly Average	3.0	3.0	0.21	0.03	0.2
	Compliant?	YES	YES	YES	YES	YES
February	02/02/2021	< 3	< 3	0.35	0.02	2
	02/09/2021	< 3	< 3	0.35	0.02	5
	02/16/2021	< 3	< 3	0.42	0.05	2
	02/23/2021	< 3	< 3	0.43	0.02	1
	Monthly Average	3.0	3.0	0.39	0.03	2.1
	Compliant?	YES	YES	YES	YES	YES
March	03/02/2021	< 6	< 6	0.24	0.03	19
	03/09/2021	< 3	< 3	0.28	0.02	0
	03/16/2021	< 3	< 3	0.15	0.03	13
	03/23/2021	< 3	< 3	0.22	0.05	0
	03/30/2021	< 3	< 3	0.27	0.02	3
	Monthly Average	3.6	3.6	0.23	0.03	0.0
April	04/06/2021	< 6	< 5	0.2	< 0.01	1
	04/13/2021	< 3	< 3	0.21	< 0.01	0
	04/20/2021	< 3	< 6	0.19	0.02	14
	04/27/2021	< 3	< 7	0.16	0.01	21
	Monthly Average	3.8	5.8	0.19	0.01	0.2
	Compliant?	YES	YES	YES	YES	YES
May	05/04/2021	< 3	< 8	0.18	0.02	10
	05/11/2021	< 3	< 3	0.08	0.01	4
	05/18/2021	< 3	< 5	0.11	0.01	15
	05/25/2021	< 3	< 6	0.19	0.03	7
	Monthly Average	3.0	5.5	0.14	0.02	8.1
	Compliant?	YES	YES	YES	YES	YES
June	06/01/2021	< 3	< 3	0.07	0.03	12
	06/08/2021	< 3	< 3	0.23	0.03	3
	06/15/2021	< 3	< 3	0.21	0.03	4
	06/22/2021	< 3	< 3	0.22	0.06	2
	06/29/2021	< 3	< 3	0.2	0.04	8
	Monthly Average	3.0	3.0	0.19	0.04	4.7
July	07/05/2021	< 3	< 3	0.19	0.03	2
	07/13/2021	< 3	< 3	0.26	0.02	1
	07/20/2021	< 5	< 5	0.36	0.04	2
	07/27/2021	< 3	< 3	0.3	0.17	12
	Monthly Average	3.5	3.5	0.28	0.07	2.6
	Compliant?	YES	YES	YES	YES	YES
August	08/03/2021	< 3	< 4	0.38	0.03	6
	08/09/2021	< 3	< 3	0.28	0.02	0
	08/17/2021	< 3	< 3	0.24	0.08	1
	08/24/2021	< 3	< 3	0.24	0.04	3
	08/31/2021	< 3	< 3	0.41	0.04	2
	Monthly Average	3.0	3.2	0.31	0.04	0.2
September	09/07/2021	< 3	< 3	0.71	0.05	2
	09/14/2021	< 3	< 3	0.95	0.05	1
	09/21/2021	< 3	< 3	0.01	0.05	1
	09/28/2021	< 3	< 3	0.5	0.06	1
	Monthly Average	3.0	3	0.54	0.05	1.2
	Compliant?	YES	YES	YES	YES	YES
October	10/05/2021	< 3	< 3	0.43	0.04	2
	10/13/2021	< 3	< 3	0.34	0.03	6
	10/19/2021	< 3	< 4	0.5	0.06	0
	10/26/2021	< 3	< 3	0.52	0.06	3
	Monthly Average	3	3.3	0.45	0.05	0.2
	Compliant?	YES	YES	YES	YES	YES
November	11/02/2021	< 3	< 3	0.51	0.04	12
	11/09/2021	< 3	< 3	0.46	0.06	6
	11/16/2021	< 3	< 3	0.45	0.06	2
	11/23/2021	< 3	< 4	0.46	0.05	6
	11/29/2021	< 3	< 5	0.44	0.02	3
	Monthly Average	3.0	3.6	0.46	0.05	4.8
December	12/07/2021	< 3	< 16	0.61	0.03	10
	12/14/2021	< 3	< 4	0.41	0.08	3
	12/21/2021	< 3	< 3	0.38	0.06	4
	12/29/2021	< 3	< 5	0.39	0.04	2
	Monthly Average	3.0	7	0.45	0.05	3.9
	Compliant?	YES	YES	YES	YES	YES

2021 - IROQUOIS WWTP LOADING CALCULATIONS

MONTH	Total Effluent Flow (m ³)		BOD	TSS	TP	NH ₃
January	55,929	Monthly Average (mg/L)	3.0	3.0	0.2	0.03
		Loading (kg/d)	5.41	5.41	0.37	0.05
		Compliant?	YES	YES	YES	YES
February	36,136	Monthly Average (mg/L)	3.0	3	0.39	0.0275
		Loading (kg/d)	3.50	3.50	0.45	0.03
		Compliant?	YES	YES	YES	YES
March	112,443	Monthly Average (mg/L)	3.6	3.6	0.23	0.03
		Loading (kg/d)	13.06	13.06	0.84	0.11
		Compliant?	YES	YES	YES	YES
April	67,262	Monthly Average (mg/L)	3.8	5.75	0.19	0.01
		Loading (kg/d)	8.14	12.48	0.41	0.03
		Compliant?	YES	YES	YES	YES
May	61,435	Monthly Average (mg/L)	3.0	5.5	0.14	0.0175
		Loading (kg/d)	5.95	10.90	0.28	0.03
		Compliant?	YES	YES	YES	YES
June	30,036	Monthly Average (mg/L)	3.0	3	0.19	0.04
		Loading (kg/d)	2.91	2.91	0.18	0.04
		Compliant?	YES	YES	YES	YES
July	41,989	Monthly Average (mg/L)	3.5	3.5	0.28	0.07
		Loading (kg/d)	4.74	4.74	0.38	0.09
		Compliant?	YES	YES	YES	YES
August	28,764	Monthly Average (mg/L)	3.0	3.2	0.31	0.04
		Loading (kg/d)	2.78	2.97	0.29	0.04
		Compliant?	YES	YES	YES	YES
September	26,378	Monthly Average (mg/L)	3.0	3	0.54	0.05
		Loading (kg/d)	2.55	2.55	0.46	0.04
		Compliant?	YES	YES	YES	YES
October	39,002	Monthly Average (mg/L)	3.0	3.3	0.45	0.05
		Loading (kg/d)	3.77	4.09	0.56	0.06
		Compliant?	YES	YES	YES	YES
November	52,060	Monthly Average (mg/L)	3.0	3.6	0.46	0.05
		Loading (kg/d)	5.04	6.05	0.78	0.08
		Compliant?	YES	YES	YES	YES
December	70,204	Monthly Average (mg/L)	3.0	7.0	0.45	0.05
		Loading (kg/d)	6.79	15.85	1.01	0.12
		Compliant?	YES	YES	YES	YES

2021 - IROQUOIS WWTP EFFLUENT UN-IONIZED AMMONIA

Sample Date	Sample Temperature ° C	Sample Temp. Kelvin	Dissociation Constant pK_a	Effluent Sample pH on-site	Fraction of Un-ionized Ammonia	Total Ammonia (mg/L) (NH ₃ + NH ₄ as N)	Un-ionized Ammonia (mg/L)
01/05/2021	13.2	286.35	9.62	7.47	0.0070	0.02	0.0001
01/12/2021	12.7	285.85	9.64	7.27	0.0042	0.02	0.0001
01/19/2021	13.8	286.95	9.60	7.17	0.0037	0.05	0.0002
01/26/2021	11.5	284.65	9.68	7.13	0.0028	0.03	0.0001
02/02/2021	11.3	284.45	9.69	7.14	0.0028	0.02	0.0001
02/09/2021	10.8	283.95	9.70	7.22	0.0033	0.02	0.0001
02/16/2021	11.6	284.75	9.68	7.41	0.0054	0.05	0.0003
02/23/2021	11.3	284.45	9.69	7.28	0.0039	0.02	0.0001
03/02/2021	10.6	283.75	9.71	7.15	0.0027	0.03	0.0001
03/09/2021	10.7	283.85	9.71	7.35	0.0044	0.02	0.0001
03/16/2021	12.8	285.95	9.64	7.51	0.0074	0.03	0.0002
03/23/2021	10.5	283.65	9.71	7.28	0.0037	0.05	0.0002
03/30/2021	10.9	284.05	9.70	7.45	0.0056	0.02	0.0001
04/06/2021	10.8	283.95	9.70	7.32	0.0041	<	0.0000
04/13/2021	11.3	284.45	9.69	7.29	0.0040	<	0.0000
04/20/2021	11.4	284.55	9.68	7.20	0.0033	0.02	0.0001
04/27/2021	12.2	285.35	9.66	7.23	0.0037	0.01	0.0000
05/04/2021	11.1	284.25	9.69	7.32	0.0042	0.02	0.0001
05/11/2021	13.1	286.25	9.63	7.29	0.0046	0.01	0.0000
05/18/2021	13.0	286.15	9.63	7.31	0.0048	0.01	0.0000
05/25/2021	14.6	287.75	9.58	7.20	0.0042	0.03	0.0001
06/01/2021	15.7	288.85	9.54	7.32	0.0060	0.03	0.0002
06/08/2021	15.3	288.45	9.55	7.17	0.0041	0.03	0.0001
06/15/2021	14.7	287.85	9.57	7.14	0.0037	0.03	0.0001
06/22/2021	15.2	288.35	9.56	7.17	0.0041	0.06	0.0002
06/29/2021	18.7	291.85	9.44	7.15	0.0051	0.04	0.0002
07/05/2021	16.2	289.35	9.52	7.08	0.0036	0.03	0.0001
07/13/2021	17.8	290.95	9.47	7.05	0.0038	0.02	0.0001
07/20/2021	17.7	290.85	9.48	7.14	0.0046	0.04	0.0002
07/27/2021	17.1	290.25	9.50	7.23	0.0054	0.17	0.0009
08/03/2021	17.1	290.25	9.50	7.20	0.0050	0.03	0.0002
08/09/2021	17.4	290.55	9.49	7.25	0.0058	0.02	0.0001
08/17/2021	18.5	291.65	9.45	7.30	0.0070	0.08	0.0006
08/24/2021	18.6	291.75	9.45	7.16	0.0051	0.04	0.0002
08/31/2021	19.1	292.25	9.43	7.35	0.0082	0.04	0.0003
09/07/2021	19.3	292.45	9.42	7.32	0.0078	0.05	0.0004
09/14/2021	18.9	292.05	9.44	7.25	0.0065	0.05	0.0003
09/21/2021	19.5	292.65	9.42	7.27	0.0071	0.05	0.0004
09/28/2021	19.3	292.45	9.42	7.52	0.0123	0.06	0.0007
10/05/2021	19.2	292.35	9.43	7.19	0.0057	0.04	0.0002
10/13/2021	18.9	292.05	9.44	7.14	0.0050	0.03	0.0002
10/19/2021	18	291.15	9.47	7.24	0.0059	0.06	0.0004
10/26/2021	17.3	290.45	9.49	7.33	0.0069	0.06	0.0004
11/02/2021	16.9	290.05	9.50	7.38	0.0075	0.04	0.0003
11/09/2021	17.7	290.85	9.48	7.20	0.0053	0.06	0.0003
11/16/2021	17.9	291.05	9.47	7.42	0.0088	0.06	0.0005
11/23/2021	17.7	290.85	9.48	7.47	0.0098	0.05	0.0005
11/29/2021	15.2	288.35	9.56	7.35	0.0062	0.02	0.0001
12/07/2021	16.5	289.65	9.52	7.53	0.0102	0.03	0.0003
12/14/2021	14.4	287.55	9.58	7.39	0.0064	0.08	0.0005
12/21/2021	16	289.15	9.53	7.49	0.0090	0.06	0.0005
12/29/2021	13.6	286.75	9.61	7.26	0.0044	0.04	0.0002

$pK_a = 0.09018 + 2729.92/T$, where pK_a is the dissociation constant of ammonia at a given temperature.

$T = (K = \text{degrees C} + 273.16)$, where T is the ambient water temperature in Kelvin.

Iroquois Wastewater Treatment System – 2021 Annual Report

2021 - IROQUOIS WWTP MONTHLY AEROBIC BIOSOLIDS CONCENTRATION RATIO

	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
Ammonia	802	1220	1110	975	1050	776	1120	1410	1590	999	1580	1400
Nitrate	3.0	1.1	0.1	1.6	1.0	1.8	2.1	2.2	1.8	1.6	6.1	5.3
Ammonia + Nitrate	805	1221	1110	977	1051	778	1122	1412	1592	1001	1586	1405
Total Phosphorus	1230	1270	981	867	745	576	1040	2730	1360	1500	1280	1280
Total Solids	29700	28200	27600	16700	25400	41100	63700	33600	29900	46200	40500	35500
Aluminum	1220	1040	902.00	867	811.0	589.0	1120	1670	1190	1470	1390	870
Arsenic	0.10	0.10	0.10	0.10	0.10	0.10	0.20	0.30	0.10	0.20	0.20	0.20
Cadmium	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.04	0.03	0.04	0.04	0.03
Chromium	0.67	0.63	0.49	0.61	0.71	0.40	0.68	2.37	0.92	1.43	1.53	1.08
Cobalt	0.12	0.12	0.10	0.13	0.13	0.08	0.12	0.22	0.09	0.15	0.15	0.13
Copper	42.60	33.50	27.40	30.70	26.90	20.00	31.90	95.70	35.00	59.00	67.80	45.80
Lead	0.90	0.80	0.70	0.80	0.70	0.50	0.90	2.40	0.90	1.50	1.60	1.00
Mercury	0.03	0.03	0.03	0.02	0.03	0.03	0.03	0.30	0.04	0.06	0.09	0.02
Molybdenum	0.34	0.31	0.26	0.31	0.30	0.28	0.35	0.77	0.30	0.45	0.60	0.44
Nickel	0.81	0.72	0.62	0.79	0.81	0.51	0.83	1.72	0.70	1.03	1.14	0.94
Selenium	0.10	0.10	0.10	0.10	0.10	0.10	0.20	0.20	0.10	0.20	0.20	0.20
Zinc	20.20	17.30	14.50	16.60	13.60	9.03	17.60	28.20	17.40	27.30	28.40	22.40

Metals ratio = mg metals/kg solids

	Metal/Solids Ratio (Sludge)												
	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Limit
Arsenic	3.37	3.55	3.62	5.99	3.94	2.43	3.14	8.93	3.34	4.33	4.94	5.63	170
Cadmium	1.01	1.06	1.09	1.80	1.18	0.73	0.47	1.19	1.00	0.87	0.99	0.85	34
Chromium	22.6	22.3	17.8	36.5	28.0	9.7	10.7	70.5	30.8	31.0	37.8	30.4	2800
Cobalt	4.04	4.26	3.62	7.78	5.12	1.95	1.88	6.55	3.01	3.25	3.70	3.66	340
Copper	1434	1188	993	1838	1059	487	501	2848	1171	1277	1674	1290	1700
Lead	30.3	28.4	25.4	47.9	27.6	12.2	14.1	71.4	30.1	32.5	39.5	28.2	1100
Mercury	0.84	0.99	0.94	1.32	0.98	0.73	0.47	8.93	1.17	1.30	2.20	0.54	11
Molybdenum	11.45	10.99	9.42	18.56	11.81	6.81	5.49	22.92	10.03	9.74	14.81	12.39	94
Nickel	27.3	25.5	22.5	47.3	31.9	12.4	13.0	51.2	23.4	22.3	28.1	26.5	420
Selenium	3.37	3.55	3.62	5.99	3.94	2.43	3.14	5.95	3.34	4.33	4.94	5.63	34
Zinc	680	613	525	994	535	221	276	839	582	591	701	631	4200

Sludge is Acceptable	TRUE	TRUE	TRUE	FALSE	TRUE	TRUE	TRUE	FALSE	TRUE	TRUE	TRUE	TRUE	TRUE
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SOME ANALYSIS RESULTS EXPRESSED AS "<" (LESS THAN);HOWEVER, IN ORDER TO COMPLETE THE CALCULATION, ONLY THE NUMERIC VALUE WAS USED, THEREFORE THE AVG. CONC. IS GREATER THAN ACTUAL.

Appendix B

Flow Meter Calibration Reports

CapitalControls

Electrical/Control Panels – PLC/SCADA Programming – Instrumentation Calibrations

1333-03 Michael St. Ottawa, ON K1B-3M9 Ph. 613 248-1999 Fax: 613 248-1997

5 Iroquois W.P.C.P.

Site Reports August, 2021



Electrical/Control Panels – PLC/SCADA Programming – Instrumentation Calibrations

1333-03 Michael St. Ottawa, ON K1B-3M9 Ph. 613 248-1999 Fax: 613 248-1997

5.1 FIT-401 Waste Sludge Basin 1

Flow Transmitter
As Found Results

Instrument Calibration/Verification Report

Date: June 9, 2021

Client Details

Customer Municipality of South Dundas
Contact Denis Villeneuve
613-543-2631

Calibrations by: Tim Stewart
Capital Controls
613-248-1999

Instrument Details

Manufacturer Eand H
Model Promag 10 W DN 80
Serial Number H107C816000
Location Iroquois W.P.C.P.
Process Waste Sludge Basin #1
Tag ID FIT-401
Output 4-20 mA

Calibration Equipment

Make	Fluke Meter	FieldCheck
Model	725	50098801
Serial #	8759025	99081402000

Test Procedure

FieldCheck

Zero Test

Current out = +0.004 mA

Amplifier

MP1 = -0.48 %
MP2 = -0.09 %
MP3 = +0.01 %
MP4 = -0.00 %

Current Output

MP1 = +0.003 mA
MP2 = +0.003 mA
MP3 = +0.003 mA
MP4 = +0.006 mA

Sensor Test

Rated for 50.00

Actual = 43.28

13.34...50.00

Coil Current Stability Passed

Comments

The instrument under test has passed the annual calibration.



Electrical/Control Panels – PLC/SCADA Programming – Instrumentation Calibrations

1333-03 Michael St. Ottawa, ON K1B-3M9 Ph. 613 248-1999 Fax: 613 248-1997

5.2 FIT-402 Waste Sludge Basin 2

Flow Transmitter
As Found Results

Instrument Calibration/Verification Report

Date: June 9, 2021

Client Details		Instrument Details	
Customer	Municipality of South Dundas	Manufacturer	Eand H
Contact	Denis Villeneuve 613-543-2631	Model	Promag 10 W DN 80
		Serial Number	JA091316000
		Location	Morrisburg WTP
Calibrations by:	Tim Stewart Capital Controls 613-248-1999	Process	Sludge Basin #2
		Tag ID	FIT-402
		Output	4-20 mA

Calibration Equipment

Make	Fluke Meter	Fieldcheck
Model	725	50098801
Serial #	8759025	99081402000

Test Procedure FieldCheck

Zero Test	Amplifier	Current Output	Sensor Test
Current out = -0.005 mA	MP1 = -0.85 %	MP1 = -0.008 mA	Rated for 50.00
	MP2 = +0.09 %	MP2 = -0.010 mA	Actual = 42.89
	MP3 = -0.04 %	MP3 = -0.021 mA	13.34...50.00
	MP4 = +0.01 %	MP4 = -0.032 mA	Coil Current Stability Passed

Comments

The instrument under test has passed the annual calibration.



Electrical/Control Panels – PLC/SCADA Programming – Instrumentation Calibrations

1333-03 Michael St. Ottawa, ON K1B-3M9 Ph. 613 248-1999 Fax: 613 248-1997

5.3 FIT-305 Raw Sewage Influent Channel 1

Flow Meter
As Found Results

Instrument Calibration/Verification Report

Date: June 9, 2021

Client Details		Instrument Details	
Customer	Municipality of South Dundas	Manufacturer	Siemens
Contact	Denis Villeneuve 613-543-2631	Model	OCM 3
		Serial Number	PDB/C0010053
		Location	Iroquois W.P.C.P.
Calibrations by:	Tim Stewart Capital Controls 613-248-1999	Process	Influent Channel 1
		Tag ID	FIT-305
		Output	4-20 mA
Programming Parameters		Calibration Equipment	
Calibration by means of Simulating Channel Level		Make	Fluke Meter
Flume Type = Parshall Size = 12"		Model	725
P47- Blanking Distance = 61.01694 cm		Serial #	8759025
P46 - Zero Head = 175.3498 cm			
P7 - Max. Head = 44.28499 cm			
P1 Linear Units = cm			
Units = m	Volume = m3		
Range = 0-199.5 l/s			
Pass/Fail Criteria: 5% of Full Scale			
Errors are expressed in percentage of Full Scale			
Simulated Level	3.7 cm	6.0 cm	7.1 cm
Actual Flow Rate	4.93 l/s	9.06 l/s	12.44 l/s
Calculated Flow Rate	4.3 l/s	9.11 l/s	11.7 l/s
Error	0.31%	0.03%	0.38%
Actual mA Output	4.39 mA	4.73 mA	4.99 mA
Expected mA Output	4.34 mA	4.75 mA	4.94 mA
mA Output Error	0.32%	0.13%	0.32%

Comments

The instrument under test has passed the annual calibration.



1333-03 Michael St. Ottawa, ON K1B-3M9 Ph. 613 248-1999 Fax: 613 248-1997

5.4 FIT-306 Raw Sewage Influent Channel 2

Flow Meter		Instrument Calibration/Verification Report		Date: June 9, 2021
As Found Results				
Client Details			Instrument Details	
Customer	Municipality of South Dundas		Manufacturer	Siemens
Contact	Denis Villeneuve 613-543-2631		Model	OCM 3
			Serial Number	PDB/C0010053
			Location	Iroquois W.P.C.P.
Calibrations by:	Tim Stewart Capital Controls 613-248-1999		Process	Influent Channel 2
			Tag ID	FI-306
			Output	4-20 mA
Programming Parameters			Calibration Equipment	
			Make	Fluke Meter
			Model	725
			Serial #	8759025
Calibration by means of Simulating Channel Level				
Flume Type = Parshall Size = 12"				
P47 - Blanking Distance = 61.01694 cm				
P46 - Zero Head = 176.3498 cm			Range = 0-200 l/s	
P7 - Max. Head = 44.1699 cm				
P1 Linear Units = cm				
Flow Units = l/s				
			Pass/Fail Criteria: 5% of Full Scale	
			Errors are expressed in percentage of Full Scale	
Simulated Level	6.3 cm	11.3 cm	17.9 cm	
Actual Flow Rate	10.43 l/s	25.1 l/s	46.2 l/s	
Calculated Flow Rate	9.71 l/s	24.2 l/s	45.5 l/s	
Error	0.36%	0.45%	0.35%	
Actual mA Output	4.84 mA	6.01. mA	7.70mA	
Expected mA Output	4.78 mA	5.94 mA	7.64 mA	
mA Output Error	0.38%	0.44%	0.25%	
Comments				
The instrument under test has passed the annual calibration.				



Electrical/Control Panels – PLC/SCADA Programming – Instrumentation Calibrations

1333-03 Michael St. Ottawa, ON K1B-3M9 Ph. 613 248-1999 Fax: 613 248-1997

5.5 FIT-304 Raw Waste Water Flow

Flow Meter
As Found Results

Instrument Calibration/Verification Report

Date: June 9, 2021

Client Details

Customer Municipality of South Dundas
Contact Denis Villeneuve
613-543-2631

Calibrations by: Tim Stewart
Capital Controls
613-248-1999

Instrument Details

Manufacturer Siemens
Model MAG 6000
Serial Number 192102H243
Location Iroquois W.P.C.P.
Process Raw Waste Water Flow
Tag ID FIT-304
Output 4-20 mA

Programming Parameters

DN 8"
Range = 0-300 l/s
Cal Factor = 23.909410

Calibration Equipment

Make Fluke Meter
Model 725
Serial # 8759025

Calibration by means of simulating output and verifying coil resistance

Pass/Fail Criteria: 5% of Full Scale
Errors are expressed in percentage of Full Scale

Simulated Flow	0%	50%	100%
Actual Flow Rate	0 l/s	150 l/s	300 l/s
Calculated Flow Rate	0 l/s	151 l/s	300.0
Error	0.00%	0.33%	0.00%

Coil resistance = 109.9 ohms
Coil resistance to ground = infinite

Comments

The instrument under test has passed the annual calibration.



Electrical/Control Panels – PLC/SCADA Programming – Instrumentation Calibrations

1333-03 Michael St. Ottawa, ON K1B-3M9 Ph. 613 248-1999 Fax: 613 248-1997

5.6 FIT-302 P.S. Inlet Sewage Flow

Flow Meter
As Found Results

Instrument Calibration/Verification Report

Date: June 9, 2021

Client Details

Customer Municipality of South Dundas
Contact Denis Villeneuve
613-543-2631

Calibrations by: Tim Stewart
Capital Controls
613-248-1999

Instrument Details

Manufacturer Siemens
Model MAG 6000
Serial Number N1D2087032
Location Iroquois W.P.C.P.
Process Elizabeth St Pump Sta
Tag ID FIT-302
Output 4-20 mA

Programming Parameters

DN 14"
Range = 0-400 l/s
Cal Factor = 82.775460

Calibration Equipment

Make Fluke Meter
Model 725
Serial # 8759025

Calibration by means of simulating output and verifying coil resistance

Pass/Fail Criteria: 5% of Full Scale
Errors are expressed in percentage of Full Scale

Simulated Flow	0%	50%	100%
Actual Flow Rate	0 l/s	200 l/s	400 l/s
Calculated Flow Rate	0 l/s	200 l/s	402 l/s
Error	0.00%	0.00%	0.50%

Coil resistance = 99.4 ohms
Coil resistance to ground = infinite

Comments

The instrument under test has passed the annual calibration.



Electrical/Control Panels – PLC/SCADA Programming – Instrumentation Calibrations

1333-03 Michael St. Ottawa, ON K1B-3M9 Ph. 613 248-1999 Fax: 613 248-1997

5.7 FIT-301 Inlet Sewage Plant Pump Station Flow

Flow Meter
As Found Results

Instrument Calibration/Verification Report

Date: June 9, 2021

Client Details

Customer Municipality of South Dundas
Contact Denis Villeneuve
613-543-2631

Calibrations by: Tim Stewart
Capital Controls
613-248-1999

Instrument Details

Manufacturer Siemens
Model MAG 6000
Serial Number N1D2087032
Location Iroquois W.P.C.P.
Process Plant Influent Pump Sta
Tag ID FIT-301
Output 4-20 mA

Programming Parameters

DN 14"
Range = 0-400 l/s
Cal Factor = 79.167340

Calibration Equipment

Make Fluke Meter
Model 725
Serial # 8759025

Calibration by means of simulating output and verifying coil resistance

Pass/Fail Criteria: 5% of Full Scale
Errors are expressed in percentage of Full Scale

	0%	50%	100%	
Simulated Flow	0 l/s	201 l/s	400 l/s	Coil resistance = 132.9 ohms Coil resistance to ground = infinite
Actual Flow Rate	0 l/s	200 l/s	400 l/s	
Calculated Flow Rate	0.00%	0.25%	0.00%	
Error				

Comments

The instrument under test has passed the annual calibration.



Electrical/Control Panels – PLC/SCADA Programming – Instrumentation Calibrations

1333-03 Michael St. Ottawa, ON K1B-3M9 Ph. 613 248-1999 Fax: 613 248-1997

5.8 FIT-303 Supernatant

Flow Meter
As Found Results

Instrument Calibration/Verification Report

Date: June 9, 2021

Client Details		Instrument Details	
Customer	Municipality of South Dundas	Manufacturer	Siemens
Contact	Denis Villeneuve 613-543-2631	Model	MAG 6000
		Serial Number	N1D6053480
		Location	Iroquois W.P.C.P.
Calibrations by:	Tim Stewart Capital Controls 613-248-1999	Process	Supernatant Pump Sta
		Tag ID	FIT-303
		Output	4-20 mA

Programming Parameters		Calibration Equipment	
DN 4"		Make	Fluke Meter
Range = 0-75 l/s		Model	725
Cal Factor = 6.4206120		Serial #	8759025

Calibration by means of simulating output and verifying coil resistance			
Pass/Fail Criteria: 5% of Full Scale			
Errors are expressed in percentage of Full Scale			
Simulated Flow	0%	50%	100%
Actual Flow Rate	0 l/s	37.5 l/s	75 l/s
Calculated Flow Rate	0 l/s	37.6 l/s	74.8 l/s
Error	0.00%	0.13%	0.27%

Coil resistance = 113.1 ohms
Coil resistance to ground = infinite

Comments
The instrument under test has passed the annual calibration.



Electrical/Control Panels – PLC/SCADA Programming – Instrumentation Calibrations

1333-03 Michael St. Ottawa, ON K1B-3M9 Ph. 613 248-1999 Fax: 613 248-1997

5.9 FIT-501 UV Channel Flow

Flow Meter
As Found Results

Instrument Calibration/Verification Report

Date: June 9, 2021

Client Details		Instrument Details	
Customer	Municipality of South Dundas	Manufacturer	Nivus
Contact	Denis Villeneuve 613-543-2631	Model	OCM Pro
		Serial Number	4549902
		Location	Iroquois W.P.C.P.
Calibrations by:	Tim Stewart Capital Controls 613-248-1999	Process	UV Inlet Channel
		Tag ID	FIT-501
		Output	4-20 mA
Programming Parameters		Calibration Equipment	
Channel Configuration:		Make	Fluke Meter
H = 0.868m		Model	725
B = 0.900m		Serial #	8759025
Sensor Configuration:		Flow rate= Area (m2) x velocity m/s	
hSensor = 0.000 m (at bottom) hmax = 0.868 (max level)		Range = 0 - 50 l/s	
Velocity = Sensor#1 Mounting = 0.000m			
Wedge Pos. Average = X1			
Calibration by comparing channel height to instrument reading and calculating flow		Pass/Fail Criteria: 5% of Full Scale Errors are expressed in percentage of Full Scale	
Measured Level	0.00 cm	76.9 cm	77.1 cm
Displayed Level	0.00 cm	76.8 cm	76.9 cm
Calculated Flow Rate	0.00 l/s	4.84 l/s	4.86 l/s
Displayed Flow Rate	0.00 l/s	4.76 l/s	4.75 l/s
Error	0.00%	0.16%	0.22%
Comments			
The instrument under test has passed the annual calibration.			