Utilities Kingston

RAVENSVIEW WASTE WATER TREATMENT PLANT

2020 ANNUAL REPORT

Contents

REPORT CHECK LIST

Annual report submitted under Condition 10 of the Environmental Compliance Approval (ECA) number 2200-A82L2B.

Condition 10- The Owner shall prepare, and submit to the District Manager, a performance report, on an annual basis, within ninety (90) days following the end of the period being reported upon.

Condition 10- Each annual report shall contain at least the following information:

- Summary and interpretation of all monitoring data and a comparison to the effluent limits outlined in Condition 7, including an overview of the success and adequacy of the works.
- Description of any operating problems encountered, and corrective actions taken.
- Summary of any effluent quality assurance or control measures undertaken in the reporting period.
- Summary of the calibration and maintenance carried out on all effluent monitoring equipment.
- Description of efforts made, and results achieved in meeting the Effluent Objectives of Condition 7.
- Tabulation of the volume of sludge generated in the reporting period, an outline of anticipated volumes to be generated in the next reporting period and a summary of the locations to where the sludge was disposed.
- Summary of any complaints received during the reporting period and any steps taken to address the complaints.
- Summary of all by-pass, spill or abnormal discharge events.
- Any other information the District Manager requires from time to time.

EXECTIVE SUMMARY

The Ravensview Wastewater Treatment Plant (WWTP) operates under a Ministry of the Environment, Conservation and Parks, ECA number 2200-A82L2B. For the reporting year 2020 the facility was compliant with all conditions outlined in condition 7 of the above-mentioned ECA and are briefly described in the following sections of this report.

Average flow through the plant was 59,435 $m^{3/}$day.

The facility had three secondary bypass events in the 2020 reporting year. All by-pass details are listed in Table 7, the Bypass Summary section of this report.

Since the facility's commissioning in 2009, staff have been able to enhance the operation and to make this WWTP a highly effective treatment facility. The Ravensview WWTP continues to generate interest from international groups. We also provide valuable research opportunities and hands-on experience to graduate students from local educational institutions such as Queen's University.

Operational staff continually improve the operation of the Ravensview WWTP taking full advantage of its state-of-the-art technology to protect the environment and maintain the quality of service our residents have come to know.

Plant Overview

The following is a process overview and description of the treatment steps taken at the Ravensview Wastewater Treatment Plant.

Raw Wastewater receiving

Raw wastewater from the central and east portions of Kingston is conveyed to the influent works. A Parshall flume metering device continuously measures the flow of raw wastewater into the plant. A newly constructed septage receiving station is now online. The septage receiving station, which is located at the influent headworks gives approved septic truck haulers a place to discharge the contents of their tanks. The septage receiving station monitors the quantity, origin and contents being unloaded and provides some pretreatment before the contents enter the WWTP.

Screening

The first step in the treatment process is screening of the raw wastewater. Three large mechanical screens remove larger materials from the incoming wastewater stream. Screened material is conveyed to a screening press where the material is compacted and stored for offsite disposal.

Grit Removal

Grit settles out of the sewage as the water flows through the tanks which are covered to keep the odours in. Air is bubbled into the tank to speed up the settling of the sand, gravel and other heavier and inorganic materials. In the bottom of the tank, a corkscrew like system pushes the settled grit into a hopper at the end of the tank. From there a pump lifts the grit and a small amount of water up into a separator, where the grit is rinsed, and then placed into a dumpster where it awaits disposal at a landfill.

Primary Clarifiers

After removing the floatables and grit, the only material left in the wastewater is organic material and dissolved contaminants. In the primary clarifier tanks, the wastewater flows very slowly from the one end of the tank to the other. As this happens, the solids, which are high in organic material, settle to the bottom. Large scrapers draw the material to the one end of the tank where it is pumped across to the digesters for further processing. At the end of the primary clarifiers, the now cleaner wastewater, termed primary effluent, flows into troughs which then direct it to the secondary treatment process. In the primary clarifiers, any grease, fats or oils that are suspended are skimmed off by rakes and are pumped to the digesters as well. Any floatable materials that may have slipped through the bars in the screening process will be ground up before entering the digester.

Biologically Aerated Filters

The primary effluent flows to a pumping facility which lifts the wastewater up to the channel running along the centre of the Biologically Aerated Filters (BAF) facility. In each of the 11 available cells, the wastewater flows from the central channel to the bottom of the filters, and up through the filter. As it does, the water is aerated to encourage growth of numerous microorganisms which consume carbon dissolved in the water, as well as reducing ammonia and phosphorus. These microscopic organisms, referred to as biomass, stick onto the Bio Styrene media (4 mm diameter polystyrene beads), which also act to filter any suspended materials. The beads are held in place under a concrete floor with nozzles which let the clean water flow out on the surface. The clean water is then disinfected with chlorine to kill any pathogenic microorganisms that may pass through the filters. Like other filters, these are backwashed periodically to remove excess biomass growth and filtered particles, to restore the filters' ability to process wastewater efficiently.

Disinfection

Disinfection is accomplished by adding sodium hypochlorite to the BAF facility effluent. The effluent flows by gravity to a chlorine contact chamber where ample time is provided for the chlorine to disinfect the BAF effluent. Just prior to exiting the chlorine contact tank the wastewater is dosed with sodium bisulphite to de-chlorinate it, and to ensure no chlorine remains in the water entering the receiving stream.

Discharge to the St. Lawrence River

After the wastewater has been disinfected and de-chlorinated, it flows by gravity out a 1050 mm diameter outfall sewer with fourteen 250 mm elbow diffusers, approximately 240 m offshore, and into the St. Lawrence River.

Anaerobic Digesters

Solids from the raw sewage entering the plant and from the BAF backwash water are settled in the clarifiers, then pumped into the digesters. The digesters are sealed, and anaerobic (without oxygen). Inside, the mixture is heated to allow microorganisms to grow and consume carbon, and to produce methane gas and carbon dioxide. One of the digesters is heated to 55 degrees Celsius (thermophilic), which further assists in the destruction of harmful bacteria in the solids. After approximately 15 days, the solids are transferred in series to two other primary digesters which are heated to 36 degrees Celsius (mesophilic), where they remain for 15 days before being stored in the secondary digester and ultimately dewatered. The digestion process reduces the amount of carbon, stabilizing the material into what is called bio-solids, which is applied to approved farm fields, and used as soil nutrients and conditioning material.

Power Building

The Power Building houses two 575 kW electric back-up generators that are designed to run the wastewater treatment plant in the event of a power outage. These units are powered by 12-cylinder, low emission natural gas engines chosen specifically for this plant to avoid the need to use diesel fuel. These units will start automatically in the event of a power failure. A third unit within the power building is a combined heat and power generation system, or ‘Co-gen’ unit. This 8-cylinder engine is designed to work on natural gas, digester gas which has been cleaned and the moisture removed, or a blend of these two fuels. The Co-gen unit is designed to run continuously and produce 375 kW of electric power and 500 kW of heat. The gas produced on-site helps offset the power purchased from the grid and reduces the amount of gas required to heat the digesters.

Dewatering

Liquid bio-solids which is about 2% solid and 98% water, is funneled from the digester holding tank into the centrifuge where a polymer is added to help the solids stick together. The centrifuge spins at a high speed forcing the solids to the outer drum and out of the liquid, where solids are pushed along and out of the centrifuge. The solids content (cake) is now about 30% and the cake material is augured to a hole in the floor where it falls into a hopper. When enough material is in the hopper, a piston pump pushes the solid cake (bio-solids) to the bio-solids storage building. Alternately, the cake materials can be loaded directly into a waiting dump truck in a separate loading bay. The remaining liquid contains many nutrients and some microorganisms. After the centrifuge processes this liquid, called centrate, is returned to the plant for treatment.

Bio-solids Storage

One of the three main beneficial products produced at Ravensview is a nutrient rich bio-solid material. The dry product resulting from the treatment processes may be stored on site for up to 200 days in large concrete bunkers. When approved farmland is available, the material is loaded into trucks within the bio-solids storage building, in an odour controlled room.

Land Application

The stored bio-solids are held onsite until they can be used for agricultural land application. The bio-solids are transported and applied on fields that have been tested and approved by the Ministry of Environment, Conservation and Parks to meet standards with respect to distance from homes, wells, water bodies and sensitive lands. After application, the bio-solids are ploughed into the field to prevent off-site odours or wash-off. By carefully regulating the application only to licensed fields, the public is protected from contact with this material that may still contain some micro-organisms.

Administration/ Lab Building

The various devices and processes used at the Ravensview WWTP are connected to an onsite SCADA system which can be used to monitor and adjust plant processes. This system is located within the administration building. The building also contains a fully operating laboratory for onsite testing of various wastewater parameters as well as offices and lunchroom facilities.

PLANT PERFORMANCE

The enclosed performance assessment summarizes and confirms the facility's compliance. Refer to appendix A for detailed tables and graphs for various parameter results.

All effluent quality and quantity parameters outlined in condition 7 of ECA number 2200-A82L2B were complied with during the reporting period of 2020.

The following tables summarize the results obtained through monitoring of plant performance in accordance with condition 7 of the ECA number 2200- A82L2B.

Table 1: Effluent Parameters

Effluent Parameter	**Objective** (mg/l)	**2020 Results (avg)**
$CBOD_5$	15.0	2 mg/l
Total suspended solids (TSS)	15.0	3.8 mg/l
Total Phosphorus	0.8	0.40 mg/l
Total Ammonia Nitrogen (October 01 to May 31) (June 01 to 30 and September 01 to 30) (July 01 to August 31)	 12.0 7.0 5.0	 0.94 mg/l 0.65 mg/l 0.44 mg/l
Total Chlorine Residual	Non-detectable	0.01 mg/l
E. Coli (Monthly Geometric Mean Density)	100 counts/ 100 ml	15 counts/ 100 ml

Table 2: Effluent Limits

Effluent Parameter	**Concentration Limit** (mg/l)	**Loading Limit from effluent (kg/d)**	**2020 annual average**
$CBOD_5$	25.0	2,375	131 (kg/d)
Suspended solids (TSS)	25.0	2,375	286.5 (kg/d)
Total Phosphorus	1.0	95	29.0 (kg/d)
pH	Maintained between 6.0 and 9.5		7.55

Effluent Parameter	Concentration Limit (mg/l)	Loading Limit from effluent (kg/d)	2020 annual average
Acute lethality to rainbow trout			pass

Table 3: Monthly Effluent Parameters

Month	CBOD5 max concen/max loading (mg/L_kg/day)	TSS max concen/max loading (mg/L_kg/day)	TP max concen/max loading (mg/L_kg/day)	E. coli (Monthly geometric mean density)
January	2mg/L-120kg/day	10mg/L 700kg/day	0.48mg/l 56kg/day	17
February	5mg/L-500kg/day	10mg/L 1000kg/day	0.79mg/l 83kg/day	8
March	4mg/L-300kg/day	8mg/L 900kg/day	0.81mg/l 70kg/day	7
April	3mg/L-150kg/day	4mg/L 300kg/day	0.80mg/l 57kg/day	4
May	3mg/L-120kg/day	6mg/L 400kg/day	0..76mg/l 87kg/day	4
June	3mg/L-100kg/day	5mg/L 300kg/day	0.82mg/l 64kg/day	8
July	3mg/L-120kg/day	7mg/L 400kg/day	0..82mg/l 46kg/day	8
August	7mg/L-400kg/day	23mg/L 1000kg/day	1.02mg/l 90kg/day	32
September	14mg/L-510kg/day	16mg/L 740kg/day	1.16mg/l 58kg/day	24
October	3mg/L-100kg/day	32mg/L 1400kg/day	0.71mg/l 41kg/day	5
November	6mg/L-400kg/day	15mg/L 620kg/day	1.14mg/l 51kg/day	4
December	3mg/L -110kg/day	11mg/L 710kg/day	0.38mg/l 27kg/day	4

Table 4: Annual Plant Flows

Parameter	2014	2015	2016	2017	2018	2019	2020
Avg. m^3/day	60,916	53,076	59,640	86,200	69,005	77,265	59,435
Max. m^3/day	185,620	136,899	179,987	169,266	181,067	160,459	141,016
Design. m^3/day	95,000	95,000	95,000	95,000	95,000	95,000	95,000
Design Peak m^3/day	193,000	193,000	193,000	193,000	193,000	193,000	193,000
% (daily/design)	69	56	63	91	73	81	63
% (peak/design)	96	71	93	88	94	83	73

Table 5: Effluent Parameters

Parameter	2014	2015	2016	2017	2018	2019	2020	LIMITS
CBOD5	2.2	1.5	1.78	1.17	2	2	3	**25 mg/l**
Suspended Solids	4.3	4.4	6.0	6.1	5	3.8	4.6	**25 mg/l**
Total	0.42	0.40	0.47	0.40	0.43	0.40	.59	**1.0 mg/l**
Total Chlorine	<0.0	<0.0	<0.0	<0.0	<0.0	<0.0	0.00	**< 0.04**
Acute Lethality	All Pass	All Pass	All Pass	All Pass	All Pass	All Pass	All Pass	**Pass**

MAINTENANCE

In 2020 we continued with our preventative maintenance program of vibration testing, oil analysis and electrical surge protection.

The following bullet points highlight other major projects completed this year.

- Sludge pump rebuild.
- Odour control system improvements.
- Routine vibration monitoring.
- Digester transfer pumps rebuild.

CAPITAL WORKS

The major highlights for capital works in 2020 at the Ravensview WWTP and associated sewage collection system were:

- Electrical bus duct replacement.
- Cogen cooling system upgrade.
- Grit system screw conveyor replacement.
- Construction of the new Riverview Way Sewage Pumping Station.
- Boiler system upgrades.
- Sludge cake pump gear box replacement.

Operations

Adequate staffing as well as preventative maintenance and regular equipment inspections allowed operational problems to be diagnosed quickly and corrective actions to be taken immediately. Non flushable materials such as wipes and grease continue to be more prominent in the sewer system resulting in some operational and maintenance challenges. Utilities Kingston is still implementing a public education program to make customers more aware of what materials should not be flushed down the sewers. This program has included radio and newspaper campaigns, social media campaigns such as Twitter and Facebook, bill stuffers, information on back of parking tickets, and bus information signs. This has been an ongoing campaign for the past three years with some positive results.

BIO-SOLIDS MANAGEMENT

The dewatering facility is the primary method of solids handling at the Ravensview WWTP. The secondary digested sludge is dewatered through a centrifuge and then stockpiled onsite in the bio-solids storage building.

Ravensview WWTP processed a volume of 58,273 m^3 of liquid sludge through the centrifuge, and approximately 5,607 m^3 of sludge cake was stored on site until it was applied to land on licensed agricultural fields. Land application is completed by Terra Pure Environmental. They applied 4,105 mt on fields.

It is too hard to predict exactly where and when the bio-solids will be spread in 2021. Crops and weather will be the major variables that will dictate the course of the 2021 spreading season. Below are the active C of A’s and addresses for the City of Kingston in which spreading can take place.

Table 6: Biosolids Recipients in 2020

C Of A and NASM Plan	Address	Expiry Date
22853	Huffam Rd.	31/12/2021
22855	Lake Rd.	31/12/2021
22901	County Rd.8	31/12/2021
23007	County Rd. 4	31/12/2021
23047	Palace Rd.	31/12/2021
23048	Multiple farms	31/12/2021
23119	Hamilton Rd.	31/12/2021
23425	Parry/Chambers Rd.	31/12/2022
23525	County Rd. 8	31/12/2022
23641	Hamilton Rd.	31/12/2022
23950	County Rd. 8	31/12/2023
24003	Hamilton Rd.	31/12/2023
24091	Multiple farms	31/12/2023
24326	Greater Napanee	31/12/2024
24327	Greater Napanee	31/12/2024

EQUIPMENT CALIBRATIONS

All the facility flow meters are calibrated annually by third party contractors. As a result of this proactive approach, the facility saw limited downtime of major equipment and saw very few mechanical or electrical failures this year. Calibration records are available upon request.

COMPLAINTS

There was one odour complaint related to Ravensview in the 2020 reporting year (March 25/20). Operations were modified to alleviate odours from these activities.

BYPASS SUMMARY

Table 7 summarizes the locations, volumes and durations of bypass events for the reporting year 2020. Table 8 summarizes the test results from samples taken during the 2020 bypass events at King- George CSO as well as test results for secondary bypasses at Ravensview WWTP.

Table 7: Bypass Summaries

Date	Location	Start Time	End Time	Volume (m^3)	Reason	Precip (mm)
01/11/2020	Sherwood Dr.	18:36	21:10	19.4	Rain/rapid snow melt	38
01/11/2020	535 Rideau Belle Park	19:44	17:53	12928	Rain/rapid snow melt	38
01/11/2020	Earl St.	14:57	4:23	161	Rain/rapid snow melt	38
01/11/2020	West St.	20:21	19:56	4332	Rain/rapid snow melt	38
01/11/2020	King-George CSO	18:58	23:20	14013	Rain/rapid snow melt	38
01/11/2020	King-Collingwood CSO	18:37	08:00	15330	Rain/rapid snow melt	38
03/4/2020	Ravensview WWTP (Secondary Bypass)	00:22	00:50	1547	Rain	9.5

Date	Location	Start Time	End Time	Volume (m^3)	Reason	Precip (mm)
03/5/2020	Ravensview WWTP (Secondary Bypass	14:50	15:15	347	Rain	0.8
04/13/2020	535 Rideau Belle Park	20:33	03:41	28	Rain	29
04/13/2020	Earl St.	12:58	15:50	108	Rain	29
04/13/2020	West St.	21:14	04:18	72	Rain	29
04/13/2020	King-George CSO	18:54	08:38	3043	Rain	29
04/13/2020	King-George CSO	15:54	04:21	6.25	Rain	29
04/30/2020	Helen St.	23:51	01:23	12	Rain	47
04/30/2020	Earl St.	17:02	00:12	311	Rain	47
04/30/2020	Lower Union	23:24	23:44	35	Rain	47
04/30/2020	King-George CSO	22:51	17:47	11913	Rain	47

Date	Location	Start Time	End Time	Volume (m^3)	Reason	Precip (mm)
04/30/2020	King-Collingwood CSO	23:30	00:53	1454	Rain	47
05/01/2020	West St.	00:19	01:53	73	Rain	47
05/01/2020	535 Rideau Belle Park	00:35	09:20	3639	Rain	47
05/01/2020	West St.	01:48	04:58	15	Rain	47
05/25/2020	535 Rideau Belle Park	04:50	04:57	27	Rain	16.7
05/25/2020	Earl St.	04:31	05:49	168	Rain	16.7
05/25/2020	Lower Union St.	04:43	05:40	43	Rain	16.7
06/03/2020	535 Rideau Belle Park	21:13	21:21	76	Rain	2.2
06/03/2020	Earl St.	21:10	21:22	123	Rain	2.2
06/03/2020	Lower Union	21:14	21:18	6	Rain	2.2
06/06/2020	Union St.	17:41	17:45	0.019	Rain	12

Date	Location	Start Time	End Time	Volume (m^3)	Reason	Precip (mm)
06/06/2020	535 Rideau Belle Park	17:43	18:05	235	Rain	12
06/06/2020	Raglan Rd.	17:42	17:57	23	Rain	12
06/06/2020	Clarence St.	17:52	18:05	89	Rain	12
06/06/2020	Earl St.	05:40	18:10	296	Rain	12
06/06/2020	Lower Union St.	17:42	18:04	51	Rain	12
06/27/2020	535 Rideau St.	19:43	19:49	21	Rain	37
06/27/2020	Earl St.	19:59	20:22	44	Rain	37
07/11/2020	Quebec St.	22:48	22:56	0.1	N/A	41
07/11/2020	Earl St.	08:53	09:09	30	N/A	41
07/13/2020	Sherwood St.	03:08	03:08	1.7	Rain	26
07/13/2020	Union St.	03:30	03:30	1	Rain	26
07/13/2020	Clarence St.	03:26	03:47	215	Rain	26
07/13/2020	William St.	03:19	03:32	17.5	Rain	26
07/13/2020	Earl St.	03:12	03:48	479	Rain	26
07/13/2020	Gore St.	03:21	03:32	32	Rain	26
07/13/2020	Lower Union	03:17	03:39	165	Rain	26

Date	Location	Start Time	End Time	Volume (m^3)	Reason	Precip (mm)
07/13/2020	West St.	03:24	03:33	36	Rain	26
07/13/2020	King-George CSO	03:52	04:07	28	Rain	26
07/13/2020	Earl St.	11:34	11:59	32	Rain	26
07/13/2020	King-George CSO	11:43	12:22	245	Rain	26
08/02/2020	Earl St.	10:51	10:54	0.001	N/A	21.2
08/02/2020	Lower Union St.	10:39	10:50	29.5	N/A	21.2
08/16/2020	Earl St.	22:24	22:35	57	N/A	10
08/18/2020	Ravensview WWTP (Secondary Bypass)	11:30	04:45	157	Rain	2
08/27/2020	535 Rideau St.	10:12	10:32	212	Rain	41.7
08/27/2020	Clarence St.	10:17	10:35	161	Rain	41.7
08/27/2020	William St.	10:15	10:16	0.001	Rain	41.7
08/27/2020	Earl St.	09:40	11:10	437	Rain	41.7

Date	Location	Start Time	End Time	Volume (m^3)	Reason	Precip (mm)
08/27/2020	Gore St.	10:12	10:17	11.8	Rain	41.7
08/27/2020	Lower Union W	09:43	10:59	171	Rain	41.7
08/27/2020	West St.	10:11	10:28	104	Rain	41.7
08/27/2020 08/29/2020	Earl St.	09:40	03:29	511	Heavy Rain	57
08/27/2020 08/29/2020	Lower Union	09:43	03:19	179.8	Heavy Rain	57
11/15/2020	Lower Union	17:38	17:48	15	Rain	8.4

Table 8: Bypass Sampling Results

Parameter	Units	Ravensview WWTP (Secondary Bypass) Annual Avg.	King-George CSO Annual Avg.
Total Coliform	Cfu/100m	N/A	1900000
E coli	Cfu/100m	25000	273636
HPC	Cfu/mL	N/A	273000
CBOD5	Mg/L	20.5	12
TSS	Mg/L	27	50.5
TP	Mg/L	1.0	0.64
TKN	Mg/L	7.5	5.4

Bypass Results Interpretations

All bypass discharges have a high bacteria count due to the lack of disinfection. $CBOD_5$, TP and TKN results are much lower than typical WWTP raw sewage influent due to the dilution attributed to rainwater during these events. Best efforts are made to capture the debris contained in these discharges to the lake. After each bypass event, shoreline inspections near discharge points are done to monitor any debris that may come ashore. Clean up is done if debris is found.

APPENDIX A – MONITORED PARAMETERS RESULTS AND GRAPHS

For further information about this report or any questions regarding accessibility contact Troy Dickerson at *tdickerson@utilitieskingston.com* , or call 613-546-1181 Ext 2190.

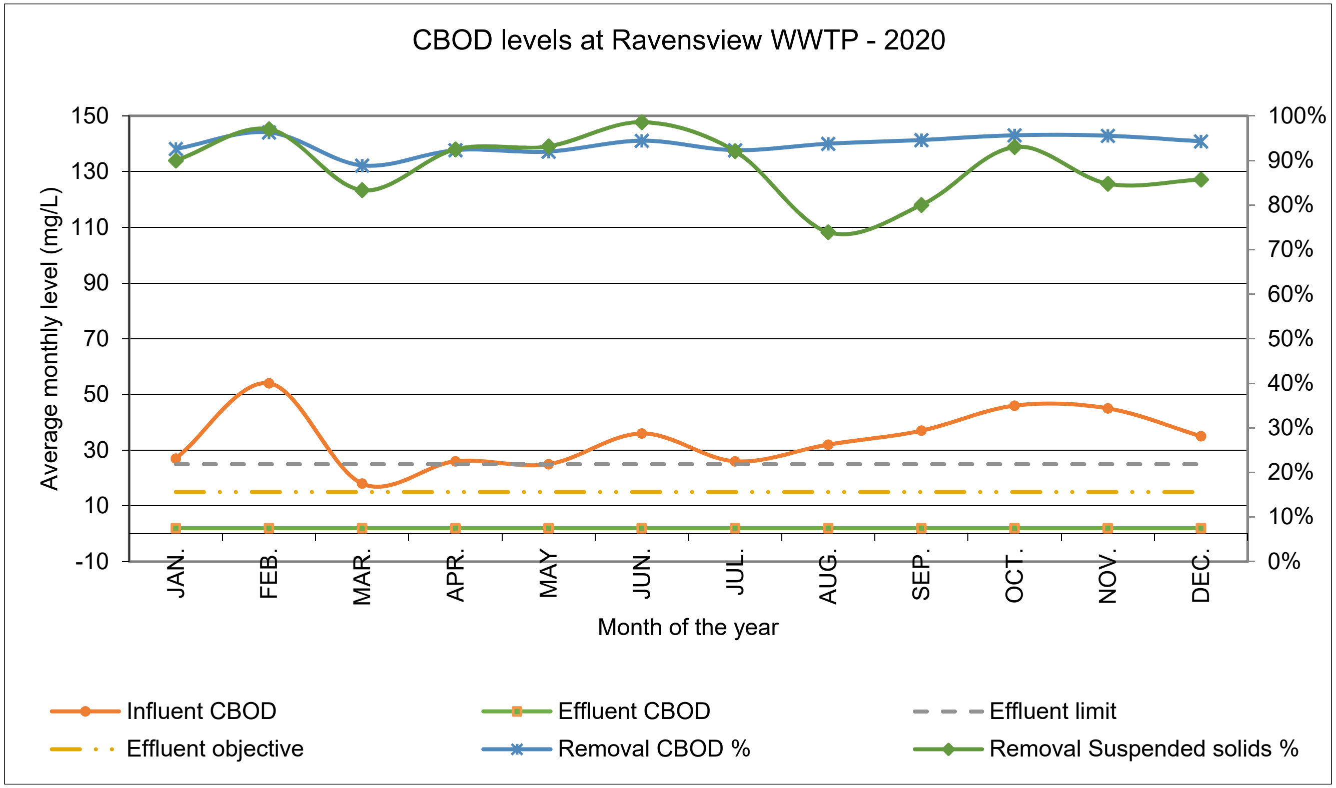
RAVENSVIEW Wastewater Treatment Plant

2020 ANNUAL REPORT

Monthly data

Month	Raw sewage CBOD	Final Effluent CBOD	Removal CBOD	Raw sewage Suspended solids	Final Effluent Suspended solids	Removal Suspended solids
Units	mg/L	mg/L	%	mg/L	mg/L	%
JAN.	27.0	2.0	93%	40.0	4.0	90%
FEB.	54.0	2.0	96%	134.0	4.0	97%
MAR.	18.0	2.0	89%	30.0	5.0	83%
APR.	26.0	2.0	92%	40.0	3.0	93%
MAY	25.0	2.0	92%	44.0	3.0	93%
JUN.	36.0	2.0	94%	213.0	3.0	99%
JUL.	26.0	2.0	92%	38.0	3.0	92%
AUG.	32.0	2.0	94%	23.0	6.0	74%
SEP.	37.0	2.0	95%	40.0	8.0	80%
OCT.	46.0	2.0	96%	129.0	9.0	93%
NOV.	45.0	2.0	96%	46.0	7.0	85%
DEC.	35.0	2.0	94%	28.0	4.0	86%

	Raw sewage	Final Effluent	Removal	Raw sewage	Final Effluent	Removal
Average	33.9	2.0	94%	67.1	4.9	93%
Objective		15.0			15.0	
Limit		25.0			25.0	


CBOD levels at Ravensview WWTP - 2020
150
130
110
90
70
50
30
10
-10
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Average monthly level (mg/L)
JAN.
FEB.
MAR.
APR.
MAY
JUN.
JUL.
AUG.
SEP.
OCT.
NOV.
DEC.
Month of the year
Influent CBOD
Effluent CBOD
Effluent limit
Effluent objective
Removal CBOD %
Removal Suspended solids %

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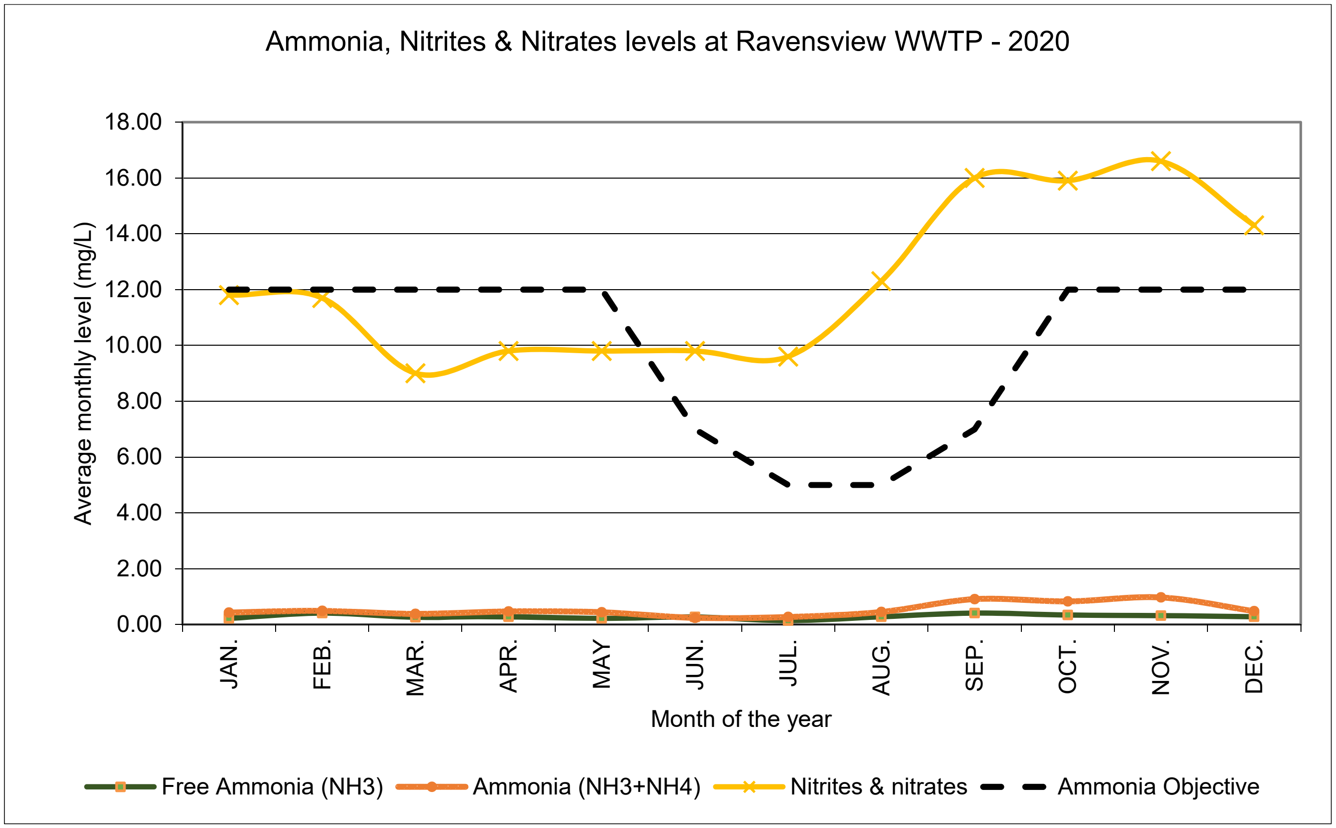
Month		Raw sewage CBOD	Final Effluent CBOD	Removal CBOD	Raw sewage Suspended solids	Final Effluent Suspended solids	Removal Suspended solids
	Units	mg/L	mg/L	%	mg/L	mg/L	%
JAN.		27.0	2.0	93%	40.0	4.0	90%
FEB.		54.0	2.0	96%	134.0	4.0	97%
MAR.		18.0	2.0	89%	30.0	5.0	83%
APR.		26.0	2.0	92%	40.0	3.0	93%
MAY		25.0	2.0	92%	44.0	3.0	93%
JUN.		36.0	2.0	94%	213.0	3.0	99%
JUL.		26.0	2.0	92%	38.0	3.0	92%
AUG.		32.0	2.0	94%	23.0	6.0	74%
SEP.		37.0	2.0	95%	40.0	8.0	80%
OCT.		46.0	2.0	96%	129.0	9.0	93%
NOV.		45.0	2.0	96%	46.0	7.0	85%
DEC.		35.0	2.0	94%	28.0	4.0	86%

	Raw sewage	Final Effluent	Removal	Raw sewage	Final Effluent	Removal
Average	33.9	2.0	94%	67.1	4.9	93%
Objective		15.0			15.0	
Limit		25.0			25.0	


Ammonia, Nitrites & Nitrates levels at Ravensview WWTP - 2020
18.00
16.00
14.00
12.00
10.00
8.00
6.00
4.00
2.00
0.00
Average monthly level (mg/L)
JAN.
FEB.
MAR.
APR.
MAY
JUN.
JUL.
AUG.
SEP.
OCT.
NOV.
DEC.
Month of the year
Free Ammonia (NH3)
Ammonia (NH3+NH4)
Nitrites & nitrates
Ammonia Objective

RAVENSVIEW Wastewater Treatment Plant

2020 ANNUAL REPORT

Monthly data

Ferric Chloride

Month	Unit	Dosage Litres / day	Dosage Kg / day	Dosage Litres / month	Dosage Kg / month	Dosage mg/L
JAN.		1,185	184	36,740	5,704	3.38
FEB.		1,261	196	35,310	5,482	3.41
MAR.		1,270	199	39,380	6,114	2.99
APR.		1,276	198	38,280	5,943	2.44
MAY		1,473	229	45,650	7,087	2.10
JUN.		1,423	221	42,680	6,626	2.03
JUL.		1,441	224	44,660	6,934	2.37
AUG.		1,331	207	41,250	6,404	2.67
SEP.		1,467	228	44,000	6,831	3.61
OCT.		1,863	289	57,750	8,966	4.63
NOV.		1,401	217	42,020	6,524	3.33
DEC.		1,352	210	41,910	6,507	3.47
Average		1,395	217	42,469	6,593.50	3.04
Objective						
Limit						

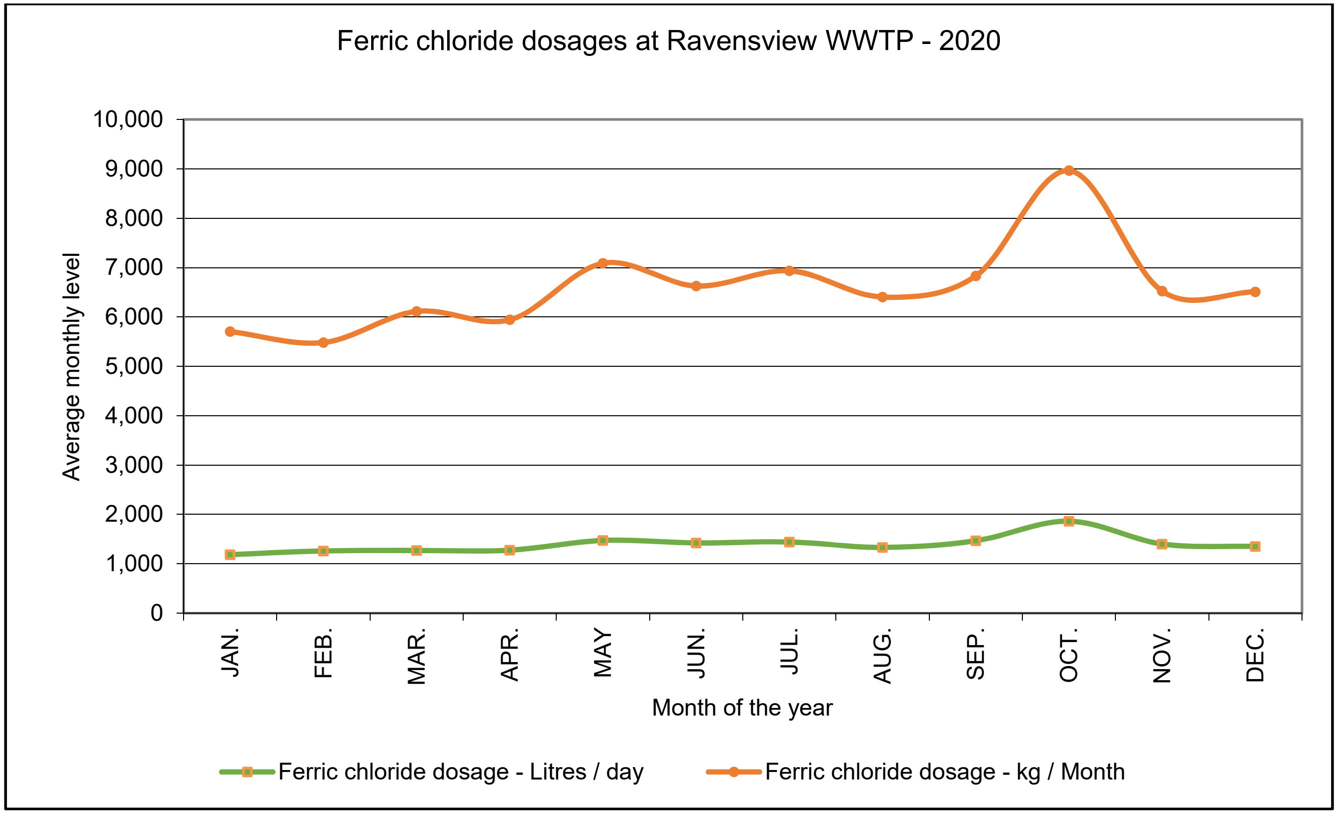
RAVENSVIEW Wastewater Treatment Plant

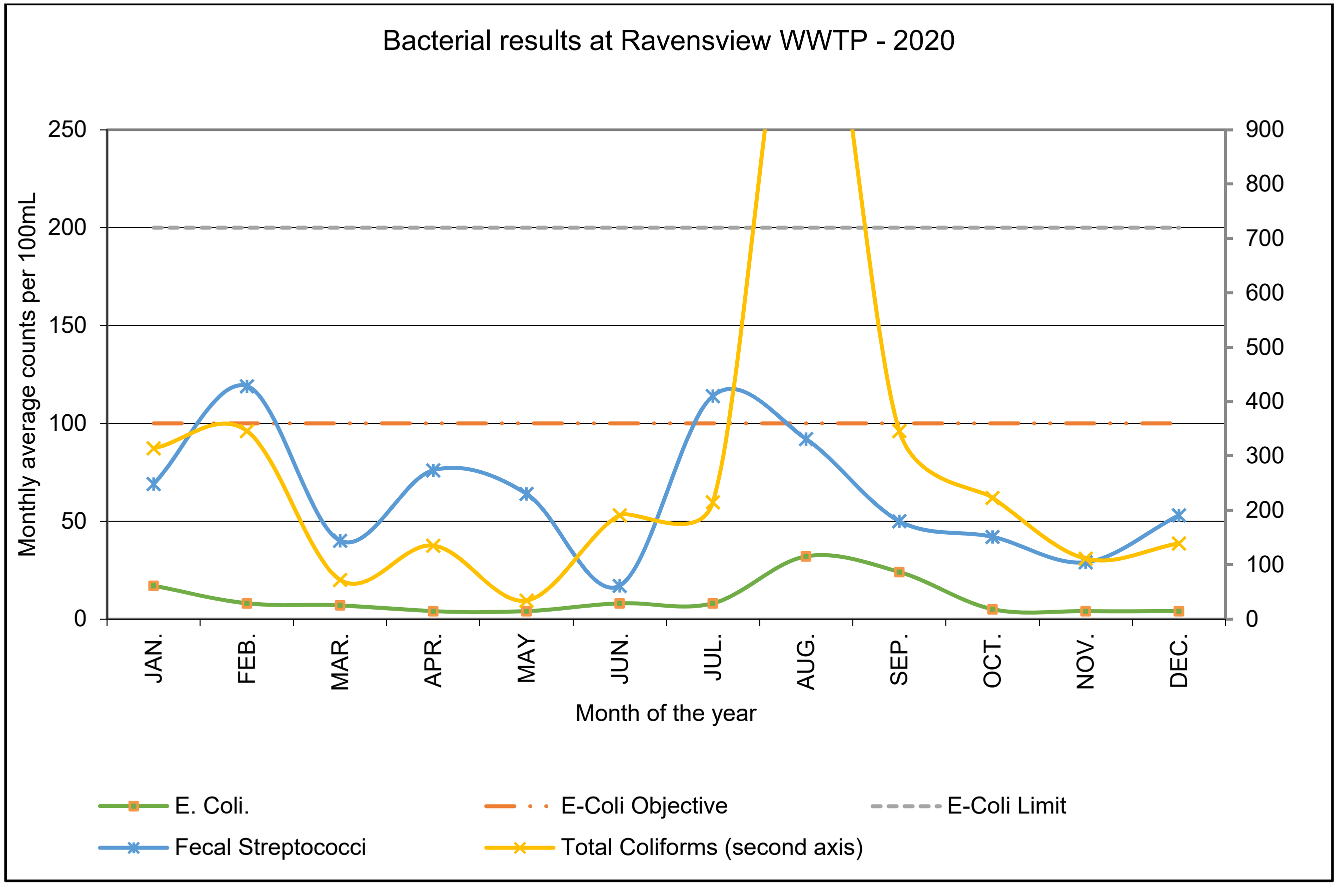
2020 ANNUAL REPORT

Monthly data

Bacterial Results

Month	Unit	Final Effluent E. Coli. (counts / 100mL)	E-Coli Objective (counts / 100mL)	E-Coli Limit (counts / 100mL)	Final Effluent Total Coliforms (second axis) (counts / 100mL)	Final Effluent Fecal Streptococci (counts / 100mL)
JAN.		17	100	200	314	69
FEB.		8	100	200	346	119
MAR.		7	100	200	72	40
APR.		4	100	200	135	76
MAY		4	100	200	34	64
JUN.		8	100	200	191	17
JUL.		8	100	200	215	114
AUG.		32	100	200	1,296	92
SEP.		24	100	200	346	50
OCT.		5	100	200	223	42
NOV.		4	100	200	111	29
DEC.		4	100	200	139	53
Average		10.42			285.17	63.75
Objective		100				
Limit		200				

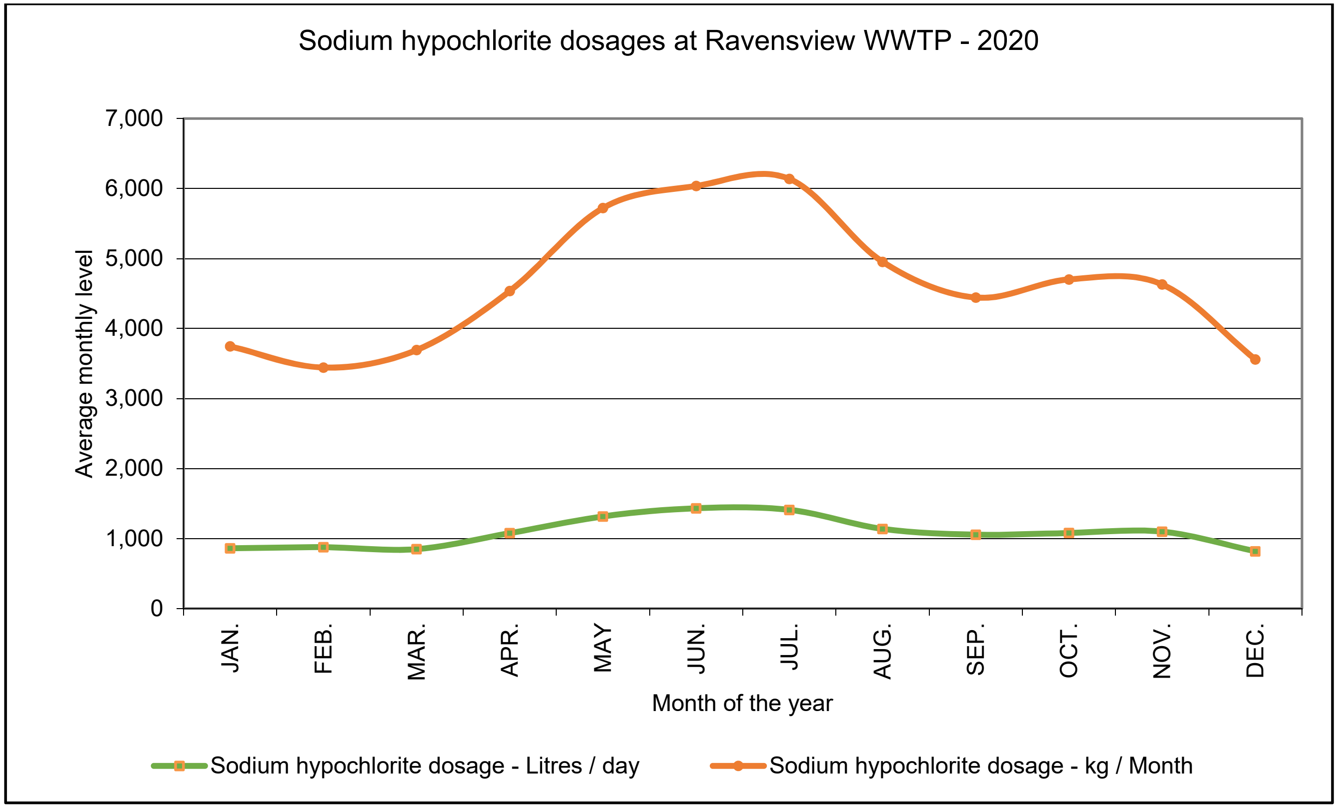

Ferric chloride dosages at Ravensview WWTP - 2020
Average monthly level
10,000
9,000
8,000
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
JAN.
FEB.
MAR.
APR.
MAY
JUN.
JUL.
AUG.
SEP.
OCT.
NOV.
DEC.
Month of the year
Ferric chloride dosage - Litres / day
Ferric chloride dosage - kg / Month


Bacterial results at Ravensview WWTP - 2020
Monthly average counts per 100mL
250
200
150
100
50
0
900
800
700
600
500
400
300
200
100
0
JAN.
FEB.
MAR.
APR.
MAY
JUN.
JUL.
AUG.
SEP.
OCT.
NOV.
DEC.
Month of the year
E. Coli.
E-Coli Objective
E-Coli Limit
Fecal Streptococci
Total Coliforms (second axis)

Monthly data

Sodium Hypochlorite

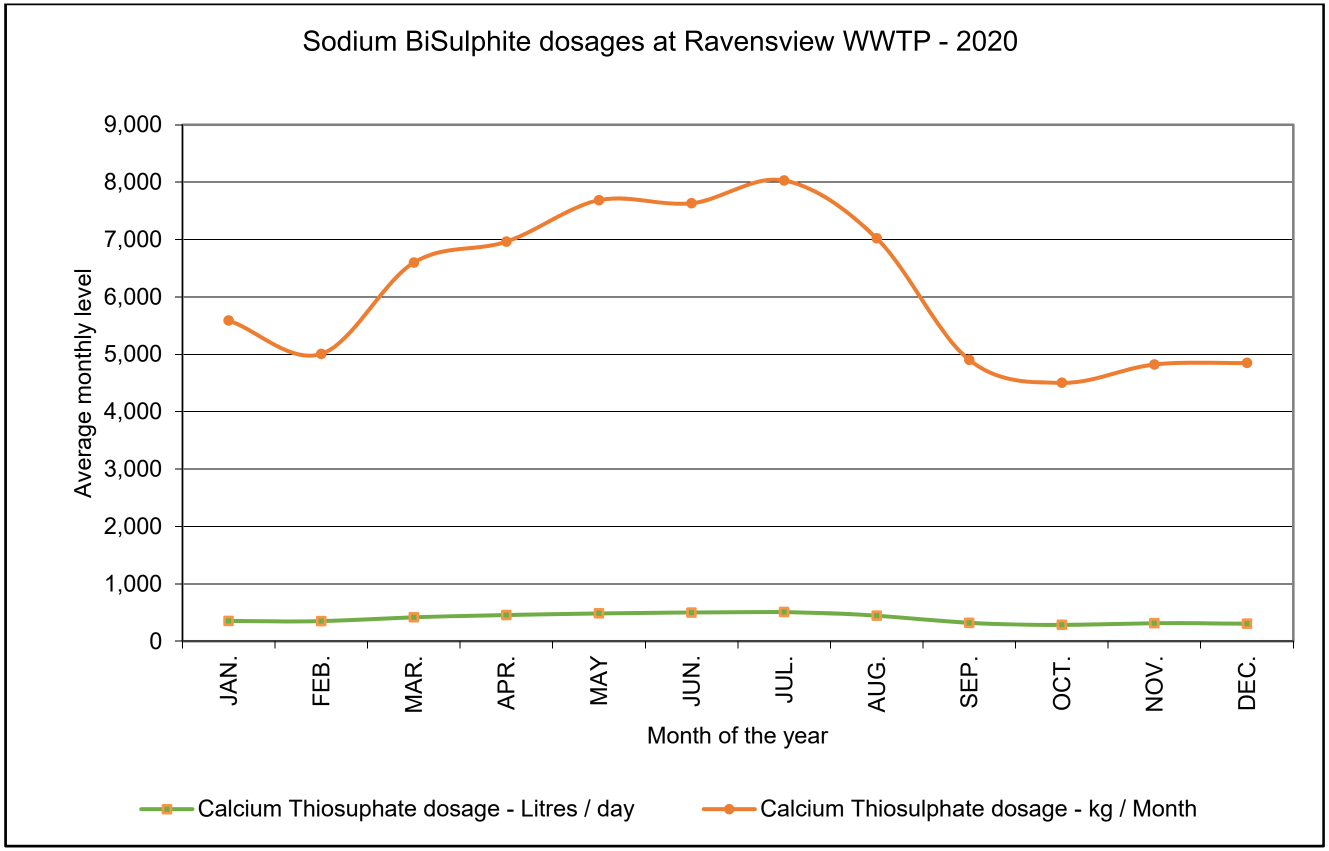
Month	Dosage	Dosage	Dosage	Dosage	Dosage	Residual
Unit	Litres / day	Kg / day	Litres / month	Kg / month	mg/L	mg/L
JAN.	860	121	26,671	3,745	2.24	0.94
FEB.	876	123	24,523	3,443	2.16	0.90
MAR.	849	119	26,306	3,693	1.94	0.90
APR.	1,077	151	32,310	4,536	1.92	0.77
MAY	1,315	185	40,759	5,722	1.71	0.60
JUN.	1,433	201	42,997	6,037	1.85	0.63
JUL.	1,410	198	43,722	6,138	2.10	0.70
AUG.	1,138	160	35,275	4,953	2.05	0.61
SEP.	1,055	148	31,642	4,443	2.31	0.62
OCT.	1,080	152	33,494	4,702	2.40	0.79
NOV.	1,099	154	32,976	4,630	2.36	0.89
DEC.	818	115	25,344	3,558	1.89	0.76
Average	1,084	152.3	33,002	4,633	2.08	0.76
Objective						
Limit						


Sodium hypochlorite dosages at Ravensview WWTP - 2020
Average monthly level
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
JAN.
FEB.
MAR.
APR.
MAY
JUN.
JUL.
AUG.
SEP.
OCT.
NOV.
DEC.
Month of the year
Sodium hypochlorite dosage - Litres / day
Sodium hypochlorite dosage - kg / Month

Sodium BiSulphite

Month		Dosage	Dosage	Dosage	Dosage	Dosage	Residual	Compliance
	Unit	Litres / day	Kg / day	Litres / month	Kg / month	mg / L	mg / L	Yes / No
JAN.		354	180	10,972	5,590	3.37	0.0	yes
FEB.		351	179	9,828	5,007	3.19	0.0	yes
MAR.		418	213	12,948	6,597	3.31	0.0	yes
APR.		456	232	13,666	6,963	2.93	0.0	yes
MAY		486	248	15,080	7,684	2.31	0.0	yes
JUN.		499	254	14,976	7,631	2.34	0.0	yes
JUL.		508	259	15,756	8,028	2.74	0.0	yes
AUG.		445	226	13,780	7,021	2.93	0.0	yes
SEP.		321	163	9,620	4,902	2.55	0.0	yes
OCT.		285	145	8,838	4,503	2.31	0.0	yes
NOV.		315	161	9,464	4,822	2.48	0.0	yes
DEC.		307	156	9,516	4,849	2.56	0.0	yes
Average		395	201	12,037	6,133	2.75	0.01	
Objective								
Limit								

RAVENSVIEW Wastewater Treatment Plant 2020 ANNUAL Report
Monthly Graphs



RAVENSVIEW Wastewater Treatment Plant

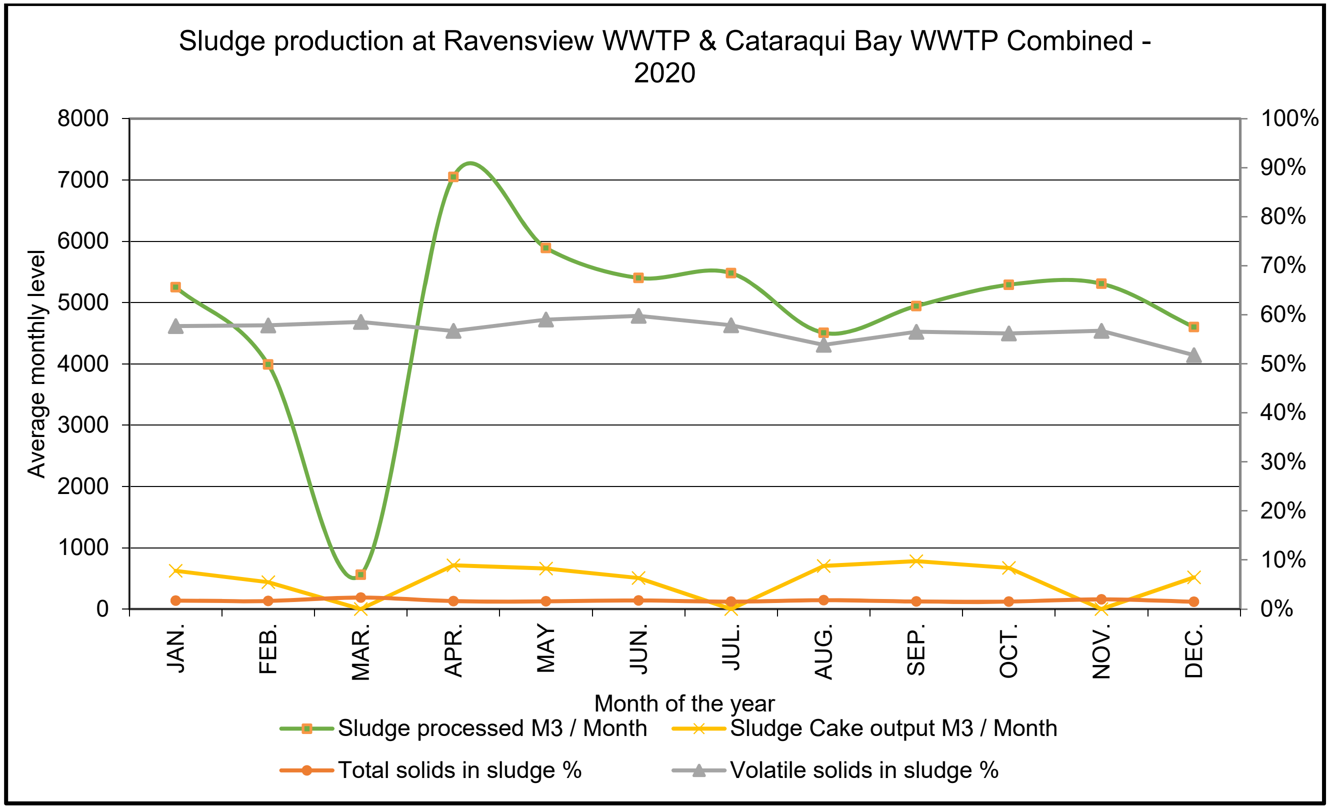
2020 ANNUAL REPORT

Monthly data

Month	Unit	Digested Sludge: Sludge processed	Digested Sludge: Total solids in sludge	Digested Sludge: Volatile solids in sludge	Sludge Cake: Sludge Cake output	Sludge Cake: Total solids in sludge cake	Sludge Cake: Vol. Solids sludge cake
	Unit	M3 / Month	%	%	M3 / Month	%	%
JAN.		5251	1.7%	57.7%	624	28.8%	55.8%
FEB.		3989	1.6%	57.8%	437	27.3%	57.4%
MAR.		559	2.3%	58.6%	0	0.0%	0.0%
APR.		7051	1.6%	56.7%	711	31.0%	59.4%
MAY		5891	1.6%	59.0%	661	29.8%	58.0%
JUN.		5403	1.8%	59.8%	506	29.5%	60.3%
JUL.		5481	1.5%	57.9%	0	30.2%	56.5%
AUG.		4506	1.8%	53.9%	703	29.6%	59.0%
SEP.		4944	1.5%	56.5%	780	25.3%	61.9%
OCT.		5291	1.5%	56.2%	669	23.9%	56.8%
NOV.		5308	2.0%	56.7%	0	0.0%	0.0%
DEC.		4600	1.5%	51.8%	516	28.8%	55.8%
Average		4,856	1.7%	56.9%	467	23.7%	48.4%
Total		58273				0.0%	

*Processed volumes are a combination of both Cataraqui Bay WWTP & Ravensview WWTP Sludge Productions

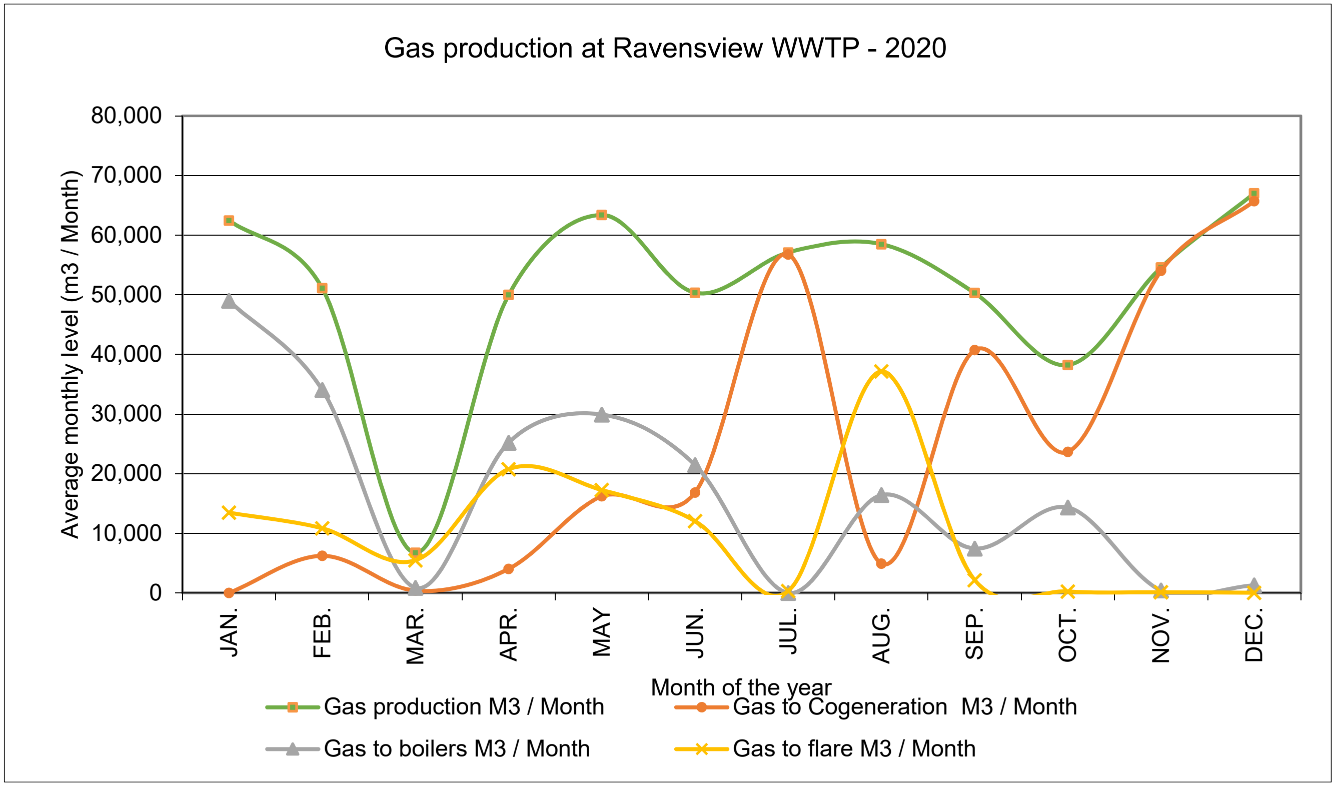
RAVENSVIEW Wastewater Treatment Plant 2020 ANNUAL REPORT
Monthly Graphs



Monthly data

Digester Gas Production

Month	Unit	Gas production	Gas to Cogeneration	Gas to boilers	Gas to flare
		M3 / Month	M3 / Month	M3 / Month	M3 / Month
JAN.		62,453	0	48,988	13,465
FEB.		51,103	6,221	34,047	10,835
MAR.		6,735	388	866	5,481
APR.		49,971	4,026	25,190	20,755
MAY		63,377	16,219	29,900	17,258
JUN.		50,340	16,837	21,442	12,061
JUL.		57,082	56,760	0	322
AUG.		58,480	4,916	16,418	37,146
SEP.		50,297	40,711	7,434	2,152
OCT.		38,219	23,655	14,319	245
NOV.		54,569	54,018	429	122
DEC.		67,008	65,694	1,278	36
Average		50,803	24,120.4	16,692.6	9,989.8
Total		**609,634**	**289,445**	**200,311**	**119,878**


Gas production at Ravensview WWTP - 2020
Average monthly level (m3 / Month)
80,000
70,000
60,000
50,000
40,000
30,000
20,000
10,000
0
JAN.
FEB.
MAR.
APR.
MAY
JUN.
JUL.
AUG.
SEP.
OCT.
NOV.
DEC.
Month of the year
Gas production M3 / Month
Gas to Cogeneration M3 / Month
Gas to boilers M3 / Month
Gas to flare M3 / Month

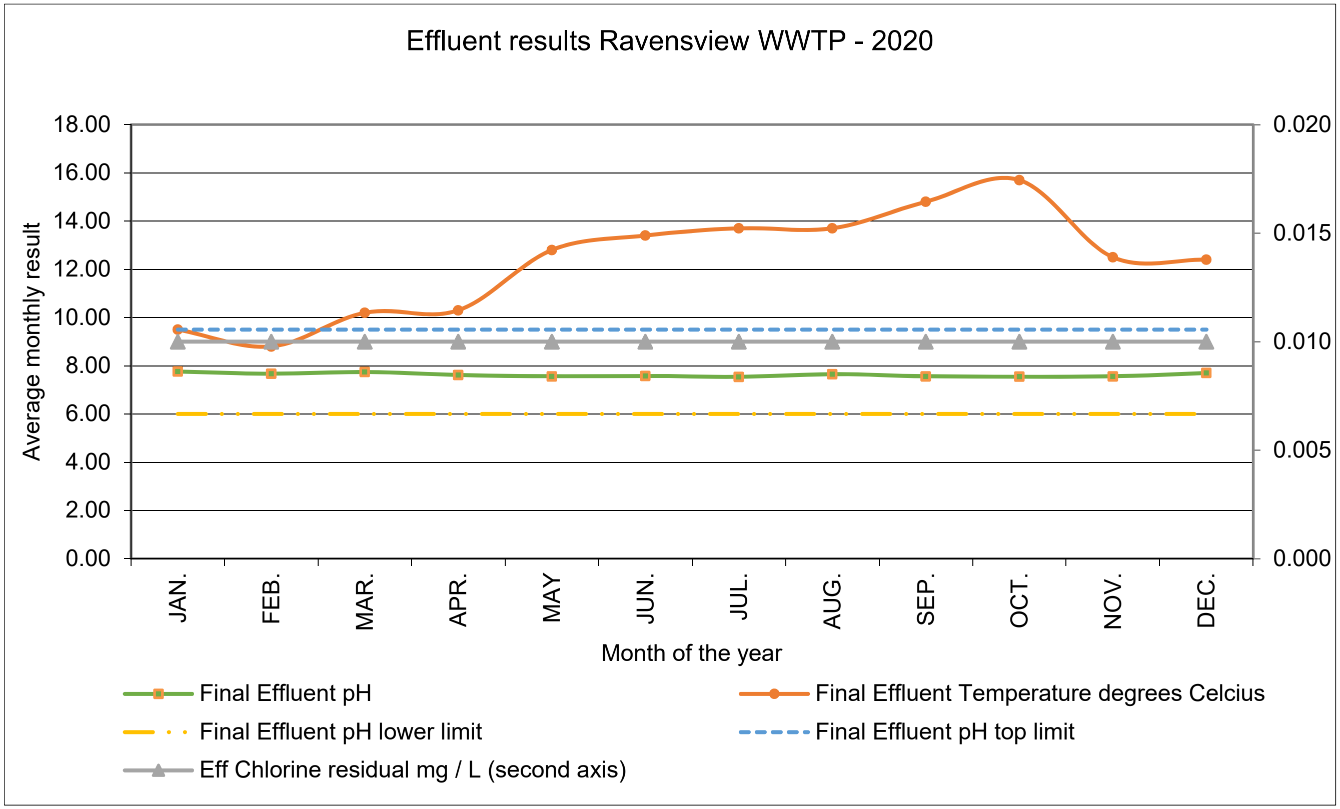
RAVENSVIEW Wastewater Treatment Plant

2020 ANNUAL REPORT

Monthly data

Effluent Summary from daily samples

Month		Final Effluent pH	Final Effluent pH lower limit	Final Effluent pH top limit	Final Effluent Temperature	Eff Chlorine residual
	Unit				degrees Celsius	mg / L (second axis)
JAN.		7.76	6	9.5	9.5	0.0
FEB.		7.67	6	9.5	8.8	0.0
MAR.		7.74	6	9.5	10.2	0.0
APR.		7.62	6	9.5	10.3	0.0
MAY		7.56	6	9.5	12.8	0.0
JUN.		7.58	6	9.5	13.4	0.0
JUL.		7.54	6	9.5	13.7	0.0
AUG.		7.65	6	9.5	13.7	0.0
SEP.		7.56	6	9.5	14.8	0.0
OCT.		7.55	6	9.5	15.7	0.0
NOV.		7.56	6	9.5	12.5	0.0
DEC.		7.70	6	9.5	12.4	0.0
	Average	7.6			12.3	0.01
	Objective					
	Limit					


Effluent results Ravensview WWTP - 2020
18.00
16.00
14.00
12.00
10.00
8.00
6.00
4.00
2.00
0.00
Average monthly result
0.020
0.015
0.010
0.005
0.000
JAN.
FEB.
MAR.
APR.
MAY
JUN.
JUL.
AUG.
SEP.
OCT.
NOV.
DEC.
Month of the year
Final Effluent pH
Final Effluent Temperature degrees Celcius
Final Effluent pH lower limit
Final Effluent pH top limit
Eff Chlorine residual mg / L (second axis)

RAVENSVIEW Wastewater Treatment Plant

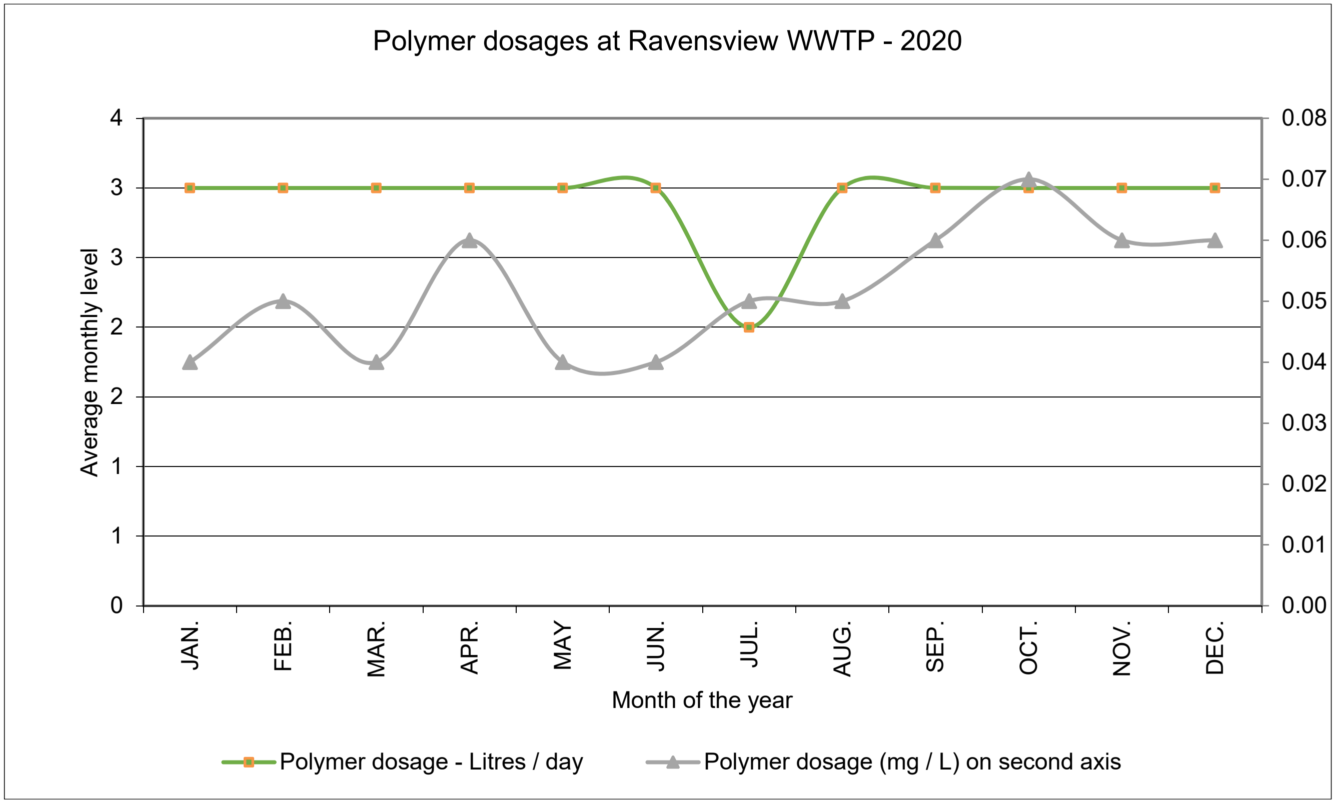
2020 ANNUAL REPORT

Monthly data

Polymer Dosage

Month	Unit	Dosage* Kg / day	Dosage Kg / month	Dosage mg / L
JAN.		3	85	0.04
FEB.		3	82	0.05
MAR.		3	87	0.04
APR.		3	124	0.06
MAY		3	96	0.04
JUN.		3	76	0.04
JUL.		2	82	0.05
AUG.		3	74	0.05
SEP.		3	74	0.06
OCT.		3	86	0.07
NOV.		3	74	0.06
DEC.		3	89	0.06
Average		2.92	86	0.05
Objective				
Limit				

Note: *Calculated value


Polymer dosages at Ravensview WWTP - 2020
Average monthly level
4
3
3
2
2
1
1
0
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0.00
JAN.
FEB.
MAR.
APR.
MAY
JUN.
JUL.
AUG.
SEP.
OCT.
NOV.
DEC.
Month of the year
Polymer dosage - Litres / day
Polymer dosage (mg / L) on second axis

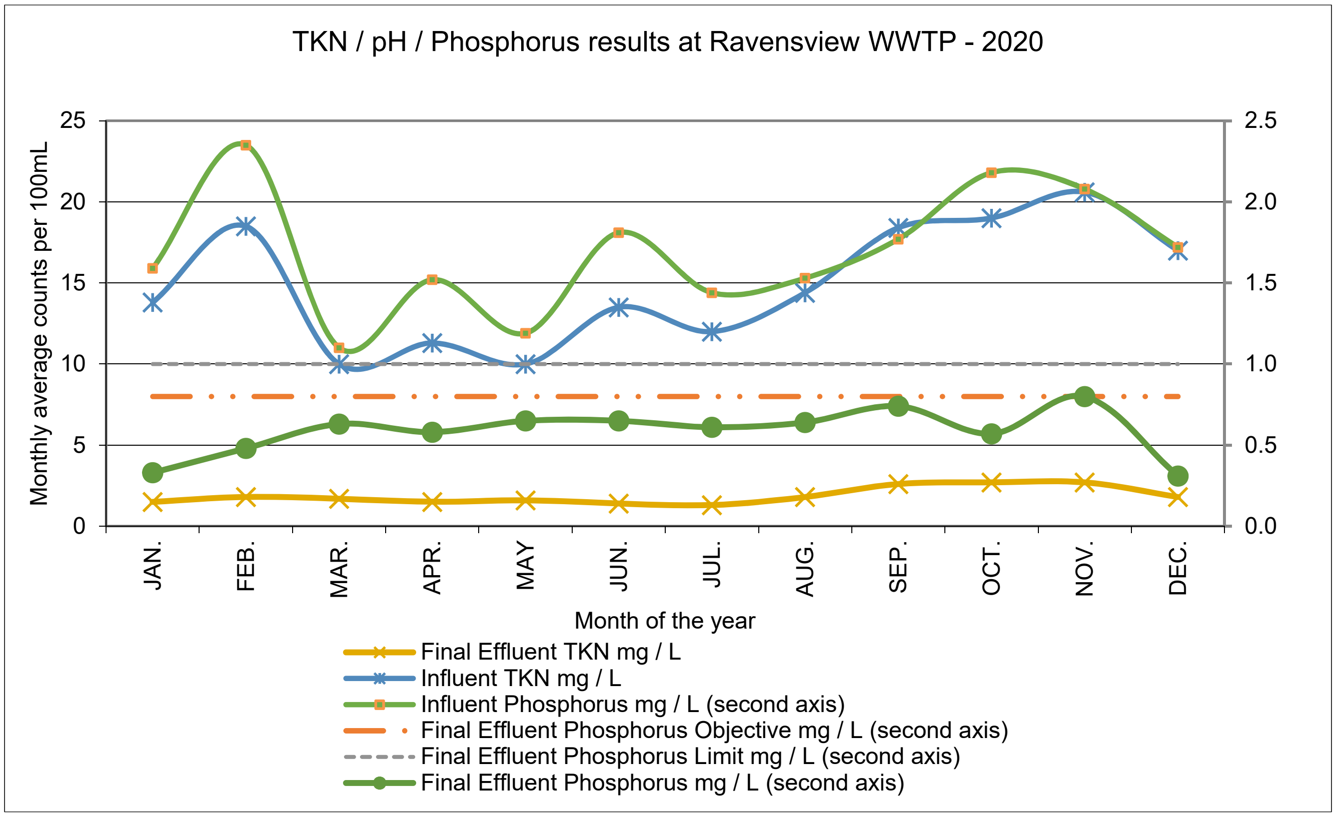
RAVENSVIEW Wastewater Treatment Plant

2020 ANNUAL REPORT

Monthly data

TKN/ Influent pH /Phosphorus

Month	Influent TKN	Final Effluent TKN	Removal TKN	Influent pH	Influent Phosphorus	Final Effluent Phosphorus	Removal Phosphorus
Unit	mg / L	mg / L	%		mg / L (second axis)	mg / L (second axis)	%
JAN.	13.80	1.50	89%	7.76	1.59	0.33	79%
FEB.	18.50	1.80	90%	7.78	2.35	0.48	80%
MAR.	10.00	1.70	83%	7.80	1.10	0.63	43%
APR.	11.30	1.50	87%	7.77	1.52	0.58	62%
MAY	10.00	1.60	84%	7.68	1.19	0.65	45%
JUN.	13.50	1.40	90%	7.80	1.81	0.65	64%
JUL.	12.00	1.30	89%	7.73	1.44	0.61	58%
AUG.	14.40	1.80	88%	7.72	1.53	0.64	58%
SEP.	18.40	2.60	86%	7.71	1.77	0.74	58%
OCT.	19.00	2.70	86%	7.69	2.18	0.57	74%
NOV.	20.60	2.70	87%	7.65	2.08	0.80	62%
DEC.	17.00	1.80	89%	7.73	1.72	0.31	82%
Average	14.88	1.87	87%	7.74	1.69	0.58	64%
Objective						0.8	
Limit						1.0	


TKN / pH / Phosphorus results at Ravensview WWTP - 2020
Monthly average counts per 100mL
25
20
15
10
5
0
2.5
2.0
1.5
1.0
0.5
0.0
JAN.
FEB.
MAR.
APR.
MAY
JUN.
JUL.
AUG.
SEP.
OCT.
NOV.
DEC.
Month of the year
Final Effluent TKN mg / L
Influent TKN mg / L
Influent Phosphorus mg / L (second axis)
Final Effluent Phosphorus Objective mg / L (second axis)
Final Effluent Phosphorus Limit mg / L (second axis)
Final Effluent Phosphorus mg / L (second axis)

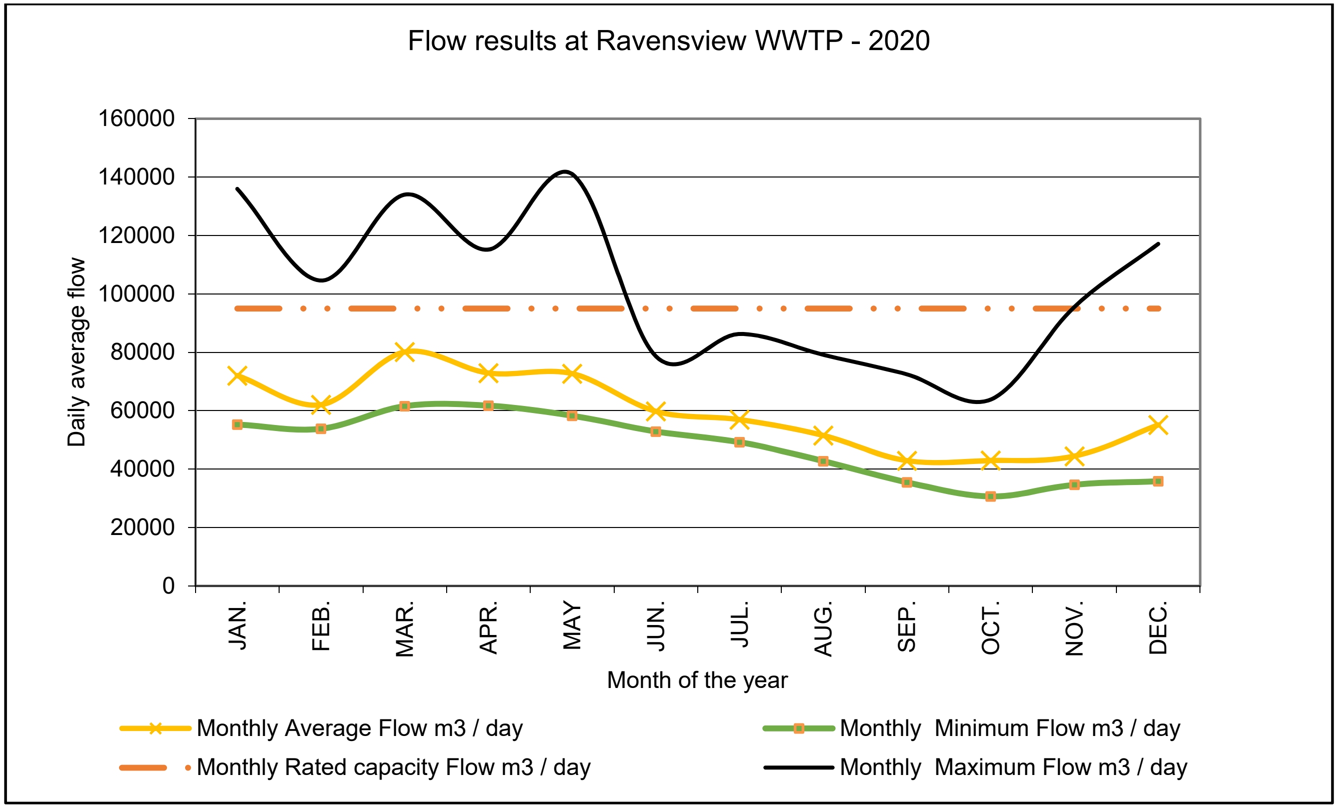
RAVENSVIEW Wastewater Treatment Plant

2020 ANNUAL REPORT

Monthly data

Flows

Month	Monthly Minimum Flow	Monthly Rated capacity Flow	Monthly Maximum Flow	Monthly Average Flow	Monthly Total Flow	Monthly Total Grit removal (Estimate)
Unit	m3 / day	m3 / day	m3 / day	m3 / day	m3 / Month	m3 / Month
JAN.	55,252	95,000	135,940	72,028	2,232,864	2
FEB.	53,789	95,000	104,555	62,019	1,798,538	2
MAR.	61,545	95,000	133,995	80,105	2,483,254	2
APR.	61,721	95,000	115,155	72,873	2,186,178	2
MAY	58,260	95,000	141,016	72,678	2,253,032	2
JUN.	52,847	95,000	78,594	59,767	1,793,022	2
JUL.	49,198	95,000	86,248	56,924	1,764,640	2
AUG.	42,706	95,000	79,126	51,514	1,596,928	2
SEP.	35,452	95,000	72,412	42,850	1,285,499	2
OCT.	30,612	95,000	63,825	42,938	1,331,092	2
NOV.	34,616	95,000	95,580	44,385	1,331,554	2
DEC.	35,821	95,000	117,120	55,137	1,709,254	2
Average	47,652	95,000	101,964	59,435	1,813,821	2.0
Objective						
Limit						


Flow results at Ravensview WWTP - 2020
160000
140000
120000
100000
80000
60000
40000
20000
0
Daily average flow
JAN.
FEB.
MAR.
APR.
MAY
JUN.
JUL.
AUG.
SEP.
OCT.
NOV.
DEC.
Month of the year
Monthly Average Flow m3 / day
Monthly Minimum Flow m3 / day
Monthly Rated capacity Flow m3 / day
Monthly Maximum Flow m3 / day