Utilities Kingston

CATARAQUI BAY
WASTEWATER TREATMENT PLANT

2018 ANNUAL REPORT

Table of Contents

REPORT CHECK LIST

Annual report submitted for the Environmental Compliance Approval number 4163-ACPPRK.

Condition 11(6) the first annual report shall cover the period from the commencement of operation of the sewage works to the end of the calendar year and shall be submitted within sixty (60) days following the end of such reporting period. Each subsequent annual report shall be submitted within sixty (60) days following the end of the calendar year being reported upon.

Condition 11(6)(a)to(l).Each annual report shall contain at least the following information:

- Executive Summary
- Tabulation and comprehensive interpretation of all monitoring data and analytical results collected during the reporting period, and a comparison to the effluent quality and quantity
- Summary of all maintenance carried out on any major structure, equipment, apparatus, mechanism or thing forming part of the works
- Description of all operating problems encountered and corrective actions taken during the reporting period
- Tabulation of the volume of sludge generated in the reporting period and an outline of anticipated volumes to be generated over the next reporting period, and an outline of the sludge handling methods and disposal areas to be utilized over the next reporting period
- Evaluation of the calibration and maintenance procedures conducted on all monitoring equipment
- Summary of effluent quality assurance or control measures under taken
- Summary of any complaints
- Summary of all by-passes
- Evaluation for the need for modifications to the works to improve performance and reliability and to minimize upsets and bypasses

EXECUTIVE SUMMARY

The Cataraqui Bay Wastewater facility was compliant with all concentrations, loadings, sampling and maintenance as required in environmental compliance approval 4163-ACPPRK. A sample for acute lethality collected on June 20, 2018 indicated a high mortality rate for Rainbow trout. SAC was notified and additional sampling was conducted which resulted in no mortality of rainbow trout which indicated the effluent water was of good quality. Additional details can be found in the tables contained in Appendix A.

Average flows through the plant decreased slightly in 2018 showing average flows of 29,009 $m^{3/}$day.

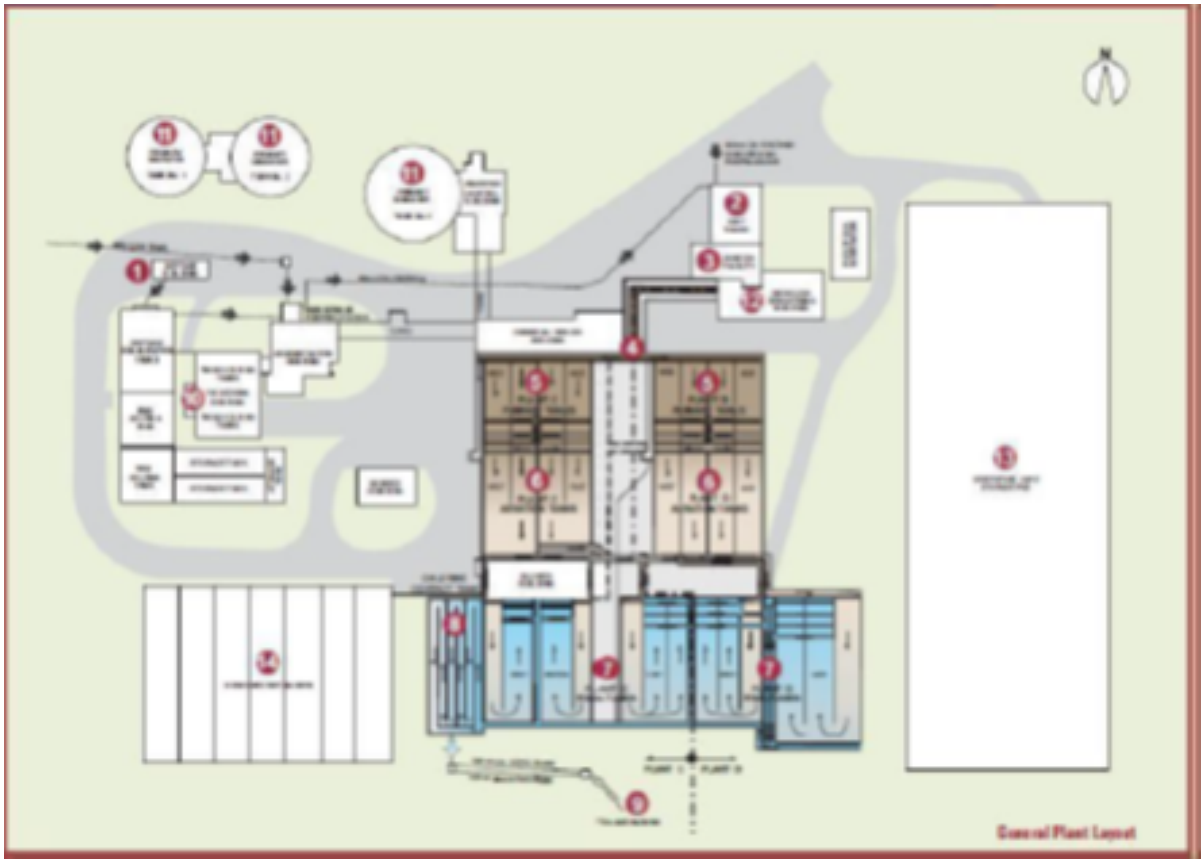
Plant staff continue to maintain operations during the facility upgrades and have continued with planned and reactive maintenance as well as capital works at both the facility and within the associated collection system. Details regarding these improvements are located in the report.

We have continued to provide additional training to staff at the facility to increase their knowledge of the process upgrades currently underway.

The facility saw six secondary bypass events at the Cataraqui Bay Wastewater Treatment Plant and four bypass events within the Kingston West Sewage Collection System in the 2018 reporting year. All by-pass details are listed in Table 7, the Bypass Summary section of this report. All the bypasses except for one (which was due to an unplanned power outage) were due to heavy rainfall events.
Our operation and maintenance staff have continued to assist and support various educational institutions in the area with facility tours, work placements and apprenticeship time.

PLANT OVERVIEW

The following is a process overview and description of the treatment steps taken at the Cataraqui Bay wastewater treatment plant.



Septage Receiving

Septage was received at the Cataraqui Bay wastewater plant via local septic truck haulers up to October of 2016. The septage building was decommissioned in October 2016 to make room for upgrades at Cataraqui Bay Wastewater Treatment Plant. There is now a temporary septage station at Ravensview Wastewater Treatment Plant.

Grit Removal

The first step in the treatment process is grit removal. This is accomplished by the introduction of air at the bottom of the grit channel. The heavier solids in the wastewater will settle to the bottom of the tank, while the organics required to be treated stay in suspension and move on to the next treatment step.

Screening

The second operation is the removal of large particles and floating debris such as wood, rags and plastics from the raw water. These items are removed through mechanical screens that rake the debris from the wastewater stream and onto a belt conveyor.

Flow Splitting

The screened wastewater discharges into a channel where a flow splitter divides the flow into two separate channels that lead to both C and D plants. The channels are equipped with motorized gate valves to control the flow rate to each plant.

Primary Settling

The heavier organics settle by gravity to the bottom of the primary clarifiers and form a sludge blanket on the bottom of the tank. The settled sludge is collected by longitudinal collector flights and scraped into a hopper at the end of the tank. The settled sludge is then pumped to digestion facilities for further treatment. As wastewater is discharged from the primary clarifiers, it is dosed with aluminum sulphate for phosphorus removal.

Aeration

Aeration is the biological process that involves the assimilation of organic insoluble and soluble matter by the action of micro- organisms. The micro-organisms flourish under stable conditions of respiration through air supply and food provided by the primary clarifier effluent. The aeration process effectively removes 95% of the biochemical oxygen demand from the incoming wastewater.

Final Settling

After the assimilation is completed in the aeration tanks, the mixed liquor from these tanks flows into the final clarifiers for solid- liquid separation. The biomass formed in the aeration tanks settles to the bottom of the final clarifiers, where a portion is returned to the head of the aeration tanks to continue assimilation of the food in the primary effluent and the remainder is pumped to sludge thickening facilities.

Disinfection

The supernatant effluent from the final clarifiers is then directed to the disinfection facilities. Chlorine is dosed to the wastewater just prior to entering the chlorine contact tank where disinfection of the final effluent occurs. Just after exiting the chlorine contact tank the wastewater is dosed with calcium thiosulphate for de-chlorinating to ensure no chlorine remains in the water entering the receiving stream.

Outfall

The disinfected effluent from the chlorine contact tank after de-chlorinating is discharged back to Lake Ontario through a 1500mm and a 900mm outfall sewer. The diffusers at the ends of the sewer lines are located 25m offshore and 16m below water surface level.

Sludge Thickening

The sludge thickening facility consists of two rectangular holding tanks, dual rotating drum thickeners and a polymer system. Sludge is thickened from 0.5% solids to approximately 3.5% solids before being pumped to the digester facilities.

Biosolids Managment

The sludge from the primary and final clarifiers as well as the sludge from the thickening process is pumped to the digestion facilities. The digester facilities consist of one primary digester, one secondary digester and a holding tank. In the primary digester the sludge is heated, mixed and re-circulated under controlled anaerobic conditions. The anaerobic digestion process produces gas and biosolids. The gas produced is rich in methane which is used as fuel for the boiler system which in turn provides heat for the digestion process. The biosolids produced through sludge digestion are dewatered and used on agricultural lands as a nutrient and soil conditioner when weather and crop conditions permit.

Biosolids Dewatering

The biosolids produced through digestion are dewatered through centrifugation. The centrifuged cake produced is land applied when weather and crops permit. Since January 2018, liquid sludge has been hauled from Cataraqui Bay WWTP to Ravensview WWTP for processing due to site construction.

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 conditions 6 and 7 of environmental compliance approval number 3714-9YURZF were compiled during the reporting period of 2018.

The following tables summarize the results obtained through monitoring of plant performance in accordance with conditions 6 and 7 of the environmental compliance approval number 3714-9YURZF. Effluent objective and limits for environmental compliance approval number 4163-ACPPRK will become effective once the facility upgrades are complete.

Table 1: Effluent Results

Effluent Objectives		
Effluent Parameter	**Objective** (mg/l)	**2018 Results** (avg.)
$CBOD_5$	15.0	5 mg/l
Total suspended solids (TSS)	15.0	6 mg/l
Total Phosphorus	1	0.40 mg/l
Total Chlorine Residual	<0.02	0.01 mg/l
E. Coli (Monthly Geometric Mean Density)	200 counts/ 100 ml	32 counts/ 100 ml

Table 2: Effluent Limits

Effluent Limits			
Effluent Parameter	**Concentration Limit** (mg/l)	**Loading Limit from effluent (kg/d)**	**2018 annual average (kg/d)**
$CBOD_5$	25.0	970	295
Suspended solids (TSS)	25.0	970	181
Total Phosphorus	1.0	39	11.9
Total Chlorine Residual	0.02		0.01

Table 3: Monthly Effluent Parameters

Maximum Monthly Comparison of Effluent 2018				
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	4mg/L 100kg/day	6mg/L 200kg/day	0.49mg/l 17kg/day	10
February	5mg/L-200kg/day	10mg/L 500kg/day	0.47mg/l 133kg/day	140
March	5mg/L-100kg/day	4mg/L 100kg/day	2.55mg/l 97.6kg/day	10
April	8mg/L-300kg/day	11mg/L 610kg/day	0.23mg/l 26kg/day	100
May	12mg/L-370kg/day	70mg/L 2000kg/day	0..60mg/l 22kg/day	393
June	3mg/L-70kg/day	7mg/L 200kg/day	0.65mg/l 15kg/day	6
July	6mg/L-100kg/day	5mg/L 90kg/day	0.61mg/l 17kg/day	6
August	23mg/L-570kg/day	11mg/L 330kg/day	0.49mg/l 17kg/day	30
September	13mg/L-270kg/day	12mg/L 310kg/day	0.69mg/l 17kg/day	10
October	6mg/L-200kg/day	5mg/L 100kg/day	0.64mg/l 15kg/day	96
November	23mg/L-630kg/day	16mg/L 440kg/day	0.84mg/l 30kg/day	44
December	6mg/L-200kg/day	5mg/L 200kg/day	0.44mg/l 15kg/day	16

Table 4: Annual Plant Flows

Plant Flows (m^3/day)							
Parameter	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
Avg. m^3/day	25374	26721	27145	26147	26072	30042	28963
Max. m^3/day	56579	78981	90801	56583	67405	121860	94957
Design. M^3/day	38800	38800	38800	38800	38800	38800	38800
% (daily/design)	65.4%	68.9%	70.0%	67.4%	67.2%	77.4%	74.6%

Utilities Kingston

Table 5: Annual Effluent Results

Final Effluent Parameter Results								
Parameter (mg/L)	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**LIMITS**
$CBOD_5$	7.86	19.34	6	5.3	4.05	3.13	5	25
Suspended Solids	5.21	5.53	6.2	6.5	4.8	5.09	6	25
Total Phosphorus	0.53	0.57	0.61	0.55	0.51	0.55	0.40	1.0
Total Chlorine	0.00	0.01	0.01	0.01	0.018	0.018	0.01	<0.02
Acute Lethality	n/a	n/a	n/a	All Pass	All Pass	All Pass	5 Pass/ 1 Fail	Pass

Note: Acute lethality testing was started in 2015.

MAINTENANCE

In 2018 we continued with our preventative maintenance program of vibration testing, oil analysis and electrical surge protection. Preventative maintenance and inspections were performed on most clarifiers during the summer months.

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

- Repaired chains and flights for secondary tanks
- Annual infrared scans on HV electrical
- Routine vibration monitoring
- Diesel generator repair & maintenance

CAPITAL WORKS

In October 2016 work began on plant wide upgrades. During the proposed project completion timeline of 4 years (2016-2020), the Cataraqui Bay Wastewater Treatment Plant will undergo an extensive process, electrical/instrumentation, and mechanical upgrade.

The additional major highlights for capital works in 2018 at the Cataraqui Bay WWTP and associated sewage collection system were:

- Westbrook Pumping Station upgrades and refurbishment
- Environmental Assessment of the Days Rd Pumping Station
- Continued work on the Wastewater Master Plan assessment

OPERATIONS

Preventative maintenance and regular process and equipment inspections lead to operational problems being diagnosed quickly and corrective actions implemented immediately. Non flushable materials such as wipes and grease have become more prominent in the sewer system resulting in some operational and maintenance challenges. Utilities Kingston has implemented 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, through social media 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 two years with some positive results.

BIOSOLIDS MANAGEMENT

The dewatering facility is the primary method of solids handling at the Cataraqui Bay facility. The secondary digested sludge is dewatered through a centrifuge and then stock piled until land application is available during the summer season.

In January of 2018, the dewatering facility at Cataraqui Bay Sewage Treatment Plant was under construction so liquid sludge was hauled to the Ravensview WWTP for processing. An approximate volume of 29,200m3 of liquid sludge was transported from Cataraqui Bay Wastewater Treatment Plant to the Ravensview Wastewater Treatment Plant in 2018. With the combination of both Ravensview WWTP and Cataraqui Bay WWTP liquid sludge to process a combined volume of 119,590 m3 of liquid sludge was processed through the centrifuge, and approximately 14,588 m3 of sludge cake was stored on site until land applied on licensed agricultural fields. Land application is completed by Smith's Pumping service.

It is too hard to predict exactly where and when we will spread in 2019, as crops and weather will be the major variables that we will be dealing with in the 2019 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 2018

C Of A and NASM Plan #	Address	Expiry Date
21808	Middle Rd.	31/12/2018
21819	Hamilton Rd.	31/12/2018
21940	SunEdison Property	31/12/2018
22144	McIntyre Rd.	31/12/2019
22243	Multiple Farms (Milligan)	31/12/2019
22281	Haig Rd.	31/12/2019
22383	Brown Rd.	31/12/2020
22685	Multiple Farms	31/12/2020
22694	South Shore Rd.	31/12/2020
22853	Huffman Rd.	31/12/2021
22855	Lake Rd.	31/12/2021
22901	County Rd. 8	31/12/2021
22987	Sunbury Rd.	31/12/2021
23007	County Rd. 4	31/12/2021
23047	Palace Rd.	31/12/2021
23074	Simmons Rd.	31/12/2021
23110	Sunbury Rd.	31/12/2020
23119	Hamilton Rd.	31/12/2021
23215	Sand Hill Rd.	31/12/2021

EQUIPMENT CALIBRATIONS

All of the plant flow meters, online analyzers and lab equipment 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 have been no official complaints about the Cataraqui Bay Wastewater Treatment Plant operations for the reporting year 2018.

BYPASS SUMMARIES

Table 7 summarizes the locations, volumes and durations of bypass events for the reporting year 2018. Table 8 summarizes the test results from samples taken during the 2018 bypass events.

Utilities Kingston

Table 7: Bypass Events

Bypass Event Record						
Date mm/dd/yyyy	Location	Start Time	Duration (hr + mins)	Volume (m^3)	Reason For Bypass	Precip (mm)
01/12/2018 – 01/13/2018	Cataraqui Bay WWTP (secondary bypass)	7:45	3:55	5600	Heavy rain/ rapid snow melt	38.1
01/12/2018	Crerar Pumping Station	6:45	21:30	600	Heavy rain/rapid snow melt	38.1
02/20/2018 – 02/21/2018	Cataraqui Bay WWTP (secondary bypass)	08:00	13:45	5600	Heavy rain/snow melt	26.1
02/20/2018	Crerar Pumping Station	13:55	19:30	100	Heavy rain/snow melt	26.1
04/16/2018 – 04/18/2018	Cataraqui Bay WWTP (secondary bypass)	17:38	10:15	20507	Heavy rain/snow melt	30.3
04/16/2018 – 04/17/2018	Crerar Pumping Station	17:15	2:30	851	Heavy rain/snow melt	30.3
05/29/2018	Cataraqui Bay WWTP (secondary bypass)	17:30	21:30	4333	Unplanned power disruption	
11/27/2018 – 11/28/2018	Cataraqui Bay WWTP (secondary bypass)	4:50	3:10	5002	Heavy rain over short period and runoff	11.5
12/22/2018 – 12/23/2018	Cataraqui Bay WWTP (secondary bypass)	18:45	2:30	6606	Heavy rain	65.7
12/21/2018 – 12/22/2018	Crerar Pumping Station	21:00	5:00	122	Heavy rain	65.7

Table 8: Bypass Sampling

Bypass Event Sampling Results Annual Average for Cataraqui Bay Wastewater Treatment Plant		
Parameter	**Units**	**Cat. Bay STP Annual Avg.**
E coli	Cfu/100mL	20568
$CBOD_5$	mg/l	28
TSS	mg/l	79
TP	mg/l	1.75

Bypass Event Sampling Results Annual Average for Crerar Pumping Station		
Parameter	**Units**	**Crerar PS Annual Avg.**
E coli	Cfu/100mL	11468
$CBOD_5$	mg/l	10
TSS	mg/l	46
TP	mg/l	0.83

BYPASS RESULT INTERPRETATIONS

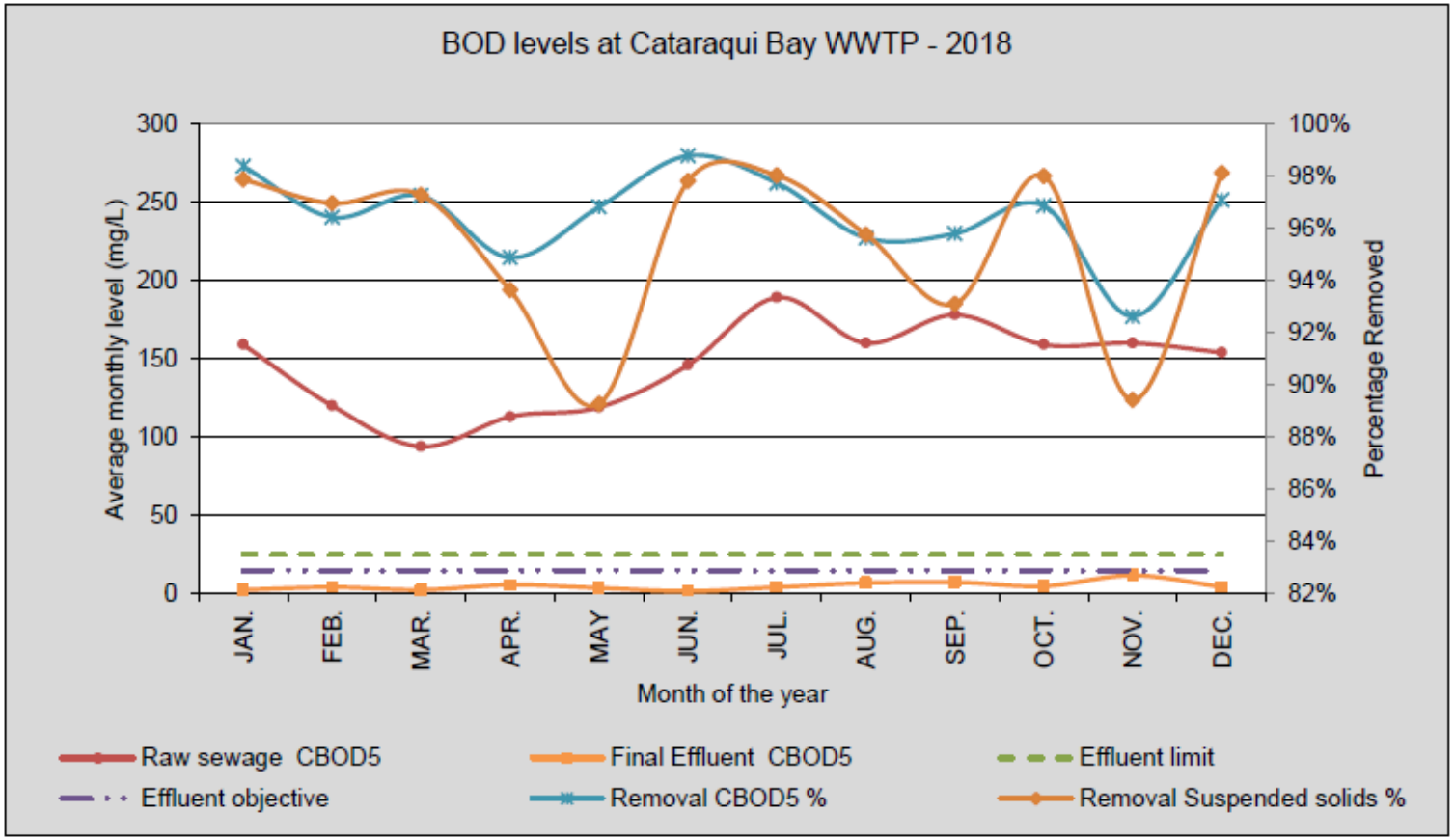
$CBOD_5$, TP & TSS results are much the same as typical raw sewage influent to the sewage plant.

APPENDIX A – MONITORED PARAMETERS RESULTS AND GRAPHS

CATARAQUI BAY Wastewater Treatment Plant
2018 ANNUAL REPORT
Monthly data

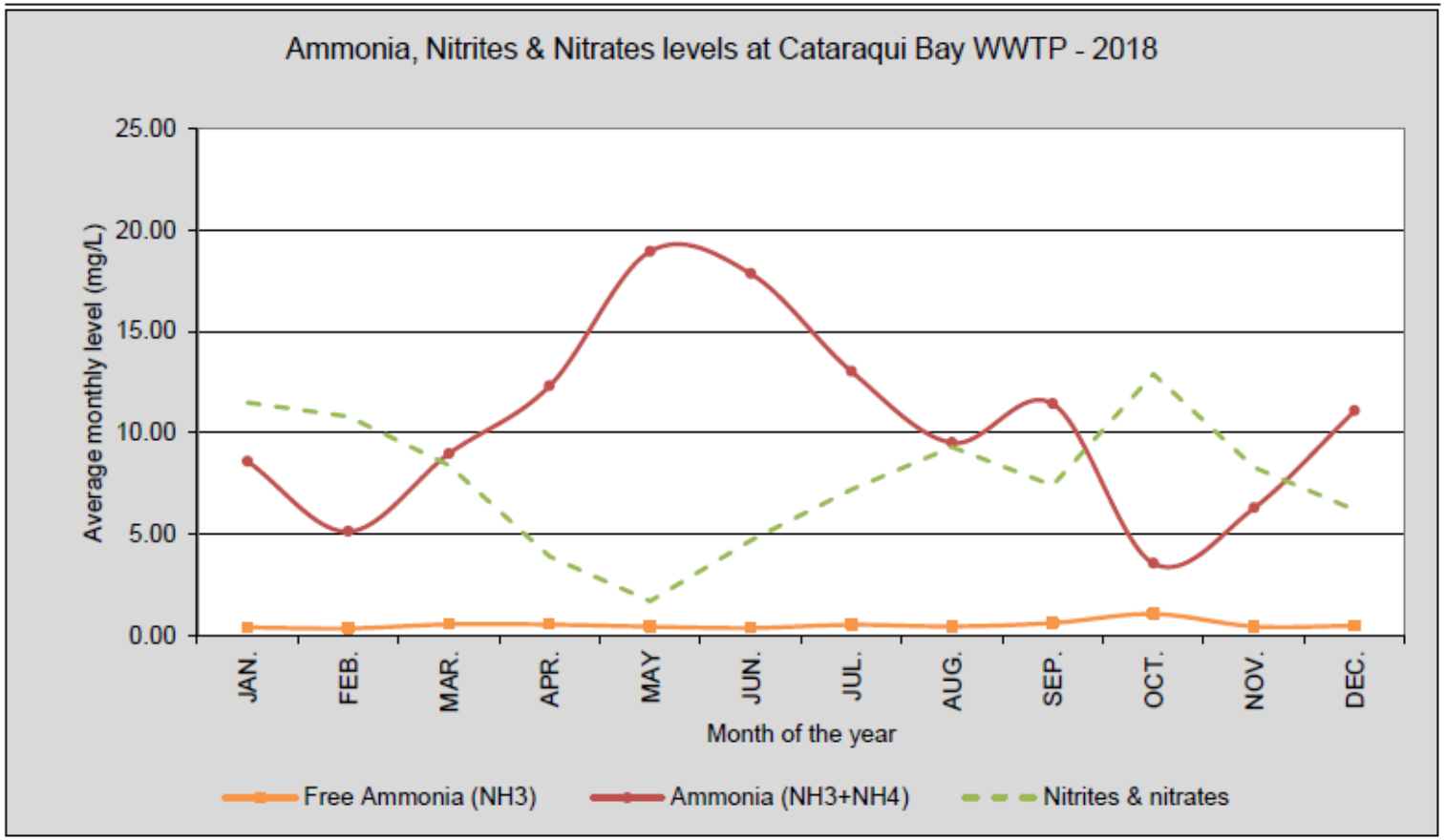
Month		Raw sewage CBOD5	Final Effluent CBOD5	Removal CBOD5	Raw sewage Suspended solids	Final Effluent Suspended solids	Removal Suspended solids
	Units	mg/L	mg/L	%	mg/L	mg/L	%
JAN.		159.0	2.6	98%	182.0	3.9	98%
FEB.		120.0	4.3	96%	141.0	4.3	97%
MAR.		94.0	2.6	97%	95.0	2.6	97%
APR.		113.0	5.8	95%	138.0	8.8	94%
MAY		119.0	3.8	97%	138.0	14.8	89%
JUN.		146.0	1.8	99%	218.0	4.8	98%
JUL.		189.0	4.3	98%	151.0	3.0	98%
AUG.		160.0	7.0	96%	132.0	5.6	96%
SEP.		178.0	7.5	96%	100.0	6.9	93%
OCT.		159.0	5.0	97%	149.0	3.0	98%
NOV.		160.0	11.8	93%	104.0	11.0	89%
DEC.		154.0	4.5	97%	159.0	3.0	98%
	Average	145.9	5.1	97%	142.3	6.0	96%
	Objective		15.0			15.0	
	Limit		25.0			25.0	

CATARAQUI BAY Wastewater Treatment Plant
2018 ANNUAL REPORT
Monthly Graphs



CATARAQUI BAY Wastewater Treatment Plant
2018 ANNUAL REPORT
Monthly data

			Final Effluent results	
		Raw sewage	**Final Effluent**	**Final Effluent**
Month		**Free Ammonia (NH_3)**	**Ammonia (NH_3+NH_4)**	**Nitrites & nitrates**
	Unit	mg/L	mg/L	mg/L
JAN.		0.40	8.59	11.5
FEB.		0.35	5.13	10.8
MAR.		0.55	8.97	8.4
APR.		0.54	12.31	3.9
MAY		0.44	18.95	1.7
JUN.		0.37	17.85	4.7
JUL.		0.53	13.03	7.2
AUG.		0.45	9.51	9.3
SEP.		0.62	11.43	7.4
OCT.		1.06	3.56	12.9
NOV.		0.45	6.29	8.3
DEC.		0.48	11.08	6.2
Average		0.52	10.56	7.69
Objective Limit			Variable	

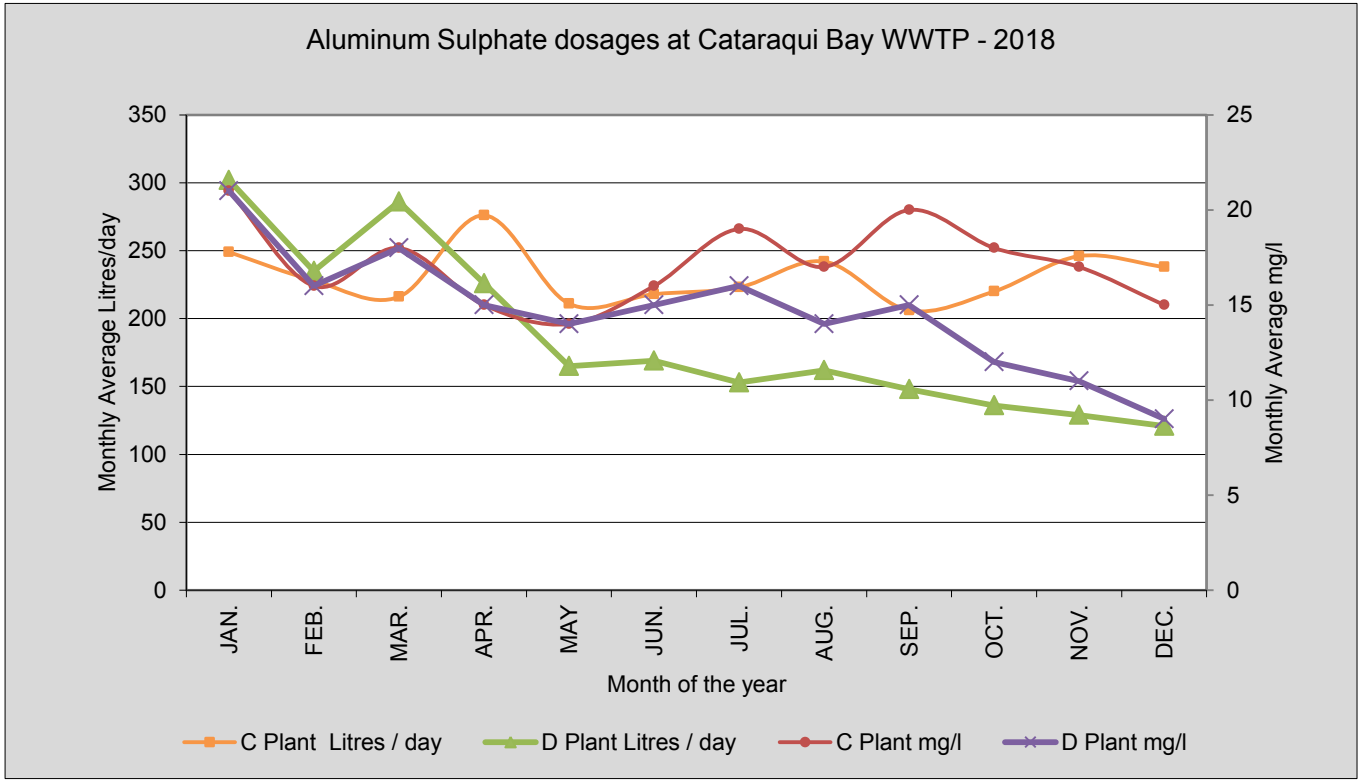

Ammonia, Nitrites & Nitrates levels at Cataraqui Bay WWTP - 2018
Average monthly level (mg/L)
25.00
20.00
15.00
10.00
5.00
0.00
JAN.
FEB.
MAR.
APR.
MAY
JUN.
JUL.
AUG.
SEP.
OCT.
NOV.
DEC.
Month of the year
Free Ammonia (NH3)
Ammonia (NH3+NH4)
Nitrites & nitrates

CATARAQUI BAY Wastewater Treatment Plant
2018 ANNUAL REPORT
Monthly data

Aluminum Sulphate

Month		**C Plant**	**C Plant**	**D Plant**	**D Plant**
	Unit	Litres / day	mg/l	Litres / day	mg/l
JAN.		249	21	302	21
FEB.		228	16	235	16
MAR.		216	18	286	18
APR.		276	15	226	15
MAY		211	14	165	14
JUN.		218	16	169	15
JUL.		223	19	153	16
AUG.		242	17	162	14
SEP.		206	20	148	15
OCT.		220	18	136	12
NOV.		246	17	129	11
DEC.		238	15	121	9
	Average	231	17	186	15

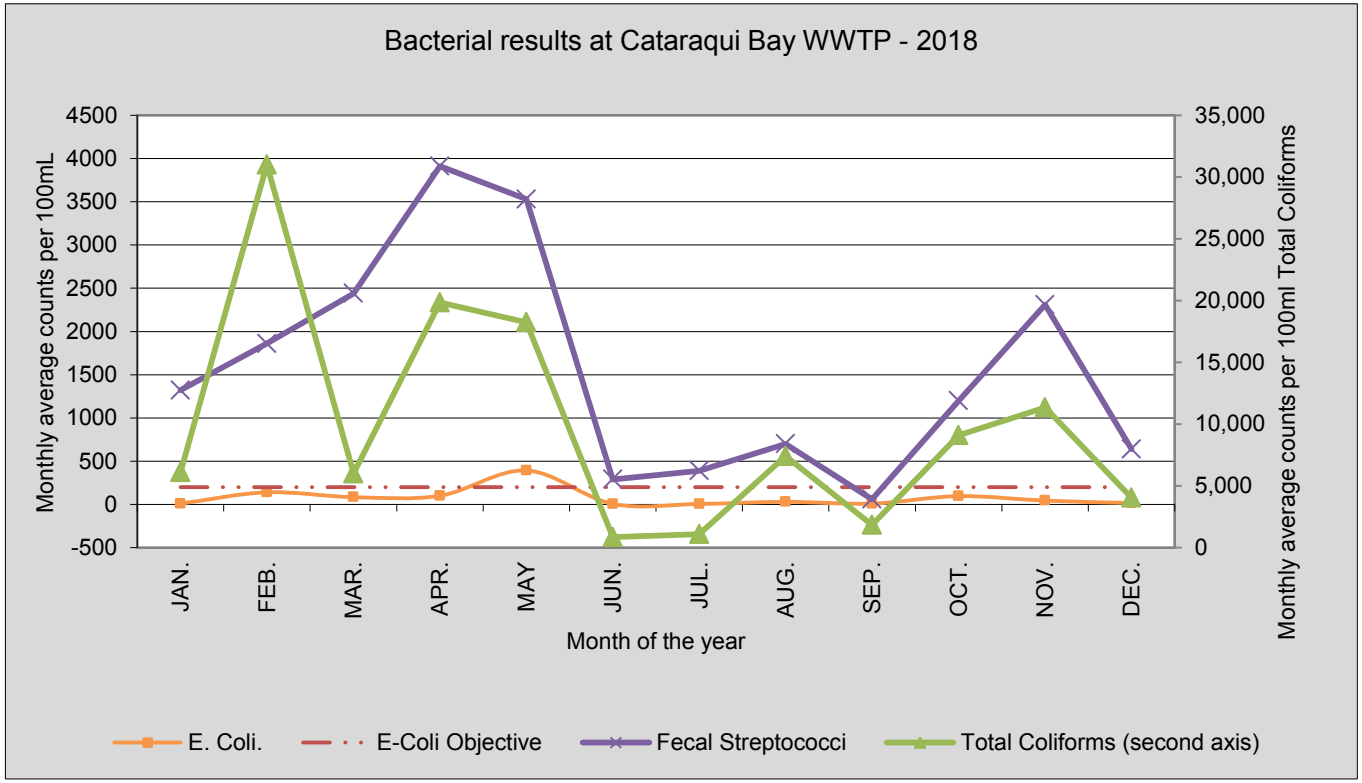
CATARAQUI BAY Wastewater Treatment Plant
2018 ANNUAL REPORT
Monthly Graphs



CATARAQUI BAY Wastewater Treatment Plant
2018 ANNUAL REPORT
Monthly data

		Bacterial results				
		Final Effluent		**Final Effluent**	**Final Effluent**	**Final Effluent**
Month		**E. Coli.**	**E-Coli Objective**	**Total Coliforms (second axis)**	**Fecal Streptococci**	**Acute lethality to trout**
	Unit	counts / 100mL	counts / 100mL	counts / 100mL	counts / 100mL	pass / fail
JAN.		10	200	6,100	1,320	
FEB.		140	200	31,000	1,860	pass
MAR.		84	200	6,000	2,440	
APR.		100	200	19,850	3,910	
MAY		393	200	18,250	3,530	
JUN.		6	200	850	290	fail
JUL.		6	200	1,100	390	pass
AUG.		30	200	7,400	700	
SEP.		10	200	1,850	60	
OCT.		96	200	9,100	1,200	pass
NOV.		44	200	11,350	2,310	pass
DEC.		16	200	4,050	640	pass
Average		77.92		9,741.67	1,554.17	
Objective		200				

CATARAQUI BAY Wastewater Treatment Plant
2018 ANNUAL REPORT
Monthly Graphs

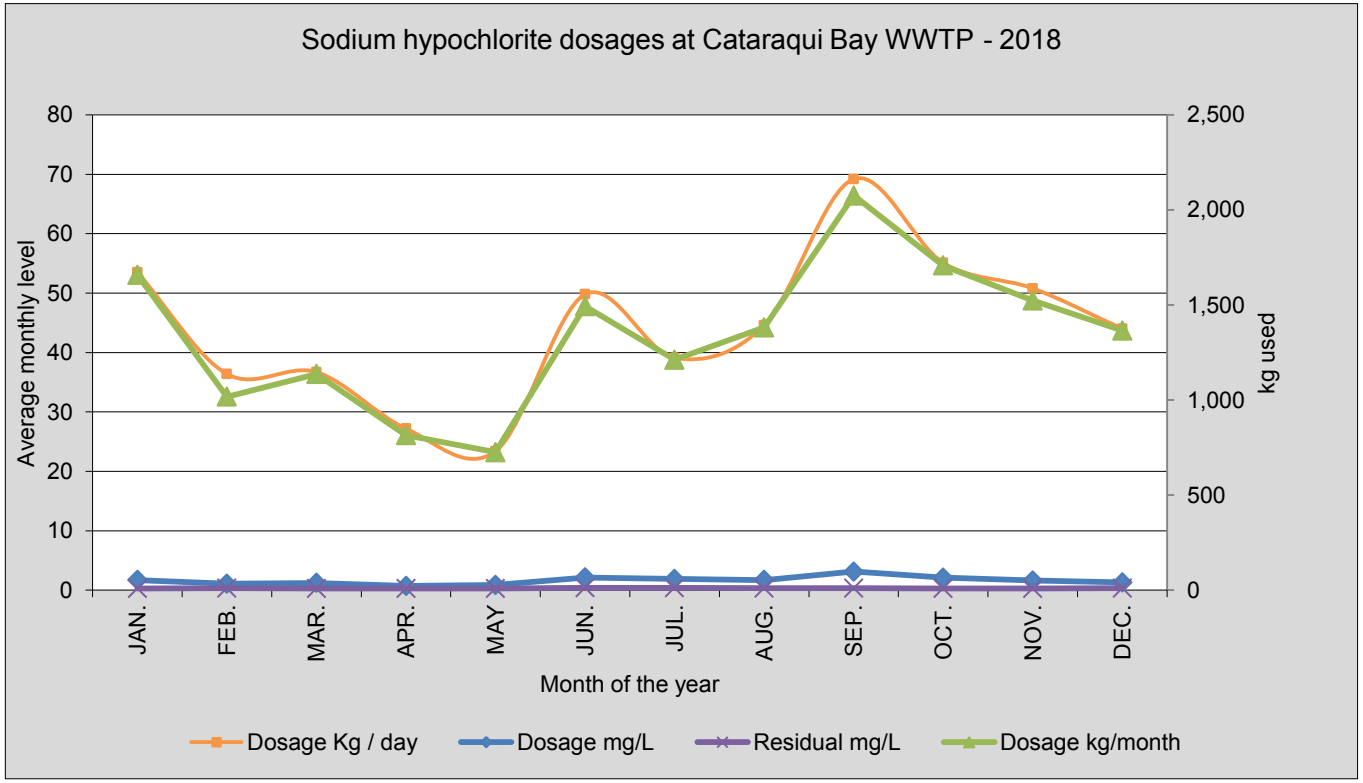


CATARAQUI BAY Wastewater Treatment Plant
2018 ANNUAL REPORT
Monthly data

Sodium hypochlorite

Month	Unit	**Dosage** Kg / day	**Dosage** kg/month	**Dosage** mg/L	**Residual** mg/L
JAN.		54	1,658	1.72	0.30
FEB.		36	1,018	1.09	0.33
MAR.		37	1,137	1.23	0.30
APR.		27	815	0.70	0.31
MAY		23	726	0.88	0.32
JUN.		50	1,493	2.15	0.38
JUL.		39	1,212	1.90	0.38
AUG.		45	1,382	1.72	0.34
SEP.		69	2,075	3.13	0.36
OCT.		55	1,708	2.10	0.31
NOV.		51	1,524	1.63	0.32
DEC.		44	1,365	1.33	0.35
	Average	44	1,342.75	1.63	0.33

CATARAQUI BAY Wastewater Treatment Plant
2018 ANNUAL REPORT
Monthly Graphs

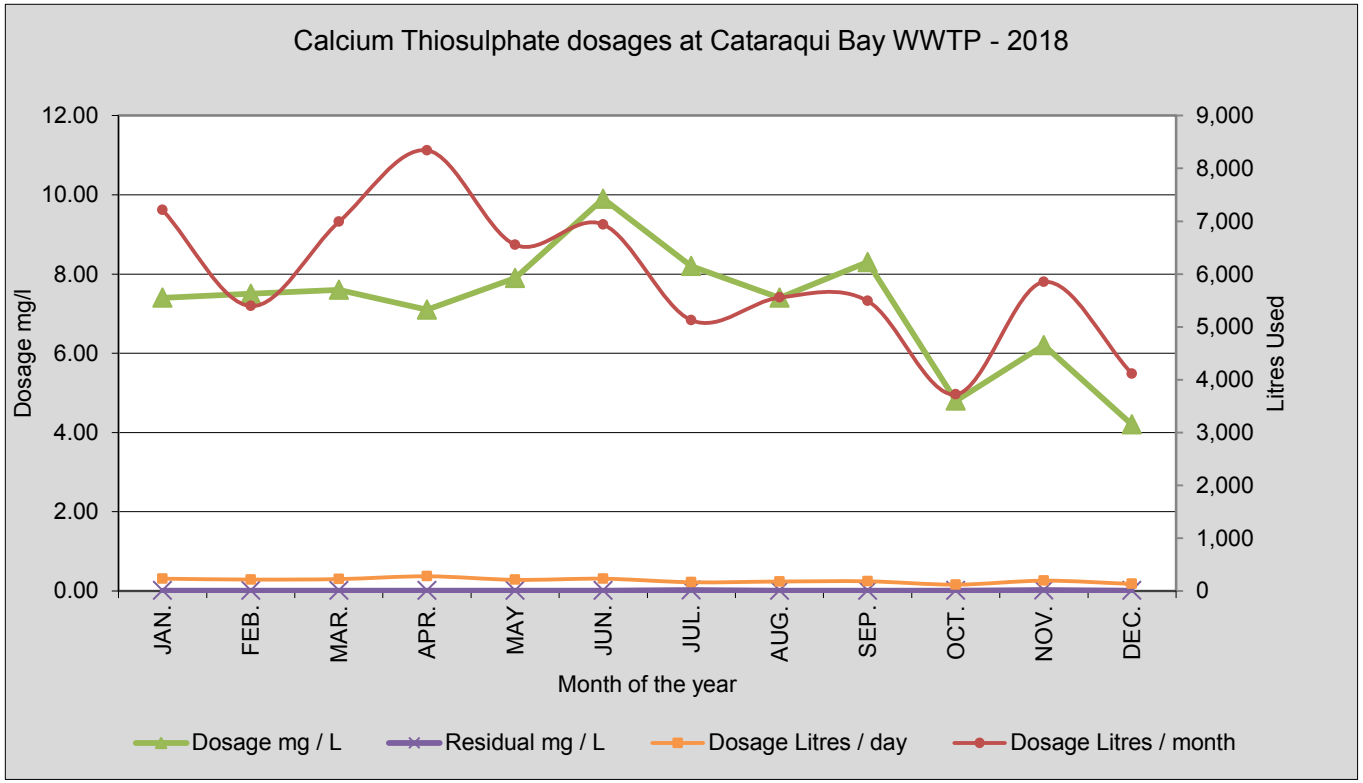


CATARAQUI BAY Wastewater Treatment Plant
2018 ANNUAL REPORT
Monthly data

Calcium Thiosulphate

Month		**Dosage**	**Dosage**	**Dosage**	**Residual**	**Compliance**
	Unit	Litres / day	Litres / month	mg / L	mg / L	Yes / No
JAN.		233	7,211	7.40	0.0	yes
FEB.		216	5,393	7.50	0.0	yes
MAR.		225	6,988	7.60	0.0	yes
APR.		278	8,343	7.10	0.0	yes
MAY		211	6,554	7.90	0.0	yes
JUN.		232	6,938	9.90	0.0	yes
JUL.		165	5,126	8.20	0.0	yes
AUG.		179	5,555	7.40	0.0	yes
SEP.		183	5,491	8.30	0.0	yes
OCT.		120	3,721	4.80	0.0	yes
NOV.		195	5,850	6.20	0.0	yes
DEC.		133	4,113	4.20	0.0	yes
	Average	198	5,940	7.21	0.0	

CATARAQUI BAY Wastewater Treatment Plant
2018 ANNUAL REPORT
Monthly Graphs

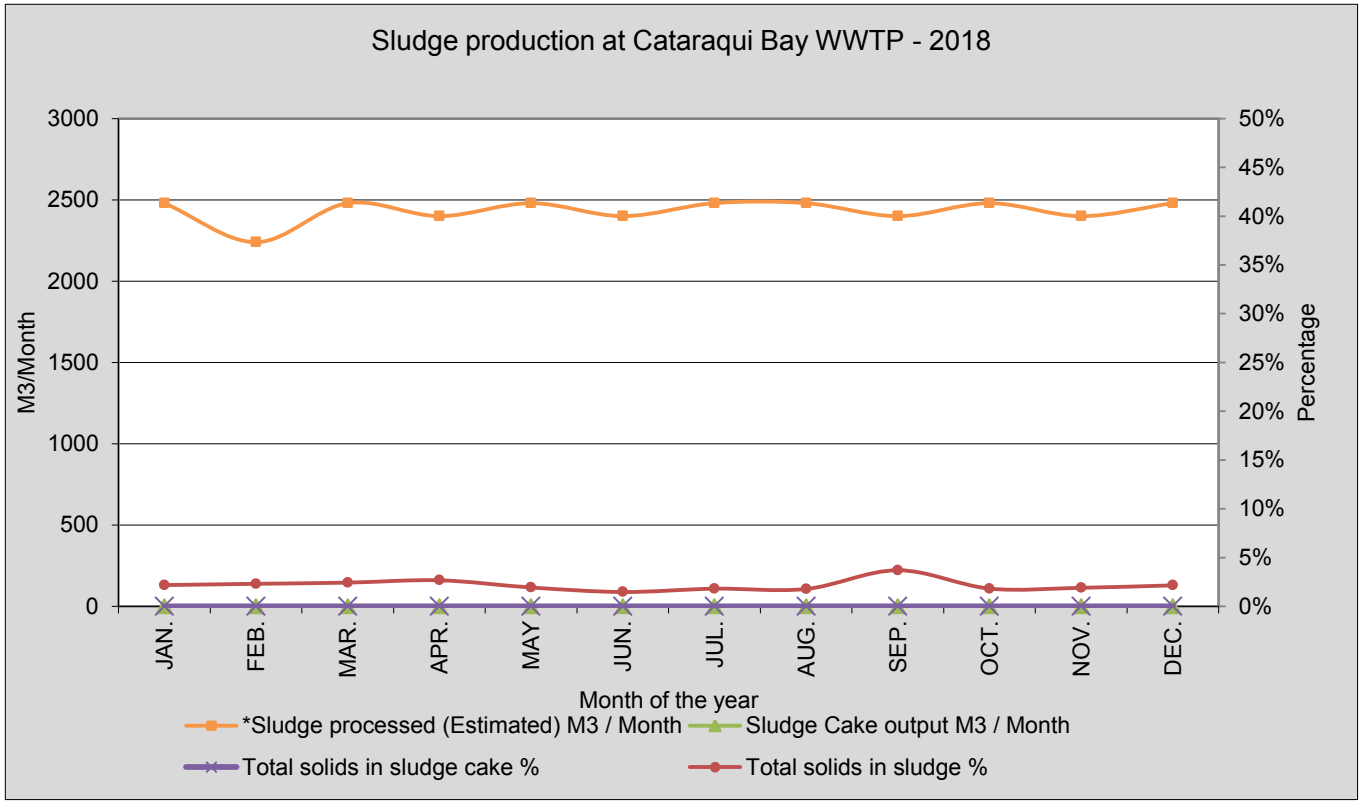


CATARAQUI BAY Wastewater Treatment Plant
2018 ANNUAL REPORT
Monthly data

Month	*Digested sludge *Sludge processed (Estimated)	Total solids in sludge	*Sludge Cake Sludge Cake output	Total solids in sludge cake
Unit	M3 / Month	%	M3 / Month	%
JAN.	2480	2.2%	N/A	N/A
FEB.	2240	2.3%	N/A	N/A
MAR.	2480	2.4%	N/A	N/A
APR.	2400	2.7%	N/A	N/A
MAY	2480	1.9%	N/A	N/A
JUN.	2400	1.5%	N/A	N/A
JUL.	2480	1.8%	N/A	N/A
AUG.	2480	1.8%	N/A	N/A
SEP.	2400	3.7%	N/A	N/A
OCT.	2480	1.8%	N/A	N/A
NOV.	2400	1.9%	N/A	N/A
DEC.	2480	2.2%	N/A	N/A
Average	2,433	2.2%		
	29200			

*Sludge Processed based on hauled sludge estimate of 80 m3/day transported to Ravenview for Sludge Cake Production at that location during construction

CATARAQUI BAY Wastewater Treatment Plant
2018 ANNUAL REPORT
Monthly Graphs

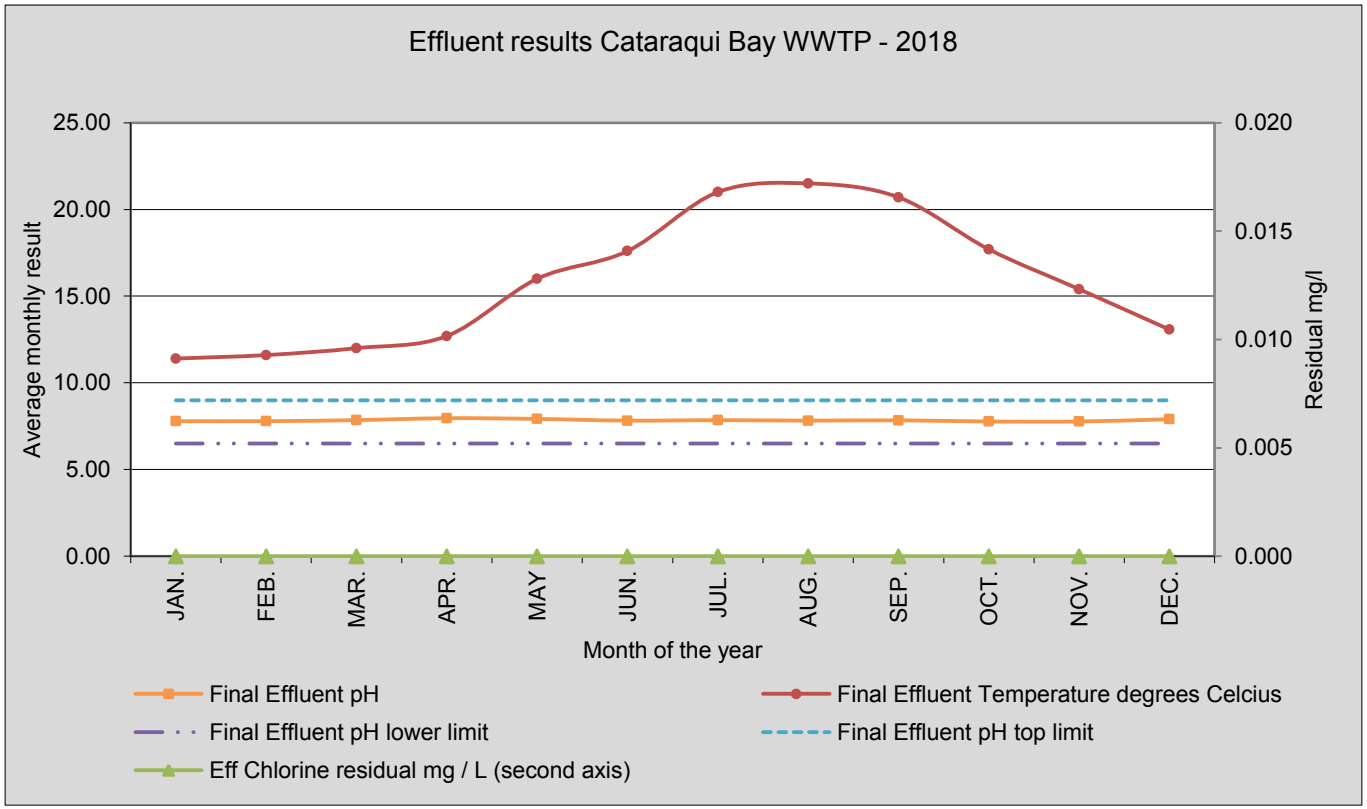


CATARAQUI BAY Wastewater Treatment Plant
2018 ANNUAL REPORT
Monthly data

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 Celcius	mg / L (second axis)
JAN.	7.79	6.5	9	11.40	0.0
FEB.	7.79	6.5	9	11.60	0.0
MAR.	7.85	6.5	9	12.00	0.0
APR.	7.96	6.5	9	12.70	0.0
MAY	7.92	6.5	9	16.00	0.0
JUN.	7.82	6.5	9	17.60	0.0
JUL.	7.85	6.5	9	21.00	0.0
AUG.	7.82	6.5	9	21.50	0.0
SEP.	7.84	6.5	9	20.70	0.0
OCT.	7.77	6.5	9	17.70	0.0
NOV.	7.77	6.5	9	15.40	0.0
DEC.	7.90	6.5	9	13.07	0.0
Average	7.8			15.89	0.00

CATARAQUI BAY Wastewater Treatment Plant
2018 ANNUAL REPORT
Monthly Graphs

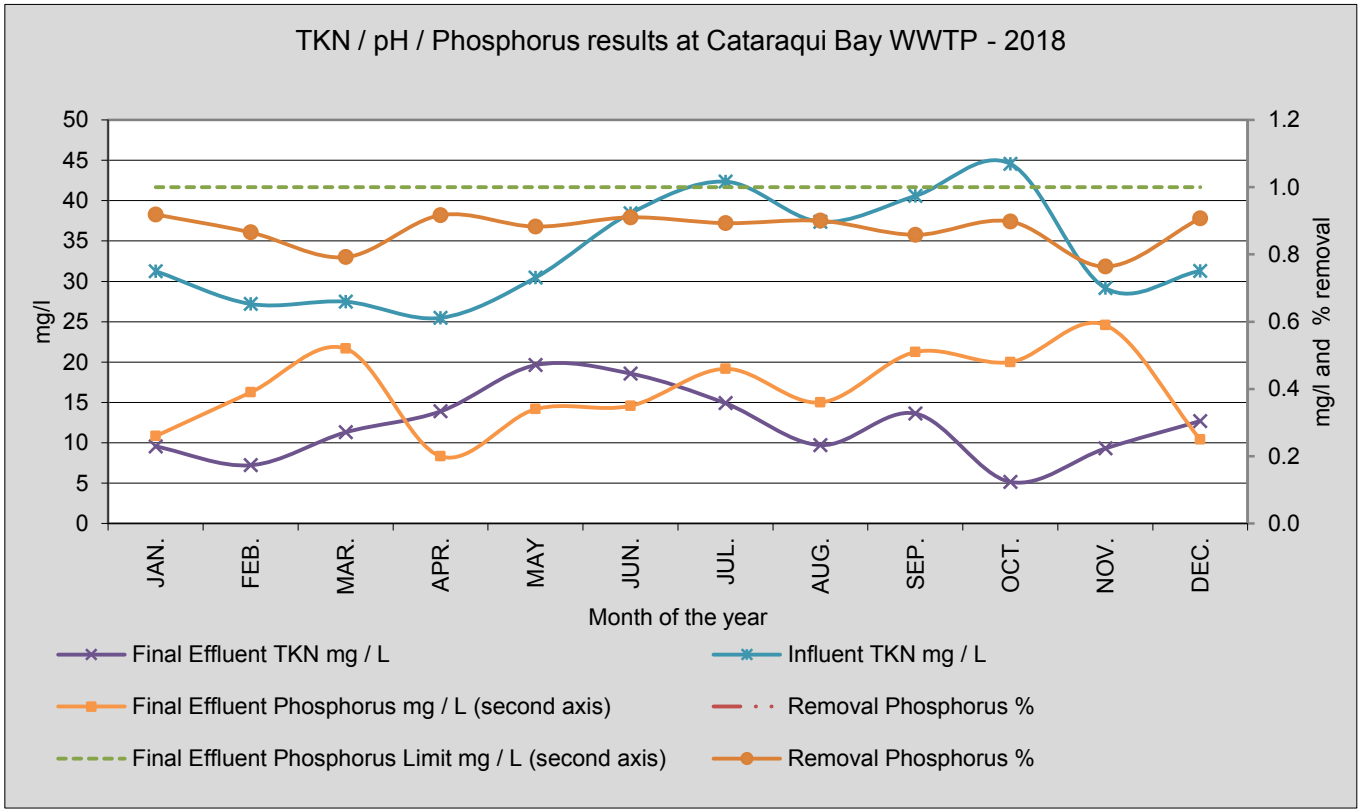


CATARAQUI BAY Wastewater Treatment Plant
2018 ANNUAL REPORT
Monthly data

TKN / Influent pH / Phosphorus

Month	Influent TKN	Final Effluent TKN	Influent pH	Influent Phosphorus	Final Effluent Phosphorus	Removal Phosphorus
Unit	mg / L	mg / L		mg / L (second axis)	mg / L (second axis)	%
JAN.	31.26	9.56	7.54	3.20	0.26	92%
FEB.	27.20	7.23	7.56	2.90	0.39	87%
MAR.	27.48	11.30	7.75	2.50	0.52	79%
APR.	25.48	13.90	7.79	2.40	0.20	92%
MAY	30.46	19.62	7.61	2.90	0.34	88%
JUN.	38.43	18.58	7.47	3.90	0.35	91%
JUL.	42.35	14.90	7.49	4.30	0.46	89%
AUG.	37.38	9.72	7.63	3.60	0.36	90%
SEP.	40.58	13.63	7.59	3.60	0.51	86%
OCT.	44.56	5.16	7.59	4.70	0.48	90%
NOV.	29.18	9.30	7.65	2.50	0.59	76%
DEC.	31.30	12.70	7.65	2.70	0.25	91%
Average	33.81	12.13	7.61	3.27	0.39	88%
Objective					1.0	
Limit					1.0	

CATARAQUI BAY Wastewater Treatment Plant
2018 ANNUAL REPORT
Monthly Graphs

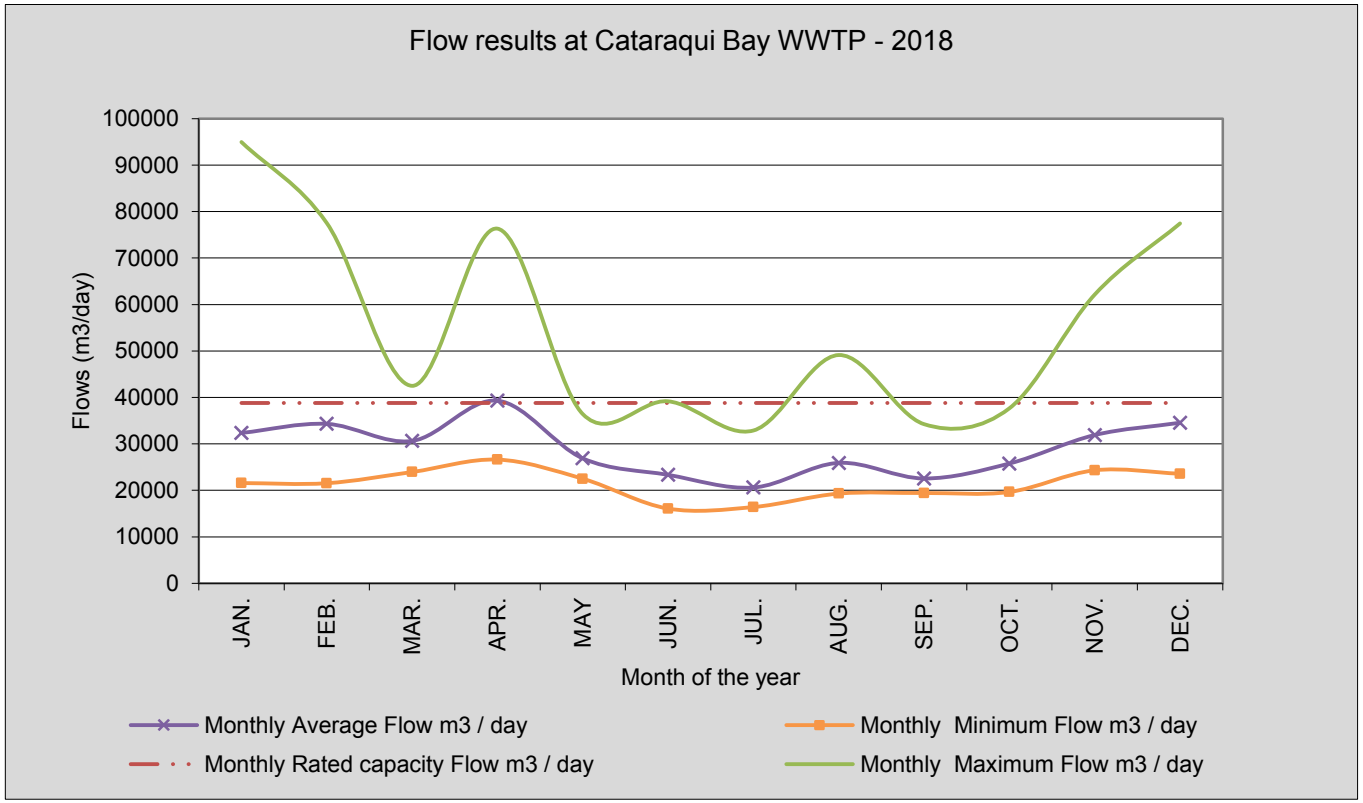


CATARAQUI BAY Wastewater Treatment Plant
2018 ANNUAL REPORT
Monthly data

effluent flow

		Flows				
		Monthly	**Monthly**	**Monthly**	**Monthly**	**Monthly**
Month		**Minimum Flow**	**Rated capacity Flow**	**Maximum Flow**	**Average Flow**	**Total Flow**
	Unit	m3 / day	m3 / day	m3 / day	m3 / day	m3 / Month
JAN.		21,566	38,800	94,957	32,349	1,002,828
FEB.		21,536	38,800	77,526	34,301	960,429
MAR.		23,946	38,800	42,491	30,632	949,582
APR.		26,617	38,800	76,326	39,307	1,179,202
MAY		22,499	38,800	36,418	26,883	833,385
JUN.		16,076	38,800	39,164	23,334	700,019
JUL.		16,403	38,800	32,882	20,608	638,860
AUG.		19,302	38,800	49,122	25,910	803,196
SEP.		19,428	38,800	34,243	22,555	676,654
OCT.		19,652	38,800	37,657	25,775	799,030
NOV.		24,319	38,800	62,132	31,904	957,116
DEC.		23,576	38,800	77,442	34,551	1,071,082
Average		21,243	38,800	55,030	29,009	880,949
Objective						
Limit						

CATARAQUI BAY Wastewater Treatment Plant
2018 ANNUAL REPORT
Monthly Graphs



CATARAQUI BAY Wastewater Treatment Plant
2018 ANNUAL REPORT
Monthly data

Month		Digester gas production Gas production	Gas to boilers	Gas to flare
	Unit	M3 / Month	M3 / Month	M3 / Month
JAN.		54,299	26,448	27,851
FEB.		43,037	23,740	19,297
MAR.		63,564	25,325	38,239
APR.		68,806	24,321	44,485
MAY		61,040	24,701	36,339
JUN.		59,033	23,754	35,279
JUL.		54,126	22,281	31,845
AUG.		44,081	20,470	23,611
SEP.		43,054	18,390	24,664
OCT.		54,080	21,508	32,572
NOV.		52,026	24,302	27,724
DEC.		56,359	23,828	32,531
Average		54,459	23,255.7	31,203.1
Total		**653,505**	**279,068**	**374,437**

CATARAQUI BAY Wastewater Treatment Plant
2018 ANNUAL REPORT
Monthly Graphs