Annual Environmental Report

2019

Lower Liffey Valley Regional Sewerage Scheme

D0004-02

CONTENTS

1 EXECUTIVE SUMMARY AND INTRODUCTION TO THE 2019 AER

This Annual Environmental Report has been prepared for D0004-02, Lower Liffey Valley Regional Sewerage, in Kildare in accordance with the requirements of the wastewater discharge licence for the agglomeration. Specified reports where relevant are included as an appendix to the AER.

1.1 ANNUAL STATEMENT OF MEASURES

A summary of any improvements undertaken is provided where applicable.

There were no significant changes or operational improvements undertaken in 2019.

1.2 TREATMENT SUMMARY

The agglomeration is served by a wastewater treatment plant(s)

- LOWER LIFFEY VALLEY REGIONAL SEWERAGE SCHEME WWTP with a Plant Capacity PE of 150000, the treatment type is 3NP - Tertiary N&P removal

1.3 ELV OVERVIEW

The overall compliance of the final effluent with the Emission Limit Values (ELVs) is shown below. More detailed information on the below ELV's can be found in Section 2.

Discharge Point Reference	Treatment Plant	Discharge Type	Compliance Status	Parameters failing if relevant
TPEFF1400D0004SW001	LOWER LIFFEY VALLEY REGIONAL SEWERAGE SCHEME WWTP	Treated	Compliant	N/A

1.4 LICENCE SPECIFIC REPORTING INCLUDED IN AER

Assessment / Report	Included in AER
There are no Licence Specific Reports included in the AER.	

2 TREATMENT PLANT PERFORMANCE AND IMPACT SUMMARY

2.1 LOWER LIFFEY VALLEY REGIONAL SEWERAGE SCHEME WWTP - TREATED DISCHARGE

2.1.1 INFLUENT MONITORING SUMMARY - LOWER LIFFEY VALLEY REGIONAL SEWERAGE SCHEME WWTP

A summary of influent monitoring for the treatment plant is presented below. This monitoring is primarily undertaken in order to determine the overall efficiency of the plant in removing pollutants from the raw wastewater.

Parameters	Number of Samples	Annual Max	Annual Mean
Total Phosphorus (as P) mg/l	36	13.7	3.74
Total Nitrogen mg/l	36	71	45.81
Suspended Solids mg/l	36	970	193.5
BOD, 5 days with Inhibition (Carbonaceous BOD) mg/l	34	461	220
COD-Cr mg/l	36	689	338.79
Hydraulic Capacity	N/A	51487	34120

If other inputs in the form of sludge / leachate are added to the WWTP then these are included in Section 2.1.5 if applicable.

Significance of Results:

The annual mean hydraulic loading is less than the peak Treatment Plant Capacity. The annual maximum hydraulic loading is less than the peak Treatment Plant Capacity. Further details on the plant capacity and efficiency can be found under the sectional 'Operational Performance Summary'. The design of the wastewater treatment plant allows for peak values and therefore the peak loads have not impacted on compliance with Emission Limit Values.

2.1.2 EFFLUENT MONITORING SUMMARY - TPEFF1400D0004SW001

Parameter	WWDL ELV (Schedule A)	ELV with Condition 2 Interpretation included Note 1	Interim % reduction from influent concentration	Number of sample results	Number of exceedances	Number of with Condition 2 Interpretation included	Annual Mean	Overall Compliance (Pass/Fail)
Fluoride mg/l	160	192	N/A	34	0	0	1.99	Pass
COD-Cr mg/l	125	250	N/A	34	0	0	16.07	Pass
Suspended Solids mg/l	35	87.5	N/A	34	0	0	4.76	Pass
pH pH units	6-9	6-9	N/A	34	0	0	6.96	Pass
BOD, 5 days with Inhibition (Carbonaceous BOD) mg/l	5	10	N/A	32	0	0	1	Pass
Total Phosphorus (as P) mg/l	2	2.4	N/A	34	0	0	0.2	Pass

Notes:
1 – This represents the Emission Limit Values after the Interpretation provided for under Condition 2 of the licence is applied

Cause of Exceedance(s):

Not applicable

Significance of Results:

The WWTP is compliant with the ELV's set in the Wastewater Discharge Licence.

2.1.3 AMBIENT MONITORING SUMMARY FOR THE TREATMENT PLANT DISCHARGE TPEFF1400D0004SW001

A summary of monitoring from ambient monitoring points associated with the wastewater discharge is provided in the sections below. For discharges to rivers upstream (U/S) and downstream (D/S) location data is provided. For other ambient points in lakes, coastal or transitional waters, monitoring data from the most appropriate monitoring station is selected.

The table below provides details of ambient monitoring locations and details of any designations as sensitive areas.

Ambient Monitoring Point from WWDL (or as agreed with EPA)	Irish Grid Reference	River Station Code	Bathing Water	Drinking Water	FWPM	Shellfish	WFD Status
Upstream	301516, 235804	RS09L011940	No	No	No	No	Unassigned
Downstream	302295, 235190	RS09L012040	No	No	No	No	Unassigned

The results for ambient results and / or additional monitoring data sets are included in the **Appendix 7.1 - Ambient monitoring summary.**

Significance of Results:

The WWTP discharge was compliant with the ELV's set in the wastewater discharge licence.

The ambient monitoring results does not meet the required EQS. The EQS relates to the Oxygenation and Nutrient Conditions set out in the Surface Water Regulations 2009.

Based on ambient monitoring results a deterioration in Ammonia concentrations downstream of the effluent discharge is noted.

A deterioration in water quality has been identified, however it is not known if it or is not caused by the WWTP.

Other causes of deterioration in water quality in the area are unknown.

The discharge from the wastewater treatment plant does not have an observable negative impact on the Water Framework Directive status.

2.1.4 OPERATIONAL PERFORMANCE SUMMARY - LOWER LIFFEY VALLEY REGIONAL SEWERAGE SCHEME WWTP

2.1.4.1 Treatment Efficiency Report - LOWER LIFFEY VALLEY REGIONAL SEWERAGE SCHEME WWTP

Treatment efficiency is based on the removal of key pollutants from the influent wastewater by the treatment plant. In essence the calculation is based on the balance of load coming into the plant versus the load leaving the plant. The efficiency is presented as a percentage removal rate.

A summary presentation of the efficiency of the treatment process including information for all the parameters specified in the licence is included below:

Parameter	Influent mass loading (kg/year)	Effluent mass emission (kg/year)	Efficiency (% reduction of influent load)
TN	590946	206402	65
TP	48219	2611	95
cBOD	2839254	12922	100
SS	2496160	61446	98
COD	4370362	207567	95

Note: The above data is based on sample results for the number of dates reported

2.1.4.2 Treatment Capacity Report Summary - LOWER LIFFEY VALLEY REGIONAL SEWERAGE SCHEME WWTP

Treatment capacity is an assessment of the hydraulic (flow) and organic (the amount of pollutants) load a treatment plant is designed to treat versus the current loading of that plant.

LOWER LIFFEY VALLEY REGIONAL SEWERAGE SCHEME WWTP	
Peak Hydraulic Capacity (m^3/day) - As Constructed	65405
DWF to the Treatment Plant (m^3/day)	48500

LOWER LIFFEY VALLEY REGIONAL SEWERAGE SCHEME WWTP	
Current Hydraulic Loading - annual max (m^3/day)	51487
Average Hydraulic loading to the Treatment Plant (m^3/day)	34120
Organic Capacity (PE) - As Constructed	150000
Organic Capacity (PE) - Collected Load (peak week)[Note1]	128043
Organic Capacity (PE) - Remaining	21957
Will the capacity be exceeded in the next three years? (Yes/No)	No

Nominal design capacities can be based on conservative design principles. In some cases assessment of existing plants has shown organic capacities significantly higher than the nominal design capacity. Accordingly plants that appear to be overloaded when comparing a collected peak load with the nominal design capacity can be fully compliant due to the safety factors in the original design.

2.1.5 SLUDGE / OTHER INPUTS - LOWER LIFFEY VALLEY REGIONAL SEWERAGE SCHEME WWTP

'Other inputs' to the waste water treatment plant are summarised in table below

Input type	Quantity	Unit	P.E.	% of load to WWTP	Included in Influent Monitoring (Y/N)?	Is there a leachate/sludge acceptance procedure for the WWTP?	Is there a dedicated leachate/sludge acceptance facility for the WWTP? (Y/N)
Landfill Leachate (delivered by tanker)	27132.72	Weight (Tonnes)	330	0.22	Yes	Yes	Yes
Waterworks Sludge	1609.43	Weight (Tonnes)	19.6	0.01	Yes	Yes	Yes
Domestic /Septic Tank Sludge	9152.97	Weight (Tonnes)	111	0.07	Yes	Yes	Yes

Input type	Quantity	Unit	P.E.	% of load to WWTP	Included in Influent Monitoring (Y/N)?	Is there a leachate/sludge acceptance procedure for the WWTP?	Is there a dedicated leachate/sludge acceptance facility for the WWTP? (Y/N)
Industrial / Commercial Sludge	2106.34	Weight (Tonnes)	26	0.02	Yes	Yes	Yes

3 COMPLAINTS AND INCIDENTS

3.1 COMPLAINTS SUMMARY

A summary of complaints of an environmental nature is included below.

Number of Complaints	Nature of Complaint	Number Open Complaints	Number Closed Complaints
54	Blocked Sewer	0	54

3.2 REPORTED INCIDENTS SUMMARY

Environmental incidents that arise in an agglomeration are reported on an on-going basis in accordance with our waste water discharge licences. Where an incident occurs and it is reportable under the licence, it is reported to the Environmental Protection Agency through their Environmental Data Exchange Network, or in some instances by telephone. Some incidents which arise in the agglomeration are recorded by Irish Water but may not be reportable under our licence for example where the incident does not have an impact on environmental performance.

A summary of reported incidents is included below.

3.2.1 SUMMARY OF INCIDENTS

Incident Type	Cause	No. of incident occurrences	Recurring (Y/N)	Closed (Y/N)
Uncontrolled release	Plant or equipment breakdown at WWTP	1	No	Yes
Spillage	Inadequate Infrastructure	1	No	Yes
Abatement Equipment offline	Plant or equipment maintenance at WWTP	1	No	Yes

Incident Type	Cause	No. of incident occurrences	Recurring (Y/N)	Closed (Y/N)
Uncontrolled release	Adverse Weather	1	No	Yes
Uncontrolled release	Adverse Weather	1	No	Yes
Uncontrolled release	Plant or equipment breakdown at WWTP	1	No	Yes
Uncontrolled release	Adverse Weather	1	No	Yes
Uncontrolled release	Adverse Weather	1	No	Yes
Uncontrolled release	Adverse Weather	1	No	Yes
Abatement Equipment offline	Plant or equipment breakdown at WWTP	1	No	No
Spillage	Broken Sewer Pipe	1	No	Yes
Abatement Equipment offline	Plant or equipment breakdown at WWTP	1	No	No

3.2.2 SUMMARY OF OVERALL INCIDENTS

Question	Answer
Number of Incidents in 2019	12
Number of Incidents reported to the EPA via EDEN in 2019	12
Explanation of any discrepancies between the two numbers above	N/A

4 INFRASTRUCTURAL ASSESSMENTS AND PROGRAMME OF IMPROVEMENTS

4.1 STORM WATER OVERFLOW IDENTIFICATION AND INSPECTION REPORT

A summary of the operation of the storm water overflows and their significance where known is included below:

4.1.1 SWO IDENTIFICATION

WWDL Name / Code for Storm Water Overflow	Irish Grid Ref.	Included in Schedule A4 of the WWDL	Significance of the overflow(High / Medium / Low)	Assessed against DoEHLG Criteria	No. of times activated in 2019 (No. of events)	Total volume discharged in 2019 (m3)	Monitoring Status
SW14	292834, 229614	Yes	Low	Meeting	Unknown	Unknown	Not Monitored
SW16	301653, 235836	Yes	Low	Not Meeting	Unknown	Unknown	Not Monitored
SW2	301546, 235839	Yes	Low	Meeting	Unknown	Unknown	Not Monitored
SW3	288868, 239585	Yes	Low	Meeting	Unknown	Unknown	Not Monitored
SW4	294412, 238713	Yes	Low	Meeting	Unknown	Unknown	Not Monitored
SW5	297173, 233844	Yes	Low	Not Meeting	Unknown	Unknown	Not Monitored

WWDL Name / Code for Storm Water Overflow	Irish Grid Ref.	Included in Schedule A4 of the WWDL	Significance of the overflow(High / Medium / Low)	Assessed against DoEHLG Criteria	No. of times activated in 2019 (No. of events)	Total volume discharged in 2019 (m3)	Monitoring Status
SW8	297584, 233306	Yes	Low	Not Meeting	Unknown	Unknown	Not Monitored
SW10	298650, 233375	Yes	Low	Meeting	Unknown	Unknown	Not Monitored
SW11	298649, 233370	Yes	Low	Meeting	Unknown	Unknown	Not Monitored
SW12	296936, 232433	Yes	Low	Meeting	Unknown	Unknown	Not Monitored
SW13	301155, 235871	Yes	Low	Not Meeting	Unknown	Unknown	Not Monitored
SW15	300413, 235863	Yes	Low	Not Meeting	Unknown	Unknown	Not Monitored
SW6	298219, 233796	Yes	Low	Meeting	Unknown	Unknown	Not Monitored
SW7	297585, 233309	Yes	Low	Not Meeting	Unknown	Unknown	Not Monitored
SW9	297379, 232911	Yes	Low	Meeting	Unknown	Unknown	Not Monitored

SWO Summary	
How much sewage was discharged via SWOs in the agglomeration in the year (m3)?	Unknown
Is each SWO identified as not meeting DoEHLG Guidance included in the Programme of Improvements?	No
The SWO Assessment included the requirements of relevant of WWDL schedules?	Yes
Have the EPA been advised of any additional SWOs / changes to Schedule C3 and A4 under Condition 1.7?	N/A

4.2 REPORT ON PROGRESS MADE AND PROPOSALS BEING DEVELOPED TO MEET THE IMPROVEMENT PROGRAMME REQUIREMENTS

4.2.1 SPECIFIED IMPROVEMENT PROGRAMME SUMMARY

A wastewater discharge licence may require a number of reports on specific subject areas to be prepared for the agglomeration in question. These reports are submitted to the EPA as part of the Annual Environmental Report. This section provides list of the various reports required for this agglomeration and a brief summary of their recommendations.

Specified Improvement Programmes (under Schedule A and C of WWDL)	Description	Licence Schedule	Licence Completion Date	Date Expired? (N/NA/Y)	Status of Works	Timeframe for Completing the Work	Comments
D0004-SIP:01	Upgrading of Storm Water Overflows to comply with the criteria outlined in the DoECLG "Procedures and Criteria in relation to Storm Water Overflows, 1995".	C	31/12/2020	No	Work ongoing on-site		Drainage Area Plan (DAP) to be completed.
D0004-SIP:02	Waste Water capacity improvement works	C	08/05/2020	No	Works Completed		
D0004-SIP:03	Waste Water Treatment plant improvement and ancillary works to meet the requirements of Schedule A.1 and condition 3.4	C	31/12/2019	No	Works Completed		

A summary of the status of any improvements identified by under Condition 5.2 is included below.

4.2.2 IMPROVEMENT PROGRAMME SUMMARY

Improvement Identifier	Improvement Description / or any Operational Improvements	Improvement Source	Expected Completion Date	Comments
There are no Improvements Programme for this Agglomeration.				

4.2.3 SEWER INTEGRITY RISK ASSESSMENT

The utilisation of multiple capital maintenance programmes and the outputs of the workshops with the Local Authority Operations Staff held under the programme can be used to satisfy the requirements of Condition 5 regarding network integrity. Improvement works identified by way of these programmes and workshops will be included in the Improvements Summary Table.

5 LICENCE SPECIFIC REPORTS

A wastewater discharge licence may require a number of reports on specific subject areas to be prepared for the agglomeration in question. These reports are submitted to the EPA as part of the Annual Environmental Report. This section provides list of the various reports required for this agglomeration and a brief summary of their recommendations.

Licence Specific Report	Required by licence	Year included in AER	Included in this AER	Reference to relevant section of AER
Priority Substances Assessment	Yes	2014	No	
Toxicity/Leachate Management	Yes	2014	No	

5.1 PRIORITY SUBSTANCES ASSESSMENT

The Priority Substances Assessment Report has been included in the AER 2014.

5.2 TOXICITY/LEACHATE MANAGEMENT

The Toxicity/Leachate Management Report has been included in the AER 2014.

6 CERTIFICATION AND SIGN OFF

6.1 SUMMARY OF AER CONTENTS

Parameter	Answer
Does the AER include an Executive Summary?	Yes
Does the AER include an assessment of the performance of the Waste Water Works (i.e. have the results of assessments been interpreted against WWDL requirements and or Environmental Quality Standards)?	Yes
Is there a need to advise the EPA for consideration of a Technical Amendment / Review of the licence?	No
List reason e.g. additional SWO identified	N/A
Is there a need to request/advise the EPA of any modification to the existing WWDL with respect to condition 4 changes to monitoring location, frequency etc	No
List reason e.g. changes to monitoring requirements	N/A
Have these processes commenced?	N/A
Are all outstanding reports and assessments from previous AERs included as an appendix to this AER	N/A

I certify that the information given in this Annual Environmental Report is truthful, accurate and complete:

Date: 06/03/2020

This AER has been produced by Irish Water's Environmental Information System (EIMS) and has been electronically signed off in that system for and on behalf of,

Katherine Walshe

Acting Head of Environmental Regulation.

7 APPENDIX

Appendix
Appendix 7.1 - Ambient monitoring summary

Lower Liffey Valley Sewerage Scheme 2019 Ambient Monitoring Summary

Ambient Monitoring Point from WWDL (or as agreed with EPA)	Irish National Grid Reference (Easting, Northing)	EPA Feature Coding Tool code	Receiving Waters Designation (Yes/No)			
			Bathing Water	Drinking Water	FWPM	Shellfish
Upstream Monitoring Point	301516, 235804	RS09L011940	No	No	No	No
Downstream Monitoring Point	302295, 235190	RS09L012040	No	No	No	No

Ambient Monitoring Point from WWDL (or as agreed with EPA)	Current WFD Status	cBOD (Mean mgl/l)	o-Phosphate (as P) (Mean mg/l)	Ammonia (as N) (mean mg/l)
Upstream Monitoring Point	Unassigned	1.000	0.078	0.135
Downstream Monitoring Point	Unassigned	1.000	0.067	0.190
Difference		0.000	-0.011	0.055
EQS		1.500	0.035	0.065
% of EQS		0.000%	-31.948%	84.444%

Lower Liffey Valley Sewerage Scheme 2019 Ambient Monitoring Data

Upstream Results							
Date		Ammonia (mg/l) *	Ortho P (mg/l) *	BOD (mg/l)	D.O (% Sat)	D.O (mg/l)	pH (mg/l)
09/01/2019	U/S	0.07	0.11	1	75	8.5	7.6
17/01/2019	U/S	0.04	0.05	1	90.9	10.66	7.8
23/01/2019	U/S	0.09	0.04	1	91.5	11.11	37
30/01/2019	U/S	0.09	0.07	1	94.6	11.6	7.2
06/02/2019	U/S	0.07	0.05	1	92.8	10.9	7.3
13/02/2019	U/S	0.14	0.04	1	93.4	11.02	
27/02/2019	U/S	0.05	0.14	1	95.8	10.8	6.9
06/03/2019	U/S	0.41	0.14	1	91.2	10.2	8.07
13/03/2019	U/S	0.07	0.05	1	93.4	10.7	7.92
20/03/2019	U/S	0.1	0.04	1	94.7	10.8	8.3
27/03/2019	U/S	0.11	0.06	1	94.1	10.7	7.8
05/04/2019	U/S	0.09	0.02	1	96.3	11.2	8.2
10/04/2019	U/S	0.05	0.03		90.7	9.89	7.99
24/04/2019	U/S	0.09	0.01	1	106.9	10.7	8.31
03/05/2019	U/S	0.09	0.02	1	107.8	11.08	8.15
08/05/2019	U/S	0.09	0.07	1	94.4	10.24	8.4
15/05/2019	U/S	0.07	0.02	1	116.1	11.5	8.2
22/05/2019	U/S	0.1	0.01		102.2	10.2	7.7
29/05/2019	U/S	0.1	0.02	1	87	8.83	7.74
06/06/2019	U/S	0.46	0.1	1	90	9.22	7.75
12/06/2019	U/S	0.07	0.05	1	92.5	9.17	7.81
19/06/2019	U/S	0.1	0.05	1	102.1	9.8	8.11
26/06/2019	U/S	0.05	0.07	1	99.5	9.71	7.99
03/07/2019	U/S	0.09	0.43	1	102.8	9.9	7.84
10/07/2019	U/S	0.09	0.39		100.9	9.4	7.9
26/07/2019	U/S	0.06	0.01	1	111	9.8	8.13
31/07/2019	U/S	0.1	0.08	1	97.3	8.99	7.98
08/08/2019	U/S	0.13	0.11	1	91	8.3	7.85
14/08/2019	U/S	0.09	0.08	1	93	8.6	7.85
21/08/2019	U/S	0.12	0.07	1	90.3	8.86	8.01
28/08/2019	U/S	0.13	0.09	1	99	9.3	8.03
05/09/2019	U/S	0.07	0.07	1	98	9.5	7.8
18/09/2019	U/S	0.16	0.1	1	88.3	8.8	7.76
25/09/2019	U/S	0.09	0.11	1	89.8	8.5	8.04
02/04/2019	U/S	0.29	0.07	1	72.6	7.65	7.83
09/04/2019	U/S	0.2	0.06	1	86.7	8.8	7.84
17/10/2019	U/S	0.18	0.08	1	90	9.39	7.94
23/10/2019	U/S	0.18	0.07	1	91.9	10.05	8.03

Upstream Results							
Date		Ammonia (mg/l) *	Ortho P (mg/l) *	BOD (mg/l)	D.O (% Sat)	D.O (mg/l)	pH (mg/l)
06/11/2019	U/S	0.21	0.07	1	90.8	10.2	7.91
13/11/2019	U/S	0.21	0.07	1	90.8	10.44	7.9
21/11/2019	U/S	0.16	0.06	1	90.8	10.6	7.96
28/11/2019	U/S	0.21	0.06	1	90.2	10.1	7.97
04/12/2019	U/S	0.24	0.04	1	91.2	11.2	8
14/12/2019	U/S	0.27			90.7	10.7	8.01
18/12/2019	U/S	0.18	0.03		89.9	10.4	7.87
Mean		**0.113**	**0.072**	**1.000**	**91.6**	**10.64**	**10.59**
95%ile		**0.275**	**0.140**	**1.000**	**95.3**	**11.36**	**24.09**

Downstream Results							
Date		Ammonia (mg/l) *	Ortho P (mg/l) *	BOD (mg/l)	D.O (% Sat)	D.O (mg/l)	pH (mg/l)
09/01/2019	D/S	0.06	0.11	1	93.3	10.98	7.9
17/01/2019	D/S	0.03	0.05	1	92.8	11.07	7.7
23/01/2019	D/S	0.14	0.07	1	94	11.5	7.9
30/01/2019	D/S	0.09	0.05	1	95.4	11.8	7.4
06/02/2019	D/S	0.1	0.05	1	94.9	11.4	7.3
13/02/2019	D/S	0.19	0.04	1	93.9	11.1	7.3
27/02/2019	D/S	0.09	0.07	1	98.9	11.4	7.02
06/03/2019	D/S	0.41	0.13	1	92.6	10.6	8.12
13/03/2019	D/S	0.06	0.04	1	92.6	10.9	7.98
20/03/2019	D/S	0.12	0.06	1	94.2	10.52	8.3
27/03/2019	D/S	0.1	0.07	1	95	10.9	7.7
05/04/2019	D/S	0.08	0.03		98.2	11.4	7.95
10/04/2019	D/S	0.06	0.02		101	11.2	8.06
24/04/2019	D/S	0.24	0.01	1	101	9.83	7.77
03/05/2019	D/S	0.07	0.02	1	104.3	11.08	8.33
08/05/2019	D/S	0.1	0.09	1	101.6	10.7	8.13
15/05/2019	D/S	0.07	0.06	1	128.3	12.6	8.3
22/05/2019	D/S	0.42	0.01		88	8.76	7.4
29/05/2019	D/S	0.8	0.04	1	87	8.6	7.37
06/06/2019	D/S	0.43	0.09	1	91.7	9.4	7.83
12/06/2019	D/S	0.22	0.08	1	91.7	9.4	7.9
19/06/2019	D/S	0.19	0.09	1	96.2	9.4	7.77
26/06/2019	D/S	0.11	0.04	1	97.8	9.68	8.02
03/07/2019	D/S	0.17	0.09	1	102.5	9.77	8.02
10/07/2019	D/S	0.12	0.05		94.8	8.65	8.02
26/07/2019	D/S	0.06	0.01	1	106.9	9.33	7.97
31/07/2019	D/S	0.15	0.13	1	102.2	9.3	8.15
08/08/2019	D/S	0.37	0.07	1	89.6	7.98	7.87

Upstream Results							
Date		Ammonia (mg/l) *	Ortho P (mg/l) *	BOD (mg/l)	D.O (% Sat)	D.O (mg/l)	pH (mg/l)
14/08/2019	D/S	0.2	0.12	1	93.4	8.61	8.3
21/08/2019	D/S	0.16	0.07	1	92	8.91	7.94
28/08/2019	D/S	0.21	0.08	1	97	8.9	7.94
05/09/2019	D/S	0.06	0.09	1	98	9.6	7.64
18/09/2019	D/S	0.17	0.1	1	94	9.05	7.69
25/09/2019	D/S	0.09	0.16	1	93.2	8.65	7.98
02/04/2019	D/S	0.22	0.08	1	87.3	9.52	7.87
09/04/2019	D/S	0.23	0.04	1	91.6	9.6	7.93
17/10/2019	D/S	0.18	0.08	1	90.7	9.27	7.93
23/10/2019	D/S	0.24	0.09	1	91.2	9.7	7.83
06/11/2019	D/S	0.15	0.07	1	91.3	10.2	7.82
13/11/2019	D/S	0.27	0.07	1	90.1	10.11	7.91
21/11/2019	D/S	0.18	0.06	1	90.1	10.2	8.06
28/11/2019	D/S	0.27	0.08	1	90.1	10.2	8.06
04/12/2019	D/S	0.33	0.04	1	90.1	10.5	7.98
14/12/2019	D/S	0.35			90.7	10.5	8.04
18/12/2019	D/S	0.17	0.04		90.9	10.9	7.9
Mean		**0.190**	**0.067**	**1.000**	**95.2**	**10.08**	**7.87**
95%ile		**0.418**	**0.129**	**1.000**	**103.9**	**11.48**	**8.30**

** Where the concentration in the result is less than the limit of detection (LOD), a value of 50% of the LOD was used in calculating the mean and 95%ile concentrations.*