Annual Environmental Report

2018

Upper Liffey Valley Sewerage Scheme

D0002-01

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1 EXECUTIVE SUMMARY AND INTRODUCTION TO THE 2018 AER

This Annual Environmental Report has been prepared for D0002-01, Upper Liffey Valley Sewerage Scheme, in Kildare in accordance with the requirements of the wastewater discharge licence for the agglomeration. Specified reports are included as an appendix to the AER as follows:

1.1 Licence specific reporting included in AER

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

1.2 Treatment Type

The agglomeration is served by a wastewater treatment plant Upper Liffey Valley Sewerage Scheme WWTP Osberstown with a Plant Capacity PE of 130000. The treatment process includes the following:

1.2.1 Upper Liffey Valley Sewerage Scheme WWTP Osberstown

Treatment type	Yes / No	Details
Preliminary Treatment	Yes	Screens, Grit Removal
Primary Treatment	Yes	3 No. PSTs
Secondary Treatment	Yes	2 No. Activated Sludge Extended Aeration Streams, 3 No. FSTs
Nutrient Removal	Yes	2 No. Anoxic /Anaerobic Streams
Tertiary Treatment	Yes	Actiflo Sand Filters (1/3 of flow), Ferric Dosing

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 2.2 Discharges from the agglomeration.

1.3 ELV Overview

1.3.1 Upper Liffey Valley Sewerage Scheme WWTP Osberstown

Compliance Status	
Were all parameters compliant for Upper Liffey Valley Sewerage Scheme WWTP Osberstown treatment plant	Yes
Where non compliant see Table 2.2.1 for details of parameters	

1.4 Sludge Removal

The amount of sludge removed from the wastewater treatment plant is shown below along with the transported destination of the sludge from the treatment plant.

Treatment Plant	Sludge type	Quantity	Unit	% Dry Solids	Destination
Upper Liffey Valley Sewerage Scheme WWTP Osberstown	Cake Sludge	10177.18	Weight (Tonnes)	18.54	SEDE Ltd, Co. Kilkenny

Annual Statement of Measures

WWTW capacity complete and sludge upgrade ongoing and expected to be completed in 2019.

2 MONITORING REPORTS SUMMARY

2.1 Summary report on monthly influent monitoring

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

2.1.1 Influent Monitoring Summary - Upper Liffey Valley Sewerage Scheme WWTP Osberstown

Parameters	Number of Samples	Annual Max	Annual Mean
COD-Cr mg/l	12	945	446.47
BOD, 5 days with Inhibition (Carbonaceous BOD) mg/l	23	328	190.39
Total Phosphorus (as P) mg/l	12	8.53	4.83
Total Nitrogen mg/l	11	36.9	23.71
Suspended Solids mg/l	1	360	360
Hydraulic Capacity	0	70363	30044

If other inputs in the form of sludge / leachate are added to the WWTP then these are included in Section 3.5 if applicable.

Significance of Results:

The annual mean hydraulic loading is less than the peak Treatment Plant Capacity as detailed further in Section 3.2. The annual maximum hydraulic loading is less than the peak Treatment Plant Capacity as detailed further in Section 3.2.

2.2 Discharges from the agglomeration

2.2.1 Effluent Monitoring Summary - Upper Liffey Valley Sewerage Scheme WWTP Osberstown

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)
COD-Cr mg/l	100	200	0	28	0	0	18.23	Pass
BOD, 5 days with Inhibition (Carbonaceous BOD) mg/l	10	20	0	50	0	0	2.51	Pass
Fats, Oils & Greases mg/l	15	18	0	4	0	0	0.42	Pass
Total Nitrogen mg/l	20	24	0	28	0	0	7.31	Pass
Kjeldahl Nitrogen mg/l	0	0	0	25	0	0	0.87	N/A
Total Oxidised Nitrogen (as N) mg/l	20	24	0	26	0	0	7.11	Pass
Ammonia-Total (as N) mg/l	0.9	1.08	0	29	0	0	0.1	Pass
pH pH units	6 to 9	6 to 9	0	29	0	0	7.98	Pass

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)
Total Phosphorus (as P) mg/l	0.9	1.08	0	27	0	0	0.38	Pass
ortho-Phosphate (as P) - unspecified mg/l	0.5	0.6	0	28	0	0	0.2	Pass
Suspended Solids mg/l	35	87.5	0	28	0	0	5.86	Pass
Faecal coliforms MPN/100ml	0	0	0	51	0	0	37599.16	N/A

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.

2.3 Ambient monitoring summary

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.

2.3.1 Ambient Monitoring Report Summary - Upper Liffey Valley Sewerage Scheme WWTP Osberstown

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	Code	Bathing Water	Drinking Water	FWPM	Shellfish	WFD Status
Upstream	285423, 220755	TPEFF1400D0002SW001	No	No	No	No	Moderate
Downstream	286940, 221639	TPEFF1400D0002SW001	No	Yes	No	No	Moderate

2.3.2 Ambient Monitoring Parameter Summary - Upper Liffey Valley Sewerage Scheme WWTP Osberstown

The table below provides a summary of monitoring results for designated ambient monitoring points. The upstream and downstream annual mean values are shown (mg/l), and the difference between both monitoring stations is given as a percentage of the Environmental Quality Standard (EQS) where relevant.

Parameter Name	Upstream Monitoring Point Location	Upstream Monitoring Point Annual Mean	Downstream Monitoring Point Location	Downstream Monitoring Point Annual Mean	EQS	% of EQS
BOD - 5 days (Total) mg/l	RS09L011100	1.17	RS09L011200	1.08	2.6	-3.5
Sulphate mg/l	RS09L011100	8	RS09L011200	10		
Nitrate (as N) mg/l	RS09L011100	1.18	RS09L011200	1.27		
Temperature °C	RS09L011100	5.4	RS09L011200	5.4		
Conductivity @25°C µS/cm	RS09L011100	327	RS09L011200	339		
pH pH units	RS09L011100	8.05	RS09L011200	8.03		
Total Nitrogen mg/l	RS09L011100	1.58	RS09L011200	1.75		

Parameter Name	Upstream Monitoring Point Location	Upstream Monitoring Point Annual Mean	Downstream Monitoring Point Location	Downstream Monitoring Point Annual Mean	EQS	% of EQS
Ammonia-Total (as N) mg/l	RS09L011100	0.11	RS09L011200	0.09	0.14	-15.4
Total Phosphorus (as P) mg/l	RS09L011100	0.23	RS09L011200			
Total Hardness (as CaCO3) mg/l	RS09L011100	151	RS09L011200	150		
Dissolved Oxygen mg/l	RS09L011100	13.2	RS09L011200	13.3		
Aluminium - unfiltered mg/l	RS09L011100	0.06	RS09L011200	0.06		
Alkalinity-total (as CaCO3) mg/l	RS09L011100	135	RS09L011200	134		
COD-Cr mg/l	RS09L011100	17	RS09L011200	14		
Total Oxidised Nitrogen (as N) mg/l	RS09L011100	0.87	RS09L011200	1.27		
Colour Hazen	RS09L011100	67	RS09L011200	65		
ortho-Phosphate (as P) - unspecified mg/l	RS09L011100	0.03	RS09L011200	0.01	0.075	-17.4
Suspended Solids mg/l	RS09L011100	4	RS09L011200	8		
Chloride mg/l	RS09L011100	14	RS09L011200	16		
Dissolved Oxygen % Saturation	RS09L011100	105	RS09L011200	105		

Significance of Results:

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

The ambient monitoring results meet the required EQS. Where the ambient monitoring results meet the EQS this relates to the Oxygenation and Nutrient Conditions set out in the Surface Water Regulations 2009.

The discharge from the wastewater treatment plant does not have an observable negative impact on the water quality.

The discharge from the WWTP has no observable negative impact on the Water Framework Directive status.

3 OPERATIONAL REPORTS SUMMARY

3.1 Treatment Efficiency Report

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:

3.1.1 Treatment Efficiency Report Summary - Upper Liffey Valley Sewerage Scheme WWTP Osberstown

Parameter	Influent mass loading (kg/year)	Effluent mass emission (kg/year)	Efficiency (% reduction of influent load)
SS	3082381.2	66061.92	97.86
cBOD	2153710.41	27540.63	98.72
TP	57723.78	4484.47	92.23
TN	285399.18	84890.54	70.26
COD	5335220.48	205305.85	96.15

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

3.2 Treatment Capacity Report Summary

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.

Upper Liffey Valley Sewerage Scheme WWTP Osberstown	
Peak Hydraulic Capacity (m^3/day) - As Constructed	85500
DWF to the Treatment Plant (m^3/day)	28500
Current Hydraulic Loading - annual max (m^3/day)	70363
Average Hydraulic loading to the Treatment Plant (m^3/day)	30044
Organic Capacity (PE) - As Constructed	130000
Organic Capacity (PE) - Collected Load (peak week)	91734
Organic Capacity (PE) - Remaining	38266
Will the capacity be exceeded in the next three years? (Yes/No)	No

3.3 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
50	Blocked Sewer	0	50

3.4 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.

3.4.1 Summary of Incidents

Incident Type	Cause	No. of incident occurrences	Recurring (Y/N)	Closed (Y/N)
Other	Other	1	No	Yes
Uncontrolled release	Plant or equipment maintenance at WWTP	1	No	Yes
Other	Plant or equipment breakdown at WWTP	2	No	Yes
Uncontrolled release	Other	1	No	Yes
Uncontrolled release	EO caused by ragging or blocking	1	No	Yes
Spillage	Other	1	No	Yes
Spillage	Other	1	No	Yes
Spillage	Other	1	No	Yes
Uncontrolled release	EO caused by pump failure	1	No	No

3.4.2 Summary of Overall Incidents

Question	Answer
Number of Incidents in 2018	10
Number of Incidents reported to the EPA via EDEN in 2018	10
Explanation of any discrepancies between the two numbers above	N/A

3.5 Sludge / Other inputs to the 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 sewer network)	24340	Volume (m^3)	296	0.22	Yes	Yes	Yes
Domestic /Septic Tank Sludge	10672.12	Weight (Tonnes)	130	0.1	Yes	Yes	Yes
Industrial / Commercial Sludge	3510.98	Weight (Tonnes)	42	0.03	Yes	Yes	Yes
Waterworks Sludge	36501.16	Weight (Tonnes)	444	0.33	Yes	Yes	Yes

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:

No Appendix Included.

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 2018 (No. of events)	Total volume discharged in 2018 (m^3)	Monitoring Status
GW1	277380, 208978	Yes	Low	Meeting			Not Monitored
GW2	278155, 210349	Yes	High	Meeting			Not Monitored
SW10	289596, 220347	Yes	Low	Meeting			Not Monitored
SW11	291925, 221550	Yes	High	Meeting			Not Monitored
SW13	288730, 223148	Yes	Low	Not Meeting			Not Monitored
SW14	282896, 227635	Yes	Medium	Meeting			Not Monitored
SW15	294123, 223690	Yes	Medium	Meeting			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 2018 (No. of events)	Total volume discharged in 2018 (m^3)	Monitoring Status
SW16	294120, 223042	Yes	Low	Meeting			Not Monitored
SW17	284075, 209882	Yes	Low	Meeting			Not Monitored
SW18	287808, 227347	Yes	Low	Not Meeting			Not Monitored
SW19	281838, 211784	Yes	Low	Meeting			Not Monitored
SW2	286924, 220613	Yes	Low	Meeting	1	5	Monitored
SW20	278418, 208542	Yes	Low	Meeting			Not Monitored
SW21	276238, 206821	Yes	Low	Not Meeting			Not Monitored
SW22	284959, 221152	Yes	Low	Meeting			Not Monitored
SW3	285413, 219720	Yes	Low	Not Meeting			Not Monitored
SW4-Decommissioned	N/A	No	Unknown	Meeting			Not Monitored
SW5	281529, 217305	Yes	Low	Meeting			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 2018 (No. of events)	Total volume discharged in 2018 (m^3)	Monitoring Status
SW6	N/A	Yes	Low	Meeting			Not Monitored
SW7	N/A	Yes	Unknown	Not yet Assessed			Not Monitored
SW8	N/A	Yes	Low	Not Meeting			Not Monitored
SW9	290193, 221482	Yes	Low	Not Meeting			Not Monitored

4.1.2 Inspection Summary Report

SWO Summary	
How much sewage was discharged via SWOs in the agglomeration in the year (m^3)?	Unknown - As all SWOs are not Monitored
Is each SWO identified as not meeting DoEHLG Guidance included in the Programme of Improvements?	Yes
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?	No

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)	Licence Schedule	Licence Completion Date	Date Expired? (N/NA/Y)	Status of Works	Timeframe for Completing the Work	Comments
Infiltration programme	C	31/03/2013	Yes	Not Started		The improvement programme will be reviewed by IW to assess the works required to comply with the licence condition on a prioritised basis.
Upgrade of the Monread Road Pumping Station (associate with SW9)	C	31/03/2013	Yes	Not Started	Feb 2022	
Upgrade of the Newhall Pumping Station (associated with SW3),	C	31/03/2013	Yes	Not Started	Feb 2022	
Upgrade to Blessington Road Pumping Station	C	30/03/2011	Yes	Works Completed		
Upgrading of sewer network to ensure all SWO comply with the criteria outlined in the DoEHLG 'Procedures and Criteria in relation to Storm Water Overflows, 1995'	C		No	Not Started	Feb 2022	
Waste water sewer network	C	31/03/2013	Yes	Not Started	Feb 2022	

Specified Improvement Programmes (under Schedule A and C of WWDL)	Licence Schedule	Licence Completion Date	Date Expired? (N/NA/Y)	Status of Works	Timeframe for Completing the Work	Comments
rehabilitation programme						
Waste Water treatment plant upgrade and ancillary works	C	31/03/2013	Yes	Work ongoing on-site	31/12/2019	
Waste Water works network rehabilitation programme	C	31/03/2013	Yes	Not Started		The improvement programme will be reviewed by IW to assess the works required to comply with the licence condition on a prioritised basis.

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	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.

5.a Licence Specific Reports Summary Table

Licence Specific Report	Required by licence	Year included in AER	Included in this AER	Reference to relevant section of AER
Drinking Water Abstraction Point Risk Assessment	Yes	2013	No	
Priority Substances Assessment	Yes	2012	No	

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?	Yes
List reason e.g. additional SWO identified	Regularisation of discharges after network upgrade
Is there a need to request/advise the EPA of any modifications to the existing WWDL?	Yes
List reason e.g. changes to monitoring requirements	Influent sampling point location changed & u/s sampling point changed
Have these processes commenced?	No
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: 19/03/2019

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,

Eleanor Roche

Acting Head of Environmental Regulation.

7 APPENDIX

Appendix
Appendix 7.1 - Ambient Monitoring Summary

ULVSS 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	284236, 219449	IE_EA_09L011050				
Downstream Monitoring Point	286677, 221082	IE_EA_09L011200	No	Yes	No	No
Downstream Monitoring Point #2	287485, 222016	IE_EA_09L011300	No	Yes	No	No

Ambient Monitoring Point from WWDL (or as agreed with EPA)	Current WFD Status	cBOD	o-Phosphate (as P)	Ammonia (as N)
Upstream Monitoring Point	Good	1.167	0.020	0.115
Downstream Monitoring Point	Moderate	1.083	0.011	0.091
Downstream Monitoring Point #2	Unassigned	1.125	0.011	0.091
Difference between Upstream and Downstream		-0.083	-0.009	-0.023
Difference between Upstream and Downstream #2		0.042	0.009	0.023
EQS		2.600	0.075	0.140
% of EQS		-3.205%	-12.222%	-16.667%
% of EQS #2		-1.603%	-12.222%	-16.667%

* 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.

ULVSS Ambient Monitoring Data

Upstream Results								
Date		Ammonia (mg/l) *	Ortho P (mg/l) *	BOD (mg/l) *	Total N (mg/l)	D.O (% Sat)	D.O (mg/l)	pH (mg/l)
22-Feb-2018	U/S	0.052	0.015	< 1	1.5	94.7	11.50	7.91
20-Mar-2018	U/S	0.042	0.012	1.0	3.5	95.9	12.37	7.73
25-Apr-2018	U/S	0.043	0.012	2.3	2.7	98.4	10.76	7.83
24-May-2018	U/S	0.040	< 0.006	< 1	2.6	112.3	11.35	7.58
25-June-2018	U/S	0.048	< 0.006	< 1	2.9	119.3	11.36	7.99
17-July-2018	U/S	< 0.02	< 0.006	< 1	2.2	97.6	9.66	7.99
29-Aug-2018	U/S	< 0.02	< 0.006	< 1	3.1	95.8	9.59	7.80
27-Sep-2018	U/S	0.073	0.009	< 1	2.2	92.8	9.98	7.93
24-Oct-2018	U/S	< 0.02	0.007	< 1	2.4	93.1	10.59	7.95
29-Nov-2018	U/S	0.056	0.016	1.6	3.5	95.5	10.71	7.83
Mean		**0.038**	**0.008**	**0.8**	2.7	99.5	10.79	7.85
95%ile		**0.065**	**0.016**	**2.0**	3.5	116.2	11.98	7.99

Downstream Results								
Date		Ammonia (mg/l) *	Ortho P (mg/l) *	BOD (mg/l) *	Total N (mg/l)	D.O (% Sat)	D.O (mg/l)	pH (mg/l)
22-Feb-2018	D/S	0.047	0.013	< 1	2.5	94.5	11.54	7.95
20-Mar-2018	D/S	0.066	0.360	1.2	3.7	96.2	12.42	7.72
25-Apr-2018	D/S	0.065	0.016	2.6	2.8	98.6	10.83	7.84
24-May-2018	D/S	0.056	< 0.006	< 1	2.8	113.0	11.63	7.62
25-June-2018	D/S	0.031	< 0.006	2.7	3.2	135.0	12.75	8.02
17-July-2018	D/S	< 0.02	< 0.006	< 1	2.6	97.4	9.48	8.02
29-Aug-2018	D/S	< 0.02	< 0.006	< 1	2.8	98.4	9.56	7.84
27-Sep-2018	D/S	0.044	0.006	2.2	2.6	91.5	9.71	7.95
24-Oct-2018	D/S	< 0.02	0.009	< 1	2.9	95.4	10.94	8.02
29-Nov-2018	D/S	0.058	0.019	1.4	3.7	93.2	10.40	7.84
Mean		**0.040**	**0.044**	**1.0**	3.0	101.3	10.93	7.88
95%ile		**0.066**	**0.207**	**2.7**	3.7	125.1	12.60	8.02

* 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.

Downstream #2 Results								
Date		Ammonia (mg/l) *	Ortho P (mg/l) *	BOD (mg/l) *	Total N (mg/l)	D.O (% Sat)	D.O (mg/l)	pH (mg/l)
22-Feb-2018	D/S	0.047	0.013	< 1	2.5	94.5	11.54	7.95
20-Mar-2018	D/S	0.066	0.360	1.2	3.7	96.2	12.42	7.72
25-Apr-2018	D/S	0.065	0.016	2.6	2.8	98.6	10.83	7.84
24-May-2018	D/S	0.056	< 0.006	< 1	2.8	113.0	11.63	7.62
25-June-2018	D/S	0.031	< 0.006	2.7	3.2	135.0	12.75	8.02
17-July-2018	D/S	< 0.02	< 0.006	< 1	2.6	97.4	9.48	8.02
29-Aug-2018	D/S	< 0.02	< 0.006	< 1	2.8	98.4	9.56	7.84
27-Sep-2018	D/S	0.044	0.006	2.2	2.6	91.5	9.71	7.95
24-Oct-2018	D/S	< 0.02	0.009	< 1	2.9	95.4	10.94	8.02
29-Nov-2018	D/S	0.058	0.019	1.4	3.7	93.2	10.40	7.84
Mean		**0.040**	**0.044**	**1.0**	3.0	101.3	10.93	7.88
95%ile		**0.066**	**0.207**	**2.7**	3.7	125.1	12.60	8.02

* 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.