

Annual Environmental Report 2017

Agglomeration Name:	Carrickmacross
Licence Register No.	D0062-01



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Section 1. Executive Summary and Introduction to the 2017 AER

1.1 Summary Report on 2017

This Annual Environmental Report has been prepared for **D0062-01, Carrickmacross**, in County **Monaghan**, in accordance with the requirements of the wastewater discharge licence for the agglomeration.

The agglomeration is served by a wastewater treatment plant with a Plant Capacity PE of 12150. The treatment process includes the following:-

- Preliminary Treatment (Screening and Grit Removal)
- Secondary Treatment (Aeration)
- Nutrient Removal (Ferric dosing and Anoxic Zone)
- Tertiary Treatment (Sand Filter)

The final effluent from the Primary Discharge Point was non-compliant with the Emission Limit Values in 2017.

The following parameters exceeded the emission limit values in 2017:-

- Ammonia N (mg/l)

1,335,400kgs sludge as dewatered cake was removed from the wastewater treatment plant in 2017. Sludge was transferred to and Biocore Sludge Treatment Centre Ballivor, Co Meath (SSF_COR_MH_13_0001_02).

The following improvement works were undertaken in 2017:-

Carrickmacross WWTP upgrade works are on the Irish Water Capital Investment Programme. Works are currently being rescoped.

- | | |
|---------------------|---|
| <i>1. Issue</i> | <i>Damaged sewer pipe</i> |
| <i>Measure</i> | <i>Robotic repair and sewer liner . 3m of 150mm pipe relined.</i> |
| <i>Status</i> | <i>100% complete</i> |
|
<i>2. Issue</i> |
<i>Manhole covers damaged</i> |
| <i>Measure</i> | <i>New covers and frames fitted</i> |
| <i>Status</i> | <i>100% complete</i> |
|
<i>3. Issue</i> |
<i>Damaged sewer causing infiltration.</i> |
| <i>Measure</i> | <i>Part relining and dig and replace</i> |
| <i>Status</i> | <i>100% complete</i> |
|
<i>4. Issue</i> |
<i>3 Actuator valves failing on the sand filter</i> |
| <i>Measure</i> | <i>Install 3 no. new valves</i> |
| <i>Status</i> | <i>100% Complete</i> |

- | | |
|----------|--|
| 5. Issue | <i>Fridge and temp sensors failed on composite sampler</i> |
| Measure | <i>Replace Fridge and temp sensors</i> |
| Status | <i>100% complete</i> |
| | |
| 6. Issue | <i>Chains on scrapers in Clarification tank No 3 require replacement</i> |
| Measure | <i>Replace stainless steel chains and rubber scrapers</i> |
| Status | <i>100% complete</i> |
| | |
| 7. Issue | <i>Faulty VSD at Oriel Rd PS</i> |
| Measure | <i>New replacement VSD</i> |
| Status | <i>100% Complete</i> |
| | |
| 8. Issue | <i>Compressor in sludge press requires replacement</i> |
| Measure | <i>Replace Compressor</i> |
| Status | <i>100% complete</i> |

An Annual Statement of Measures is included in **Appendix 7.1**

Section 2. Monitoring Reports Summary

2.1 Summary report on monthly influent monitoring

Table 2.1 Influent Monitoring Summary

2.1.1 Monthly Influent Monitoring	BOD (mg / l)	COD (mg / l)	SS (mg / l)	TP (mg / l)	TN (mg / l)	Hydraulic Loading (m3/d)
Number of Samples	12	12	12	12	12	
Annual Max.	508	1106	4558	12.5	56.3	7824
Annual Mean	290.46	718.97	520.00	7.25	39.12	2062.03

Other inputs in the form of sludge/leachate are added to the WWTP after the influent monitoring point and are therefore not represented by influent monitoring. Other inputs, where relevant, are detailed in Section 3.6.

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. The design of the wastewater treatment plant allows for peak values and therefore the peak loads have not impacted on compliant with Emission Limit Values

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

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

2.2 Discharges from the agglomeration

Table 2.2 - Effluent Monitoring

2.2.1 Effluent Monitoring Summary	BOD (mg/l)	COD (mg/l)	TSS (mg/l)	Total P (mg/l)	Ortho P / MRP (mg/l)	Ammonia N (mg/l)	pH (Range)
WWDL ELV (Schedule A) where applicable	10.00	125.00	10.00	1.00	0.40	0.75	6 to 9
ELV with Condition 2 Interpretation included	20.00	250.00	25.00	1.20	0.80	1.50	No allowable exceedances
% Reduction (Schedule A)							
Number of sample results	12	12	12	12	12	12	12
Number of sample results above WWDL ELV	0	0	0	0	1	2	0
Number of sample results above ELV with Condition 2 Interpretation	0	0	0	0	0	1	0
Annual Mean (for parameters where a mean ELV applies)							
Overall Compliance (Pass/Fail)	Pass	Pass	Pass	Pass	Pass	Fail	Pass

Table 2.2 - Effluent Monitoring.....Continued

2.2.1 Effluent Monitoring Summary
WWDL ELV (Schedule A) where applicable
ELV with Condition 2 Interpretation included
% Reduction (Schedule A)
Number of sample results
Number of sample results above WWDL ELV
Number of sample results above ELV with Condition 2 Interpretation
Annual Mean (for parameters where a mean ELV applies)
Overall Compliance (Pass/Fail)

Significance of results

The WWTP was non-compliant with the ELV's set in the wastewater discharge licence. One sample was non-compliant with the ELVs in relation to Ammonia N (mg/l). The non-compliance is due to breach of ELV for ammonia on the 16/05/17 2.8mg/l N , the max elv for ammonia is 1.5mg/l N. The impact on receiving waters is assessed further in Section 2.3.

2.3 Ambient Monitoring Summary

Table 2.3. Ambient Monitoring Report Summary Table

Ambient Monitoring Point from WWDL (or as agreed with EPA)	Irish Grid Reference	EPA Feature Coding Tool code	Bathing Water	Drinking Water	FWPM	Shellfish
Upstream Monitoring Point	284561, 302882	RS06P010230				
Downstream Monitoring Point	284719, 302758	RS06P010280	No	No	No	No
Downstream Monitoring Point #2						

Table 2.3.2 Ambient Impact Assessment Table

Ambient Monitoring Point from WWDL (or as agreed with EPA)	Current WFD Status	cBOD	0-Phosphate (as P)	Ammonia (as N)	Nitrogen		
Upstream Monitoring Point	Good	3.25	0.058	0.01	2.7		
Downstream Monitoring Point	Poor	3	0.087	0.037	4.6		
Downstream Monitoring Point #2							
Difference between Upstream and Downstream		-0.25	0.029	0.027			
Difference between Upstream and Downstream #2							
EQS		2.6	0.075	0.14			
% of Eqs		-9.62%	38.67%	19.29%			
% of Eqs #2							

The results for the upstream and downstream monitoring and/or additional monitoring data sets from Irish Water are included in the Appendix.

Significance of results

- The WWTP was non-compliant with the ELV's set in the wastewater discharge licence as detailed in Section 2.2.
- The receiving waters do not meet the EQS required.
- 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.

2.4 Pollutant Release and Transfer Register (PRTR) - report for previous year

A PRTR is not required as the PE is < 2000

Section 3. Operational Reports Summary

3.1 Treatment Efficiency Report

	cBOD (kg/yr)	COD (kg/yr)	SS (kg/yr)	Total P (kg/yr)	Total N (kg/yr)
Influent mass loading (kg/year)	179,922	445,353	322,108	4,493	24,232
Effluent mass emission (kg/year)	1,846	11,608	2,098	201	8,215
% Efficiency (% reduction of influent load)	99%	97%	99%	96%	66%

3.2 Treatment Capacity Report

Table 3.2 - Treatment Capacity Report Summary

Hydraulic Capacity – Design / As Constructed (dry weather flow) (m3/day)	2,758
Hydraulic Capacity – Design / As Constructed (peak flow) (m3/day)	8,274
Hydraulic Capacity – Current loading (m3/day)	2,062
Hydraulic Capacity – Remaining (m3/day)	6,212
Organic Capacity - Design / As Constructed (PE)	12,150
Organic Capacity - Collected Load (PE)	9,264
Organic Capacity – Remaining (PE)	2,886
Will the capacity be exceeded in the next three years? (Yes / No)	No

3.3 Extent of Agglomeration Summary Report

In this section Irish Water is required to report on the amount of urban waste water generated within the agglomeration. It does not include any waste water collected and created in a private system and discharged to water under a Section 4 Licence issued under the Water Pollution Acts 1977 (as amended).

Table 3.3 - Extent of Agglomeration Summary Report

	% of P.E. load generated in the agglomeration	Estimated / Measured
Load generated in the agglomeration that is collected in the sewer network	100%	Estimated
Load collected in the agglomerations that enters treatment plant	100%	Estimated
Load collected in the sewer network but discharges without treatment (includes SWO, EO, and any discharges that are not treated)		

Load generated in the agglomeration that is collected in the sewer network is the total load generated and collected in the municipal network within the boundary of the agglomeration.

Load collected in the agglomerations that enters treatment plant is that portion of the previous figure which enters the waste water treatment plant.

Load collected but discharged without treatment is that portion of the first figure which is discharged without treatment.

3.4 Complaints Summary

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

Table 3.4 - Complaints Summary Table

Number of Complaints	Nature of Complaint	Number Open Complaints	Number Closed Complaints
3	Investigation Sewage Flooding - Below Ground Waste Water	0	3

3.5 Reported Incidents Summary

A summary of reported incidents is included below.

Table 3.5.1 - Summary of Incidents

3.5.1 Incident Type (e.g. Non-compliance, Emission, spillage, pollution incident)	Incident Description	Cause	No. of Incidents	Recurring Incident (Yes/No)	Corrective Action	Authorities Contacted. Note 1	Reported to EPA (Yes/No)	Closed (Yes/No)
INCI012170 Breach of ELV	Breach of ELV for Ammonia 2.8mg/l ,final effluent sample taken on the 16/05/17	Plant or equipment breakdown at WWTP	1	No	Composite sampler repaired 08/06/17	IFI	Yes	Yes
INCI012239 Uncontrolled Release	Power outage caused by severe weather conditions the sludge blanket in the clarifier to overflow.	EO caused by power failure	1	Yes	Plant was run on manual until power was restored. All alarms were responded to without delay.	IFI, Veolia	Yes	No
INCI012578 Breach of ELV	Breach of ELV for Ammonia final effluent sample taken on the 12/07/17 , Ammonia 1.1mg/l	Plant or equipment breakdown at WWTP	1	No	Fridge in composite sampler failed again , composite sampler fully repaired and calibrated	IFI	Yes	No

Note 1: For shellfish waters notify the Marine Institute (MI) Sea Fisheries Protection Authority (SFPA) Food Safety Authority (FSAI) and An Bord Iascaigh Mhara (BIM). This should also include any other authorities that should be contacted arising from the findings of any Licence Specific Reports also e.g. Drinking Water Abstraction Impact Risk Assessment, Fresh Water Pearl Mussel Impact Assessments etc.

Table 3.5.2 - Summary of Overall Incidents

Number of Incidents in 2017	3
Number of Incidents reported to the EPA via EDEN in 2017	3
Explanation of any discrepancies between the two numbers above	N/A

3.6 Sludge / Other inputs to the WWTP

Other inputs to the waste water treatment plant are summarised in Table 3.6 below.

Table 3.6 - Other Inputs

Input Type	Quantity	P.E.	% of load to WWTP	Included in Influent Monitoring? (Y/N)	Is there a leachate/sludge acceptance procedure for the WWTP? (Y/N)	Is there a dedicated leachate/sludge acceptance facility for the WWTP? (Y/N)	
Domestic /Septic Tank Sludge	676 m3	8	0.10%	Yes	Yes	No	
Waterworks Sludge	0 m3						
Industrial / Commercial Sludge	120 m3	1	0.02%	Yes	Yes	No	
Landfill Leachate (delivered by tanker)	0 m3						
Landfill Leachate (delivered by sewer network)	0 m3						
Other (specify)	290 m3	4	0.04%	Yes	Yes	No	Sludge from other IW WWTPS

Section 4. Infrastructure Assessments and Programme of Improvements

4.1 Storm water overflow identification and inspection report

A summary of the significance and operation is included below. The Stormwater Overflow Assessment was submitted previously in AER 2016.

Table 4.1.1 - SWO Identification and Inspection Summary Report

WWDL Name / Code for Storm Water Overflow	Irish Grid Ref.	Included in Schedule A4 of the WWDL	Significance of the overflow (High/Med/Low)	Compliance with DoEHLG criteria	No. of times activated in 2017 (No. of events)	Total volume discharged in 2017 (m3)	Total volume discharged in 2017 (P.E.)	Estimated / Measured data
SW-2	284588, 302860	Yes	Medium	Non-Compliant	18	8911	108	Measured

Table 4.1.2 - SWO Identification and Inspection Summary Report

How much sewage was discharged via SWOs in the agglomeration in the year (m3/yr)?	Unknown
How much sewage was discharged via SWOs in the agglomeration in the year (p.e.)?	Unknown
What % of the total volume of sewage generated in the agglomeration was discharged via SWOs in the agglomeration in 2013?	Unknown
Is each SWO identified as non-compliant with DoEHLG Guidance included in the Programme of Improvements?	Yes
The SWO assessment includes the requirements of relevant WWDL Schedules (Yes/No)	Yes
Have the EPA been advised of any additional SWOs / changes to Schedules A/C under Condition 1 ?	N/A

4.2 Report on progress made and proposals being developed to meet the improvement programme requirements.

The Improvement Programme is included in Appendix 7.1.

The Improvement Programme addresses the **Specified Improvement Programmes** as detailed in Schedules A3 and C of the WWDL. It should detail other improvements identified through assessments required under the licence.

Table 4.2.1 - Specified Improvement Programme Summary

Specified Improvement Programmes	Licence Schedule	Licence Completion Date	Date Expired	Status of Works	% Construction Work Completed	Expected Completion Date	Comments
SW-3 - SW-12 Discharges to be Discontinued	A	31/12/2011	Yes	Completed	100%		
Advance Works at waste water treatment plant, including (1) effluent outfall pipeline and associated works, (2) Pumping Station (inlet and outlet), (3) Storm tanks, and (4) Inlet works.	C	01/01/2015	Yes	At planning stage	0%	2020	Project is currently being rescoped
Decommissioning of SW-1 (Existing)	A	31/12/2014	Yes	At planning stage	0%	2020	Project is currently being rescoped

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

Table 4.2.2 - Improvement Programme Summary

Improvement Identifier / Name	Improvement Description	Improvement Source	Progress (% complete)	Expected Completion Date	Comments
No standby pump at main inlet Oriel Road pump station no overhead lifting equipment or gantry to lift pump when required.	Provision and installation of standby pump and overhead lifting equipment and gantry at Oriel road Inlet Pump Station	Improved Operational Control	100%	01/04/2015	Completed 2015
No record of activation or flow measurement from SWO tank at the WWTP	Install SWO measurement /recorder device to measure flows/ record no times it activates	Improved Operational Control	100%	02/08/2016	Flow meter installed on the SWO at the wwtp in 2016 as part of the Flow monitoring and Sampling Programme
Carrickmacross Sewage Scheme Contract 3 (Treatment Plant upgrade and Outfall)	Carrickmacross Sewage Scheme Contract 3 (Treatment Plant upgrade and Outfall)	Drinking Water Abstraction Risk Assessment (Condition 4)	0%		Project currently being rescope
Overflows from storm tank during adverse weather	Extension/ upgrade of aeration tank No 1	Improved Operational Control	0%		Project currently being rescope

Table 4.2.3 - Sewer Integrity Risk Assessment Tool Summary

The Improvement Programme should include an assessment of the integrity of the existing wastewater works for the following:	Risk Assessment Rating (High, Medium, Low)	Risk Assessment Score	Reference to relevant section of AER (e.g. Appendix 2 Section 4).	Specified improvements	Comment
Hydraulic Risk Assessment Score	High	150	Appendix 7.3 AER 2016		
Environmental Risk Assessment Score	Low	500	Appendix 7.3 AER 2016		
Structural Risk Assessment Score	High	150	Appendix 7.3 AER 2016		
Operation & Maintenance Risk Assessment Score	Low	200	Appendix 7.3 AER 2016		
Overall Risk Score for the agglomeration	High	1000	Appendix 7.3 AER 2016		

Section 5. Licence Specific Reports

Licence Specific Reports Summary Table

Licence Specific Report	Required by Condition 5 in Licence	Required in this AER or outstanding from previous AER?	Included in this AER?	Reference to previous AER containing report or relevant section of this AER
Priority Substances Assessment	Required	No	No	AER 2011
Drinking Water Abstraction Point Risk Assessment	Required	No	No	AER 2012
Shellfish Impact Assessment	Not Required	No	No	
Pearl Mussel Report	Not Required	No	No	
Toxicity/Leachate Management	Not Required	No	No	
Toxicity of Final Effluent Report	Not Required	No	No	
Small Stream Risk Score Assessment	Not Required	No	No	
Habitats Impact Assessment	Not Required	No	No	

Licence Specific Reports Summary of Findings

Licence Specific Report	Recommendations in Report	Summary of Recommendations in Report
Priority Substances Assessment	Yes	Screening for priority substances
Drinking Water Abstraction Point Risk Assessment	Yes	To relocate the discharge below the drinking water abstraction point
Shellfish Impact Assessment	No	
Pearl Mussel Report	No	
Toxicity/Leachate Management	No	
Toxicity of Final Effluent Report	No	
Habitats Impact Assessment	No	

5.1 Priority Substances Assessment

The Priority Substance Assessment Report was submitted previously in AER 2011. A summary of the significance and operation is included below.

Table 5.1 - Priority Substance Assessment Summary Report

Does the assessment use the Desk Top Study Method or Screening Analysis to determine if the discharge contains the parameters in Appendix 1 of the EPA guidance?	Desktop study and Screening Analysis
Does the assessment include a review of Trade inputs to the works?	No
Does the assessment include a review of other inputs to the works?	No
Does the report include an assessment of the significance of the results where a listed material is present in the discharge? (e.g. impact on the relevant EQS standard for the receiving water)	Yes
Does the assessment identify that priority substances may be impacting the receiving water?	No
Does the Improvement Programme for the agglomeration include the elimination / reduction of all priority substances identified as having an impact on receiving water quality?	No
Recommendations	Screening for priority substances
Status of any improvement measures required	Screening results submitted with 2012 AER

5.2 Drinking Water Abstraction Point Risk Assessment

The Drinking Water Risk Assessment was submitted previously in AER 2012. A summary of the significance and operation is included below.

Table 5.2 - Drinking Water Abstraction Point Risk Assessment Summary

Is a Drinking Water Abstraction Risk Assessment required in the 2017 AER (or outstanding from a previous AER)?	No
Does the Drinking Water Abstraction Risk Assessment identify whether any of the discharges in Schedule A of the licence pose a risk to a drinking water abstraction?	Yes
Does the assessment identify if any other discharge(s) from the works pose a risk to a drinking water abstraction (includes emergency overflows)?	Yes
What is the overall risk ranking applied by the licensee?	Medium
Does the risk assessment consider the impacts of normal operation?	Yes
Does the risk assessment consider the impacts of abnormal operation (e.g. incidents /overflows)?	Yes
Does the risk assessment include control measures for each risk identified?	Yes
Does the risk assessment consider operational control measures?	Yes
Does the risk assessment include infrastructural control measures?	Yes
Recommendations	To relocate the discharge below the drinking water abstraction point
Does the Improvement Programme for the agglomeration include control measures / corrective actions to eliminate / reduce priority substances identified as having an impact on receiving water quality?	No
Status of any improvement measures required.	Findings from the assessment have been included under the

	programme of improvements required under Condition 5 as part of the contract 3 for Carrickmacross. This is on the IW capital investment programme and is currently being rescoped.
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A copy of the detailed assessment should be included as an appendix to the AER. Where relevant, findings from this assessment should be considered under the Programme of Improvements required under Condition 5.

Section 6. Certification and Sign Off

Table 6.1 - Summary of AER Contents

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 modifications to the existing WWDL? Refer to Condition 1.7 (changes to works/discharges) & Condition 4 (changes to monitoring location, frequency etc.)	No
List reason e.g. failure to complete specified works within dates specified in the licence, changes to monitoring requirements	N/A
Have these processes commenced? (i.e. Request for Technical Amendment / Licence Review / Change Request)	N/A
Are all outstanding reports and assessments from previous AERs included as an appendix to this AER?	Yes
Ensure the following reports are included	

Declaration by Irish Water

The AER contains the following:

- Introduction and background to 2017 AER.
- Monitoring Reports Summary.
- Operational Reports Summary.
- Infrastructural Assessment and Programme of Improvements.
- Licence specific reports
- Certification and Sign Off
- Appendices

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

Signed : 

Date: 22/02/2018

Michael O'Leary
Acting Head of Environmental Regulation

Section 7. Appendices

Appendix 7.1 Statement of Measures / Improvement Programme

Carrickmacross WWTP upgrade works are on the Irish Water Capital Investment Programme. Works are currently being rescoped.

- | | |
|----------|---|
| 1. Issue | Damaged sewer pipe |
| Measure | Robotic repair and sewer liner. 3m of 150mm pipe relined. |
| Status | 100% complete |
| 2. Issue | Manhole covers damaged |
| Measure | New covers and frames fitted |
| Status | 100% complete |
| 3. Issue | Damaged sewer causing infiltration. |
| Measure | Part relining and dig and replace |
| Status | 100% complete |
| 4. Issue | 3 Actuator valves failing on the sand filter |
| Measure | Install 3 no. new valves |
| Status | 100% Complete |
| 5. Issue | Fridge and temp sensors failed on composite sampler |
| Measure | Replace Fridge and temp sensors |
| Status | 100% complete |
| 6. Issue | Chains on scrapers in Clarification tank No 3 require replacement |
| Measure | Replace stainless steel chains and rubber scrapers |
| Status | 100% complete |
| 7. Issue | Faulty VSD at Oriel Rd PS |
| Measure | New replacement VSD |
| Status | 100% Complete |
| 8. Issue | Compressor in sludge press requires replacement |
| Measure | Replace Compressor |
| Status | 100% complete |

Appendix 7.2 Ambient Monitoring

Upstream

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)	Temp °C
11/01/2017	0.01	0.02	1.50	1.90		10.09	8.20	6.30
08/02/2017	0.00	0.02	2.00	1.90		12.40	8.00	6.10
13/03/2017	0.02	0.05	0.50			10.99	8.00	9.80
12/04/2017	0.00	0.04	18.00	1.90		10.55	7.90	11.70
16/05/2017	0.02	0.04	1.30	2.40		9.24	8.30	13.99
14/06/2017	0.00	0.03	3.90	3.10		9.13	8.10	15.20
12/07/2017	0.00	0.28	1.40	1.60		9.38	8.10	12.30
16/08/2017	0.00	0.03	5.90	2.10		8.91	8.00	14.10
18/09/2017	0.00	0.09	1.20	2.90		10.39	8.10	12.10
18/10/2017	0.00	0.03	1.00	2.90		9.88	8.10	12.60
08/11/2017	0.04	0.03	0.50	2.70		11.08	8.20	9.50
04/12/2017	0.02	0.05	1.90	6.10		10.37	7.90	8.30
Mean	0.01	0.06	3.26	2.68		10.20	8.08	11.00
95%ile	0.03	0.17	11.35	4.60		11.67	8.25	14.60

Downstream

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)	Temp °C
11/01/2017	0.04	0.24	3.20	9.30			7.90	7.20
08/02/2017	0.03	0.04	4.00	5.40			7.80	7.20
13/03/2017	0.04	0.05	16.00				7.80	10.80
12/04/2017	0.00	0.02	1.80	6.90			7.80	11.10
16/05/2017	0.07	0.09	1.30	3.00			8.20	15.20
14/06/2017	0.03	0.10	1.10	3.20			8.00	15.60
12/07/2017	0.05	0.10	1.30	2.30			7.90	15.10
16/08/2017	0.05	0.17	2.30	3.70			8.00	15.20
18/09/2017	0.06	0.07	0.50	3.40			7.80	12.20
18/10/2017	0.05	0.08	1.30	3.60			8.00	12.50
08/11/2017	0.02	0.06	0.50	5.10			7.90	9.40
04/12/2017	0.00	0.05	2.70	4.60			8.00	8.10
Mean	0.04	0.09	3.00	4.59			7.93	11.63
95%ile	0.07	0.20	9.40	8.10			8.09	15.38

Entity	Station	Sample Date	Dissolve Oxygen mg/l
Carrickmacross	Downstream	11-Jan-2017	9.78
Carrickmacross	Downstream	8-Feb-2017	11.79
Carrickmacross	Downstream	13-Mar-2017	10.78
Carrickmacross	Downstream	12-Apr-2017	10.43
Carrickmacross	Downstream	16-May-2017	9.2
Carrickmacross	Downstream	14-June-2017	8.78
Carrickmacross	Downstream	12-July-2017	8.85
Carrickmacross	Downstream	16-Aug-2017	8.05
Carrickmacross	Downstream	18-Sep-2017	9.62
Carrickmacross	Downstream	18-Oct-17	9.64
Carrickmacross	Downstream	08-Nov-17	10.06
Carrickmacross	Downstream	04-Dec-17	10.42
		Mean	9.78
		95%ile	11.23