Annual Environmental Report

2018

Castledermot

D0236-01

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1 EXECUTIVE SUMMARY AND INTRODUCTION TO THE 2018 AER

This Annual Environmental Report has been prepared for D0236-01, Castledermot, 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
Small Stream Risk Score Assessment	Yes

1.2 Treatment Type

The agglomeration is served by a wastewater treatment plant Castledermot WWTP with a Plant Capacity PE of 2400. The treatment process includes the following:

1.2.1 Castledermot WWTP

Treatment type	Yes / No	Details
Preliminary Treatment	Yes	Screening, grease & grit removal
Primary Treatment	No	
Secondary Treatment	Yes	Activated sludge
Nutrient Removal	Yes	Phosphorus removal
Tertiary Treatment	No	

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 Castledermot WWTP

Compliance Status	
Were all parameters compliant for Castledermot WWTP treatment plant	No
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
Castledermot WWTP	Liquid Sludge	1219.38	Weight (Tonnes)	1	D0002 - Osberstown
Castledermot WWTP	Cake Sludge	24.66	Weight (Tonnes)	16	D0002 - Osberstown

Annual Statement of Measures

There were no major capital or operational changes undertaken.

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 - Castledermot WWTP

Parameters	Number of Samples	Annual Max	Annual Mean
BOD, 5 days with Inhibition (Carbonaceous BOD) mg/l	11	315	219.56
Suspended Solids mg/l	11	363	195.78
Total Nitrogen mg/l	11	45.5	32.68
Total Phosphorus (as P) mg/l	11	9.25	5.71
COD-Cr mg/l	11	827	523.07
Hydraulic Capacity		1697.3	705.55

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 greater 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 - Castledermot WWTP

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)
Suspended Solids mg/l	30	75	0	12	0	0	3.49	Pass
Total Phosphorus (as P) mg/l	0.7	0.84	0	12	0	0	0.27	Pass
Total Nitrogen mg/l	0	0	0	12	0	0	11.67	N/A
ortho-Phosphate (as P) - unspecified mg/l	0.3	0.6	0	12	0	0	0.1	Pass
COD-Cr mg/l	125	250	0	12	0	0	26.4	Pass
BOD, 5 days with Inhibition (Carbonaceous BOD) mg/l	10	20	0	12	0	0	1.63	Pass
Ammonia-Total (as N) mg/l	0.6	1.2	0	12	1	1	0.52	Fail
pH pH units	6 to 9	0	0	12	0	0	7.36	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):

ELV exceedance caused by cold weather conditions.

Significance of Results:

The WWTP is not compliant with the ELV's set in the Wastewater Discharge Licence. There was 1 exceedance in relation to the Condition 2 Ammonia-N ELV. The impacts on receiving waters is discussed in Section 2.3.

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 - Castledermot WWTP

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	277669, 184624	TPEFF1400D0236SW001	No	No	No	No	Poor
Downstream	277507, 184609	TPEFF1400D0236SW001	No	No	No	No	Poor

2.3.2 Ambient Monitoring Parameter Summary - Castledermot WWTP

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
pH pH units	RS14L010120	7.98	RS14L010140	8.02		

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	RS14L010120	0.025	RS14L010140	0.031	0.14	4.3
Suspended Solids mg/l	RS14L010120	1.7	RS14L010140	1.7		
Total Nitrogen mg/l	RS14L010120	5.26	RS14L010140	5.46		
Dissolved Oxygen % Saturation	RS14L010120	102.58	RS14L010140	103.78		
ortho-Phosphate (as P) - unspecified mg/l	RS14L010120	0.05	RS14L010140	0.06	0.075	4
Dissolved Oxygen mg/l	RS14L010120	10.08	RS14L010140	10.2		
Total Phosphorus (as P) mg/l	RS14L010120	0.08	RS14L010140	0.09		
BOD - 5 days (Total) mg/l	RS14L010120	1.1	RS14L010140	1.2	2.6	3.8
COD-Cr mg/l	RS14L010120	12.1	RS14L010140	13.7		

Significance of Results:

The WWTP discharge was not 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 - Castledermot WWTP

Parameter	Influent mass loading (kg/year)	Effluent mass emission (kg/year)	Efficiency (% reduction of influent load)
TP	1471.68	69.43	95.28
TN	8426.16	3057.42	63.72
COD	134866.19	6914.15	94.87
SS	50479.26	914.37	98.19
cBOD	56611.41	426.81	99.25

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.

Castledermot WWTP	
Peak Hydraulic Capacity (m^3/day) - As Constructed	1350
DWF to the Treatment Plant (m^3/day)	540
Current Hydraulic Loading - annual max (m^3/day)	1697.3
Average Hydraulic loading to the Treatment Plant (m^3/day)	705.55
Organic Capacity (PE) - As Constructed	2400
Organic Capacity (PE) - Collected Load (peak week)	1757
Organic Capacity (PE) - Remaining	643
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
4	Blocked Sewer	0	4

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)
Non-compliance	Other	1	No	Yes

3.4.2 Summary of Overall Incidents

Question	Answer
Number of Incidents in 2018	1
Number of Incidents reported to the EPA via EDEN in 2018	1
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)
There is no Sludge and Other Input data for the Treatment Plant included in the AER.							

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
SW002	277640, 184625	Yes	Low	Meeting	0	0	Monitored
SW003	277632, 184624	Yes	Low	Meeting	2	503	Monitored

4.1.2 Inspection Summary Report

SWO Summary	
How much sewage was discharged via SWOs in the agglomeration in the year (m^3)?	503
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
Upgrade of SWO to comply with the criteria outlined in the DoEHLG "Procedures and criteria in relation to storm water overflows, 1995". SW2	C	31/12/2012	Yes	Works Completed		
Upgrade of SWO to comply with the criteria outlined in the DoEHLG "Procedures and criteria in relation to storm water overflows, 1995". SW3	C	31/12/2012	Yes	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	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
Small Stream Risk Score Assessment	Yes	2017	Yes	5.1
Priority Substances Assessment	Yes	2011	No	N/A

5.1 Small Stream Risk Score Assessment

The Small Stream Risk Score Assessment Report is included in Appendix 7.1 - Small Stream Risk Score Assessment. A summary of the findings of this report is included below.

Parameter	Value
Condition 5 Improvement Programme Reference	N/A
Does SSRS indicate discharges are posing a pollution risk?	No
Downstream SSRS Water Quality Risk	At Risk
SSRS Required?	Yes
Upstream SSRS Water Quality Risk	At Risk
What is Downstream SSRS?	6.4
What is Upstream SSRS?	5.6

Parameter	Value
Does improvement programme include any procedural and/or infrastructural works?	N/A

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 modifications to the existing WWDL?	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: 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 - Small Stream Risk Score Assessment

Small Stream Risk Score (SSRS) Assessment

CASTLEDERMOT WASTEWATER AGGLOMERATION

Co. Kildare

October 2018

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University College Cork (UCC)
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For: Kildare County Council, Water Services Section, Osberstown WWTP, Kildare County Council, Naas, Co. Kildare

Document Control:

Version	Date	Author	Signature
1	02/12/2018	L. Williams	

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1 INTRODUCTION

This report sets out findings of Small Stream Risk Score (SSRS) assessments at sites upstream and downstream of Castledermot Waste Water Treatment Plant (WWTP), Co. Kildare. The discharge is to the Lerr River.

Assessments were carried out on October 2nd 2018, in good weather conditions during below average flow conditions.

SSRS is a biological risk assessment system for detecting potential sources of diffuse pollution in 1st and 2nd order streams that may be causing main channel sites to fail in reaching Good Ecological Status (Anon., 2009). Sites are evaluated based on their macroinvertebrate assemblage and are assigned to one of 3 risk categories: “At risk”, “May be at risk” and “Probably not at risk”. “Risk” refers to the risk of the watercourse causing water quality problems in larger waterbodies downstream as a result of being polluted.

2 METHODOLOGY

2.1 SSRS

Samples were collected according to the EPA Standard Operating Procedure for River Monitoring adhering to ISO Standard for kick sampling. Under this system, standard 2-minute, travelling, kick-samples are taken in the fast flowing (riffle) areas of the rivers using a long-handled sampling net (250 mm width, mesh size 0.25mm). Riffle areas of streams receive preference in sampling, as the fauna of riffles tends to be more sensitive to pollution impacts. Stone washing is employed to ensure that "clinging" species, e.g. leeches and gastropods, are adequately collected.

Samples were washed and placed in a large, white plastic tray on the bankside and covered in stream water. Samples were then carefully examined and identified in the field, recording absolute abundance of faunal groups for SSRS assessment purposes. Where necessary, and for quality control purposes, same samples were preserved in situ with 70% IMS alcohol; placed in labelled plastic bags and brought back to the laboratory to check identification.

Scores are calculated by examining the relative abundance of faunal groups and through use of standard SSRS fieldsheets and score calculator (Anon., 2009). Scores can range between 0 (lowest; poor water quality) and 11.2 (highest; good water quality). Risk category is assigned based on the individual site score as follows: >7.25 = Probably not at risk; >6.5 – 7.25 = Indeterminate, stream may be at risk; <6.5 = Stream at risk.

3 RESULTS

3.1 SSRS Summary

Appendix 1 contains the SSRS field sheets with score calculations included. **Table 1** summarises the location, SSR score and risk category for upstream and downstream sites. Sampling occurred on October 2nd 2018.

Table 1: SSRS summary - Castledermot WWTP

Site	Location (X, Y)	SSRS	SSRS Risk Category
Upstream	277665 184642	5.6	At risk
Downstream	277465 184580	6.4	At risk

3.2 Water Quality

Both sites were "At risk" in 2018 according to the SSRS; the downstream site slightly better quality than upstream. Scores were indicative of slight-moderate organic pollution at both sites. As in previous years, the upstream site recorded the sensitive mayfly, *Rithrogenia semicolorata,* which is a species that tends to hatch in the stream in the autumn and requires reasonably good water quality. The main difference between the sites was increased pollution tolerant fauna (snails, worms, midges and fly larvae) at the upstream site relative to downstream.

3.3 Site Photographs

Plate 1: Castledermot WWTP - upstream SSRS site, view u/s (2/10/18)

Plate 2: Castledermot WWTP - downstream SSRS site, view d/s (2/10/18)

3.4 SSRS Comparison 2014 - 2018

Table 2 compares SSRS results for sampling 2014 to 2018. **Figure 1** shows the trend over the past five years. Both sites were 'At Risk' each year except 2017, when the upstream site resulted in "Indeterminate – May be at risk". In 2018, the downstream site was slightly better quality than upstream, although both sites were "At Risk" and of moderate to poor quality. Figure 1 tends to show an overall improvement in the stream during 2018, compared to previous years.

Table 2: SSRS Comparison 2014 – 2018 Castledermot WWTP

Site	SSRS					SSRS Risk Category				
	2014	2015	2016	2017	2018	2014	2015	2016	2017	2018
U/S	5.6	5.6	3.2	7.2	5.6	At risk	At risk	At risk	Indet. – may be at risk	At risk
D/S	3.2	3.2	4	4.8	6.4	At risk	At risk	At risk	At Risk	At risk

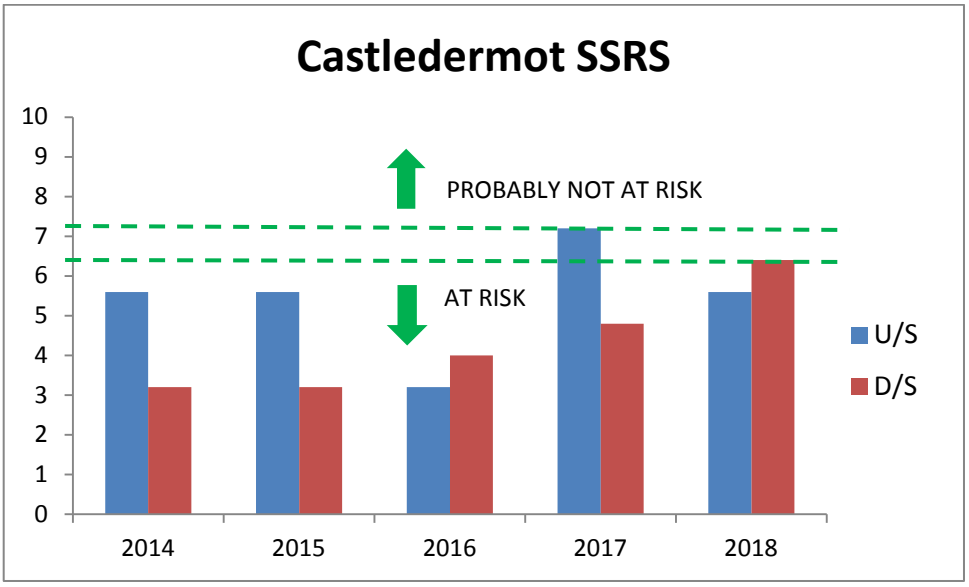


Figure 1 – SSRS Comparison 2014 - 2018 Castledermot WWTP

4 REFERENCES

Anon. (2009) Small Streams Risk Score (SSRS) Training Manual. A pollution investigation tool for use in the field. White Young Green, Apex Business Centre, Blackthorn Road, Sandyford, Dublin.

APPENDIX 1 SSRS Sheets

River: LERR **Code:** — **Date:** 2/10/18 **Time:** 15-30

Station no. U/S **Location:** CASTLEDERMOT U/S **Grid (6 figure):** S 77665 84642

Stream Order: —

Stream flow: Riffle ✓ Riffle/Glide Slow flow

Modifications: Y/N Canalised-widened-bank erosion-arterial drainage Deepened.

Dominant Types:
Bedrock
Boulder (>128mm)
Cobble (32-128mm) +
Gravel (8-32mm) ++
Fine Gravel (2-8mm) ++
Sand (0.25-2mm) +
Silt (<0.25mm) +

Slope: Low – Medium – High – Very High

Geology: Calcareous-Siliceous-Mixed

Substratum Condition: Calcareous-Compacted-Loose - Normal

Substratum: Stoney bottom-Muddy bottom-Mud over stones

Degree of siltation: Clean-Slight-Moderate-Heavy

Depth of mud: None: <1cm: 1-5cm: 5-10cm: >10cm

Litter: None – Present – Moderate - Abundant

Shading: High – Moderate – Low - None

Cattle access Y: upstream – downstream ok N

Photo: Y / N

Field Chemistry	
DO%	
DO mg/l	
Temp (°C)	
Conductivity	
pH	
Bank width (cm)	6.5m
Wet width (cm)	3.0m
Avg Depth (cm)	10cm
Staff gauge	

Velocity	Colour
Torrential	None ✓
Fast ✓	Slight
Moderate ✓	Moderate
Slow	High
Very slow	

Clarity	Discharge
Very clear	Flood
Clear ✓	Normal
Slightly turbid	Low ✓
Highly turbid	Very Low
	Dry
	Recent Flood

Filamentous Algae: None – Present – Moderate - Abundant

Sewage Fungus: None – Present – Moderate - Abundant

Main land use u/s: Pasture, Bog, Forestry, Urban ✓, Tillage ✓, Other

Sample retained: Y / N

Sampled in Minutes: Pond net x 1-5; Stone wash x 0.5; Weed sweep x

General Comments: Natural concretions on substrates. Vaucheria (pollution tolerant macro algae ++). Low diversity fauna.

Macroinvertebrate Composition

The macroinvertebrates are divided into the following 5 specific groups:
- Group 1 = Ephemeroptera (3-tails) – note that tails may be damaged during sampling
- Group 2 = Plecoptera (2-tails) - note that tails may be damaged during sampling
- Group 3 = Trichoptera
- Group 4 = G.OL.D (Gastropoda, Oligochaeta and Diptera)
- Group 5 = *Asellus*
- Calculate the total number of taxa and relative abundance of each macroinvertebrate group below: (Abundance – Ab)

Relative Abundance	
1-5	1
6-20	2
21-50	3
51-100	4
101+	5

Ephemeroptera:		Plecoptera:	
Ecdyonurus Ab		*Leuctra* Ab	1
Rhithrogena Ab	1	*Isoperla* Ab	
Heptagenia Ab		*Protonemura* Ab	
Ephemerella Ab		*Amphinemura* Ab	
Caenis Ab		*Perla* Ab	
Paraleptophlebia Ab		*Dinocras* Ab	
Ephemera danica Ab		Other Plecop Ab	
Other Ephem Ab		Other Plecop Ab	
Total no. of taxa 1	**Total Relative Abundance** 1	**Total no. of Taxa** 1	**Total Relative Abundance** 1

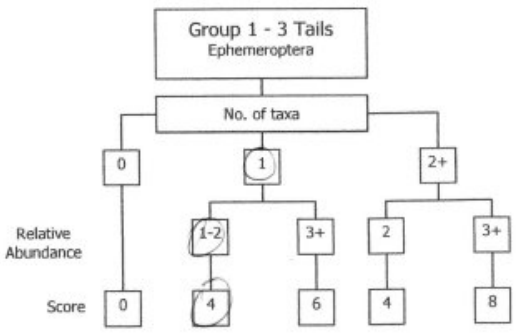
Trichoptera:		G.OL.D:				Asellus:	
Hydropsychidae Ab	3	*Lymnaea* (G) Ab		Chironomidae (D) Ab	2	Absent	
Polycentropodidae Ab		*Potamopyrgus* (G) Ab	3	*Chironomus* (D) Ab		Few/Low	✓
Rhyacophila Ab		*Planorbis* (G) Ab		Simuliidae (D) Ab	1	Common/ Numerous	
Philopotamidae Ab		*Ancylus* (G) Ab		*Dicranota* (D) Ab	1		
Limnephilidae Ab		*Physa* (G) Ab		Tipulidae (D) Ab			
Sericostomatidae Ab	1	*Lumbriculus* (Ol) Ab		Ceratopogonidae (D) Ab			
Glossosomatidae Ab		*Eiseniella* (Ol) Ab		Other GOLD Ab			
Lepidostomatidae Ab		Tubificidae (Ol) Ab	1				
Other Trichoptera Ab							
Total no. of Taxa 2	**Total Relative Abundance** 4	**Total no. of Taxa** 5		**Total Relative Abundance** 8			

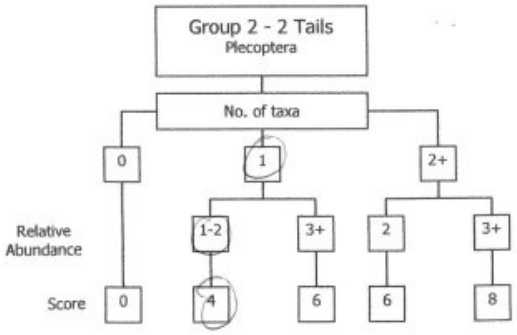
NOTE: *Asellus* must be recorded as absent if none are found

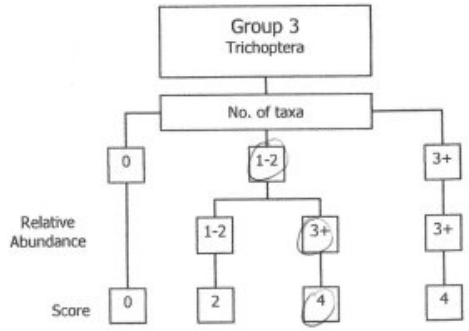
NOTE *Baetis* is an Ephemeropteran and is the most commonly occurring invertebrate genus in streams in Ireland. It is vital that *Baetis* is not counted in SSRS. See Appendix B for more details on how to identify *Baetis*.

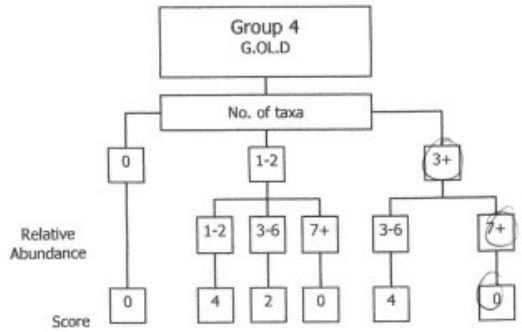
CASTLEDERMOT U/S

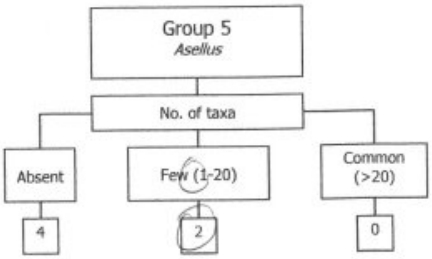
Step 1. Calculate the Index Score by circling the appropriate box representing the total number of taxa and the total abundance calculated from ***each macroinvertebrate group*** calculated from page 1 of the recording sheet and enter in to the boxes in Step 2.











Step 2

a) Index Score Group 1	4
b) Index Score Group 2	4
c) Index Score Group 3	4
d) Index Score Group 4	0
e) Index Score Group 5	2

Step 3. Calculate the Total Index Score, the Average Index Score and the SSR Score using the boxes below

Total Index Score (TIS) sum (a+b+c+d+e)	14	Average Index Score (AIS) TIS/5 (5 for 5 groups)	2.8	**SSR Score** (AIS x 2)	5.6

Step 4. Assess the stream by comparing the final SSR score with the categories below and tick the appropriate box

> 7.25 Probably not at risk		> 6.5 – 7.25 Indeterminate Stream may be at risk		<6.5 Stream at risk	✓

Surveyor (signed): [signature] Name (print): LAUREN WILLIAMS Date: 30 / 11 / 18

River: LERR.	**Code:**	**Date:** 2/10/18.	**Time:** 15·00.
Station no. D/S	**Location:** CASTLEDERMOT D/S.		**Grid (6 figure):** S 77465.
	Stream Order:		**Stream flow:** S4642. Riffle ✓ Riffle/Glide ✓ Slow flow

Field Chemistry	
DO%	
DO mg/l	
Temp (°C)	
Conductivity	
pH	
Bank width (cm)	6M.
Wet width (cm)	2·8M.
Avg Depth (cm)	11 cm.
Staff gauge	

Velocity	Colour
Torrential	None ✓
Fast ✓	Slight
Moderate	Moderate
Slow	High
Very slow	

Clarity	Discharge
Very clear	Flood
Clear ✓	Normal
Slightly turbid	Low ✓
Highly turbid	Very Low
	Dry
	Recent Flood

Modifications: Y/N Canalised-widened-bank erosion-arterial drainage Deepened.

Dominant Types:
Bedrock +
Boulder (>128mm)
Cobble (32-128mm) +
Gravel (8-32mm) ++
Fine Gravel (2-8mm) +
Sand (0.25-2mm) +
Silt (<0.25mm)
Calcified concretions.

Slope: Low – Medium – High – Very High

Geology: Calcareous-Siliceous-Mixed

Substratum Condition: Calcareous-Compacted-Loose - Normal

Substratum: Stoney bottom-Muddy bottom-Mud over stones

Degree of siltation: Clean-Slight-Moderate-Heavy

Depth of mud: None: <1cm: 1-5cm: 5-10cm: >10cm

Litter: None – Present – Moderate - Abundant

Filamentous Algae: None – Present – Moderate - Abundant

Main land use u/s: Pasture, Bog, Forestry, Urban ✓, Tillage ✓, Other

Sample retained: Y / N

Shading: High – Moderate – Low - None

Cattle access Y: upstream – downstream or N

Photo: Y / N

Sewage Fungus: None – Present – Moderate - Abundant

Sampled in Minutes:
Pond net x 1·5
Stone wash x 0·5
Weed sweep x

General Comments: Natural concretions – substrates compacted. Low diversity of fauna.

Macroinvertebrate Composition

The macroinvertebrates are divided into the following 5 specific groups:
- Group 1 = Ephemeroptera (3-tails) – note that tails may be damaged during sampling
- Group 2 = Plecoptera (2-tails) - note that tails may be damaged during sampling
- Group 3 = Trichoptera
- Group 4 = G.OL.D (Gastropoda, Oligochaeta and Diptera)
- Group 5 = *Asellus*
- Calculate the total number of taxa and relative abundance of each macroinvertebrate group below: (Abundance – Ab)

Relative Abundance	
1-5	1
6-20	2
21-50	3
51-100	4
101+	5

Ephemeroptera:		**Plecoptera:**	
Ecdyonurus Ab		*Leuctra* Ab	1
Rhithrogena Ab		*Isoperla* Ab	
Heptagenia Ab		*Protonemura* Ab	
Ephemerella Ab	1	*Amphinemura* Ab	
Caenis Ab		*Perla* Ab	
Paraleptophlebia Ab		*Dinocras* Ab	
Ephemera danica Ab		Other Plecop Ab	
Other Ephem Ab		Other Plecop Ab	
Total no. of taxa	1	**Total no. of Taxa**	1
Total Relative Abundance	1	**Total Relative Abundance**	1

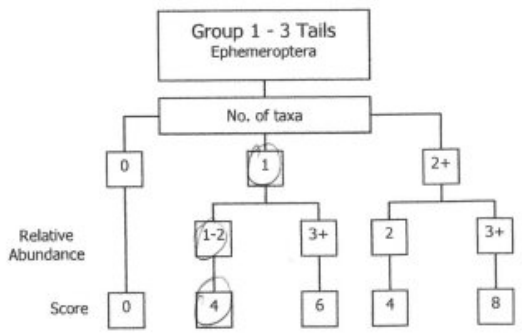
Trichoptera:		**G.OL.D:**				**Asellus:**	
Hydropsychidae Ab	4	*Lymnaea* (G) Ab		Chironomidae (D) Ab	3	Absent	✓
Polycentropodidae Ab		*Potamopyrgus* (G) Ab	3	*Chironomus* (D) Ab		Few/Low	
Rhyacophila Ab		*Planorbis* (G) Ab		Simuliidae (D) Ab	2	Common/ Numerous	
Philopotamidae Ab		*Ancylus* (G) Ab		*Dicranota* (D) Ab			
Limnephilidae Ab		*Physa* (G) Ab		Tipulidae (D) Ab			
Sericostomatidae Ab		*Lumbriculus* (Ol) Ab		Ceratopogonidae (D) Ab			
Glossosomatidae Ab		*Eiseniella* (Ol) Ab		Other GOLD Ab			
Lepidostomatidae Ab		Tubificidae (Ol) Ab	1				
Other Trichoptera Ab							
Total no. of Taxa	1	**Total Relative Abundance**	4	**Total no. of Taxa**	4	**Total Relative Abundance**	9

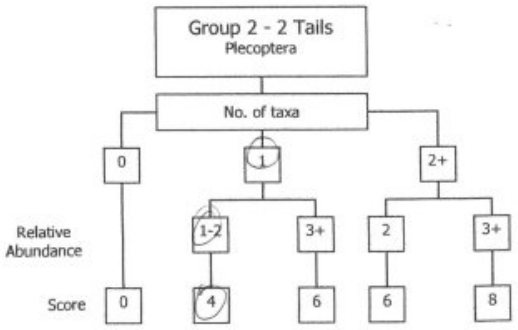
NOTE: *Asellus* must be recorded as absent if none are found

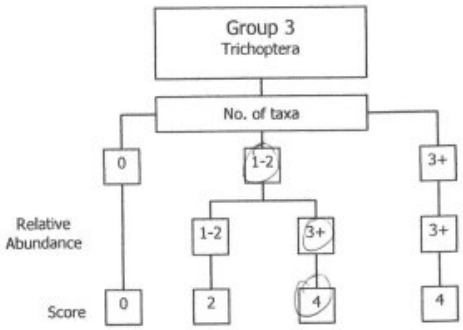
NOTE *Baetis* is an Ephemeropteran and is the most commonly occurring invertebrate genus in streams in Ireland. It is vital that *Baetis* is not counted in SSRS. See Appendix B for more details on how to identify *Baetis*.

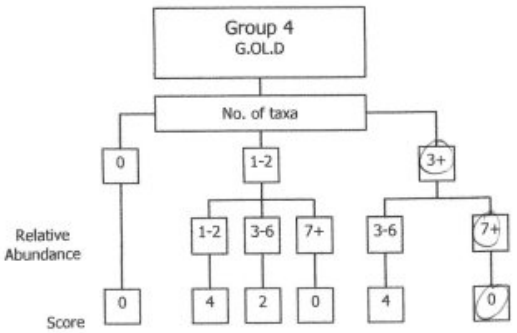
CASTLEDERMOT D/S.

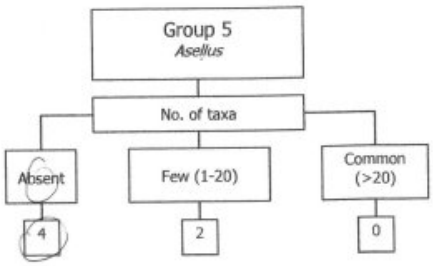
Step 1. Calculate the Index Score by circling the appropriate box representing the total number of taxa and the total abundance calculated from ***each macroinvertebrate group*** calculated from page 1 of the recording sheet and enter in to the boxes in Step 2.











Step 2

a) Index Score Group 1	4
b) Index Score Group 2	4
c) Index Score Group 3	4
d) Index Score Group 4	0
e) Index Score Group 5	4

Step 3. Calculate the Total Index Score, the Average Index Score and the SSR Score using the boxes below

Total Index Score (TIS) sum (a+b+c+d+e) 16

Average Index Score (AIS) TIS/5 (5 for 5 groups) 3.2

SSR Score (AIS x 2) 6.4

Step 4. Assess the stream by comparing the final SSR score with the categories below and tick the appropriate box

> 7.25 Probably not at risk	> 6.5 – 7.25 Indeterminate Stream may be at risk	<6.5 Stream at risk
		✓

Surveyor (signed): _____ Name (print): LAUREN WILLIAMS Date: 30 / 11 / 18