#### **Powerscourt Paddock**

# 2019 Ecological Survey



**Final Report** 

16th March 2020

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# **Powerscourt Paddock**

# 2019 Ecological Survey

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#### **Powerscourt Paddock**

#### 2019 Ecological Survey

# 1. Introduction

A baseline habitat condition and ecological survey and habitat management plan was prepared for the Powerscourt Paddock upland farm in 2018<sup>1</sup> and the measures within same underwent screening for Appropriate Assessment<sup>2</sup>.

The implementation of the management prescriptions in the plan began in 2019. The management prescriptions in the SUAS plan for this upland farm set out to address the impacts highlighted in that report so progress is made towards attaining **Favourable status** for the Annex I habitats present on the site – principally **4010 Northern Atlantic Wet Heaths with** *Erica tetralix*, **4030 Dry Heath** and **4060 Alpine and Boreal Heath**. The major impacts to the habitats in this upland farm arise predominantly from under grazing (and historical overgrazing in the valley areas), lack of movement of sheep across the hill resulting in under-grazing in many areas, lack of burning, vegetation management of dry heath through flailing (which has been successful in some parts but not in others), and recreational access resulting in localised peat erosion.

The extent of habitats present within the Powerscourt Paddock upland farm and their affinities to either Fossitt (Level 3) or Annex I habitats were mapped as presented on **Figures 1** and **2** (See **Appendix 1**) and their conservation status was assessed and mapped as shown on **Figure 3** (See **Appendix 1**). A series of management prescriptions were drawn up for the Powerscourt Paddock upland farm as detailed in **Table 1** and mapped on **Figure 4** (See **Appendix 1**).

# 2. SUAS Vegetation Management Measures

The proposed management measures for the Powerscourt Paddock upland farm under SUAS are as follows:

## Year 1 (2019)

- 1. Control burn a number of small sections in area 8. Cut up to a maximum of 13ha, in sections of approx. 2-3ha in size. These areas should be dispersed around area 8, and away from previously cut areas to encourage sheep to spread out more over this area. Fire control lines, at least 3m wide shall be cut around each section, either by tractor mounted machine or by hand, to ensure these controlled burning areas are contained. This controlled burning will help build up experience among the farmers and in future years they may be able to work with much smaller control lines. Controlled burning may be carried out either in the spring or the autumn (or both) so long as it is within the legal burning season and has the approval of NPWS.
- 2. Spray Bracken in area 4. A number of small areas, totalling up to 1-2ha, to be trialled in 2019. As this area is not suitable for tractors, control will involve the application of asulox herbicide, by means of knapsack sprayer, hand lance or such other handheld device as is

<sup>&</sup>lt;sup>1</sup> Wilson, F. (2019). Ecological Baseline Survey prepared for Powerscourt Paddock upland farm as part of the Commonage Management Plan for SUAS. 27th January 2019. Unpublished report for SUAS EIP.

<sup>&</sup>lt;sup>2</sup> Wilson, F. (2019). Report for Screening for Appropriate Assessment for a Commonage Management Plan at Powerscourt Paddock, Roundwood, Co. Wicklow in accordance with the requirements of Article 6(3) of the EU Habitats Directive. 11th February 2019. Unpublished report for SUAS EIP.

licenced for this product. The use of asulox is subject to emergency licence granting of full licence approval for this product in 2019.

3. Mulch up some of the brash left in the previously cut sections in area 8. This can be done using tractor mounted flail cutter is a number of sections and then the brash removed from part of these areas. It is planned to burn some of this brash in at least one of the cut areas to see how this affects recovery of heath vegetation.

#### Year 2 (2020)

- 1. Control burn a number of small sections in area 8. Cut up to a maximum of 13ha in 2020, in sections of approx. 2-3ha in size. These areas should be dispersed around area 8, and away from previously burnt/cut areas to encourage sheep to spread out more over this area.
- 2. Spray further sections in area 4, up to 5ha for bracken during 2020.

#### Year 3 (2021)

- 1. Control burn a number of small sections in area 8. Cut up to a maximum of 13ha in 2021, in sections of approx. 2-3ha in size. These areas should be dispersed around area 8, and away from previously burnt/cut areas to encourage sheep to spread out more over this area.
- 2. Spray further sections in area 4, up to 5ha for bracken during 2021.

#### Year 4 (2022)

- 1. Control burn a number of small sections in area 8. Cut up to a maximum of 13ha in 2022, in sections of approx. 2-3ha in size. These areas should be dispersed around area 8, and away from previously burnt/cut areas to encourage sheep to spread out more over this area.
- 2. Spray further sections in area 4, up to 5ha for bracken during 2022.

#### Shepherding

Average time per shepherding: 6 Hours

No of times sheep are to be shepherded: 2-3 Times per week from 1<sup>st</sup> May to 30<sup>th</sup> November.

Identified objective of the shepherding;

- Sheep are to be kept from straying off the commonage onto surrounding areas.
- Move off sheep from other commonages.
- Monitor sheep health for signs of tick diseases.
- Count numbers of deer grazing the commonage and areas they are grazing.

#### Other works to be carried out for entire commonage

Use feed buckets to encourage more sheep grazing the commonage in the Jan/Feb and the April/May period.

Use the feed buckets to move grazing pressure to overgrown areas in Jan/Feb time.

#### Details of sheep stocking rates proposed

Accurate sheep numbers will be obtained in year 1 and over the remaining 3 years, they will be increased gradually up to GLAS stocking rates.

#### **Ecological Assessment**

The commonage was surveyed in November 2019 by Faith Wilson to examine and review the implementation of the proposed measures and make any recommendations regarding same. The observations and recommendations from this visit are set out below.

# 3. 2019 Walkover Survey

# The following observations, comments on same and recommendations on the works completed in 2019 are presented.

## Bracken control

There has been some bracken control implemented in Area 4, which is great to see as this is one of the main challenges in many upland sites. This was done on 5<sup>th</sup> September 2019 using knapsack sprayers. A rate of 11 litres of asulox per ha was applied and an area of 2 ha was treated. The results of this will not be clear until the growing season begins in 2020.



Plate 1. Bracken control in Area 4.

## Observations/Challenges

It was planned to do the spraying earlier, but the first contractors lined up to do it fell through and getting suitable weather conditions when the second contractor was available was difficult.

We picked an easier area to trial the spraying in year 1 to see if it was possible with knapsack sprayers and whether it is practical or not. If successful, it is planned to move out from here into more difficult areas next year.

Getting water on to the site was an issue, as the contractors wouldn't use water from the stream (from experience small bits of debris in the water keeps blocking up the sprayers). Quite a lot of water was required to dilute the asulox and to keep refilling the knapsack sprayers.

It is great to see a good dense area of bracken had been sprayed. If possible it would be good in 2020 to attempt to target those areas of bracken which are encroaching on or invading dry heath as this is compromising the favourable condition of this Annex I habitat.

## **Firebreaks for controlled burning**

A number of new firebreaks for controlled burning were created on the 12<sup>th</sup> and 14<sup>th</sup> February 2019 on the hillside using a flail mulcher behind a tractor. These can be seen in the Bing Maps imagery of the commonage as presented on **Figure 1** below. The older flailed areas near the forestry can also be seen.



Figure 1. Old flailed areas and new firebreaks cut on Powerscourt Paddock (Bing Maps).

The prepared control burning areas were located up towards the top of the commonage to encourage the sheep up away from the old flailed areas and the hill ditch near the lower enclosed fields. The areas prepared varied in size from 1 to 2ha. No burning was done on Powerscourt Paddock in these areas in 2019 as Brian Mulligan worked with the farmers on Glasnamullen commonage to carry out their controlled burning and there was no other suitable day to do the burning on Powerscourt.

Based on the experience next door in Glasnamullen where only one area got burnt each day, one could expect to do 2 or even 3 sections per day. If we get 2 suitable days in the year and can do 3 sections in a day that is 6 sections in a year (which is optimistic and probably wouldn't happen every year). The maximum area that should be burnt/flailed is 13 ha per year (but note that applies to areas actually requiring burning).

## Observations/Challenges

The project was constrained as to where areas could be prepared for burning by where the tractor could travel, and where the contractor could access the hill from. The cut areas have avoided those

areas which were previously flailed, which is very welcome and were obviously constrained as to where the machine could safely travel and work.

In general the areas prepared for burning may possibly be too large and would allow sheep to remain grazing in them on the regrowth for a long time and possibly not move across the hill? This may not of course be the case but is an observation based on what had been seen in the large flailed areas on Powerscourt Paddock where sheep are tending to congregate (see below). It might be worth seeing if smaller patches of heather in a patchwork are prepared for burning would this encourage sheep to move on more readily as fodder within regenerated areas will be browsed out earlier and the sheep will have to find fresh forage.



Plate 2. Some flailed areas have regenerated well with ling heather.

# **Previously Flailed Areas**

The areas previously flailed adjoining the forestry were also examined and whilst here has been some recovery here sheep are tending to congregate here as evidenced by their dunging and presence.

Some areas within the flailed areas are dominated by bilberry whilst others are dominated by ling.

There are still large areas which show little to no regeneration of vegetation. The movement of sheep back down towards the lower enclosed fields on the farm coupled with natural runoff and the slope are causing significant erosion and damaged areas of bare peat. It is recommended that gazers are excluded from this area through the erection of a temporary fence to allow the peat to stabilise and the vegetation to recover.



Plate 3. Sheep are tending to congregate within the flailed areas resulting in bare peat, dunging and poor regeneration of ling heather and bilberry.



Plate 4. Significant erosion, bare peat and damage is occurring on the slope adjoining the forestry.



Plate 5. Some of the older flailed areas remain slow to recover and regenerate.

The issue with overgrazing in the old cut areas will be tackled in 2020.

4. Appendix 1. Maps & Management Recommendations



Figure 1. Habitats mapped to Level Three (Fossitt, 2000) within Powerscourt Paddock.



Figure 2. Habitats mapped according to their correspondence with Annex I habitats within Powerscourt Paddock.



Figure 3. Habitat Condition Assessment for Powerscourt Paddock.



Figure 4. Management measures for Powerscourt Paddock.

Id	Annex	Annex I	Fossitt	Habitat	Area	Area	Conservation Status	Management Measure
	I Code	Description	Code		(m)	(Ha)		
1	4030	Dry Heath	HH1	Dry heath	274984	27.50	Favourable	Ensure no burning Monitor grazing and sheep movements to keep in good condition.
2			HD1	Dense Bracken	22404	2.24	Unfavourable - Inadequate	Bracken Control
3	4030	Dry Heath	HH1	Dry heath	4421	0.44	Unfavourable - Inadequate	Monitor grazing and sheep movements. Move sheep out of this area where they tend to congregate.
4			HD1	Dense Bracken	156617	15.66	Unfavourable - Inadequate	Bracken Control
5	4030	Dry Heath	HH1	Dry heath	7629	0.76	Unfavourable - Inadequate	Monitor grazing and sheep movements. Move sheep out of this area where they tend to congregate.
6			HD1	Dense bracken	168820	16.88	Unfavourable - Inadequate	
7	4030	Dry Heath	HH1	Dry heath	118500	11.85	Unfavourable - Inadequate	Monitor grazing and sheep movements. Move sheep out of this area where they tend to congregate.
8	4030	Dry Heath	HH1	Dry heath	780057	78.01	Unfavourable - Inadequate	Controlled burning of some areas of tall leggy heather further up the slopes away from the bottoms Raking/removal of vegetation from flailed areas where regeneration has failed Trial excluding sheep through fencing from some flailed areas to see what regeneration is like in the absence of grazing (provide flight diverters for grouse on any fencing used) Trial flailing using various methods – working up, down or across the direction of slope Flailing at different heights Flailing with different machines – mulching/shredding as opposed to simply cutting once Controlled burn within previously flailed area
9	4030	Dry Heath	HH1	Dry heath	75370	7.54	Unfavourable - Inadequate	Raking/removal of vegetation from flailed areas where regeneration has failed Trial excluding sheep through fencing from some flailed areas to see what regeneration is like in the absence of grazing (provide flight diverters for grouse on any fencing used)

# Table 1. Habitats present on Powerscourt Paddock and Management Recommendations.

Id	Annex I Code	Annex I Description	Fossitt Code	Habitat	Area (m)	Area (Ha)	Conservation Status	Management Measure
10	4030		HH1/GS3	Dry heath/Acid grassland Mosaic	108668	10.87	Unfavourable - Inadequate	Monitor grazing and sheep movements. Move sheep out of this area where they tend to congregate.
11	4030	Dry Heath	HH1	Dry heath	12710	1.27	Unfavourable - Inadequate	Monitor grazing and sheep movements. Move sheep out of this area where they tend to congregate.
12	4030	Dry Heath	HH1	Dry heath	14557	1.46	Unfavourable - Inadequate	Monitor grazing and sheep movements. Move sheep out of this area where they tend to congregate.
13	4030		HH1/GS3	Dry heath/Acid grassland Mosaic	25364	2.54	Unfavourable - Inadequate	Monitor grazing and sheep movements. Move sheep out of this area where they tend to congregate.
14	4030	Dry Heath	HH1	Dry heath	51253	5.13	Unfavourable - Inadequate	Monitor grazing and sheep movements. Move sheep out of this area where they tend to congregate.
15	4010	Northern Atlantic Wet Heaths with <i>Erica tetralix</i>	HH3/GS3	Wet heath/Acid grassland Mosaic	153800	15.38	Unfavourable - Inadequate	Monitor grazing and sheep movements. Move sheep out of this area where they tend to congregate.
16	4030	Dry Heath	HH1	Dry heath	3972	0.40	Unfavourable - Inadequate	Monitor bracken and control as required.
17	4010	Northern Atlantic Wet Heaths with <i>Erica tetralix</i>	HH3/GS3	Wet heath/Acid grassland Mosaic	13116	1.31	Unfavourable - Inadequate	Monitor bracken and control as required.
18			PF2	Poor fen and flush	23319	2.33	Favourable	Monitor sheep movements and ensure area remains in good condition
19	4010	Northern Atlantic Wet Heaths with <i>Erica tetralix</i>	HH3	Wet heath	323042	32.30	Favourable	Ensure no burning Monitor grazing and sheep movements to keep in good condition.
20	4060	Alpine and Boreal Heath	HH4	Montane heath	211035	21.10	Unfavourable - Inadequate	Monitor erosion along the walking track and remediate.
21	4030		HH1/GS3	Dry heath/Acid grassland Mosaic	86773	8.68	Unfavourable - Inadequate	Monitor grazing and sheep movements. Move sheep out of this area where they tend to congregate. Monitor erosion along the walking track.
22	4060	Alpine and Boreal Heath	HH4	Montane heath	117239	11.72	Unfavourable - Inadequate	Monitor erosion along the walking track and remediate.

Id	Annex	Annex I	Fossitt	Habitat	Area	Area	Conservation Status	Management Measure
	I Code	Description	Code		(m)	(Ha)		
23	4010	Northern Atlantic Wet Heaths with	HH3	Wet heath	166822	16.68	Favourable	Ensure no burning Monitor grazing and sheep movements to keep in good condition.
		Erica tetralix						condition.
24	4010	Northern Atlantic Wet Heaths with <i>Erica tetralix</i>	HH3	Wet heath	159313	15.93	Favourable	Ensure no burning Monitor grazing and sheep movements to keep in good condition.

# 5. Water Quality

Water samples were taken on the Glen River and the unnamed tributary of the River Dargle in February 2019 at four sampling locations as shown on **Figure 5** below. The water samples were assessed by Carl Dixon. The upstream section of the Glen River (PP1) was assessed as a stream at risk of not achieving 'Good' water quality status, whereas the downstream sampling station (PP4) was assessed as 'Indeterminate – may be at risk of not achieving 'Good' water quality status '.

The upstream section of the unnamed tributary of the River Dargle (PP2) was assessed as 'Indeterminate – may be at risk of not achieving 'Good' water quality status ', whereas the downstream sampling station (PP3) was assessed as a stream at risk of not achieving 'Good' water quality status.

The Small Streams Risk Score (SSRS) is a biological risk assessment system for identifying rivers that are definitely 'at risk' of failing to achieve the 'good' water quality status goals of the Water Framework Directive (WFD). It was developed by the Environmental Protection Agency (EPA) in association with the Western River Basin District (WRBD) in 2006. The main aim of the SSRS is to support the programme of measures for the WFD, which has its main objective to achieve 'good' water quality status in all water bodies by 2020.



Figure 5. Water quality sample locations at Powerscourt Paddock.

# SUAS Water Quality Sampling - Glen River

River:	Code:	Date:	Sample Taken By:
Glen River	IE_EA_10D010010	22/02/2019	Faith Wilson
Gien River			
Sample Number:	Location:	Stream Order:	Grid Reference:
PP1	Powerscourt paddock	1 <sup>st</sup> order	O 18478 10816
111	Commonage – just		0 10470 10010
	below Djouce		
	Mountain		
Velocity:	Clarity:	Colour:	Discharge:
Torrential	Very clear	None	Flood
Fast	Clear	Slight	Normal
Moderate	Slightly turbid	Moderate	Low
Slow	Highly turbid	High	Very low
Very Slow			Dry
, ci y 010 W			Recent flood
Modifications: Y/N	Dominant Types:	Slope:	Geology:
Canalised	Bedrock	Low	Calcareous
Widened	Boulder (>128mm)	Medium	Siliceous
Bank erosion	Cobble (32 - 128mm)	High	Mixed
Arterial drainage	Gravel (8 – 32mm)	Very high	IVIIXed
Arterial urainage	Fine gravel (2 - 8mm)	very nigh	
	Sand (0.25mm – 2mm)		
	Silt (<0.25mm)		
	Silt (<0.25mm)		
Substratum	Substratum:	Degree of Siltation:	Depth of Mud:
Condition:	Substratum.	Degree of Situation.	Deptil of Mud.
Compacted	Stoney bottom	Clean	None
Loose	Muddy bottom (peat)	Slight	<1cm
Normal	Mud over stones	Moderate	1-5cm
Normai		Heavy	5-10cm
		Ticavy	>10cm
Litter:	Filamentous Algae:	Stream Flow:	Shading:
None	None	Riffle	High
Present	Present	Riffle/glide	Moderate
Moderate	Moderate	Slow flow	Low
Abundant	Abundant	510W 110W	None
Abunuani	Abunuani		INUITE
Stock Access:	Sewage Fungus:	Sample Type (Mins):	Main Land Use
STUCK ALLESS.	Sewage rungus:	Sample Type (MIIIS):	Adjacent/Upstream:
Sheep	None	Kick sample - 3	Pasture
Deer	Present	Stone washing	Bog
		0	<u> </u>
	Moderate	Weed sweep	Forestry
	Abundant		Tillage
			Urban
			Other



Plate 1. Photographic record of sampling location.

River:	Code:	Date:	Sample Taken By:
Glen River	IE_EA_10D010010	22/02/2019	Faith Wilson
Sample Number:	Location:	Stream Order:	Grid Reference:
PP4	Powerscourt paddock	1 <sup>st</sup> order	O 18965 11493
	Commonage – just		
	above where path		
	crosses the stream		
Velocity:	Clarity:	Colour:	Discharge:
Torrential	Very clear	None	Flood
Fast	Clear	Slight	Normal
Moderate	Slightly turbid	Moderate	Low
Slow	Highly turbid	High	Very low
Very Slow			Dry

			Recent flood
Modifications: Y/N	<b>Dominant Types:</b>	Slope:	Geology:
Canalised	Bedrock	Low	Calcareous
Widened	Boulder (>128mm)	Medium	Siliceous
Bank erosion	Cobble (32 - 128mm)	High	Mixed
Arterial drainage	Gravel (8 – 32mm)	Very high	
	Fine gravel (2 - 8mm)		
	Sand (0.25mm – 2mm)		
	Silt (<0.25mm)		
Substratum Condition:	Substratum:	Degree of Siltation:	Depth of Mud:
Compacted	Stoney bottom	Clean	None
Loose	Muddy bottom (peat)	Slight	<1cm
Normal	Mud over stones	Moderate	1-5cm
		Heavy	5-10cm
			>10cm
Litter:	Filamentous Algae:	Stream Flow:	Shading:
None	None	Riffle	High
Present	Present	Riffle/glide	Moderate
Moderate	Moderate	Slow flow	Low
Abundant	Abundant		None
Stock Access:	Sewage Fungus:	Sample Type (Mins):	Main Land Use Adjacent/Upstream:
Sheep	None	Kick sample - 3	Pasture – Upland Grassland
Deer	Present	Stone washing	Bog
	Moderate	Weed sweep	Forestry
	Abundant		Tillage
			Urban
			Other
			Oulei



Plate 1. Photographic record of sampling location.

## **Glen River**

Station no.		Code: Date: Location:		Time: Grid (6 figure):	
		Stream Order:		Stream flow: Riffle	
D0%	hemistry	Modifications: Y/N Canalised-wid arterial drainage	ened-bank erosion-	Riffle/Glide Slow flow	
DO mg/l Temp (*C)		Dominant Types: Bedrock			
Conductivity pH		Boulder (> 128mm) Cobble (32-128mm) Gravel (8-32mm)			
Bank width (cm) Wet width (cm)		Fine Gravel (2-8mm) Sand (0.25-2mm)			
Avg Depth (cm)		Silt (<0.25mm) Slope: Low - Medium - High - Ve	w High		
Stall gauge Velocity Tomential	Colour	Geology: Calcareous-Sliceous-Mi	ed	Shading: High - Moderat	
Fast Moderate	None Slight Moderate	Substratum Condition: Calcareo Loosa - Normal Substratum:	us-Compacted-	Cattle access YI upstream	n - Cownstream or N
Slow Very slow Clarity	High	Stoney bottom-Muddy bottom-Mud		Photo: Y / N	
Very clear	Discharge Flood	Degree of siltation: Cean-Sigh- Depth of mud: None: <1cm: 1-5c			
Clear	Normal	Litter: None – Present – Moderate Filamentous Algae:		En ana En	
Slightly turbid Highly turbid	Low Very Low	None – Present – Moderate - Abund Main land use u/s:	lant Sample	Sewage Fungus: None – Present – Moderate Sampled in Minutes:	- Abundant
	Dry Recent Flood	Pasture Urban Bog Tillage	retained: Y/N	Pond net x Stone wash x	
General Comme	1	Forestry Other		Weed sweep x	
<ul> <li>Group 2 = §</li> <li>Group 3 = 3</li> <li>Group 4 = 6</li> <li>Group 5 = A</li> <li>Calculate th</li> </ul>	Recoptera (2-taile)-, Irichoptera 3.OL.D (Gestropoda 4eei\ur	ils) – note thattails may be damaged note that tails may be damaged durin (Bigochesta, and Diptera) to and relative abundance of each ma	g sampling croinvertebrate.gro.	up belows (Abundance - Ab)	1-5 1 6-20 2 21-50 3 51-100 4 101+ 5
Ephomeroptera:	Ena	Estimanuar Ab   Plecop Rhithmanna Ab Estatopena Ab Estatopena Ab Estatopena Ab Estatopena Ab Linkerna Ab merro (denizabb		is Proton Artobio Di	euctra Ab
		Other Epibern Ab		Other g	lecop Ab ]
Total no. of tax		tive Atuntance Total no	of Taxa	Total Relative Abu	undance .
Total no. of taxo Trichopteras	a Texa Ana Hudeopourbidae Polycantropodidae <i>Rituracophil</i> Philocotamidae Limpephildae	Ab G.OLD: Lystram eAb Batamopyga eAb Batamopyga eAb Aroula Ab Aroula	(G) Ab (G) Ab (G) Ab (G) Ab (G) Ab (G) Ab	Chirocomus(D) Ab Semulichae (D) Ab Dicrocoste (D) Ab Tissulichae (D) Ab	Aselfus Absent () Frew (1-30) Contimon (>20)
	a Total Rose Hudeconychidae Polycentropodidae <i>Rhyac</i> obii Philopotamidae	Ab         G.OLD:         Listian           Ab         Bistamagnaga         Bistamagnaga           Ab         Bistamagnaga         Bistamagnaga           Ab         Abash         Bistamagnaga           Ab         Bistamagnaga         Bistamagnaga           Ab         Bistamagnaga         Bistamagnaga           Ab         Listbooka         Bistamagnaga           Ab         Listbooka         Bistamagnaga           Ab         Eistennelle         Bistamagnaga	(G) Ab (G) Ab (G) Ab (G) Ab (G) Ab (G) Ab (D) Ab (D) Ab	Chirocomudae. (D) Ab Chirocomus (D) Ab Simulidae. (D) Ab Dicracoste. (D) Ab	Asellus: Absent () Rev (1-20) Common

p PL

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.



River:		17	Code:	Dal	Las		Time:			
Station no.			Location:	Dai	ue:					
Station no.			Stream Or	dam			Grid (6 figure Stream How:	:];		-
							Riffle			
Field C	hemistry		Modifications Interial drainag		widened-bank ero	15101-	Riffle/Glide Slow flow			
00 mg/l	-		Dominant Ty	PRSI		1	SIGH TION	-		
Temp (*C)	1		Redrock			1		-		
Conductivity	1.000	0	koulder (> 178 Jobbie (32-128	mm)					1	
PH	1		sravel (6-32mi	n)		T				
Bank width (cm)			ine Gravel (2- land (0.25-2m			1				
Wet width (on) Aug Depth (cm)	-		ilt (<0.25mm)			F	and the los			
Staff gauge	-	5	lope Low -!	fedium - High -	Very High	1		-		-
Velocity	C			areous-Silceous-			Shading: High-	Moder	ate - Low - N	one
Tomential	N	ione «			reaus-Compacted		Cattle access Yill	upstrei	am - downstr	eam or
Fast Moderate		igra L	oose - Normal							
Slow			iubstratum:	Muddy bottom-M	Auf over stores	H	Photo: Y/N	-		-
Very slow Clarity					she-Moderate-Hea					
Very clear		Contract of the			-Scm: S-10cm: >					
Clear	-			Present - Moder		1782.00				
			ilamentous /		and - Manufranking			1		
Slightly turbid	1			- Moderate - Ab	undant		Sewage Fungus: None – Present – M	Inders	te Ahuntan	
Highly turbid		y Low	lain land use	u/s:	Sample	-	Sampled in Minu	tes:	Section Section	
	Recer	nt Flood B	esture bo	Urban	retained:		Pand net x			
	n es:	nt Flood B	orestry	Tilage Other	Y/N		Pond net x Stone wash x Weed sweep x		Relative	
<ul> <li>Group 2 = 8</li> <li>Group 3 = 3</li> </ul>	nts: rates are Spherosig Seconsig	Ma divided into th ptara (3-tails) - not a	og orestry Croinverte a folkwing 5 sp – note thattail a that tails ma	Tilage Other brate Com sectic goups I may be damaged di	Y/N position		Stone wash x		Abunda 1-5 6-20	nce
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The macroinventeb Group 1 = § Group 3 = 1 Group 3 = 1 Group 4 = 0 Group 5 = A	ness phemeno lecopreco richopoles c.OL.D (S traillus	Ma chudad into th aptras (3-tails) - not a, initropoda Oli mber of taoa a	og onestry croinverte a folkoving 5 sj – note thattails ma gochesta and I	Tilage Other ebrate Com sectic groups Is may be damag y be damaged of Xiptera) undance of each	Y/N position wedduring sampling	8	Stone wash x Weed sweep x	-Ab)	Abunda 1-5 6-20 21-50 51-100 101+	nce
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pp4

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. Group 1 - 3 Tails Ephemeroptera Group 2 - 2 Tails Plecoptera Т No. of taxa No. of taxa 1 0 2+ 0 24 1-2 1-2 3+ 3+ 3+ 2 3+) 6 4 0 4 6 Score 8 0 6 8 Group 3 Trichoptera Group 4 G.OL.D No. of taxa No. of taxa 1 0 3+ Ū 0 3+ 1-2 3-6 7+ 3-6 7+ Relative 1-2 3+ 0 (4) 2 0 4 0 2 0 4 Score Step 2 Group 5 Asellus a) Index Score Group 1 T b) Index Score Group 2 No. of taxa c) Index Score Group 3 d) Index Score Group 4 Common (>20) Absent Few (1-20) e) Index Score Group 5 6 2 0 Step.3. Calculate the Total Index Score, the Average Index Score and the SSR Score using the boxes below Total Index Score (TIS) sum (atbtctdte) Average Index Score (AIS) TIS/S (5 for 5 groups) 3.6 (AIS x 2) 7. 2 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 <6.5 Stream at risk Indeterminate nay be at risk L Surveyor (signed): Name (print): CAM/ plyon Date:

PP4

# SUAS Water Quality Sampling - Unnamed watercourse - tributary River Dargle

River:	Code:	Date:	Sample Taken By:
Unnamed watercourse	IE_EA_10D010010	22/02/2019	Faith Wilson
– tributary River			
Dargle			
Sample Number:	Location:	Stream Order:	Grid Reference:
PP2	Powerscourt Paddock	1 <sup>st</sup> order	O 17731 11245
	Commonage – north of		
	Middle Hill, upper		
	reaches, above oak		
	trees		
37.1.4			D' I
Velocity:	Clarity:	Colour:	Discharge:
Torrential	Very clear	None	Flood Normal
Fast Moderate	Clear	Slight Moderate	Low
Slow	Slightly turbid Highly turbid		Very low
Very Slow	Flightly turbid	High	Dry
very Slow			Recent flood
Modifications: Y/N	Dominant Types:	Slope:	Geology:
Canalised	Bedrock	Low	Calcareous
Widened	Boulder (>128mm)	Medium	Siliceous
Bank erosion	Cobble (32 - 128mm)	High	Mixed
Arterial drainage	Gravel (8 – 32mm)	Very high	
0	Fine gravel (2 - 8mm)		
	Sand (0.25mm – 2mm)		
	Silt (<0.25mm)		
Substratum	Substratum:	Degree of Siltation:	Depth of Mud:
Condition:			
Compacted	Stoney bottom	Clean	None
Loose	Muddy bottom (peat)	Slight	<1cm
Normal	Mud over stones	Moderate	1-5cm
		Heavy	5-10cm
			>10cm
Litter:	Filamentous Algae:	Stream Flow:	Shading:
None	None	Riffle	High
Present	Present	Riffle/glide	Moderate
Moderate	Moderate	Slow flow	Low
Abundant	Abundant		None
Stock Access:	Sewage Fungus:	Sample Type (Mins):	Main Land Use
Stock Inccost	Serrage I unguo.	sumple type (minis).	Adjacent/Upstream:
Sheep	None	Kick sample - 3	Pasture
Deer	Present	Stone washing	Bog
	Moderate	Weed sweep	Forestry
	Abundant		Tillage
			Urban
			Other



Plate 1. Photographic record of sampling location.

River:	Code:	Date:	Sample Taken By:
Unnamed watercourse - tributary River Dargle	IE_EA_10D010010	22/02/2019	Faith Wilson
Sample Number:	Location:	Stream Order:	Grid Reference:
PP3	Powerscourt Paddock Commonage – north of Middle Hill, lower reaches, pool below oak and birch trees	1 <sup>st</sup> order	O 18353 12072
Velocity:	Clarity:	Colour:	Discharge:
Torrential	Very clear	None	Flood
Fast	Clear	Slight	Normal
Moderate	Slightly turbid	Moderate	Low
Slow	Highly turbid	High	Very low
Very Slow		- 11511 	Dry
			Recent flood
Modifications: Y/N	Dominant Types:	Slope:	Geology:
Canalised	Bedrock	Low	Calcareous
Widened	Boulder (>128mm)	Medium	Siliceous
Bank erosion	Cobble (32 - 128mm)	High	Mixed
Arterial drainage	Gravel (8 – 32mm)	Very high	
0	Fine gravel (2 - 8mm)		
	Sand (0.25mm – 2mm)		
	Silt (<0.25mm)		
Substratum Condition:	Substratum:	Degree of Siltation:	Depth of Mud:
Compacted	Stoney bottom	Clean	None
Loose	Muddy bottom (peat)	Slight	<1cm
Normal	Mud over stones	Moderate	1-5cm
		Heavy	5-10cm
			>10cm
Litter:	Filamentous Algae:	Stream Flow:	Shading:
None	None	Riffle	High
Present	Present	Riffle/glide	Moderate
Moderate	Moderate	Slow flow	Low
Abundant	Abundant		None
Stock Access:	Sewage Fungus:	Sample Type (Mins):	Main Land Use Adjacent/Upstream:
Sheep	None	Kick sample - 3	Pasture
Deer	Present	Stone washing	Bog
	Moderate	Weed sweep	Forestry
	Abundant		Tillage
			Urban
			Other



Plate 1. Photographic record of sampling location.

# Unnamed tributary of Dargle River

Station no. Field C		Code: Date:		Time:	
		Location: Stream Order:		Grid (6 figure): Stream Now:	
DO%	hemistry	Modifications: Y/N Canalised-wid	ened-bank erosion-	Riffle Riffle/Glide	
D0 mg/l		arterial drainage Dominant Types:		Slow flow	
Temp (*C) Conductivity		Bedrock Boulder (>128mm)			
pH		Gravel (8-32mm)			
Bank width (cm) Wet width (cm)		Fine Gravel (2-8mm) Sand (0.25-2mm)			
Bug Depth (cm)		Silt (<0.25mm) Sloper Low - Medium - High Ver	ry High		
Staff gauge Velocity Torrential	Colour	Geology: Calcareous-Sticeous-Mor	ed	Shading: High - Moderate -	
Fast Moderate	Slight Moderate	<ul> <li>Substratum Condition: Calcareo</li> <li>Loose - Normal</li> </ul>	us-Compacted-	Cattle access Y: upstream -	overnaciesari or N
Siow	High	Substratum: Stoney bottom-Muddy bottom-Mud		Photo: Y/ N	
Very slow Clarity Very clear	Discharge	Degree of siltation: Gean-Sigit- Depth of mud: None: <10mi 1-50			
Gear	Normal	Litter: None - Present - Moderate	- Abundant		
Slightly turbid	Low	Filamentous Algae: None – Present – Moderate - Abund	iant	Sewage Fungus: None – Present – Moderate - A	loundant
Highly turbid	Very Low Dry	Main land use u/s: Pasture Urban	Sample retained:	Sampled in Minutes: Pond net x	
	Recent Flood	Bog Tillage Forestry Other	Y/N	Stone wash x Weed sweep x	
<ul> <li>Group 2 = 1</li> <li>Group 3 = 1</li> </ul>	Piecoptera (Z-calis) - Trichoptera G.OL.D (Gastropoda	alls) - note that tails may be damaged note that tails may be damaged during & Oligochesta and Diptera)	g sampling		5 1 20 2 -50 3 -100 4
					1+ C
Calculate th	he total number of ta	era and relative abundance of each ma		p below: (Abundance – Ab)	1+ 5
Calculate th     Ephemeropheral	he total number of ta	Estivisional Ab Plecope Rhithmonea Ab		p below: (Abundance - Ab) 10 Leux	1+ 5 ctra Ab j ería Ab
<ul> <li>Calculate th</li> </ul>	he total number of ta	Estivorum Ab Plecope Rhithmoena Ab bisotagemin Ab		p below: (Abundance – Ab)   10 Leva Jsop Bostonezi	1+ S ctra Ab i eth Ab i wca Ab i
Calculate th	he total number of to	Esthuosene Ab Plecope Rhithmoene Ab Heotagenie Ab Enhemenelle Ab Denis Ab		p below: (Abundance-Ab)   10 Leve Bostonen Attochisen B	1+ S ctra Ab   ecta Ab   waa Ab   waa Ab   ecta Ab
<ul> <li>Calculate th</li> </ul>	he total number of to	Esthonuna Ab Plecope Rhinkmosena Ab Hisotageneik Ab Enhemmenik Ab Calenter Ab akonschlake Ab emers denizaAb		p below: (Abundance-Ab)   10 Leve Bostonen Attochisen B	1+ 5 ctra Ab c
Galculate # Ephemeropherai	An total number of ta	Ecolocoust Ab Plecope Rhitmosena Ab Meatagenin Ab Echemenelle Ab Chentie Ab althoschrieben Ab Other Ephem Ab		p below: (Abundiance- Ab)   10 Lew Ison Abuninem Abuninem Abuninem Dinc Other Bie Other Bie	1+         5           cma Ab
<ul> <li>Calculate th</li> </ul>	An total number of ta An Est An An An An An An An An An An An An An	Esthorouna Ab Plecope Rhithmoena Ab Beatagenin Ab Centric Ab Calentorohistin Ab other Ephetin Ab et re Raundace et Ab (G.OL.D: Lonneer	b. of Taxa	p below: (Abundiance – Ab) 10 Leva Rostanoas Abushiseo Abushiseo Chiar Blac Other Blac Total Relative Abure Chistoposticles (D) Ab 148	1+ 5 ctra Ab   enda Ab
Giculate the Ephemeropterat	An total number of ta An 5pt a 0 Total Res Biolomeschile Polyceneropodia Rhyacoph	Ecolycosurar Ab Plecoper Rhitmozena Ab Hextapensi Ab Ecolemonelik Ab Chemis Ab Chemis Ab Chemis Ab Chemis Ab About Abo	0. of Taxa (6) Ad (6) Ad (6) Ad	p below: (Abundiance-Ab) 10 Lew Bootenees Atronhisees	1+         5           ctra Ab         1           etha Ab
Griculate # Ephemeroptera: Total no. of tax	An total number of ta An Sph Ball of Total Res Bolivenetropodda Rhisecaath Bhisecaath Bhisecaath Bhisecaath	Ecolococara Ab Rintmozena Ab Meatagenin Ab Echemenelle Ab Chentis Ab Chentis Ab Chentis Ab Other Ephem Ab Other Ephem Ab Chen Echemenelle Ab Beatanogenza Bab Bab Ab Ab Ab Ab Ab Ab Ab Ab Ab	0. of Taxa (6) Ad (6) Ad (6) Ad	p below: (Abundiance-Ab) 10 Lew Bootenees Atronhisees	1+         5           ctra Ab         1           eda Ab         1           ucra Ab
Griculate # Ephemeroptera: Total no. of tax	An total number of ta An An An An An An An An An An	Ecolycosura Ab Plecope Rhitmozena Ab Hextaponik Ab Cotenie Ab Chenie Ab Chenie Ab Alextaponik Ab Chenie Ab Alextaponik Ab Chenie Ab Alextaponik Ab	0. of Taxa (6) At (6) At (6) At (6) At (6) At (6) At (6) At (6) At	p below: (Abundiance - Ab) 10 Lew Ison Abunnet	1+         5           ctra Ab         1           stra Ab         1           ura Ab         1           ura Ab         1           stra Ab
Giculate the Ephemeropheras	An total number of ta An Sph Ball of Total Res Bolivenetropodda Rhisecaath Bhisecaath Bhisecaath Bhisecaath	Ecolourum Ab Plecopu Rhitmoena Ab Heatagatain Ab Caentier Ab Caentier Ab Caentier Ab Selecocolistika Ab Other Epbean Ab ethol G.OL.DT Lumane abb Bioscopyaga Babb Clambiculos Ab Clambiculos Ab Clambiculos Caentier Ab Clambiculos Clambiculos Clambiculos Clambiculos	tera:	p below: (Abundiance - Ab) 10 Lew Ison Abunnem	1+         5           ctra Ab         1           eth Ab         1           uca Ab         1           dance         3           uca /ba         3

PP2

Step.1, Calculate the Index Score by circing 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.



PP3

River:		Code			\$		Time:			
Station no.		Loca	Location:				Grid (6 figure):			
		Stre	am Order	1		1	Stream flows	-	11000	1000
E-M	emistry	Made	and and the	Constant of	dered-bank en		Riffle			
D0%	insury		il drainage	N Canadado-Wi	cieneo-cank en		Riffie/Glide			
DO mo/l		- Domi	nant Types:				Slow flow			
		- Bedro								-
Temp (°C)	and the second sec	Boulde	er (>128mm)							
Conductivity		Cobbie	= (32-128mm	1						-
pH	Service of the servic	Grave	l (8-32mm)							
Bank width (cm)		- Fine G	ravel (2-8mm	n)						
Wet width (cm)			0.25-2mm}							
Aug Depth (cm)		Sit ( <i< td=""><td>0.25mm)</td><td></td><td></td><td>-</td><td></td><td>-</td><td></td><td>_</td></i<>	0.25mm)			-		-		_
		Slope	s Low - Medi	um – High – W	ery High	-			Carlo Carlo	-
Stall gauge Velocity	Colour			us-Sliceous-Mi			Shading: High-I	Modera	Re-Low-R	ione
Torrential	None	-				-	Manufa and and a			
Fast	Slight	- Subst	tratum Cond	lition: Calcaner	ous-Compacted	F 1	Cattle access Y: v	spotrea	m - cowns	rean o
Moderate	Moderate	Loose	- Normal			1000				
Slow	High					H	Diata W/M	-	-	
Very slow				idy bottom-Mu			Photo: Y/N			
Clarity	Discharge	Degre	e of siltatio	n: Cean-Slight	-Moderate-Hes	evy				
Very clear	Flood	Depth	of mude He	ner « lem 1.5	icm 5-10cm >	10m				
Gear	Normal	1.000								
	recental		Litten None - Present - Moderate - Abundant							
Slightly turbid	Low	Filam	entous Alga	et		1	Sewage Fungus:	Gale -	and the second	
Highly turbid		None-	Present - M	oderate - Abun		11	None - Present - M	loderar	re - Abundar	t.
	Very Low		and use u/s		Sample		Sampled in Hinu	ces:		-
	Dry	Pasture		Urban	retained:	1	Pondinetix			
	Recent Flood	8og Forest/		Tillage Other	Y/N	1 3	Stone wash x			
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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.