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RIVER ECOLOGY ASSESSMENT REPORT

2023

GROVE TURKEYS LTD
SMITHBOROUGH
CO. MONAGHAN

LICENCE NO. P0832-01

Date:	17th July 2023	**Prepared By:**	Martin O'Looney, BSc.
Report Number:	SSRS_21930	**Checked:**	Mike Fraher, BSc.

TABLE OF CONTENTS

EXECUTIVE SUMMARY

Panther Environmental Solutions Ltd (PES Ltd) was commissioned by Grove Turkeys Ltd, Smithborough to carry out an aquatic assessment of the Magherarney River in accordance with the site IE licence.

Monitoring was conducted at two sampling stations, on Tuesday 11th July 2023, under flood to normal flow conditions, which are located upstream and downstream of the discharge point in the Magherarney River. Monitoring was conducted by Martin O'Looney BSc of PES Ltd.

The weather during summer 2023 was characterised by an extended period of very dry and warm weather. However, the heatwave had ceased by the beginning of July 2023, during the time at which the aquatic assessment was completed. Therefore, high temperature and low flow conditions may have caused additional stress upon macroinvertebrate communities within the Magherarney River

Temperature and pH were within the expected ranges. Dissolved oxygen levels remained below level of c.9mg/l O_2 and 80-120%saturation, due to there being no significant riffle area in the near upstream vicinity (i.e. low surface mixing).

Past dredging of the river-bed is evident at MP2 and bank erosion at both locations. No sewage slime or fungus was noted at either monitoring point. However, there was increased bryophyte cover at MP2.

There was no significant difference in the biotic index results obtained from monitoring stations upstream and downstream of the discharge point. However, there was a slight variation in species present between the two monitoring locations, with a higher diversity of more pollution tolerant species at MP2.

The SSRS Methodology classified MP1 and MP2 as 'at risk' with a score of 5.6 at MP1 and 4.8 at MP2.

Overall, the quality of the River remains moderately polluted with both monitoring locations holding a quality rating of Q3.

As per EPA monitoring, the Magherarney River has maintained the status of Q2 to Q3 for the last thirty years at monitoring locations upstream and downstream of this assessment's monitoring locations.

It is concluded that the Grove Turkeys Ltd effluent discharge does not appear to be resulting in a significant negative impact upon the biotic quality of the Magherarney River.

1.0 INTRODUCTION AND SCOPE OF WORK

Grove Turkeys Ltd is a producer and processor of poultry products, mainly Turkeys. This site takes in live turkeys and produces fresh and frozen whole turkeys, and value-added products for the major retail outlets in Ireland and the UK.

The installation is adjacent to the Magherarney Lough but has no discharges to the lake. There is an on-site wastewater treatment plant for treating on-site process and imported effluent. The treated effluent from the wastewater treatment plant is discharged to the Magherarney River.

A local family founded the company in 1972. Kerry Group acquired the company in 1988 and the business continued to grow and expand into new products and markets. In January 2007, the company changed hands in a management buyout (MBO) by a Management team within Kerry Foods. The 2 Sisters Food Group acquired the business in 2016.

The site is licenced to carry out the following activity, under Industrial Emissions Licence No P0832-01;

7.4.1 "The *operation of slaughterhouses with a carcass production capacity greater than 50 tonnes per day*".

11.1 "*The recovery or disposal of waste in a facility within the meaning of the Act of 1996, which facility is connected or associates with another activity specified in this Schedule in respect of which a licence or revised licence under Park IV is in force or in respect of which a licence under the said Part is or will be required.*"

Panther Environmental Solutions Ltd (PES Ltd) was commissioned by Grove Turkeys Ltd to carry out an aquatic assessment of the Magherarney River. This assessment is required as the site discharges treated effluent to the Magherarney River, under IED licence conditions, from its primary and biological effluent treatment plant.

This Aquatic Assessment was compiled as a requirement under the IED licence, as follows:

Schedule C.6 Ambient Monitoring

Receiving Water Monitoring

Location: Upstream & downstream of discharge point.

Parameter	**Monitoring Frequency** Note 1	**Analysis Method/Technique**
Biological Quality (Q) Rating/Q Index	Annually	To be agreed by the Agency

Note 1: Monitoring period - June to September.

2.0 DESCRIPTION OF THE MAGHERARNEY RIVER

Hydrometric Area 36 contains the Erne Catchment (area 4,372 km^2). The River Finn (36F01), of which the Magherarney River is a tributary, rises in the townland of Corragunt, Co Fermanagh, west of Knockatallon in Co Monaghan. It is a tributary of Upper Lough Erne and enters the Erne 6.5km outside Clones. The surface catchments drained by the River Erne discharge to the sea at Ballyshannon, County Donegal.

The Magherarney River IE_NW_36_1082 (36M01) (catchment area 66.6 km^2) rises at Drumloo Lough, west of Scotstown, Co Monaghan, and flows for approximately 16.2 km before meeting the River Finn at Derryleggan, Co. Monaghan.

Figure 2.1: Magherney River, EPA Monitoring Stations and Survey Stations

The Magherarney River is not a designated waterbody for drinking water, nutrient sensitive waters, salmonid species or shellfish. There are no SAC or SPA designated sites within the vicinity of the Magherarney River.

The discharge from the Smithborough UWWTP (D0464-01) [E264465,N318871] is located approximately 1km downstream of the discharge from the Grove Turkeys facility.

The European Communities Environmental Objectives (Surface Waters) Regulations (S.I. 272 of 2009) provide for the classification of surface water bodies by the EPA for the purposes of the Water Framework Directive, and the establishment of legally binding quality objectives for all surface waters.

These regulations establish that those surface waters classified by the Agency as being of "high" or "good" status shall be maintained at their current level, and those surface waters which have been classified as less than "good" status shall be improved to at least good status by 2021.

The EPA Interim Report on the Biological Survey of River Quality - Results of 2004 Investigations stated that the Magherarney River "*had improved below Smithborough', since 2001 but was still far from satisfactory there and again upstream.*'' The river has a biological quality rating of 3 (moderately polluted).

EPA monitoring in 2013 classified the Magherarney River as poor status in the locations of Br East of Smithborough and Magherarney Br. "*A lack of sensitive macroinvertebrate fauna characterised both sites sampled on the Magherarney in 2013. Unsatisfactory ecological conditions have persisted in the Magherarney river for over thirty years.*"

The 2017 EPA monitoring report noted "*The Magherarney River was in quite poor condition at both sites surveyed in September 2017. Cattle access at the upper site (0150) was causing physical damage to the river banks, leading to unnecessary siltation and nutrient inputs.*"

The 2022 EPA monitoring report noted "*Two sites were sampled on the Magherareny in 2022; 0150 (Br E of Smithborough) and 0200 (Magherarney Br). Site 0150 remained in poor ecological condition, however site 0200 improved from poor to moderate condition.*"

Table 2.1: EPA Recording Stations – Q-values

River	**Magherarney River. (36M01)**				
Station Code	**0100**	**0150**	**0200**	**0250**	**0300**
Location	**Magherarney Br 2km NE of Smithborough**	**Br E of Smithborough**	**Magherarney Br**	**Magherarney 0.2 km u/s Maghery R confl**	**Magherarney 0.2 km d/s Maghery R confl**
2022		3	3-4		
2019		2-3	3		
2017		2-3	3		
2013		2-3	2-3		
2010		3	3		
2007			3		
2004		3	3		
2001		2-3	2/0		
1998		3	3		
1997		3	3		
1993		3	3		
1989	2-3	3	2-3	2-3	3
1987	3	3	2-3		
1986			2		2-3
1982	3		2		
1980	3		2-3		
1977			3		

3.0 DESCRIPTION OF MONITORING LOCATIONS

The two selected sampling stations are located upstream and downstream of the discharge point in the Magherarney River.

Table 3.1: Sampling Station Locations

Station	River	Location	Grid Ref
1	Magherarney	Behind Meadows housing estate (West). Upstream of discharge point.	E258530, N 330240
2	Magherarney	Behind Meadows Housing Estate (East). Downstream of discharge point.	E258619, N330365

Appendix A contains a map overview of monitoring locations and the discharge point along the course of the Magherarney River. Further details of monitoring location characteristics are presented within Table B3 in Appendix B.

Monitoring Point 1 is located approximately 35m upstream of the discharge point. It is west of the Meadows Housing Estate. The EPA monitoring location "*Br E of Smithborough*" (Station code RS36M010150) is located approximately 2.2 km upstream of this monitoring point. In 2020, this monitoring position has been moved closer to the discharge point.

Figure 3.1: *Monitoring Point 1*

Monitoring Point 2 is located 100m downstream of the discharge point. It is East of the Meadows Housing Estate. The EPA monitoring location "*Magherarney Br*" (Station code RS36M010200) is located approximately 950m downstream of this monitoring point.

Following the dredging of this section of river several years ago, the substrate of the river continues to change significantly, year on year. Since 2019, a large earth island in the centre of the channel has decomposed and earth deposits are now present on the edges of the channel. In 2023, sections of muddier substrate had a fair cover of sand and fine gravels.

Figure 3.2: *Monitoring Point 2*

4.0 METHODOLOGY

4.1 SAMPLING PERSONNEL & METHOD

Monitoring of the three sampling stations was conducted by Martin O'Looney BSc Env Sci & Tech of PES Ltd on Tuesday 11th July 2023 under flood to normal flow conditions.
Martin has over 9 years of experience undertaking Q values in rivers, successfully completed the SSRS training and QC scheme in 2022 with Aquafact in Galway, is registered with the EPA to carry out SSRS monitoring, and has completed annual quality control in 2023.

The summer of 2023 was generally drier, with higher temperatures than average (https://www.met.ie/climate/past-weather-statements).

Ecological analysis was carried out in accordance with Standard Methods "*Benthic Macroinvertebrates*" Section 10500, Chapter 1, page 10-63 and Toner et al (2005).

Where possible, the following principles in the selecting of sampling locations and the conducting of sampling have been applied;

1. Collect samples in riffles (shallow areas where water breaks over rocks).
2. Sample where the stream flow velocity is at least 0.3 meters per second.
3. Sample substrate composed of course gravel to larger rubble (< 0.3 meters diameter).
4. Sample similar environments and standardize protocols (points 1 – 3) at all assessment sites if possible, particularly if comparisons are being made between or among sites, or at sites over time.

A net of 500µm pore size and a metal frame was used and kick sampling was carried out from one side of the river to the other for a duration of 2 minutes. The net was held against the substrate at a distance of 1-2 feet downstream of where the kicking took place. Where possible, weed sweeps were taken over 1 minute periods. Stone wash samples were also collected from two brick sized stones at all locations where this was possible.

The samples were retained in plastic containers at the sampling site and removed to the laboratory for further analysis. The samples were then sorted live in a white tray under a bench lamp. All macroinvertebrates were preserved in 70% methanol, before being counted and identified to the appropriate taxonomic level.

Kick sampling should preferably be carried out in a riffle area (i.e. shallower areas of water flowing /breaking over stones) or glide area (slightly deeper water with good flow) and the sampling points used were not ideal. Sample stations MP1 / MP2 would be described as deep pool areas with a muddy substrate. Consequently, results may indicate lower quality.

However, sampling locations are defined by previous monitoring history and more appropriate sample locations may not be available within a reasonable distance of the site discharge. It is noted that the upstream and downstream locations are similar in flow profile and substrates.

Sampling occurs during the summer months of June to September, as is required by the sites IE licence, where the lowest flows and highest temperatures typically occur during the year. This period covers the time of year when any impact, both natural and anthropogenic, can have its maximum impact.

As the sampling occurs during the summer period, macroinvertebrate communities are in a state of transition between typical spring community associations and autumn community associations. Although sampling design is intended to reduce the influence of extraneous variables, values of indices may differ during seasons and years because of variations in weather and hydrology.

4.2 EPA Q-RATING METHODOLOGY

The methodology outlined in Toner et al (2005) was followed in order to determine the Biotic Quality Rating (Q) at each monitoring location. Macroinvertebrates were identified down to the lowest taxon as outlined in Appendix I of Toner et al (2005).

In the presence of pollution, characteristic and well-documented changes are induced in the flora and fauna of rivers and streams. The changes which occur are due to the varying sensitivities of the different components of the community to the stresses caused by pollution. It is, therefore, possible to relate certain faunal groupings or community types to particular levels of pollution. Biotic indices are a qualitative measure of the influence of pollution in that they give an indication of the presence and potentially the type (organic, eutrophication or toxicity) of an impact, however, a quantitative measure of the source of the impact is not defined.

Identified macroinvertebrates were grouped into categories based upon their relative sensitivities to pollution, from "Group A" being most sensitive to "Group E" being the most tolerant of pollution. The relative abundances of each group were calculated and the Q-rating for each monitoring station was determined. The correlation between Q values and water quality can be seen in **Table 4.1** below.

Table 4.1: Relationship between Q-value and Water Quality

Biotic Index	Water Quality	Condition	Status
Q5 or Q4-5	Good	Satisfactory (Pristine)	**High Status**
Q4	Fair	Satisfactory	**Good Status**
Q3-4	Transitional (Slight Pollution)	Unsatisfactory	**Moderate Status**
Q3, Q2-3, Q2	Moderately Polluted	Unsatisfactory	**Poor Status**
Q1	Seriously Polluted	Unsatisfactory	**Bad Status**

The intermediate ratings, Q1-2, Q2-3, Q3-4 and Q4-5, are used to denote transitional conditions, ratings within parenthesis, i.e. (Q4), indicate borderline values, and a rating including a zero i.e. Q3/0, indicate toxic effects rather than eutrophication.

Site characteristics for each station have also been included in order to allow a more complete assessment of the ecological make-up at each site. This included an examination of substrate characteristics, riparian vegetation and shade, macrophyte growth and percentage cover.

4.3 SSRS METHODOLOGY

The fieldwork and assessment method followed was such as set out in the "Small Streams Risk Score Method Manual, December 2005".

The SSRS methodology only uses certain biological indicators to calculate the risk. The taxa used have been placed into 5 groups:
Group 1 – Ephemeroptera (Mayflies)
Group 2 – Plecoptera (Stoneflies)
Group 3 – Trichoptera (Caddisflies)
Group 4 – G.Ol.D (Gastropods, Oligochaetes and Dipterns)
Group 5 – Asellus (Waterlouse)

The groupings are based on their sensitivity to organic pollution, e.g., mayflies and stoneflies are sensitive to pollution and are given a high score, whilst taxa within Group 4 are less sensitive and are given a lower score. The overall score for each river sample is based on the number of taxon present in each sample along with the relative abundance of each taxon. These scores are added together and divided by five to give an average index score (AIS). The final SSRS is achieved by multiplying the AIS by 2.

Table 4.2: SSRS Risk Scoring

SSRS Score	Risk Category
<6.5	At Risk
6.5-7.25	Probably at Risk
>7.25	Not at Risk

5.0 RESULTS

5.1 FIELD MEASUREMENT RESULTS FOR THE MAGHERARNEY RIVER.

Table 5.1: Temperature, Dissolved Oxygen and pH Levels

Station	pH	DO (mg/l)	DO (%Sat)	Temperature (°C)
1	8.1	7.72	79.1	16.2
2	7.9	7.19	73.5	16.1

5.2 EPA Q-RATING RESULTS

Lists of species identified and abundance for the sampling stations are provided in Appendix B. The following table outlines the final scores for each of the locations:

Table 5.2: Magherarney River 2023 Q-rating Results

Sensitivity Group	MP1			MP2		
	#Indiv	#Taxon	%Ab	#Indiv	#Taxon	%Ab
A	0	0	0%	0	0	0%
B	0	0	0%	1	1	0%
C	316	9	97%	260	12	93%
D	4	2	1%	6	3	2%
E	5	1	2%	12	2	4%
N/A	0	0	0%	2	1	1%
Q-Rating	**3**			**3**		

Table 5.3: Magherarney River 2023 Survey and Historical Q-values for MP1 and MP2

Station / Year	Q-values	
	MP1	MP2
2023	Q3	Q3
2022	Q3	Q3
2021	Q3	Q3
2020	Q3	Q3
2019	Q3	Q3
2018	Q3	Q3

5.3 SSRS RESULTS

SSRS field sheets for the sampling stations are provided in appendix C. The following table outlines the final scores for each of the locations:

Table 5.4: Small Stream Risk Score (SSRS) recorded at each station

Station	Score	Risk Status
Upstream (MP1)	5.6	At Risk
Downstream (MP2)	4.8	At Risk

Table 5.5: Historical SSRS recorded for MP1 and MP2

Station / Year	SSR Score	
	MP1	MP2
2023	5.6 (At Risk)	4.8 (At Risk)
2022	4.8(At Risk)	5.6 (At Risk)
2021	4.8(At Risk)	4.0 (At Risk)
2020	6.4(At Risk)	5.6 (At Risk)
2019	4.0(At Risk)	4.0 (At Risk)
2018	4.0 (At Risk)	3.2 (At Risk)

6.0 DISCUSSION

6.1 DISCUSSION OF CHEMICAL RESULTS

Field Measurements

pH values recorded in the Magherarney River were within the normal range of values which have been recorded in previous years. All pH measurements were within the 6-9 pH range as specified in the Freshwater Fish Directive (2006/44/EC).

Dissolved Oxygen is essential for the survival of fish and other aquatic life and is an important indicator of pollution and/or eutrophication in rivers. Dissolved oxygen levels in the Magherarney River were below the 9 mg/l O_2 limit, ranging from 7.19 mg/l to 7.72 mg/l.

DO saturation for both monitoring locations were also below the 80 to 120% saturation range as specified in the Environmental Objectives (Surface Waters) Regulations 2009 (S.I. No. 272 of 2009).

Low DO levels are primarily due to the monitoring areas. The monitoring locations are within or closely downstream of pool type areas, with no significant riffle area in close proximity upstream. Therefore, the DO within the river at these locations are not being readily replenished.

6.2 DISCUSSION OF ECOLOGICAL RESULTS

The weather during summer 2023 was characterised by an extended period of very dry and warm weather. However, the heatwave had ceased by the beginning of July 2023, during the time at which the aquatic assessment was completed.

Therefore, high temperature and low flow conditions may have caused additional stress upon macroinvertebrate communities within the Magherarney River

As with previous years, the macroinvertebrate community included predominantly the moderately pollution-tolerant species. However, more sensitive species which had begun to return in 2022 in small numbers, were absent in 2023.

The 2022 monitoring survey was carried out earlier in the season (June vs July) than previous surveys and the 2023 survey. The warm dry period prior to sampling in 2022 was not as long or pronounced as 2023. It is also noted in 2022 that both sites included more significant areas of fine gravels (rather than mud). These factors may account for the presence of more sensitive species in 2022.

Moderate to heavy siltation was noted at both locations in 2023, being more pronounced than in previous years. This may indicate activities upstream influencing baseline water quality in the survey area.

The following table outlines the relationship between the EPA Biotic Index (Q) and the corresponding water quality.

Table 6.1: EPA scheme of Biotic Indices (Q) and its Corresponding Water Quality

Biotic Index	Quality Status	Quality Class
Q5, Q4-5, Q4	Unpolluted	Class A
Q3-4	Slightly Polluted	Class B
Q3, Q2-3	Moderately Polluted	Class C
Q2, Q1-2, Q1	Seriously Polluted	Class D

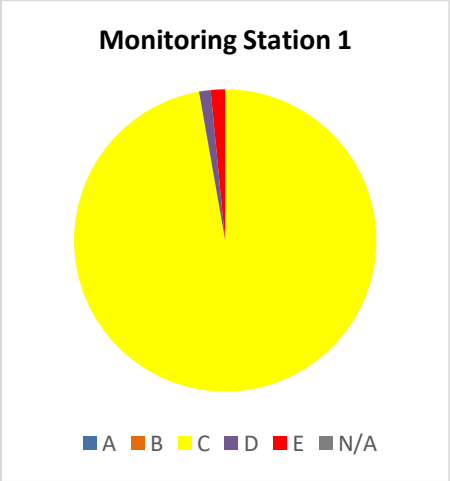

Figure 6.1.: Monitoring location 1

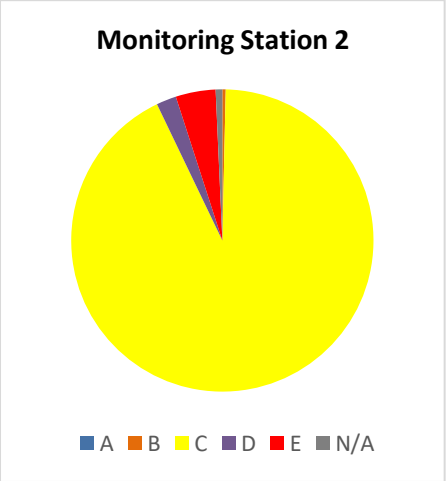

Figure 6.2: Monitoring location 2

Community profiles were similar to previous years with abundance ranging from 281 to 325 between the two locations and a taxon richness of 12 at MP1 and 18 at MP2 in the Magherarney River.

All monitoring stations along the Magherarney River were dominated by Group C species. The Magherarney River was dominated (common to numerous) by pollution tolerant species such as the freshwater shrimp *Gammarus, Chironomidae* flies and *Elminthidae* beetles. The Group C mayfly *Serratella ignita* and caddisfly *Hydropsyche siltalai* were also common at MP1.

The 2022 small numbers of Group B mayfly *Baëtidae,* caddisfly *Sericostomatidae* and single specimens of Group A mayfly *Heptageniidae* were absent in 2023.

The most pollution tolerant Group E *Chironomus sp* and *Tubificidae* species have also returned in small numbers in 2023.

Due to the dominance of pollution tolerant Group C organisms, stations 1 and 2 have been classified as being of moderately polluted ecological status (Q3). Therefore, the Q index for the sites is unaltered from previous years.

The SSRS Methodology classified MP1 and MP2 as 'at risk' with a score of 5.6 at MP1 and 4.8 at MP2.

A single taxa of Group 1 Ephemeroptera were represented at both sites in good numbers, while Group 2 Plecoptera were absent. Group 3 Trichoptera was well represented at both sites. Group 4 G.O.L.D. species were present at both locations, with higher abundance and diversity (indicating higher pollution risk under this group) at MP2. Group 5 Asellus was present in few numbers at MP1 and MP2.

This survey and the history of SSRS at the site indicates consistent poorer quality at MP2, with a high diversity of more pollution tolerant species, and increased bryophyte cover in 2023.

While MP1 and MP2 are similar. It is noted that there are slight differences which may influence the populations at each site. The stream width is wider at MP2, with slightly slower flow and a higher degree of siltation. It is also noted that MP2 was previously subject to widening and there is more pronounced bank erosion and areas of muddy substrates which would provide habitat for pollution tolerant species.

There is no significant evidence that the discharge is preventing the watercourse from achieving good status.

7.0 CONCLUSIONS

- The Quality rating showed that Group C was dominant at both monitoring locations with many such species being "*numerous*" at monitoring stations 1 and 2.

- Both monitoring locations were classified as ecological status Q3 which indicates that the water quality is "moderately polluted". This condition is considered unsatisfactory in terms of the Water Framework Directive.

- The SSRS Methodology classified MP1 and MP2 as 'at risk' with a score of 5.6 at MP1 and 4.8 at MP2.

- It should be noted, as per EPA Monitoring, that there has been a long-term absence of sensitive macroinvertebrate fauna in the Magherarney River. Unsatisfactory ecological conditions have persisted in the Magherarney River for over thirty years.

- Historic EPA ecological status at monitoring locations upstream and downstream of this assessment's monitoring stations has ranged from Q2 to Q3, maintaining predominantly at Q3.

- The Grove Turkeys Ltd effluent discharge does not appear to be resulting in a significant negative impact upon the biotic quality of the Magherarney River.

8.0 REFERENCES

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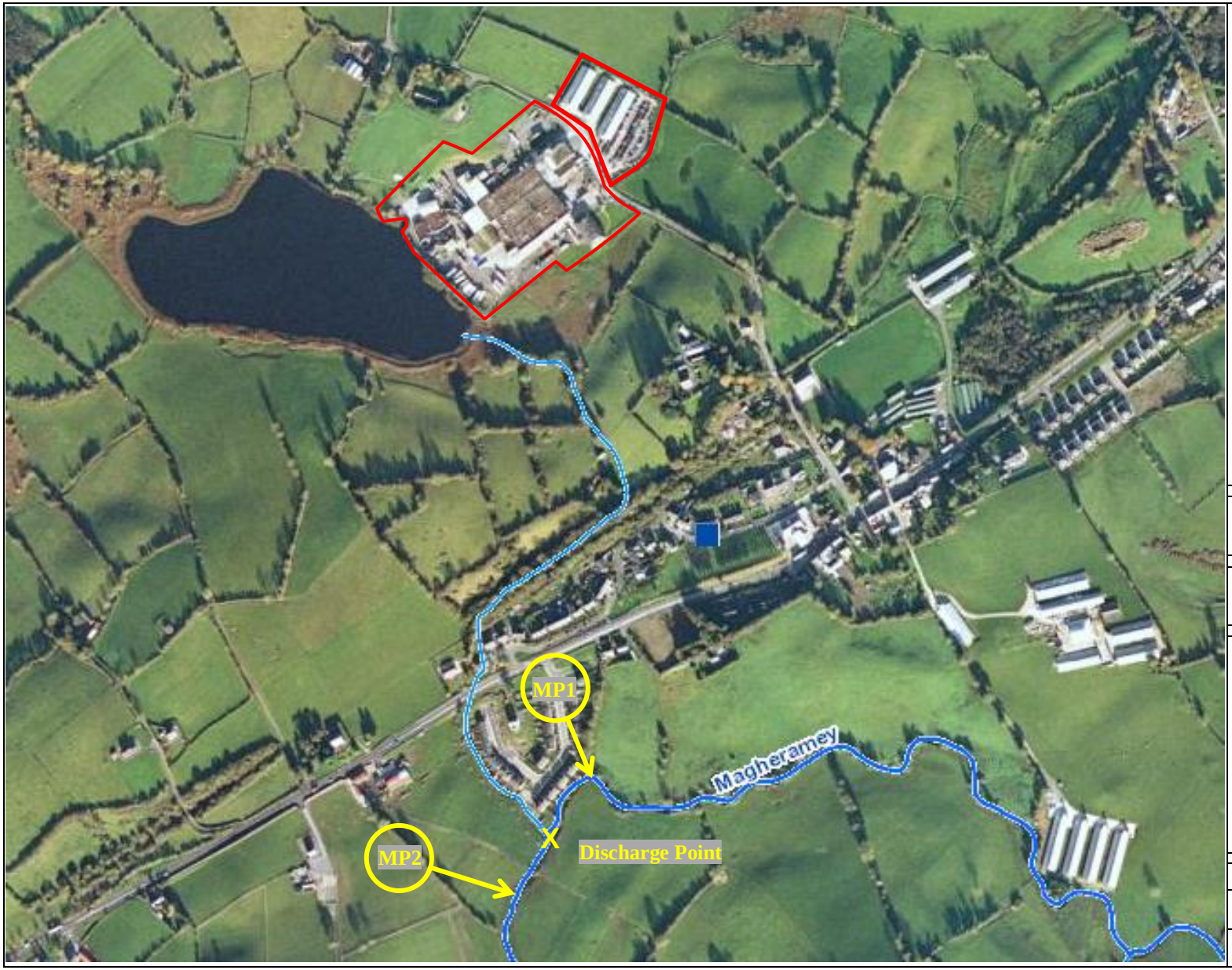
APPENDIX A
RIVER COURSE MAPS AND MONITORING LOCATIONS



Notes:

N

MP1 – **Upstream Monitoring Point**

MP2 – **Downstream Monitoring Point**

– **Site Area**

ECOLOGICAL MONITORING LOCATIONS MAP

GROVE TURKEYS LTD
SMITHBOROUGH, CO. MONOGHAN

PANTHER
ENVIRONMENTAL SOLUTIONS LTD

UNIT 4
INNOVATION CENTRE
GREEN ROAD
CARLOW
R93 W248

TELEPHONE: 059 91 34222
MOBILE: 087 851 9284
EMAIL: info@pantherwms.com
WEB: www.pantherwms.com

datum:	EPA		scale: NTS	A4
			drawn: MOL	
drawing no.	rev		checked: MF	
PES_20_9732-1	A		approved: -	
			date: 24.07.20	

APPENDIX B
ECOLOGICAL MONITORING RESULTS

Table B1: List of Species Identified for the Magherarney River

EPHEMEROPTERA - MAYFLIES	**COLEOPTERA – BEETLES**
Baëtis sp	*Elmis aenea* (adult & larva)
Baëtis rhodani	*Esolus parallelepipedus* (adult & larva)
Serratella ignita	*Limnius volckmari* (adult & larva)
Heptagenia sulphurea	Dytiscidae (adult)
	Haliplidae (adult)
PLECOPTERA - STONEFLIES	**CRUSTACEA - CRUSTACEANS**
	Gammarus duebeni (freshwater shrimp)
	Asellus spp. (hog-lice)
TRICHOPTERA – CADDISFLIES	**DIPTERA - TRUE FLIES**
Rhyacophila dorsalis	Simuliidae (black-flies)
Hydropsyche sp.	Tipulidae
Hydropsyche siltalai	Chironomidae (non-biting midges)
Polycentropus flavomaculatus	*Chironomus* spp. (blood worm)
Wormalidia sp.	Dicranota sp.
Sericostoma personatum	Ceratopogonidae sp.
Lepidostoma hirtum	**HIRUDINEA - LEECHES**
Limnephilis spp.	Glossiphonidae
Silo Pallipes	*Glossiphonia complanata*
Hydroptilidae	Piscicolidae
HYDRACARINA – WATERMITES	*Piscicola geometra*
Hydracarina	Erpobdella
TRICLADIDA - FLATWORMS	**OLIGOCHAETE - WORMS**
Polycelis sp.	Lumbriculidae
Planaria torva	*Tubifex tubifex* (sludge worm)
MOLLUSCA – MOLLUSCS	**MEGALOPTERA**
Ancylidae	Sialidae
	HEMIPTERA

Table B2: Abundances of Species Identified for the Magherarney River

Benthic Macroinvertebrate Survey Results		
Station	**1**	**2**
EPHEMEROPTERA		
Baetidae		
Ephemerellidae	51	22
Heptageniidae		
TRICHOPTERA		
Rhyacophilidae	2	6
Hydropsychidae	61	1
Philopotamidae	10	9
Polycentropidae		
Sericostomatidae		
Lepidostomatidae		
Limnephilidae		
Hydroptilidae		
Goeridae		
MEGALOPTERA		
Sialidae	2	
CRUSTACEA		
Gammarus sp.	100	100
Asellus sp.	2	3
COLEOPTERA		
Elminthidae	45	9
Dytiscidae		5
Halipilidae		1
PLANARIIDAE		
Polycelis sp.	1	2
Planaria sp.		1
HIRUDINEA		
Piscicolidae	2	4
Erpobdella		1
Glossiphonidae		2
HYDRACARINA		
Hydracarina		
DIPTERA		
Simuliidae		
Tipulidae		
Chironomidae	44	100
Chironomous sp.		10
Dicranota sp.		2
Ceratopogonidae sp.		
MOLLUSCA		
Ancylidae	3	
OLIGOCHAETE		
Lumbriculidae		
Tubificidae	5	2
OTHER		
Q-RATING	3	3
TAXON RICHNESS	12	18
TOTAL ABUNDANCE	325	281

Table B3: Monitoring Station Characteristics for the Magherarney River.

STATION	WIDTH (m)	DEPTH (cm)	CURRENT	SUBSTRATE	COMMENT
1	4.8	50	Fast	Mud, fine gravel, some sand, with sections of loose stones	%Shade = 30% Primarily grass and field/hedgerow species with yellow iris (*Iris pseudacorus*) and alder (*Alnus glutinosa*). Fine gravels with no slime, sewage fungus or excessive algal development noted. Bank erosion and moderate siltation was noted.
2	5.1	30	Fast	Mud and sand with scattered stones	%Shade = 10% Primarily common grassland species. The river has been widened in this section of the river in the past and there is a lot of variation in the stream bed, year on year. Sand / fine gravels on mud substrate with no slime, sewage fungus or excessive algal development noted. Sections of earth extend into the river channel at water level. Macrophyte cover 10% with Common Water-Starwort (*Callitriche stagnalis*). Increased bryophyte cover in 2023, however, extent not evident due to high siltation/cover obscuring visibility through water.

APPENDIX C
SSRS RESULTS SHEETS

River:	Magherarney	Code:	36M010200	Date:	11-07-2023	Time:	12:00
Station no.	MP1	Location:	Gorteen Lower, Nurney	Stream Order:	4	Grid (6 figure):	258530, 330240

Field Chemistry	
DO %	79.1
DO mg/l	7.72
Temp (°C)	16.2
Conductivity	222
pH	8.1
Bank width (cm)	4.8
Wet width (cm)	4.5
Avg Depth (cm)	50
Staff gauge	CR

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	Bank erosion	

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
		Medium		

Geology:	Calcareous	Siliceous	Mixed
	Calcareous		

Substratum Condition:	Calcareous	Compacted	Loose	Normal
			Loose	

Substratum:	Stoney bottom	Muddy bottom	Mud over stones
		Muddy bottom	

Degree of siltation:	Clean	Slight	Moderate	Heavy
			Moderate	

Depth of Mud:	None	<1cm	1-5cm	5-10cm	<10cm
				5-10cm	

Litter:	None	Present	Moderate	Abundant
		Present		

Filamentous Algae:	None	Present	Moderate	Abundant
	None			

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

Sample Retained:	Y	N

Stream Flow:
Riffle
Riffle / Glide
Slow Flow

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	2
Stone wash x	2
Weed sweep x	n/a

General Comments:

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

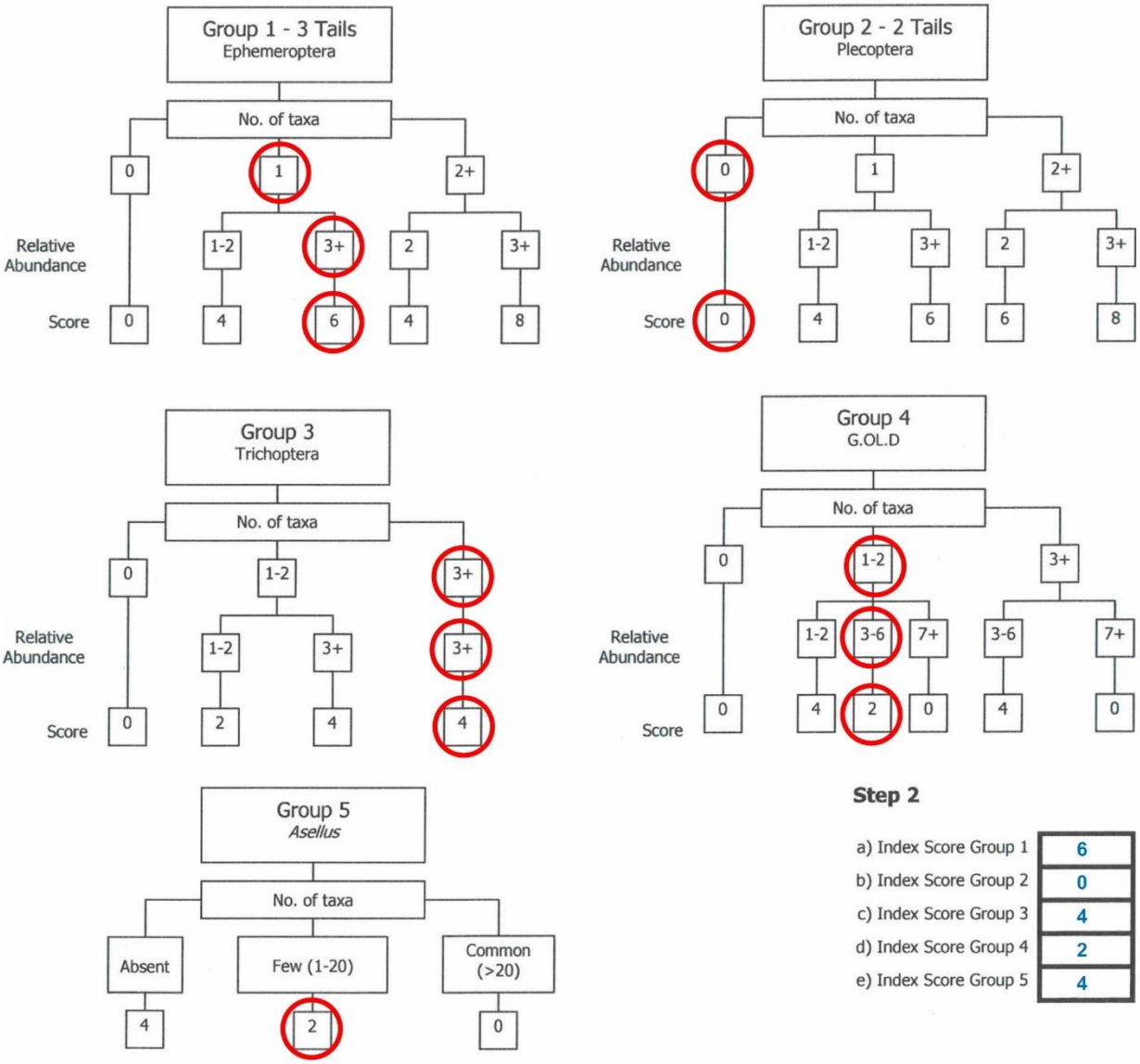
Ephemeroptera:		Plecoptera:	
Ecdyonurus Ab	0	*Leuctra* Ab	0
Rhithrogena Ab	0	*Isoperla* Ab	0
Heptagenia Ab	0	*Protonemura* Ab	0
Ephemerella Ab	4	*Amphinemura* Ab	0
Caenis Ab	0	*Perla* Ab	0
Paraleptophlebia Ab	0	*Dinocras* Ab	0
Ephemera danica Ab	0	Other Plecop Ab	0
Other Ephem Ab	0	Other Plecop Ab	0
Total no. of Taxa: 1	Total Relative Abundance: 4	Total no. of Taxa: 0	Total Relative Abundance: 0

Trichoptera:		G.OL.D:				Asellus:	
Hydropsychidae Ab	4	*Lymnaea* (G) Ab	0	Chironomidae (d) Ab	3	Absent	
Polycentropodidae Ab	0	*Potamopyrgus* (G) Ab	0	*Chirinomus* (D) Ab	0	Few/Low	X
Rhyacophila Ab	1	*Planorbis* (G) Ab	0	Simuliidae (D) Ab	0	Common / Numerous	
Philopotamidae Ab	2	*Ancylus* (G) Ab	0	Dicranota (D) Ab	0		
Limnephilidae Ab	0	*Physa* (G) Ab	0	Tipulidae (D) Ab	0		
Sericostomatidae Ab	0	*Lumbriculus* (Ol) Ab	0	Ceratopogonidae (D) Ab	0		
Glossosomatidae Ab	0	*Eiseniella* (Ol) Ab	0	Other GOLD Ab	0		
Lepidostomatidae Ab	0	Tubufucudae (Ol) Ab	1				
Other Trichoptera Ab	0						
Total no. of Taxa: 3	Total Relative Abundance: 7	Total no. of Taxa: 2		Total Relative Abundance: 4			

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*.

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	6
b) Index Score Group 2	0
c) Index Score Group 3	4
d) Index Score Group 4	2
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)	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	X

Surveyor (signed): Martin O'Looney Name (print): MARTIN O'LOONEY Date: 11 / 07 / 2023

River:	Magherarney	Code:	36M010200	Date:	11-07-2023	Time:	11:30
Station no.		Location:	Gorteen Lower, Nurney			Grid (6 figure):	
MP2		Stream Order:	4			258619, 330365	

Field Chemistry	
DO %	73.5
DO mg/l	7.19
Temp (°C)	16.1
Conductivity	173
pH	7.9
Bank width (cm)	510
Wet width (cm)	500
Avg Depth (cm)	30
Staff gauge	CR

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

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
Filamentous Algae:				
None	Present	Moderate	Abundant	

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

Sample Retained:	
Y	N

Stream Flow:
Riffle
Riffle / Glide
Slow Flow

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	2
Stone wash x	2
Weed sweep x	n/a

General Comments:

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

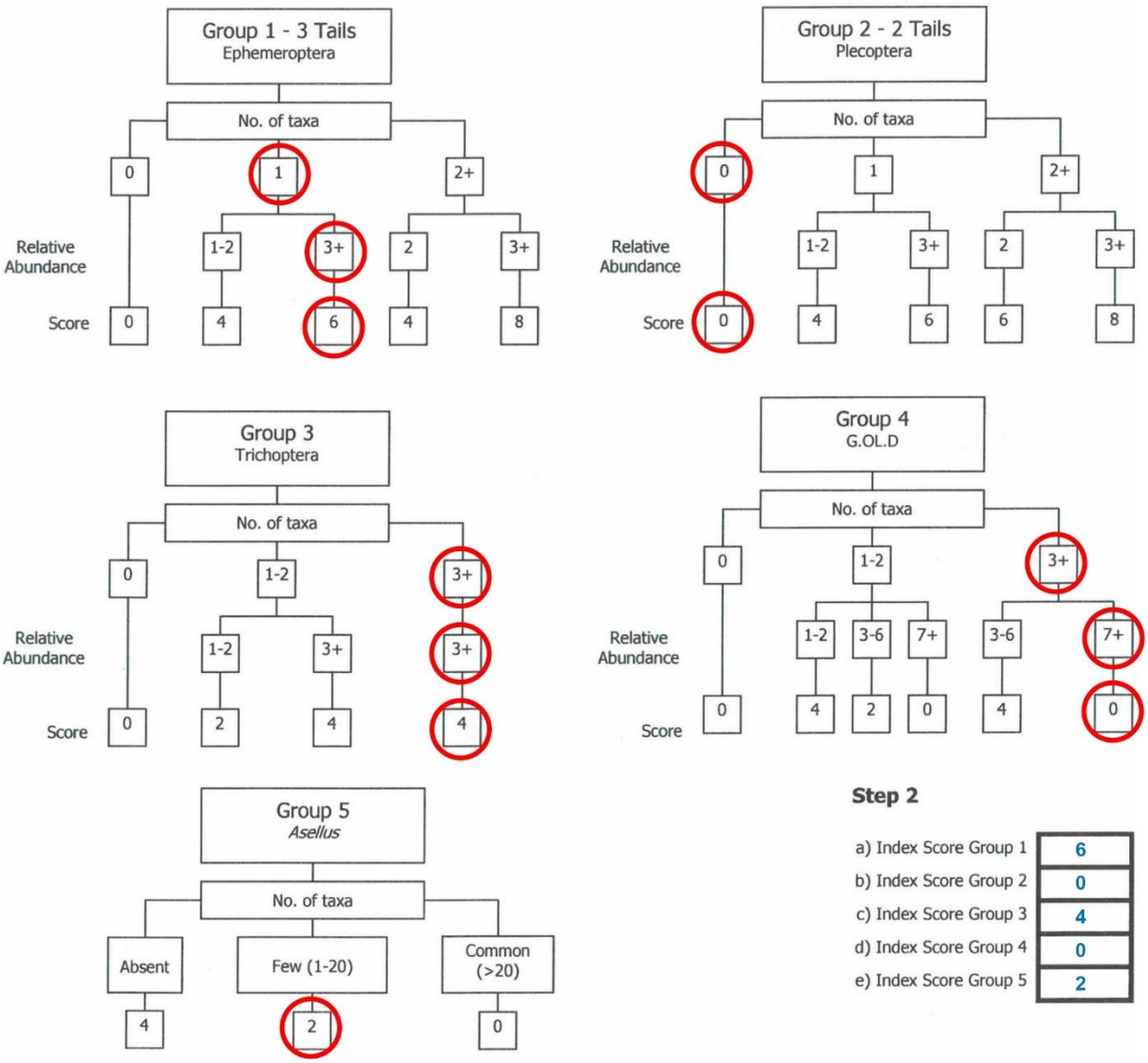
Ephemeroptera:		Plecoptera:	
Ecdyonurus Ab	0	*Leuctra* Ab	0
Rhithrogena Ab	0	*Isoperla* Ab	0
Heptagenia Ab	0	*Protonemura* Ab	0
Ephemerella Ab	3	*Amphinemura* Ab	0
Caenis Ab	0	*Perla* Ab	0
Paraleptophlebia Ab	0	*Dinocras* Ab	0
Ephemera danica Ab	0	Other Plecop Ab	0
Other Ephem Ab	0	Other Plecop Ab	0
Total no. of Taxa: 1	Total Relative Abundance: 3	Total no. of Taxa: 0	Total Relative Abundance: 0

Trichoptera:		G.OL.D:				Asellus:	
Hydropsychidae Ab	1	*Lymnaea* (G) Ab	0	Chironomidae (d) Ab	4	Absent	
Polycentropodidae Ab	0	*Potamopyrgus* (G) Ab	0	*Chirinomus* (D) Ab	2	Few/Low	X
Rhyacophila Ab	2	*Planorbis* (G) Ab	0	Simuliidae (D) Ab	0	Common / Numerous	
Philopotamidae Ab	2	*Ancylus* (G) Ab	0	Dicranota (D) Ab	1		
Limnephilidae Ab	1	*Physa* (G) Ab	0	Tipulidae (D) Ab	0		
Sericostomatidae Ab	0	*Lumbriculus* (Ol) Ab	0	Ceratopogonidae (D) Ab	0		
Glossosomatidae Ab	0	*Eiseniella* (Ol) Ab	0	Other GOLD Ab	0		
Lepidostomatidae Ab	0	Tubufucudae (Ol) Ab	1				
Other Trichoptera Ab	0						
Total no. of Taxa: 4	Total Relative Abundance: 6	Total no. of Taxa: 4		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*.

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	6
b) Index Score Group 2	0
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)	12	Average Index Score (AIS) TIS/5 (5 for 5 groups)	2.4	**SSR Score** (AIS x 2)	4.8

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	X

Surveyor (signed): Martin O'Looney Name (print): MARTIN O'LOONEY Date: 11 / 07 / 2023