APPENDIX 6-3

KICK SAMPLE REPORT

Aquatic Macroinvertebrate Sampling Report

Glenard Wind farm, Co. Donegal

DOCUMENT DETAILS

Client: **FuturEnergy Ireland**

Project Title: **Glenard Windfarm, Co. Donegal**

Project Number: **190114**

Document Title: **Aquatic Macroinvertebrate Sampling Report**

Document File Name: **AMS D – 190114 – 2020.11.27**

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Rev	Status	Date	Author(s)	Approved By
01	Draft	27.06.2021	PE	JH
02	Draft	09.12.2021	PE	JH
03	Final	25/01/2022	PE	JH

Table of Contents

1. INTRODUCTION

MKO were appointed to conduct ecological surveys of the rivers and streams that are located downstream of the proposed development at Glenard, Co. Donegal. The survey work was conducted by Julie O'Sullivan (B.Sc, M.Sc), David McNicholas (B.Sc., M.Sc., MCIEEM), Rachel Walsh (B.Sc.) and Cathal Bergin (B.SC.).

Sampling was carried out downstream of the EIAR study area at 4 sites on the 14th of August 2019, 2 sites on the 15th of December 2020 and 3 additional sites on the 1st of December 2021. Watercourses assessed were all located within or downstream of the Proposed Development or the grid connection route/ turbine delivery route and comprised flowing water. The locations of each watercourse surveyed are provided in Figure 6.3, Chapter 6 of the EIAR.

Biological water quality was assessed through kick-sampling each of these watercourses. Macro-invertebrate samples were converted to Q-ratings as per Toner et al. (2005)[1]. The applied Q ratings followed the EPA water quality classes and Water Framework Directive status categories. All riverine samples were taken with a standard kick sampling hand net (250mm width, 500µm mesh size) from areas of riffle/glide utilising a two-minute sample, as per ISO standards for water quality sampling (ISO 10870:2012). Large cobble was also washed at each site where present. The results of the surveys at all sites are provided below.

1.1 Statement of Authority

Field surveys were undertaken by Julie O'Sullivan (B.Sc, M.Sc), David McNicholas (B.Sc., M.Sc., MCIEEM), Rachel Walsh (B.Sc) and Cathal Bergin (B.Sc). All surveyors are experienced ecologists and are considered competent experts for the purposes of the surveys completed. This report has been compiled by Patrick Ellison B.Sc., M.Sc., ACIEEM), who is an experienced ecologist with over 5 years' experience working in environmental consultancy This report has been reviewed by John Hynes (B.Sc., M.Sc., MCIEEM). John is a highly experienced ecologist and has over 10 years' professional experience in environmental management and ecological assessment.

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[1] *Toner, P., Bowman, J., Clabby, K., Lucey, J., McGarrigle, M., Concannon, C.,. & MacGarthaigh, M. (2005). Water quality in Ireland. Environmental Protection Agency, Co. Wexford, Ireland.*

1.2 Methodology

The watercourses that are assessed in this document were first identified from preliminary desk studies of aerial photographs and OSI Discovery Range 1:50,000 maps of the area undertaken prior to field surveys. The identified watercourses were assessed during the multidisciplinary walkover survey and were selected for further assessment due to their size, naturalness or connectivity with larger or more sensitive rivers. In total, 10 Sampling Stations were identified for assessment (see Figure 6.3, Chapter 6 of the main EIAR).

Information regarding riparian habitats, macrophytes present and any other ecological information was recorded. These watercourses were also studied as part of Otter surveys that were undertaken.

Aquatic invertebrate sampling was carried out at the proposed development site at 9 locations (10 locations were initially identified but one of these (Sample Station 8) was judged to be too dangerous to safely access. The methodology used was the same as that used by the EPA for their national water sampling regime (Toner *et al.* 2003[2]). The survey locations are provided on Figure 1.1. GPS coordinates and dates of surveys are provided in Table 1.1. The method used was as per EPA Q value assessments. Samples were taken using a 2-minute 'kick' sampling method in the fast flowing (riffle) areas of the river, with a standard hand net (250 mm x 250 mm, with a 300 mm bag depth and a 1 mm mesh size). The aquatic macroinvertebrates collected were sorted, stored in a 70% alcohol solution and identified using a binocular dissecting microscope.

Table 1: Sample station locations and dates of surveys.

Sample Station	Date Sampled	Location (ITM)
1	14th August 2019	643919, 933987
2	14th August 2019	643944, 933890
3	14th August 2019	644234, 932810
4	14th August 2019	644941, 933931
5	30th of November 2020	639717, 929964
6	30th of November 2020	638254, 930112
7	1st of December 2021	642298, 930281
8	Not accessible	642631, 933287
9	1st of December 2021	647818, 936226
10	1st of December 2021	6487750, 936115

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[2] *Toner et al. Water Quality in Ireland 2001 – 2003. Environmental Protection Agency, 2005.*

Specimens were identified using the following literature, Elliott et al. (1988) for Ephemeroptera, Hynes (1977) for Plecoptera, Macan (1977) for Gastropoda, Edington & Hildrew (1981) for caseless caddis larvae, Wallace et al. (1990) for cased caddis larvae.

The sites are scored on a five-point system developed by the EPA called the Biological Q rating system. Individual macroinvertebrate species are ranked for their sensitivity to organic pollution and the Q-value is assessed based, primarily, on their relative abundance within a biological sample. EPA indices, EPA water quality status and WFD status are interpreted in Table 2 below.

Table I: EPA water quality status summary

Q Value	EPA Pollution Status	EPA Quality Class	WFD Status
Q5	Unpolluted	A	High
Q4-5	Unpolluted	A	High
Q4	Unpolluted	A	Good
Q3-4	Slightly Polluted	B	Moderate
Q3	Moderately Polluted	C	Poor
Q2-3	Moderately Polluted	C	Poor
Q2	Seriously Polluted	D	Bad
Q1-2	Seriously Polluted	D	Bad
Q1	Seriously Polluted	D	Bad

2. RESULTS

The following sections outline the findings of the surveys.

2.1 Sample Station 1

The Q rating assigned to the channel was Q3. It was assigned this value as Group A invertebrates were absent, Group B and C invertebrates were the most numerous, Group D had one representative and Group E was absent.

Table II Invertebrate Sample Station 1 Results

Indicator Group	Taxon	Dominance
Group A - Very Pollution Sensitive	None	None
Group B - Moderately Pollution Sensitive	Plecoptera *(Leuctra)*	Present
	Baetis spp.	Dominant
Group C - Moderately Pollution Tolerant	*Chironomidae (ex. Chironomus)*	Present
	Coleoptera (larvae)	Fair numbers
Group D - Very Pollution Tolerant	*Hirudinia*	Present
Group E - Most Pollution Tolerant	None	None

Plate 2.1 Sample Station 1

Sample Station 2

The Q rating assigned to the channel was Q3. It was assigned this value as Group A invertebrates were absent, Group B and C invertebrates were the most numerous, Group D and Group E were absent.

Table 2.2 Invertebrate Sample Station 2 Results

Indicator Group	Taxon	Dominance
Group A - Very Pollution Sensitive	None	None
Group B - Moderately Pollution Sensitive	*Baetis* spp.	Dominant
	Leuctra spp.	Few
Group C - Moderately Pollution Tolerant	*Chironomidae (ex. Chironomus)*	Present
	Coleoptera (*Hydroporus*)	Present
Group D - Very Pollution Tolerant	None	None
Group E - Most Pollution Tolerant	None	None

Plate 2.2 Sample Station 2

2.3 Sample Station 3

The Q rating assigned to the channel was Q3. It was assigned this value as Group A invertebrates were absent, Group B and C invertebrates were numerous, Group D and Group E were absent.

Table 2.3 Invertebrate Sample Station 3 Results

Indicator Group	Taxon	Dominance
Group A - Very Pollution Sensitive	None	None
Group B - Moderately Pollution Sensitive	*Baetis spp*	Dominant
Group C - Moderately Pollution Tolerant	*Trichoptera* (Uncased)	Present
	Gammarus	Common
Group D - Very Pollution Tolerant	None	None
Group E - Most Pollution Tolerant	None	None

Plate 2.3 Sample Station 3

2.4 Sample Station 4

The Q rating assigned to the channel was Q3. It was assigned this value as Group A and B invertebrates were absent, Group C invertebrates were present, Group D was absent, and Group E had one representative.

Table 2.4 Invertebrate Sample Station 4 Results

Indicator Group	Taxon	Dominance
Group A - Very Pollution Sensitive	None	None
Group B - Moderately Pollution Sensitive	None	None
Group C - Moderately Pollution Tolerant	*Coleoptera* (*Hydroporus*)	Few
Group D - Very Pollution Tolerant	None	None
Group E - Most Pollution Tolerant	*Chironomus spp.*	Present

Plate 2.4 Sample Station 4

2.5 Sample Station 5

The Q rating assigned to the channel was Q3-4. It was assigned this value as Group A invertebrates were present, B invertebrates were absent, Group C invertebrates were present (2 taxa) and Group D Group E invertebrates were also present.

Table 2.5 Invertebrate Sample Station 5 Results

Indicator Group	Taxon	Dominance
Group A - Very Pollution Sensitive	Heptageniidae (*Ecdyonurus* spp.)	Present
Group B - Moderately Pollution Sensitive	None	None
Group C - Moderately Pollution Tolerant	Baetidae *(Baetis rhodani)* Lymnaeidae	Present
Group D - Very Pollution Tolerant	Glossiphoniidae	Present
Group E - Most Pollution Tolerant	Chironominae *(Chironomus spp).*	Present

Plate 2.5 Sample Station 5

2.6 Sample Station 6

The Q rating assigned to the channel was Q3. Despite both Group A and B invertebrates being present, it was assigned this value as Group C invertebrates were present represented by 3 taxa, Group E invertebrates were common. Group D invertebrates were absent.

Table 2.6 Invertebrate Sample Station 6 Results

Indicator Group	Taxon	Dominance
Group A - Very Pollution Sensitive	Plecoptera (Nemouridae)	Present
Group B - Moderately Pollution Sensitive	Leuctridae (*Leuctra* spp.) Leuctridae (*Leuctra nigra*)	Present
Group C - Moderately Pollution Tolerant	Lymnaeidae Simuliidae Baetidae *(Baetis rhodani)* Lymnaeidae	Present
Group D - Very Pollution Tolerant	None	Present
Group E - Most Pollution Tolerant	*Chironomus* spp.	Common

Plate 2.6 Sample Station 6

2.7 Sample Station 7

The Q rating assigned to the channel was Q3-4. It was assigned this value as Group A invertebrates were present, B invertebrates were absent, Group C invertebrates were present (2 taxa) and Group E invertebrates were also present.

Table 2.7 Invertebrate Sample Station 7 Results

Indicator Group	Taxon	Dominance
Group A - Very Pollution Sensitive	*Isoperla*	Fair numbers
	Chloroperla	Dominant
	Perla	Present
Group B - Moderately Pollution Sensitive	None	None
Group C - Moderately Pollution Tolerant	*Polycentropus*	Present
	Tipulidae	Present
Group D - Very Pollution Tolerant	*None*	None
Group E - Most Pollution Tolerant	Bloodworm	Present

Plate 2.7 Sample station 7

2.8   # Sample Station 8

Due high water levels and a high flow rate at this location it was not possible to carry out kick sampling analysis at Sample Station 8 on the survey dates.

Plate 2.8 Sample station 8

2.9 **Sample Station 9**

The Q rating assigned to the channel was Q3. It was assigned this value as Group A and B invertebrates were absent, Group C invertebrates were present, Group D was absent, and Group E had one representative.

Table 2.8 Invertebrate Sample Station 9 Results

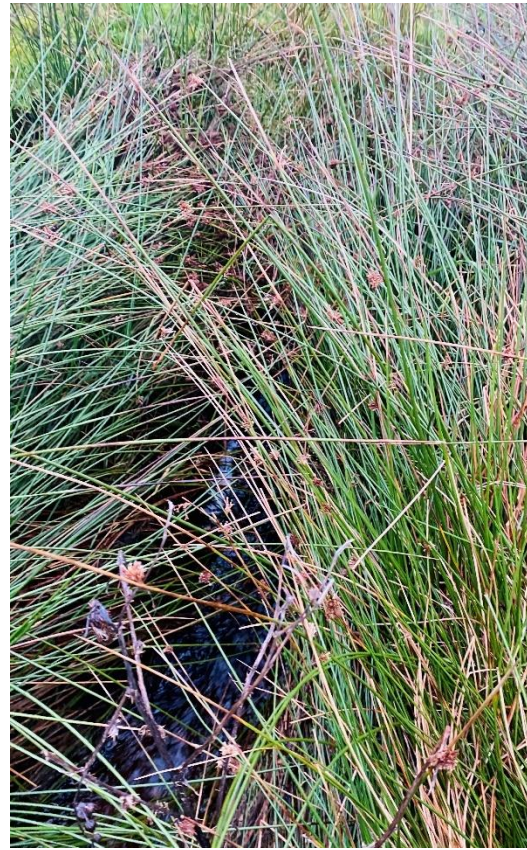| Indicator Group	Taxon	Dominance
Group A - Very Pollution Sensitive	None	None
Group B - Moderately Pollution Sensitive	None	None
Group C - Moderately Pollution Tolerant	*Polycentropus*	Present
Group D - Very Pollution Tolerant	*None*	None
Group E - Most Pollution Tolerant	Oligochaeta	Present

Plate 2.9 Sample station 9

2.10 Sample Station 10

The Q rating assigned to the channel was Q4. It was assigned this value as Group A invertebrates were present in reasonable numbers, Group B invertebrates were numerous, Group C invertebrates were represented by 3 taxa and Group E and Group D had only one representative each.

Table 2.9 Invertebrate Sample Station 10 Results

Indicator Group	Taxon	Dominance
Group A - Very Pollution Sensitive	Chloroperla	Common
Group B - Moderately Pollution Sensitive	Plecoptera *(Leuctra)*	Present
	Baetis spp.	Dominant
Group C - Moderately Pollution Tolerant	*Hydrachnidia*	Present
	Tipulidae	Present
Group D - Very Pollution Tolerant	*Hirudinia*	Present
Group E - Most Pollution Tolerant	Oligochaeta	Present

Plate 2.10 Sample station 10

3.

CONCLUSION

The survey included a general habitat assessment and biological water quality assessment at every watercourse where flowing water was present within or downstream of the Proposed Development. Six of the ten sample locations surveyed were assessed as Q3 'Moderately Polluted', with two of the locations assigned a Q value of Q3-4 'slightly polluted', one location was assigned a Q value of Q4 "Unpolluted". One location identified as a potential sampling station was inaccessible due to high water levels and a risk to safety (Sample Station 8), and therefore a Q value could not be obtained for this location.