APPENDIX 6-3

AQUATIC INVERTEBRATE SURVEY REPORT

Planning and Environmental Consultants

Appendix 6-3 - Aquatic Macroinvertebrate Sampling Report

Umma More Renewable Energy Development

DOCUMENT DETAILS

Client:	**ENERCO**
Project Title:	**Umma More Renewable Energy Development**
Project Number:	**201050**
Document Title:	**Aquatic Macroinvertebrate Sampling Report**
Document File Name:	**AMSR - F – 2023.02.25 – 201050**
Prepared By:	**MKO** **Tuam Road** **Galway** **Ireland** **H91 VW84**

Planning and Environmental Consultants

Rev	Status	Date	Author(s)	Approved By
01	Draft	13.09.2022	BB	PE
02	Final	25/02/2023	PE	JH

Table of Contents

TABLE OF TABLES

TABLE OF PLATES

1. INTRODUCTION

MKO were commissioned to conduct a biological assessment of water quality within the rivers and streams located downstream of the site of the Proposed Development. The ecological survey work was conducted during August 2022 by Patrick Ellison (BSc., MSc. ACIEEM) and Laoise Chambers (B.Sc., MCIEEM) of MKO.

Macro-invertebrate sampling methodology was used to carry out water quality assessment; this work was carried out downstream of the EIAR Site Boundary at 6 identified locations on the 19th August 2022. The locations of each watercourse surveyed are provided in Figure 1-1 of this report.

Biological water quality was assessed through kick-sampling of each of these watercourses. All riverine samples were taken with a standard kick sampling hand net (250mm width, 500µm mesh size) from areas of riffle/glide (where present) utilising a two-minute period of sampling effort, as per ISO standards for water quality sampling (ISO 10870:2012). Large cobble was also washed at each site where present. Macro-invertebrate samples were subsequently 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. The results of the surveys at the 6 identified locations are provided below.

1.1 Statement of Authority

Field surveys were undertaken by Patrick Ellison (B.Sc., M.Sc. ACIEEM) and Laoise Chambers (B.Sc, MCIEEM), assisted by Cora Twomey and Brónagh Boylan of MKO on 19th August 2022. This report has been prepared by Brónagh Boylan and Patrick Ellison. Brónagh has relevant academic qualifications and over 7 months' experience in ecological consultancy and survey. Patrick is an experienced ecologist who has over 6 years' experience working in ecological consultancy. This report has been reviewed by John Hynes (B.Sc., M.Sc., MCIEEM). John is a highly experienced ecologist who has over 10 years' professional experience in environmental management and ecological assessment and is a full member of the Institute of Ecology and Environmental Management (CIEEM).

[1] *Toner, P., Bowman, J., Clabby, K., Lucey, J., McGarrigle, M., Concannon, C.,. & MacGarthaigh, M. (2005). Water quality in Ireland 2001-2003. Environmental Protection Agency, Co. Wexford, Ireland.*

Map Legend

- EIAR Site Boundary
- Kick Sample Locations
- WFD Watercourses

N

Drawing Title: Kick Sample Locations

Project Title: Umma More Renewable Energy Development

Drawn By	Checked By
PE	JH
Project No.	Drawing No.
201050	Figure 1.1 (A 6-3)
Scale	Date
1:50,000	2023-02-28

MKO
Planning and Environmental Consultants
Tuam Road, Galway
Ireland, H91 VW84
+353 (0) 91 735611
email:info@mkoireland.ie
Website: ww.mkoireland.ie

2. RESULTS

The following sections outline the findings of the water quality assessments for each of the sampling locations.

2.1 Sample Station 1

Sample Station 1 is located approximately 703m north-east of the EIAR Site Boundary at its closest point and is within the Dungolman waterbody [ID Code: IE_SH_26D060400] which is within the Upper Shannon catchment (WFD catchment ID: 26D) and the Inny[Shannon]_SC_090 sub-catchment (WFD sub-catchment ID: 26F_5).

The river was bordered by agricultural grassland and housing with steep banks on both sides of the waterway. The river was moderately fast flowing and approximately 10-15cmm in depth, and 6m in width. The substrate comprised mainly boulder and rock gravel, with sand and some siltation. Located within the stream was abundant bryophytes, with *Ranunculus spp.* present. Bankside vegetation consisted of Willow (*Salix spp.)*, Hawthorn (*Crataegus monogyna)*, and Ash (*Fraxinus spp.*). The river was completed shaded from the bankside vegetation.

The Q rating assigned to the channel at Sample Station 1 was Q3-4. It was assigned this value as Group A taxa were absent; the sample consisted mainly of Group C and E taxons with *Simulidae* species (Group C) being most abundant. No Group D invertebrates were recorded; however, Group E invertebrates (in the form of oligochaete worms) made up approximately 7% of the sample. The macro invertebrates recorded at this location are provided in Table 2-1.

Table 2-1 Invertebrate Sample Station 1 Results

Indicator Group	Taxon	Approximate abundance count (% of sample)
Group A - Very Pollution Sensitive	None	-
Group B - Moderately Pollution Sensitive	Ephemeroptera (*Leptophlebia*)	1 (2.5%)
Group C - Moderately Pollution Tolerant	Trichoptera (*Hydropsyche*)	4 (10%)
	Ephemeroptera (*Baetis rhodani*)	6 (15%)
	Ephemeroptera (*Ephemerellidae*)	2 (5%)
	Coleoptera (*Elmidae*)	4 (10%)
	Diptera (*Simulidae*)	10 (25%)
	Crustacea (*Gammaris spp.*)	8 (20%)
	Crustacea (*Austopotamobious pallipes*)	2 (5%)
Group D - Very Pollution Tolerant	None	-
Group E - Most Pollution Tolerant	Diptera (*Ceraptogenidae*)	1 (2.5%)
	Oligochaeta (*Tubificaidae*)	2 (5%)

Plate 2-1 Sample Station 1, located at E: 619229 N: 749342

2.2 Sample Station 2

Sample Station 2 is located within the Wind Farm Site along the Dungolman waterbody [ID Code: IE_SH_26D060400] just downstream of where the Moneynamanagh watercourse flows into this watercourse. This sample point occurs within the Upper Shannon catchment (WFD catchment ID: 26G) and the Inny [Shannon]_SC_090 sub-catchment (WFD sub-catchment ID: 26F_5).

The channel width was recorded as 4m with an average 50cm depth. The stream was heavily vegetated with algal growth in-stream at the sample point. The watercourse was shallow with a slow flow at the kick-point however was mostly stagnant in the surrounding channel area. It had a stony substrate with rock, cobble, gravel, and sand present. Bankside vegetation consisted of Willow herb (*Chamaenerion angustifolium)*, Bindweed (*Calystegia sepium)*, Yellow-flag iris (*Iris pseudacorus*) and Canary reed (*Phalaris arundinacea*). In stream vegetation consisted of Canary stream grass (*Phalaris arundinacea*), Water mint (*Mentha aquatica*), and Water parsnip (*Berula erecta*). There was some evidence of cattle with tracks and droppings found adjacent to the stream.

Evidence of otter *Lutra lutra* (spraint) was recorded immediately next to the stream at this location.

The Q rating assigned to the channel at Station 2 was Q3. It was assigned this value as there was only 1 Group A taxa present; the sample consisted mainly of Group C and D taxa, with *Asellus* and *Gammarus* species being most abundant. Group B species were absent, and 2 Group E species were recorded. The macro invertebrates recorded at this location are presented in Table 2-2.

Table 2-2 Invertebrate Sample Station 2 Results

Indicator Group	Taxon	Approximate abundance count (% of sample)
Group A - Very Pollution Sensitive	Ephemeroptera (*Heptagenia*)	1 (2.7%)
Group B - Moderately Pollution Sensitive	None	-
Group C - Moderately Pollution Tolerant	*Diptera (Tipulidae)*	1 (2.7%)
	Crustacea (Gammaris spp.)	30 (81%)
Group D - Very Pollution Tolerant	Crustacea (*Asellus sp.)*	2 (5.4%)
	Gastropoda (*Radix baldhica*)	1 (2.7%)
Group E - Most Pollution Tolerant	Diptera (*Ceraptogenida*)	2 (5.4%)

Plate 2-2 Station 2, located at E: 618687 N: 745647.

2.3 Sample Station 3

Sample Station 3 is located within the Wind Farm Site along the Mullenmeehan Stream [ID Code: IE_SH_26D060400]. This sample point occurs within the Upper Shannon catchment (WFD catchment ID: 26G) and the Inny [Shannon]_SC_090 sub-catchment (WFD sub-catchment ID: 26F_5).

The sampling location is bordered with vegetation cover including Cock's foot Dactylis glomerata, Canary reed (*Phalaris arundinacea),* Docks (*Rumex spp.*), False oat-grass (*Arrhenatherum elatius)* and nettle (*Urtica dioica*) amongst other species. Instream vegetation consisted of Watercress (*Nasturtium officinale)*, Blue water speedwell (*Veronica anagallis-aquatica),* and Water parsnip (*Berula erecta).* The river was an average of 15cm in depth here, with a medium flow at the kick point, slowing down further

upstream. The river-bed comprised of rock, cobble, gravel, and sand substrate with dense algal growth in certain locations.

The Q rating assigned to the channel at Station 2 was Q3. It was assigned this value as there was only 1 Group A taxa present; the sample consisted mainly of Group C and D taxa, with *Asellus* and *Gammarus* species being most abundant. Group B species were minimal, and 2 Group 10 species were recorded. The macro invertebrates recorded at this location are presented in Table 2-3.

Table 2-3 Invertebrate Sample Station 3 Results

Indicator Group	Taxon	Approximate abundance count (% of sample)
Group A - Very Pollution Sensitive	Ephemeroptera (*Heptagenia*)	1 (0.6%)
Group B - Moderately Pollution Sensitive	Plecoptera (*Leuctra spp.*)	1 (0.6%)-
	Trichoptera (*Glossosomatidae*)	1 (0.6%)
Group C - Moderately Pollution Tolerant	Ephemeroptera (*Baetis rhodani*)	40+ (25%)
	Trichoptera (*Hydropsyche*)	3 (2%)
	Crustacea *(Gammaris spp.)*	40+ (25%)
	Coleoptera *(Coleoptera)*	1 (0.6%)
Group D - Very Pollution Tolerant	Gastropoda (*Radix spp.*)	60+ (38%)
Group E - Most Pollution Tolerant	Diptera (*Chironomus spp.*)	10 (6%)

Plate 2-3 Sample Station 3, located at E: 196499 N: 243307.

2.4 Sample Station 4

Sample Station 4 is located along the Grid Connection approximately 4km to the south-west of the Wind Farm Site along the Grid Connection, and is on the Cross (Roscommon)_030 [EPA ID Code: IE_SH_26C100300] within the Upper Shannon catchment {WFD Catchment ID: 26G) and the Shannon [Upper]_SC_100 sub-catchment (WFD sub-catchment ID: 26G_2).

The channel width was recorded as 1-2m. Substrate within the stream consisted of rock, cobble, gravel, mud, and cow dung. Further upstream the substrate became very muddy. The kick sample point was at a low riffle section which was heavily silted. Instream vegetation consisted of some algae on the rocks with bankside vegetation consisting of Hawthorn (*Crataegus monogyna)*, Hazel (*Corylus avellana)*, and Ash *(Fraxinus excelsior)*.

The Q rating assigned to the channel was Q3. It was assigned this value as Group A and B taxa were absent; the sample consisted of Group C taxons only with *Dicranota* and *Gammaridae* being most abundant. No Group D or Group E invertebrates were recorded. The macro invertebrates recorded at this location are provided in Table 2-4.

Table 2-4 Invertebrate Cable Route 1 Results

Indicator Group	Taxon	Abundance
Group A - Very Pollution Sensitive	None	-
Group B - Moderately Pollution Sensitive	None	-
Group C - Moderately Pollution Tolerant	Ephemeroptera (*Baetis rhodani*)	3 (5%)
	Diptera (*Chironamidae*)	9 (15%)
	Diptera (*Dicranota*)	12 (20%)
	Crustacea (*Gammarus spp*)	35 (59%)
Group D - Very Pollution Tolerant	None	-
Group E - Most Pollution Tolerant	None	-

Plate 2-4 Sample Station 4 located at E: 623543 N: 741562.

2.1 Sample Station 5

Sample Station 5 is located approximately 7.8km southwest of the Wind farm Site along the Grid Connection, and is on the DERRYHALL 25_3863 [EPA ID Code: IE_SH_25G010500] within the Lower Shannon catchment {WFD Catchment ID: 25A) and the BROSNA_SC_030 sub-catchment (WFD sub-catchment ID: 25A_9).

The channel width was recorded as 2-3m, with a 5-10cm. Instream vegetation consisted of Water parsnip (*Berula erecta)*, Fool's watercress *(Apium nodiflorum),* Canary reed (*Phalaris arundinacea)*, and Yellow-flag iris (*Iris pseudacorus*). Bankside vegetation consisting of Hawthorn, Ash, Willow herb (*Epilobium* spp.) and Meadowsweet (*Filipendula ulmaria).*

The Q rating assigned to the channel was Q3. It was assigned this value as Group A taxa were absent; the sample consisted of 1 Group B taxa, multiple Group C taxons and some Group E taxon. No Group D invertebrates were recorded. The macro invertebrates recorded at this location are provided in Table 2-5.

Table 2-5 Invertebrate Grid Connection Underground Electrical Cabling Route 3 Results

Indicator Group	Taxon	Abundance
Group A - Very Pollution Sensitive	None	-
Group B - Moderately Pollution Sensitive	Trichoptera (*Limnephilidae*)	1 (2%)
Group C - Moderately Pollution Tolerant	Crustacea (*Gammarus spp.)*	49 (90%)
	Diptera (*Chironamidae*)	1 (2%)
Group D - Very Pollution Tolerant	None	-
Group E - Most Pollution Tolerant	Oligochaeta (*Eiseniella*)	3 (6%)

Plate 2-5: Sample Station 5, located at E: 626193 N: 738770.

2.1 Sample Station 6

Sample Station 6 is located approximately 9.1km south of the EIAR Site Boundary at its closest point and is on the Gageborough [EPA ID Code: IE_SH_25G010300] within the Lower Shannon catchment {WFD Catchment ID: 25A) and the BROSNA_SC_030 sub-catchment (WFD sub-catchment ID: 25A_9).

The channel width was recorded as 4m, with a 20-30cm. Instream vegetation consisted of Fool's watercress (*Apium nodiflorum),* and dense algal growth. Bankside vegetation consisting of Meadowsweet and Hard rush (*Juncus inflexus).* The stream was fast flowing with both riffle and glide sections. The stream's substrate was loose, consisting of rock, cobble and sand.

The Q rating assigned to the channel was Q3. It was assigned this value as Group A and B taxa were absent, multiple Group C taxons were present and some Group D taxon. No Group E invertebrates were recorded. The macro invertebrates recorded at this location are provided in Table 2-6.

Table 2-6 Invertebrate Cable Route 3 Results

Indicator Group	Taxon	Abundance
Group A - Very Pollution Sensitive	None	-
Group B - Moderately Pollution Sensitive	None	-
Group C - Moderately Pollution Tolerant	Crustacea (*Gammarus spp.)*	17 (39%)
	Ephemeroptera (*Baetis rhodani*)	10 (23%)
	Diptera (*Chironamidae*)	3 (7%)
	Diptera (*Dicranota*)	1 (2%)
	Coleoptera (*Elmidae*)	8 (18%)
	Trichoptera (*Rhyacophila*)	1 (2%)
	Trichoptera (*Polycentropus*)	1 (2%)
Group D - Very Pollution Tolerant	Gastropoda (*Radix peregra*)	2 (4%)
Group E - Most Pollution Tolerant	None	-

Plate 2-6: Sample Station 6, located at E: 627594 N: 738277.

3. CONCLUSION

The surveys summarised within this report included a general habitat assessment in addition to biological water quality assessment using macro-invertebrate sampling methodology at six Sampling Stations where flowing water was present and easily accessible downstream of the Proposed Development.

The six sample locations assessed were all categorised as being a Q value of Q3 'Moderately polluted'.