

Watercourse Survey Report

Cleanrath Windfarm





DOCUMENT DETAILS

Client: **Cleanrath Windfarm Ltd**

Project Title: **Cleanrath Wind Farm**

Project Number: **191223a**

Document Title: **Aquatic Macroinvertebrate Sampling Report**

Document File Name: **AMS F – 191223a – 2020.06.05**

Prepared By: **MKO
Tuam Road
Galway
Ireland
H91 VW84**



Rev	Status	Date	Author(s)	Approved By
01	Final	05.06.2020	PR	PR



Table of Contents

1.	INTRODUCTION	3
2.	RESULTS	4
2.1	Sample Station 1.....	4
2.2	Sample Station 2	5
2.3	Sample Station 3	6
2.4	Sample Station 4	8
2.5	Sample Station 5	11
2.6	Sample Station 6	13
2.7	Sample Station 7	15
2.8	Sample Station 8	16
2.9	Sample Station 9	17
2.10	Sample Station 10	19
2.11	Sample Station 11.....	22
3.	CONCLUSION	24

1.

INTRODUCTION

MKO. were appointed to conduct ecological surveys of the rivers and streams that are located downstream of the Cleanrath windfarm development. The survey work was conducted by suitably qualified ecologist, Pat Roberts. B.Sc. (Env.), MCIEEM.

Sampling was carried out downstream of the study area at 11 sites on the 14th May 2020. Watercourses were assessed if they were located within or downstream of the wind farm development or the grid connection route and contained flowing water. The locations of each watercourse surveyed are provided in Figure 1.1.

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.

In addition to the biological water quality assessment, each watercourse was visually assessed for signs of pollution or instream activity that could be attributable to the construction of the windfarm.




The results of the surveys at all 11 sites are provided below.

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.*

Map Legend

Kick sample locations

- Grid connection route
- Development footprint
- WFD water catchments
- WFD river waterbodies
- Site boundary

- Grid connection route
-  Development footprint
-  WFD water catchments
- WFD river waterbodies
-  Site boundary



Drawing Title
Kick sample locations

Project Title	Cleanrath FIAR
---------------	----------------

Drawn By DMN	Checked By PR
Project No.	Drawing No.

191223a	Figure 1.
Scale 1:44976	Date 18.05.202



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

2.

RESULTS

The following sections outline the findings of the surveys.

2.1

Sample Station 1

Sample Station 1 was located in a drain through bog habitat within the windfarm site itself but located over 200m from the closest infrastructure. Whilst this was likely to be a natural stream, it had been straightened and managed to improve its drainage function in the past. It was in no way modified during the construction or operation of the windfarm and no signs of any such activity were recorded at or in close proximity to this stream. It flows into Cleanrath Lough and from there, into the Toon River after approximately 2km.

No instream or emergent macrophytes were recorded at the sample point and the stream had a silty substrate. bryophytes. The bankside vegetation was typical of bog and heath habitats and contained species such as purple moor grass (*Molinia caerulea*), Devil's bit scabious (*Succisa pratensis*), bog myrtle (*Vaccinium myrtillus*) and butterwort (*Pinguicula vulgaris*)

The stream was not suitable for freshwater pearl mussel and did not support any spawning habitat for salmonid fish at the sample point. The Q rating assigned to the channel was Q4. It was assigned this value as Group A invertebrates were common but there was only one taxon recorded. This was similar with Group B invertebrates. Group C invertebrates were common but not excessive and included three taxa. No group D or E taxa were recorded.

There were no riffles in the stream close to the sampling point and the silty stream was not ideal for the undertaking of a kick sample for the purposes of biological assessment of the watercourse. However, the results demonstrate that the stream is not polluted and no signs of any impacts resulting from the construction and operation of the windfarm were recorded.

Table 2.1: Invertebrate Sample Station 1 Results

Indicator Group	Taxon	Dominance
Group A - Very Pollution Sensitive		
	Ephemeroptera - Heptageniidae	Common (stone wash)
Group B - Moderately Pollution Sensitive		
	Trichoptera - Cased	Common
Group C - Moderately Pollution Tolerant		
	Ephemoptera – <i>Baetis rhodani</i>	Common
	Trichoptera - Caseless	Few
	Gammarus spp.	Few

Group D - Very Pollution Tolerant		
Group E - Most Pollution Tolerant		
Also Present	River Limpet (<i>Ancylus fluviatilis</i>)	Few
	Oligochaeta (non Tubificidae)	Few

2.2

Sample Station 2

Sample Station 2 was located in a narrow bog stream that is located to the south of an existing public road. There was no defined channel to the north of the road and no direct surface water connectivity with the wind farm site (the stream arises out of a wetland to the north. There were no riffles in the stream and it had a substrate comprising primarily of peat and bedrock. It was approximately 1.5m in width. This stream is shown in Plate 2.1. It flows to the south of the wind farm site and enters Lough Allua after approximately 2.5km.



Plate 2.1. Sample Station 2.

The instream macrophytes included bog pondweed (*Potamogeton polygonifolius*) and stoneworts (*Chara Sp.*). There was some growth of algae within the stream. Emergent vegetation included a number of small sedges (*Carex Spp.*). The bankside vegetation was dominated by typical bog species including bog myrtle, milkwort (*Polygala serpyfolia*), cross leaved heath (*Erica tetralix*) and butterwort.

The stream did not provide suitable habitat for freshwater pearl mussel and did not provide significant fisheries habitat as it was very narrow, steep and shallow with a substrate of bedrock and peat. The Q rating assigned to the channel was Q3. It was assigned this value as the density and diversity of invertebrates was low and no Group A species were present. Group B species were recorded and Group C species were common. This rating is likely due to the lack of riffle habitat and nature of the substrate, which was not ideal for undertaking a Q value assessment rather than any pollution within the channel. There was no luxuriant growth of algae, sewage fungus or any other slimes and the stream appeared clean – but peaty. No signs of any impacts resulting from the construction and operation of the windfarm were recorded.

Table 2.2: Invertebrate Sample Station 2 Results

Indicator Group	Taxon	Dominance
Group A - Very Pollution Sensitive		
Group B - Moderately Pollution Sensitive		
	Odonata -Zygoptera	Few
Group C - Moderately Pollution Tolerant		
	Ephemeroptera - <i>Baetis rhodani</i>	Numerous
	Trichoptera - caseless	Few
	Coleoptera	Few
Group D - Very Pollution Tolerant		
Group E - Most Pollution Tolerant		

2.3

Sample Station 3

Sample Station 3 was located along the grid connection route in the Townland of Rathgaskig. This watercourse is a tributary of the Aghnakinneigh Stream and is approximately 3.5 metres wide at the sample point. It was very shallow at the time of the survey. It had a substrate of gravels and cobbles but no riffles in the area surrounding the grid connection route. The sample was taken downstream of the grid connection (which was located in the road bed where it crossed the bridge on the public road).

There were no signs of pollution or any instream or bankside works having taken place. This stream is shown in Plate 2.2.



Plate 2.2. Sample Station 3.

No instream or emergent vegetation was recorded. The stream was very shaded and the bankside vegetation was dominated by dense bramble (*Rubus fruticosus agg.*), hazel (*Corylus avellana*), Herb Robert (*Geranium robertianum*), birch (*Betula pubescens*), holly (*Ilex aquifolium*) and grey willow (*Salix cinerea*). Filamentous algae, whilst present, was very sparse.

The Q rating assigned to the channel was Q4. It was assigned this value as 2 Group A taxa were recorded along with a Group B Taxon in fair numbers. Group C were well represented but not excessive. The sample was not undertaken in a riffle and thus not in ideal habitat for a biological sample. In addition, it was heavily shaded at the sample location. No suitable habitat for freshwater pearl mussel was recorded at this location as the watercourse was too shallow and steep. The gravel substrate provides some potential habitat for salmonid fish. No signs of any impacts resulting from the construction of the grid connection were recorded.

Table 2.3: Invertebrate Sample Station 3 Results

Indicator Group	Taxon	Dominance
Group A - Very Pollution Sensitive		
	Ephemeroptera – <i>Heptageniidae</i> (Stone wash)	Few
	Plecoptera (Non Leuctra)	Few

Group B - Moderately Pollution Sensitive		
	Trichoptera (<i>Cased</i>) (Stone wash)	Numerous
	Odonata - Zygoptera	Few
Group C - Moderately Pollution Tolerant		
	Trichoptera - Caseless	Common
	Gammarus Sp.	Few
	Ephemeroptera (<i>Baetis rhodani</i>)	Few
Group D - Very Pollution Tolerant		
Group E - Most Pollution Tolerant		

2.4

Sample Station 4

Sample Station 4 was located alongside an agricultural track that had been recently surfaced with limestone chips and was surrounded by fields of improved agricultural grassland. The grid connection route passed along and within the bed of an adjacent public road with no instream works required. The sample was taken downstream of the grid connection. The drain was a managed drainage channel with a substrate of boulders and cobbles and a moderated degree of siltation. It was approximately one metre wide at the sample point. This drain converges with the River Lee at Ballinageary after approximately 3km. This drain is shown in Plate 2.3.



Plate 2.3. Sample Station 4.

The instream macrophytes included duckweed (*Lemna minor*) emergent vegetation including hemlock water dropwort (*Oenanthe crocata*) and floating sweet grass (*Glyceria fluitans*). The bankside vegetation was dominated by grassy vegetation and bramble and foxglove (*Digitalis purpurea*).

The Q rating assigned to the channel was Q3. It was assigned this value as Group A were absent, group B were represented in fair numbers and Group C were also numerous. There was also moderate growth of filamentous algae present. This result is typical of a drain that is surrounded by improved agricultural lands. The stream does not provide any suitable habitat for freshwater pearl mussel or any significant habitat for salmonid fish at the sample point. The cable was laid in the public road (not in the private agricultural track that is adjacent to the stream) No signs of any impacts resulting from the construction of the grid connection were recorded.

Table 2.4: Invertebrate Sample Station 4 Results

Indicator Group	Taxon	Dominance
Group A - Very Pollution Sensitive		
Group B - Moderately Pollution Sensitive		
	Trichoptera – Cased (Stone wash)	Numerous

Group C - Moderately Pollution Tolerant		
	Ephemeroptera – (<i>Baetis rhodani</i>)	Numerous
	Gastropoda	Common
	Coleoptera	Common
	Trichoptera - Caseless	Few
	Hemiptera (Corixidae)	Few
Group D - Very Pollution Tolerant		
Group E - Most Pollution Tolerant		

2.5

Sample Station 5

Sample Station 5 was located on a tributary of the Bunsheelin River that flows into the River Lee approximately 2km downstream at Ballinageary. It was approximately 6m wide at the survey point, with an average depth of 0.3m at the time of the survey. The substrate was dominated by bedrock, boulders and cobbles and there was little siltation. The grid connection cable was strapped to the side of the bridge in this location and there was no requirement for instream works. This sample station is shown in Plate 2.4.



Plate 2.4. Sample Station 5.

The instream macrophytes included the aquatic moss *Fontinalis antipyretica* along with other bryophytes. Emergent vegetation included hemlock water dropwort. The bankside vegetation was included grassy vegetation and woodrush (*Luzula sylvatica*), hemlock water dropwort and bramble. Ash (*Fraxinus excelsior*), Birch and sycamore (*Acer campestre*) were present surrounding the banks.

The Q rating assigned to the channel was Q4. It was assigned this value as Group A and B taxa were recorded in fair numbers with Group C numerous. The sample was undertaken in a riffle and was a suitable location to undertake an accurate biological water sample. The river offered potential habitat for freshwater pearl mussel (despite the presence of bedrock) though none were recorded at the sample site. The river also provided good quality fisheries habitat, with riffles, glides and pools present and a stony substrate. No signs of any impacts resulting from the construction of the grid connection were recorded.

Table 2.5: Invertebrate Sample Station 5 Results

Indicator Group	Taxon	Dominance
Group A - Very Pollution Sensitive		

	Ephemoptera – heptageniidae (Mainly in stone wash)	Common
	Plecoptera (Non Leuctra)	Few
Group B - Moderately Pollution Sensitive		
	Trichoptera - Cased	Common
	Plecoptera - Leuctra	Few
Group C - Moderately Pollution Tolerant		
	Ephemoptera – <i>Baetis rhodani</i>	Numerous
	Gammarus Sp.	Few
	Simuliidae	Few
	Chironomidae	Few
Group D - Very Pollution Tolerant		
Group E - Most Pollution Tolerant		

2.6

Sample Station 6

Sample Station 6 was located at the confluence of two streams that are downstream of the grid connection route and form part of the Bunsheelin River that flows into the River Lee at Ballinageary, approximately four kilometres downstream. This river is approximately three metres wide at the sample point with a substrate of cobbles and gravels with no appreciable siltation. The sample point is surrounded by pasture lands along with a recently constructed house and garden. The grid connection was located in the existing road and there were no signs of pollution at either crossing point or downstream at the sample site. This sample site is shown in Plate 2.5.



Plate 2.5. Sample Station 6.

The instream macrophytes included the aquatic moss *Fontinalis antipyretica* along with other bryophytes. Emergent vegetation included hemlock water dropwort. The bankside vegetation was dominated by woodrush, willow, gorse and holly scrub. The river provided suitable habitat for freshwater pearl mussel, though none were recorded at the sample site. The stream is possibly a little steep and unstable for the species. The substrate of gravels and cobbles provides good Salmonid fish habitat.

The Q rating assigned to the channel was Q4. It was assigned this value as Group A were recorded in fair numbers with Group B recorded and Group C recorded in fair numbers. There was no filamentous algae or sewage fungus and no signs of other pollution. No signs of any impacts resulting from the construction of the grid connection were recorded.

Table 2.6: Invertebrate Sample Station 6 Results

Indicator Group	Taxon	Dominance
Group A - Very Pollution Sensitive		
	Ephemoptera - Heptageniidae	Common
Group B - Moderately Pollution Sensitive		
	Trichoptera - Cased	Few
	Plecoptera - Leuctra	Few
Group C - Moderately Pollution Tolerant		
	Ephemoptera – <i>Baetis rhodani</i>	Common
	Gammarus	Few
	Trichoptera - Caseless	Few
	Coleoptera	Few
	Chironomidae	Few
	Hydracarina	Few
Group D - Very Pollution Tolerant		
	Hirudinea	Few
Group E - Most Pollution Tolerant		

2.7

Sample Station 7

Sample Station 7 was located at the edge of a private garden downstream of the grid connection route. It is a tributary of the Bunsheelin River and is approximately one kilometre upstream of sample station 6. The stream was approximately 2.5 metres wide and 0.1m deep at the time of survey and had a substrate of cobbles and gravels. The grid connection was located in the road upstream and no signs of disturbance or instream works were recorded. This sample station is shown in Plate 2.6.



Plate 2.6. Sample Station 7.

The instream macrophytes included the aquatic moss *Fontinalis antipyretica* along with other bryophytes. No emergent vegetation was recorded. The bankside vegetation was dominated by grassy vegetation associated with the lawn of a private house. It included species such as sorrel (*Rumex acetosa*), dandelion (*Taraxicum officinale agg.*), field speedwell (*Veronica serpyfolia*) and ribwort (*Plantago lanceolata*). The channel was steep, shallow and likely to be subject to large fluctuations in water levels. In this regard it is unsuitable for freshwater pearl mussel at this location. It does provide some potential habitat for salmonid species but is very small and shallow.

The Q rating assigned to the channel was Q4. It was assigned this value as Group A were recorded in fair numbers with Group B recorded and Group C recorded in fair numbers. There was no filamentous algae or sewage fungus and no signs of other pollution. No signs of any impacts resulting from the construction of the grid connection were recorded.

Table 2.7: Invertebrate Sample Station 7 Results

Indicator Group	Taxon	Dominance
Group A - Very Pollution Sensitive		

	Ephemeroptera – Heptageniidae (Stone wash)	Common
	Plecoptera – non leuctra	Few
Group B - Moderately Pollution Sensitive		
	Plecoptera - Leuctra	Few
Group C - Moderately Pollution Tolerant		
	Ephemeroptera – <i>Baetis rhodani</i>	Common
	Hydracarina	Few
	Simuliidae	Few
	Trichoptera - Caseless	Few
	Gammarus	Few
Group D - Very Pollution Tolerant		
Group E - Most Pollution Tolerant		

2.8

Sample Station 8

Sample Station 8 was located on a very steep mountain stream that was located alongside the grid connection route as it travels up to the Kerry border at Lackabaun. The stream was approximately one metre wide at the sample station but was less than 0.1m deep and had a substrate of bedrock and boulders. This stream flows down the steep mountain for approximately one kilometre before reaching sample station 7. There was no evidence of any impacts having resulted from the construction of the nearby grid connection.

The instream macrophytes included the aquatic moss *Fontinalis antipyretica* along with other bryophytes. No emergent vegetation was recorded. The bankside vegetation was dominated by such as butterwort, primrose (*Primula vulgaris*), sweet vernal grass (*Anthoxanthum odoratum*), yellow pimpernel (*Lysimachia nemorum*) and Meadowsweet (*Filipendula ulmaria*). The stream was too shallow and too steep to effectively kick sample. Boulders were lifted and a rock washing exercise took was undertaken.

No Q value was assigned as no kick sample was possible. However, the stone washing revealed Group A and Group B species – indicating unpolluted waters. There was no filamentous algae or sewage fungus and no signs of other pollution. No signs of any impacts resulting from the construction of the grid connection were recorded.

Table 2.8: Invertebrate Sample Station 8 Results

Indicator Group	Taxon	Dominance
Group A - Very Pollution Sensitive		
	Ephemeroptera – Heptageniidae (Stone wash)	Common
Group B - Moderately Pollution Sensitive		
	Trichoptera - Cased	Common
Group C - Moderately Pollution Tolerant		
Group D - Very Pollution Tolerant		
Group E - Most Pollution Tolerant		

2.9

Sample Station 9

Sample Station 9 was located at a location where the access road to the wind farm crosses the Toon River. The river here is approximately 5 metres wide with a mixed substrate of boulders, cobbles, gravels and fine gravels. The river provides good quality salmonid habitat. It also provides suitable habitat for freshwater pearl mussel, though none were recorded at the sample location. Evidence of road enhancement works were noted on the bridge and on the surrounding road infrastructure but no signs of any effects on the river channel were identified. This sample station is shown in Plate 2.7.



Plate 2.7. Sample Station 9.

The instream macrophytes included the aquatic moss *Fontinalis antipyretica* along with other bryophytes. Water crowfoot was recorded upstream of the bridge, where the channel conforms to the EU Habitats Directive Annex I habitat ‘water courses of plain to montane levels with the *Ranunculum fluitantis* and *Callitriche-Batrachion* vegetation (3260)’. Emergent vegetation included hemlock water dropwort. The bankside vegetation was included bramble, ferns and figwort (*Scrophularia* sp.) with shading from tree species including hawthorn (*Crataegus monogyna*), grey willow and ash.

The Q rating assigned to the channel was Q4. It was assigned this value as Group A were recorded in fair numbers with Group B recorded and Group C recorded in fair numbers. There was no filamentous algae or sewage fungus and no signs of other pollution. No signs of any impacts on the river resulting from the construction of the wind farm were recorded.

Table 2.9: Invertebrate Sample Station 9 Results

Indicator Group	Taxon	Dominance
Group A - Very Pollution Sensitive		
	Ephemeroptera – Heptageniidae (stone wash)	Numerous
	Plecoptera – non leuctra	Few
Group B - Moderately Pollution Sensitive		
	Trichoptera – Cased	Few

	Plecoptera - Leuctra	Common
Group C - Moderately Pollution Tolerant		
	Ephemeroptera – <i>Baetis rhodani</i>	Common
	Trichoptera - Caseless	Few
	Gammarus	Few
	Simulidae	Few
Group D - Very Pollution Tolerant		
Group E - Most Pollution Tolerant		

2.10

Sample Station 10

Sample Station 10 was located at a location where the access road to the wind farm crosses a tributary of the Toon River. The river here is approximately 4.5 metres wide with a mixed substrate of boulders, cobbles, gravels and silts. The river provides good quality salmonid habitat. It also provides suitable habitat for freshwater pearl mussel, though none were recorded at the sample location. Evidence of road enhancement works were noted on the bridge and on the surrounding road infrastructure. This included extensive works on the culvert. However, no signs of any instream works or effects on the river channel were identified. This sample station is shown in Plate 2.8.



Plate 2.8. Sample Station 10.

No submerged or emergent macrophytes were recorded. The bankside vegetation included meadowsweet, bramble, nettle (*Urtica dioica*) and wavy bittercress (*Cardamine flexuosa*).

The Q rating assigned to the channel was Q4. It was assigned this value as Group A were recorded in fair numbers with Group B recorded and Group C recorded in fair numbers. There was no filamentous algae or sewage fungus and no signs of other pollution. No signs of any impacts on the river resulting from the construction of the wind farm were recorded.

Table 2.10: Invertebrate Sample Station 10 Results

Indicator Group	Taxon	Dominance
Group A - Very Pollution Sensitive		
	Ephemeroptera – Heptageniidae (stone wash)	Numerous
	Plecoptera – non leuctra	Few
Group B - Moderately Pollution Sensitive		
	Trichoptera - cased	Few
	Plecoptera - leuctra	Few

Group C - Moderately Pollution Tolerant		
	Ephemeroptera – <i>Baetis rhodani</i>	Common
	Trichoptera - Caseless	Few
	Platyhelminthes	Few
Group D - Very Pollution Tolerant		
Group E - Most Pollution Tolerant		

2.11

Sample Station 11

Sample Station 10 was located on the Toon River approximately 1.8 kilometres downstream of sampling station 9. The river here is approximately 10 metres wide with a gravel substrate. The river provides good quality salmonid habitat. It also provides suitable habitat for freshwater pearl mussel, though none were recorded at the sample location. No signs of any effects of the windfarm on this river channel were identified. This sample station is shown in Plate 2.9.



Plate 2.9. Sample Station 11.

Submerged macrophytes included water crowfoot (*Ranunculus sp.*) and the channel conforms to the EU Habitats Directive Annex I habitat ‘water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitriche-Batrachion* vegetation (3260)’ at this location. Emergent vegetation included hemlock water dropwort, marsh ragwort (*Senecio aquaticus*) and figwort. The bank side vegetation included hemlock water dropwort, bramble, gorse and broom (*Sarothamnus scoparius*) scrub with willows on the banks.

The Q rating assigned to the channel was Q4. It was assigned this value as Group A were recorded in fair numbers with Group B recorded and Group C recorded in fair numbers. There was no filamentous algae or sewage fungus and no signs of other pollution. No signs of any impacts on the river resulting from the construction of the wind farm were recorded.

Table 2.11: Invertebrate Sample Station 11 Results

Indicator Group	Taxon		Dominance
Group A - Very Pollution Sensitive			

		Ephemeroptera – Heptageniidae (stone wash)	Numerous
		Plecoptera – non leuctra x 2 species	Common
Group B - Moderately Pollution Sensitive			
		Trichoptera - cased	Few
		Plecoptera - leuctra	Few
Group C - Moderately Pollution Tolerant			
		Ephemeroptera – <i>Baetis rhodani</i>	Numerous
		Simuliidae	Few
Group D - Very Pollution Tolerant			
Group E - Most Pollution Tolerant			

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 wind farm site and grid connection route following construction and operation of the wind farm. In none of the 11 survey stations was there any evidence to indicate that there had been any impact on water quality or any other aspect of the watercourse as a result of the construction or the operation of the wind farm and grid connection.

