Planning and Environmental Consultants

Aquatic Macroinvertebrate Sampling Report

Slieveacurry Renewable Energy Development, Co. Clare

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1. INTRODUCTION

MKO were appointed to conduct ecological surveys of the rivers and streams that are located downstream of the Slieveacurry Renewable Energy Development. The survey work was conducted by Olivia O' Gorman (BSc, MSc) and Laoise Kelly (BSc. Env, MCIEEM).

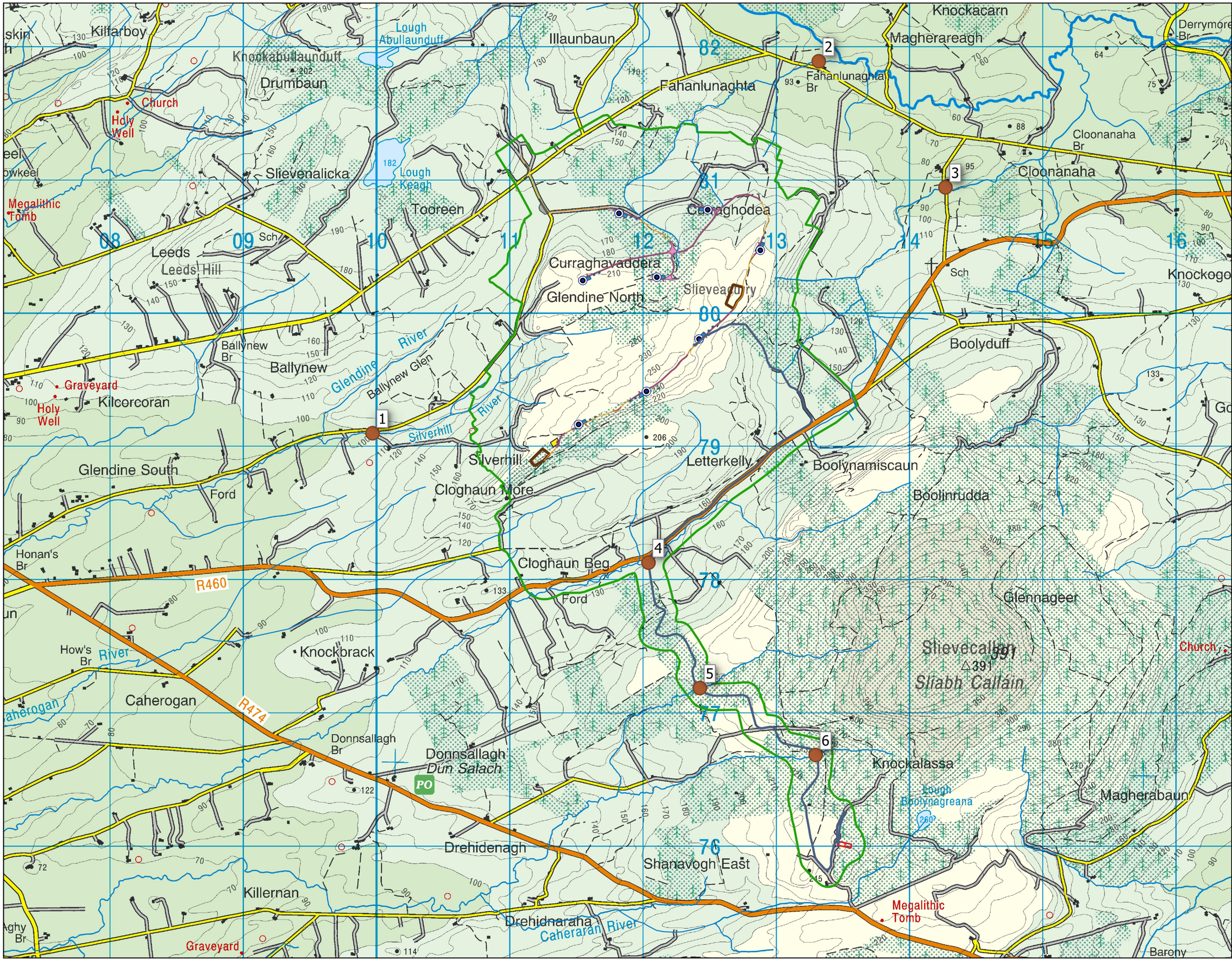
Sampling was carried out downstream of the EIAR study area at 6 sites on the 30th and 31st of July 2020. Watercourses were assessed if they were located within or downstream of the Proposed Development or the grid connection route and contained flowing water. The locations of each watercourse surveyed 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. The results of the surveys at 6 sites are provided below.

1.1 Statement of Authority

Field surveys were undertaken by Olivia O'Gorman (B.Sc., M.Sc.,) and Laoise Kelly (B.Sc., MCIEEM) of MKO on 30th July 2020. Both Olivia and Laoise have over 5 years' experience working in environmental consultancy. This report has been reviewed by David McNicholas (B.Sc., M.Sc., MCIEEM). David is a highly experienced ecologist has over 10 years' professional experience in environmental management and ecological assessment.

[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
- EPA Mapped Watercourses
- EIAR Study Boundary
- Proposed Turbine Locations
- Existing Roads - Upgrade Proposed
- Proposed New Site Roads
- Proposed Turbine Foundations
- Proposed Turbine Hardstands
- Proposed Borrow Pits
- Proposed Temporary Construction Compound
- Met Mast Location
- Proposed Underground Cable Route
- Proposed Extension to Existing Slievecallan Substation
- Temporary Runover Area
- County Road to be Maintained
- Public Road Expansion Area
- Soft Levelled Area

Drawing Title: Kick Sample Locations

Project Title: Slieveacurry Renewable Energy Development, Co. Clare

Drawn By	Checked By
Holly Witter	Olivia O'Gorman
Project No.	Drawing No.
170224	Figure 1-1
Scale	Date
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2. RESULTS

The following sections outline the findings of the surveys.

2.1 Sample Station 1

Sample Station 1 is located to the west of the site on the Silverhill River which flows into the Glendine River downstream. The watercourse is densely shaded by woodland for almost its entire length. Trees species recorded included Ash (*Fraxinus excelsior*), Hazel (*Coryllus avellana*), Pedunculate Oak (*Quercus robur*) and Hawthorn (*Crataegus monogyna*). Bankside vegetation included Bramble (*Rubus fruticosus agg.*), Ivy (*Hedera helix*) and Bracken (*Pteridium aquilinum*). The river was fast flowing and included areas of both riffle and glide. The substrate comprised bedrock, boulder, cobble, gravel and fine gravel. No instream or emergent macrophytes were recorded at the sample point.

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 was absent and Group E had one representative.

Table 2.1 Invertebrate Sample Station 1 Results

Indicator Group	Taxon	Dominance
Group A - Very Pollution Sensitive	None	None
Group B - Moderately Pollution Sensitive	Plecoptera *(Leuctra)*	Numerous
	Trichoptera (Cased)	Present
Group C - Moderately Pollution Tolerant	Trichoptera (Uncased)	Few
	Gammarus	Small numbers
	Chironomidae (ex. Chironomus)	Fair numbers
	Coleoptera	Present
	Tipulidae	Scarce/Few
	Simuliidae	Fair numbers
Group D - Very Pollution Tolerant	None	None
Group E - Most Pollution Tolerant	*Tubificaidae*	Present

Plate 2-1 Sample Station 1 to the west of the site on Silverhill River E509940 N679137

2.2 Sample Station 2

Sample Station 2 is located within the Fahanlunaghtamore stream [EPA code: 28F09] 1.1km north of the proposed development site boundary. This sample point occurs downstream of three watercourses which flow from the northern section of the proposed development site. This is natural watercourse with no modifications apparent at the sampling location. The watercourse flows to the Inagh River Estuary SAC via the Derrymore 28 {EPA code: 28D08] and the Inagh watercourse [EPA code: 28I01].

No instream or emergent macrophytes were recorded at the sample point. The watercourse was fast flowing and turbid with a boulder, cobble, gravel and fine gravel substrate. There was some erosion along the bankside with riparian vegetation comprising species such as Hawthorn *(Crataegus monogyna*), ivy *(Hendra helix),* bramble *(Rubus fruticosus agg.)*, tutsan *(Hypericum androsaemum)* , herb-robert *(Geranium robertianum),* yellow iris *(Iris pseudacorus)* and willow spp. *(Salix spp.).*

The Q rating assigned to the channel was Q3. It was assigned this value as Group A invertebrates were absent with Group B invertebrates and Group C invertebrates common. No group D or E taxa were recorded.

There were riffles in the stream downstream of the sampling point and the stream was fast flowing with a high volume of water within the channel. Although the sampling conditions within the watercourse channel were not ideal, the results demonstrate that the stream is slightly polluted.

Table 2.2 Invertebrate Sample Station 2 Results

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

Plate 2-2 Sample Station 2 to the north of the site boundary E513290 N681929

2.3 Sample Station 3

Sample Station 3 is located within the Knockacarn watercourse [EPA code: 28K42] to the east of the proposed development site and drains a number of watercourses from the south-east of the proposed site. The sampling site is located within a natural watercourse surrounded by agricultural grassland and crossed by a road bridge downstream of the sampling location. The Knockacarn flows to the Inagh River Estuary SAC via the Derrymore 28 {EPA code: 28D08] and the Inagh watercourse [EPA code: 28I01].

The watercourse was moderate to fast flowing and comprised of bedrock, cobble, gravel and fine gravel substrate with heavy siltation within the channel. The watercourse was eroded and there were areas of heavy poaching along the bank side due to cattle accessing the river. There were riffle and glide sequences within in the watercourse. The watercourse was shaded in places and bankside vegetation comprised bramble *(Rubus fruticosus agg.)*, knapweed *(Centaurea nigra)*, soft rush *(Juncus effuses)*, cocks-foot and angelica *(Angelica sylvestris)* with some yellow iris *(Iris pseudacorus)* growing within the water channel.

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 within the sample and Group C species were numerous. Group D were numerous and there was litter within the watercourse and there was no growth of algae, sewage fungus or any other slimes. 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		
	Trichoptera (Cased)	Fair
Group C - Moderately Pollution Tolerant		
	Ephemeroptera – *Ephemrellidae*	Numerous
	Trichoptera (Uncased)	Fair
	Gammarus spp.	Numerous
Group D - Very Pollution Tolerant	Hirudinea	Numerous
Group E - Most Pollution Tolerant	None	None

Plate 2-3 Sample Station 3 to the east of the site boundary E514241 N680982

2.4 Sample Station 4

Sample Station 4 is located on the Kildeema [EPA code; 28K01] where the proposed grid connection leaves the R460 and enters the existing Slievecallan Wind Farm. The stream runs beneath a corrugated steel pipe installed as part of the access road to the existing windfarm.

No instream or emergent macrophytes were recorded at the sample point. The stream was fast flowing and had a substrate of cobble, gravel and fine gravel. Bankside vegetation was dominated by bramble (*Rubus fruticosus agg.*), willow (*Salix*), yellow flag (*Iris pseudacorus*) and bracken (*Pteridium aquilinum*). Otter spraint was recorded on a rock beneath the culvert adjacent to the stream. Otter prints were also recorded along the bank beneath the culvert, however no otter holts were recorded.

The Q rating assigned to the channel was Q3. It was assigned this value as only one individual was recorded in Group A. Group B and C taxon numbers were ranged from present to common and Group D was dominant. No Group E invertebrates were recorded.

Table 2.4 Invertebrate Sample Station 4 Results

Indicator Group	Taxon	Dominance
Group A - Very Pollution Sensitive	Ephemeroptera - *Heptageniidae*	Present
Group B - Moderately Pollution Sensitive		
	Plecoptera *(Leuctra spp.)*	Common
Group C - Moderately Pollution Tolerant		
	Baetis rhodani	Scarce/Few
	Gammarus	Fair

Indicator Group	Taxon	Dominance
	Coleoptera	Present
Group D - Very Pollution Tolerant	*Simuliidae*	Dominant
Group E - Most Pollution Tolerant	None	None

Plate 2-4 Sample Station 4 on grid connection route to south of site E512011 N678165

2.5 Sample Station 5

Sample Station 5 is located along the grid connection route within the existing Slievecallen Wind Farm to the southern end of the proposed development. Sample Station 5 was located within the Letterkelly watercourse [EPA code: 28L07] and flows via the Annagh (Clare) [EPA code: 28A03] to the Carrowmore point to Spanish point and Islands SAC and Mid-Clare Coast SPA.

The watercourse was fast flowing with some riffles and a cobble, gravel and silt substrate. It had a moderate volume of water within the channel at the time of the survey. The sample was taken downstream of the existing wind farm access road and proposed grid connection route. This watercourse is shown in Plate 2-5.

Horsetail spp. were recorded instream. The bankside vegetation was comprised of willow spp. *(Salix spp.),* creeping buttercup *(Ranunculus repens),* yorkshire-fog *(Holcus lanatus)*, angelica *(Angelica sylvestris),* soft rush, *(Juncus effuses),* bramble *(Rubus fruticosus agg.)* and marsh cinquefoil *(Comarum palustre).* There was no growth of filamentous algae, sewage fungus or any other slimes.

The Q rating assigned to the channel was Q3-4. It was assigned this value as Group A taxa were numerous with Group B and Group C taxon recorded in fair numbers. Group C were numerous. The sample was not undertaken in a riffle and thus not in ideal habitat for a biological sample.

Table 2.5 Invertebrate Sample Station 5 Results

Indicator Group	Taxon	Dominance
Group A - Very Pollution Sensitive	Ephemeroptera – *Siphlonuriidae*	Numerous
Group B - Moderately Pollution Sensitive		
	Trichoptera (*Cased*)	Fair
Group C - Moderately Pollution Tolerant		
	Trichoptera (Uncased)	Common
	Gammarus Sp.	Common
Group D - Very Pollution Tolerant	Diptera - *Simuliidae*	Numerous
Group E - Most Pollution Tolerant	None	None

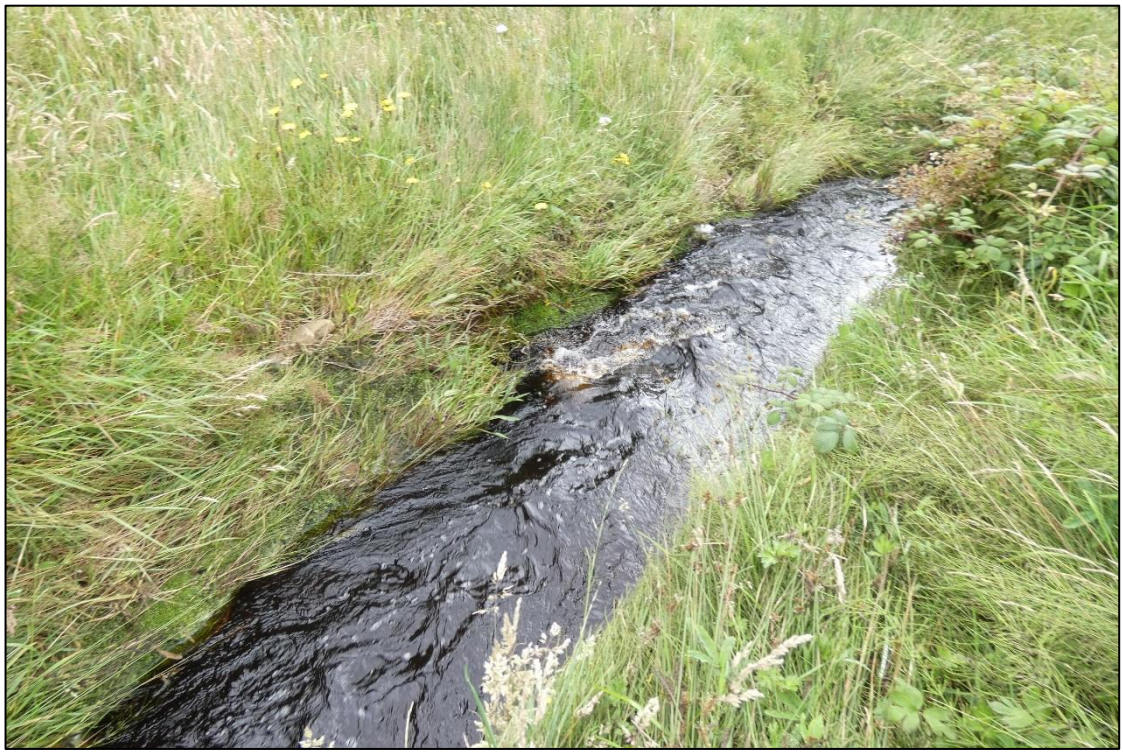

Plate 2.5 Sample Station 5 on the proposed grid connection route E512398 N677224

2.6 Sample Station 6

Sample Station 6 was not suitable for sampling due to the narrow nature of the watercourse and heavy encroachment of vegetation.

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 and grid connection route. Four of the six sample locations assessed were Q3 'Poor', one as Q-3-4 'Moderate' and one was not suitable for assessment due to its small nature and dense vegetation.