



APPENDIX 6-4

BIODIVERSITY MANAGEMENT ENHANCEMENT PLAN

Biodiversity Management and Enhancement Plan

Proposed Glenard Windfarm Application





DOCUMENT DETAILS

Client: **Futureenergy Glenard Designated Activity Company (DAC).**

Project Title: **Proposed Glenard Windfarm Application**

Project Number: **190114**

Document Title: **Biodiversity Management and Enhancement Plan**

Document File Name: **BMEP – F – 2022.02.03– 190114**

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



Rev	Status	Date	Author(s)	Approved By
01	Draft	26/11/2020	DMN	JH
02	Draft	06/07/2021	PE	JH
03	Final	25/01/2022	PE	JH

Table of Contents

1.	INTRODUCTION.....	1
1.1	Background.....	1
1.1.1	Statement of Authority.....	2
2.	BIODIVERSITY MEASURES	3
2.1	Forestry Felling and Peatland Restoration	3
2.2	Removal of Conifers from NPWS Article 17 mapped Blanket Bog	8
2.3	Management of Peatland Adjacent to Proposed Development Infrastructure	9
2.4	Replacement Hedgerow Planting	9
2.5	Timing of Works	9
2.6	Monitoring.....	9
2.6.1	Vegetation Monitoring.....	9
2.6.2	Hydrological monitoring.....	10
2.7	Reporting.....	10
3.	CONCLUSION	13
4.	BIBLIOGRAPHY	14

1. INTRODUCTION

1.1 Background

This Biodiversity Management and Enhancement Plan (BMEP) has been prepared in support of the Environmental Impact Assessment Report (EIAR) produced for the proposed Glenard Wind Farm, Co. Donegal.

A Biodiversity Management and Enhancement Plan has been prepared as part of the Proposed Development to offset the loss of degraded peatland habitats that are within the footprint.

Part of Turbine no. T12 is located on Blanket bog (PB2) habitat, with the entire site access track located within plantation forestry (WD4). Turbine no. T10 is located adjacent to an area of blanket bog (PB2) and a short section of the associated access track leading west to T14 is located within this habitat. With the exception of a number of small sections of peatland loss along a proposed site access track between T9 and T1, and road widening/upgrade works at the site entrance, all other infrastructure (including site compounds, the borrow pit, peat repository, met mast and the proposed amenity walkways between T1 and T2) are located within plantation forestry (WD4) or on existing site access tracks. The extent of the proposed infrastructure located on peatland habitats within the EIAR study area boundary has therefore been kept to a minimum. The peatland habitats on which the Proposed Development is located consists primarily of a mosaic of Upland blanket bog (PB2) and Wet heath (HH3) mosaic. Some areas of peatlands within the study area have been subject to significant historic peat extraction/turf cutting, classified as PB4 on Figure 6.6, see Plate 1.1, however, these areas are completely avoided by the Proposed Development.

The receiving habitats are fully described in Chapter 6 of the accompanying EIAR. Existing site access tracks have been utilised where possible to minimise the impact of the Proposed Development footprint on the receiving environment. Secondly, the road construction methodology has also been designed to minimise the amount of material movement.

The loss of peatland habitat to the Proposed Development footprint equates to 0.25ha hectares (ha). Therefore, this BMEP provides for the restoration of forestry land, that has been planted on peatland habitats, back to this peatland habitat as well as the restoration and management of other areas of peatland within the EIAR study area. The areas identified for restoration and management are shown in Figure 1. In summary, the measures proposed are as follows:

1 Proposed forestry felling and restoration to peatland habitats

It is proposed that an area of forestry located to the north of the proposed turbine T10 is to be permanently felled and reinstated to peatland habitat (see Figure 1) where it is described as ‘proposed felling and peatland restoration area’. Much of this area of plantation forestry is dominated by Sitka spruce, with poor growth resulting in large open areas of peatland vegetation beneath, see Plate 2.2 in Section 2. This area can therefore be effectively returned to peatland habitat.

The total additional area of forestry felling and associated restoration to peatland is **2.7ha**. The above area was chosen for felling given the proximity to an existing Coillte ‘Bioclass’ area i.e. an area of peatland within the EIAR study area boundary (to the west of turbine no. T7 and associated access road, see again Figure 1) and the proximity of peatland to the west and northwest. By linking up these habitats, this will increase connectivity between peatland habitats locally, which is beneficial for biodiversity and dispersal of species dependant on the habitat, and improves the general hydrology and function of the habitat at a landscape scale¹.

¹ Thom et al. *Conserving Bogs: The Management Handbook*

2 Peatland management measures

1. *It is proposed to remove individual trees within the north-western part of the proposed peatland restoration area. This has been mapped as EU Habitats Directive Article 17 Annex I blanket bog by the NPWS and as XXX in the habitats map in Figure 6.6. This area equates to approximately 2.7ha, see Figure 1.*

The above measure would result in the management of a further 2.7 ha of peatland habitat (over and above the 2.7ha of forest felling and peatland restoration) within the EIAR study area boundary. The proposed measures are described in full in this BMEP.

Following the implementation of the two measures outlined in this report, to offset the loss of peatland habitat, there will be no residual net loss of peatland habitats on the site. In addition, the proposed forestry reinstatement to peatland has the potential to result in a long-term positive effect with a net gain (of 2.45ha) in peatland habitat overall and further beneficial management of 2.7ha of peatland.

This BMEP provides measures that will be employed to improve the ecological quality of the peatland habitats that are located outside the construction footprint but within the control of the developer. The bog restoration programme described in this report will be implemented in accordance with the published guidelines and best practice described in detail below including the guidelines arising from the EU-LIFE/Coillte ‘*Irish Blanket Bog Restoration Project*’ (2002-2007), Scottish Natural Heritage (SNH)’s guidance note Planning for development: *What to consider and include in Habitat Management Plans* (Version 2, January 2014) and the National Parks and Wildlife Service’s (NPWS) publication ‘*Best practice in raised bog restoration in Ireland*’ (2017, Irish Wildlife Manuals No. 99).

1.1.1

Statement of Authority

This report has been prepared by David McNicholas (B.Sc., M.Sc., MCIEEM) and Patrick Ellison (B.Sc. ACIEEM). David has over 10 years’ professional ecological consultancy experience and is a full member of the Chartered Institute of Ecology and Environmental Management. Patrick has over 5 years’ professional ecological consultancy experience and is an associate member of the Chartered Institute of Ecology and Environmental Management. This report has been reviewed by John Hynes (B.Sc., M.Sc., MCIEEM). John has 10 years’ experience in ecological management and assessment.

2. BIODIVERSITY MEASURES

2.1 Forestry Felling and Peatland Restoration

As shown in Figure 1, it is proposed to reinstate areas of coniferous plantation forestry equating to **4.2ha** within an area of the site north-west of turbine no. T10. These areas will be felled as part of the construction phase of the wind farm. However, these areas will require further maintenance to achieve successful reinstatement back to peatland habitat. Areas where plantation forestry will be removed still comprise of typical peatland species beneath the conifers, see Plate 2.2. These areas are therefore most likely to be successfully reinstated to peatland if the conifer crop is sympathetically removed, in a manner that will cause minimal damage to the bog surface.

As described in the Irish Wildlife Manual (IWM) No. 99 (Mackin et al, 2017²):

‘Removal of forestry is a proven restoration measure, and has been used effectively by organisations such as Coillte at a number of raised bogs in Ireland, both on the high bog and cutover. In recent years, this measure has been applied at many raised bog sites as part of EU LIFE-funded restoration projects, including Crosswood Bog SAC, Lough Ree SAC, Killyconny Bog (Cloghbally) SAC, Girley Bog NHA, Scohaboy Bog NHA and Wooddown Bog NHA.’

The IWM also states that:

‘In general, clear-felling using a harvesting machine should only be carried out if a crop is commercially viable, surface conditions are dry and there is a low risk of damage to raised bog habitats. A number of alternatives to clear-felling are available, depending on the particular circumstances of a bog. These include halo-thinning, ring barking, fell to waste using a specialist track machine or chainsaw, or complete tree removal with cables and winches.’

‘In order to select the most appropriate solution, consideration should be made of the following: the potential for peat-forming habitats to develop, the risk of damage to the bog surface, and the commercial viability (area and yield class) of the crop. Where working conditions on the raised bog surface are unsuitable for machinery, or only a small crop of conifers are present, use of a chainsaw may be the most appropriate solution.’

The approach to be taken to conifer removal is to be considered with reference to the guidance provided within Appendix A of the Macklin *et al.* 2017. Where clear-felling using a specialist harvesting machine is undertaken, the waste material, including branches and waste lengths of timber will be used to create a brash mat beneath the machine as it works to reduce damage to the bog surface.

Plate 2-1 illustrates the rapid change to conditions after conifer removal and drain blocking. This rewetting of the peat mass facilitates Sphagnum moss establishment/ spreading and prevents further drying out.

² Mackin, F., Barr, A., Rath, P., Eakin, M., Ryan, J., Jeffrey, R. & Fernandez Valverde, F. (2017) *Best practice in raised bog restoration in Ireland*. Irish Wildlife Manuals, No. 99. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht, Ireland.



Plate 2-1 (Left) Bog surface prior to forestry removal and drain blocking; (Right) Bog surface one year after forestry removal and drain blocking (Source: Mackin *et al*, 2017 - © John Derwin).

In order to facilitate the re-establishment of peatland vegetation within these areas, and maintain an effective hydrological regime, the following measures are proposed in these areas:

- All trees will be felled using conventional forestry harvesting approaches/machinery as described in Section 4.9.1 of the main EIAR, and with specific reference to Macklin *et al*. 2017.
- Removal of brash from felled areas off-site post felling.
- Drain blocking will be undertaken on a local scale, both within and immediately surrounding the newly felled forestry. This will be achieved by installing peat dams within the existing drainage ditches (predominantly remnant semi-functioning forest drains). This will maintain, enhance and restore the favourable baseline hydrological and ecological conditions within each of the restoration locations. This measure is effective in raising water levels in the peat and encouraging peat-forming habitats on cutover bog (Mackin *et al*, 2017) An example of peat dams proposed is shown in Plate 2.3. The methodology for peat dam construction, as per (Mackin *et al*, 2017) is provided in Plates 2-5 and 2-6, with the plastic dam methodology provided in Plate 2-7. Peat removed from the drain initially to create a key for the dam will be used to backfill the borrow pit (see Plate 2.5).
- No additional drainage will be installed in proximity to these habitat areas during the lifetime of the development.
- The use of off-road vehicles on the site will be restricted to the proposed new site access track unless where specifically required to access the areas to be felled
- These works will also be preceded by a toolbox talk to the felling team by the project ecologist to ensure all measures are implemented in full.
- No application of chemical and organic fertilisers or herbicides and pesticides will be undertaken within the development footprint.
- Peat extraction within the proposed peatland reinstatement area will not be permitted.
- Burning and dumping will not be permitted.
- The rehabilitation area will be monitored (as described below) to assess the success of the rehabilitation plan.



Plate 2.2 Example of proposed area for forestry felling with typical peatland vegetation remaining beneath the conifers. Such low-quality forestry offers high potential for restoration to peatland.



Plate 2.3 Example of peat dams to be used for on-site forestry drain blocking. This will re-establish and maintain a hydrological regime for the required peatland rehabilitation.



Plate 2.4 Example of plastic dams to be used for on-site drain blocking where peat dams are not suitable.

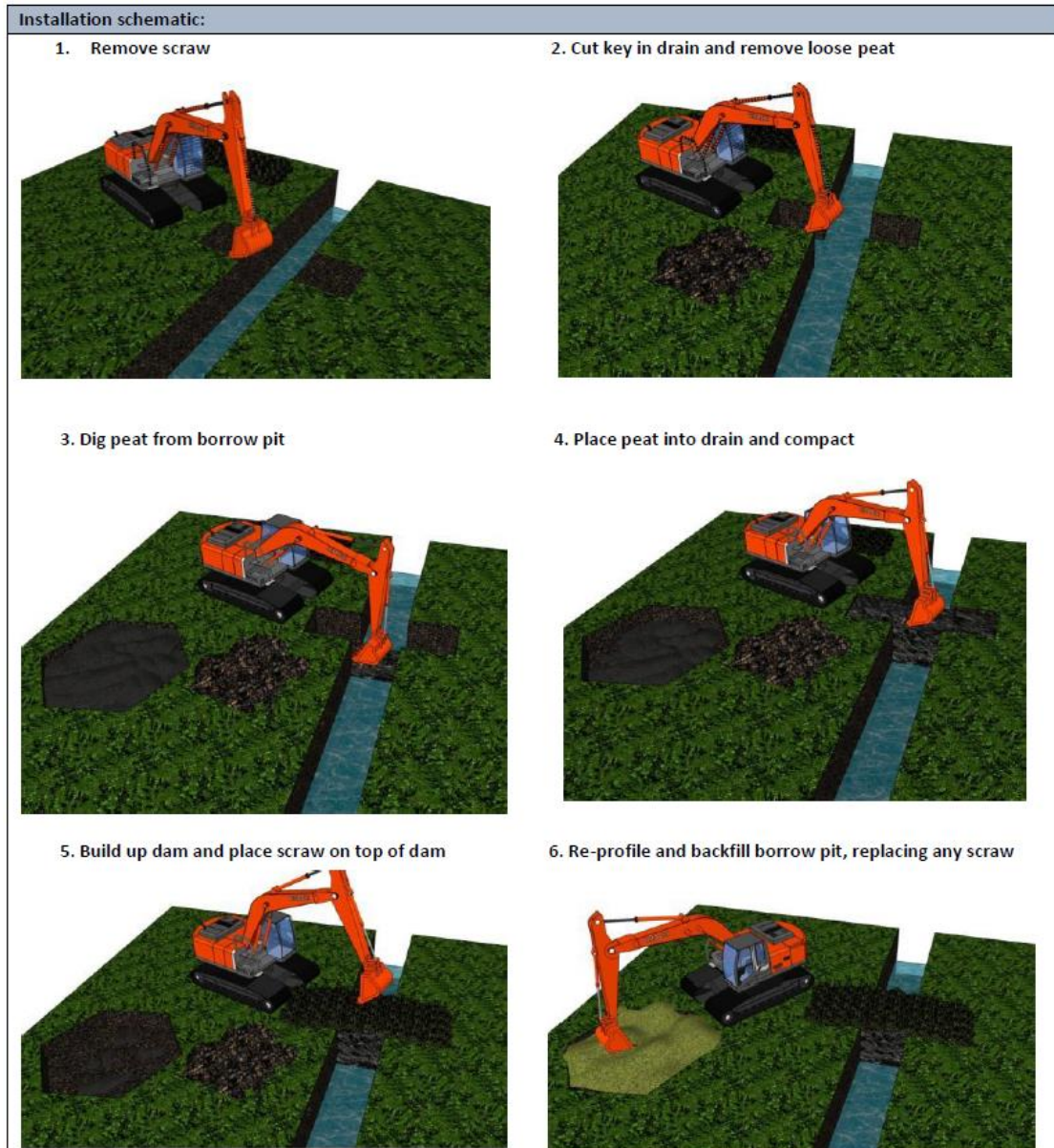


Plate 2-5 Methodology for peat dam construction (Source: Mackin et al, (2017))

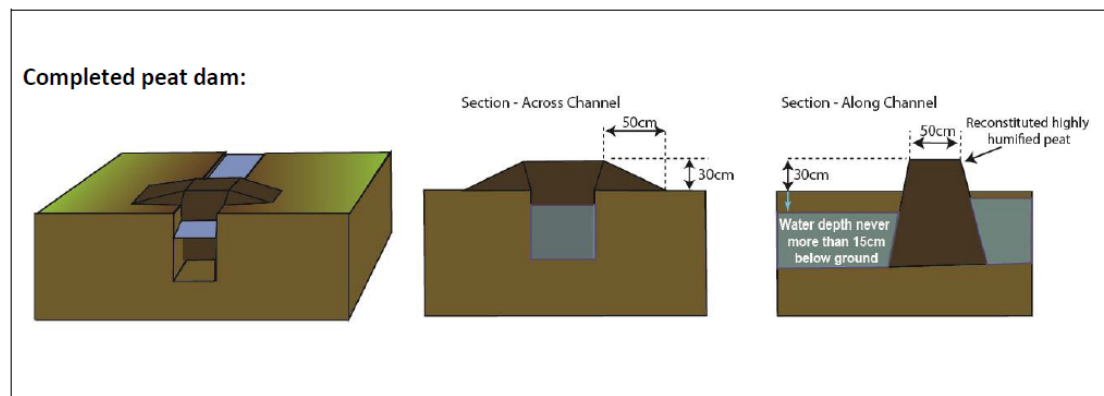


Plate 2-6 Drain Blocking by machine (McDonagh, 1996³)

³ McDonagh, E. (1996). *Drain Blocking by machine on Raised Bogs*. National Parks and Wildlife Service, Dublin.

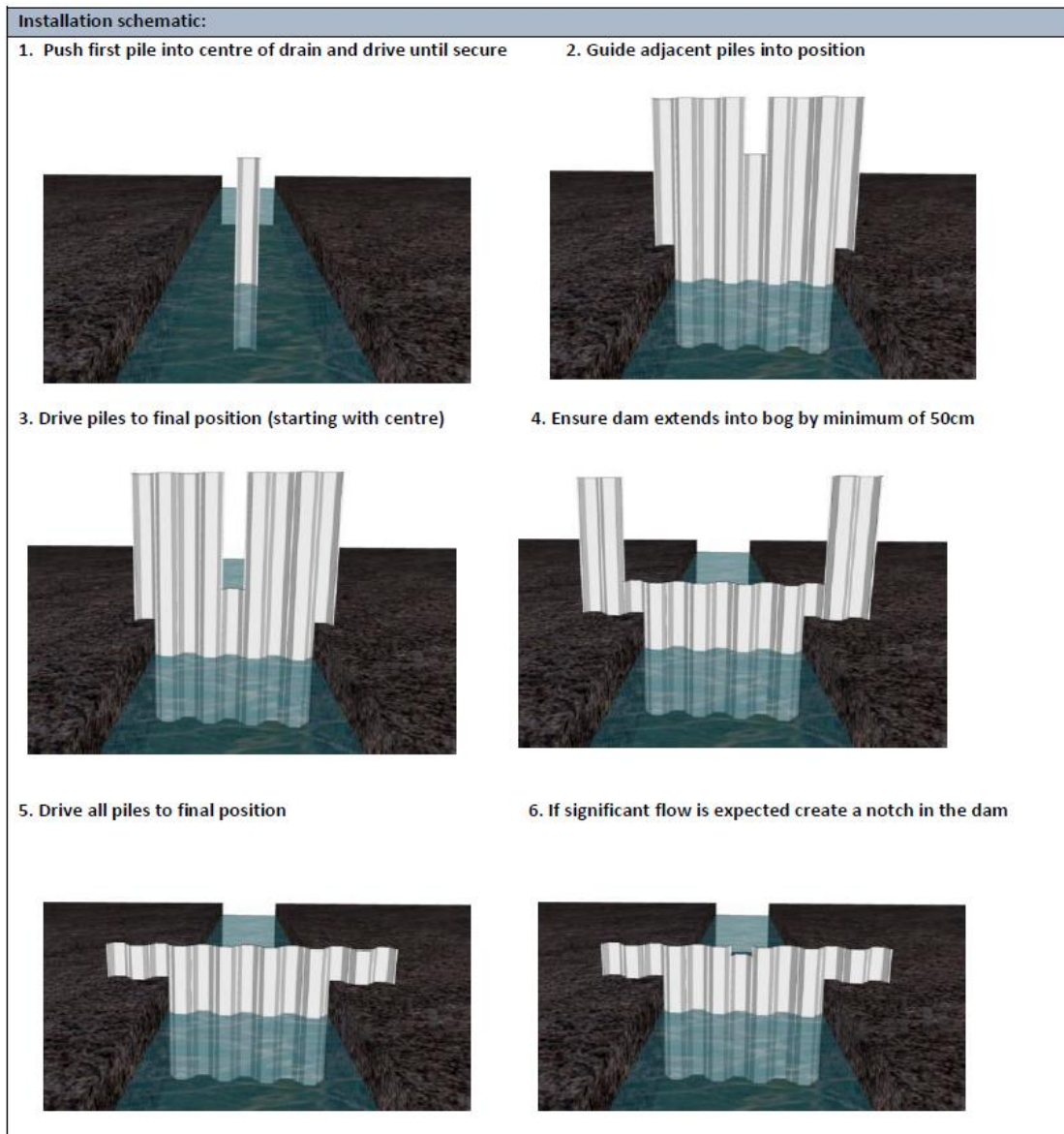


Plate 2-7 Plastic dam installation methodology (Source: Mackin et al, (2017)).

2.2

Removal of Conifers from NPWS Article 17 mapped Blanket Bog

An area of peatland, originally drained and partly planted with conifers, see Figure 1, has been identified for peatland restoration. This is described as PB2/HH3/PB4, upland blanket bog/wet heath/cutover bog mosaic in the habitat map in Figure 6.6a and 6.6b of the EIAR. This has also been mapped as conforming to the EU Habitats Directive Annex I habitat Blanket bog by the NPWS as part of Article 17 reporting. This area equates to approximately 2.7ha and is located adjacent to the area identified for felling and restoration described above, further magnifying the restoration benefits. The tree removal and drain blocking (will be carried out using the same approach to that already described in Section 2.1, however this will be on a much smaller scale. It will also include some removal of individual trees by hand using a chainsaw as some are remote and tracking by machine would cause unnecessary damage. These works will also be preceded by a toolbox talk to the felling team by the project ecologist.

2.3 Management of Peatland Adjacent to Proposed Development Infrastructure

In addition to the reinstatement measures proposed above, this plan also sets out measures that will reinstate the embankments (cut and fill areas) alongside the newly constructed infrastructure i.e. site access roads and turbine hardstands, within areas of peatland habitat i.e. at T12, T10 and access road to west of T10 and between T1 and T9. Such measures will further minimise the peatland loss and the extent of the development footprint. During initial site preparation works, the acrotelm (top vegetated layer of peat) shall be placed/temporarily stored with the vegetation part of the sod facing the right way up to encourage growth of plants and vegetation at the surface of the placed peat and spoil. This will then be placed back on the reinstated berm along the adjacent section of new access track. In addition to the above listed measures, the below will also be implemented:

- No vehicular access will be permitted within the reinstated peatland areas once all initial works are completed.
- The rehabilitation areas will be monitored to assess the success of the rehabilitation plan. This is further described in Section 2.7 of this report.
- Where revegetation has not established or ground conditions do not allow for easy recolonisation, any reseeded will be restricted to species occurring in the immediate surroundings. Where required, reseeded will use Sheep's fescue (*Festuca ovina*) or red fescue (*Festuca rubra*). Such grasses will help to stabilise the reinstated peat, while not outcompeting any natural revegetation from local seed dispersal.

2.4 Replacement Hedgerow Planting

In order to accommodate the proposed road widening works at the northern site entrance to facilitate turbine delivery approximately 75 linear meters of hedgerow is proposed to be cleared. It will not be possible to replant hedgerow in the same location following these works because..., it is proposed to carry out hedgerow planting further to the north along this road. Approximately 270m of hedgerow planting will be carried out along the area shown in Figure 2, which will result in a net gain in this habitat within the site and will improve connectivity between the existing tree cover and linear habitat features in this location.

Rowan *Sorbus aucuparia* and hawthorn will be utilised for the replacement planting as these are low-growing and produce flowers and berries that are beneficial for a variety of bird and small mammal species.

2.5 Timing of Works

Hedgerow clearance works will be conducted in line with the provisions of Section 40 of the Wildlife Acts 1976 (as amended, 2000) which state that it is an offence to clear hedgerow between the 1st March and the 31st of August in a given year.

2.6 Monitoring

2.6.1 Vegetation Monitoring

To confirm that habitat restoration and enhancement has been successful, all areas of restored vegetation will be monitored post-restoration. Monitoring results will be reported by a suitably experienced ecologist within an Annual Environmental Report for the first 5 years post construction,

and every 5 years thereafter for the operational life of the wind farm, with any criteria failures identified and corrective actions implemented as part of the Glenard Construction Environmental Management Plan (CEMP).

Prior to the commencement of all habitat enhancement measures described in this Plan, permanent vegetation monitoring plots will be established within the management areas. The monitoring plot locations will be selected using stratified random sampling. This will allow the monitoring plots to be representative of microtopography and vegetation cover, sampling areas from the wettest, intermediate and driest parts of the management areas. Monitoring plots will be surveyed and classified using the relevé method as per the National Survey of Upland Habitats (Perrin et al., 2014) with plot sizes being 2m x 2m. Biotic and abiotic parameters that form baseline indicators of ecological and hydrological condition of the bog will be recorded. Monitoring plots will be marked out permanently using fencing posts and their location recorded using GPS. The number of monitoring plots will be determined by the level of plant community heterogeneity identified following felling/drain blocking. However, it is proposed that a minimum of ten 2m x 2m monitoring plots will be established across the enhanced areas.

Monitoring plots will be surveyed once annually during the first five years of the windfarm and at 5 year intervals for the lifespan of the windfarm (35 years) by a suitably qualified ecologist. Results will be analysed and a report of the findings for the year will be produced. The enhancement plan will be regularly updated and amended where necessary to improve the efficacy of the enhancement work.

Habitat data gathered during the monitoring surveys will be classified and analysed according to the methodology provided within the following documents:

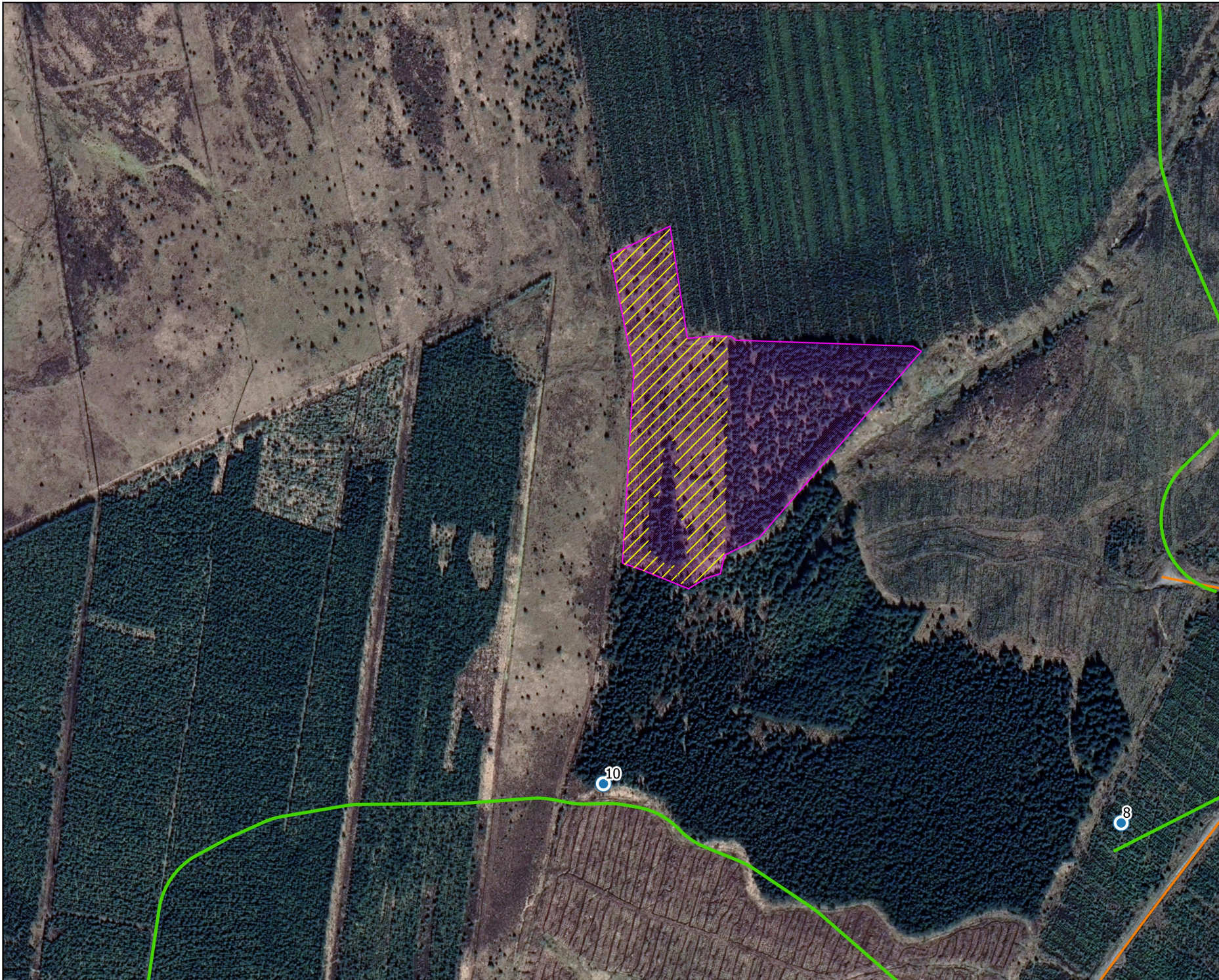
- Vegetation Description and Data Analysis: A Practical Approach, 2nd Edition (Kent, 2011)
- Detailed habitat and ecotype classification based on The National Survey of Upland Habitats (Perrin et al., 2014)

2.6.2 Hydrological monitoring






Water levels within areas where drains are blocked will be recorded bi-annually during the first five years of the windfarm and at 5 year intervals for the lifespan of the windfarm (30 years). A number of dipwells or piezometers will be inserted on the peatland to monitor the height of the water table. These will be constructed from 52mm internal diameter PVC. To stop peat filling the tube from the base, the pipe will be covered with gauze affixed with tape. This will be done prior to restoration to allow monitoring of water levels within both the restoration and enhancement areas. In this way, any positive impacts on the local hydrology can be verified and quantified.

2.7 Reporting

Reports detailing the monitoring works carried out, the results obtained and a review of their success, along with any suggestions for amendments to the plan will be prepared in years 1, 2, 3, 4, 5, 10, 15, 20, 30 and 35 following commencement of the plan's implementation. Should the operational life of the wind farm be extended beyond year 35 monitoring will continue every 5 years.



Map Legend

-  Proposed felling & peatland restoration area
-  Single Tree Removal Area
-  Proposed turbine location
-  Proposed Existing Roads Upgrade
-  Proposed New Site Roads



Microsoft product screen shots reprinted with permission from Microsoft Corporation

Drawing Title
Proposed Peatland Restoration Area

Project Title
Proposed Gleanard Wind Farm

Drawn By PE	Checked By JH
-----------------------	-------------------------

Project No. 190114	Figure No. A-6.4, Fig 1
------------------------------	-----------------------------------

Scale 1:5000	Date 21.01.2021
------------------------	---------------------------



MKO
 Planning and Environmental Consultants
 Tuam Road, Galway
 Ireland, H91 WW84
 +353 (0) 91 735611
 email: info@mkofireland.ie
 Website: www.mkofireland.ie



Map Legend

- EIAR Site Boundary
- Indicative area of replacement hedgerow planting
- Proposed hedgerow removal



Microsoft product screen shots reprinted with permission from Microsoft Corporation

Drawing Title
Proposed Hedgerow Removal and Replacement Planting

Project Title
Proposed Gleanard Wind Farm

Drawn By PE	Checked By JH
-----------------------	-------------------------

Project No. 190114	Figure No. A-2
------------------------------	--------------------------

Scale 1:5000	Date 21.01.2021
------------------------	---------------------------

MKO
 Planning and Environmental Consultants
 Tuam Road, Galway
 Ireland, H91 WW84
 +353 (0) 91 735611
 email: info@mkofireland.ie
 Website: www.mkofireland.ie

3. CONCLUSION

As described in this report, the majority of the proposed infrastructure is located within plantation forestry (WD4). The extent of the proposed infrastructure located on peatlands has therefore been kept to a minimum. The areas of deep peat within the study area have been avoided in the design of the development and all areas that are within the construction footprint have been degraded through extensive grazing of sheep or cattle, drainage, peat cutting, forestry or scrub encroachment. In addition, the Proposed Development utilises existing site access tracks wherever possible to minimise the impact of the Proposed Development footprint on the receiving environment.

This Biodiversity Management and Enhancement Plan sets out measures for the restoration and enhancement of peatlands within the EIAR boundary. These have been set out under the following actions:

- > Forestry Felling and Peatland Restoration
- > Removal of Conifers from NPWS Article 17 mapped Blanket Bog - Area E
- > Management of Peatland Adjacent to Proposed Development Infrastructure

The success of these measures will be evaluated through a detailed monitoring and reporting programme. Following the implementation of the measures outlined in this report to offset the loss of degraded peatland habitat, there will be no residual net loss of peatland habitats on the site. In addition, the proposed forestry reinstatement to peatland will result in a long-term positive effect with a net gain (of 0.2 ha) in peatland habitat overall and improvement of a further 2.7ha.

4. BIBLIOGRAPHY

EU-LIFE/Coillte ‘*Irish Blanket Bog Restoration Project*’ (2002-2007), Online, Available at:
http://www.irishbogrestorationproject.ie/downloads/4_progress_report.pdf, Accessed: 07.10.2020

Scottish Natural Heritage (SNH), 2014. Guidance note Planning for development: *What to consider and include in Habitat Management Plans* (Version 2, January 2014). Online, Available at:
<https://www.nature.scot/sites/default/files/2019-01/Guidance%20-%20Planning%20for%20development%20-%20What%20to%20consider%20and%20include%20in%20Habitat%20Management%20Plans.pdf>, Accessed: 07.10.2020