

**PROPOSED WIND FARM
AT MOANMORE LOWER, CO. CLARE**

**BIODIVERSITY ENHANCEMENT
AND MANAGEMENT PLAN**

APRIL 2025

Prepared for

Moanmore Lower Green Energy Ltd.

by

BIOSPHERE ENVIRONMENTAL SERVICES

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1.0 INTRODUCTION

1.1 Background

This Biodiversity Enhancement and Management Plan (BEMP) has been prepared in support of the Environmental Impact Assessment Report (EIAR) produced for the proposed Moanmore Lower Wind Farm, Co. Clare. Full details of the Development are given in **Chapter 2** of the EIAR.

As part of the Development, an area of cutover bog (0.8 ha), which is part of an extensive area of bog that includes a remnant area of uncut raised bog (see EIAR **Chapter 6: Sections 6.3.3.4 & 6.3.3.5**), will be directly impacted as a result of the construction of Turbine T2 and its associated access track. As the bog complex in its entirety is rated of County Importance, mitigation is being provided to offset the habitat loss through the implementation of a Biodiversity Enhancement and Management Plan (BEMP), as described in this report.

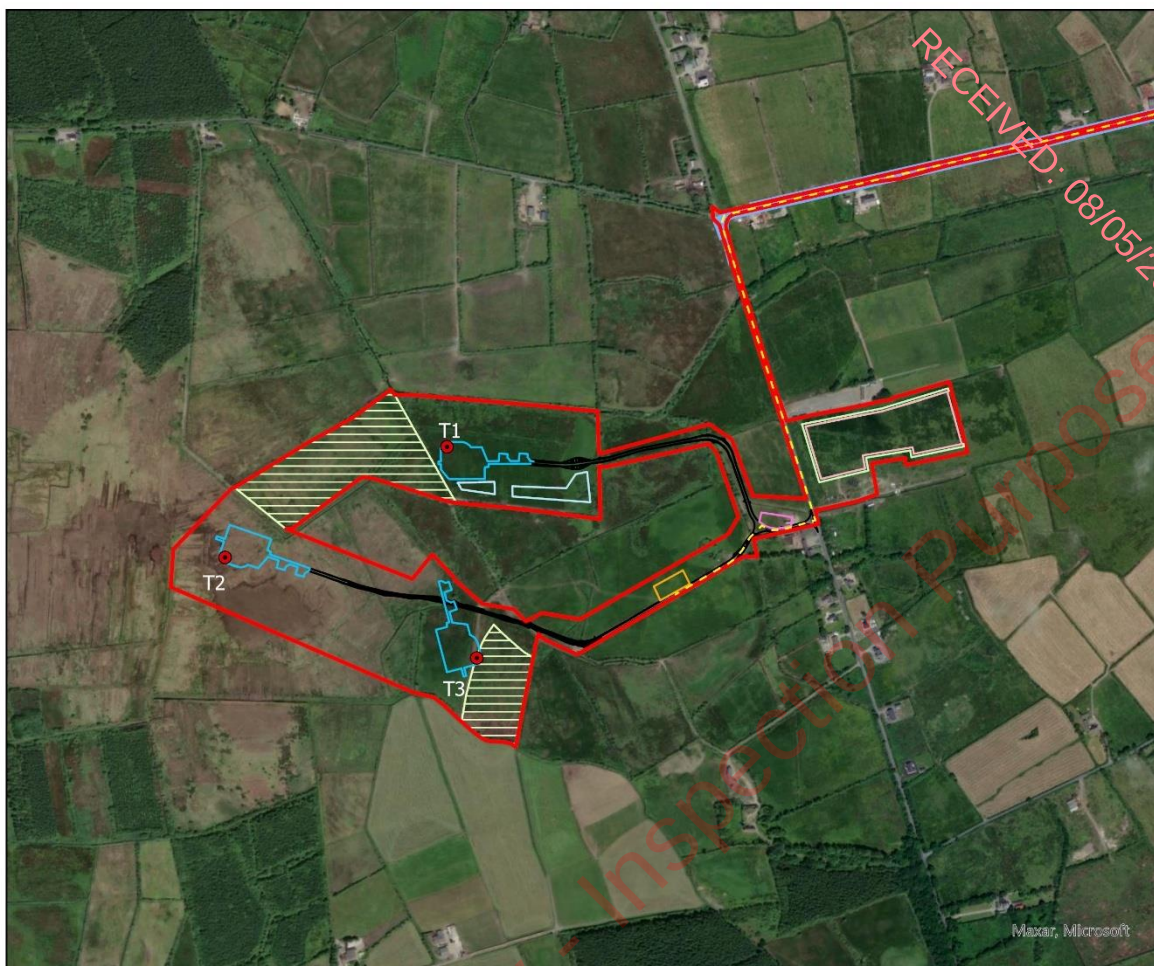
Mitigation is also required to offset the loss of a small area of Molinia meadow (estimated at 200 m²) (see EIAR **Section 6.3.3.2**), an Annex I listed habitat, as a result of the construction of Turbine T3. The mitigation will enhance the main area of this habitat (c.1.78 ha) within the site and will also focus on increasing the suitability of the habitat for the Annex II listed marsh fritillary (while not recorded in the baseline survey, part of the Molinia meadow habitat was rated as 'suitable').

While hedgerows are not a significant feature of the Moanmore Lower site, there will be a loss of an estimate 20 m due to new access tracks and a loss of 70 m at the location for the proposed blade set-down area. In addition, an estimated 175 m of hedging will be removed to provide a bat buffer around T1 (the other two turbines do not require hedge removal). Mitigation for loss of hedging will be provided by a replanting programme which forms part of the BEMP.

The areas for the BEMP are within the Redline Boundary for the Development (see **Figure 1**).

The programme described in this report will be implemented in accordance with published guidance and best practice, namely:

- SNH (now NatureScot) "Planning for development: What to consider and include in Habitat Management Plan – Guidance" (Version 2, March 2016).
- CIEEM (2023) Briefing Paper on 'Biodiversity Enhancement for New Developments in Ireland', (the "CIEEM Guidance")



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Client Moanmore Lower Green Energy Ltd	Title Locations of Areas for BEMP																		
Legend Redline Boundary Turbine Locations Spoil Area Hardstands Access Tracks 38kV Substation Rock Armour Berm Temporary Compound Grid Connection Route Flood Compensation Area Locations of Areas for BEMP Temporary Road Widening 00.130.250.5 Km	JENNINGS O'DONOVAN an RSK company © COPYRIGHT OF JENNINGS O'DONOVAN AND PARTNERS LIMITED FINISKLIN Tel (+353) 719 161 416 SLIGO Email. info@jodireland.com IRELAND www.jodireland.com @JOD_Sligo Jennings O'Donovan & Partners Jennings O'Donovan <table><tr><td>Date</td><td>24/12/2024</td><td>Revision</td><td>0</td><td>Job No.</td><td>6778</td></tr><tr><td>Scale</td><td>1:10,000</td><td>Stage</td><td>EIAR</td><td>Figure</td><td>1</td></tr><tr><td>Drawing</td><td>POD</td><td>Checked</td><td>SM</td><td>Approved</td><td>SM</td></tr></table>	Date	24/12/2024	Revision	0	Job No.	6778	Scale	1:10,000	Stage	EIAR	Figure	1	Drawing	POD	Checked	SM	Approved	SM
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Figure 1. Locations of areas for the BEMP (shown by hatched lines).

1.2 Outline Description of Proposed Wind Farm Site

The wind farm Site, as shown in **Figure 1 above**, is located in south-west county Clare, 3 km northwest of the town of Kilrush and 6.8 km southwest of Cooraclare village. The wind farm Site is located within the townland of Moanmore Lower.

The proposed Development is situated within a landscape dominated by agricultural land (mainly used for livestock grazing) and with scattered stands of commercial conifer plantation. Remnant raised bogs, now almost entirely cut, are a feature of the area. There are a number of operational wind farms in the area, including Moanmore Wind Farm, located c. 1.7 km to the northeast and Tullabrack Wind Farm, located c. 2.16 km to the east of the Site.

From a conservation perspective, the River Shannon system is the dominant feature of the local area, with Poulmasherry Bay located just over 1 km to the west of the Site. Various small lakes and wetlands occur in the hinterland of the Site, including Tullagher Lough, Tullabrack Lough, Gower Lough and Moanmore Lough.

The mapped geological formation underlying the Site and GCR is the Gull Island Formation, which is a grey SILTSTONE with up to 20% sandstone towards the base decreasing upwards (see **EIAR Chapter 8** for details). Much of the Site is covered in peat, particularly in the western sector. Peat depths at survey points (266 no.) ranged from 0.00 m to 5.1 m, though generally depths were very shallow to moderately deep. Deepest peats occurred south of T2 and south / southwest of T3.

The wind farm Site is characterised by relatively flat lying topography with associated elevations ranging between 8 to 16 m AOD and an average slope of 2.5°.

The proposed wind farm Site and Grid Connection Route to the Tullabrack 110kV substation are situated within the Shannon Estuary North catchment (ID: 27, Area: c.1,651.27 km²) (for details see **EIAR Chapter 9: Hydrology and Hydrogeology**). The Site and its surroundings have indirect hydraulic connectivity to the Shannon estuary via natural and artificial drainage that connect to the Moyasta River, which drains the Site. A section of the river flows along the northern boundary of the site, and continues in a westward direction before draining to Poulmasherry Bay and into the Shannon Estuary. In addition to the Moyasta River, there are numerous drainage ditches located within the proposed Site and its surrounds.

Ecologically, the Site for the proposed wind farm can be described as being dominated by Wet grassland (GS4) (semi-improved to varying extents) and Cutover bog (PB4), with a small area of Raised bog (PB1). The bog type is former raised bog of the 'Western' category. In a detail evaluation of raised bogs in Ireland, Cross (1990) refers to Co. Clare and writes "*Raised bogs*

occurred in two areas; small bogs in the undulating lowlands east of Tulla and an extensive tract near Kilrush at the mouth of the Shannon (Monmore Bog). All bogs have been largely cut away leaving a few very small remnants behind.” A full ecological description of the site is given in **Chapter 6** of the EIAR.

1.3 Objectives of the BEMP

Objective no. 1

To enhance an existing area of cutover bog that has been improved for grazing and is now largely dominated by wet grassland with frequent rushes.

Objective no. 2

To enhance an area of Molinia meadow (Annex I listed) which has been degraded by over-grazing and which has potential to provide habitat suitable for marsh fritillary (Annex II listed).

Objective no. 3

To offset the loss of hedgerows by a replanting programme.

1.4 Statement of Authority

This BEMP has been prepared by Brian Madden, with expertise on the marsh fritillary component provided by Ryan Mitchell.

Brian Madden BA Mod. (Hons.), PhD, MCIEEM

Brian graduated in Natural Sciences from the University of Dublin in 1984 and earned a Ph.D degree from the National University of Ireland for his research on ecosystem processes in raised bogs. Since 1994, Brian has been the principal ecologist with BioSphere Environmental Services.

Brian has carried out botanical surveys and habitat assessments for most terrestrial habitats which occur on the island of Ireland. He is also an experienced ornithologist, with particular interest in birds of peatland and wetland habitats.

BioSphere Environmental Services has been involved in energy related projects, and particularly wind farms, since the 1990s. Many of the projects have included Biodiversity Enhancement and Management Plans, including Castlepook Wind Farm, Co. Cork, Oweninny Wind Farm, Co. Mayo and Eglis Wind Farm, Co. Tyrone.

Ryan Mitchell, B.Sc. – Senior Ecologist & Marsh Fritillary expert

Ryan is a senior Environmental Scientist / Ecologist working at Jennings O'Donovan & Partners Ltd. He is an experienced entomologist, with specialisation in pollinator insects and Diptera (True flies). Ryan has much experience of working on large scale renewable energy projects (onshore wind & solar) as a Marsh Fritillary surveyor both in planning and construction stages. He has also carried out invertebrate monitoring surveys for NPWS within various Natura 2000 sites. He has published numerous papers in peer reviewed journals on terrestrial invertebrates in Britain and Ireland.

Examples of energy projects requiring lepidoptera studies that Ryan has worked on include: Derrinlough Wind Farm, Co. Offaly; Carrickatane Wind Farm, Co. Tyrone, Clooncunny Wind Farm, Co. Sligo, Timahoe North Solar Farm, Co. Kildare.

2.0 PLAN DETAILS: OBJECTIVE 1 – CUTOVER BOG ENHANCEMENT

2.1 Background

The enhancement plot, which measures approximately 4.04 ha, lies to the west of the location for turbine T1 (see **Figure 1**) (separated by a distance of 35.4m). It is essentially used as a field, demarcated by drains, for rough grazing of cattle. The area is shown as bog on the OS 6 inch and 25 inch historical maps, and even then drains demarcated much of the boundary. The north-east tip of the plot extends to the Moyasta River. There is one main internal drain which separates the south-eastern sector (triangular shaped plot) from the main sector (rectangular shaped). Main drains occur along the western, southern and eastern boundaries, with a minor drain along the northern boundary. In general, the eastern part of the plot is more improved and drier.

The present land use is grazing by cattle which appears to be at a low to moderate level and on a seasonal basis. Some localised areas of poaching were evident in the wet grassland areas at the time of survey (September 2023).

Vegetation description

The area comprises a mix of cutover bog and wet grassland habitat on peat soil (**Figure 2**). The western half of the area is dominated by a revegetated cutover bog surface, which is characterized by varying proportions of *Molinia caerulea*, *Juncus effusus* and *Juncus acutiflorus* and with frequent *Carex panicea*, *Erica tetralix*, *Succisa pratensis*, *Calluna vulgaris* and *Potentilla erecta*. Sphagnum moss is locally frequent (**Plate 1**), with *Sphagnum capillifolium* and *Sphagnum papillosum* the main species present. Another common moss species is *Aulacomium palustris*, which is typical of wet bog habitat. The cutover bog habitat present has not been subject to peat cutting for a considerable time. Areas of bare peat are absent and there is no evidence of recent cutting activity.

The eastern half of the enhancement area is generally dominated by wet grassland vegetation which has a high cover of soft rush *Juncus effusus* (**Plate 2**) with bog species either absent or present at a low cover. Frequent species occurring, in addition to *Juncus effusus*, include *Juncus acutiflorus*, *Ranunculus repens*, *Succisa pratensis*, *Cirsium palustre* and *Holcus lanatus* with *Rhytidiadelphus squarrosus* the main moss species seen.

In places the cutover bog and wet grassland habitats intermix and form a habitat mosaic.



Figure 2. Aerial photograph with the outline of proposed habitat enhancement area in yellow.



Plate 1: View of cutover bog vegetation in the west of the area, showing *Sphagnum capillifolium* growing along with various sedges and grasses (September 2023).



Plate 2: General view of wet grassland habitat in the eastern half of the plot (September 2023).

2.2 Proposed Management Methodology

The principal aim is to maximise over the lifetime of the Plan the amount of cutover bog within the Plot. This will off-set the loss of cutover bog as a result of the Project and will also enhance the quality of habitat for important bird species such as hen harrier, snipe and meadow pipit.

This aim will be achieved through reducing the amount of rush cover (mainly soft rush) throughout the plot by sensitive mowing/cutting and an appropriate level of grazing. However, in areas dominated by wet grassland and perhaps less likely to revert fully back to bog, increasing the diversity of wetland plant species within the grassland sward will be desirable.

The closure of internal drains will be undertaken in conjunction with the project ecologist and hydrologist so as to maximise the wetness of the surface.

The initial task in Year 1 of the BEMP will be a detailed vegetation review of the plot and the setting out of an appropriate programme of works for the first 5 Years of the Plan

It is noted that during the lifetime of the Plan, there will be no spreading of fertilisers within the Plot.

2.2.1 Measure no. 1: Survey and review of work programme

During the year prior to construction, a detailed vegetation survey of the Plot will be carried out during the summer period which will aim to map in detail the distribution of the bog and wet grassland habitats. The areas which are identified as predominantly existing cutover bog will be marked out (using bamboo canes or similar) as these will be excluded from subsequent mowing to minimise disturbance.

In conjunction with the project hydrologist and ecologist, any internal drains to be blocked will be marked out so as to increase the wetness of the surface layer.

Following this review, a suitable programme of works will be identified for the first 5 Years of the Plan.

Outlines of the likely approaches for the work programmes are given in the following.

2.2.2 Measure no. 2: Control of rushes by cutting

Much of the plot has a moderate to high coverage of rushes, mostly soft rush *Juncus effusus*. This species forms tussocks which can occur densely and outcompete other species. While some rushes will always be present in disturbed bog habitats and wet grassland, coverage of more than 30% is undesirable.

Rushes will be controlled by a combination of mowing/cutting and an appropriate level of stock grazing (see next section). [It is not proposed to use herbicides during the operation of the Plan to control rushes or weed species.] It is proposed that in Year 1 of Plan, the entire Plot will be mowed,

with the exclusion of the areas identified as predominantly existing cutover bog. This will be done either in early spring (prior to start of bird nesting season) or, more likely, in September (after bird nesting season). Mowing in Year 1 will be done using a low ground pressure tractor suitable for use on peat bogs. The cutting should be as low to the ground as possible and will be done by a machine mounted flail or brush-cutter. The cut rushes will be collected and removed from site so as to reduce soil fertility. Grazing will then be allowed in period September to end of October to assist in control of rushes.

In Year 2, an inspection will be made at start of February to consider whether another early full or even partial (say 50%) cut of Plot by tractor and mower would be useful. If ground is too wet, this will be delayed until autumn (as above).

After 1-3 years of above approach, it may be desirable to continue cutting, at least in some parts of the Plot, by a hand method using a flail or similar tool so as to reduce disturbance to the surface.

With annual cutting, the vigour of the rushes will be reduced (in combination with appropriate grazing). However, it is anticipated that some cutting will be required in each Year of the Plan.

The mowing works will be carried out by an experienced operator under the guidance of the project ecologist.

2.2.3 Measure no. 3: Grazing

An appropriate level of grazing is required to control and reduce the cover of rushes and other robust plant species.

A level of 1 livestock unit per hectare per year (1 LU/ha/yr) is considered appropriate for the first three to five years of the Plan (after which the level will be reviewed). While this level is higher than would be recommended for uncut bog, it is appropriate for semi-natural grassland or in this case cutover bog with rushes. On this basis, 4 cattle will be allowed within the Plot for grazing.

Grazing will be on a seasonal basis being limited to the periods (i) March to mid-May (say 15th), and (ii) September and October.

The avoidance of the summer period mid-May to end of August will facilitate the flowering and seed production of the flora in the summer months.

The avoidance of the winter period November to February (inclusive) will prevent poaching.

The use of ring feeders for supplementary feeding can cause damaging enrichment of bog and poaching. If supplementary feeding is necessary, this will be discussed with the project ecologist and the most suitable area will be selected.

2.2.4 Measure no. 4: Drain blocking

A walk-over survey in September 2023 suggested that there are few active internal drains within the management plot.

However, as part of Measure no. 1, a detailed inspection will take place in the pre-construction year by an ecologist and hydrologist to determine where blocking of drains would be feasible and be beneficial to increasing the wetness of the surface (see **Chapter 9; Hydrology & Hydrogeology, section 9.6.2.12**).

Identified drains will be blocked by hand using either wooden or recycled plastic dams (see **Plate 3**) which are hammered into place with a mallet. Procedure for drain blocking in raised bogs is described in detail in Mackin *et al.* (2017).

The ultimate purpose of blocking drains is to raise water levels and encourage peat-forming vegetation and especially the growth of Sphagnum mosses.



Plate 3. An example of a recycled plastic dam used to block functioning drains on a raised bog site.

2.3 Monitoring

To confirm that the objectives of the Plan are being achieved, the area of enhancement will be monitored during the lifetime of the wind project. SNH (2016) note that a Habitat Management Plan should be a live document, which may be altered following monitoring results, unexpected events or

evolving guidance. Any alterations would only occur following approval by the relevant stake-holding parties, in this case Clare County Council and NPWS.

2.3.1 Monitoring for cutover bog enhancement

After the baseline survey at the commencement of the Plan, a series of permanent quadrats will be set up for the purpose of monitoring of vegetation change over time. The location of these quadrats will be marked using wooden pegs and the grid reference will be recorded using GPS. It is expected that up to ten quadrats will be described. These will be of an appropriate size, probably 2 m x 2 m, to take into account the scale of the plan area. The occurrence and cover of vascular plant and moss species will be recorded in these quadrats along with a number of other important parameters such as the height of vegetation, cover of bare peat, flowering of plant species etc. This survey will take place in the late summer/autumn period of each monitoring year. Photographs of the quadrats will also be taken on deployment and subsequently during the following years of monitoring.

Monitoring will take place during the wind farm Operational Years 1, 2, 3 & 5 of the Plan implementation, with Year 1 being the base year at the time the works are carried out. After Year 5, a review of the progress will be conducted in light of the Plan objectives, and a programme will be developed for the next 5-Year period of the Plan (and so on for the lifetime of the project).

From the monitoring results in each year, an assessment will be made by the project ecologist on whether modifications are required in either the mowing or grazing regimes in place.

Peat water level monitoring, by means proposed standpipe installations, will also be carried out to monitor the effectiveness of the bog re-wetting, i.e. blocking of drains. The monitoring will continue through the lifetime of the Project (see **Chapter 9: section 9.7.2.13**).

2.4 Time Period for Plan Implementation

Year 1 of the Plan will include the baseline survey, the first mowing of rushes, and the establishment of the grazing programme. The site will be assessed by the project hydrologist and ecologist and internal drains marked where blocking will occur to raise water levels in the peat soils. Where this is required, such works will be undertaken within Year 1 of the Plan.

Year 1 will coincide with the completion of wind farm construction works.

Year 2 to Year 5

Throughout the lifetime of the Plan there is a need to ensure that the mowing and grazing measures are carried out in each year in accordance with the outline descriptions within the present document. This will be achieved through 1-2 site visits (one at time of mowing operations) each year. The monitoring of quadrats will be an additional visit focused on the state of the vegetation. Drain blocking

will be visually inspected to ensure that the dam is operating as required and does not require adjusting (should water be escaping) and water levels measured.

Year 5 onwards

As noted, a review of the Plan progress will be made after Year 5. At that stage, it will be apparent how successful the works are in achieving the objective of enhancing the distribution of cutover bog within the Plot. Modifications to the mowing and grazing programmes may be made for the next 5-Year period.

3.0 PLAN DETAILS: OBJECTIVE 2 – MOLINIA MEADOW ENHANCEMENT AND MARSH FRITILLARY

3.1 Background

The baseline botanical assessment identified one field where the Annex I listed habitat Molinia meadow (code 6410) was dominant (see **EIAR Chapter 6: section 6.3.3.2**). This is located east of turbine T3, with the turbine positioned on the western margin of the field (see **Figure 1**). The sward has developed in an area of cutover bog where a residual peat soil occurs (see **Plate 4**). As the sward has been degraded in parts by recent heavy grazing, it was rated as of Local Importance (higher value). The field has an area of 1.78 ha.

Due to the frequency within the sward of the foodplant of the marsh fritillary butterfly (Annex II listed), devil's-bit scabious *Succisa pratensis*, a survey of the field for larval webs of marsh fritillary was carried out in September 2023 (see **EIAR Appendix 6.3**) (see **Figure 3**).

While no larval webs were discovered on site, habitat suitability assessments were undertaken and concluded that the field contains 'suitable' habitat for marsh fritillary. The area was assessed as 'Suitable (Over-grazed) Habitat' for Marsh Fritillary. The overall habitat has a relatively species-rich sward ranging in average height of 25 cm tall. There was extensive evidence of heavy grazing across the entire survey area. The devil's-bit scabious cover was dense in many places (>10 plants per m²), with the distribution widespread and reasonably consistent across the survey area. Where devil's-bit scabious occurred, the sward height was mostly 12 cm. However, there were only a few small pockets of 'Good Habitat Condition' for marsh fritillary throughout the site.

In addition, the desktop study indicated that there is a total of 34 NBDC records of marsh fritillary within a 5 km radius of the Site, and hence it can be considered as being relatively widespread in the wider area of Moanmore Lower.

As the wind farm project will encroach slightly into an area dominated by an Annex I listed habitat, and considering that there is good potential for the Annex II listed marsh fritillary, management and enhancement of this plot is proposed as part of this BEMP.

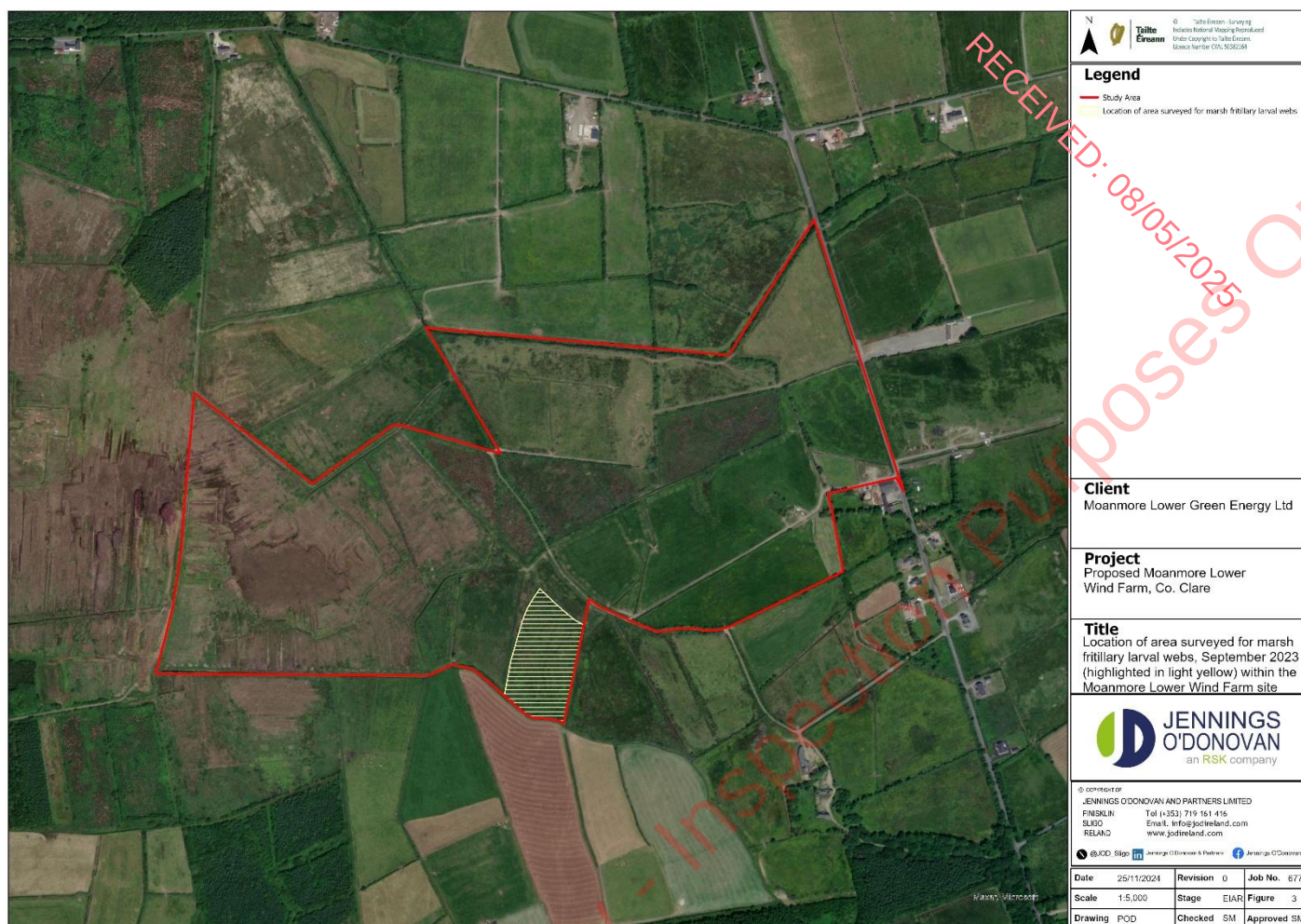


Figure 3: Location of area surveyed for marsh fritillary larval webs, September 2023 within the Moanmore wind farm Site.

Vegetation description

As noted, habitat classified as the EU Annex I habitat *Molinia* meadows has developed in an area of cutover bog. The main species in the relatively species-rich vegetation are purple moor-grass *Molinia caerulea*, marsh bird's-foot trefoil *Lotus uliginosus* and sweet vernal grass *Anthoxanthum odoratum*, with tormentil *Potentilla erecta*, soft rush *Juncus effusus*, sharp-flowered rush *Juncus acutiflorus*, carnation sedge *Carex panicea* and ling heather *Calluna vulgaris* also locally frequent. Moss cover is mainly provided by *Pleurozium schreberi* and *Rhytidadelphus squarrosus*.

In 2023, the field had been subject to apparent heavy grazing pressures and the sward was classified as being in a somewhat degraded state.



Plate 4: General view of Molinia wet grassland in the south of the survey area (September 2023).

3.2 Proposed Management Methodology

The principal aim is to enhance the habitat, both from the perspective of the Annex I habitat itself and the potential for marsh fritillary, by maintaining an appropriate level of grazing during the lifetime of the Plan. This will be achieved by following best guidance for the creation of suitable habitat for the butterfly.

While the management will be focused on grazing levels, no other land use activities will be allowed within the plot, such as insertion of new drains or tracks, or the planting of trees.

It is noted that the enhancement of this plot will also benefit bird species which already occur in the general area, such as foraging hen harrier and kestrel, breeding meadow pipit and skylark, and wintering snipe. Other invertebrate species will also benefit.

3.2.1 Measure no. 1: Grazing

Best practice management of grasslands for marsh fritillary is detailed in the following:

Byrne, D. & Moran J. (2018). Best practice guidelines from managing lowland species-rich grasslands and marsh fritillary grassland habitat in north-west Ireland. Report prepared for the European Commission, DG Environment, Agreement No. 07.027722/2014/697042/SUB/B2.
(https://www.researchgate.net/publication/334277108_RBAPS_Lowland_Species-Rich_Grassland_Marsh_Fritillary_Grassland_Habitat_Best_Practice_Guidelines)

A detailed plan for the management of the Plot will be compiled by an ecologist with experience of marsh fritillary at the commencement of the wind farm construction. As several years will have passed since the 2023 baseline survey, a resurvey of the condition of the Molinia meadow in the context of habitat suitability for the butterfly will be undertaken prior to the commencement of works on site (pre-construction year)

For management of wet grassland (inc. Molinia meadow) for marsh fritillary, Byrne and Moran note the following:

Grazing is needed to provide a patchwork of vegetation heights for the different life cycles of the butterfly. Ideally, grasslands should have areas with vegetation height ranging from 5 to 60 cm during summer and autumn. If over that period, the majority of the grassland is grazed lower than 5cm, it would be advisable to remove livestock to give it a chance to recover and be of use for the butterfly.

Stocking levels on the wet grasslands suitable for marsh fritillary are usually low (0.5 LU/ha or less), which reduces potential for over poaching and trampling of the larval webs. Depending on the grassland condition, and farm practices, livestock may graze in spring to summer or it may be beneficial to outwinter livestock, particularly if this has been done traditionally, as they will break down plant litter and reduce purple moor-grass cover. If overwintering, supplementary feed the livestock with concentrates designed to meet their minimum nutritional conditions as this will minimize excess nutrients in the grassland system.

Extensive grazing will also result in some areas that look under-grazed and may have dead plant litter - these areas are used for basking by adult butterflies. However, keep an eye on these areas as they can be prone to invading scrub.

Avoid mowing grassland suitable for marsh fritillary as this removes the different sward heights—however mowing small areas of tussocky grass / rushes annually might be useful in restoring habitat for the butterfly.

On the basis of a recommended stocking rate of 0.5 LU/ha, it is likely that only 1-2 cattle will be allowed access to the Plot and on a seasonal basis.

In addition to optimising the stocking level for the Plot, measures may need to be taken to reduce dense patches of rushes and encroaching scrub (as noted, such features will be assessed in the resurvey at the time of construction). However, it is likely that such control and removal would be localised and could be done by hand to minimise disturbance to the surface.

3.3 Monitoring

To confirm that the objectives of the Plan are being achieved, the area of enhancement will be monitored during the lifetime of the wind project.

Monitoring on an annual basis in the first five years of the Plan would be required to assess the structure of the vegetation in the context of its suitability as habitat for marsh fritillary. This would be done in late summer/early autumn period during optimal weather conditions by an ecologist with experience of the habitat requirements of marsh fritillary. Search for larval webs would also be conducted.

After Year 5, a review of the Plan progress will be made. At that stage, it will be apparent how successful the works are in achieving the objective of enhancing the Molinia meadow and of providing suitable habitat for marsh fritillary. Modifications to the grazing programme may be made for the next 5-Year period.

3.4 Time Period for Plan Implementation

Year 1 of the Plan will include the baseline survey and the compilation of a detailed management programme for grazing.

If necessary, scrub (often dominated by dense bramble and gorse) and rushes may be cut back, as considered necessary, in the autumn period.

Year 1 will coincide with the completion of wind farm construction works.

Year 2 to Year 5

Site surveys to assess the state of the vegetation for marsh fritillary suitability, and to check for presence of larval webs, will be carried out. If required, modifications may be made to the grazing regime.

Year 5 onwards

As noted, a review of the Plan progress will be made after Year 5. At that stage, it will be apparent how successful the works are in achieving the objective of enhancing the Molinia meadow grassland and providing suitable habitat for marsh fritillary. Modifications to the grazing programme may be made for the next 5-Year period.

4.0 PLAN DETAILS: OBJECTIVE 3 – OFFSETTING THE LOSS OF HEDGEROWS

4.1 Background and Management Approach

While hedgerows are not a prominent feature of the Moanmore Lower wind farm site, hedgerows are of biodiversity importance in a local context for a range of wildlife.

The main permanent losses occur where the new access track leading to turbine T3 breaches a hedge along the existing farm track (c.20m) and also at the blade set-down area where a strip of approximately 70 m of former hedge (now a scrubby willow strip) along the northern margin of the plantation will be removed to allow access from the local road.

It is noted that the main track upgrade from the site entrance leading to the T3 area has hedging only along the southern side and the upgrade works will leave this hedgerow in situ.

Hedge removal is required at turbine T1 to provide a bat buffer around the turbine (see **Chapter 6: Section 6.5.5.1**). This amounts to removal of 175 m of low hedging dominated by gorse.

The total loss of hedging amounts to 265 m, including the 175 m bat buffer.

Additional hedgerow habitat will be created to offset the loss following best practice. The new plantings, which will be a total length of 880 m, will comprise native hawthorn *Crataegus monogyna* and willow (*Salix aurita* and/or *Salix cinerea* subsp. *oleifolia*). Hazel *Corylus avellana* and holly *Ilex aquifolium* will be included as secondary species. All plantings will be of certified Irish genetic stock.

Planting will be along the boundaries of fields within the Redline Boundary of the wind farm Site where there is either no existing hedging (usually just a drainage ditch with perhaps a bramble strip) or where there is an existing hedge that is poorly grown with gaps and would be improved through bolstering. The exact locations will be selected during the construction phase, with options shown on **Figure 4**. (It is noted that the areas shown are outside of the buffer zones for bats)

Planting will take place in the first appropriate season (autumn/winter) after construction commences and will be by a contractor with experience of laying new hedgerows.

4.2 Monitoring

The contractor will carry out an annual inspection for failed plantings and will replace same at the earliest opportunity. This will be done for as long as it takes the hedging to become fully established.

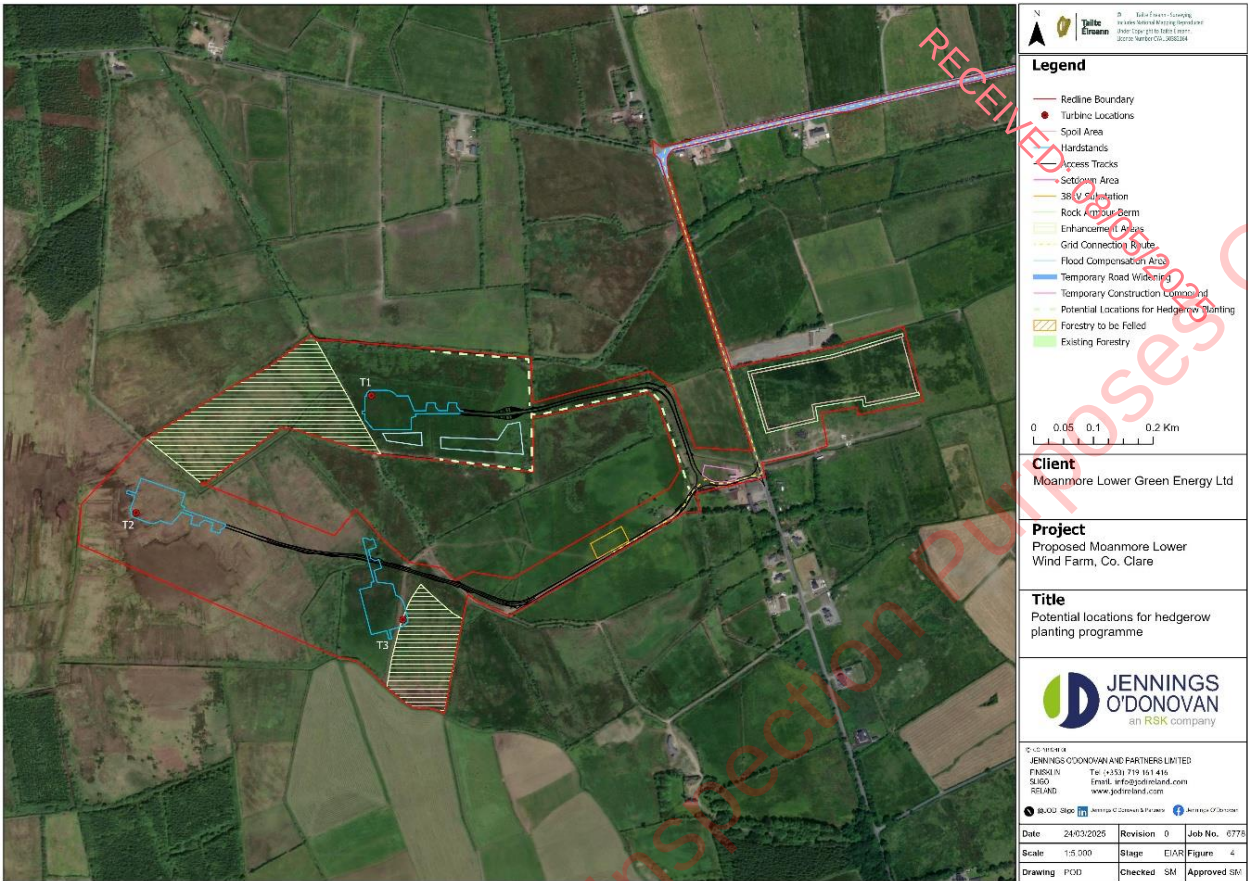


Figure 4. Potential locations for hedgerow planting programme.

5.0 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 BEMP will be prepared in years 1, 2, 3, 4, 5 and submitted to Clare County Council and the NPWS yearly for review. After Year 5 monitoring intervals will be increased to Years 10, 15, 20, 25, 30 and 35 subject to agreement. The BEMP should be considered as a live document to be reviewed and modified as required, pending submission to and approval by Clare County Council and the NPWS.

Implementing and managing the plan will be the responsibility of the wind farm operator. It is the wind farm operator's obligation to uphold the objectives included in this management plan, to be accountable for the maintenance of the habitats that will be created and monitoring of the species as specified.

Monitoring and reporting on the measures will be undertaken by independent, suitably experienced and qualified ecologists and hydrologists employed by the wind farm operator, with reporting submitted to Clare County Council and the NPWS on behalf of the wind farm operator.

6.0 CONCLUSION

The BEMP for the Moanmore Lower Wind Farm project will enhance an area (4.04 ha) of cutover bog that has been used for grazing and is largely dominated by rushes. This will offset the loss of a relatively small area of cutover bog (c.0.8 ha) as a result of the Development. By including a large area of bog within the Plan compared to the relatively small loss as a result of the Development, the Plan recognises and highlights the importance of this habitat.

The BEMP will also manage sensitively an area of Annex I listed *Molinia* meadow (1.78 ha), of which a small part (c.200m²) is being affected by the Development. The meadow, which has been somewhat degraded through over-grazing, will be managed with a particular focus on providing suitable habitat for the marsh fritillary butterfly (Annex II listed species).

The BEMP will also offset the loss of hedgerows as a result of the Development by a hedgerow replanting programme within the Site.

The total area covered by the BEMP is 5.82 ha.

The success of these measures will be evaluated through a detailed monitoring and reporting programme, which will be submitted to Clare County Council and the NPWS every monitoring year as evidence of compliance.

It is anticipated that with the implementation of the BEMP, the overall ecological value of the Site will increase over time, with benefits not just for habitats and marsh fritillary, but also birds, mammals and invertebrates.

The objectives for the Plan are achievable, as the methods to be used are straightforward and have been implemented at many other sites throughout Ireland.

It is noted that the Plan will allow for remediations and/or modifications to ensure that the objectives are being achieved throughout the lifetime of the Proposed Development

7.0 REFERENCES

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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.

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