



APPENDIX 6-4

Biodiversity Management and Enhancement Plan

Biodiversity Management and Enhancement Plan

Cooloo Wind Farm, Co.
Galway





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1. INTRODUCTION

1.1 Background

MKO have prepared a Biodiversity Management and Enhancement Plan (BMEP) to support the EIAR for the Proposed Project, which includes a 9 Turbine wind farm, and associated works. The full description of the Proposed Project is detailed in Chapter 4 of this EIAR.

The centre of the Proposed Wind Farm is located at the approximate grid reference ITM 37221 43791.

Where the term 'Plan' is used in this document, this refers to the Biodiversity Management and Enhancement Plan.

With biodiversity in global decline, and with due consideration of development policy shifts towards avoidance of biodiversity net loss and a drive towards biodiversity net gain, this Biodiversity Management and Enhancement Plan has been prepared in respect of the Proposed Project to not only ensure that the Project has no impacts on biodiversity but to also take the opportunity to provide a net gain in biodiversity within the Site. The objectives of this Plan, set out below, align with the goals of the recently published 4th National Biodiversity Action Plan.

1.1.1 Objectives of the Biodiversity Management and Enhancement Plan

The objectives of this Biodiversity Management and Enhancement Plan are as follows:

- To set out the required measures to protect existing habitats within the Proposed Wind Farm site.
- To provide biodiversity enhancement within the Proposed Wind Farm site, by creating additional species rich grassland habitats, marsh fritillary habitat enhancement, encouraging bog woodland/scrub development and replanting broadleaf woodland
- Enhancing existing higher value habitats within the Proposed Project
- Planting of 4.7km of linear vegetation within the Site in order to increase hedgerow and treeline habitat, bolster wildlife corridors and offset the loss of 3.74km of hedgerow and treeline habitat associated with the Proposed Project.
- To provide additional foraging areas and nesting opportunities for pollinators
- To provide a management and monitoring plan to ensure the success of the proposed biodiversity enhancement and offsetting measures.

1.2 Statement of Authority

This report has been prepared by Emily Fair (B.Sc., M.Sc.). Emily is an Ecologist with MKO and has over 4 years of professional experience. This report has been reviewed by Rachel Walsh (B.Sc. Env., MCIEEM). Rachel has extensive experience in ecological consultancy and has undertaken numerous assessments covering a wide range of projects including wastewater treatment plants, wind farms, road and rail infrastructure and housing developments.

2. ECOLOGICAL BASELINE

Multidisciplinary ecological surveys, comprising desk studies, walkover surveys, badger surveys, bat surveys, bird surveys and invasive species surveys were undertaken by MKO between 2021 and 2025 as detailed within the EIAR submitted as part of the application.

2.1 Existing Habitats and Flora

A detailed account of the habitats and associated species found within the Site is found within the EIAR (Chapter 6) which accompanies this application. The following habitats are present within the boundary of the Proposed Project:

- Wet grassland (GS4)
- Improved agricultural grassland (GA1)
- Dry meadows and grassy verges (GS2)
- Arable crops (BC1)
- Buildings and artificial surfaces (BL3)
- Stone walls and other stonework (BL1)
- Recolonizing bare ground (ED3)
- Conifer plantation (WD4)
- Broadleaved woodland (WD1)
- Scrub (WS1)
- Wet grassland/scrub (GS4/WS1)
- Cutover bog (PB4)
- Uncut raised bog (PB1)
- Rich fen (PF1)
- Treelines (WL2)
- Hedgerows (WL1)
- Lowland/depositing rivers (FW2)
- Drainage ditches (FW4)

The BMEP has been prepared as part of the Proposed Project to offset the potential loss of a number of habitats identified as KERs in Chapter 6 of the EIAR. These include linear habitats, (hedgerows (WL1), treelines (WL2) and stone walls (BL1)), scrub (WS1) associated with peatland habitats, broadleaved woodland (WD1), cutover raised bog (PB4) and uncut raised bog (PB1) habitats.

The Proposed Project will result in the loss of a number of habitats throughout the Proposed Wind Farm site. Linear feature losses associated with access roads and turbine bat buffers (as per NatureScot guidelines) are shown on Figure 3-1. The below sections describe the measures which will be implemented to contribute to offsetting these losses.

2.1.1 Protected Flora Species

No species listed in the Irish Red Data Books, nor any species listed under the Flora (protection) Order (S.I. No. 235 of 2022) or the EU Habitats Directive (92/43/EEC) were recorded on the Site.

2.2 Faunal Records

A full assessment of potential impacts on fauna has been provided in Section 6.2.4 and Section 6.3 of Chapter 6 Biodiversity.

2.2.1

Bats

Twelve structures and their associated outbuildings were identified within and around the Proposed Wind Farm as containing features with potential to support roosting bats. Of the twelve structures surveyed, six were assessed as having negligible bat roost potential, three as low, two as moderate, and one as high. One structure (Structure 6, a derelict building near Turbine 5) was assessed as having moderate roost potential and is proposed for demolition.

Acoustic monitoring identified the following species activity patterns:

- T1: High soprano pipistrelle activity within the GA1 habitat with adjacent hedgerow.
- T2: High common pipistrelle and Leisler's bat activity within a scrub and GA1 habitat.
- T7: High common pipistrelle activity within a GA1 habitat with adjacent hedgerow.
- T8: High common pipistrelle activity and proximity to a known roost.

The habitats at T1, T2 and T7 are considered sub-optimal for bats (open grassland, scrub) yet recorded high bat activity. These areas will be targeted for mitigation to discourage bat use within the rotor-swept zone.

Additionally, two roosts were confirmed at the Proposed Wind Farm site:

- Structure 8 (Close to T6): Single soprano pipistrelle, emerged from a vacant single-storey house during surveys carried out in June 2024. Located approx. 550m east of T7.
- Structure 9 (Close to T8): At least 10 soprano pipistrelles emerged from a vacant farmhouse during emergence surveys carried out in May 2024, 20 soprano pipistrelles emerged during surveys carried out in September 2022 and 7 soprano pipistrelles emerged during surveys carried out in October 2021. Located approx. 160m east of T8.

Measures are based on 2024 ground-level static detector data, roost assessments and emergence survey results and following best-practice guidance including *Collins (2023)* and *NatureScot (2021)*.

- Reduce collision risk for bats by discouraging activity in high-risk turbine zones.
- Maintain and improve habitat connectivity and foraging areas away from turbine locations.
- Enhance roosting opportunities in low-risk areas.
- Ensure legal compliance and contribute positively to bat conservation.

Measures to discourage bat activity within the bat buffer zones, as well as to provide habitat enhancement and additional roosting habitats are provided below in Section 3.4.1.

2.2.2

Marsh Fritillary

Multiple marsh fritillary larval webs were identified within the stand-alone field to the east of the Proposed Wind Farm site, as well as one larval web identified approximately 20m north of T5. Additional fields with suitable marsh fritillary habitat (but no identified larval webs during surveys carried out in 2024) have been identified as suitable marsh fritillary enhancement areas. Landowner agreements will be in place to ensure that no ploughing, re-seeding, intensive grazing or intensive management will take place within these areas of the site.

Further details on the management and enhancement of these areas are provided below in Section 3.4.2.1.

2.3 Loss of Habitat

2.3.1 Hedgerow (WL1), Treelines (WL2) and Stone Wall Loss (BL1)

The Proposed Wind Farm site contains a large extent of pre-existing hedgerows (WL1), largely found along existing field boundaries. A lesser extent of treelines (WL2) exists within the Proposed Wind Farm site. Stone walls (BL1) are almost exclusively associated with existing hedgerow/treelines within the Proposed Project and are therefore considered in conjunction with these habitats. There is a total of approximately 14.9km of existing hedgerows and 1.30km of existing treelines within the Wind Farm site.

The loss of linear features will largely be as a result of the construction of new roads, turbine hard-standing areas and turbine buffers required to avoid impacts on bats as per NatureScot recommendations. The total loss of linear habitats within the site will be approximately 3.74km. Approximately 773m of this figure is as a result of the bat buffers associated with the 9 turbines.

It is proposed to offset the potential loss of approximately 3.74km of linear features within the Proposed Wind Farm site by replanting approximately 4.70km of hedgerows along field boundaries outside of the required bat buffers. This additional habitat creation (approx. 960m) is proposed given that it would not be a like for like replacement and would take time to establish as an enhancement.

The proposed additional 960m of hedgerows within the Proposed Wind Farm site will result in approximately a 26% addition of linear features. The replanting will focus on integrating with existing hedgerow networks, reinforcing connectivity across the landscape, and providing long-term biodiversity benefits.

Further details on this enhancement measure can be found in Section 3.3.1 below.

2.3.2 Scrub (WS1) and Broadleaved Woodland (WD1) Loss

It is anticipated that these habitat areas associated with either uncut raised bog (PB1) and cutover bog (PB4) would likely regenerate into a bog woodland (WN7) if left unmanaged and allowed to entirely recolonize naturally. The proposed road between T7 and T9 will traverse through a small section of this habitat and therefore considered a KER for further assessment. Additionally, proposed roads between T5 and T6, infrastructure associated with T5, and hardstands/a small section of a proposed road at T2 will result in the loss of areas of recolonizing scrub associated with cutover bog (PB4) habitats within the Proposed Wind Farm site.

The existing broadleaf woodland (WD1) within the Proposed Wind Farm site is located south of the proposed road between T5/T9 and T8. These habitats are plantation forestry associated with the adjoining conifer woodland (WD4) to the northwest. One block of this forestry is a monoculture of Alder (*Alnus glutinosa*) and a smaller plot is Ash (*Fraxinus excelsior*) woodland. The ash woodland is affected by ash dieback. There is approximately 3.80ha total of existing broadleaved woodland (WD1), made up of approximately 0.90 of the Ash (*Fraxinus excelsior*) plantations affected by Ash Dieback, and 2.9ha of the Alder woodland. There is also approximately 15.94ha of monoculture Sitka spruce (*Picea sitchensis*) conifer plantation (WD4) within the Proposed Wind Farm site.

There will be a loss of approximately 0.17ha of broadleaved woodland largely concentrated within the Ash plantation as a result of a turning bay within the proposed new access road. It is proposed to replace all conifer plantation woodland (WD4) with healthy native trees of various ages in order to enhance the age structure and longevity of this woodland.

Further details on this enhancement measure can be found in Section 3.3.1.1 below.

2.3.3 Cutover Bog (PB4) Loss

The cutover bog peatland habitats within and surrounding the development footprint are degraded and do not support active peat formation as the habitats are extensively drained. The cutover peatland habitats are subject to recent and continued turbary activity and are dominated by bare peat and moderate *Sphagnum* communities. They do not correspond to any Annex I peatland habitats.

The Proposed Wind Farm will result in the loss of this habitat area for sections of the proposed new road between T7 to T9, between T5 to T9 and between T5 to T6. Additional areas will be lost to accommodate T5 and associated hard-standing areas, as well as a section of the hard-standing areas of T2. Peat repository and spoil repository areas (PRA2 and SRA4) are included in these loss calculations.

There is approximately 42.0ha of existing cutover bog habitat within the Proposed Wind Farm site boundaries. There will be a loss of approximately 2.12ha of PB4 habitat, which constitutes a loss of approximately 5% of the total habitat area. The peat required to be extracted to accommodate these infrastructure areas will be stored within peat storage areas within the Site. Measures to enhance these peat storage areas are provided below in Section 3.2.3 below.

2.3.4 Raised Bog (PB1) Loss

The northwest side of the Proposed Wind Farm site is mapped under Article 17 habitat as Annex I Active Raised Bog [7110]. A section of approximately 580m of the proposed new floating road between T7-T9 will be located within the mapped Article 17 habitat. The proposed 'floating road' is detailed in Section 4.9.2.1 of Chapter 4 Description of this EIAR.

The habitat areas within the Proposed Wind Farm site corresponding to the habitat uncut raised bog (PB1) are largely found in a number of small, non-continuous areas. All of these habitat areas have been drained and the entire high bog area is surrounded by either historical or active peat extraction, with small pockets of uncut areas that have not been drained. Approximately 285m of the proposed floating road will travel through the raised bog (PB1) habitat, while the remaining 295m will travel through the cutover bog (PB4) habitat.

Following detailed relevés and condition assessments based on the IWM 128¹ and IWM 81², the habitat area did not conform to the Annex 1 *7110 Active Raised bog* habitat classification. Therefore, by taking a conservative, precautionary approach, this habitat corresponds to the Annex 1 habitat *7120 Degraded raised bogs still capable of natural regeneration*.

Approximately 32.29ha of PB1 habitats exist within the Proposed Wind Farm site. The loss of approximately 0.18ha for the proposed new road between T7 and T9 will result in the loss of approximately 0.54% of the total habitat area within the Proposed Wind Farm site. However, this loss is still considered to be a significant loss of habitat. Additionally, consideration has been given to the nature of the impacts on the hydrology of the surrounding habitats and the impacts this may have on the high bog (as detailed in Chapter 9).

¹ Smith, G.F. & Crowley, W. (2020) *The habitats of cutover raised bog. Irish Wildlife Manuals, No. 128. National Parks and Wildlife Service, Department of Housing, Local Government and Heritage, Ireland.*

² Fernandez, F., Connolly K., Crowley W., Denyer J., Duff K. & Smith G. (2014) *Raised Bog Monitoring and Assessment Survey 2013. Irish Wildlife Manuals, No. 81. National Parks and Wildlife Service, Department of Arts, Heritage and Gaeltacht, Dublin, Ireland.*

3. BIODIVERSITY MEASURES

3.1 Protection of Existing High Value Habitats within the Site During Construction

A number of high-value habitats exist within the Proposed Project boundaries. The habitat areas were identified during the initial habitat surveys of the site, and the Proposed Wind Farm infrastructure was designed in order to avoid all possible areas containing higher value habitats.

The following habitat areas will be fenced off during the construction phase works in order to avoid any damage or loss of habitat:

- Known marsh fritillary suitable habitat containing larval webs identified during 2024 surveys
- Rich fen (PF1) habitat with links to the Annex 1 habitat *Alkaline Fen (7140)*
- Permanent Fencing along waterbodies, with riparian vegetation planting

The fencing will contain signage strictly prohibiting entry to these areas. This will denote the area where strictly no machinery, storage of materials or entry of construction site personnel will be permitted. The protective fencing will be inspected and signed off by the supervising Ecological Clerk of Works (ECoW) prior to commencement of the Proposed Project.

These measures are in keeping with Action 1 of the National Biodiversity Data Series No. 25 *Pollinator friendly Management of Wind Farms (ISSN 2009-6852)*, which is as follows: *Protect what you have: Many wind farms already contain areas of pollinator-friendly habitat. Identify and protect existing areas that are already providing food and shelter for pollinators, e.g. native hedgerows, flowers, earth banks.*

3.1.1 Enhancement and protection of Existing Rich Fen (PF1) Habitat

An existing rich fen (PF1) habitat has been identified within a stand-alone field to the east of the main area of the Proposed Project. Species recorded within this habitat are indicators species of the Annex 1 habitat *7230 Alkaline Fen*, and therefore there this habitat likely confirms to *7230 Alkaline Fen*.

Early on in this project, this habitat area was originally proposed as the location for the proposed substation. However, following the surveys carried out within this area, it was flagged as unsuitable for infrastructure. This field has been retained as part of the Proposed Project in order to provide enhancement opportunities with landowner agreements in place to implement.

Given that the existing habitat already corresponds to rich fen (PF1), the following measures will be implemented to ensure that the habitat is enhanced and does not deteriorate in condition due to heavy management or grazing.

- Low intensity cattle grazing (0.03 Livestock Unit/ha³) will be implemented within this area with existing cattle, which will help to reduce the dominance of taller plants as cattle are less selective feeders. Grazing will also help to prevent the spread of encroaching scrub.
 - Grazing should be carried out between May and late September each year.
 - As the grounds get wetter, reduce grazing to prevent poaching of specific areas of this habitat area.
- Do not implement any additional drainage works within the field or the adjoining fields.

³ <https://nrbs.ie/conservation-grazing-stocking-rates-and-timing/>

- Existing drains and ditches may need occasional clearing to prevent silt build up.
 - Do not allow scrub to recolonize the fen habitat. Some low-laying scrub can be beneficial, but do not let dominate. Cutting back may be necessary to prevent overgrowth.
 - There will be no fertilization applied within the grassland field surrounding the existing fen habitat. Fens are sensitive of pollution and may suffer from pollution.
- Invasive species are known to readily colonize fen, marsh and swamp habitats. Invasive species management will be required if they begin to recolonize these habitat areas.

3.1.2 Protection and Maintenance of Existing Marsh Fritillary Breeding Habitat

It is proposed to enhance approximately 3.2ha of existing grassland areas that have existing marsh fritillary suitable habitat and an abundance of devil's bit scabious (*Succisa pratensis*), the larval foodplant of the species, within the Proposed Wind Farm site.

Existing marsh fritillary breeding habitats that occur adjacent to the proposed road from T5 and adjacent to the proposed turbine base at T5 will be fenced off in advance of construction of the Proposed Wind Farm. These areas were identified during ecological surveys of the Proposed Wind Farm, and the Proposed Project was designed to avoid these areas. The fencing will contain signage strictly prohibiting entry to these areas. This will denote the area where strictly no machinery, storage of materials or entry of construction site personnel will be permitted. The protective fencing will be inspected and signed off by the supervising ECoW prior to commencement of the Proposed Project. As described in Chapter 6 of the EIAR, the following protective measures will be in place:

- Existing known marsh fritillary breeding areas will be fenced off with a minimum buffer of 5m. This is particularly important at the known location of a larval web, directly north of T5.
- The construction works area for proposed turbine T5 and associated site access routes will be fully fenced off (with solid hoarding where possible) to ensure there is no access or egress to adjacent areas of sensitive habitat.

There is no infrastructure proposed within the small stand-alone field to the east of the Proposed Project. There will be no access requirements to this area for construction or operation of the Proposed Wind Farm site or for the Proposed Grid Connection Route. The field was retained entirely as a habitat enhancement opportunity. Therefore, the known Marsh Fritillary habitat with larval webs does not need to be fenced off from any work. However, management of this habitat area in order to enhance the suitability of this habitat has been provided below in Section 3.4.2 below.

3.2 Habitat Enhancement Measures

3.2.1 Permanent Fencing and Riparian Vegetation Planting

Providing permanent fencing along rivers/drains within fields that are at risk of livestock poaching will be fenced off for the operational life of the Proposed Wind Farm. Preventing livestock access to the riverbank edges will prevent excess nutrients entering into the waterbodies and prevent damage to the stability of the riverbank edge. Encouraging native plants to recolonize in these areas will also improve riverbank stability and preventing soil erosion. There is approximately 1.2km of fencing/replanting proposed within the Wind Farm site.

Additional replanting of native scrub species will also provide a permanent barrier and increase linear replanting along riverbank edges. This will provide additional shelter habitat for local species and provide a commuting corridor along rivers/streams within the site. The following will be implemented:

- Areas along linear waterbodies where there is poaching from livestock – fence off using stock-proof fencing and plant riparian vegetation
- Riparian vegetation planting where the extent is limited, along rivers and drains – planting species such as willow and alder
- Allow scrub to recolonize these areas.

3.2.2 Grassland Enhancement

3.2.2.1 Long Flowering Meadows

The majority of the existing grassland habitats within the Proposed Project boundaries are highly modified or re-seeded fields consisting of improved agricultural grassland (GA1). Lesser areas of wet grassland (GS4) exist where drainage is poor and the fields are less intensively grazed, resulting in a higher sward height. There are opportunities within the site to enhance existing lower value grassland to encourage long-flowering meadow management with a reduced grazing regime.

Approximately 4.45ha of grassland areas within the Proposed Project site boundaries will be converted into long-flowering meadows with reduced management and allowing to naturally revegetate. The following will be implemented:

- Cut for hay during the first 3-5 years post-establishment in September. This will help to reduce nutrients within the soil.
 - Remove all cuttings from the site
 - Do not apply any fertilizer
- The grassland areas may be lightly grazed following the establishment of grassland, ideally by sheep stock to maintain the grass sward and to allow for new growth.
- Should invasive species begin to establish in this area, these will be removed, as per the relevant guidance for each.
- Tall weeds, such as Nettles, Ragwort, Hogweed or Thistles will be removed between March-August. Anything taller than knee-height should be manually removed in the first years as the meadow is established. No fertilizer will be spread within the grassland areas.
- Depending on the nature and the underlying soils, the fields will either become long flowering wet grassland meadows or dry grassland meadows.

3.2.3 Peat and Spoil Repository Areas

Peat Repository Areas

- From areas of cutover bog which will require excavation, sods and turves of the surface vegetation will be retained and will be emplaced on top of the peat repository areas in order to retain and translocate existing cutover community habitats and reduce run-off potential from these areas.
- These repository areas will be left to naturally recolonize with the existing seed banks.

Spoil Repository Areas

- Locally sourced topsoil from the site will be spread on top of the spoil repository areas.
- The soil will be scarified and left to naturally recolonize.
- No fertilizer or herbicide will be applied on these areas.
- The grassland areas may be lightly grazed following the establishment of grassland, ideally by sheep stock to maintain the grass sward and to allow for new growth.

- Should invasive species begin to establish in this area, these will be removed, as per the relevant guidance for each.
- Allow scrub to naturally develop and do not remove.

3.2.4 Development of Bog Woodland/Scrub Community

A number of uncut raised bog (PB1) and regenerating cutover bog (PB4) habitat areas have started to recolonize with scrub. It is proposed to allow these areas to regenerate into what is expected will become bog woodland habitat. Common species within these habitat areas include willow (*Salix sp.*), Gorse (*Ulex europeaus*), occasional Holly (*Ilex aquifolium*), downy birch (*Betula pubescens*) saplings and Sitka spruce (*Picea stitchensis*) saplings, where these habitats are found in proximity to conifer woodland (WD4). Lower growing species such as ling heather (*Calluna vulgaris*), cross leaved heath (*Erica tetralix*), Bracken (*Pteridium aquilinum*), Bramble (*Rubus fruticosus agg.*), Ivy (*Hedera hibernica*), as well as Bog myrtle (*Myrica gale*).

Habitat areas within the site that do not contain any proposed infrastructure or peat storage areas and were identified as being unsuitable for drain blocking to enhance the habitat areas, will be left to allow a bog woodland/scrub community develop. Surveys were carried out in 2025 to determine the viability of these areas. Survey criteria focussed on whether the community was already developing naturally without any additional management. Additionally, in habitat areas where bog habitats were naturally regenerating and it was envisioned that a scrub-dominated habitat would impede the development of the peatland habitat, these areas were removed from the management regime. This is shown on Figure 3-1 below.

The following measures will be applied within the identified viable areas:

- All current or ongoing peat extraction activities will cease.
- Remove all conifer saplings present.
- Allow gorse and willows, birch and holly to naturally recolonize.
- Prevent negative indicator species such as bracken, brambles, from recolonizing large habitat areas.
- Should any non-native invasive species or conifers begin to establish within these areas, these will be removed, as per the relevant guidance for each specific species.

3.3 Offsetting Habitat Loss

3.3.1 Planting of Hedgerows

As outlined in Section 2.3.1, there will be a loss of approximately 3.74km of linear features within the site, including turbines and associated bat buffers, wind farm roads and other key infrastructure. Offsetting measures will include replanting approximately 4.70km of hedgerow habitat within the Proposed Wind Farm site which will provide more than a 960m net gain in linear habitat. The hedgerow replanting areas are depicted on Figure 3-1 and have been strategically chosen to link up existing areas of bat activity.

The below listed species, which were identified as being locally present during the detailed habitat surveys undertaken or identified as being suitable native species found within the wider local area, will be used in the species composition.

- Planting will use larger seedlings, transplants or cuttings (sizing as per the *BS 3936 - Nursery Stock - Part 1: Specification for trees and shrubs*⁴) to ensure connectivity gains are immediate and will be indigenous to the local area. Species to be used include hawthorn (*Crataegus monogyna*) which will make up approximately 75% of the hedgerow mix. The ideal native hedge is made up of 75% Hawthorn and 25% of at least 4 other species⁵.
- Other species present within the Proposed Project which will be included:
 - Spindle (*Euonymus europaeus*)
 - Dog rose (*Rosa canina*)
 - Hazel (*Corylus avellana*)
 - Elder (*Sambucus nigra*)
 - Blackthorn (*Prunus spinosa*)
 - Goat willow (*Salix caprea*)
 - Grey willow (*Salix cinerea*)

When planting new hedgerow, plants will be closely spaced (a maximum of 50cm apart) and planted in a staggered row. The new hedgerow will need to be protected from browsing by livestock through the erection of new stockproof fencing which will be at least 1m away from the hedge, and on each side, if required.

3.3.1.1 Maintenance of Hedgerows

- Hedgerows to be trimmed on a 2- or 3-year rotation to maximise structural diversity and to prevent over-trimming,
- Hedgerows to reach approx. 2.5m height with an 'A' shape,
- Cut hedgerows between November and January. This will avoid the bird nesting season (March 1st to August 31st) and will avoid impacts on foraging pollinators,
- It is expected that ivy will self-colonise, and this will be retained where possible,
- Grassy margins will be retained to preserve flowering ground flora,
- Avoid the use of fertilisers, slurry, herbicides and pesticides.

3.3.2 Native Woodland Creation

As described above in Section 2.3.2, it is proposed to fell the non-native, conifer woodland located at the junction of the road between T5 and T8/T9. An arborist assessment will be carried out within the areas proposed to remove any plantation forestry. The following areas of conifer woodland will be lost:

- Approximately 0.7ha of conifer woodland (WD4) will be lost as a result of the proposed new internal access roads and associated infrastructure.
- It is proposed to fell an additional 10.55ha of monoculture Sitka spruce conifer woodland within the block immediately adjoining the Alder/Ash plantations in order to re-plant this area with native broadleaved species.

Therefore there will be a total removal of an area of 11.25ha of conifer woodland (WD4).

In total, approximately 11.5ha of broadleaved woodland will be planted to replace the existing conifer woodland (WD4) within the felled conifer woodland areas, as well as plant additional broadleaved woodland between T3 and T5.

Trees will be of native origin and will be of advanced nursery stock where possible. The following species which are common to the locality will be used:

⁴ British Standard. (1992). *BS 3936 - Nursery Stock - Part 1: Specification for trees and shrubs*.

⁵ NBDC. (2018). *All Ireland Pollinator Plan How-to-guide: Hedgerows for pollinators*. National Biodiversity Data Centre.

- High-canopy, dominant species will comprise of less than 20-25% of the overall planting mix. Species selection will include:
 - Pedunculate oak (*Quercus robur*)
 - Hazel (*Corylus avellana*)
- Sub-dominant, lower canopy species will then take up approximately 20% or less. Species composition will include the following semi-mature species:
 - Hazel (*Corylus avellana*)
 - Alder (*Alnus glutinosa*)
- The understory/fringe species will take up approximately 40% of the remaining area. The understory/fringe species will be made up of a mixture of:
 - Elder (*Sambucus nigra*)
 - Hawthorn (*Crataegus monogyna*)
 - Hazel (*Corylus avellana*),
 - Holly (*Ilex aquifolium*)
 - Goat willow (*Salix caprea*)
 - Blackthorn (*Prunus spinosa*)
 - Spindle (*Euonymus europaeus*)
 - Honeysuckle (*Lonicera periclymenum*)
 - Dog-rose (*Rosa canina*)
 - Eared willow (*Salix aurita*)
 - Guelder rose (*Viburnum opulus*)

Additionally, the following measures will be applied when planting trees:

- Mark out the area for planting so it is clear exactly where planting will be established.
- Total stump removal will be carried out with complete removal of timber, brash and stumps which will be removed off-site.
- During stump removal works, a 5-metre buffer from watercourses must be applied wherein there will be no works.
- Trees will not be evenly spaced and instead will be spaced out randomly to mimic natural plant spacing. They will be planted at lower planting densities in order to allow natural recolonisation by other native species, particularly shrubs.
- Newly planted trees will need to be protected from poaching by livestock, through the installation of new stockproof fencing which should be at least 2m away from the treeline, and on each side if required. Where new trees are being planted along existing conifer plantation fencing on both sides will likely not be possible. In this case, tall tube tree guards may also be required to protect newly planted trees from wild animals such as deer

3.3.2.1 Maintenance of Woodland

In order to facilitate the successful establishment of the new trees to be planted within the Proposed Wind Farm site, the following measures are proposed:

- During spring and autumn maintenance periods all trees and plants will be checked and adjusted/replaced as required, soil firmed and any dead wood present removed back to healthy tissue and mulch added if required. Where tree stakes and ties are no longer required these will be removed to avoid damage to the tree;
- During the first growing season, all standard trees/ semi-mature trees will be watered regularly during any prolonged dry periods during the growing season (i.e. in April, May, June, July and August). During the second growing season the trees will be kept well-watered as often as required, particularly during June, July and August.
- During the first growing season, all standard trees/ semi-mature trees will be watered regularly during any prolonged dry periods during the growing season (i.e. in April, May, June, July and August).

August). During the second growing season the trees will be kept well watered as often as required, particularly during June, July and August.

- Any tree, hedge or shrub that is removed, uprooted, destroyed or that becomes seriously damaged, defective diseased or dead shall be replaced in the same location with another plant of the same species and size as that which was originally planted. All such replacements shall be carried out within the first planting season following the loss.
- Hedgerows and replanted trees will be inspected following the main growing season (i.e. in September) for the first five years of growth, where the requirement for replacement planting will be assessed. If any trees are dead or damaged these will be replaced using the same species within the next planting season. Recommendations for ongoing or remedial management required will be specified within an Annual Monitoring Report (see Section 4).

3.4 Faunal Habitat Creation

3.4.1 Bats

Discouraging Bat Activity in Turbine Zones

- Vegetation free Bat buffers of approximately 96m will be implemented at all turbines. These vegetation free areas (i.e. height below 2m) will be maintained throughout the lifetime of the development.
- Any woodland/hedgerow/treeline replanting to offset the loss of vegetation within the bat buffers will avoid and only take place outside of the 96m buffer.

Habitat Enhancement Areas

A total area of approximately 4.70km of linear replanting is proposed within the Proposed Wind Farm site, as outlined in Section 3.2.3 above. This will serve to offset the loss of approximately 3.74km linear habitat within the Proposed Wind Farm site as a result of the proposed infrastructure, as well as provide additional foraging/commuting corridors for bats.

The location of the proposed hedgerow planting has been designed to link up with existing, retained linear features within the Proposed Wind Farm site, and encourage bats away from the proposed turbines to reduce collision risk.

Bat Box Provision

The proposed development can also provide new roosting opportunities for bats. Bat boxes will be erected within the site following best practice guidelines (Kelleher & Marnell 2006, NRA 2006). Twenty bat boxes will be positioned at suitable locations around the site. Bat boxes will have a southerly orientation and be positioned at least 3m from the ground, away from artificial lighting. All placements will be at the edges of the wind farm boundary or near existing linear features leading away from turbines.

Boxes will include a mix of crevice-type and cavity-type designs (e.g. Schwegler 1FF and Schwegler 2F), installed at 3–5 m height and oriented to receive morning sun.

20 bat boxes will be erected on existing trees within the Proposed Wind Farm site. These will be put up in the following locations (final locations to be confirmed by the Project Ecologist):

- 10 bat boxes will be erected on trees located to the north of T7
- 10 bat boxes will be erected within existing treelines, southwest of T1

Lighting Strategy

No permanent lighting is proposed across any of the turbine areas. However, if lighting is required at the 110kV substation or battery energy storage system (BESS) compound, the following measures will be applied to prevent any disturbance to bats:

- Use warm-spectrum lighting (<2700K).
- Lights to be fully shielded and downlit.
- Motion sensors or timers to minimise light duration.
- No lighting to be directed toward treelines, roost structures, or hedgerows.

3.4.2 Marsh Fritillary

The Proposed Wind Farm has been designed such that existing areas of breeding marsh fritillary habitat have been avoided and retained, as discussed in Section 2.2.2 above. It is further proposed to create additional areas of potential breeding habitat for the populations of marsh fritillary within the Proposed Wind Farm site, and to create additional 'stepping stone' habitat which is key for the survival of the meta populations of the species and to increase its distribution across the landscape.

Approximately 12.76ha of wet grassland (GS4) that currently does not contain any devil's bit scabious plants is proposed to be sown with devil's bit scabious plants (as below).

In areas of grassland where limited or no devil's bit scabious plants are found, it is proposed to sow the plant within the Wet grassland (GS4) fields. It should be noted that devil's bit scabious is a slow-growing perennial and may take several years to reach maturity and flower. If growing from seed, it can take 5-6 years to germinate. Therefore, plug planting with plants from a certified native source is the preferred method⁶. However, sowing with devil's bit scabious seed will also be considered if sourcing plug plants is a limiting factor to the Plan.

- The soils will be plug planted with devils bit scabious with plants from a certified native source.
- To maintain and increase the cover of the plant it is important to let it flower and set seed annually. The plant can be very sensitive to grazing levels and management (e.g. rush cutting) during the flowering season. At this time (mid-August to mid-October) stocking levels should be reduced, especially if the site is grazed by sheep as they selectively feed on the plant, including the flowers.

3.4.2.1 Management

- Field operations such as rush or scrub control should only be carried out November to February when caterpillars are in hibernation and less subject to disturbance, and outside of bird nesting season
- A light grazing regime to be maintained, to be specified depending on habitat condition and monitored, with a goal of achieving a sward of 12 to 25cm
 - There will be a reduced or no grazing regime from mid-August to mid-October
 - Longer periods of lighter grazing are far more preferable than shorter periods of heavier grazing.
 - Autumn/winter grazing is also suitable, as is spring/summer grazing on wetter sites.
- Cattle grazing is preferable, ideally by traditional breeds as they are less selective grazers and consequently cope better with coarse vegetation and scrub. Sheep selectively feed on devil's-bit scabious and at high stocking levels, can reduce and even eliminate it from sites. Therefore, sheep grazing will be avoided in these habitat areas.

⁶ [Plantlife UK: Managing Meadows. Available at: https://www.plantlife.org.uk/learning-resource/managing-meadows/](https://www.plantlife.org.uk/learning-resource/managing-meadows/)

- Features that provide shelter from wind such as hedgerows, scrub patches, ditches and earth banks will be maintained; particularly on the western, south-western and north-western sides of fields where possible. Any management of these features such as scrub control or hedge-laying must be carefully planned to ensure shelter is maintained.
- If the site is already in favourable management for the habitat and Marsh Fritillary, then it is important that the established management is maintained
- No fertilizer will be used in these habitat areas.

3.4.3 Embankments and Pollinator Nesting Habitats

Safe places for bees to nest are crucial to the survival of each species. Adult solitary bees die in autumn, leaving the next generation behind as pupae in nests to emerge as adults the following spring. Adult bumblebees also die in autumn, except for the new queens. These queen bumblebees need to find a safe place to hibernate over winter and emerge the following spring to begin building a colony of their own. Pollinators usually forage within close vicinity of their nest sites. Solitary bees commonly forage within 300m of their nest⁷. Therefore, as well as the above measures providing pollinator foraging habitat within the Proposed Wind Farm site, it will be beneficial to provide nearby nesting habitat.

Using excavated soils from the construction of the infrastructure associated with the Proposed Wind Farm, embankments/berms will be constructed around the wind turbines, the 110kV substation, BESS compound and other infrastructure. These berms will be allowed to become recolonised by vegetation naturally to ensure the local seedbank is preserved.

Our 62 species of mining solitary bees nest by making tiny burrows in bare earth. It is proposed to maintain south-facing embankment slopes free of vegetation to provide bare soil for nesting pollinators including solitary bee species. A mining bee's nest can look like a small ant hole if it is on flat ground, or like a tiny tunnel dug into an earth bank.

3.4.3.1 Management

- Manually formed south facing slopes of embankments, kept free of vegetation.
- Do not use pesticides, herbicides or fertilisers on berms/embankments
- Bumblebees nest in long or tussocky grass. Leave long grass uncut along the base of hedgerows from March until October.

⁷ NBDC (2021). *Pollinator-friendly management of Wind Farms. All-Ireland Pollinator Plan, Guidelines 12. National Biodiversity Data Centre*



Plate 3-1 Embankment used by nesting mining bees. Source: National Biodiversity Data Centre.

Figure 3-1 Proposed Biodiversity Measures

4. MONITORING

A site-specific monitoring and evaluation programme is necessary to ensure that the success of the proposed measures remains long-term. It will also assist in situations where the habitat establishment may not have been successful by providing evidence of shortcomings, allowing a revised management plan to be formulated.

Monitoring will be carried out on a yearly basis until the proposed grasslands have been sufficiently established and have given consistent results for 3 consecutive years after the establishment phase. Once the grassland has been successfully established, monitoring can be carried out every other year (years 5, 7, 10, 15 and 20 post-establishment). During this time the Project Ecologist will ascertain whether the establishment methodology needs to be adapted.

Monitoring results will be reported by a suitably experienced ecologist within an Annual Environmental Report. Any criteria failures will be identified, and corrective actions will be implemented. 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. Specifically, the Plan will address the measures relating to hedgerow planting, marsh fritillary breeding habitat/ grassland creation, and the cutover peatland enhancement area. To confirm that habitat creation and enhancement has been successful, all areas of restored vegetation (replanted hedgerows) and enhanced habitats (grasslands) will be monitored post-restoration. This will be undertaken in partnership between the Developer, the Project Ecologist and the Landowners. The proposed management actions will be conveyed to each of the landowners and management alterations implemented as required to achieve the targets of the management plan.

The Plan will be regularly updated and amended where necessary to improve the efficacy of the prescribed works.

4.1 Grassland Monitoring

Prior to the commencement of habitat enhancement measures, permanent, random vegetation monitoring plots will be agreed and established within the management areas (using GPS). This will allow the monitoring plots to be representative of microtopography and vegetation cover. Monitoring plots will be surveyed and classified using the relevé method as per Martin et al., (2018) with plot sizes being 2m x 2m. Biotic and abiotic parameters that form baseline indicators of ecological condition of the grassland will be recorded. The number of monitoring plots will be determined by the level of plant community heterogeneity identified during the baseline survey. However, it is envisaged that a minimum of three 2m x 2m monitoring plots will be established at each of the enhanced areas. Grassland conditions assessed in both the short and long-term will be informed by O'Neill et al., (2013) and Martin et al., (2018). Monitoring should be carried out between July and September.

The Monitoring Plan will be regularly updated and amended where necessary to improve the efficacy of the enhancement work. The number of monitoring plots may change depending on the results of the initial surveys

4.2 Marsh Fritillary Enhancement Monitoring

Prior to the commencement of habitat enhancement measures, marsh fritillary habitat suitability assessments will be carried out within the relevant areas. Habitat condition assessments include surveying along a predetermined route for the presence and abundance of devil's bit scabious as well as recording the vegetation height and any grazing evidence within the study site and is based on

methodology and recording sheets designed by the National Biodiversity Data Centre⁸. Monitoring should be carried out between August and September when devils bit scabious is in flower. The habitat suitability condition assessments should be carried out in Years 1, 3, 5, 7, 10, 15 and 20 of the Plan. Following establishment of devils bit scabious within these areas, marsh fritillary habitat suitability assessments should additionally be carried out in these areas as part of the Monitoring Plan. The results of the marsh fritillary breeding habitat suitability assessments will inform whether adaptive management measures need to be introduced to improve the condition of the habitats for marsh fritillary.

Monitoring surveys will also include presence/absence surveys for marsh fritillary larvae initially throughout the Monitoring Plan. These will be carried out in accordance with best practice guidance (NRA 2009) and the National Biodiversity Data Centre (NBDC) marsh fritillary survey methodologies for larval web surveys⁸. The optimum survey period for larvae is during August and September, in sunny conditions. Occupied larval webs will be recorded.

4.3

Bat Habitat Monitoring

A three-year post-construction monitoring (PCM) programme will be implemented for the proposed bat management. (Refer to Section 6.2 of Appendix 6-2 Bat Report for further details). This will include yearly:

- Static detectors at all turbines.
- Walked transects for observation of behaviour.
- Carcass searches to assess bat mortality.

An annual review of activity data to inform turbine curtailment or further mitigation.

Review Mechanism

- Year 1 PCM will act as a baseline.
- Annual reporting will assess effectiveness of planting and bat boxes installation.

Where risk to bats is detected, an adaptive management response (e.g. seasonal curtailment or habitat enhancement expansion) will be initiated.

⁸ NBDC. (2021) marsh fritillary larval web survey/monitoring. Information Sheet for Surveyors. Available at: <https://biodiversityireland.ie/app/uploads/2021/11/Marsh-Fritillary-Habitat-Condition-Form.pdf>

5.

CONCLUSION

This Plan sets out the measures to be implemented to ensure that the Proposed Project will provide enhancement and offsetting opportunities within the Proposed Wind Farm site; specifically with regard to breeding marsh fritillary habitat, native woodland creation as well as a net gain in hedgerow habitats.

This Plan has set out measures to be implemented during establishment and management phases to ensure that the measures are successful, as well as regular monitoring and reporting by an ecologist to ensure the success of the prescribed measures.

6.

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