

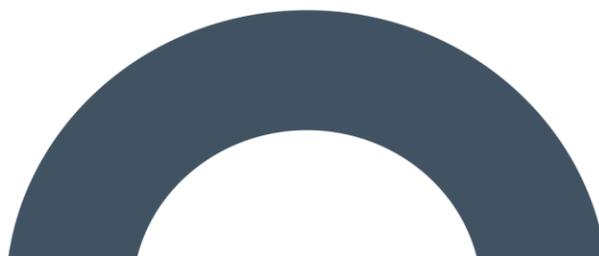


## **APPENDIX 6-4**

### ***BIODIVERSITY MANAGEMENT AND ENHANCEMENT PLAN***

# **Biodiversity Management and Enhancement Plan**

Laurclavagh Renewable  
Energy Development, Co.  
Galway





## DOCUMENT DETAILS

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# 1. INTRODUCTION

## 1.1 Background

MKO have prepared a Biodiversity Management and Enhancement Plan to support the EIAR for the Proposed Project, which includes an 8 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 Site 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 4<sup>th</sup> 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 site.
- To provide Biodiversity Enhancement within the Proposed Wind Farm site, by creating additional species rich grassland habitats to link up existing Annex I grassland and limestone pavement habitats within the site,
- Planting of 3.6km of linear vegetation within the Site in order to increase hedgerow and treeline habitat, bolster wildlife corridors and offset the loss of 1.8km 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 Plan was prepared by Rachel Walsh who has extensive ecological consultancy experience, having worked on Appropriate Assessments and Ecological Impact Assessments for a range of project types, including renewable energy infrastructure, water services infrastructure and transport infrastructure. This report has been reviewed by John Hynes (B.Sc., M.Sc., MCIEEM). John has 10 years’ experience in ecological management and assessment.

## 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 2023 as detailed within the EIAR submitted as part of the application.

### 2.1 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:

- > Improved agricultural grassland (GA1)
- > Dry calcareous and neutral grassland (GS1)
- > Dry meadows and grassy verges (GS2)
- > Exposed calcareous rock (Limestone pavement) (ER2)
- > Dry calcareous heath (HH2)
- > Immature woodland (WS2)
- > Oak-ash-hazel woodland (WN2)
- > Hedgerows (WL1)
- > Treelines (WL2)
- > Scrub (WS1)
- > Dense bracken (HD1)
- > Horticultural land
- > Stone walls (BL1)
- > Spoil and bare ground (ED2)
- > Buildings and Artificial Surfaces (BL3)

#### 2.1.1 Protected Habitats

The following Annex I habitats are present within the Proposed Project site but are located completely outside of the footprint of the Proposed Project:

- > Limestone pavements [8240]
- > Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) [6210]
- > European dry heaths [4030]

#### 2.1.2 Protected Flora

Spring gentian (*Gentiana verna*), which is classed as Near Threatened in the Red Data List of Vascular Plants 2016, was recorded within the site on areas of dry calcareous heath (HH2) and limestone pavement (ER2). These areas are completely avoided by the footprint of the Proposed Project.

No other 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.

### 3. BIODIVERSITY ENHANCEMENT MEASURES

#### 3.1 Protection of Existing High Value Habitats within the Site

High value habitats that occur adjacent to proposed works areas will be fenced or roped off, including Annex 1 species-rich calcareous grasslands, limestone pavements, calcareous heath and wooded areas in advance of construction of the Proposed Wind Farm. These areas were identified during initial habitat surveys of the site 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 Ecological Clerk of Works prior to commencement of the Proposed Project. As described in the EIAR, the following protective measures will be in place:

- Prior to any site clearance/enabling works, the required works area will be marked out using post and rope by the project engineer and project ecologist,
- Annex I habitat areas will be marked out and will be securely fenced or roped off from potential access by machinery or construction personnel with clear signage erected,
- In addition, areas of oak-ash-hazel woodland located in close proximity to works areas will be roped off,
- There will be no access by construction personnel or machinery to areas of limestone pavement, calcareous dry heath or calcareous grassland,
- There will be no temporary storage of materials within areas of limestone pavement, calcareous dry heath or calcareous grassland,
- There will be no unnecessary tracking/shortcuts taken across areas of these habitats,
- Any materials imported to the Site will be certified to be free of invasive species,
- Any transport of materials with potential to give rise to dust will be transported to the Site in a tarpaulin-covered vehicle, and
- Hardstanding areas/site roads with the potential to give rise to dust will be regularly watered during dry and/or windy conditions.

In addition, to ensure that existing hedgerows to be retained are not impacted by the construction works, such as existing hedgerows along proposed new roads, the following measures will be in place:

- A minimum set back of 2 meters will be maintained between existing trees and permanent and temporary construction areas for new wind farm roads.
- Where required, trimming and maintenance of the hedgerows will be carried out to remove any weak overhanging limbs.
- This area will be roped off from the works area.
- There will be no access to the exclusion zone around the trees and no storage of materials within these zones.

These measures are contained within the mitigation section of the EIAR Biodiversity Chapter (Chapter 6). 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.*

## 3.2 Offsetting of Habitat Loss

### 3.2.1 Replanting Hedgerow

There will be a loss of approx. 1800m of linear habitat (hedgerow/treeline) to accommodate the footprint of the Proposed Project, including turbines and associated bat buffers, wind farm roads and other key infrastructure. This will be offset through the replanting of 3600m of hedgerow habitat within the Site which will provide a 100% net gain of linear habitat. The hedgerows will be replanted within the suitable areas depicted in Figure 3-1 in consultation with the landowners who are supportive of the hedgerow planting proposals.

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. The species selected will maximise flowering times throughout the year as well as berry availability later in the year as detailed in Table 3-1.

- Hawthorn (*Crataegus monogyna*)
  - Proportion of hedgerow mix: 75%
  - Age class to be planted: combination of whips and advanced nursery stock (10cm – 12 cm girth trees) to increase structure diversity.
- Hazel (*Corylus avellana*)
- Blackthorn (*Prunus spinosa*)
- Guelder rose (*Viburnum opulus*)
- Goat Willow (*Salix caprea*)
  - Proportion of hedgerow mix: 25%
  - Age class to be planted: Whips predominantly.

Table 3-1 Hedgerow Species Flowering Periods<sup>1</sup>

Species	Blossoming Period
Willow	March - April
Blackthorn	March - April
Whitethorn/Hawthorn	May - June
Guelder Rose	May - July

### 3.2.2 Hedgerow Management

- 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 1<sup>st</sup> to August 31<sup>st</sup>) 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.

<sup>1</sup> National Biodiversity Data Series 7 – How-to-Guide – Hedgerows for Pollinators – National Biodiversity Data Centre: ISSN 2009-6852

## 3.3 Habitat Creation and Enhancement

### 3.3.1 Species-rich Grassland Creation

All existing high value and species-rich habitats within the Proposed Wind Farm site are completely avoided by the infrastructure footprint. In order to provide Biodiversity Enhancement, increase biodiversity and link up existing high value, species-rich habitats at the Proposed Wind Farm site, it is proposed to convert/manage 14.5ha of existing agricultural grasslands) into species-rich grasslands, with a view to eventually creating calcareous grassland (GS1, Fossitt 2000) which corresponds with the Annex 1 habitat ‘6210 Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia)’.

#### 3.3.1.1 Establishment Methodology

It is proposed to convert 7.5ha of the existing improved agricultural grasslands to species rich calcareous grasslands via the green hay transfer method (these areas are shown in blue on Figure 3-1). This is the most suitable option given the availability of the habitat and associated seedbank in the local vicinity of the fields. This will ensure that the seedbank is of local genetic origin and adapted to the local soils. Further details on establishment methodology are provided below specifically in relation to the key areas; substrate preparation, green hay strewing and short term to long term management.

##### 3.3.1.1.1 Substrate preparation (Year 1)

Given the history of fertilisation on the subject fields, it will be necessary to stop all nutrient input and to prepare the ground through removing existing nutrient levels in the topsoil where possible. This can be achieved by silage cutting: one cut earlier in the year to reduce weeds and competitive grasses and a late cut in August or September to further reduce nutrients. It is important that all cuttings are completely removed from the site to prevent nutrient input. No fertiliser, including slurry, is to be applied. This measure is to be carried out in the first year.

##### 3.3.1.1.2 Green hay strewing (Year 2)

After a year of silage cut and removal has been carried out, the subject fields can be prepared for green hay strewing (i.e. seed transfer) the following year. This method involves taking a fresh cut of hay containing flowers and other desirable plants and seeds from a species rich donor field, and immediately spreading the hay on the receptor field. It has been shown that a receptor field of just one third of the size of the donor field is a sufficient ratio for the amount of green hay required to adequately cover a site<sup>2</sup>. Therefore, it is expected that there will be sufficient seed sources within the adjacent donor fields which are shown in yellow on Figure 3-1. This will be undertaken in September once flowering plants have set seed.

The receptor field should first be scarified to provide bare substrate for seeds to germinate. Cut hay will be completely removed from the site. The green hay transfer should ideally take place within the same day so that plant material is as fresh as possible. The donor fields from which the cut will be taken are shown on Figure 3-1 and presently comprise species rich GS1 (Fossitt 2000) grasslands. The recipient fields are also shown on this Figure. The hay cut from the donor field can be collected in a similar way to silage harvesting, however, avoid using a conditioner mower or silage harvester to avoid loss of seed. A ‘low chop’ setting however may be used<sup>2</sup>.

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<sup>2</sup> Great Irish Grasslands Green Hay Transfer Leaflet. Accessed at <https://www.greatirishgrasslands.ie/wp-content/uploads/2023/08/GIG-Green-Hay-Transfer-Leaflet.pdf>

Steps:

- Scarify receptor field to create bare patches of soil.
- Cut hay from donor field in September and transfer to receptor field within 24 hours.
- Spread evenly over receptor field.
- To ensure good contact between the hay/seeds and the soil, the site will be rolled after green hay transfer. Alternatively, livestock can be put out on the site to trample the hay.

### Establishment Phase Timeline

Year 1 of implementation of Plan - Substrate Preparation. Two cuts of hay to be taken early in the year and in september from the proposed green hay transfer receptor fields and completely remove cuttings, no fertiliser or slurry input.

Year 2: Green hay transfer to be carried out from the proposed donor fields to the receptor fields in September.

### Supplementary seed sourcing

Monitoring of the success of the green hay transfer will be carried out by the Project Ecologist as detailed under the Monitoring Section in Section 3.4. During the monitoring period the Project Ecologist will gauge whether additional green hay transfer is required in subsequent years or whether, as a supplementary measure, seeds from donor fields can be collected and stored for sowing on recipient fields as follows:

- Seeds to be collected on a dry day in late summer or early autumn (August-September), later in the day when the dew has dried out from the sun. Seeds should be of full maturity when they are harvested.
- Seeds can be collected either by hand, brush harvested or by vacuum harvesting;
  - **Brush Harvesting:** A harvester is towed across the site and seeds are brushed into a hopper. The seed is then emptied into tarpaulins when the hopper fills.
  - **Vacuum Harvesting:** Hand-held vacuum harvesters or walk-behind models can be used to vacuum seeds from the donor site. Seeds are then collected into a bag attached to the vacuum harvester.
  - Brush and vacuum harvesting can be carried out throughout the season to collect seed from early, mid and late flowering plants.
  - **Collect by hand:** This is a species-selective method. Whole seed heads can be collected by hand and gathered in a bag. Discard of large seed heads, and sieve seeds to remove debris.
- Seeds collected will be dried immediately after collection.
- Sieve the seeds to remove any larger stalks, leave or debris.
- Seeds will be stored in the following conditions:
  - A cool, dry, dark place between 2°C and 5°C
  - Ensure storage location is rodent-free and store in small containers to prevent heat build-up.
  - Seeds can be temporarily stored in paper bags (short-term). If sowing the next spring, seeds will be stored in air-tight containers.

### 3.3.1.2 Management

It is proposed to implement a suitable management regime in additional lands, (shown in green on Figure 3-1), to create additional areas of calcareous grassland. The management regime for these areas, as well as the areas benefitting from green hay transfer/seeding, totalling 14.5ha, is set out below.

### 3.3.1.2.1 **Short term management of newly seeded areas (years 1 to 3 after green hay transfer)**

This section sets out the management measures to be implemented on areas subject to green hay transfer/seeding for the first 3 years after the green hay transfer is complete (shown in blue on Figure 3-1).

According to Ashwood, F. (2014), calcareous grassland will take approximately 3-5 years to become fully established. During the first year after green hay strewing is complete, grazing will be avoided during April to July to allow seeds to establish. Mowing may be more suitable at these sites (where machinery access is feasible) during the first 3 years. A cut and removal should be carried out in September. This would ensure that the entire grass sward is removed and will reduce potential for overgrazing during the plant flowering and self-seeding period. Following mowing, when grass growth has started again, it can be grazed by livestock. This aftermath grazing will further control the dominance of grasses. Once a satisfactory species richness has been established, cattle or sheep can provide year-round grazing management if used at low stocking rates.

A rule of thumb is to use 0.5 cattle or 2.5 sheep per hectare per year (Department of Transport, 1993<sup>3</sup>). Livestock will be put on the field to graze from mid-July / August onwards into the autumn. Winter grazing will be monitored for poaching (Ashwood, 2014). Once a desired species rich grassland sward has been achieved, the grassland can be treated as pasture instead of hay cutting.

The following measures will be undertaken in newly seeded areas in years 1 to 3 after the green hay transfer is complete:

- Avoid grazing in the first year after green hay transfer to allow seeds to establish.
- If grass growth is vigorous, cut and remove grasses in September. Cutting in September will maximize invertebrates/small mammal value and will ensure that plants have dropped their seeds before cutting.
- Following cutting, the grass will be entirely removed from the field to avoid smothering, to allow for patches of bare ground and to avoid additional nutrient inputs.
- In the following year, or once vegetation has established, livestock can be introduced to the field at a rate of 0.5 cattle or 2.5 sheep per hectare per year, avoiding the flowering period April to July for the first 3 years.

### 3.3.1.2.2 **Long-term management of all enhancement areas**

Long-term management through grazing and/or cutting is essential for maintaining species richness (O'Neill et al., 2013). This BMEP aims to retain existing and established species-rich calcareous grasslands occurring within the Site in agreement with the relevant landowners. The extent of lands agreed for this future management within the application boundary, with enhancement areas shown in blue and green, as well as the existing species-rich fields shown in yellow, is shown in Figure 3-1. Long-term management of the species-rich fields will include:

- Continued suitable grazing regime with stocking density of 0.5 cattle or 2.5 sheep per hectare per year
- No fertiliser, slurry, herbicide, pesticide usage
- No reseeding with perennial rye grass

<sup>3</sup> Department of Transport (1993). *The wildflower handbook*. HMSO, London

### 3.3.2 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 nest<sup>4</sup>. Therefore, as well as the above measures providing pollinator foraging habitat within the Site, it will be beneficial to provide nearby nesting habitat.

Using excavated soils from the construction of the Proposed Project, embankments/berms will be constructed around the wind turbines, the substation 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.

#### 3.3.2.1 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.



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

<sup>4</sup> National Biodiversity Data Series No. 25 – Pollinator-friendly Management of Wind Farms ISSN 2009-6852.



*Plates 3-2, 3-3: Pollinators recorded in the Proposed Project site (Brimstone butterfly, six-spotted burnet)*

## Monitoring

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

Monitoring will be carried out once per year during Year 1, Year 2 and Year 3 of implementation of this Plan, which will include the species-rich grassland establishment phase set out in Section 3.3.1.1.

Monitoring will be carried out on a yearly basis until the grassland has been sufficiently established and has 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 and 10 post-establishment). During this time the Project Ecologist will ascertain whether the establishment methodology needs to be adapted, for example through additional green hay transfer or seed harvesting.

Monitoring results will be reported by a suitably experienced ecologist within an Annual Environmental Report. Any criteria failures 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, species-rich grassland creation, berms and management of same.

To confirm that habitat restoration 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.

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<sup>5</sup>) 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 enhancement 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.

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<sup>5</sup> Martin, J.R., O'Neill, F.H. & Daly, O.H. (2018), *The monitoring and assessment of three EU Habitats Directive Annex I grassland habitats. Irish Wildlife Manuals, No. 102. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht, Ireland.*



- ### Map Legend
-  Site Boundary
  -  Proposed Turbine Locations
  -  Donor field (green hay transfer)
  -  Receptor field (green hay transfer)
  -  Additional areas to be managed as species-rich grasslands
  -  Potential hedgerow replanting areas
  -  Construction-phase Fencing



Drawing Title

## Biodiversity Measures

Project Title

### Laurclavagh Renewable Energy Development

Drawn By	Checked By
<b>RW</b>	<b>JH</b>
Project No.	Drawing No.
<b>210627</b>	<b>Figure 3.1</b>
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## CONCLUSION

This Biodiversity Management and Enhancement Plan sets out the measures to be implemented to ensure that the Proposed Project will result in a net gain in biodiversity, specifically, a larger area coverage of species rich calcareous grasslands and habitats for pollinators, 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 regularly monitoring by an ecologist to ensure the success of the habitat restoration measures.

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