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APPENDIX 6-4

BIODIVERSITY MANAGEMENT AND ENHANCEMENT PLAN

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1. INTRODUCTION

1.1 Background

MKO have prepared a Biodiversity Management and Enhancement Plan (BMEP) to support the Environmental Impact Assessment Report (EIAR) for the Proposed Gannow Renewable Energy Development in Co. Galway (the Proposed Project), which includes 8 no. turbines and all associated infrastructure and works. The full description of the Proposed Project is detailed in Chapter 4 of the EIAR. The centre of the Proposed Wind Farm is located at the approximate grid reference ITM 561114 730084.

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 Plan has been prepared in respect of the Proposed Wind Farm to take the opportunity to provide a net gain in biodiversity within the Proposed Wind Farm site. The objectives of this Plan, set out below, align with the goals of the 4th National Biodiversity Action Plan.

1.1.1 Objectives of the Biodiversity Management and Enhancement Plan

The objectives of this Plan are as follows:

- To set out the required measures to protect existing high value habitats within the Proposed Wind Farm.
- To provide biodiversity enhancement within the Proposed Wind Farm by creating additional potential marsh fritillary breeding habitat throughout the site.
- To safeguard, maintain and monitor existing marsh fritillary breeding habitat.
- To provide enhanced peatland habitat within the Proposed Wind Farm
- Planting of 3,520m of linear vegetation and 1.9ha of native woodland within the Proposed Wind Farm in order to increase hedgerow, treeline and woodland internal and edge habitat and bolster wildlife corridors.
- To provide a management and monitoring plan to ensure the success of the proposed measures.

1.2 Statement of Authority

This Plan was prepared by Rachel Walsh (B.Sc. Env, MCIEEM) who has over 5 years' 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 is Ecology Director at MKO with over 15 years' experience in ecological management and assessment.

2. ECOLOGICAL BASELINE

Multidisciplinary ecological surveys, comprising desk studies, walkover surveys, marsh fritillary surveys, badger surveys, bat surveys, bird surveys and invasive species surveys were undertaken by MKO between 2023 and 2025 as detailed within the EIAR submitted as part of the application. A high-level overview of habitats and fauna within the Site is provided below.

2.1 Habitats

A detailed account of the habitats, including a habitat map, 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 Site:

- > Raised Bog (PB1)
- > Cutover bog (PB4)
- > Bog woodland (WN6)
- > Wet grassland (GS4)
- > Wet grassland/wet heath mosaic (GS4/HH3)
- > Transitional Wet grassland – Marsh (GS4-GM1)
- > Improved agricultural grassland (GA1)
- > Dry meadows and grassy verges (GS2)
- > Immature woodland (WS2)
- > Oak-ash-hazel woodland (WN2)
- > Hedgerows (WL1)
- > Treelines (WL2)
- > Scrub (WS1)
- > Spoil and bare ground (ED2)
- > Recolonising bare ground (ED3)
- > Buildings and Artificial Surfaces (BL3)
- > Conifer forestry (WD4)
- > Reed and large sedge swamps (FS1)
- > Drainage ditches (FW4)
- > Lowland/depositing river (FW2)

2.1.1 Annex I Habitats

The following Annex I habitats (as listed under the European Habitats Directive) are present within the Proposed Wind Farm site but are located completely outside of the footprint of the Proposed Wind Farm:

- > Article 17 Active raised bog
- > Wet heath and Molinia meadow mosaic

2.1.2 Fauna

A number of protected species have been recorded using the Proposed Wind Farm site. Evidence of breeding marsh fritillary (active larval webs) were found within the Proposed Wind Farm site. In addition, it is known that bat species, badger, bird species and pine marten also use the Proposed Wind Farm site. Otter are likely to use the Rford River within the Proposed Wind Farm site and a range of other commonly occurring species are also likely to use the Proposed Wind Farm site.

3. PROPOSED PROTECTION AND ENHANCEMENT MEASURES

3.1 Protection and Maintenance of Existing Marsh Fritillary Habitats within the Proposed Wind Farm site

3.1.1 Construction Phase

Existing marsh fritillary breeding habitats that occur adjacent to proposed works areas will be fenced off in advance of construction of the Proposed Wind Farm. These areas were identified during initial ecological surveys of the Proposed Wind Farm site and the Proposed Wind Farm 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 (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 marsh fritillary breeding areas will be fenced off with a minimum buffer of 5 metres. This includes the areas of breeding marsh fritillary habitat near proposed turbines T01, T03, T05 and T08.
- The construction works area for proposed turbine T08, 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.

Further protective mitigation measures for marsh fritillary and other habitats during construction phase of the Proposed Project are outlined in Chapter 6 of the EIAR.

3.1.2 During Operation of the Proposed Wind Farm

During operation of the Proposed Wind Farm, it is proposed that existing areas of breeding marsh fritillary habitat are safeguarded. This includes the main breeding areas identified within the east of the Proposed Wind Farm site in Blocks L and K (Figure 3-1 below). It has been agreed that these areas will be protected from development, land clearance or use conversion, or significant agricultural works for at least the duration of this Plan. The grasslands will be included as part of the Monitoring Plan for the Proposed Project (Section 3.3 below) and will be subject to the below listed low-intensity management measures. During the course of the Monitoring Plan throughout the operation of the Proposed Wind Farm, the Project Ecologist may prescribe alternative management measures for these areas in order to maintain or increase their value for marsh fritillary:

- Sheep grazing is unsuitable as they will graze selectively for flowers. Grazing only by cattle.
- Use of supplementary feeding within Blocks L and K is prohibited.
- If grazing the fields, a stocking level of no more than 0.5LU/ha will be applied. However, the stocking rate is to be subject to monitoring and altered as required. The goal is to have a structured sward between 12 and 25cm in height.
- Avoid mowing as this removes variations in sward height.
- No fertiliser, slurry, herbicide, pesticide usage
- 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

- Maintain shelter on western, south-western and north-western sides of fields where possible.

3.2 Habitat Creation

3.2.1 Marsh Fritillary Breeding Habitat

The Proposed Project has been designed such that existing areas of breeding marsh fritillary habitat have been avoided and retained, as discussed in Section 3.1 above. It is further proposed to create 8ha of 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.

It is proposed to convert 4.5ha of existing conifer forestry to grasslands comprising devils bit scabious (*Succisa pratensis*), the larval foodplant of the species, within the Proposed Wind Farm site. These areas are depicted in Figure 3-1 (Block F and H).

It is also proposed to create suitable marsh fritillary habitat adjacent to existing breeding areas near proposed Turbine T03 by planting the proposed peat management area with devils bit scabious. This is depicted by Block C on Figure 3-1 and this area measures 3.5ha.

Devils 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 will be the preferred method¹. However, sowing with devils bit scabious seed will also be considered if sourcing plug plants is a limiting factor to the Plan.

3.2.1.1 Conversion of forestry to wet grassland (GS4)

It is proposed that areas of clear-felled conifer forestry around proposed turbine T04 and T05 will be converted to grassland with devils bit scabious and will be managed for marsh fritillary. This will be achieved as follows (please see Blocks F and H, Figure 3-1):

- Forestry to be felled and removed.
- The areas will be spread with a layer of peat excavated during ground works for the Proposed Project.
- The underlying soils will be treated organically, and no herbicides or fertilisers will be added.
- The soils will be plug planted with devils bit scabious with plants from a certified native source.
- It is also proposed to plant local willow species along the southwest boundary of the proposed grassland around proposed turbine T04 (outside of the bat buffer) to provide shelter and increase suitability for marsh fritillary.
- Habitat maintenance of the newly established areas which are adjacent to existing forestry will involve the eradication of self-seeding conifers, and removal off-site.

3.2.1.2 Management

It is proposed to implement a suitable management regime in the marsh fritillary enhancement areas. The aim will be to create an uneven patchwork of short and long vegetation by the end of the grazing period. On a broader scale, the aim is to create a connected network of grasslands suitable for marsh fritillary within the Proposed Wind Farm site.

¹ <https://www.plantlife.org.uk/learning-resource/managing-meadows/>

- Sheep grazing is unsuitable as they will graze selectively for flowers. Enhancement areas will be grazed by cattle.
- Supplementary feeding to be only provided on improved grasslands outside of enhancement areas.
- Use a low stocking level of approx. 0.5LU/ha². However, the stocking rate is to be subject to monitoring and altered as required. The goal is to have a structured sward between 12 and 25cm in height. Extensive (but non-intensive) grazing will result in areas that look under grazed, but which are used for basking adults.
- Avoid mowing as this removes variations in sward height.
- No fertiliser, slurry, herbicide, pesticide usage
- No reseeding with perennial rye grass
- 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
- Maintain shelter on western, south-western and north-western sides of fields where possible.

3.2.2 Cutover Peatland Enhancement

It is proposed to enhance an area measuring 5.3ha which currently consists of cutover, drained peatland on the margin of Article 17-mapped Active Raised Bog. This area is depicted as Block D in Figure 3-1. Excavated peat generated as a result of construction in peat areas will be used for enhancement purposes here and will be strictly restricted to peat. It is anticipated that blocking the existing drains within this area, as well as ceasing further turbary activity will allow subsurface water levels to rise, making the area wetter and allowing for colonisation of wetland plants. This will in turn be of hydrological benefit to the adjacent Article 17 mapped raised bog area. It is important when blocking drains to consider the hydrology of the Proposed Wind Farm site in order to maximise the benefits to the onsite water table. This can be assessed by field or GIS surveys, which highlight slope and drainage to inform decisions on where to place dams. A map of the existing drains within Block D is shown in Figure 3-2. Locations of drain blocking and peat profiling will be confirmed by the Project Ecologist and Hydrologist in advance of commencement of works in this area. The key management objectives to be carried out within this area are as follows:

- Cease any further peat cutting activity
- Block existing drains using plastic corrugate or excavated peat sods at strategically chosen points according to existing drainage depicted on Figure 3-2.
- Plug planting of Sphagnum on bare peat areas
- Removal of Gorse outside of bird nesting season
- Re-profiling of sheer face banks to create a soft slope to be revegetated via recolonisation as well as plug planting with Sphagnum and devils bit scabious.

3.2.3 Replanting Hedgerow

It is proposed to plant 3,520m of hedgerow habitat within the Proposed Wind Farm site. The hedgerow replanting areas are depicted on Figure 3-1 and have been strategically chosen to link up existing areas of bat activity.

Species selected will be indigenous to the local area. The ideal native hedge is made up of approx. 75% hawthorn and 25% of at least four other species³. When planting new hedgerows, plants will be closely spaced (a maximum of 50cm apart) and planted in a staggered row. The new hedgerow will need to be

² Byrne, Dolores and Moran, James (2018). *Best practice guidelines for 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.*

³ *Pollinator-friendly management of Wind Farms. All-Ireland Pollinator Plan, Guidelines 12. National Biodiversity Data Centre*

protected from poaching by livestock, through the erection of new stockproof fencing where required, which should be at least 1m away from the hedge, and on each side if required. 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.

Riparian planting will be carried out along the Raford River in the east of the Proposed Wind Farm site; all saplings will be planted by hand to reduce to potential for bare soil exposure and sediment runoff. Strictly no fertilisers are to be used in the riparian zone. Species to be planted include:

- 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*)
- Rowan (*Sorbus aucuparia*)
- Elder (*Sambucus nigra*)
- Goat Willow (*Salix caprea*)
- Grey willow (*Salix cinerea*)

The following measures will be followed when planting trees:

- All planting will be done by hand and will be undertaken by a suitably qualified arborist.
- Planting will be undertaken in the dormant season, between November and March.
- Hedgerow will be pit planted, in areas of clear vegetation. This involves using a spade to dig a hole with roots placed in the centre. Soil is then placed around the hedgerow and firmed in, ensuring the tree is upright.

3.2.3.1 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 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.

3.2.4 Native Woodland

It is proposed to plant 1.9ha of native woodland in Blocks M and O as shown on Figure 3-1. 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:

- Pedunculate oak (*Quercus robur*)
- Sessile oak (*Quercus petraea*)
- Hazel (*Corylus avellana*)
- Alder (*Alnus glutinosa*)
- Birch (*Betula pubescens*)
- Rowan (*Sorbus aucuparia*)
- Willows (*Salix cinerea*, *Salix caprea*)
- Hawthorn (*Crataegus monogyna*)

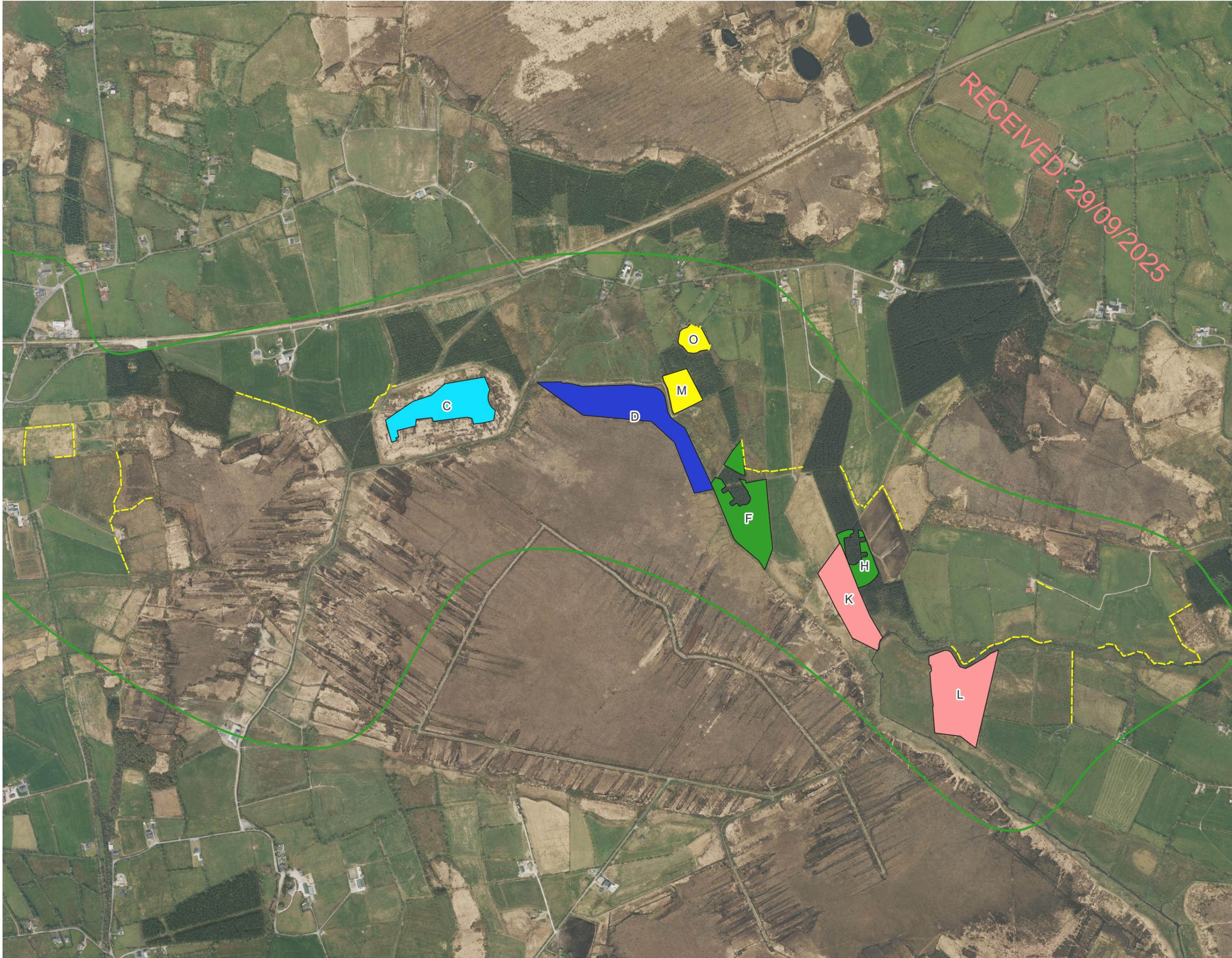
The following measures should be followed when planting trees:

- Mark out the area for planting so it is clear exactly where planting will be established.
- Use thin stakes or sticks to mark the rows or areas of trees to be planted.
- It is recommended that there are 2m spacings between trees. Shelterbelt planting may be applied by planting up two lines of trees as a staggered row.
- 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.

3.2.4.1 Native Woodland Management

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:

- New tree planting will be kept weed and litter free until the new plants are established, particularly from ruderal weeds. Healthy growth will be maintained by allowing the plant to occupy as much of the planting areas as possible to allow them to achieve as close their natural form as possible.
- 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 guards 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.
- 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 a Monitoring Report (see Section 3.3).



Map Legend

	EIA Site Boundary
	Linear habitat planting
	Confersion of forestry to marsh fritillary grassland
	Peatland enhancement
	Habitat management for marsh fritillary
	Devils bit scabious planting
	Native woodland planting

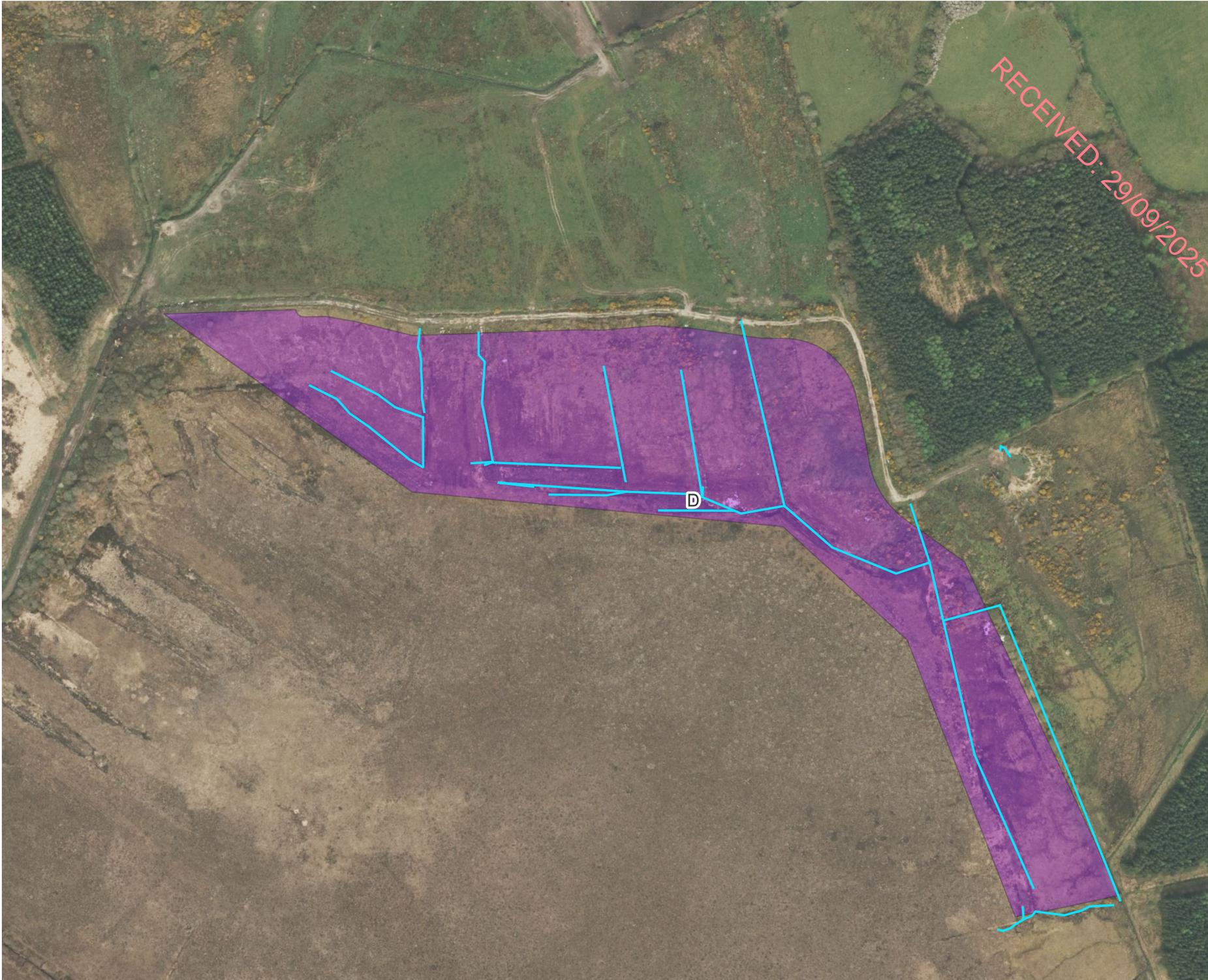
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Drawing Title	
Proposed Biodiversity Measures	
Project Title	
Gannow Renewable Energy Development	
Drawn By	Checked By
RW	JH
Project No.	Drawing No.
240323	Figure 3-1
Scale	Date
1:11,000	2025-09-03

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Map Legend

- Drains
- Block D area

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D



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Drawing Title	
Black D - Drains	
Project Title	
Gannow Renewable Energy Development	
Drawn By	Checked By
RW	JH
Project No.	Drawing No.
240323	Figure 3-2
Scale	Date
1:3,000	09.07.25
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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 a Monitoring 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 restoration and enhancement has been successful, all areas of restored vegetation (replanted hedgerows) and enhanced habitats (grasslands, peatlands) 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.

Marsh Fritillary Enhancement Measures

Following establishment of devils bit scabious in Blocks C, F and H, marsh fritillary habitat suitability assessments will be carried out in these areas as part of the Monitoring Plan. 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 Centre⁴. 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. 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 in Blocks K and L and additionally in new breeding areas, i.e., Blocks C, F and H, 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 surveys⁵. The optimum survey period for larvae is during August and September, in sunny conditions. Occupied larval webs will be recorded.

⁴ <https://biodiversityireland.ie/app/uploads/2021/11/Marsh-Fritillary-Habitat-Condition-Form.pdf>

⁵ <https://biodiversityireland.ie/app/uploads/2021/11/Marsh-Fritillary-Larval-Survey-Form.pdf>

3.3.2 **Monitoring of Hedgerow and Native Woodland Establishment**

Newly planted native woodland will be monitored throughout the monitoring period prescribed above until native woodland is established.

It will be ensured that the establishment and management measures set out above in Section 3.2.3.1 and 3.2.4.1 are adhered to. Any further recommended measures will be outlined in the Monitoring Report.

3.3.2.1 **Cutover Peatland Enhancement Area**

The success of the measures in this area will be monitored throughout the Monitoring Plan periods prescribed as outlined above and will include vegetation relevés undertaken within the area. Fixed point 4 x 4 relevés with GPS coordinates and photos will be undertaken in both the cutover area (Block D) and within the immediately adjacent Article 17 mapped area. A minimum of 5 relevés from Block D will be recorded. The relevé data will be recorded in accordance with the methodology for cutover raised bog habitats set out in Smith et al (2020).

The Project Ecologist will make recommendations as required within the Monitoring Report with regard to management measures or potential habitat condition improvements for Block D.

4.

CONCLUSION

This Plan sets out the measures to be implemented to ensure that the Proposed Project will result in a net gain in biodiversity, specifically with regard to breeding marsh fritillary habitat 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.

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