FEHILY TIMONEY

DESIGNING AND DELIVERING
A SUSTAINABLE FUTURE

Appendix 9.1

Biodiversity Enhancement and Management Plan (BEMP)

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DESIGNING AND DELIVERING
A SUSTAINABLE FUTURE

SHANCLOON WIND FARM

Biodiversity Enhancement and Management Plan (BEMP)

Prepared for:

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RWE

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1. INTRODUCTION

Ireland's 4th National Biodiversity Action Plan (NBAP) sets the national biodiversity agenda for the period 2023-2030. Under Objective 3 of the Plan, to 'Secure Nature's Contribution to People', actions are included to ensure that the private sector takes action to protect and restore biodiversity. Action 3C1 sets a target that by 2030, shared responsibility for the conservation of biodiversity will be acted on, and that "*all Public Authorities and private sector bodies will move towards no net loss of biodiversity through strategies, planning, mitigation measures, appropriate offsetting and/or investment in Blue-Green infrastructure*".

This Biodiversity Enhancement and Management Plan (BEMP) has been prepared to align with the objective of Ireland's 4th National Biodiversity Action Plan and is in support of the Environmental Impact Assessment Report (EIAR) produced for the proposed Shancloon Wind Farm. The BEMP provides guidance for the creation, maintenance and management of habitat and species enhancement features which will form part of the Proposed Development. The BEMP has been prepared having regard to *'Planning for development: What to consider and include in Habitat Management Plans*' (Nature Scot, 2016). The BEMP should be read in conjunction with Chapter 9 – Biodiversity, Chapter 10 – Ornithology and Chapter 12 – Hydrology and Water Quality. Mitigation / exclusion areas prescribed in these aforementioned chapters as may relate to biodiversity are prescribed for the protection of the environment. The measures prescribed herein are additional to those and are aimed at benefitting the habitats and species that have been identified at the Proposed Development Site and its environs. A key concept in this BEMP is that result in improvements in the quality and extent of habitats of value, local fauna will also benefit. It is noted also that the BEMP focusses on the lands within the development boundary, which has been specifically determined to avoid habitats of higher ecological value in the wider environment.

The habitat and species information pertaining to the Proposed Development lands is summarised in Chapter 9 - Biodiversity of the EIAR.

The habitat enhancement and management measures that are included in this document are designed to offset the loss of habitats within the Proposed Development footprint as well as aiming to increase the overall biodiversity value of the Site. This has been achieved through the following measures:

- replacement of lost woodland habitat associated with the proposed development footprint
- creation of areas of new woodland planting within improved agricultural grassland
- creation of suitable habitat for Marsh Fritillary through translocation of devil's bit scabious seed
- scrub clearance/control
- localised drain blocking in cutover bog
- replacement of hedgerows and treelines to be removed within the footprint of the Proposed Development and as associated with bat buffers
- planting of new linear hedgerows and treelines to provide more intact landscape connectivity for bats, mammals and birds.

The provision of the enhancement lands is not proposed to reduce or avoid or compensate for any adverse effects on the integrity of any European site. A NIS has been prepared for the Proposed Development and identified no potential for adverse effect son site integrity associated with habitat loss, collision risk effects or disturbance.

2. ENHANCEMENT MEASURES

A range of habitat enhancement measures have been determined as feasible at the Proposed Development Site as shown in Figure 9.4, Volume IV of the EIAR. These enhancement measures are discussed in the sections hereunder.

The enhancement measures prescribed herein will be overseen by a suitably qualified ecologist (member of the Chartered Institute of Ecology and Environmental Management).

Table 2-1 provides an overview of the enhancement measures proposed as part of the Proposed Development.

Table 2-1: Enhancement Measures Objectives

BEMP ID	Enhancement Measure	Objective	Area
WP1, WP2 WP3 and WP4	Native woodland tree planting	To offset for the loss of mixed woodland at TDR accommodation works location POI16 and to provide new areas of planting to enhance native and local biodiversity and to improve structure and landscape connectivity for fauna.	49653.72 m2
SW1, SW2 and SW3	Dry Stone Wall	To increase diversity of habitat in the development area: dry stone walls provide a specific natural ecosystem for many species including reptiles, bees, invertebrates, birds and mammals, along with specialist vegetation including algae, fungi, mosses and lichens.	310m
HT1, HT2 and HT3 AND TP1, TP2, TP3, TP4 and TP5 AND RV1 to RV4	Treeline and hedgerow planting	The objective of hedgerow and treeline planting is to provide more natural planting to compensate for the intensity of hedgerow management in the wider environment (and indeed within Site), as associated with agricultural practices. The locations of the planting have been specifically identified to provide landscape connectivity for mammals and birds. Planting is also proposed to offset against the loss of hedgerow as required to be removed as bat buffers from the wind turbines.	2,454m
MF1 and MF2	Management of wet grassland for Marsh Fritillary	This existing wet grassland is heavily grazed. This area will be managed and enhanced by the exclusion of livestock, to transform this area into a more species-diverse wetland habitat.	41,760.50 m2
PR1 (restoration area) and DB1, DB2 and DB3 (associated drain blocking locations)	Rehabilitation of cutaway peatland	The drains adjacent to the facebank of the cutover bog near T11 and parallel drains within the raised bog, east of T11, will be blocked. Peat from within the footprint of the Proposed Development will be mounded against the facebank, the objective of which will be to re-establish water levels at the bog surface of the adjacent intact raised bog, and to increase the extent of favourable conditions within the raised bog habitat.	5201.16 m2

BEMP ID	Enhancement Measure	Objective	Area
		The site-specific drainage that is proposed for the wind farm infrastructure is entirely separate from the drain blocking and rewetting that is proposed as part of this habitat enhancement.	

2.1 Native woodland Planting

New broadleaf woodland (planting reference WP1, WP2 and WP4 on Figure 9.4) will be planted on lands surrounding the existing farmyard buildings which are located within the western land parcel (derelict house and cattle shed). Additionally, a corridor of broadleaf woodland (WP3) will be planted adjacent to an area of conifer plantation located immediately outside of the red line boundary. This planting is intended to maintain landscape connectivity and foraging opportunity for bats in the event that the conifer forestry is felled by third parties in the future.

Planting will be in accordance with the Department of Agriculture, Food & the Marine's Forestry Standards Manual (2023). The lands proposed for woodland planting are underlain by grey/brown podzols and as such the appropriate planting type is Oak-Birch-Holly Woodland. The Native Woodland Scheme recommends planting mixture as follows: Sessile oak (30%), Scots pine (30%), downy birch (15%), rowan (15%), holly (10%). The sessile oak will be planted in small groups, with one-quarter of the downy birch, holly and rowan scattered intimately throughout. The remaining of the lands will be planted with the remaining rowan, downy birch & holly as an intimate mix. The scots pine will be planted away from wetter areas of the enhancement areas. The oak trees will be heavy standard trees (12-14cm girth and 5-8 years old) to allow for their quick establishment. A minimum tree planting spacing of 3 x 3 metres is required, giving a planting density of 1,100 trees per hectare. All material used (seeds, plants, cuttings) must originate from suitable sources within Ireland, and must be compliant with the Forest Reproductive Material Directive regarding traceability from seed collection through to the planting site. Design and stocking densities will be in accordance with Woodlands of Ireland Information Note 5 (Establishment, design and stocking densities of new native woodlands) (Little et al., 2009).

Any existing semi-natural features within the woodland enhancement lands will be retained e.g. drains and hedgerows/treelines. The planting design will incorporate open spaces to allow for patches of understory growth and establishment of woodland ground flora and diversity in structure.

It is not proposed to undertake any drainage to facilitate the planting of the woodlands.

Unplanted areas will be allowed to recolonise naturally and will provide habitat for invertebrates. Periodic grazing under strict supervision may be used for brief periods to control brambles and other dense scrubby vegetation. Non-plastic tree protectors should be used to avoid any losses of trees to grazing.

Vegetation control will be required until young trees are established. This will be achieved using mechanical means only; no herbicides will be used.

The woodland will be fenced off to prevent deer and other large herbivores entering, but fencing will include gaps at the bottom to allow other mammals to continue traversing the area. Gaps measuring 300mm x 300mm will be placed at the bottom of the fence at 50m intervals.

Maintenance and management will be in accordance with Management Guidelines for Ireland's Native Woodlands[1].

Given that Sycamore is present in adjacent treelines, it will be important to control regeneration of this species such that it does not establish in the woodland. The sycamore trees in the adjacent treelines should be felled and replaced with sessile oak.

Additionally, where the area of forestry felling is proposed to accommodate the 33kV cable route, linear sections of conifer forestry (HR1 and HR2) will be retained so as to remain as wildlife corridors in the event that the conifer outside of the red line boundary is felled as part of ongoing forestry practices in the study area. The area of disturbed land associated within the felled forestry will be allowed to revegetate naturally, however regenerating conifers from the adjacent planted forestry will be removed from this area.

2.2 Dry Stone Wall

Dry stone walls, <0.5m in height, will be constructed at three locations within the Site (SW1, SW2 and SW3) and will be constructed in accordance with 'Dry Stone Walling: A Practical Handbook' (Alan Brooks and Sean Adcock, 1999) and by a trained member of the Dry Stone Wall Association of Ireland.

2.3 Treeline and Hedgerow Planting and Management of Habitat for Bats

This measure provides mitigation in four specific areas:

- Prevents net loss of linear wooded habitats
- Directs bats away from tree-free buffers along alternative commuting routes
- Prevents net loss of linear bat foraging and commuting features
- Provides corridors for connectivity to wider landscape for mammals, reptiles and birds

2.4 Bat Buffers

Where tree/scrub removal is required to facilitate the proposed turbines, a minimum of 50m buffer from the blade tip to the nearest woodland, as recommended by the Natural England (2014) and SNH (2019) guidelines, shall be implemented. These vegetation-free areas will be maintained during the operational life of the development to minimise the collision risk for bat species present at the proposed development site, which equates to an equates to an 88m buffer for the Proposed Development. These vegetation-free areas will be maintained during the operational life of the development. They will be monitored during years 1, 3, 5 and every 5 years after for the lifetime of the proposed project.

Tree-free buffers will be maintained around all turbines to reduce risks to bats. These bat felling buffers will be maintained by keeping vegetation short, which will minimise insect abundance. This will be achieved by mechanical means only, and pesticides and toxic substances shall not be utilised. The buffers shall be cut twice per year, in spring and summer as required. This is applicable primarily to areas where trees will be removed, but mowing will be implemented in existing grassland within buffers as required if regular grazing is not

[1] Cross, J.R. & Collins, K.D. 2017. Management Guidelines for Ireland's Native Woodlands. Jointly published by the National Parks & Wildlife Service (Department of Arts, Heritage, Regional, Rural & Gaeltacht Affairs) and the Forest Service. Forest Service, Department of Agriculture, Food & the Marine, Kildare Street, Dublin 2, Ireland

occurring.

2.5 Hedgerow/Treeline Enhancement

Existing poorly developed/conditioned hedgerows and treelines within the Site will be enhanced as appropriate to improve their value as commuting/foraging/sheltering corridors for bats and other wildlife, in particular those connected to the wider landscape, including woodland habitats (example at HT2). This will comprise planting up of existing hedgerow/treeline to fill large gaps/openings in existing linear features with appropriate native shrubs and trees as well as providing additional planting to connect these features to the wider environment.

Where hedgerows or treelines are affected by turbine felling buffers, bats will be directed away from tree-free buffers along newly planted alternative commuting routes. This will be achieved by planting new mixed treelines and hedgerows at locations HT1, HT2 and HT3 (see Figure 9.4). Additionally, new treeline planting will be provided at TP3, TP4 and TP5 to provide enhanced landscape connectivity for bats and other wildlife (TP1 and TP2 will act as screen planting for the substation site). These areas will ensure no net loss of linear foraging /commuting features for wildlife and will enhance connectivity in the landscape for wildlife, which has been impacted in some areas by intensive agricultural management.

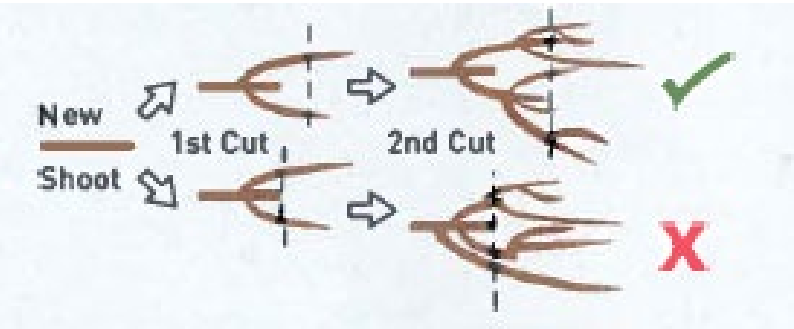
It is proposed to create closely spaced double lines of hedgerow with the following species mixes: Sessile oak, rowan, holly, downy birch, grey willow, alder, hawthorn, blackthorn as appropriate as determined by the EcOW for the Proposed Development. Planting of these species will be staggered to prevent excessive shading and aid establishment of the hedgerows/treelines. Young trees will require protection until established.

All hedgerow planting is required to use plants of native provenance (local if possible). The landscaping contractor is required to be informed well in advance to allow the acquisition of suitable native stock.

2.6 Hedgerow Maintenance

Existing and new hedgerows and treelines within the Site will be managed for wildlife to ensure that the overall structure and shape of the hedgerow provides adequate cover and shelter for wildlife and to provide variation in structure and height. Hedge cutting will be kept to a minimum. Any necessary hedgerow maintenance will be undertaken between November and February, in line with the NBDC Data Series Guidance 'Pollinator-friendly management of wind farms'. Hedgerow maintenance will be prohibited during the bird breeding season (March-August, inclusive), this is in keeping with the Wildlife Act 1976 (as amended).

Tightly cut hedgerows with flat tops provide little benefit to wildlife, taller and bulky hedgerows are recommended as this provides more shelter for wildlife. When the hedgerows are maintained, stems will be cut a little above the last cut (see Image 2-1) as cutting back to the exact same point depletes the energy of the hedgerow, forms a build-up of scar tissue which discourages new growth.



Source:Teagasc

Image 2-1: Hedgerow Level of Cut

Light annual cutting of hedgerows is not good for wildlife as it limits the production of flowers and fruit. The sites hedgerows will be cut every three to four years in rotation as this will leave areas of undisturbed hedgerows. Cutting equipment used will be sharp so as not to shatter or fray the hedge. Shattering and fraying allows for disease to enter plants and can lead to decay and weaken the vigour of the hedgerow. A finger-bar cutter is recommended as the most appropriate tool to minimise fraying and smashing of branches (Heritage Council, 2017). A flail-type hedge cutter is unsuitable for hedge trimming in situations where hedgerow health is a priority.

2.6.1 Semi-mature Trees

Larger trees can be slower to establish following transplantation and need help until established. These trees may require watering and provisions should be made for this. While establishing, the trees will not require pruning, except where dead branches form or branches are damaged by winds. These branches should be carefully removed to prevent the introduction of disease.

2.7 Bridge Crossing

Riparian vegetation abutting the clear span bridge crossing of the Togher River will be replanted following construction, to minimise habitat loss and repair connectivity for wildlife along the riparian corridor (locations RV1 to RV4). Existing vegetation comprises willow and alder and will be replaced with the following mix: grey willow- 70%; alder- 30%.

2.8 Management of Wet Grassland for Marsh Fritillary

The lands within the proposed Shancloon Wind farm were not found to contain areas of suitable habitat for Marsh Fritillary and no larval webs were recorded within the Site. The wet grassland towards T2 includes the footplant for Marsh Fritillary butterfly: devil's-bit scabious *(Succisa pratensis)* in patches. However, as per the NBDC Habitat Condition Assessment for Marsh Fritillary, the grassland is classified as unsuitable for Marsh Fritillary given the low frequency of *Succisa* per m^2 (~5%) and the level of grazing at this location, coupled with scrub encroachment. Elsewhere within the wet grassland habitat within the Site, the vegetation structure and height was uniform, with low sward height due to grazing, and with low *Succisa* abundance. These lands in their current condition are unsuitable for Marsh Fritillary, as per the NBDC Habitat Condition Assessment guidelines. However, two land parcels within the wet grassland (MF1 and MF2) were deemed suitable for management for Marsh Fritillary.

A Marsh Fritillary habitat management and monitoring programme will be put into place for these areas (MF1 and MF2) for the construction and operational phase of the Proposed Development and will be overseen by a suitably qualified ecologist. These lands will be managed to create patches of abundant Devil's-bit Scabious, in

an uneven patchwork of short and tall vegetation 5-25cm tall. Prior to the commencement of site works, areas MF1 and MF2 will be clearly marked out by a suitably qualified ecologist and fenced off. This will avoid damage from construction activities.

The lands near T2 were determined as sub-optimal for enhancement given the extensive level of scrub encroachment. However, there are devil's bit plants present within these lands (marked as MF-D in Figure 9.4), albeit in too low a density for Marsh Fritillary, which will be used as donor seed for sites MF1 and MF2. As such this area (MF-D) will also be clearly marked out by a suitably qualified ecologist and fenced off to avoid damage from construction activities. Seed from these lands will be collected and transferred to areas MF1 and MF2 as required in accordance with NBDC guidelines[2]. This will aid in increasing the density of devil's-bit scabious within the receptor lands.

In advance of any construction activity, the vegetation structure and suitability for Marsh Fritillary within areas MF1 and MF2 will be monitored in accordance with the Habitat Condition Assessment for Marsh Fritillary methodology. This will be used to compare baseline surveys of the vegetation with future survey findings and thus assist in informing the management measures for these lands.

"Good condition" Marsh Fritillary habitat should have three or more Devil's-bit Scabious plants per square metre, across more than one fifth or twenty percent of the habitat. Marsh Fritillary thrive in habitats where there is a varied sward structure and where features of the terrain such as banks, ditches and hollows persist (see Image 2-3).

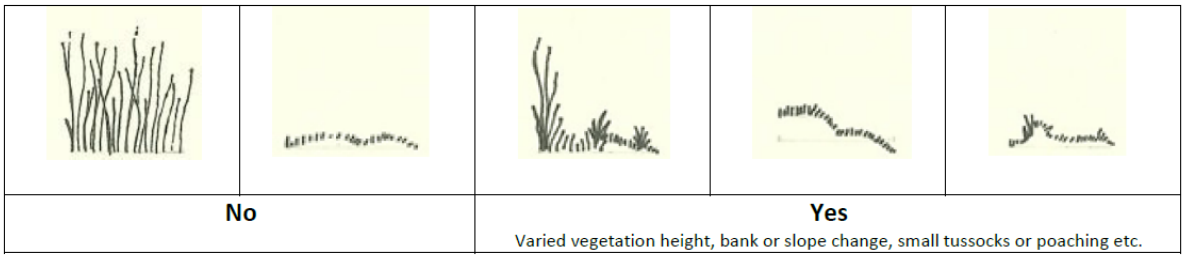
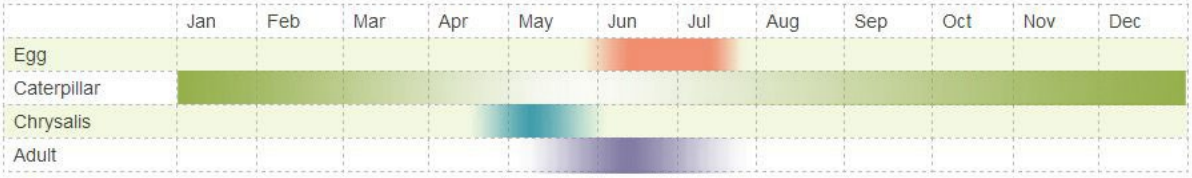


Image 2-2: Example of suitable and unsuitable vegetation structure

The lifecycle of Marshe Fritillary butterflies is set out hereunder:

- **Mid-February to early- April:** Marsh Fritillary caterpillars re-emerge after winter hibernation. This is the ideal time to check for presence/absence of the species breeding as webs are easier to identify.
- **May-June:** Marsh Fritillary adults on the wing and may be detected in suitable habitat.
- **Mid-August to mid-October:** Devil's-bit Scabious is in flower, the ideal time to gauge the extent of potential Marsh Fritillary habitat.
- **November to February:** The Marsh Fritillary caterpillars hibernate deep in the vegetation.



Management Measures for Marsh Fritillary

[2] Collecting and using pollinator friendly wildflower seed. All Ireland Pollinator Plan, How-to-guide 2. National Biodiversity Data Centre Series No.6, Waterford. May, 2016. Updated October 2022.

Low- intensity grazing is essential to maintain a varied vegetation structure needed by Marsh Fritillary. Light grazing by cattle and/or ponies at 0.2-0.3 LU/ha/year will be employed in areas MF1 and MF2. Grazing will not exceed 0.2 LU/ha during June to September. Sheep are unsuitable as they have a preference for devil's bit. Artificial fertilizer, manure or slurry will not be applied, neither will pesticides.

Scrub will be controlled in the Marsh Fritillary areas MF1 and MF2. Once scrub over 1m high occupies more than 10- 15% of suitable habitat it will be controlled. If required, rush cutting will be carried out prior to March or delayed until after the devil's-bit scabious flowering period has finished.

Monitoring

The construction phase of the Proposed Development will be monitored by a suitably qualified ecologist to ensure the protection of Marsh Fritillary habitat. A monitoring report will be submitted in years 1, 3 & 5 and every five years thereafter for the lifetime of the proposed project. This report will initially document the establishment of vegetation and the distribution of Marsh Fritillary food plant and any evidence of usage by Marsh Fritillary. Monitoring will be in accordance with Marsh Fritillary Larval Web Survey/Monitoring instructions for surveyors and Marsh Fritillary Larval Web Recording Form' (NBDC). Any additional management measures will also be undertaken in consultation with Butterfly Conservation Ireland (BCI).

2.9 Rehabilitation of Cutaway Peatland

Drains along the facebank within the peatland restoration area PR1 will be blocked by filling with the peat.

In other areas (DB1, DB2 and DB3) the drains will be blocked using peat dams or plastic dams as deemed appropriate by the geotechnical engineer and ecologist for the Proposed Development, see Image 2-3 and Image 2-4.

The intention of the dam is not to fully block the drains, as this would result in an excessive build-up of water pressure which can enhance the likelihood of failure/slippage. Dams will be installed at 0.1m drop in elevation, allowing surface water still to flow but reducing the velocity of surface water flow through the drainage channels, allowing water time to filtrate into groundwater naturally and retain water within these areas to create favourable conditions for peat-forming plan communities which can over time generate bog.

No vehicular access will be permitted to or within the dedicated peatland restoration area once all initial works are completed.

No additional drainage to be installed in proximity to or within the dedicated peatland restoration area once all initial works are completed.

Peat extraction within the proposed peatland restoration area will not be permitted.

The Raised Bog Restoration Guidance Notice will be used as further guidance when installing dams at this site. The guidance is provided within the Irish Wildlife Manual No. 99 - ' Best Practice in Raised Bog Restoration in Ireland'[3] .

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

Image 2-3: Example of Peat Dam

Image 2-4: Example of Plastic Dam

2.10 Ecological and Hydrological Monitoring Programme

In order monitor the success of habitat restoration the following will be carried out:

Vegetation Sampling: Detailed relevé-level surveys shall be carried out within the peatland subject to restoration. A number of fixed relevé sites (i.e. permanent quadrats) will be set up in the area where active management is proposed. Baseline data will be recorded prior to the commencement of habitat management activities set out in this plan. The character of each relevé will be recorded (e.g. full botanical list, species proportions present, vegetation structure and height) and photographs will be taken of each relevé from a fixed point. Relevé survey will be undertaken during the optimum survey season. The field survey season generally spans six months, from April to September. This is the optimum time for field survey due to longer days, more favourable weather conditions and the fact that the majority of higher plants flower during this period, facilitating identification.

Surface Peat Assessment: An assessment of the physical state of the surface peat with regard to:

- Percentage bare peat not covered by vegetation
- Moisture status (qualitative)
- Intactness (e.g. presence of visible cracking in surface peat;
- General stability (e.g. presence of peat erosion)

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 and submitted to the planning authority in years 1, 2, 3, 5, 8, 10, 15, 20, 25 and 29 (i.e., in the year before the final year of operation of the wind farm) on the basis of the results of vegetation sampling and peat assessment from the managed areas. Analysis of the data collected will be the basis for a review of the measures and techniques employed.

2.11 Other Ecological Enhancement

2.11.1 Retention of Settlement Ponds

Settlement ponds will be constructed within the Site as a water quality protection measure during the construction stage, in line with the drainage design for the Proposed Development. Ponds which are located

outside of the bat buffers for the turbines will be retained and managed as wildlife ponds for the operation phase of the Proposed Development in accordance with the Guide to the restoration, creation and management of ponds[4].

2.11.2 Bat Boxes/Bricks

Two bat bricks will be installed to the underside of the new bridge crossing (see Image 2-5) to provide additional roosting opportunity. The bricks will be installed under the supervision of the EcOW.

Bat boxes (8 nr.) will be placed along trees in the treelines on site. This will help to provide further roosting/breeding habitat for bats on the site. The appropriate locations for same will be selected on-site by an ecologist to ensure they are sheltered from prevailing winds and exposed to the sun for part of the day. Bat boxes will be placed at least 4m above ground with a clear flight path free from overhanging branches and away from artificial light sources.

Marnell, Kelleher & Mullen 2022 recommend woodcrete (cement and sawdust) bat boxes over wooden boxes as they are more durable and need less maintenance, as well as a mixture of bat box types per tree should to cater for seasonal and species requirements. A combination of crevice type boxes (for Pipistrelle spp. and Leisler's bat) and cavity type boxes (for Myotis spp. and brown-long eared bat), or those designed for both crevice and cavity dwellers.

Image 2-5: Schwegler woodcrete bat box for cavity and crevice dwelling bats

Image 2-6: Example Schwegler bat Brick

2.11.3 Kestrel nest boxes

One Kestrel nest box will be installed and will be located 3-5m above ground level and attached to a tree (at location NB1 on Figure 9.4, Volume IV) with a clear flight path without overhanging branches. The opening of the box will be positioned away from the prevailing wind.

The nest box will be maintained and replaced as required during the lifespan of the wind farm. Any maintenance work may only be carried out from October to February inclusive under the supervision of a qualified ecologist to ensure nesting season is avoided.

Nest boxes for kestrel are commercially available or can alternatively can be constructed onsite. Plans for kestrel boxes are included in Image 2-9.

[4] Sayer, C.D., Biggs, J.,Greaves, H.M., & Williams, P. (2023) Guide to the restoration, creation and management of ponds. University College London, London, UK

Source: NHBS website https://www.nhbs.com/

Image 2-7: Example of kestrel nest

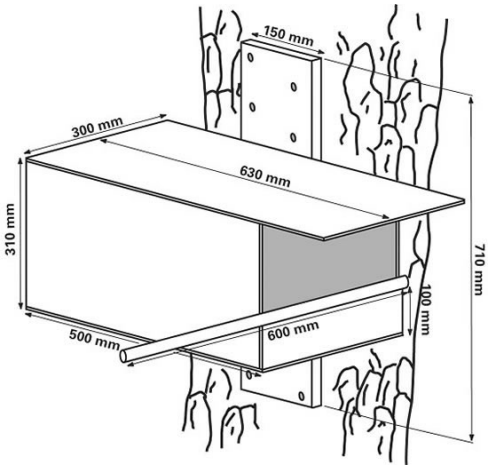


Image 2-8: Kestrel Nest Box Dimensions

2.11.4 Passerine nest boxes

Nest roosting pockets (6 nr.) will be installed for smaller species such as goldcrest, as well as robin and wren. A mix of oval hole nest boxes and open-fronted nest boxes (12 nr.) will be installed for other species, including linnet, robin, wren, spotted flycatcher and greenfinch. The entrance hole for these general bird boxes will be at least 3cm in diameter to allow access to these species. Potential locations will be determined by the project EcOW having regard to site clearance to ensure they are located at appropriate locations for the species.

Source: NHBS website https://www.nhbs.com/

Image 2-9: Nest roosting pockets

Source: NHBS website https://www.nhbs.com/

Image 2-10: Oval hole nest box

Source: NHBS website https://www.nhbs.com/

Image 2-11: Open-fronted nest box

2.11.5 Refugia piles and Hibernacula Piles

Refugia piles and hibernacula (hibernation sites) will be created. These provide sheltering locations for a wide

range of wildlife, including reptiles, amphibians, small mammals and invertebrates. Refugia piles are produced by piling natural materials such as logs, sticks and leaves; that can be supported by additional materials such as rubble and bricks to form a structure with many cracks and crevices for sheltering. Hibernacula are produced in a similar way, but often require setting into the ground in a shallow pit and topping with soil to enclose the structure and creating a more stable microclimate suitable for hibernating species. These structures will be installed near hedgerows and treelines within the site, where they are less likely to be disturbed.These piles will be created in accordance with the Reptile Habitat Management Handbook.[5]

A proportion of the timber being removed from Site (substantial pieces of timber-tree trunk/branches) and brash (smaller scrub and branches) will be salvaged from areas of forestry felling by cutting into logs to create log stacks/piles in the areas specified in Figure 9.4, Volume IV. These piles will be placed in sunny locations and set within existing vegetation (for example, areas of long grass or scattered scrub), so that there is cover immediately surrounding, or adjacent to, the pile.

These piles will be used by insects as the timber decay, and by amphibians, reptiles and small mammals. Logs of different sizes can be stacked on top of each-other or positioned vertically in a pile. It is important to ensure that some logs remain damp and do not dry out by part-burying (some) logs and placing in a partly shaded location within the Proposed Development lands. Log piles should contain a mixture of sizes and shapes, with some small-diameter material present.

The key design features for the sites are;

- a sunny position,
- a well-drained site, not prone to flooding,
- orientation so that one of the long banks faces south,
- location in a patch of habitat favourable for dispersal, such as tussocky grassland,
- minimal public disturbance,
- size at least 4 m long, by 2 m wide by 1 m high.

(Source: Edgar P, Foster J and Baker J (2010))

Image 2-12: Example of Log Pile Habitat

(Source: Edgar P, Foster J and Baker J (2010))

Image 2-13: Example of Brash Pile Habitat

[5] Edgar P, Foster J and Baker J (2010) Reptile Habitat Management Handbook. Amphibian and Reptile Conservation, Bournemouth.

3. MONITORING

Commencing in year 1 of operation the status of the habitats created, enhanced hedgerows and the species enhancement measures will be checked as per Table 3-2 below. Monitoring will be undertaken by a qualified ecologist appointed by the developer/operator of the wind farm. This will follow implementation of the plan to confirm whether habitats have successfully established and to identify any issues that need to be addressed. Following these monitoring visits, a short status report will be prepared. This will identify any necessary actions to ensure the success of the BEMP, which will be implemented on foot of the report findings.

A final assessment of the condition and success of the various biodiversity management and enhancement prescriptions will also be undertaken in Year 29 (i.e., in the year before the final year of operation).

Table 3-1: Monitoring of Biodiversity Enhancement & Management Measures

Measure	Target Species/ Habitat	Implementation Timeline	Monitoring	Ongoing Management
Mitigation				
Hedgerow/ Treeline Reinstatement Planting	Hedgerows/ Treelines Associated bird & insect species	To be planted in the first growing season prior to commencement of development.	Years 1, 2, 3, 5, 10, 15	Ensure establishment of new hedgerows and improved connectivity of the site
Bat Buffer Maintenance	All bat species occurring onsite	Buffers to be cleared prior to turbine installation. Clearance will take place outside the bird breeding season (March-August inclusive)	Annual monitoring throughout lifespan of wind farm (mid-late summer)	Ensure vegetation is kept low
Enhancement				
Marsh Fritillary Grassland biodiversity areas	Marsh Fritillary	From project initiation	Years 1, 2, 3, 5, 10, 15, 20, 25, 29 A positive findings to be reported to the National Biodiversity Date Centre.	Ensure grazing rate is appropriate, no signs of over/ under grazing, poaching. Ensure no succession into scrub
New Hedgerows	All bat species occurring onsite pollinators	From project initiation	Years 1, 2, 3, 5, 10, 15, 20, 25,29	Ensure establishment; ensure hedgerows are not cut back excessively and are maintained as a viable corridor.

Measure	Target Species/ Habitat	Implementation Timeline	Monitoring	Ongoing Management
Woodland and riparian vegetation establishment	Oak-Birch-Holly woodland and riparian vegetation	From project initiation; ongoing management through establishment phase	Years 1, 2, 3, 5, 10, 15, 20, 25, 29	Ensure establishment of planted trees; ensure continued functioning of fencing or plant protectors targeted interventions to promote habitat heterogeneity
Nest boxes	Kestrel Passerines	Following access track construction and 33kV cable installation	Annual monitoring Any positive findings reported to the National Biodiversity Date Centre.	Ensure boxes are well maintained and/or replaced as required
Log Piles / Refugia / Hibernacula	Small mammals Insects	Following access track construction and 33kV cable installation	Years 1, 2, 3, 5, 10, 15, 20, 25, 29 Any positive findings reported to the National Biodiversity Date Centre.	Ensure continued presence; add material as required

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