



Appendix 5.10

Habitat and Species Management Plan

Knockanarragh Wind Farm EIAR Volume 3

Knockanarragh Wind Farm Limited

27 November 2023



Habitat and Species Management Plan

Knockanarragh Wind Farm

Knockanarragh Wind Farm Ltd

Building 4200, Cork Airport Business Park, Cork, T12 D23C

Prepared by:

SLR Environmental Consulting (Ireland) Ltd

City Gate, Mahon 1000, Cork, T12 W7CV

SLR Project No.: 501.V00727.00008

Client Reference No: N/A

5 January 2024

Revision: 0

Revision Record

Revision	Date	Prepared By	Checked By	Authorised By
0	5 January 2024	Dr Jonathon Dunn	Richard Arnold	Dr Jonathon Dunn
	Click to enter a date.			
	Click to enter a date.			
	Click to enter a date.			
	Click to enter a date.			

Basis of Report

This document has been prepared by SLR Environmental Consulting (Ireland) Ltd (SLR) with reasonable skill, care and diligence, and taking account of the timescales and resources devoted to it by agreement with Knockanarragh Wind Farm Ltd (the Client) as part or all of the services it has been appointed by the Client to carry out. It is subject to the terms and conditions of that appointment.

SLR shall not be liable for the use of or reliance on any information, advice, recommendations and opinions in this document for any purpose by any person other than the Client. Reliance may be granted to a third party only in the event that SLR and the third party have executed a reliance agreement or collateral warranty.

Information reported herein may be based on the interpretation of public domain data collected by SLR, and/or information supplied by the Client and/or its other advisors and associates. These data have been accepted in good faith as being accurate and valid.

The copyright and intellectual property in all drawings, reports, specifications, bills of quantities, calculations and other information set out in this report remain vested in SLR unless the terms of appointment state otherwise.

This document may contain information of a specialised and/or highly technical nature and the Client is advised to seek clarification on any elements which may be unclear to it.

Information, advice, recommendations and opinions in this document should only be relied upon in the context of the whole document and any documents referenced explicitly herein and should then only be used within the context of the appointment.



Table of Contents

Basis of Report	i
1.0 Introduction	1
1.1 Scope.....	1
2.0 Hedgerow	2
2.1 Summary of Baseline	2
2.2 Objectives	2
2.2.1 Objective 1: To compensate for the loss of hedgerows.....	2
2.2.2 Objective 2: To increase the length of hedgerows	6
2.2.3 Objective 3: To enhance existing hedgerow	7
3.0 Treeline	10
3.1 Summary of Baseline	10
3.2 Objectives	10
3.2.1 Objective 4: To compensate for the loss of treelines	11
3.2.2 Objective 5: To increase the length of treelines	12
4.0 Riparian Zone	13
4.1 Summary of Baseline	13
4.2 Objectives	14
4.2.1 Objective 6: Restoration of riparian zone.....	14
5.0 Transition Mire and Quaking Bog	16
5.1 Summary of Baseline	16
5.2 Objectives	17
5.2.1 Objective 7: Enhancement of transition mire and quaking bog habitats	17
6.0 Bats	19
6.1 Summary of Baseline	19
6.2 Objectives	20
6.2.1 Objective 8: To avoid permanent destruction of linear bat foraging and commuting habitat	20
6.2.2 Objective 9: To provide additional bat roosts	21
6.2.3 Objective 10: To implement bat mitigation felling buffers to reduce collision risk	23
7.0 Birds	26
7.1 Summary of Baseline	27
7.2 Objectives	27
7.2.1 Objective 11: Reduction in habitat suitability for common kestrel.....	27
7.2.2 Objective 12: Provision of additional bird nesting and/or foraging habitat	30
8.0 Hedgehog	33



8.1	Summary of Baseline	33
8.2	Objectives	33
8.2.1	Objective 13: Provision of hibernacula for hedgehogs	33
9.0	Reptiles and amphibians	35
9.1	Summary of Baseline	36
9.2	Objectives	36
9.2.1	Objective 14: Provision of reptile and amphibian hibernacula	36
9.2.2	Objective 15: Management of new and existing drainage ditches to benefit amphibians	37
10.0	Invertebrates.....	39
10.1	Summary of Baseline	39
10.2	Objectives	39
10.2.1	Objective 16: Provision of invertebrate foraging habitat and hibernacula	39
10.2.2	Objective 17: Enhancement of marsh fritillary breeding habitat	41
11.0	Invasive Species.....	43
11.1	Summary of Baseline	43
11.2	Objectives	44
11.2.1	Objective 18: Control of Invasive Species.....	44
12.0	Summary of Management and Monitoring Schedule.....	51
13.0	References.....	58

Tables in Text

Table 2-1: Management and Monitoring Programme for Objective 1.....	5
Table 2-2: Management and Monitoring Programme for Objective 3.....	9
Table 4-1: Management and Monitoring Programme for Objective 6.....	16
Table 5-1: Management and Monitoring Programme for Objective 7.....	19
Table 6-1: Management and Monitoring Programme for Objective 9.....	22
Table 6-2: Details of Bat Mitigation Buffers Required for Each Turbines	24
Table 6-3: Management and Monitoring Programme for Objective 10.....	26
Table 7-1: Management and Monitoring Programme for Objective 11.....	29
Table 7-2: Management and Monitoring Programme for Objective 12.....	32
Table 8-1: Management and Monitoring Programme for Objective 13.....	35
Table 9-1: Management and Monitoring Programme for Objective 15.....	38
Table 10-1: Management and Monitoring Programme for Objective 16.....	41
Table 11-1: IAS species recorded	44
Table 11-2: Management and Monitoring Programme for Objective 18.....	49
Table 12-1: Management and Monitoring Schedule	51



Appendices

Appendix A Figures



1.0 Introduction

This report has been prepared by SLR Environmental Consulting (Ireland) Limited (SLR) on behalf of Knockanarragh Wind Farm Limited (the 'Applicant'), located in Co. Westmeath. The report presents a Habitat and Species Ecological Management Plan (HSMP) for Knockanarragh wind farm (the 'Proposed Development') for an initial 35-year period. The HSMP forms a commitment from the development proposal and should be read in conjunction with Environmental Impact Assessment Report (EIAR) chapter 5 (biodiversity) and associated Natura Impact Statement (NIS) report. The mitigation, enhancement or compensation measures set out in this HSMP are derived from the EIA and do not relate to any mitigation measures set out in the NIS.

All measures in the HSMP will be implemented in full, subject to discussion and confirmation with NPWS.

1.1 Scope

This HSMP sets out the key objectives and methods by which parts of the Proposed Development lands (the 'Site') will be managed to the benefit of biodiversity. The HSMP is intended to cover the establishment and management of habitats and species required to compensate for impacts identified within the EIAR. Measures to mitigate impacts during operation such as the spread of invasive and non-native species are also included, along with enhancement measures such as the provision of additional nesting habitat for birds and hibernacula for amphibians and reptiles. Most of the information about mitigation measures to be employed during the construction period is included in the Construction Environmental Management Plan (CEMP).



2.0 Hedgerow

The following sections sets out a summary of the baseline conditions for hedgerows including a description and evaluation, along with any ecological trends and constraints that could influence management.

Next listed are the objectives with details of actions that will be implemented in full.

2.1 Summary of Baseline

There are currently 11,976.39 m of hedgerows at the Proposed Development (comprising 10734.11 m of hedgerows, 182.89 m of hedgerows x drainage ditch mosaic and 1,059.39 m as a treeline x hedgerows mosaic) and of these, 548.86 m are predicted to be lost.

Hedgerows were evaluated as being important at the local scale due to providing foraging, resting and breeding habitat for a variety of animal species. They also act as ecological corridors, connecting fragmented populations of plants and animals within the landscape. Hedgerows can also protect water quality.

Most hedgerows are managed at the Proposed Development via regular trimming, although some have been left to 'escape' (i.e. they have started turning into treelines) and have started to turn into treelines. Some hedgerows are 'gappy'.

Any hedgerow management proposed as part of this HSMP could be constrained by existing agricultural practices at the Proposed Development e.g. livestock could damage any newly established hedgerows, hedges could also be over- or under-trimmed, close ploughing could damage roots and spray drift from herbicides/insecticides could affect plants/animals within the hedge.

2.2 Objectives

Westmeath County Development Plan 2021-2027 and Meath County Development Plan 2021-2027 both have policy objectives that relate to the preservation and enhancement of existing hedgerows, along with replacement of any hedgerows that are removed with native species indigenous to the area.

Objectives and criteria for success have been developed in accordance with the ACRES specifications (DAFM, 2022; 2023) and the Hedgerow Appraisal System (Foulkes et al., 2013).

The objectives relating to hedgerow compensation and enhancement are set out below along with associated measures to successfully establish and manage these habitats for each objective.

Figure 1 in Appendix A shows the locations for proposed hedgerow creation, which are all within the red-line boundary or optioned lands. The locations have been chosen to help protect / restore riparian zones (see section 4.0).

2.2.1 Objective 1: To compensate for the loss of hedgerows

Listed below include targets to define success for objective 1, details of measures (establishment and management) that will be implemented to achieve success, details of monitoring measures and possible remedial actions, the programme, details of reporting requirements and who will be responsible for implementing the measures, monitoring and reporting.

2.2.1.1 Targets

Minimum thresholds for success include:



- To compensate for loss of existing hedgerows by planting 548.86 m of replacement hedgerow;
- By year 5 after planting, new hedgerows should meet the criteria for 'Favourable' under the Hedgerow Appraisal System; and
- In addition to the condition assessment, the diversity of the tree / shrub / climber component (otherwise described in the Hedgerow Appraisal System as 'canopy' forming species) should be the same, or greater than, that at planting (>3 native 'hedgerow' species per 30 m hedgerow strip – see section 2.2.1.2 below).

2.2.1.2 Establishment Actions

Establishment actions that will be implemented include:

- Plant 548.86 m of new hedgerows using native fruit and seed-bearing 'hedgerow' species (e.g. hawthorn *Crataegus monogyna*, blackthorn *Prunus spinosa*, dog rose *Rosa canina*, guelder rose *Viburnum opulus*, hazel *Corylus avellana*, holly *Ilex aquifolium*, spindle *Euonymus europaeus* and alder buckthorn *Frangula alnus*) using a 'like-for-like' approach to replace lost hedgerows where possible;
- Plants must be of Irish Origin or Irish Provenance and purchased from Department of Agriculture, Fishing and the Marine (DAFM) registered professional operators¹;
- New planting will be undertaken in the appropriate season, with bareroot stock planted October to December (avoiding periods when the ground is waterlogged or frozen) unless on clay (which underlies some peat soils at the Proposed Development), when planting should be delayed until March due to risk of frost heave during heavy frost;
- Planting will not be undertaken until the first appropriate season post-construction to avoid damage to whips;
- To ensure new hedgerows are beneficial for biodiversity, there must be five plants per metre in a double-staggered row with >3 species listed above. It is recommended to incorporate as many 'hedgerow species' listed above into the new hedgerow as possible;
- One tree species (see section 3.2.1.2 below for list of native tree species) should be planted every 50 m to ensure there are some hedgerow trees present, which will provide additional value for invertebrates, birds and bats;
- Water during the first year to assist with establishment. Frequency of watering to adapt to weather conditions i.e. a new bareroot hedge will need at least 5-10 L of water per every metre of hedgerow delivered once weekly under normal summer conditions and twice weekly during hot weather conditions (i.e. five consecutive days with maximum temperatures of >25°C). If weeds are controlled before and after planting (e.g. via use of mulch, which will help the soil retain moisture), then watering is unlikely to be required under normal weather conditions outside of summer. Watering via a leaky hose for 2-4 hours is recommended;
- New hedgerows must be protected from livestock with an appropriate permanent fence located at least 1.5 m from the edge of the new hedgerow, which will allow the to hedgerow mature and expand; and

¹ The GLAS specification (DAFM, 2020) provides the mailbox plantandpests@agriculture.gov.ie as the place to request this info from.



- Whips intended to mature into hedgerow trees will be left to mature without cutting and protected with a tree guard/shelter and fenced off from livestock if present.

2.2.1.3 Management Actions

Management actions that will be implemented include:

- Ploughing and application of fertilisers and herbicides must not be undertaken within at least 2 m of the hedgerow edge to avoid damage to root systems and the hedge itself; ideally, tussocky grass will be allowed to develop at the base of the hedgerows;
- Hedgerows will be cut annually via top trimming during establishment phase (the first five years) to encourage sideways growth and canopy closure;
- Whips intended to grow into hedgerow trees (see section 2.2.1.2 above) will not be cut / trimmed and will be allowed to grow into mature trees;
- Hedgerows must not be cut below 1.8 m in height (either during establishment or post-establishment);
- Post-establishment, not all hedgerows should be cut in the same calendar year (a 3–5-year rotation is recommended, raising cutting heights each time for post-construction years 5-35) and should be cut in an ‘A’ shape to encourage a dense shrub layer and diverse range of hedgerow heights;
- Any hedgerows that have been allowed to ‘escape’ (develop into treelines) should be cut from the side only;
- Hedgerow cutting must be undertaken outside the breeding bird season i.e. March to August inclusive and should ideally be undertaken in late winter (January to February) to provide food for birds;
- Outgrowths of rose and bramble (i.e. hedgerows with wavy edges), and patches of suckering blackthorn should be retained where possible to provide nesting and foraging opportunities for birds;
- Branches from any hedgerows overhanging ditches should be cut back once every 5 years to help maximise usage of ditches for wildlife; and
- Competing vegetation will be controlled, preferably via mulching with organic matter such as wood chippings, straw and composed bark, which will be applied immediately after planting.

2.2.1.4 Monitoring and Remedial Actions

Monitoring and remedial actions that will be implemented include:

- Newly created or enhanced hedgerows will be subject to condition assessment following the Hedgerow Appraisal System each year after planting for the first 5 years (the establishment phase), and then every 5 years until (and including) year 35 (the maintenance phase);
- The results of the condition assessment will help identify ongoing management actions, such as weed control, gapping up and where fence maintenance is required;
- Enhancing ‘gappy hedgerows’ is described in more detail below in objective 3 section 2.2.3.2. If mulching does not control competing vegetation during establishment, compostable film or plastic should be used in preference of chemical herbicides and cutting back competitive species with a hand-held hook can also be used;
- Failed or dead plants (identified during condition assessments) will be replaced the following planting season;



- If hare or rabbits start to damage the newly planted hedgerow, then netting will be implemented along with the stock-proof fencing; the bottom 25 cm of netting must be laid out in the direction attack and securely pegged into the ground;
- Should any newly planted hedgerows require temporary removal to allow for maintenance works to the wind farm, they will be reinstated following the criteria mentioned above in section 2.2.1.2; and
- It is anticipated that the cycle of management described in section 2.2.1.3 will allow the newly planted hedgerows to develop to maturity over 20 to 35 years from planting, after which they may start to become open at the base. If any hedges become open at the base, then then trimming will cease, allowing the hedge to grow upwards. If the hedge consists of largely dead plants, then new planting (see section 2.2.1.2) will be implemented. If the hedge has grown upwards following the cessation of cutting, then laying or coppicing (see objective 3 section 2.2.3.2) should be implemented.

2.2.1.5 Programme

The programme to achieve objective 1 is given in Table 2-1.

Table 2-1: Management and Monitoring Programme for Objective 1

Summary Action	Timescale Relative to End of Construction
Plant new hedgerow	Year 1 in the first appropriate season (October – December, or March where soils have more clay)
Watering	Year 1 in summer (if whips are mulched) depending on weather conditions (once/week in normal conditions or twice/week in hot weather conditions)
Trimming (establishment)	Annual top-trimming cutting during Jan-Feb in years 1 to 5 except for hedgerow trees, which will be left uncut
Trimming (post-establishment)	Trimming on a 3 to 5-year rotation during Jan-Feb between years 5-35, except for hedgerow trees, which will be left uncut
Monitoring (condition assessment) / Reporting	Years 1 to 5, and every 5 years thereafter until and including year 35
Remedial actions (replacement of dead/failed plants, weed control, hare/rabbit netting, restoration of 'gappy' hedges)	As for monitoring but when required only

2.2.1.6 Reporting

Monitoring results will be reported on an annual basis (during years in which monitoring takes place) and if necessary (e.g. if stated targets were not being met), recommendations made for reasonable changes to management prescriptions, as appropriate. Monitoring reports will be submitted to Planning Authority and any changes proposed to management prescriptions would be discussed with them in the first instance.



2.2.1.7 Responsibilities

All management tasks carried out under the HSMP will either be undertaken by the developer, operator or by suitably experienced contractors acting on their behalf.

All ecological monitoring and reporting will be undertaken by suitably qualified and experienced ecologists.

2.2.2 Objective 2: To increase the length of hedgerows

Listed below include targets to define success for objective 2, details of measures (establishment and management) that will be implemented to achieve success, details of monitoring measures and possible remedial actions, the programme, details of reporting requirements and who will be responsible for implementing the measures, monitoring and reporting.

2.2.2.1 Targets

Minimum thresholds for success include:

- To increase the amount of hedgerow so the total length at the Proposed Development is >11,976.39 m; and
- Other targets are the same as for objective 1 described in section 2.2.1.1.

2.2.2.2 Establishment Actions

Establishment actions that will be implemented are the same as for objective 1 and as described in section 2.2.1.2 but include:

- Planting of 1,461.14 m of new hedgerow.

2.2.2.3 Management Actions

Management actions that will be implemented are the same as for objective 1 and as described in section 2.2.1.3.

2.2.2.4 Monitoring and Remedial Actions

Monitoring and remedial actions that will be implemented are the same as for objective 1 and as described in section 2.2.1.4.

2.2.2.5 Programme

The programme to achieve objective 2 is the same as for objective 1 and is given in Table 2-1.

2.2.2.6 Reporting

The reporting required for objective 2 is the same as for objective 1 and is given in section 2.2.1.6.

2.2.2.7 Responsibilities

The responsibilities for objective 2 are the same as for objective 1 and are given in section 2.2.1.7.



2.2.3 Objective 3: To enhance existing hedgerow

Listed below include targets to define success for objective 3, details of measures (establishment and management) that will be implemented to achieve success, details of monitoring measures and possible remedial actions, the programme, details of reporting requirements and who will be responsible for implementing the measures, monitoring and reporting.

2.2.3.1 Targets

Minimum targets for success include:

- To enhance all existing hedgerow at the Proposed Development which require rejuvenation (i.e. those without a dense base with stems >15 cm diameter that are widely spaced and evidence hedgerow cut to same heights for years, is under 2 m high and is slowly dying) or where gaps threaten continuity of the hedgerow network itself (i.e. complete absence of sections of hedge); and
- Other targets are the same as for objective 1 described in section 2.2.1.1.

2.2.3.2 Establishment Actions

Establishment actions that will be implemented include:

- Prior to other actions and immediately post-construction, a survey will be undertaken to establish the length and locations of hedgerows requiring enhancement, which will be mapped; and
- Consideration will be given to the type of enhancement i.e. whether infilling, coppicing, or laying is the most suitable action. While coppicing is quicker and less skilled the hedge laying, it has a greater initial negative impact on existing hedgerows, because it prevents the hedge from flowering for the first couple of years. Therefore, hedge laying is recommended as the preferred hedgerow rejuvenation method.

Infilling

- If gaps are present within existing hedgerow that cannot be filled via regrowth from coppicing or laying of hedgerow, then new hedgerow whips must be used to infill gaps following establishment actions set out for objective 1 in section 2.2.1.2; and
- Infilling with light whips is difficult as they do not compete well with the existing root structure. It is advisable to purchase stronger plants for infilling.

Coppicing

- Coppicing is one of the options recommended for rejuvenating a hedgerow. It is less time consuming than laying a hedgerow (see below) and involves the stem being completely cut through close to the ground, encouraging new growth;
- Carry out coppicing works between 1 September and end of February;
- Individual mature trees within the selected hedgerow, must be retained and not coppiced;
- To encourage vigorous re-growth from the base of the plant, cut the stems down to a maximum of 10 cm above ground level (or from top of bank) at an angle so water can run off. It is important to cut as low to the ground as possible, just above the soil to produce new shoots. A circular saw can bring down the height of the hedge but after



that the vegetation will have to be cleared with a slash hook and the stump cut down to 4 to 6 cm at an angle using a small chainsaw;

- Cut out competing vegetation like bramble, briars and ivy;
- All newly coppiced hedgerows in a grass or tillage field must be protected from livestock with a permanent fence, from the time the hedgerow is coppiced. However, where the coppiced hedgerow bounds a public road or watercourse, fencing is not required on the road or water body side if the hedgerow is not being damaged by livestock. The fence must be stockproof and fit for purpose;
- Where possible fence at least 1 m out from the edge of the coppiced hedgerow; and
- Remove all cut branches and debris from the immediate site after completion of the work.

Laying

- Laying a hedgerow is one of the options recommended for rejuvenating a hedgerow. In laying hedgerows, stems which are a bit more flexible in autumn are partially cut through near the ground and bent over or laid to form a living barrier which continues to grow. The new growth comes from the cut stump at ground level and from the laid stem. This is a specialised activity and is more time-consuming than coppicing (see above);
- Carry out laying works between 1 September and end of February;
- Laying cannot be carried out using heavy machinery;
- Hedge laying is a skilled craft. If works are not being carried out by a professional, upskilling on the technique of laying a hedgerow is advised;
- Method for hedgerow laying:
 - Stems are to be cut at the base 70-80% of the way through, keeping the cuts as low as possible to the ground;
 - A long, thin hinge allows this stem to be twisted and best positioned to lay it over, ideally at an angle of 45 degrees and always running up a slope. The laid stems are woven into the ones previously laid to knit together; and
 - The heel or stub is cut off at a sloping angle near the ground to encourage regrowth from the ground and allow water to run-off.
- Laid stems should be secured to prevent rocking and damage from strong winds especially on exposed sites. Cut stems should be secured to posts driven into the hedge bank interwoven with suitable rods (hazel/willow) to give stability;
- Make cuts in the stems higher up to form the hedgerow into the shape you want, and this will also cause regeneration from these points;
- Always lay the stems uphill to get better transpiration and ensure the hedge lives;
- Do not lay hedgerows directly down on the line of the cut base. Roll the stems back slightly from the ground cuts to allow light in which will encourage better rejuvenation at the cuts;
- All newly laid hedgerows in a grass or tillage field must be protected from livestock with a permanent fence, from the time the hedgerow is laid. However, where the laid hedgerow bounds a private laneway, public road or watercourse, fencing is not required on the lane/road or water body side as long as the hedgerow is not being damaged by livestock. The fence must be stockproof and fit for purpose; and



- Where possible, fence at least 1 metre out from the edge of the laid hedgerow.

2.2.3.3 Management Actions

Management actions that will be implemented include:

Infilling

Management actions that will be implemented are the same as for objective 1 and as described in section 2.2.1.3.

Coppicing

Management actions that will be implemented are the same as for objective 1 and as described in section 2.2.1.3.

Exceptions include the use of compostable film over the cut stumps, which may be considered as vegetation management is important for the coppiced hedgerow to develop.

Laying

Management actions that will be implemented are the same as for objective 1 and as described in section 2.2.1.3.

Exceptions include the trimming schedule during the first five years, where growth on a laid hedge should only be trimmed lightly on the top of the hedge after 3 or 4 years if getting a lot of vertical growth.

2.2.3.4 Monitoring and Remedial Actions

Monitoring and remedial actions that will be implemented are the same as for objective 1 and as described in section 2.2.1.4.

2.2.3.5 Programme

The programme to achieve objective 3 is given in Table 2-2.

Table 2-2: Management and Monitoring Programme for Objective 3

Summary Action	Timescale Relative to End of Construction
Survey to identify areas of hedgerow for enhancement and type of enhancement required	Year 1
Infilling gaps	Year 1 in the first appropriate season (October – December, or March where soils have more clay)
Rejuvenation (coppicing or hedge laying)	Year 1 in the first appropriate season (1 September to end of February)
Watering (required for infilling only and not rejuvenated hedge with established roots)	Year 1 in summer (if whips are mulched) depending on weather conditions (once/week in normal conditions or twice/week in hot weather conditions)
Trimming (establishment)	For infilling / coppicing: Annual top-trimming cutting during Jan-Feb in years 1 to 5 except for hedgerow trees, which will be left uncut



Summary Action	Timescale Relative to End of Construction
	For laid hedge: Trim lightly on the top after years 3 or 4 and only if getting a lot of vertical growth.
Trimming (post-establishment)	Trimming on a 3 to 5-year rotation during Jan-Feb between years 5-35 except for hedgerow trees, which will be left uncut
Monitoring (condition assessment)	Years 1 to 5, and every 5 years thereafter until and including year 35
Remedial actions (replacement of dead/failed plants, weed control, hare/rabbit netting, restoration of 'gappy' hedges)	As for monitoring but when required only

2.2.3.6 Reporting

The reporting required for objective 3 is the same as for objective 1 and is given in section 2.2.1.6.

2.2.3.7 Responsibilities

The responsibilities for objective 3 are the same as for objective 1 and are given in section 2.2.1.7.

3.0 Treeline

The following sections sets out a summary of the baseline conditions for treelines including a description and evaluation, along with any ecological trends and constraints that could influence management.

Next listed are the objectives with details of actions that will be implemented in full.

3.1 Summary of Baseline

There are currently 7,920.91 m of treelines at the Proposed Development (comprising 6,861.52 m of hedgerows and 1,059.39 m as a treeline x hedgerows mosaic) and of these, 98.9 m are predicted to be lost.

Treelines were evaluated as being important at the local scale due to providing foraging, resting and breeding habitat for a variety of animal species. They also act as ecological corridors, connecting fragmented populations of plants and animals within the landscape.

Most treelines are not managed at the Proposed Development apart from the occasional trimming of overhanging branches.

Any treeline management proposed as part of this HSMP could be constrained by existing agricultural practices at the Proposed Development e.g. livestock could damage any newly established treelines, treelines could also be over-trimmed, close ploughing could damage roots and spray drift from herbicides/insecticides could affect plants/animals within the treelines.

3.2 Objectives

Objectives and criteria for success have been developed in accordance with British Standard 5837: 'Trees in relation to design, demolition and construction – Recommendations' (2012).



The objectives relating to treeline compensation are set out below along with associated measures to successfully establish and manage these habitats for each objective.

Figure 1 in Appendix A shows the locations for proposed treeline creation, which are all within the red-line boundary or optioned lands. The locations have been chosen to help protect / restore riparian zones (see section 4.0).

3.2.1 Objective 4: To compensate for the loss of treelines

Listed below include targets to define success for objective 4, details of measures (establishment and management) that will be implemented to achieve success, details of monitoring measures and possible remedial actions, the programme, details of reporting requirements and who will be responsible for implementing the measures, monitoring and reporting.

3.2.1.1 Targets

Minimum targets for success include:

- To compensate for loss of existing treelines by planting 98.9 m of replacement treeline; and
- Success will be defined as >95% of trees established at year 5, with at least 90% at Year 20 meeting the British Standard 5837: 'Trees in relation to design, demolition and construction – Recommendations' (2012) criteria for Category A – Tree of High Quality'.

3.2.1.2 Establishment Actions

Establishment actions that will be implemented include:

- Plant 98.9 m of new treelines using native fruit and seed-bearing species (e.g. bird cherry *Prunus padus*, crab apple *Malus sylvestris*, goat willow *Salix caprea*, grey willow *Salix cinerea*, rowan *Sorbus aucuparia*, wild cherry *Prunus avium*, hawthorn, Irish whitebeam *Sorbus hibernica*, sessile oak *Quercus petraea* and pedunculate oak *Quercus robur* for treelines) using a 'like-for-like' approach to replace lost hedgerows/treelines where possible; and
- All other establishment actions should follow those for objective 1 outlined in section 2.2.1.2.

3.2.1.3 Management Actions

Management actions that will be implemented include:

- All relevant management actions set out for objective 1 outlined in section 2.2.1.3; and
- No top trimming should be undertaken (although new trees can be pruned from the side if required).

3.2.1.4 Monitoring and Remedial Actions

Monitoring and remedial actions that will be implemented include:

- Newly planted trees forming treelines will be inspected each year after planting for the first 5 years, and then every 5 years until year 35; and
- These inspections will inform the need or otherwise for weed control, replacement of failed trees, removal of tree guards (usually around years 3-5) and pruning;



- Failed or dead plants (identified during condition assessments) will be replaced the following planting season;
- If deer, hare or rabbits start to damage the newly planted treeline, then tree guards may be fitted; and
- Should any newly planted treelines require temporary removal to allow for maintenance works to the wind farm, they will be reinstated following the criteria mentioned above in section 2.2.1.2.

3.2.1.5 Programme

The programme to achieve objective 4 is the same as for objective 1 and is given in Table 2-1.

3.2.1.6 Reporting

Monitoring results will be reported on an annual basis (during years in which monitoring takes place) and if necessary (e.g. if stated targets were not being met), recommendations made for reasonable changes to management prescriptions, as appropriate. Monitoring reports will be submitted to Planning Authority and any changes proposed to management prescriptions would be discussed with them in the first instance.

3.2.1.7 Responsibilities

All management tasks carried out under the HSMP will either be undertaken by the developer, operator or by suitably experienced contractors acting on their behalf.

All ecological monitoring and reporting will be undertaken by suitably qualified and experienced ecologists.

3.2.2 Objective 5: To increase the length of treelines

Listed below include targets to define success for objective 5, details of measures (establishment and management) that will be implemented to achieve success, details of monitoring measures and possible remedial actions, the programme, details of reporting requirements and who will be responsible for implementing the measures, monitoring and reporting.

3.2.2.1 Targets

Minimum thresholds for success include:

- To increase the amount of treeline so the total length at the Proposed Development is >7,920.91 m; and
- Other targets are the same as for objective 4 described in section 3.2.1.1.

3.2.2.2 Establishment Actions

Establishment actions that will be implemented are the same as for objective 4 and as described in section 3.2.1.2 but include:

- Planting of 396.10 m of new treeline.

3.2.2.3 Management Actions

Management actions that will be implemented are the same as for objective 4 and as described in section 3.2.1.3.



3.2.2.4 Monitoring and Remedial Actions

Monitoring and remedial actions that will be implemented are the same as for objective 4 and as described in section 3.2.1.4.

3.2.2.5 Programme

The programme to achieve objective 5 are the same as for objective 4 and is given in Table 2-1.

3.2.2.6 Reporting

The reporting required for objective 5 are the same as for objective 4 and is given in section 3.2.1.6.

3.2.2.7 Responsibilities

The responsibilities for objective 5 are the same as for objective 4 and are given in section 3.2.1.7.

4.0 Riparian Zone

The following sections sets out a summary of the baseline conditions for riparian zones including a description and evaluation, along with any ecological trends and constraints that could influence management.

Next listed are the objectives with details of actions that will be implemented in full.

4.1 Summary of Baseline

There are currently 2,249.46 m of lowland / depositing watercourses within the Main Wind Farm Site, although none are predicted to be lost by the Proposed Development. In particular, the River Stoneyford, D'arcys Crossroads Stream and the Killacroy Stream are part of the River Boyne and River Blackwater SAC.

Lowland / depositing watercourses were evaluated as being important at the local scale due to providing foraging, resting and breeding habitat for a variety of animal species. They also act as ecological corridors, connecting fragmented populations of plants and animals within the landscape. The River Boyne and River Blackwater SAC itself is important at the international scale.

Most lowland / depositing watercourses bordering the Main Wind Farm Site have been modified historically, resulting in poor hydro-morphology; there is also often excessive siltation (sometimes due to poaching from livestock), excessive macrophyte coverage and low seasonal flows. A lot of the riparian zone within the northern part of the Main Wind Farm Site is very narrow, bordered by rough grassland.

According to the European Environment Agency's Datahub², high intensity threats to the River Boyne and River Blackwater SAC include pollution to surface waters (including discharges) and modification to watercourses / hydraulic conditions. Other relevant threats of medium to lower intensity include stock feeding, cultivation, mowing / cutting grassland, fertilisation, siltation and management of bankside vegetation for drainage purposes.

² <https://www.eea.europa.eu/en/datahub/datahubitem-view/6fc8ad2d-195d-40f4-bdec-576e7d1268e4?activeAccordion=1084066> Last accessed 16/02/2024.



Any management of the riparian zone proposed as part of this HSMP could be constrained by existing agricultural practices at the Proposed Development, including the threats mentioned above.

4.2 Objectives

The objectives relating to enhancement of the riparian zone are set out below along with associated measures to successfully establish and manage these habitats. Objectives and criteria for success have been developed in accordance with ACRES guidance (DAFM, 2022), IFI (2020) guidance and IFI studies on passive restoration implemented at the River Stonyford (Fleming et al, 2021).

Figure 1 in Appendix A shows the locations for riparian enhancement, which are all within the red-line boundary.

4.2.1 Objective 6: Restoration of riparian zone

Listed below include targets to define success for objective 6, details of measures (establishment and management) that will be implemented to achieve success, details of monitoring measures and possible remedial actions, the programme, details of reporting requirements and who will be responsible for implementing the measures, monitoring and reporting.

4.2.1.1 Targets

Minimum targets for success include:

- The presence of pioneer macrophyte species (e.g. *Nasturtium officinale* and *Helosciadium nodiflorum*), increased depth, flow and substrate diversity in year 1 (stage 1);
- Replacement of pioneers with other macrophyte species (e.g. *Phalaris arundinacea* and *Sparganium erectum*), filling the channel, impeding flow velocities in years 2-5 (stage 2); and
- More naturalised channel form, increasing substrate coarseness and higher flow velocities in years 5, and every five years thereafter until and including year 35 (stage 3; although this third stage may occur sooner).

4.2.1.2 Establishment Actions

Establishment actions that will be implemented include:

- Erection of 1,440 m of stock-proof fencing along the southern side of the SAC watercourses (Killacroy Stream and D'arcys Crossroads Stream). This will ensure 'passive restoration' of the zone (Fleming et al., 2021), which is a proven technique that has been implemented at the River Stonyford. This approach will be discussed and confirmed with NPWS prior to implementation;
- The stock-proof fencing should ideally be at least 10 m from the riverbank (IFI, 2020), which will allow the riparian zone to re-vegetate naturally and will prevent grazing and erosion/damage by cattle and other livestock. Where this is not possible due to landowner constraints (in the riparian enhancement area to the west of turbine T2), a stock-proof fence will be erected as far away from the riverbank as possible. While a 10 m distance is recommended by IFI (2020) guidance, Fleming et al. (2021) have erected a fence along the SAC watercourses elsewhere that is c. 1 m from the riverbank and still achieved passive restoration goals;



- Planting of hedgerows and tree lines (as described under objectives 1, 2, 3 and 4) along the southern side of the SAC river inside the new stock-proof fence and outside of the bat mitigation buffers; and
- Hedgerows and treelines will be planted at least >10 m (ideally 15 m) from the riverbank (IFI, 2020), which, together with the riparian zone vegetation, will help act as a sump/filter for any nutrients or sediment from farmland overland surface runoff. This will also prevent shading of the river or any other unintended negative consequences on the SAC. As stock-proof fences are required to establish hedgerows (see section 2.2.1.2) and treelines (see section 3.2.1.2), it is recommended that newly planted hedgerows and treelines are planted within the fence to protect the SAC watercourses i.e. the arrangement is river > riparian zone > hedgerow / treelines > stockproof fence. If the relevant separation distance for new hedgerow / treeline cannot be achieved, stockproof fence will be used only. The approach described above will be discussed and confirmed with NPWS prior to implementation.

4.2.1.3 Management Actions

Management actions that will be implemented include:

- Provision of gates in the fence and corresponding gaps in the hedgerow / treeline to allow for management access while excluding livestock;
- Management of hedgerows and treelines (as described under objectives 1, 2, 3 and 4);
- Soil cultivation cannot be implemented and chemical or organic fertilisers cannot be used within the fenced off riparian zone;
- To prevent vegetation in the riparian zone from developing into scrub and shading out the watercourse, cutting is permitted once every three years, but cannot taken place between March to August inclusive and should be undertaken by hand; and
- Heavy machinery should be avoided within 2 m of the riverbank when trimming hedgerows / treelines.

4.2.1.4 Monitoring and Remedial Actions

Monitoring and remedial actions that will be implemented include:

- The effects of passive restoration on the streamside zone, including the river itself, will be subject to condition assessment each year after fencing for the first 5 years and then every 5 years until (and including) year 35;
- A series of lateral transects will be used to estimate plant frequency/distribution and physical attributes of the watercourse (depth, flow, and substrate type) following the methodology described by Fleming et al., (2021); and
- The results of the monitoring will help identify ongoing management actions, such as fence maintenance, removal of scrub or management of non-native and invasive species (see section 11.0), where required.

4.2.1.5 Programme

The programme to achieve objective 6 is given in Table 4-1. The programme for hedgerow / treeline are given in the relevant sections.



Table 4-1: Management and Monitoring Programme for Objective 6

Summary Action	Timescale Relative to End of Proposed Development Construction
Erect stock-proof fencing	Year 1 after planting of new hedgerow / treeline
Hand cutting of scrub	Trimming on a 3-year rotation during Sep-Feb from years 1-35 unless monitoring suggests a greater frequency is required
Monitoring (condition assessment) / Reporting	Years 1 to 5, and every 5 years thereafter until and including year 35
Remedial actions (invasive plant control, fence repair and scrub control)	As for monitoring but when required only

4.2.1.6 Reporting

Monitoring results will be reported on an annual basis (during years in which monitoring takes place) and if necessary (e.g. if stated targets were not being met), recommendations made for reasonable changes to management prescriptions, as appropriate. Monitoring reports will be submitted to Planning Authority and any changes proposed to management prescriptions would be discussed with them in the first instance.

4.2.1.7 Responsibilities

All management tasks carried out under the HSMP will either be undertaken by the developer, operator or by suitably experienced contractors acting on their behalf.

All ecological monitoring and reporting will be undertaken by suitably qualified and experienced ecologists.

5.0 Transition Mire and Quaking Bog

The following sections sets out a summary of the baseline conditions for transition mire and quaking bog including a description and evaluation, along with any ecological trends and constraints that could influence management.

Next listed are the objectives with details of actions that will be implemented in full.

5.1 Summary of Baseline

There is currently 2.11 ha of transition mire and quaking bog within the Main Wind Farm Site with an additional 1.31 ha of recolonising cutover bog and 2.3 ha of bog woodland. Much of the transition mire and quaking bog is of the H7140 Annex I habitat type and there are also some trenches of the same type within the cutover bog and bog woodland areas. None of the H7140 Annex I type habitats are predicted to be lost by the Proposed Development.

Transition mire and quaking bog habitats were evaluated as being important at the county / regional scale, and cutover bog and bog woodland at the local scale. The transition mire and quaking bog habitats also supported many marsh fritillary butterfly *Euphydryas aurinia* larval webs (see objective 17 for details).

Any management of the riparian zone proposed as part of this HSMP could be constrained by existing agricultural practices at the Proposed Development, including poaching and grazing from livestock, as well as scrub encroachment/woodland succession, and associated hydrological changes.



5.2 Objectives

The objectives relating to transition mire and quaking bog enhancement are set out below along with associated measures to successfully establish and manage these habitats. Objectives and criteria for success have been developed in accordance with the latest Article 17 report (NPWS, 2019).

Figure 1 in Appendix A shows the locations for proposed mire and bog enhancement, which are all within the red-line boundary or optioned lands.

5.2.1 Objective 7: Enhancement of transition mire and quaking bog habitats

Listed below include targets to define success for objective 7, details of measures (establishment and management) that will be implemented to achieve success, details of monitoring measures and possible remedial actions, the programme, details of reporting requirements and who will be responsible for implementing the measures, monitoring and reporting.

5.2.1.1 Targets

Minimum targets for success include:

- The presence/abundance of typical indicator and high-quality indicator species, frequency of hoof prints, absence of invasive species, absence of problematic native species (*Myrica gale*, *Ulex europaeus* and *Pteridium aquilinum*) and absence of vegetation >50 cm in height;
- There should be at > seven typical indicator species per relevé and > 21 typical indicator species present over five relevés (the current baseline level for transition mire and quaking bog habitats at the Proposed Development);
 - Typical indicator species include *Agrostis stolonifera*, *Caltha palustris*, *Cardamine pratensis*, *Carex demissa*, *C. diandra*, *C. lasiocarpa*, *C. lepidocarpa*, *C. limosa*, *C. nigra*, *C. pulcaris*, *C. rostrata*, *Comarum palustre*, *Epilobium palustre*, *Equisetum fluviatile*, *Eriophorum angustifolium*, *E. latifolium*, *Filipendula ulmaria*, *Galium palustre*, *Hydrocotyle vulgaris*, *Lysimachia vulgaris*, *Lythrum salicaria*, *Mentha aquatica*, *Menyanthes trifoliata*, *Molinia caerulea*, *Myrica gale*, *Pedicularis palustris*, *Phragmites australis*, *Potamogeton polygonifolius*, *Ranunculus flammula*, *Rhynchospora alba*, *Silene flos-cuculi*, *Succisa pratensis*, *Valeriana officinalis*, *Viola palustris*, *Aneura pinguis*, *Aulacomnium palustre*, *Bryum pseudotriquetrum*, *Calliergon giganteum*, *Calliergonella cuspidate*, *Campylium stellatum*, *Fissidens adianthoides*, *Philonotis fontana*, *Polytrichum commune*, *Sarmentypnum exannulatum*, *Scorpidium cossonii*, *S. revolvens*, *S. scorpioides*, *Sphagnum contortum*, *S. denticulatum*, *S. fallax*, *S. fimbriatum*, *S. palustre*, *S. squarrosum*, *S. subnitens* and *Straminergon stramineum*; and
- There should be at least one high-quality indicator species per relevé and a total of one high-quality indicator species present over five relevés (the current baseline level for transition mire and quaking bog habitats at the Proposed Development showed there were no high-quality indicator species present);
 - High-quality indicator species include *Cinclidium stygium*, *Eriophorum gracile*, *Hamatocaulis vernicosus*, *Hammarbya paludosa*, *Pyrola rotundifolia subsp. rotundifolia*, *Saxifraga hirculus*, *Sphagnum platyphyllum*, *S. subsecundum*, *S. teres*, *S. warnstorffii* and *Tomentypnum nitens*.

5.2.1.2 Establishment Actions

Establishment actions that will be implemented include:



- Erection of stock-proof fencing around the 8.44 ha of land contained within Biodiversity Enhancement Zone B (see **Figure 1** in Appendix A) and maintaining low stocking densities (0.2 – 0.8 cattle/ha) within the fenced area and only during the driest months of the summer (June to August, inclusive with no grazing from September to May), for at least two weeks of the year (ŠeffEROVÁ StanOVÁ, et al. 2008). This will prevent livestock damaging sensitive Annex I habitats via poaching from cattle / nutrient enrichment from dung, while also allowing a low level of grazing to prevent the encroachment of scrub, which could remove Annex I habitats;
- Based on the size of the management area, the livestock used to graze should be 1-6 highland cattle;
- If cattle cannot be used, discussion will be made with NPWS to identify whether any other types of grazers (sheep or goats) may be used; alternatively, hand-cutting of scrub will be implemented outside the breeding bird season (March-September inclusive) and avoiding heavy machinery; and
- This objective will also help enhance marsh fritillary breeding areas (see objective 17).

5.2.1.3 Management Actions

Management actions that will be implemented include:

- Maintenance of low stocking densities according to the regime above (ideally highland cattle but other species of grazer may be used if agreed with NPWS);
- Hand-cutting of scrub may be required if the appropriate breed of cattle cannot be procured and / or if cattle are not removing enough scrub. The same is true if NPWS determine that alternative species of livestock cannot be used. Heavy machinery should not be used. Removal of scrub should take place outside of the breeding bird season (March-September inclusive) and should take place once a year; and
- If hedge cutting (see objective 1) via tractor, the machine should follow the line of hedgerow around the exterior and not cross over the interior of Biodiversity Enhancement Zone B, which could damage sensitive habitats.

5.2.1.4 Monitoring and Remedial Actions

Monitoring and remedial actions that will be implemented include:

- The effects of grazing should be assessed using adaptive management. In year 1, the stocking density must be assessed to determine the optimal level. If the frequency of hoof prints is more than would occur during the occasional crossing of grass, then the stocking density is too high and must be reduced;
- Once the optimal stocking density is identified, this will be used to inform the target level for the frequency of hoof prints within relevés (see section 5.2.1.1);
- Relevés will be used to assess the botanical composition of the habitat for the first 5 years and then every 5 years until (and including) year 35; and
- Depending on the results of the monitoring, remedial actions such as repairs to the fence or spot treatment of invasive / problematic native species or hand-cutting of scrub may be required.

5.2.1.5 Programme

The programme to achieve objective 7 is given in Table 5-1.



Table 5-1: Management and Monitoring Programme for Objective 7

Summary Action	Timescale Relative to End of Proposed Development Construction
Erect stock-proof fencing	Year 1 after planting of new hedgerow / treeline
Stocking of 1-6 highland cattle within fenced area	Cattle should be left to graze for at least two weeks between June-August every year from years 1 to 35
Hand cutting of scrub if required by condition assessment	Trimming on a three-year rotation during Sep-Feb from years 1-35 unless monitoring suggests a greater frequency is required
Monitoring (condition assessment) / Reporting	Years 1 to 5, and every 5 years thereafter until and including year 35
Remedial actions (reduction of stocking density, invasive / problematic native plant control, fence repair and scrub control)	As for monitoring but when required only

5.2.1.6 Reporting

Monitoring results will be reported on an annual basis (during years in which monitoring takes place) and if necessary (e.g. if stated targets were not being met), recommendations made for reasonable changes to management prescriptions, as appropriate. Monitoring reports will be submitted to Planning Authority and any changes proposed to management prescriptions would be discussed with them in the first instance.

5.2.1.7 Responsibilities

All management tasks carried out under the HSMP will either be undertaken by the developer, operator or by suitably experienced contractors acting on their behalf.

All ecological monitoring and reporting will be undertaken by suitably qualified and experienced ecologists.

6.0 Bats

The following sections sets out a summary of the baseline conditions for bats including a description and evaluation, along with any ecological trends and constraints that could influence management. These measures are independent of any compensation measures which may be required by wildlife licences potentially needed to allow construction work to progress. Note that any works to roosts recorded during pre-construction checks of trees / bridges will be subject to NWPS licence conditions.

Next listed are the objectives with details of actions that will be implemented in full.

6.1 Summary of Baseline

Surveys showed that there were eight species of bats recorded at the Main Wind Farm Site. There were four structures confirmed as being used by roosting bats and 38 trees with potential roost features. None of the confirmed roost structures or potential roost trees are predicted to be lost by the Proposed Development.

All bat species were evaluated as being important at the county / regional or local scale.



Any management for bats proposed as part of this HSMP could be constrained by existing agricultural and agroforestry practices at the Proposed Development, including the use of pesticides, which could reduce prey availability, along with accidental destruction of bat roosts within trees due to felling of woodland and hedgerow/treeline management.

6.2 Objectives

All hedgerows and treelines that will be lost due to construction will be replaced (as per objectives 1 and 4) which will ensure there is no net loss of commuting routes for bats, and the creation of new mixed broadleaved woodland (as per section 7.2.2), hedgerows (objective 2) and treeline (objective 5) will provide foraging resources to bats in the medium and long-term.

Westmeath and Meath County Council Development Plans requires all new developments to enhance ecological features by making provision for local biodiversity. While no significant effects are predicted in the EIAR for bats, bat boxes will be erected near the Proposed Substation. This will help enhance the area for bat species, while avoiding raising the level of collision risk near the Main Wind Farm Site itself.

The objective to reduce bat collision risk was developed in accordance with NatureScot (2021) guidance.

Figure 1 in Appendix A shows the indicative locations for proposed bat management measures.

6.2.1 Objective 8: To avoid permanent destruction of linear bat foraging and commuting habitat

Listed below include targets to define success for objective 8, details of measures (establishment and management) that will be implemented to achieve success, details of monitoring measures and possible remedial actions, the programme, details of reporting requirements and who will be responsible for implementing the measures, monitoring and reporting.

6.2.1.1 Targets

Minimum targets for success include in situ replacement of all hedgerow or treeline projected to be lost due to the Proposed Development.

6.2.1.2 Establishment Actions

Establishment actions that will be implemented are the same as for objectives 1 and 4.

6.2.1.3 Management Actions

Management actions that will be implemented are the same as for objectives 1 and 4.

6.2.1.4 Monitoring and Remedial Actions

Monitoring and remedial actions that will be implemented are the same as for objectives 1 and 4.

6.2.1.5 Programme

The programme to achieve objective 8 is the same as for objectives 1 and 4 and is given in Table 2-1.



6.2.1.6 Reporting

The reporting required for objective 8 is the same as for objectives 1 and 4.

6.2.1.7 Responsibilities

All management tasks carried out under the HSMP will either be undertaken by the developer, operator or by suitably experienced contractors acting on their behalf.

All ecological monitoring and reporting will be undertaken by suitably qualified and experienced ecologists.

6.2.2 Objective 9: To provide additional bat roosts

Listed below include targets to define success for objective 9, details of measures (establishment and management) that will be implemented to achieve success, details of monitoring measures and possible remedial actions, the programme, details of reporting requirements and who will be responsible for implementing the measures, monitoring and reporting.

6.2.2.1 Targets

Minimum targets for success include:

- Creation of new broadleaved woodland in situ to provide new roosting opportunities;
- Ten bat boxes available for use every year for 35 years following construction; and
- Evidence of occupation by bats of at least five boxes within the first five years following construction.

6.2.2.2 Establishment Actions

Establishment actions that will be implemented include:

- New broadleaved woodland will be planted in situ as part of compensation measures for birds and is described in section 7.2.2.2;
- Ten bat boxes will be erected in mature trees, with some boxes clustered together on the same tree and clusters located in proximity to each other where possible (locations shown on **Figure 1** in Appendix A are indicative only and will be agreed upon with the landowner / Planning Authorities prior to installation);
- Boxes will be installed at least 4 m above ground level (AGL), each facing in a different (south, south-east or south-west) direction, and sheltered from strong winds;
- Boxes will be positioned such that there is a clear flight path to and from the box entrance (i.e. the box entrance is not obscured by vegetation);
- A mixture of bat boxes suitable for both maternity and hibernation roosting will be used. At least one 'gable end' box (see Pschonny et al., 2022) will be installed in each tree; and
- Mature trees will be selected that are outside of bat mitigation buffers and that are located in treelines or along the edge of retained woodland habitat and adjacent to good quality foraging habitat. The locations and access arrangements will be agreed with the relevant landowner.

6.2.2.3 Management Actions

Management actions that will be implemented include:



- Actions to manage newly planted broadleaved woodland are described for objective 12 in section 7.2.2.3; and
- Detritus (not including bat droppings) will be cleared from bat boxes during inspections and vegetation trimmed to ensure entrances do not become obstructed.

6.2.2.4 Monitoring and Remedial Actions

Monitoring and remedial actions that will be implemented include:

- Monitoring and remedial actions for new planted broadleaved woodland are described in section 7.2.2.4;
- Bat box inspections undertaken in every year post-construction years 1-5, and then every five years to year 35;
- All bat roosts records to be submitted to Bat Conservation Ireland online at <https://www.batconservationireland.org/in-your-area/sightings>;
- Where boxes have become damaged or are missing, these will be replaced immediately. If there is evidence of human vandalism, an alternative tree in a less prominent position will be identified (and permissions obtained) and a replacement bat box will be reinstalled in the new tree; and
- If the targets for bat box occupancy is not met, boxes will be assessed to see if any management / remedial actions are required. If not, they will be moved to new locations according to the establishment actions outlined above.

6.2.2.5 Programme

The programme to achieve objective 9 is given in Table 6-1. Note the programme for the replacement of hedgerows and treelines is already given in Table 2-1 and for the establishment and management of new broadleaved woodland is given in Table 7-2.

Table 6-1: Management and Monitoring Programme for Objective 9

Summary Action	Timescale Relative to End of Proposed Development Construction
Installation of 10 new bat boxes	Year 1
Monitoring (bat box inspections) / Reporting	Years 1 to 5, and every 5 years thereafter until and including year 35
Remedial actions (removal of detritus, removal of vegetation obscuring bat box entrance, replacement of bat box if damaged, missing or vandalised, and relocation of bat boxes if occupancy targets are not met)	As for monitoring but when required only

6.2.2.6 Reporting

Monitoring results will be reported on an annual basis (during years in which monitoring takes place) and if necessary (e.g. if stated targets were not being met), recommendations made for reasonable changes to management prescriptions, as appropriate. Monitoring reports will be submitted to Planning Authority and any changes proposed to management prescriptions would be discussed with them in the first instance.



6.2.2.7 Responsibilities

All management tasks carried out under the HSMP will either be undertaken by the developer, operator or by suitably experienced contractors acting on their behalf.

All ecological monitoring and reporting will be undertaken by suitably qualified and experienced ecologists.

6.2.3 Objective 10: To implement bat mitigation felling buffers to reduce collision risk

Listed below include targets to define success for objective 10, details of measures (establishment and management) that will be implemented to achieve success, details of monitoring measures and possible remedial actions, the programme, details of reporting requirements and who will be responsible for implementing the measures, monitoring and reporting.

6.2.3.1 Targets

Minimum targets for success include:

- Maintenance of a 50 m separation distance from the blade tips of the turbine to the nearest bat commuting / foraging habitat feature for every turbine; and
- A reduction in bat activity levels surrounding turbines where mitigation buffers have been implemented relative to the pre-construction survey period.

6.2.3.2 Establishment Actions

Establishment actions that will be implemented are described in Chapter 5 and reproduced here:

- Details for the felling buffer dimensions are provided in Table 6-2;
- The area where trees/scrub is cleared to create the bat mitigation buffers will be kept clear over the lifetime of the Proposed Development and will be made as unfavourable to bats as possible;
- Felling should be undertaken outside of the breeding bird season (March to August inclusive);
- Immediately prior to the felling of any vegetation, surveys will be carried out within the felling area to identify whether there are any new bat roosts, mammal dwellings or breeding amphibians within the felling areas.
 - If any new mammal dwellings are identified, then appropriate exclusion zone(s) will be implemented and construction activities timed to avoid sensitive periods, such as the breeding season or hibernation, as relevant.
 - Relevant exclusion zones for mammals are 50 m for red squirrel, 100 m for pine marten, 150 m for otter and 50 m for badger. If exclusion zones cannot be implemented, advice will be sought from NPWS and appropriate mitigation and compensation measures will be put in place and application will be made to NPWS for a derogation licence if required.
 - If any new bat roosts are identified, surveys will inform derogation licence application process from NPWS to undertake appropriate mitigation actions, as required, to ensure the conservation of bats. These could include measures to exclude bats from potential roost holes prior to vegetation removal and provision of alternative roost sites.



- If no bat roosts are identified but trees are classified as having moderate to high potential roost features, then 'soft felling' will be implemented outside the hibernation season (1 October to 30 April). This will include: 1) removal of the tree in sections, starting with top branches and working down the trunk, avoiding cavities; 2) lowering any sections with potential roost features with care, positioning them on the ground with potential entrances to roosts facing upwards to allow the bats to exit the roost; and 3) leaving these sections in place for 24 hours in suitable weather conditions (i.e. dusk temperatures above 7°C, ground-level wind speed <5 m/s and no or only very light rainfall). If felling cannot be undertaken outside the bat hibernation season in the manner described above, then advice will be sought from NPWS.
- If spawning frogs are present in any felling area, adults and spawn will be translocated under NPWS licence to suitable alternative locations. Pitfall traps and drift fences will be used to capture adult frogs.
- Felled timber and branches will be removed with stumps brashed to ground level;
- Any excess soil generated by construction will be deposited over stumps to flatten the ground during the first instance of felling. Deposition of excess soil will not be undertaken near watercourses to avoid the risk of sedimentation and runoff. This is appropriate for turbines T1 and T2;
- To avoid root damage to sensitive possible ancient woodland (PAW) areas, felling near the PAW 20 m root zone buffer for turbines T4 and T5 will be undertaken by hand. No felling of PAW areas themselves will occur; and
- Vegetation removal within the recolonizing cutover bog area near T1 in Biodiversity Enhancement Area B will also be undertaken by highland cattle or by hand (see objective 7), which will help avoid damage to any areas of sensitive transition mire and quaking bog habitats.

Table 6-2: Details of Bat Mitigation Buffers Required for Each Turbines

Turbine Number	Habitat Feature	Area (ha) or length (m) to be removed
T1	Broadleaved woodland	0.18 ha
	Recolonising cutover bog (areas containing scrub and saplings)	0.10 ha
T2	Hedgerow	148.4 m
T3	Broadleaved woodland	2.48 ha
T4	Broadleaved woodland	2.59 ha
	Conifer plantation	0.69 ha
T5	Broadleaved woodland	1.37 ha
	Conifer plantation	1.39 ha
T6	None nearby	No felling required
T7	Broadleaved woodland	2.56 ha
T8	Overhang of branches only	No felling required – trimming of overhanging branches only



6.2.3.3 Management Actions

Management actions that will be implemented include maintenance of shrub or tree-free buffers via infrequent (once a year) mowing or trimming of vegetation, which will be undertaken outside the breeding bird season (March to August inclusive) for years 2-35. This includes trimming of any overhanging branches from woodland, treelines or hedgerows adjacent to the buffer edges. These actions are constrained by other sensitivities within the felling areas e.g. if removal of scrub is required within Biodiversity Enhancement Area B (transition mire and quaking bog), then hand-removal or use of highland cattle must be used to remove scrub and no heavy machinery used. Similarly, mowing or trimming near the PAW 20 m root zone buffer for turbines T4 and T5 must be undertaken by hand to avoid damage to the PAW root system.

6.2.3.4 Monitoring and Remedial Actions

Monitoring and remedial actions that will be implemented include:

- Bat mitigation buffers will be monitored annually during years 1-3 to ensure vegetation clearance and management measures have resulted in the desired habitat conditions i.e. free of shrubs and trees that could attract foraging or commuting bats;
- Additional establishment / management felling or trimming actions must be undertaken if this is not the case and outside the breeding bird season (March to August inclusive);
- A post-construction monitoring programme for bats will be implemented, which will check whether bat activity levels have been reduced around turbines with bat mitigation buffers relative to the pre-construction period. This will consist of:
 - static detector surveys: these surveys will allow for a valid comparison of bat activity and Proposed Development usage with pre-construction levels. Following NatureScot (2021) guidance, the surveys are to be conducted during years 1, 2 and 3 post construction to allow for annual variation and cumulative effects. Surveys will follow baseline survey methods, as outlined in NatureScot (2021) guidance. After three years of post-construction surveys, the monitoring programme may be extended or halted based on the results and following agreement with the competent authority and NPWS.
 - fatality monitoring: if this is determined to be required following the additional year of pre-construction monitoring (i.e. due to high levels of bat activity), this will initially be conducted during years 1, 2 and 3 post construction to allow for annual variation and cumulative effects. After three years of post-construction surveys, the monitoring programme may be extended or halted following agreement with the competent authority and NPWS.
- The results of the post-construction monitoring surveys will be used to determine whether further mitigation measures are required. If no significant effects are shown (this would be demonstrated via an assessment of recorded mortality in the light of changes in current conservation status at the time of the monitoring survey, indicating that the Proposed Development is contributing to the decline or hindering restoration efforts for the relevant species), the monitoring should no longer be required, subject to agreement with the competent authority and NPWS. If monitoring indicates potentially significant levels of collision mortality for bat species, mitigation measures will be implemented (including turbine curtailment), and further monitoring will also be implemented in all additional years post construction, to ensure there are no significant collision effects on any bat species.



6.2.3.5 Programme

The programme to achieve objective 10 is given in Table 6-3.

Table 6-3: Management and Monitoring Programme for Objective 10

Summary Action	Timescale Relative to End of Proposed Development Construction
Pre-felling survey for non-bat mammals, bats and amphibians	Year 1 (immediately prior to felling)
Felling of shrubs and trees around each turbine	Year 1 (outside of breeding bird season March to August inclusive and dependent on the results of pre-felling survey for non-bat mammals, bats and amphibians)
Maintenance of buffers via mowing or trimming of vegetation	Years 2-35
Monitoring (checking felling has been implemented; static detector and fatality monitoring surveys) / Reporting	Years 1 to 3 (checking felling / vegetation clearance being implemented correctly; static detector and fatality monitoring surveys; reporting) Years 4-35 (additional static detector and fatality monitoring; reporting but only if required by NPWS and Planning Authorities)
Remedial actions (additional trimming/mowing; additional mitigation measures, such as curtailment)	If and when required only; curtailment is only to be implemented if required by NPWS and Planning Authorities

6.2.3.6 Reporting

Monitoring results will be reported on an annual basis (during years in which monitoring takes place) and if necessary (e.g. if stated targets were not being met), recommendations made for reasonable changes to management prescriptions, as appropriate. Monitoring reports will be submitted to Planning Authority and any changes proposed to management prescriptions would be discussed with them in the first instance.

6.2.3.7 Responsibilities

All management tasks carried out under the HSMP will either be undertaken by the developer, operator or by suitably experienced contractors acting on their behalf.

All ecological monitoring and reporting will be undertaken by suitably qualified and experienced ecologists.

7.0 Birds

The following sections sets out a summary of the baseline conditions for birds including a description and evaluation, along with any ecological trends and constraints that could influence management. These measures are independent of any compensation measures which may be required by wildlife licences potentially needed to allow construction work to progress.

Next listed are the objectives with details of actions that will be implemented in full.



7.1 Summary of Baseline

Surveys showed that there were only two species of bird that could suffer direct habitat loss due to the Proposed Development: common snipe *Gallinago gallinago* and Eurasian woodcock *Scolopax rusticola*. This included one snipe and two woodcock breeding territories. These two bird species were evaluated as being important at the county / regional or local scale.

No significant effects are predicted for common kestrel *Falco tinnunculus* due to collision with operational turbines; however, the implementation of bat mitigation buffers (see Objective 10) could make the habitats near turbines more suitable for kestrel prey species, which could increase collision risk beyond what is predicted. This species was evaluated as being important at the local level.

Any management for birds proposed as part of this HSMP could be constrained by existing agricultural and agroforestry practices at the Proposed Development, including damage to common snipe and Eurasian woodcock nests on the ground.

7.2 Objectives

To reduce or offset collision risk during operation, measures to dissuade kestrel from foraging near to turbines will be implemented.

Measures to compensate for loss of foraging and/or breeding habitat for common snipe and Eurasian woodcock will also be implemented.

Westmeath and Meath County Council Development Plans requires all new developments to enhance ecological features by making provision for local biodiversity.

Enhancement measures further include provision of nesting/breeding habitat as set out below, and objectives 1 to 4 (relating to creation and appropriate management of hedgerows and treelines), 6 (relating to enhancement of riparian zone) and 7 (relating to enhancement of transition mire and quaking bog) will also be of benefit to the local bird populations.

Objectives and criteria for success have been developed in accordance with the Scottish Government's guidance for the creation of wader scrapes³ and Natural England Technical Information Note TIN089⁴, The British Association for Shooting and Conservation for creation of Eurasian woodcock habitats⁵ and Swift Conservation⁶ for the erection of swift *Apus apus* towers.

Figure 1 in Appendix A shows the indicative locations for proposed bird management measures.

7.2.1 Objective 11: Reduction in habitat suitability for common kestrel

Listed below include targets to define success for objective 11, details of measures (establishment and management) that will be implemented to achieve success, details of monitoring measures and possible remedial actions, the programme, details of reporting requirements and who will be responsible for implementing the measures, monitoring and reporting.

³ <https://www.ruralpayments.org/topics/all-schemes/agri-environment-climate-scheme/management-options-and-capital-items/creation-of-wader-scrapes/guidance-for-creation-of-wader-scrapes/> Accessed 16/02/2024

⁴ <https://www.bto.org/sites/default/files/snipe-habitat-guide.pdf> Accessed 16/02/2024

⁵ <https://basc.org.uk/woodcock-the-snipe-of-the-woods/> Accessed 16/02/2024

⁶ <https://swift-conservation.org/Swift%20Towers.pdf> Accessed 16/02/2024



7.2.1.1 Targets

Minimum targets for success include:

- Maintenance of vegetation heights <50 cm in all bat mitigation buffer areas; and
- No significant effects of collision on kestrel populations (demonstrated via an assessment of recorded mortality in the light of changes in current conservation status at the time of the monitoring survey, indicating that the Proposed Development is contributing to the decline or hindering restoration efforts for the relevant species).

7.2.1.2 Establishment Actions

Establishment actions that will be implemented include:

- Creation of uniformly short vegetation heights (<50 cm) via infrequent mowing or trimming of vegetation. The mowing / trimming regime has already been described for bat mitigation buffers (see objective 10 in section 6.2.3.3) and will be applied here also;
- Removal of timber/brush from felling and chipping of tree stumps to ground level. This will be undertaken as part of establishment actions for bat mitigation buffers (see objective 10 in section 6.2.1.2) and will follow the same timings / restrictions;
- Spread and compaction of chipped wood and spoil to create a flat surface to prevent rapid colonisation of new vegetation. This will be undertaken as part of establishment actions for bat mitigation buffers (see objective 10 in section 6.2.1.2) and will follow the same timings / restrictions; and
- Piping/filling over of open field/forestry drains within the areas of the bat mitigation buffers for each turbine. Open field drains include those surrounding turbines T1 and T2. Forestry drains include those surrounding turbines T3, T4 and T5. This will be undertaken as part of establishment actions for bat mitigation buffers (see objective 10 in section 6.2.1.2) and will follow the same timings / restrictions.

7.2.1.3 Management Actions

Management actions that will be implemented include:

- Continuation of mowing / trimming of vegetation as for the establishment actions described above; and
- Other management actions will be undertaken as part of those for bat mitigation buffers (see objective 10 in section 6.2.3.3).

7.2.1.4 Monitoring and Remedial Actions

Monitoring and remedial actions that will be implemented include:

- Monitoring of vegetation heights will take place as part of annual monitoring for objective 10 and is described in section 6.2.3.4;
- If vegetation heights are not short enough, the frequency of mowing / trimming regime may need to be increased. This must be undertaken outside the breeding bird season (March – August inclusive);
- If any open field/forestry drains become open, they must be piped/filled over again;
- A post-construction monitoring programme for all birds will be implemented, which will assess whether the reduction in habitat suitability around turbines has resulted in preventing any significant collision effects on kestrel populations. This programme will consist of:



- A targeted range of flight activity surveys and collision monitoring (carcass searching) will be undertaken during the breeding and non-breeding seasons in years 1, 2 and 3 post construction, to monitor the rate of avian turbine collisions and identify any significant effects; and
- Six hours of survey per vantage point per month will be carried out for flight activity surveys and one round of carcass searches per turbine per month will be carried out.
- The results of the post-construction monitoring surveys will be used to determine whether further mitigation measures are required (both for kestrel and other birds more generally). If no significant effects are shown (this would be demonstrated via an assessment of recorded mortality in the light of changes in current conservation status at the time of the monitoring survey, indicating that the Proposed Development is contributing to the decline or hindering restoration efforts for the relevant species), the monitoring should no longer be required, subject to agreement with the competent authority and NPWS. If monitoring indicates potentially significant levels of collision mortality for bird species, mitigation measures will be implemented (including turbine curtailment), and further monitoring will also be implemented in all additional years post construction, to ensure there are no significant collision effects on any bird species, including kestrel.

7.2.1.5 Programme

The programme to achieve objective 11 is given in Table 7-1. Only those actions not already described for objective 10 in Table 6-3 are given.

Table 7-1: Management and Monitoring Programme for Objective 11

Summary Action	Timescale Relative to End of Proposed Development Construction
Monitoring (vantage point and fatality monitoring surveys) / Reporting	Years 1 to 3 (vantage point and fatality monitoring surveys / reporting) Years 4-35 (additional vantage point and fatality monitoring / reporting, but only if required by NPWS and Planning Authorities)
Remedial actions (additional trimming/mowing; additional mitigation measures, such as curtailment)	If and when required only; curtailment is only to be implemented if required by NPWS and Planning Authorities

7.2.1.6 Reporting

Monitoring results will be reported on an annual basis (during years in which monitoring takes place) and if necessary (e.g. if stated targets were not being met), recommendations made for reasonable changes to management prescriptions, as appropriate. Monitoring reports will be submitted to Planning Authority and any changes proposed to management prescriptions would be discussed with them in the first instance.

7.2.1.7 Responsibilities

All management tasks carried out under the HSMP will either be undertaken by the developer, operator or by suitably experienced contractors acting on their behalf.

All ecological monitoring and reporting will be undertaken by suitably qualified and experienced ecologists.



7.2.2 Objective 12: Provision of additional bird nesting and/or foraging habitat

Listed below include targets to define success for objective 12, details of measures (establishment and management) that will be implemented to achieve success, details of monitoring measures and possible remedial actions, the programme, details of reporting requirements and who will be responsible for implementing the measures, monitoring and reporting.

7.2.2.1 Targets

Minimum targets for success include:

- Common snipe: provision of two wader scrapes for the lifespan of the Proposed Development;
- Eurasian woodcock: creation of 0.7 ha of new broadleaved woodland suitable for woodcock, with two glades; and
- Common swift: erection of one swift tower for the lifespan of the Proposed Development.

7.2.2.2 Establishment Actions

Establishment actions that will be implemented include:

- Creation of wader scrapes for common snipe:
 - Excavate a minimum 20 m² area per scrape, aiming to vary the depth across the scrape to a maximum of 45 cm and creating gently sloping edges. One scrape should be located within Biodiversity Enhancement Area A (0.844 ha in area) and one in Area B (8.44 ha in area; see **Figure 1** in Appendix A);
 - Create linear or irregular shaped scrapes; and
 - Biodiversity Enhancement Areas A and B will be fenced as part of objectives 1 to 4, and 6 along hedgerows / the edge of the watercourse and around any other boundaries of the areas themselves.
- Creation of new broadleaved woodland for Eurasian woodcock:
 - Plant native trees suitable for breeding / foraging woodcock in the Proposed Development in Biodiversity Enhancement Area C (0.7 ha of new broadleaved woodland in an overall area of 1.3 ha) and that support woodcock prey such as earthworms. These trees should be predominantly *Betula pubescens* and also include a mixture of *Alnus glutinosa*, *Salix alba*, *Salix caprea*, *Salix cinerea* subsp *oleifolia*, *Salix aurita*, *Sorbus aucuparia* and *Virbunum opulus* in Biodiversity Enhancement Zone C (see **Figure 1** in Appendix A);
 - Follow guidance from objective 1 and 4 to help guide planting and to establish the new broadleaved woodland;
 - Stagger planting so that there are a variety of trees of different ages and heights to allow for a mosaic of woodland / habitat structure; and
 - Ensure trees are planted in such a way that there are two glades of 20 x 20 m area within the new woodland and that access to the glades for maintenance is possible via rides.
- Erection of one swift tower within the land surrounding the Proposed Substation:
 - Erect tower with a gap of 15 m from the nearest major source of obstruction so there is clear access to the nest entrance;



- Position nest boxes within the tower to they are not exposed to sun and are sheltered from the rain and are at least 7 m from the ground; and
- Ensure the nest chamber dimensions, material and construction follows the specifications outlined in Swift Conservation's guidance⁶ to exclude predators and competitor species.

7.2.2.3 Management Actions

Management actions that will be implemented include:

- Common snipe wader scrapes:
 - Leave the scrape itself unfenced and use low stocking densities of highland cattle (or other livestock species if agreed by NPWS) as described for objective 7 to prevent re-vegetation of the scrape and achieve an appropriate sward structure in the field containing the scrape, as shown in Natural England Technical Information Note TIN089⁴ (snipe require soft damp ground, a tussocky sward and large, open fields for foraging and breeding); and
 - If cattle (or other livestock) cannot be used to prevent re-vegetation of the scrape / achieve the appropriate sward structure, then hand mowing of the edges of the scrape can be undertaken outside the breeding bird season (March to August inclusive).
- Eurasian woodcock woodland:
 - Follow management actions for objective 4 to ensure establishment of woodland; and
 - Restore any glades or rides within the woodland that are closing up by trimming / felling vegetation outside of the breeding bird season (March – August inclusive). Vegetation cutting of the glades / rides should be undertaken annually from the time of establishment of the new forest (starting in year 5 and continued every year until year 35). To help provide 'soft edges' for the glades, any grass edges within the glade should be mowed every other year.
- Common swift tower:
 - Removal of any vegetation within 15 m that has started to obscure the flyway to the tower entrance or that has started to climb up the tower should be undertaken annually outside the breeding bird season (March – August inclusive). This will prevent predators from reaching the nest and will deter competitors from using the tower; and
 - Safety checks to ensure the integrity of the construction material and any fixings should be undertaken annually from years 1-5 and then every five years until year 35 thereafter.

7.2.2.4 Monitoring and Remedial Actions

Monitoring and remedial actions that will be implemented include:

- Bird surveys / checks every year during years 1-5 post-construction and every five years thereafter to year 35 to ensure that wader scrapes and woodcock glades are present / functional and that the swift tower is in good condition / is used by swifts;
- If wader scrapes have been re-vegetated despite ongoing management actions, then they may need to be re-excavated or the edges may require hand mowing;
- If glades have started to close up, then trimming / felling of vegetation (including edge vegetation) may be required as detailed above in section 7.2.2.3;



- Where the swift tower has become damaged, it will be repaired or replaced immediately. If there is evidence of human vandalism, a new location in a less prominent position will be identified (and permissions obtained) and a replacement swift tower will be reinstalled in the new location; and
- If there has been no uptake of the swift tower after the first three years, playback of swift calls may be required to attract swifts to the tower. Similarly, it will determine whether repairs to the swift tower are required.

7.2.2.5 Programme

The programme to achieve objective 12 is given in Table 7-2. Only those actions not already described for objective 7 in Table 5-1 are given.

Table 7-2: Management and Monitoring Programme for Objective 12

Summary Action	Timescale Relative to End of Proposed Development Construction
Creation of wader scrapes / planting of new broadleaved woodland / erection of swift tower	Year 1
Remove vegetation on wader scrapes via grazing of highland cattle or manual mowing if cattle cannot be used	Annually years 2-35 (stocking densities and regime are described for objective 6; of manual mowing must be undertaken this should be undertaken annually outside the breeding bird season March-August inclusive).
Removal / trimming of vegetation within woodcock glades	Annually year 5-35 (this should be undertaken annually outside the breeding bird season March-August inclusive).
Mowing of grassy woodcock glade edges	Every other year from year 5-35.
Removal of any obscuring vegetation within 15 m of swift tower	Annually years 2-35 (this should be undertaken annually outside the breeding bird season March-August inclusive).
Monitoring (checks of wader scrapes, woodcock glades and swift tower) / Reporting	Annually from years 1-5 and every five years thereafter until year 35.
Remedial actions (additional vegetation removal/excavation to wader scrapes; additional removal/trimming of any vegetation starting to 'infill' woodcock glades; repairs/replacement/relocation of swift tower)	When required only; curtailment is only to be implemented if required by NPWS and Planning Authorities

7.2.2.6 Reporting

Monitoring results will be reported on an annual basis (during years in which monitoring takes place) and if necessary (e.g. if stated targets were not being met), recommendations made for reasonable changes to management prescriptions, as appropriate. Monitoring reports will be submitted to Planning Authority and any changes proposed to management prescriptions would be discussed with them in the first instance.



7.2.2.7 Responsibilities

All management tasks carried out under the HSMP will either be undertaken by the developer, operator or by suitably experienced contractors acting on their behalf.

All ecological monitoring and reporting will be undertaken by suitably qualified and experienced ecologists.

8.0 Hedgehog

The following sections sets out a summary of the baseline conditions for treelines including a description and evaluation, along with any ecological trends and constraints that could influence management. These measures are independent of any compensation measures which may be required by wildlife licences potentially needed to allow construction work to progress.

Next listed are the objectives with details of actions that will be implemented in full.

8.1 Summary of Baseline

European hedgehogs *Erinaceus europaeus* were not recorded as part of dedicated mammal surveys; however, it is likely they are present based on desktop records and availability of suitable habitats.

Hedgehogs were evaluated as being important at the local scale.

No significant effects on hedgehogs were predicted.

Any management for hedgehogs proposed as part of this HSMP could be constrained by existing agricultural and agroforestry practices at the Proposed Development, including the use of pesticides, which could reduce prey availability, along with accidental destruction of hibernacula due to felling of woodland and hedgerow/treeline management.

8.2 Objectives

The adoption of good practice measures during construction will minimise direct and indirect impacts on hedgehogs.

Westmeath and Meath County Council Development Plans requires all new developments to enhance ecological features by making provision for local biodiversity.

Measures to enhance the Main Wind Farm Site for hedgehog during operation involve the creation of hibernacula and are set out below. Objectives have been developed using Gazzard and Baker (2022).

Figure 1 in Appendix A shows the indicative locations for proposed hedgehog management measures within the red-line boundary and optioned lands.

8.2.1 Objective 13: Provision of hibernacula for hedgehogs

Listed below include targets to define success for objective 13, details of measures (establishment and management) that will be implemented to achieve success, details of monitoring measures and possible remedial actions, the programme, details of reporting requirements and who will be responsible for implementing the measures, monitoring and reporting.

8.2.1.1 Targets

Minimum targets for success include:



- Provision of eight suitable (as according to the establishment and management actions set out below) hedgehog hibernacula available for usage for the lifespan of the Proposed Development; and
- Evidence of use (droppings, nests) recorded within at least two hibernacula in the first 5 year after construction.

8.2.1.2 Establishment Actions

Establishment actions that will be implemented include:

- Eight no. hibernacula/shelters will be constructed for hedgehogs from logs arising from felled trees as shown in **Figure 1** in Appendix A;
- The hibernacula will be constructed in areas that are south facing, well-drained, undisturbed by humans/vehicles (e.g. paths and roads) adjacent to broad-leaved trees (to provide leaves for nest construction⁷) and act as transitions between habitats (e.g. between scrub and woodland etc.);
- The logs will be laid in a hole 0.5 m deep, and at least 2 m wide and 4 m long, with turves of vegetation from the area excavated kept aside to be placed on top of the hibernacula. The hole will be filled to just below ground level with gravel or sand to facilitate drainage, with logs piled on top in a configuration that creates voids within the heap, with access gaps into these voids. Logs will be piled to a height of at least 1 m. Soil arising from the hole and the salvaged turves of vegetation will be laid on top of the logs with the aim of establishing a cover of vegetation to provide insulation on the northern side of the mound;
- The hibernacula must be free draining and should not be located within areas prone to flooding or frost hollows; and
- The locations of the hibernacula will be agreed in conjunction with landowners and the Planning Authority prior to the operation of the Proposed Development.

8.2.1.3 Management Actions

Management actions that will be implemented include:

- Preventing vegetation from encroaching on to the southern side of the hibernacula via light hand trimming of vegetation every year outside the hibernation period (October to March). This will prevent a thick root mat from developing and allowing easy access to the hibernacula from the southern side for both hedgehogs and other animals; and
- If turves of vegetation have not established themselves on the northern side of the hibernacula after year 1, more may be needed to be placed to act as insulation.

8.2.1.4 Monitoring and Remedial Actions

Monitoring and remedial actions that will be implemented include:

- Annual checks in years 1-5 indicate hibernacula are in suitable condition for use by hedgehogs and check for evidence of use (droppings, nests) and checks every five years until year 35 thereafter;

⁷ Gazzard & Baker, 2022 found that the presence of supply of broad-leaved leaves as a bedding material increased the likelihood of nest box occupancy



- If targets for hedgehog occupancy are not met, then the hibernacula must be assessed for their suitability against the establishment actions in section 8.2.1.2. If they are unsuitable, changes may need to be made (see below). If they are suitable, then
- If any of the hibernacula have become unsuitable (as assessed against the establishment actions in section 8.2.1.2), adjustments may need to be made. Log piles may need to be replaced if rotted. Alternatively, if any broadleaved woodlands are removed, new log piles may need to be created nearer to other broadleaved woodland locations to maximise chance of hibernacula occupancy. If any new development is implemented that could result in destruction of hibernacula, log piles should be created in a new, safe location; and
- All hedgehog records to be submitted to the Irish Hedgehog Survey online at Record sightings | Hedgehog Survey (irishhedgehogsurvey.com).

8.2.1.5 Programme

The programme to achieve objective 13 is given in Table 8-1.

Table 8-1: Management and Monitoring Programme for Objective 13

Summary Action	Timescale Relative to End of Construction
Creation of new hibernacula	Year 1
Management (light hand trimming of vegetation on southern side of hibernacula; addition of new vegetated turves on northern side if required)	Years 2-35
Monitoring / Reporting	Years 1 to 5, and every 5 years thereafter until and including year 35
Remedial actions (moving, adjustment or replacement of hibernacula)	As for monitoring but when required only

8.2.1.6 Reporting

Monitoring results will be reported on an annual basis (during years in which monitoring takes place) and if necessary (e.g. if stated targets were not being met), recommendations made for reasonable changes to management prescriptions, as appropriate. Monitoring reports will be submitted to Planning Authority and any changes proposed to management prescriptions would be discussed with them in the first instance.

8.2.1.7 Responsibilities

All management tasks carried out under the HSMP will either be undertaken by the developer, operator or by suitably experienced contractors acting on their behalf.

All ecological monitoring and reporting will be undertaken by suitably qualified and experienced ecologists.

9.0 Reptiles and amphibians

The following sections sets out a summary of the baseline conditions for reptiles and amphibians including a description and evaluation, along with any ecological trends and constraints that could influence management. These measures are independent of any



compensation measures which may be required by wildlife licences potentially needed to allow construction work to progress.

Next listed are the objectives with details of actions that will be implemented in full.

9.1 Summary of Baseline

Common frog *Rana temporaria* was recorded in a single pond but other pond sites and drainage ditches have suitability for this species. Smooth newt *Lissotriton vulgaris* was recorded in high densities in a single pond site. No reptiles were recorded during field surveys and no desktop records were available.

Common frog and smooth newt were evaluated as being of local importance.

No significant effects on reptiles or amphibians were predicted.

Any management for reptiles and amphibians proposed as part of this HSMP could be constrained by existing agricultural and agroforestry practices at the Proposed Development, including the use of pesticides, which could reduce prey availability, along with accidental destruction of hibernacula due to felling of woodland and hedgerow/treeline management, dredging of drainage ditches during the amphibian breeding season and allowing hedgerows/treelines to shade ditches.

9.2 Objectives

Best practice measures adopted during construction will prevent direct impacts to frogs and reptiles such as pre-works checks for spawning frogs (subject to NPWS licence conditions), the use of herpetofauna fencing to prevent individuals from accessing potentially dangerous construction areas and translocation of any spawn within the development footprint (subject to NPWS licence conditions).

Westmeath and Meath County Council Development Plans requires all new developments to enhance ecological features by making provision for local biodiversity.

To increase the suitability of the site for reptiles and amphibians, further enhancement measures are presented below based on guidance within the Reptile Habitat Management Handbook (Edgar et al., 2010) and the Amphibian Habitat Management Handbook (Baker et al, 2011).

Figure 1 in Appendix A shows the indicative locations for proposed reptile and amphibian management measures within the red-line boundary and optioned lands.

9.2.1 Objective 14: Provision of reptile and amphibian hibernacula

Listed below include targets to define success for objective 14, details of measures (establishment and management) that will be implemented to achieve success, details of monitoring measures and possible remedial actions, the programme, details of reporting requirements and who will be responsible for implementing the measures, monitoring and reporting.

9.2.1.1 Targets

Minimum targets for success include provision of eight suitable reptile and amphibian hibernacula available for usage for the lifespan of the Proposed Development.

9.2.1.2 Establishment Actions

Establishment actions that will be implemented include:



- Eight no. hibernacula will be constructed for reptiles and amphibians from logs formed from felled trees (see **Figure 1** in Appendix A);
- The hibernacula will be the same as those for hedgehogs (see objective 13) and establishment actions will follow those given in section 8.2.1.2;
- The hibernacula will be located in a sunny position, orientated such that a long side faces south and near to watercourses / drainage ditches, within rough grassland or scrub and avoiding areas of intensively managed / grazed land. These needs will be balanced against the requirements for hedgehogs (see objective 13 in section 8.2.1.2); and
- The locations of the hibernacula will be agreed in conjunction with landowners and the Planning Authority prior to the operation of the Proposed Development.

9.2.1.3 Management Actions

Management actions that will be implemented include the same as for objective 13 and outlined in section 8.2.1.3.

9.2.1.4 Monitoring and Remedial Actions

Monitoring and remedial actions that will be implemented include the same as for objective 13 and outlined in section 8.2.1.4.

9.2.1.5 Programme

The programme to achieve objective 14 is the same as for objective 13 and is given in Table 8-1.

9.2.1.6 Reporting

Monitoring results will be reported on an annual basis (during years in which monitoring takes place) and if necessary (e.g. if stated targets were not being met), recommendations made for reasonable changes to management prescriptions, as appropriate. Monitoring reports will be submitted to Planning Authority and any changes proposed to management prescriptions would be discussed with them in the first instance.

9.2.1.7 Responsibilities

All management tasks carried out under the HSMP will either be undertaken by the developer, operator or by suitably experienced contractors acting on their behalf.

All ecological monitoring and reporting will be undertaken by suitably qualified and experienced ecologists.

9.2.2 Objective 15: Management of new and existing drainage ditches to benefit amphibians

Listed below include targets to define success for objective 15, details of measures (establishment and management) that will be implemented to achieve success, details of monitoring measures and possible remedial actions, the programme, details of reporting requirements and who will be responsible for implementing the measures, monitoring and reporting.

9.2.2.1 Targets

Minimum targets for success include the establishment actions mentioned below.



9.2.2.2 Establishment Actions

Establishment actions that will be implemented include:

- Dredging to be undertaken of new and existing ditches within red-line boundary outside amphibian breeding period (February – July) and on rotation with not more than ¼ of ditch length dredged over a 3-year period;
- Dredging arisings to be left near to ditch;
- Ditch / marginal vegetation to be cut on rotation, with not more than ¼ of ditch length cut over a 3-year period, and to a minimum of 150 mm above ground level;
- Shading vegetation controlled to ensure ditch network does not become totally shaded. Not more than ¼ of shading vegetation cut over a 3-year period; and
- Where possible, ditches to be locally widened and deepened in discrete sections to encourage ‘ponding’ / retention of water during dry spells.

9.2.2.3 Management Actions

Management actions that will be implemented include the same as the establishment actions mentioned above in section 9.2.2.2.

9.2.2.4 Monitoring and Remedial Actions

Monitoring and remedial actions that will be implemented include:

- Checks of the drainage network on an annual basis between years 1-5 and every five years thereafter until year 35 to ensure establishment/management actions are being implemented; and
- If establishment/management actions have not been implemented, then they must be undertaken at the next available opportunity.

9.2.2.5 Programme

The programme to achieve objective 15 is given in Table 9-1.

Table 9-1: Management and Monitoring Programme for Objective 15

Summary Action	Timescale Relative to End of Construction
Dredging of new and existing ditches, cutting of ditch / marginal vegetation and trimming of shading vegetation	Year 1-35, ¼ of ditch length to be dredged on rotation every three years between August to January
Monitoring / Reporting	Years 1 to 5, and every 5 years thereafter until and including year 35
Remedial actions (implementing any outstanding management actions)	As for monitoring but when required only

9.2.2.6 Reporting

Monitoring results will be reported on an annual basis (during years in which monitoring takes place) and if necessary (e.g. if stated targets were not being met), recommendations made for reasonable changes to management prescriptions, as appropriate. Monitoring reports will be submitted to Planning Authority and any changes proposed to management prescriptions would be discussed with them in the first instance.



9.2.2.7 Responsibilities

All management tasks carried out under the HSMP will either be undertaken by the developer, operator or by suitably experienced contractors acting on their behalf.

All ecological monitoring and reporting will be undertaken by suitably qualified and experienced ecologists.

10.0 Invertebrates

The following sections sets out a summary of the baseline conditions for invertebrates including a description and evaluation, along with any ecological trends and constraints that could influence management. These measures are independent of any compensation measures which may be required by wildlife licences potentially needed to allow construction work to progress.

Next listed are the objectives with details of actions that will be implemented in full.

10.1 Summary of Baseline

Marsh fritillary butterfly currently breed within Biodiversity Enhancement Zone B, with 59 larval webs recorded in 2022. Other common butterfly and damselfly species were recorded during other surveys, including silver-washed fritillary *Argynnis paphia*.

Marsh fritillary butterfly were evaluated as being of county / regional importance and other invertebrates of site importance.

No significant effects on invertebrates were predicted.

Any management for invertebrates proposed as part of this HSMP could be constrained by existing agricultural and agroforestry practices at the Proposed Development, including the use of insecticides, accidental destruction of hibernacula due to felling of woodland and hedgerow/treeline management and over- or under-grazing, which could affect the availability of various insect food plants.

10.2 Objectives

To increase the suitability of the site for pollinators, further enhancement measures are presented below based on guidance contained within the NBDC (2022) 'Protecting Farmland Pollinators Project' report and NBDC (2009) 'Pollinator-friendly management of wind farms' guidance were used to inform proposed management measures for invertebrates.

In addition, measures to enhance transition mire and quaking bog habitat, will also be beneficial to marsh fritillary butterfly breeding habitat. These were based on guidance contained within the NBDC Habitat management for the marsh fritillary report (Phelan et al., 2021).

Figure 1 in Appendix A shows the indicative locations for proposed invertebrate management measures.

10.2.1 Objective 16: Provision of invertebrate foraging habitat and hibernacula

The actions for objectives 1 - 3 related to hedgerows and objective 7 related to transition mire and quaking bog will also help provide nesting and foraging habitat for a range of pollinators.

Listed below include targets to define success for objective 16, details of measures (establishment and management) that will be implemented to achieve success, details of monitoring measures and possible remedial actions, the programme, details of reporting



requirements and who will be responsible for implementing the measures, monitoring and reporting.

10.2.1.1 Targets

Minimum targets for success include:

- Provision of at least three insect hotels per 35 ha (i.e. 4 in total) over the lifespan of the Proposed Development; and
- Provision of 5 m rough grassland along access tracks, hardstands and substation where possible over the lifespan of the Proposed Development.

10.2.1.2 Establishment Actions

Establishment actions that will be implemented include:

- Maintain 5 m rough grassland buffer along access tracks, hardstands, and substation to provide habitat for pollinators (where practical to do so i.e. cannot be implemented easily within woodland habitats and considering landowner constraints). This will be achieved by avoiding mowing during March to October inclusive, with some mowing required outside these periods to prevent scrub from dominating. It is also recommended to also leave a scrape of 1 x 1 m² of bare ground in one of the rough grassland buffer areas to provide habitat for ground-nesting bees (a well-drained, sheltered, and sunny location on a south-facing slope should be chosen);
- Erect insect hotels in the first year of operation. Insect hotels or bee boxes can be created by drilling holes into fence posts or pieces of wood and positioning appropriately. These sites can be created along dry hedgerows and other field boundaries, avoiding north-facing aspects. Holes should be 10 cm in depth and 4-8 mm in diameter and should be placed at a height of at least 1.5 – 2 m. They should be drilled at a slight upward angle to prevent them filling with rainwater and ideally, should be covered via a sloping roof to ensure they stay dry during wet weather. Holes should be different sizes to accommodate different bee species;
- Alternatively, reeds or bamboo stems can be used instead of drilling holes. These must be bundled together and attached securely within a dry hedgerow or field boundary, as described above;
- Locate both insect hotels in sunny, sheltered areas, ideally no more than 300 m from areas of food plants; and
- The locations of the insect hotels will be agreed in conjunction with landowners and the Planning Authority prior to the operation of the Proposed Development.

10.2.1.3 Management Actions

Management actions that will be implemented include:

- Ensure insect hotels are maintained or replaced over the lifespan of the wind farm as required (typically hotels will need replacing after four years);
- If an insect hotel contains an active bee nest, put a second replacement nest next to it after four years, to encourage the bees to use the replacement nest; and
- Mowing rough grassland buffers annually between November to February to prevent encroachment of scrub (mow once a year) and manually scrape back any vegetation that has grown on bare soil in an area designed for ground-nesting bees.



10.2.1.4 Monitoring and Remedial Actions

Monitoring and remedial actions that will be implemented include:

- Maintenance checks to ensure grassland buffer habitats, and insect hotels still present and functional, to be carried out annually in years 1-5 post-construction and every five years to year 35 thereafter;
- If the insect hotel is not occupied within two years, move to a different location; and
- If scrub encroaches rough grassland buffers, the frequency of mowing may need to be increased.

10.2.1.5 Programme

The programme to achieve objective 16 is given in Table 10-1.

Table 10-1: Management and Monitoring Programme for Objective 16

Summary Action	Timescale Relative to End of Construction
Creation / erection of 4 insect hotels, creation of rough grassland buffers along access tracks, hardstands and substation	Year 1
Mowing of rough grassland buffer and scraping back of vegetation that has colonised bare soil in ground-nesting bee area	Years 2-35 (annually)
Monitoring / Reporting	Years 1 to 5, and every 5 years thereafter until and including year 35
Remedial actions (replacement / repair / relocation of insect hotels; mowing of rough grassland buffer or removal of vegetation at bare ground patch)	As for monitoring but when required only

10.2.1.6 Reporting

Monitoring results will be reported on an annual basis (during years in which monitoring takes place) and if necessary (e.g. if stated targets were not being met), recommendations made for reasonable changes to management prescriptions, as appropriate. Monitoring reports will be submitted to Planning Authority and any changes proposed to management prescriptions would be discussed with them in the first instance.

10.2.1.7 Responsibilities

All management tasks carried out under the HSMP will either be undertaken by the developer, operator or by suitably experienced contractors acting on their behalf.

All ecological monitoring and reporting will be undertaken by suitably qualified and experienced ecologists.

10.2.2 Objective 17: Enhancement of marsh fritillary breeding habitat

Listed below include targets to define success for objective 17, details of measures (establishment and management) that will be implemented to achieve success, details of monitoring measures and possible remedial actions, the programme, details of reporting



requirements and who will be responsible for implementing the measures, monitoring and reporting.

10.2.2.1 Targets

Minimum targets for success include:

- Habitat condition in Biodiversity Enhancement Area B: >20% frequency Devil's bit scabious *Succisa pratensis* of category B/C abundance, growing in structured sward height between 12-25 cm and <10% of tall (>0.5 m tall) scrub; and
- Larval web monitoring: number of occupied webs found and estimated population size (scaling up webs/ha in search area over total suitable habitat) should be greater than the baseline (59 webs recorded in 2.4 ha of suitable habitat).

10.2.2.2 Establishment Actions

Establishment actions that will be implemented include those as outlined for objective 7.

10.2.2.3 Management Actions

Management actions that will be implemented include:

- Light grazing by cattle will be implemented as for objective 7 (although other grazers or manual removal of vegetation maybe implemented if this is not possible; the final approach will be discussed and agreed with NPWS). This will help maintain a structured sward height, which allows food plant Devil's bit scabious to spread; and
- Light grazing or manual removal of willow, gorse, blackthorn or bramble scrub surrounding marsh fritillary breeding areas to help reduce encroachment of scrub where it threatens to remove marsh fritillary habitats as for objective 7. Scrub should not be totally removed, as it will be used by other fauna.

10.2.2.4 Monitoring and Remedial Actions

Monitoring and remedial actions that will be implemented include:

- Habitat condition and larval web monitoring for marsh fritillary to be carried out annually in years 1-5 and every five years thereafter until post-construction year 35 following Ireland's National Biodiversity Centre methodology⁸;
- All marsh fritillary records to be submitted to Ireland's National Biodiversity Data Centre Online at to Ireland's Citizen Science Portal <https://records.biodiversityireland.ie/> or using the Biodiversity Data Capture app; and
- If there are any indicators of under grazing or overgrazing, then management actions may need to be undertaken including reducing or increasing stocking densities of cattle and should included and be balanced against the remedial actions required for objective 7 (including additional scrub removal and fence repair).

10.2.2.5 Programme

The programme for objective 17 is the same as for objective 7 and is given in Table 5-1.

⁸ <https://biodiversityireland.ie/surveys/marsh-fritillary-monitoring-scheme/#:~:text=Under%20the%20Red%20List%20of%20Irish%20Butterflies%20published,the%20midlands%20and%20western%20half%20of%20the%20country>. Accessed 16/02/2024



10.2.2.6 Reporting

Monitoring results will be reported on an annual basis (during years in which monitoring takes place) and if necessary (e.g. if stated targets were not being met), recommendations made for reasonable changes to management prescriptions, as appropriate. Monitoring reports will be submitted to Planning Authority and any changes proposed to management prescriptions would be discussed with them in the first instance.

10.2.2.7 Responsibilities

All management tasks carried out under the HSMP will either be undertaken by the developer, operator or by suitably experienced contractors acting on their behalf.

All ecological monitoring and reporting will be undertaken by suitably qualified and experienced ecologists.

11.0 Invasive Species

Regarding plants, cherry laurel *Prunus laurocerasus*, Japanese knotweed *Fallopia japonica*, winter heliotrope *Petasites fragrans* and snowberry *Symphocarpus alba* and have been recorded near to the Site by surveys. Regarding animals, crayfish plague *Aphanomyces astaci* was recorded by aquatic surveys.

However, measures to minimise the risk of spreading crayfish plague are described in the EIAR chapter. This includes following the 'check-clean-dry' protocol⁹ and ensuring any works within or nearby a watercourse are carried out in an upstream to downstream sequence (i.e. to avoid spreading plague to any upstream area). The 'check-clean-dry' protocol is summarised below:

- Check, clean and allow all equipment used within or nearby a watercourse to thoroughly dry-out and then dry for further 48 hours;
- If drying out equipment is not feasible equipment should be either:
 - Power Steam washed at a suitably high temperature (at least above 65°C) – use of mobile steam power washers or use of nearby power washers at service stations as an alternative; and
 - Disinfect everything using an approved disinfectant such as Milton (follow product label), Virkon Aquatic (3 mg/L), Proxitane (30 mg/L) or an iodine-based product for 15 minutes. Items difficult to soak can be sprayed or wiped down with disinfectant. Engine coolant water or residual water in boats/kayaks should be drained and where possible flushed out with disinfectant.

The rest of the measures below focus on invasive alien plant species.

11.1 Summary of Baseline

The distribution of the invasive alien plant species is presented in the EIAR Figure 5-5.

Table 11-1 below describes the location of the species in relation to the Site's footprint.

Any management for invasive plant species proposed could be constrained by existing agricultural and agroforestry practices at the Proposed Development, as well as the biodiversity compensation and enhancement measures outlined previously, all of which could potentially accidentally spread invasive species.

⁹ <https://invasives.ie/check-clean-dry-resources/>. Accessed 16/02/2024



Table 11-1: IAS species recorded

Species	X (ITM)	Y (ITM)	Description of Baseline Conditions	Within Development Footprint? Y/N
Cherry laurel	660141.682	763061.797	At TDR node	Y
	663719.021	766550.05	Along Cable Corridor	N
	645604.058	754065.873	At TDR node in hedge as line to slip road	Y
Japanese knotweed	663384.271	766608.965	In waste land off Cable Corridor	N
	663351.662	766575.137	In waste land off Cable Corridor	N
	663344.885	766587.288	In waste land off Cable Corridor	N
	663340.392	766577.211	In waste land off Cable Corridor	N
	663368.221	766573.134	In waste land off Cable Corridor	N
Snowberry	663934.658	766010.974	At TDR node (line)	N
	663193.184	766705.445	Along access track entrance to Southern Cluster	Y
Winter heliotrope	659742.772	762471.771	At TDR node (verge)	N

11.2 Objectives

To eradicate and/or halt the spread of IAS via prevention, containment, treatment and eradication, the following management measures will be implemented with reference to best-practice guidance provided in relevant sections.

11.2.1 Objective 18: Control of Invasive Species

Listed below include targets to define success for objective 18, details of measures (establishment and management) that will be implemented to achieve success, details of monitoring measures and possible remedial actions, the programme, details of reporting requirements and who will be responsible for implementing the measures, monitoring and reporting.

11.2.1.1 Targets

Minimum targets for success include: a reduction in the presence, distribution and extent of invasive and non-native plant species relative to the baseline, with complete eradication representing complete success.



11.2.1.2 Establishment and Management Actions

Establishment and management actions are described below.

General prevention measures

- Supervision of control measures and treatment by appropriate qualified ecologist or invasive species specialist;
- Use of toolbox talks given by suitably qualified personnel as part of site introduction to workers, including what to look out for and procedures to follow if invasive species are observed;
- Only planning or sowing native species within the Main Wind Farm Site, and along the Cable Corridor and TDR.
- Where invasive species are physically removed, disturbed soil will be seeded or replanted with native plant species to prevent recolonisation of bare soil by non-natives;
- Unwanted material originating from the Site will be transported off-site by an appropriate licenced waste contractor and disposed of at a suitably licenced facility, or buried on-site following NRA (2010) guidelines;
- Signs will be used to warn workers of invasive species contamination;
- Good hygiene practices;
- Removal of build-up of soil on equipment;
- Keeping equipment clean;
- Washing vehicles existing the Site using a pressure washer to prevent the transport of seeds;
- Storing wastewater from washing facilities securely and treating to prevent spread of invasive species outside the Site;
- Checking footwear and clothing of operatives working nearby invasive species for seeds, fruits or other viable material before leaving Site; and
- Any reproductive plant material arising from cleaning equipment, vehicles, footwear and clothing will be carefully disposed of following NRA (2010) guidelines in such a manner which will not cause the spread of invasive species.

General containment measures

- A pre-construction survey will be used to confirm the findings of the EIAR during the growing season (April to August) immediately prior to the construction phase. This will be used to physically mark out the extent of invasive plant species; and
- A 1 m buffer (except for named species below) will be used to cordon off invasive species outside the works footprint.

11.2.1.3 Species-specific treatment measures

Japanese knotweed

Japanese knotweed code of practice

To help developers, consultants, and contractors to select the most appropriate treatment option, some excerpts from the Knotweed Code of Practice (UK Environment Agency, 2013) are reproduced below. The code of practice has been developed by experts in the control of



Japanese knotweed and is based on the successes and failures of a number of Japanese knotweed management plans in the United Kingdom. Therefore, it represents the best available guidance on the different treatment options.

- *“Unless an area of Japanese knotweed is likely to have a direct impact on the development, control it in its original location with herbicide over a suitable period of time, usually two to five years;*
- *Only consider excavating Japanese knotweed as a last resort, and if so, keep the amount of knotweed excavated to a minimum;*
- *Soil containing Japanese knotweed material may be buried on the site where it is produced to ensure that you completely kill it. Bury material at least 5 m deep;*
- *Where local conditions mean you cannot use burial as an option, it may be possible to create a Japanese knotweed bund. The purpose of the bund is to move the Japanese knotweed to an area of the site that is not used. This ‘buys time’ for treatment that would not be possible where the Japanese knotweed was originally located;*
- *Due to timing, location, landfill is the only reliable option, but it should be treated as a last resort. Landfill can be expensive and would require haulage, which would increase the risk of Japanese knotweed spreading; and*
- *When transporting soil infested with Japanese knotweed to landfill, it is essential to carry out strict hygiene measures. If these standards are not followed, this may result in the spread of this invasive species. Japanese knotweed is a particular problem along transport routes/corridors, where it can interfere with the line of vision and can potentially result in traffic accidents.”*

Information is also provided by the National Road Authority (NRA) (now Transport Infrastructure Ireland (TII)) (NRA, 2010), and Invasive Species Ireland (ISI, 2015) in relation to identification, control and eradication of Japanese knotweed.

Exclusion zone

Prior to the construction phase/excavations at the Site, the following bio-security measures will be in place at the Site:

- A 7 m exclusion zone, measured horizontally from the nearest visible Japanese knotweed plant, will be established around all areas infested by Japanese knotweed;
- Where part of the exclusion zone encroaches onto an active public access, or beyond a site boundary, this section of the exclusion zone will be positioned as close as possible to the boundary;
- The exclusion zone will be delineated with a secure temporary construction fence, such as herras panels or timber post and netting, and be fitted with appropriate warning / advisory signage;
- Fencing will remain in place for the duration of construction works, and while the stand is being treated, allowing the rest of the fencing to be constructed. No fencing will be erected within this exclusion until treatment is completed and no new growth is detected; and
- Signs will be placed on the fence to advise site personnel that the area contains Japanese knotweed material, and that bio-security measures are actively in force.

Chemical control

The desired option to treat Japanese knotweed generally is to control the infestation in-situ with a combination of physical and herbicide control over a period of time (typically 3-5



years, or until no new growth is observed). The control of Japanese knotweed will require the use of herbicides, which can pose a risk to human health, to non-target plants or to wildlife. To ensure the safety of herbicide applicators and of other public users of the Site, it is essential that a competent and qualified person carries out the herbicide treatment. A qualified and experienced contractor will be employed to carry out all treatment work. The contractor will follow the detailed recommendations of the following documents for the control of invasive species and noxious weeds:

- Chapter 7 and Appendix 3 of the TII Publication: The Management of Noxious Weeds and Non-Native Invasive Plant Species on National Roads (NRA, 2010);
- Best Practice Management Guidelines for Japanese Knotweed (Invasive Species Ireland, 2015); and
- Circular Letter NPWS 2/08 Use of Herbicide Spray on Vegetated Road Verges (National Parks and Wildlife Service 2008).

A systemic herbicide (e.g. Picloram) and/or a bioactive formulation (i.e. glyphosate) may be sprayed on foliage during dry weather or injected directly into the stems of Japanese knotweed plants identified within the Site. Strong systemic herbicides are most effective at targeting the persistent roots of Japanese knotweed; however, they may also persist in the soil and/or kill surrounding vegetation.

Chemical control using a bioactive formulation of glyphosate is the most appropriate herbicide for use in or near water (Environment Agency, 2003).

The length of treatment may vary depending on the type of herbicide used, i.e. highly persistent herbicides may eradicate a plant within one to two years, whereas non-persistent herbicides (such as glyphosate) may take over a period of at least three years to ensure the successful eradication of the plants.

Annual spot-checks will be conducted in May-June to identify and retreat any re-growth.

Such treatment can take up to five years to completely eradicate growth; therefore, further treatment may be required beyond the three years. This will be determined by the results of the monitoring. Japanese knotweed does not produce viable seed in Ireland, and therefore seed germination in subsequent years will not be an issue. The optimal time period for treatment is May-June and September-October.

Cherry laurel

Four options for the treatment of cherry laurel have been proposed. Any one or a combination of these four options shall be used to eradicate cherry laurel from the Site and avoid the spread of the species. However, the following general recommendations will be adhered to as part of the plan:

- No treatment measures to take place in these areas without supervision and agreement by appointed cherry laurel eradication specialist;
- The cherry laurel plant contains cyanide and as per good practice will only be handled with gloves. This plant will be disposed of via an appropriately licensed waste facility; and
- Equipment, clothing and footwear is to be checked following treatment operations and cleared of fruits/seeds as necessary.

Option 1: Cut to stump and dig out stump; bury onsite

This method involves cutting the main stem of the plant down near ground level and digging out the stump and any visible roots. This option is not usually practical in areas where there



are other invasive plants present as the disturbed soil can allow for the setting of seeds or the spread of rhizomes of adjacent species (ISI, 2008).

Option 2 - Cut to stump and treat stump with herbicide

This method involves cutting the main stem of the plant down near ground level, and applying herbicide to the freshly cut wound. The herbicide concentrations used, and timings of applications vary according to which chemical is used. When treating many stems, vegetable dye added to herbicide is useful for highlighting the stems that have and haven't been treated. The use of a brush or other such applicator will provide an accurate application and prevent damaging adjacent non-target plants via spray drift. Please see ISI (2008) for best treatment times.

Since the 26th November 2015, only a DAFM registered professional user can apply Plant Protection Products that are authorised for professional use. As such any application of herbicide must be carried out by a professional user. Since the 26th November 2016, it has been a requirement for sprayers to have passed a Pesticide Application Equipment Test before being used to apply professional use Plant Protection Products.

Option 3 – Cut to main stem and inject stem with herbicide

This method involves the 'drill and drop' method where the main stem is cut, and a hole drilled into the cut. The main drawback to this technique is that the plant is left in place to rot, which can take a decade or more. Please consult ISI (2008) for best treatment times.

Option 4 - Cut back to stump and spray regrowth with herbicide

This application involves cutting a main stem down near ground level and then treating the new stems with herbicide. This method is the least effective as some stems may be missed and not treated. Also, the application of herbicide is generally via spraying, which can result in adjacent non-target plants being killed off. Please see consult ISI (2008) for best treatment times.

Snowberry

The primary means of preventing spread of this species due to the works is predicted to be avoidance, as it is located in hedgerows along an access road, plus at TDR nodes. In the event of interaction of works with snowberry, one option for the treatment of snowberry at the site has been proposed to avoid the spread of the species. The general recommendations outlined in section 0 and 0 will be adhered to as part of the plan.

Option 1 - Excavation of the entire root system

This option is thought to be a very effective method of snowberry control. This must be done before the plants' seeds ripen in autumn. Plant matter from this process can be disposed of using a licenced landfill site or may be buried to a depth of over 2 m.

Any reproductive plant material will be carefully disposed of following NRA (2010) guidelines. Any equipment used will be inspected and thoroughly cleaned, as will the footwear and clothing of operatives removing invasive species material. Any material arising from cleaning of equipment and footwear will be disposed of in a manner which will not cause the spread of invasive species.

Winter heliotrope

The primary means of preventing spread of this species due to the works is predicted to be avoidance, as it is in a verge at a TDR node near the village of Delvin. In the event of interaction of works with winter heliotrope, two options for the treatment of winter heliotrope have been proposed to avoid the spread of the species. The general recommendations outlined in section 0 and 0 will be adhered to as part of the plan.



Option 1 - Excavation of the entire root system

This is thought to be an effective method of winter heliotrope control, but only on a limited scale and may need to be combined with treatment via herbicides (option 2). Plant matter from this process can be disposed of using a licenced landfill site or may be buried to a depth of over 2 m.

Option 2 - Chemical control

This can be undertaken via application of glyphosate-based herbicide after flowering in February to March.

11.2.1.4 Monitoring and Remedial Actions

Monitoring and remedial actions that will be implemented include:

- Immediately prior to construction, a survey will be undertaken during the growing season (April to August) to check whether any invasive or non-native plants have spread during the intervening period. The locations and extent of all such species will be mapped, which will be used to determine the baseline and progress against minimum targets for success.
- The Proposed Development will be monitored annually during operational phase years 1-5, and every five years thereafter until year 35 during the growing season for signs of regrowth of all invasive and non-native species, with records of these species sent to National Biodiversity Data Centre¹⁰; and
- Depending on the results of the monitoring, additional prevention, containment and eradication efforts may need to be implemented, as outlined above.

11.2.1.5 Programme

The programme to achieve objective 18 is given in Table 11-2.

Table 11-2: Management and Monitoring Programme for Objective 18

Summary Action	Timescale Relative to End of Construction
Pre-construction survey	Immediately before construction during the growing season (April to August)
General prevention and containment measures	During construction
Species-specific treatment measures	During construction and after construction years 1-5, depending on species
Monitoring / Reporting	During construction, then after construction during years 1 to 5, and every 5 years thereafter until and including year 35
Remedial actions (implementing any outstanding management actions)	As for monitoring but when required only

11.2.1.6 Reporting

Monitoring results will be reported on an annual basis (during years in which monitoring takes place) and if necessary (e.g. if stated targets were not being met), recommendations

¹⁰ <https://records.biodiversityireland.ie/start-recording> Accessed 16/02/2024



made for reasonable changes to management prescriptions, as appropriate. Monitoring reports will be submitted to Planning Authority and any changes proposed to management prescriptions would be discussed with them in the first instance.

11.2.1.7 Responsibilities

An ecologist or horticulturalist with experience of the identification and removal of IAS will be employed to carry out the manual removal of the IAS.

All ecological monitoring and reporting will be undertaken by suitably qualified and experienced ecologists.



12.0 Summary of Management and Monitoring Schedule

The management and monitoring schedule is shown in Table 12-1 below.

Table 12-1: Management and Monitoring Schedule

Year	Management to be Implemented	Monitoring to be Implemented	Details to be Reported
Prior to construction	<ul style="list-style-type: none"> Objective 10: Establish buffer zones for sensitive birds/bats/other mammals/amphibians/marsh fritillary if required. Objective 18: Physically mark out locations of invasive plants. 	<ul style="list-style-type: none"> Objective 10: Carry out surveys for breeding birds, bat roosts, non-bat mammals, amphibians and marsh fritillary. Objective 18: Carry out pre-construction survey for invasive plant species. 	<ul style="list-style-type: none"> Objective 10: Locations of breeding / resting places, evidence of occupancy, and recommendations for mitigation measures if required. Objective 18: Locations/extent invasive plant species.
During construction	<ul style="list-style-type: none"> Objective 10: Implement mitigation measures for breeding birds, bats, other mammals, amphibians and marsh fritillary. Objective 18: Carry out prevention and containment measures for invasive plant species. 	<ul style="list-style-type: none"> Objective 18: Undertake survey for invasive plant species during the growing season. 	<ul style="list-style-type: none"> Objective 18: Locations and extent of any invasive plant species, plus responses to eradication attempts, and whether any remedial actions need to be implemented.
Operational year 1	<ul style="list-style-type: none"> Objectives 1, 2, 4, 5 and 8: Plant and fence off new hedgerow / treeline; water if required; trim hedgerow. Objective 3: Carry out hedgerow survey of existing hedgerows to determine what needs enhancement and what enhancement action is most suitable; infill, coppice or lay hedgerow. Objective 6: Erect stock-proof fence around riparian zones. Objectives 7, 12 and 17: Erect stock-proof fenced around Biodiversity Enhancement Zones A and B; stock low densities of highland cattle during driest of summer 	<ul style="list-style-type: none"> Objectives 1, 2, 3 and 8: Undertake condition assessment of hedgerow. Objectives 4 and 5: Undertake condition assessment of treeline. Objective 6: Undertake surveys of botany and physical characteristics of watercourses and riparian zones. Objective 7: Undertake assessment of frequency of hoof prints (if livestock used) to determine optimal stocking 	<ul style="list-style-type: none"> Objectives 1, 2, 3 and 8: Measures of hedgerow condition in 'Hedgerow Appraisal System' including diversity of tree / shrub / climber component, and whether any remedial actions need to be implemented Objectives 4 and 5: Measures of tree condition in 'British Standard 5837', and whether any remedial actions need to be implemented. Objective 6: Plant frequency / distribution, watercourse depth/flow/substrate type, and whether any remedial actions need to be implemented. Objective 7: Plant frequency / distribution, number of typical indicator and high-quality



Year	Management to be Implemented	Monitoring to be Implemented	Details to be Reported
	<p>months OR use alternative livestock following agreement with NPWS OR remove scrub via hand.</p> <ul style="list-style-type: none"> • Objective 9: Erect new bat boxes. • Objective 10: Fell / remove shrubs/trees for bat mitigation buffers. • Objective 11: Deter kestrel from bat mitigation buffers by mowing vegetation; removing timber/brush; preventing colonisation of new vegetation; piping over/filling open drains. • Objective 12: Excavate two wader scrapes in Biodiversity Enhancement Zones A and B; plant new broadleaved woodland in Biodiversity Enhancement Zone C; erect new swift tower at Proposed Substation location. • Objectives 13 and 14: Create new hedgehog/reptile/amphibian hibernacula. • Objective 15: Dredge new / existing ditches; cut ditch / marginal vegetation; trim shading vegetation. • Objective 16: Erect insect hotels; leave 5 m rough grassland buffers to develop adjacent to access tracks/substation/hardstands and create one bare soil patch for ground-nesting bees in a rough grassland buffer. • Objective 18: Carry out any treatment measures to eradicate invasive plant species. 	<p>density and undertake botanical surveys of species composition.</p> <ul style="list-style-type: none"> • Objective 9: Undertake checks of bat box integrity of materials and fixings and evidence of occupation by bat boxes. • Objective 10: Undertake checks to ensure bat mitigation buffers have been implemented and static/fatality surveys for bats. • Objective 11: Undertake checks to ensure bat mitigation buffers are unsuitable for kestrel and fatality surveys for birds. • Objective 12: Undertake checks of wader scrapes, woodcock glades and swift tower to ensure presence / functionality and whether swift tower is occupied. • Objectives 13 and 14: Undertake check of suitability of hibernacula (presence/functionality) and whether there is evidence of occupancy by hedgehogs. • Objective 15: Undertake check of ditches according to management criteria. • Objective 16: Undertake check of insect hotels and 	<p>indicator species, frequency of hoof prints, presence of invasive or problematic native species and vegetation height, and whether any remedial actions need to be implemented.</p> <ul style="list-style-type: none"> • Objective 9: Presence of bat boxes, integrity of materials and fixings, evidence of occupancy, and whether any remedial actions need to be implemented. • Objective 10: Absence of shrub or trees within bat mitigation buffers, levels of bat activity surrounding turbines relative to baseline conditions, and whether any remedial actions need to be implemented. • Objective 11: Vegetation heights within bat mitigation buffers, kestrel fatalities, and whether any remedial actions need to be implemented. • Objective 12: For wader scrapes: whether scrapes present and vegetation-free; whether surrounding area contains soft ground and appropriate sward structure as outlined by National England Technical Information Note TIN089. For Biodiversity Enhancement Zone C: measures of tree condition in 'British Standard 5837', tree species diversity, tree age and heights, whether glades are free of vegetation. For swift tower, whether tower is present / functional and occupied by swifts. The need for any remedial actions to be implemented should also be reported. • Objectives 13 and 14: Locations of hibernacula, orientation, evidence of flooding nearby / being located in a frost hollow, proximity to woodlands/scrub/watercourses, establishment of vegetation on north/south part of hibernacula,



Year	Management to be Implemented	Monitoring to be Implemented	Details to be Reported
		<p>occupancy, rough grassland buffers and bare soil patch for ground-nesting bees.</p> <ul style="list-style-type: none"> Objective 17: Undertake assessment of marsh fritillary habitat condition and survey for larval webs in Biodiversity Enhancement Area B. Objective 18: Undertake survey for invasive plant species during the growing season. 	<p>evidence of occupancy by hedgehogs, whether any remedial actions need to be implemented.</p> <ul style="list-style-type: none"> Objective 15: Whether ditches need to be dredged or not, evidence of dredging arisings left near ditch, height of ditch/marginal vegetation, evidence of shading vegetation, evidence of ditch widening, and whether any remedial actions need to be implemented. Objective 16: Locations / orientation / occupancy / condition of insect hotels, presence of 5 m rough grassland buffers and whether scrub has invaded, presence of bare patch for ground-nesting bees, and whether any remedial actions need to be implemented. Objective 17: Abundance of Devil's bit scabious, sward height and abundance of scrub, number and location of larval webs, and whether any remedial actions need to be implemented. Objective 18: Locations and extent of any invasive plant species, plus responses to eradication attempts, and whether any remedial actions need to be implemented.
Operational years 2-5	<ul style="list-style-type: none"> Objectives 1, 2, 3 and 8: Top trim hedgerow every year (new, infill or coppice) or after years 3-4 for newly laid hedge. Objectives 1, 2, 3 and 8: Carry out hedgerow enhancement if and when required. Objectives 7, 12 and 17: Stock low densities of highland cattle during driest of summer months every year OR use alternative livestock following agreement with NPWS OR remove scrub via hand on a three-year rotation. 	<ul style="list-style-type: none"> Objectives 1, 2, 3 and 8: Undertake condition assessment of hedgerow every year. Objectives 4 and 5: Undertake condition assessment of treeline every year. Objective 6: Undertake surveys of botany and physical characteristics of watercourses and riparian zones every year. 	<ul style="list-style-type: none"> Objectives 1, 2, 3 and 8: Measures of hedgerow condition in 'Hedgerow Appraisal System' including diversity of tree / shrub / climber component, and whether any remedial actions need to be implemented. Objectives 4 and 5: Measures of tree condition in 'British Standard 5837', and whether any remedial actions need to be implemented. Objective 6: Plant frequency / distribution, watercourse depth/flow/substrate type, and whether any remedial actions need to be implemented.



Year	Management to be Implemented	Monitoring to be Implemented	Details to be Reported
	<ul style="list-style-type: none"> • Objective 9: Clear detritus from bat boxes every year. • Objective 10: Fell / remove shrubs/trees for bat mitigation buffers every year. • Objective 11: Mow / trim vegetation within bat mitigation buffers to deter kestrel every year. • Objective 12: Hand mow edges of wader scrape if livestock cannot be used for conservation grazing every year; follow establishment actions for new trees in Biodiversity Enhancement Area C; remove any vegetation obscuring or climbing up swift tower every year; check integrity of materials and fixings of swift tower every year. • Objectives 13 and 14: Add new turves to hibernacula if required on north side / trim vegetation obscuring southern entrance to hibernacula if required every year. • Objective 15: Dredge new / existing ditches; cut ditch / marginal vegetation; trim shading vegetation in year 3. • Objective 16: Mow 5 m rough grassland buffers adjacent to access tracks/substation/hardstands and scrape back bare soil patch every year. • Objective 18: Carry out any treatment measures to eradicate invasive plant species every year for as long as required. 	<ul style="list-style-type: none"> • Objective 7: Undertake botanical surveys of species composition every year. • Objective 9: Undertake checks of bat box integrity of materials and fixings and evidence of occupation by bat boxes every year. • Objective 10: Undertake checks to ensure bat mitigation buffers have been implemented and static/fatality surveys for bats every year up to year 3 only. • Objective 11: Undertake checks to ensure bat mitigation buffers are unsuitable for kestrel and fatality surveys for birds every year up to year 3 only. • Objective 12: Undertake checks of wader scrapes, woodcock glades and swift tower to ensure presence / functionality and whether swift tower is occupied every year. • Objectives 13 and 14: Undertake checks of hibernacula every year. • Objective 15: Undertake check of ditches according to management criteria every year. 	<ul style="list-style-type: none"> • Objective 7: Plant frequency / distribution, number of typical indicator and high-quality indicator species, frequency of hoof prints, presence of invasive or problematic native species and vegetation height, and whether any remedial actions need to be implemented. • Objective 9: Presence of bat boxes, integrity of materials and fixings, evidence of occupancy, and whether any remedial actions need to be implemented. • Objective 10: Absence of shrub or trees within bat mitigation buffers, levels of bat activity surrounding turbines relative to baseline conditions, and whether any remedial actions need to be implemented. • Objective 11: Vegetation heights within bat mitigation buffers, kestrel fatalities, and whether any remedial actions need to be implemented. • Objective 12: For wader scrapes: whether scrapes present and vegetation-free; whether surrounding area contains soft ground and appropriate sward structure as outlined by National England Technical Information Note TIN089. For Biodiversity Enhancement Zone C: measures of tree condition in 'British Standard 5837', tree species diversity, tree age and heights, whether glades are free of vegetation. For swift tower, whether tower is present / functional and occupied by swifts. The need for any remedial actions to be implemented should also be reported. • Objectives 13 and 14: Locations of hibernacula, orientation, evidence of flooding nearby / being located in a frost hollow, proximity to woodlands/scrub/watercourses, establishment



Year	Management to be Implemented	Monitoring to be Implemented	Details to be Reported
		<ul style="list-style-type: none"> • Objective 16: Undertake check of insect hotels and occupancy, rough grassland buffers and bare soil patch for ground-nesting bees every year. • Objective 17: Undertake assessment of marsh fritillary habitat condition and survey for larval webs in Biodiversity Enhancement Area B every year. • Objective 18: Undertake survey for invasive plant species during the growing season every year. 	<ul style="list-style-type: none"> • of vegetation on north/south part of hibernacula, evidence of occupancy by hedgehogs, whether any remedial actions need to be implemented. • Objective 15: Whether ditches need to be dredged or not, evidence of dredging arisings left near ditch, height of ditch/marginal vegetation, evidence of shading vegetation, evidence of ditch widening, and whether any remedial actions need to be implemented. • Objective 16: Locations / orientation / occupancy / condition of insect hotels, presence of 5 m rough grassland buffers and whether scrub has invaded, presence of bare patch for ground-nesting bees, and whether any remedial actions need to be implemented. • Objective 17: Abundance of Devil's bit scabious, sward height and abundance of scrub, number and location of larval webs, and whether any remedial actions need to be implemented. • Objective 18: Locations and extent of any invasive plant species, plus responses to eradication attempts, and whether any remedial actions need to be implemented.
Operational years 5-35	<ul style="list-style-type: none"> • Objectives 1, 2, 3 and 8: Top different segments of hedgerow on 3-5 year rotation and cut back hedgerow overhanging ditches every five years. • Objectives 1, 2, 3 and 8: Carry out hedgerow enhancement if and when required. • Objectives 7, 12 and 17: Stock low densities of highland cattle during driest of summer months every year OR use alternative livestock following agreement with NPWS 	<ul style="list-style-type: none"> • Objectives 1, 2, 3 and 8: Undertake condition assessment of hedgerow every five years. • Objectives 4 and 5: Undertake condition assessment of treeline every five years. • Objective 6: Undertake surveys of botany and physical characteristics of watercourses 	<ul style="list-style-type: none"> • Objectives 1, 2, 3 and 8: Measures of hedgerow condition in 'Hedgerow Appraisal System' including diversity of tree / shrub / climber component, and whether any remedial actions need to be implemented. • Objectives 4 and 5: Measures of tree condition in 'British Standard 5837', and whether any remedial actions need to be implemented. • Objective 6: Plant frequency / distribution, watercourse depth/flow/substrate type, and



Year	Management to be Implemented	Monitoring to be Implemented	Details to be Reported
	<p>OR remove scrub via hand on a three-year rotation.</p> <ul style="list-style-type: none"> • Objective 9: Clear detritus from bat boxes every five years. • Objective 10: Fell / remove shrubs/trees for bat mitigation buffers every year. • Objective 11: Mow / trim vegetation within bat mitigation buffers to deter kestrel every year. • Objective 12: Hand mow edges of wader scrape if livestock cannot be used for conservation grazing every year; follow establishment actions for new trees in Biodiversity Enhancement Area C; remove any vegetation obscuring or climbing up swift tower every year; check integrity of materials and fixings of swift tower every year. • Objectives 13 and 14: Add new turves to hibernacula if required on north side / trim vegetation obscuring southern entrance to hibernacula if required every year. • Objective 15: Dredge new / existing ditches; cut ditch / marginal vegetation; trim shading vegetation; all to be implemented on three year rotation per 1/4 ditch length. • Objective 16: Mow 5 m rough grassland buffers adjacent to access tracks/substation/hardstands and scrape back bare soil patch every year. • Objective 18: Carry out any treatment measures to eradicate invasive plant species every year for as long as required. 	<p>and riparian zones every five years.</p> <ul style="list-style-type: none"> • Objective 7: Undertake botanical surveys of species composition every five years. • Objective 9: Undertake checks of bat box integrity of materials and fixings and evidence of occupation by bat boxes every five years. • Objective 12: Undertake checks of wader scrapes, woodcock glades and swift tower to ensure presence / functionality and whether swift tower is occupied every five years. • Objectives 13 and 14: Undertake checks of hibernacula every five years. • Objective 15: Undertake check of ditches according to management criteria every five years. • Objective 16: Undertake check of insect hotels and occupancy, rough grassland buffers and bare soil patch for ground-nesting bees every five years. • Objective 17: Undertake assessment of marsh fritillary habitat condition and survey for larval webs in Biodiversity 	<p>whether any remedial actions need to be implemented.</p> <ul style="list-style-type: none"> • Objective 7: Plant frequency / distribution, number of typical indicator and high-quality indicator species, frequency of hoof prints, presence of invasive or problematic native species and vegetation height, and whether any remedial actions need to be implemented. • Objective 9: Presence of bat boxes, integrity of materials and fixings, evidence of occupancy, and whether any remedial actions need to be implemented. • Objective 10: Absence of shrub or trees within bat • Objective 12: For wader scrapes: whether scrapes present and vegetation-free; whether surrounding area contains soft ground and appropriate sward structure as outlined by National England Technical Information Note TIN089. For Biodiversity Enhancement Zone C: measures of tree condition in 'British Standard 5837', tree species diversity, tree age and heights, whether glades are free of vegetation. For swift tower, whether tower is present / functional and occupied by swifts. The need for any remedial actions to be implemented should also be reported. • Objectives 13 and 14: Locations of hibernacula, orientation, evidence of flooding nearby / being located in a frost hollow, proximity to woodlands/scrub/watercourses, establishment of vegetation on north/south part of hibernacula, evidence of occupancy by hedgehogs, whether any remedial actions need to be implemented.



Year	Management to be Implemented	Monitoring to be Implemented	Details to be Reported
		<p>Enhancement Area B every five years.</p> <ul style="list-style-type: none"> Objective 18: Undertake survey for invasive plant species during the growing season every five years. 	<ul style="list-style-type: none"> Objective 15: Whether ditches need to be dredged or not, evidence of dredging arisings left near ditch, height of ditch/marginal vegetation, evidence of shading vegetation, evidence of ditch widening, and whether any remedial actions need to be implemented. Objective 16: Locations / orientation / occupancy / condition of insect hotels, presence of 5 m rough grassland buffers and whether scrub has invaded, presence of bare patch for ground-nesting bees, and whether any remedial actions need to be implemented. Objective 17: Abundance of Devil's bit scabious, sward height and abundance of scrub, number and location of larval webs, and whether any remedial actions need to be implemented. Objective 18: Locations and extent of any invasive plant species, plus responses to eradication attempts, and whether any remedial actions need to be implemented.



13.0 References

Baker, J., Beebee, T., Buckley, J., Gent, T. and Orchard, D., 2011. Amphibian Habitat Management Handbook. Amphibian and Reptile Conservation, Bournemouth.

British Standard 5837: 'Trees in relation to design, demolition and construction – Recommendations (2012) criteria for Category A - Tree of High Quality'

Circular Letter NPWS 2/08 Use of Herbicide Spray on Vegetated Road Verges

DAFM, 2021. Alien Invasive Plant Species. Available at gov.ie - Alien Invasive Plant Species (www.gov.ie) Accessed 24/05/2023

DAFM, 2022. Agri-Climate Rural Environment Scheme (ACRES) Specification Tranche 1 – November 2022. Available at <https://assets.gov.ie/231749/39dd9ce0-fb95-4619-bd8e-8ff53b752d08.pdf> Accessed 22/12/2023

DAFM, 2023. ACRES Circular No. 4/2023. Amendments to 'Planting a New Hedgerow' Specification.

Edgar, P., Foster, J., and Baker, J., 2010. Reptile Habitat Management Handbook. Amphibian and Reptile Conservation, Bournemouth.

Environment Agency, 2003. Guidance for the control of invasive weeds in or near freshwater. Environment Agency, Rio House, Waterside Drive, Aztec West, Almondsbury, Bristol, BS32 4UD.

Fleming, C., McCollom, A. and O'Leary, C. (2021) Environmental River Enhancement Programme Report 2020. Inland Fisheries Ireland, 3044 Lake Drive, Citywest, Dublin 24, Ireland.

Foulkes, N., Fuller, J., Little, D., McCourt, S. and Murphy, P., 2013. Hedgerow Appraisal System – Best Practice Guidance on Hedgerow Surveying, Data Collection and Appraisal. The Heritage Council.

Gazzard A, Baker PJ. What makes a house a home? Nest box use by West European hedgehogs (*Erinaceus europaeus*) is influenced by nest box placement, resource provisioning and site-based factors. PeerJ. 2022 Jul 4;10:e13662. doi: 10.7717/peerj.13662. PMID: 35811826; PMCID: PMC9261924.

Inland Fisheries Ireland. (2020). Urban Watercourse Planning Guide.

ISI. (2023). www.invasivespeciesireland.ie (Accessed 10/07/2023)

ISI. (2015) Best Practice Management Guidelines for Japanese Knotweed

ISI. (2008). Best Practice Guidelines for Rhododendron (*Rhododendron ponticum*) and Cherry Laurel (*Prunus laurocerasus*). Invasive Species Ireland. <http://www.tii.ie/technicalservices/environment/construction/Management-of-Noxious-Weeds-and-Non-Native-Invasive-Plant-Species-on-National-Road-Schemes.pdf>

Meath County Development Plan 2021-2027. Chapter 8 (Cultural and Natural Heritage Strategy).

National Biodiversity Data Centre (2009). Pollinator-friendly management of wind farms. Guidelines 12.

National Biodiversity Data Centre (2022). Protecting Farmland Pollinators Midterm Report.

National Roads Authority (2010) The Management of Noxious Weeds and Non-Native Invasive Plant Species on National Road Schemes (chapter 7 and appendix 3)

NatureScot (formerly SNH), 2016. Planning for development: what to consider and include in Habitat Management Plans. Battleby, Scotland.

Nature Scot (2021) Bats and Onshore Wind Turbines: Survey, Assessment and Mitigation. NatureScot (Scottish Natural Heritage), Natural England, Natural Resources Wales, RenewableUK, Scottish Power Renewables, Ecotricity Ltd, the University of Exeter and the Bat Conservation.

NPWS (2019). The Status of EU Protected Habitats and Species in Ireland. Volume 2: Habitat Assessments. Unpublished NPWS report. Edited by: Deirdre Lynn and Fionnuala O'Neill

Phelan, N., Nelson, B., Harding, J. & Lysaght, L. (2021) Ireland's Butterflies Series No. 1: Habitat Management for the Marsh Fritillary. National Biodiversity Data Centre, Waterford

Pschonny, S., Leidinger, J., Leitzl, R. and Weisser, W.W., 2022. What makes a good bat box? How box occupancy depends on box characteristic and landscape-level variables. Ecological Solutions and Evidence. 3: e12136

ŠefferoVá Stanová V., Šeffeř J. & Janák M. 2008. Management of Natura 2000 habitats. 7230 Alkaline fens

UK Environment Agency (2013) The Knotweed Code of Practice: Managing Japanese Knotweed on development sites. Version 3. Published by the UK Environment Agency, Bristol. Available online at <https://www.gov.uk/government/publications/japanese-knotweed-managing-ondevelopment-sites> (now withdrawn).

Westmeath County Development Plan 2021-2027. Chapter 12 (Natural Heritage and Green Infrastructure).



Appendix A Figures

Habitat and Species Management Plan

Knockanarragh Wind Farm

Knockanarragh Wind Farm Ltd

SLR Project No.: 501.V00727.00008

5 January 2024

661000 662000 663000 664000 665000 666000

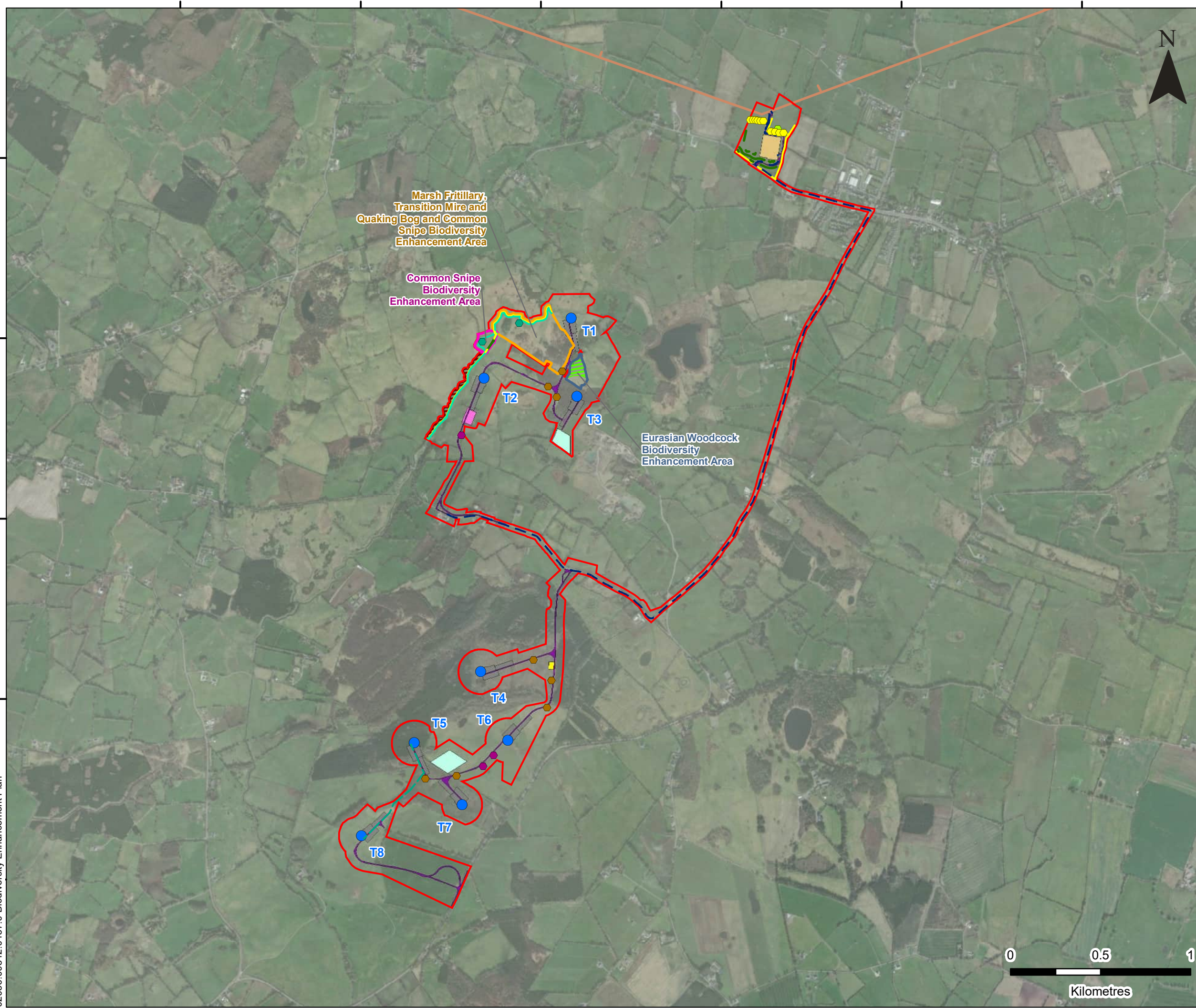
769000

768000

767000

766000

02036.008.12.0137.0 Biodiversity Enhancement Plan



LEGEND

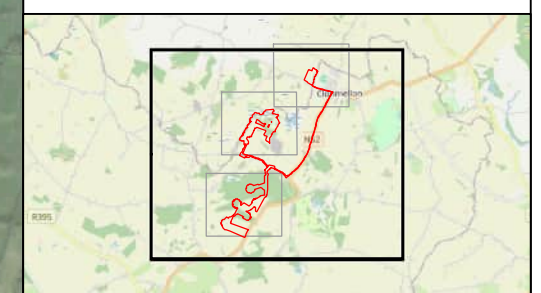
- Proposed Development Site Boundary
- Proposed Turbine Location
- Proposed Internal Collector Cable
- Proposed Cable Route
- Proposed Access Track
- Proposed Temporary Construction Compound
- Proposed Operational Compound
- Proposed Substation Location
- Proposed Borrow Pit
- Proposed Crane Hardstanding
- Existing High Voltage Transmission Line

Biodiversity Enhancement Zone

- A
- B
- C

Habitat Enhancement Feature

- Bat Box
- Common Snipe Wader Scrape
- Insect Hotel
- Log Pile For Hedgehog / Reptile
- Swift Tower
- New & Replacement Hedgerow Planting
- Replacement Treeline Planting
- Watercourse Rehabilitation Fencing
- New Broadleaved Woodland For Eurasian Woodcock
- Riparian Buffer for New Planting



KNOCKANARRAGH WIND FARM LIMITED

7 DUNDRUM BUSINESS PARK
WINDY ARBOUR
DUBLIN D14 N2Y7
IRELAND
T: 0129 64667
www.slrconsulting.com

KNOCKANARRAGH WIND FARM
ENVIRONMENTAL IMPACT
ASSESSMENT REPORT

HABITAT & SPECIES MANAGEMENT

**BIODIVERSITY ENHANCEMENT PLAN -
OVERVIEW**

FIGURE 1-2-a

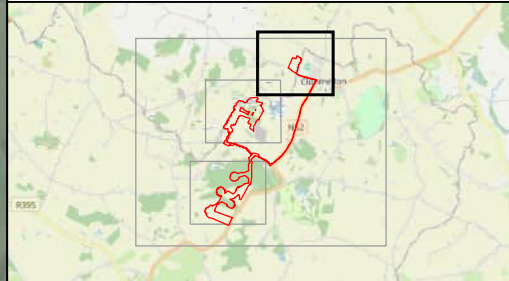
Scale 1:20,000 @ A3 Date JANUARY 2024

664000

665000



- LEGEND**
- Proposed Development Site Boundary
 - Proposed Cable Route
 - Proposed Access Track
 - Proposed Substation Location
 - Existing High Voltage Transmission Line
- Habitat Enhancement Feature**
- Bat Box
 - Swift Tower
 - New & Replacement Hedgerow Planting
 - Replacement Treeline Planting



**KNOCKANARRAGH
WIND FARM LIMITED**

SLR 7 DUNDRUM BUSINESS PARK
WINDY ARBOUR
DUBLIN D14 N2Y7
IRELAND
T: 0129 64667
www.slrconsulting.com

**KNOCKANARRAGH WIND FARM
ENVIRONMENTAL IMPACT
ASSESSMENT REPORT**

HABITAT & SPECIES MANAGEMENT

**BIODIVERSITY ENHANCEMENT PLAN -
SUBSTATION**

FIGURE 1-2-b



Scale 1:6,000 @ A3 Date JANUARY 2024

769000

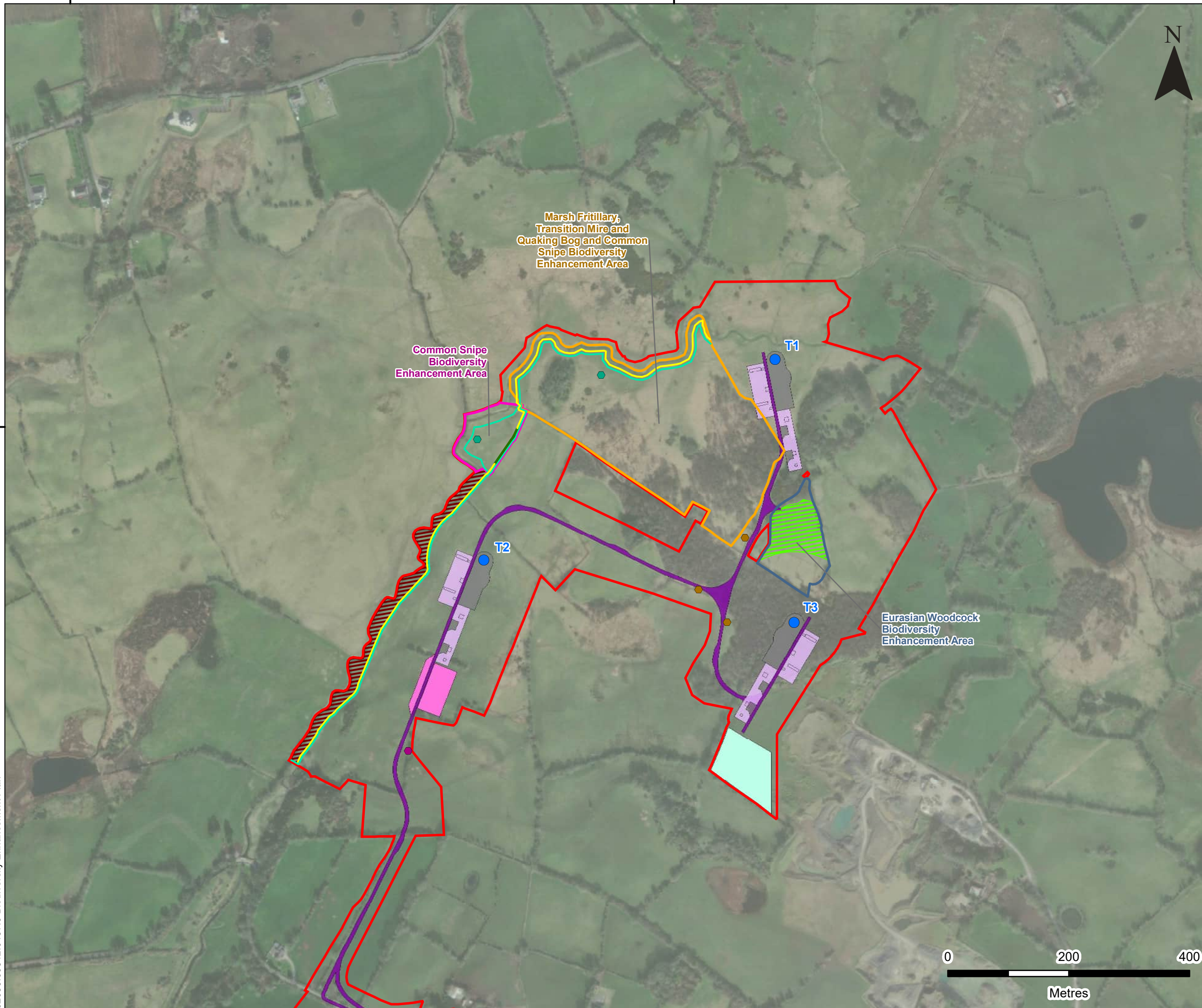
02036_00812_0137.0 Biodiversity Enhancement Plan

662000

663000

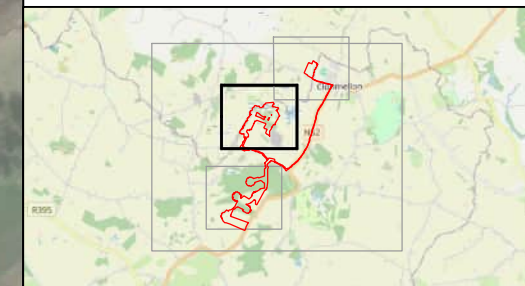
768000

02036_00812_0137.0 Biodiversity Enhancement Plan



LEGEND

- Proposed Development Site Boundary
- Proposed Turbine Location
- Proposed Access Track
- Proposed Temporary Construction Compound
- Proposed Borrow Pit
- Proposed Crane Hardstanding**
- Permanent
- Temporary
- Biodiversity Enhancement Zone**
- A
- B
- C
- Habitat Enhancement Feature**
- Common Snipe Wader Scrape
- Insect Hotel
- Log Pile For Hedgehog / Reptile
- New & Replacement Hedgerow Planting
- Replacement Treeline Planting
- Watercourse Rehabilitation Fencing
- New Broadleaved Woodland For Eurasian Woodcock
- Riparian Buffer for New Planting



KNOCKANARRAGH WIND FARM LIMITED

7 DUNDRUM BUSINESS PARK
 WINDY ARBOUR
 DUBLIN D14 N2Y7
 IRELAND
 T: 0129 64667
 www.slrconsulting.com

KNOCKANARRAGH WIND FARM
 ENVIRONMENTAL IMPACT
 ASSESSMENT REPORT
 HABITAT & SPECIES MANAGEMENT
**BIODIVERSITY ENHANCEMENT PLAN -
 NORTHERN CLUSTER**

FIGURE 1-2-c

Scale 1:6,000 @ A3 Date JANUARY 2024

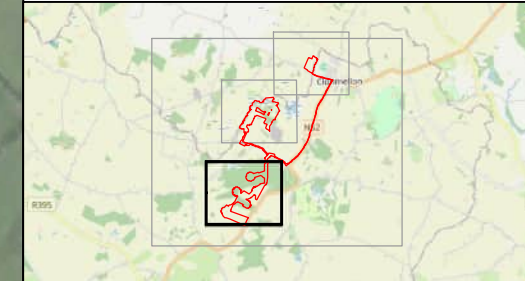
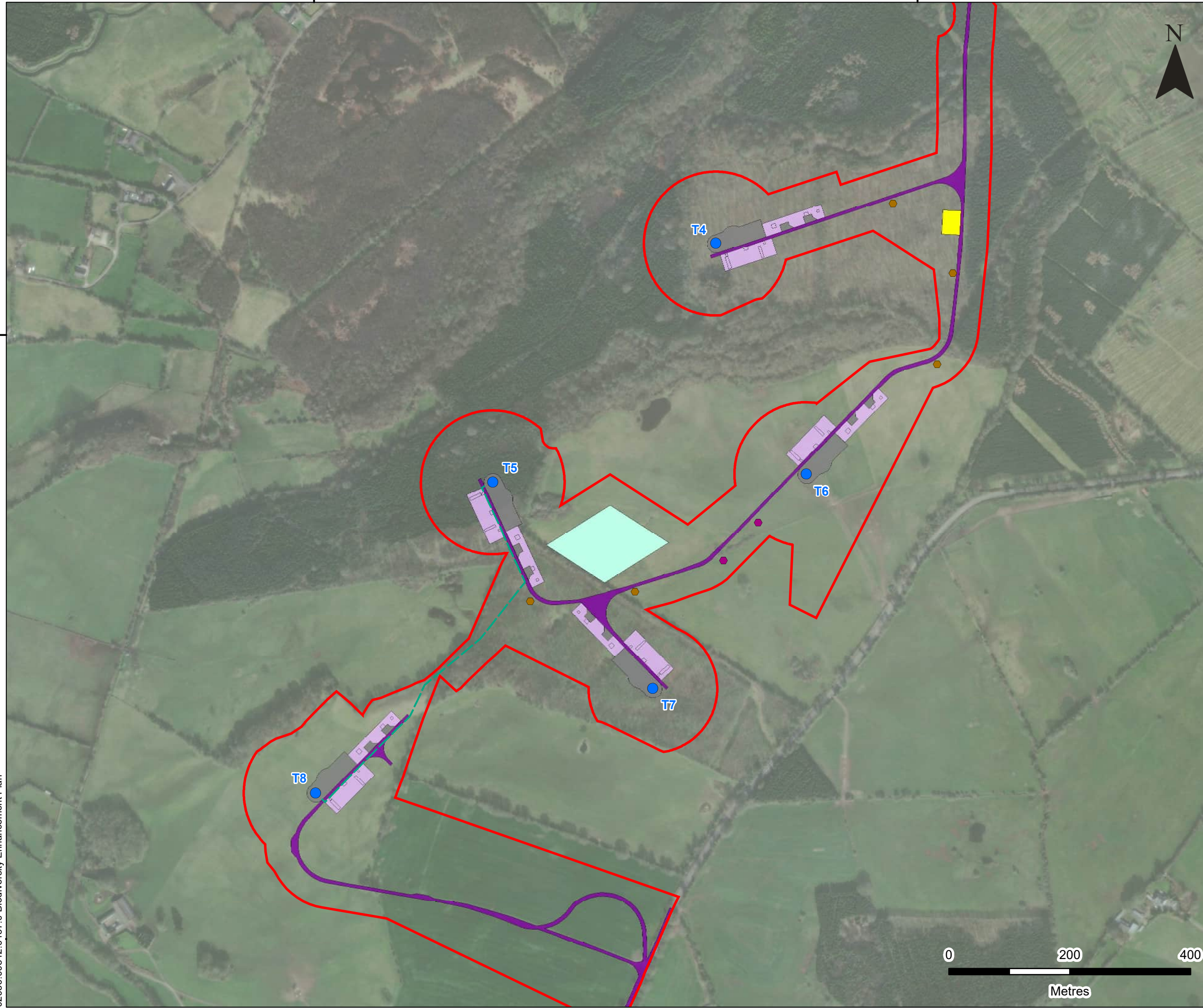
662000

663000



- LEGEND**
- Proposed Development Site Boundary
 - Proposed Turbine Location
 - Proposed Internal Collector Cable
 - Proposed Access Track
 - Proposed Operational Compound
 - Proposed Borrow Pit
 - Proposed Crane Hardstanding**
 - Permanent
 - Temporary
 - Habitat Enhancement Feature**
 - Insect Hotel
 - Log Pile For Hedgehog / Reptile

766000



**KNOCKANARRAGH
WIND FARM LIMITED**

SLR 7 DUNDRUM BUSINESS PARK
WINDY ARBOUR
DUBLIN D14 N2Y7
IRELAND
T: 0129 64667
www.slrconsulting.com

KNOCKANARRAGH WIND FARM
ENVIRONMENTAL IMPACT
ASSESSMENT REPORT
HABITAT & SPECIES MANAGEMENT
**BIODIVERSITY ENHANCEMENT PLAN -
SOUTHERN CLUSTER**

FIGURE 1-2-d



Scale 1:6,000 @ A3 Date JANUARY 2024

02036_00812_0137.0 Biodiversity Enhancement Plan



Making Sustainability Happen