Colehill 110Kv Substation Environmental Designations Map Appendix 2A - Figure 2.1

Key

- Development Boundary
- 5km Study Area
- 15km Study Area
- Special Areas of Conservation (SACs)
- Natural Heritage Area (NHA)
- Proposed Natural Heritage Areas (pNHAs)
- Ramsar sites

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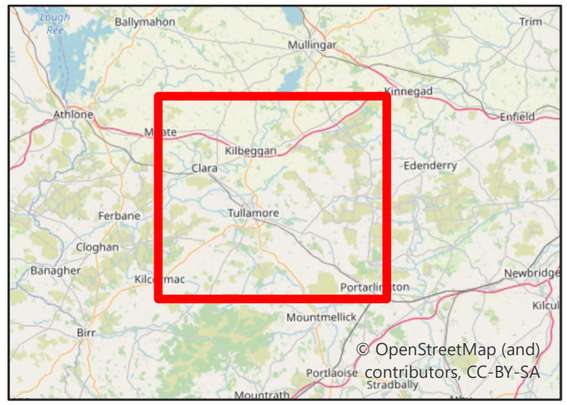
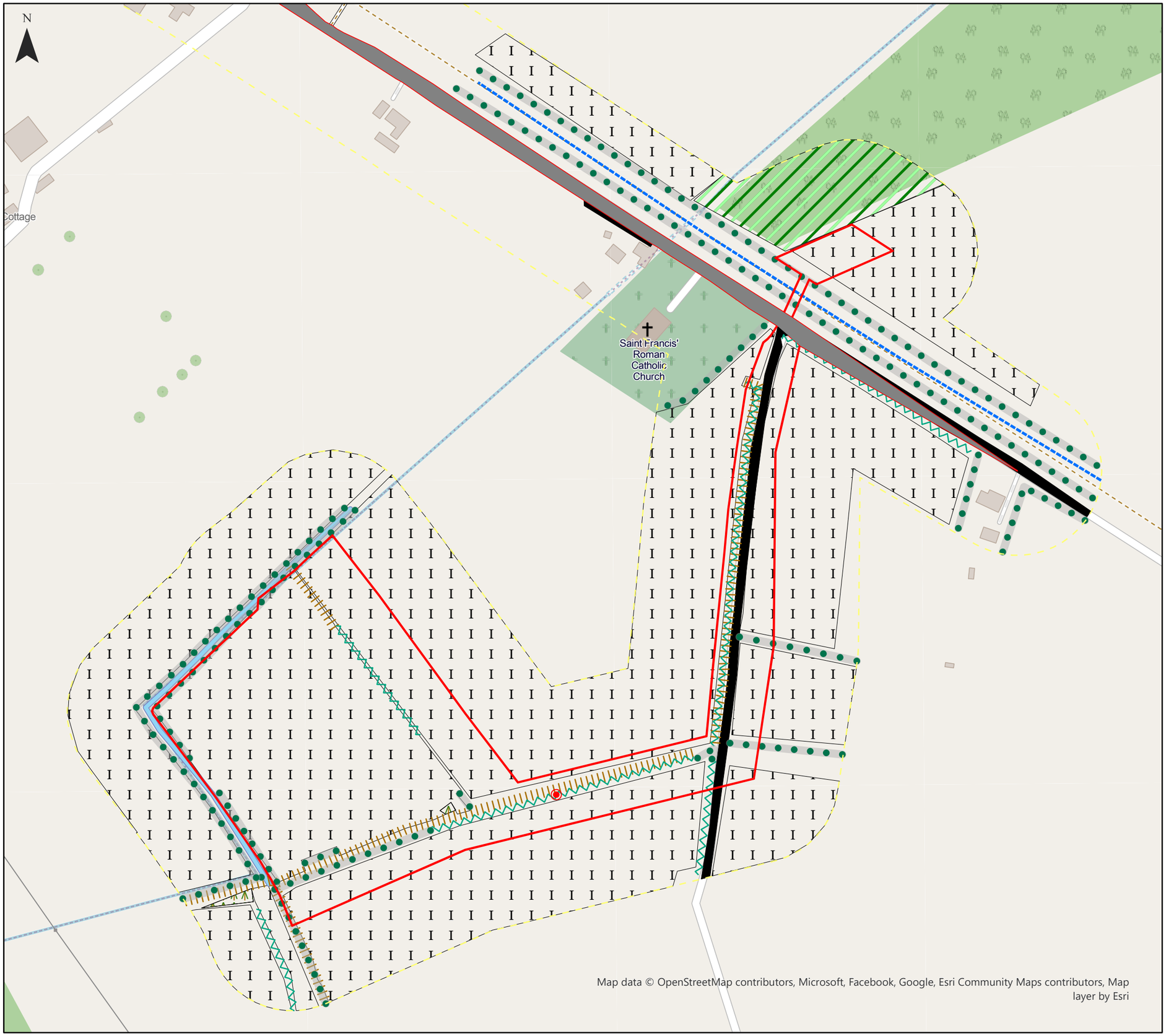


Date: 21/11/2025
Drawn By: Kellie Kerr
Scale (A3): 1:125,000
Drawing No: NEO01104/021I/A

Colehill 110Kv Substation
Fossitt Habitat Map
Appendix 2A - Figure 2.2



Key

- Development Boundary
- Grid Route
- 50m ESA buffer
- Target notes
- Depositing/Lowland Rivers (FW2)
- Dry Canals (FW3)
- Drainage Ditches (FW4)
- Hedgerow (WL1)
- Treelines (WL2)
- Buildings and Artificial Surfaces (BL3)
- Improved Agricultural Grassland (GA1)
- Scrub (WS1)
- Mixed Broadleaved Woodland (WD1)

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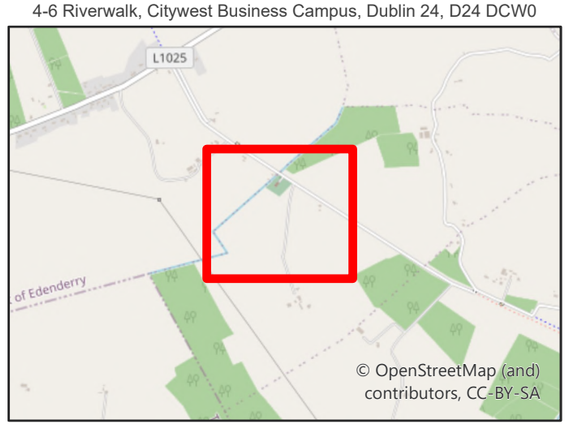

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Appendix 2B: Site Photographs

Colehill 110kV Substation and Grid Route

Photograph 1: Improved agricultural grassland (Within ESA) – GA1

Photograph 2: Wet Grassland - GS4

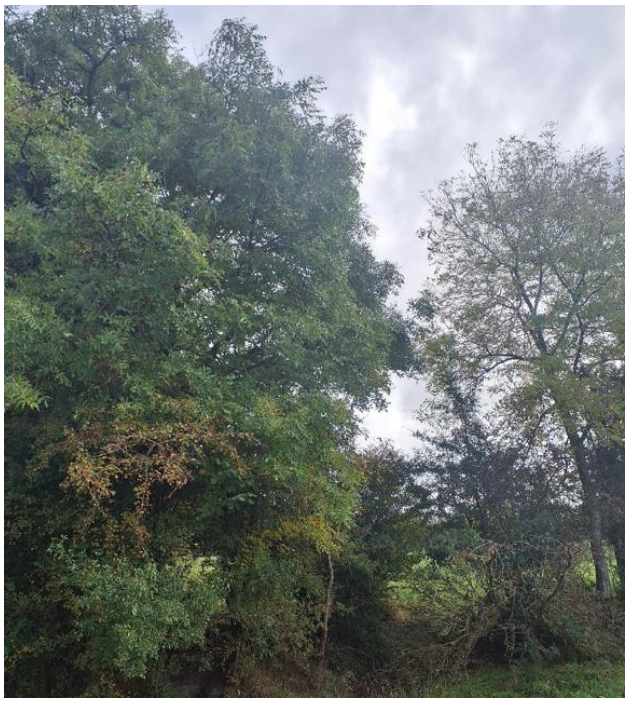
Photograph 3: Scrub - WS1

Photograph 4: Depositing Lowland Watercourses – FW2

Photograph 5: Drainage Ditches – FW4

Photograph 6: Dry Canals– FW3

Photograph 7: Treelines- WL2



Photograph 8: Hedgerows WL1

Photograph 9: Ash tree with Low Bat Roost Potential

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Appendix 2C

Appendix 2C– Habitat of Bat Species in Ireland

Table 2-9: General/Preferred Foraging and Commuting Habitats of Bat Species Returned by the Data Search

Species	Foraging and Commuting Habitat	Roosting Preferences
Common pipistrelle (*Pipistrellus pipistrellus*)	Shows a preference for deciduous woodland but a generalist using a wide range of habitats.	Maternity colonies are found mainly in buildings, usually roosting out of sight in crevices. Colonies may use a number of sites through the summer but are often loyal to the same sites for many years. Maternity colonies are extremely variable in terms of numbers, from 20 to over 1,000 bats. Males roost singly or in small groups in the summer, in buildings or trees. Bat boxes are used by both males and females but generally only males use them in the summer. These species do not use underground sites for hibernation but are sometimes found in the cracks and crevices of buildings in the winter.
Soprano pipistrelle (*Pipistrellus pygmaeus*)	Tends to select riparian habitats over other habitat types available.	
Nathusius' pipistrelle (*Pipistrelle nathusii*)	Riparian habitats, broadleaved and mixed woodland and parkland, occasionally found in farmland but always near water. Found over lakes and rivers.	The very few known Irish roosts are in buildings, with hibernation roosts in hollow trees and crevices in cliffs, walls and caves.
Leisler's bat (*Nyctalus leisleri*)	Recorded foraging in woodland edges, scrub or woodland-lined roads and over pasture. Also recorded over drainage canals, lakes and coniferous forests. Recorded as selecting parkland/amenity grasslands, deciduous woodland edge and river/canals but avoiding improved grassland.	Roosts in trees, bat boxes and buildings such as houses; for example around the gable end of lofts, under tiles, under soffit boards and in disused chimneys. Often uses a variety of sites in the summer. Hibernates in holes, buildings and sometimes in caves and tunnels.

Brown long-eared bat (*Plecotus auritus*)	Strongly associated with tree cover, prefers woodland with cluttered understory, including native species, particularly deciduous. Also forages in mixed woodland edge and among conifers. Use of hedgerows increase through the active season.	Maternity roosts found in the voids of large, old buildings and bat boxes in woodland. Usually roosts against wooden beams at the roof apex in attics or farm buildings. Bats often cluster at the highest part of the roof and require enough space for unobstructed, internal flight. Shows high roost fidelity. Common uses feeding perches and night roosts in porches or outbuildings separate from the main roost. Hibernate in underground sites, trees holes and buildings.
Whiskered bat (*Myotis mystacinus*)	Whiskered bats use mixed woodland, riparian vegetation, arable and rough grassland habitats although select the first two as core foraging habitats. One study found that whiskered bat selected pasture with hedgerows for foraging. A German study showed that whiskered bats favour areas near rivers and more open habitats with hedges and coppices.	Can roost in trees and a wide range of buildings in the summer. Hibernates in caves or other underground sites, where they can be found in the open or in cracks and crevices.
Natterer's bat (*Myotis nattereri*)	Preferred foraging habitat is semi-natural broad-leaved woodland, tree-lined river corridors and ponds, but also uses grassland. Avoids dense coniferous plantation. An autumn study revealed that the species use woodland and mixed agricultural areas.	Roost sites include tree holes and different types of buildings but has also been found in bridges. Usually roost in attics between late May and mid-July and often roosts have enough space for internal flights. This species also breeds in bat boxes. Timber-framed barns built between 12th and 19th centuries may be particularly important to this species, with roosts found in mortise joints in both summer and winter.

		Hibernates in cracks and crevices in caves and mines. Other hibernations sites recorded are canal and railway tunnels, ice houses and tree cavities.
Daubenton's bat (*Myotis daubentonii*)	Preferred foraging habitat is over water; this species favours riverine habitats but is also known to forage in woodland.	Roosts are found in hollow trees, bridges or sometimes buildings generally close to water. Nursery roosts are not exclusively female – males make up 25% or more of the colony and large male-only colonies have also been recorded. Hibernation sites are usually underground including caves, mines and suitable tunnels where bats are found both in crevices and on open walls. They may also hibernate in tree cavities.
Lesser horseshoe bat (*Rhinolophus hipposideros*)	Preferred foraging habitats include broad-leaved woodland well connected by commuting routes such as hedge, woodland edge and riparian trees. This species has also been recorded in coniferous woodland. Probably reluctant to cross open space as recorded very low (less than 1m) in open habitats. This species can remain active during the hibernation periods.	Roost sites include attics, chimneys and boiler rooms of buildings, rural houses and out buildings in the summer, and cellars, tunnels, disused mines and caves for hibernation. Also found in industrial buildings. This species prefers to fly directly into roost sites and into their roosting position.

Appendix 2D – Biodiversity Management Plan

Colehill 110kV Substation and Grid Route

20/11/2025

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Approved By:	Paul Neary	

Contents

1. EXECUTIVE SUMMARY

1.1. Neo Environmental Ltd have been commissioned by Renewable Energy Systems (RES) Ltd ("the Applicant") to undertake Biodiversity Management Plan (BMP) to enhance and maintain the biodiversity for a proposed Strategic Infrastructure Development ("SID") Application for a new 110kV Substation, access road, interconnection cables and grid route ("the Proposed Development") to connect into the existing Thornsberry Substation. The substation, access road, interconnection cables and grid route is situated within the townlands of Ballyteige Little, Wood of O, Corndarragh, Derrynagall or Ballydaly, Ardan and Puttaghan, Co. Offaly ("the Proposed Development Site"). The Substation is to facilitate the Ballyteige Solar Farm (PA Ref: 2198) and Derrygrogan Solar Farm (PA Ref: 22378 ABP-318041-23).

1.2. These include enhancement measures such as the development of species-rich grassland and wildflower mix and the installation of bird boxes and bat boxes.

1.3. Actions have been formulated within this document to enable the objectives to be met and to maximise the site's potential for supporting wildlife. Species which have been given priority within this management plan include farmland birds, butterflies, bats and herptile species.

1.4. An updated Fossitt habitat survey was carried out on the 9th and 10th of October 2024 by Louis Maloney, a former Principal Ecologist at Neo Environmental as part of the ecological assessment for the Proposed Substation site and a 50m buffer around the site.

1.5. The enhancements and management measures set out in this document have been developed in accordance with the findings of the above habitat survey. This will mitigate potential impacts on local biodiversity associated with the Proposed Development.

2. INTRODUCTION

Background

2.2. Neo Environmental Ltd has been appointed by Renewable Energy Systems on behalf of Ballyteige Solar Limited (the "Applicant") to undertake a Biodiversity Management Plan for a Strategic Infrastructure Development ("SID") Application for a new 110kV Substation ("Colehill 110kV Substation") and grid connection to the existing Thornsberry 110kV substation.

Development Description

2.3. "The Proposed Development" comprises of a 110kV substation, access road, interconnection cables and grid route. The Proposed Development is to facilitate the connection of Ballyteige (PA Ref: 2198) and Derrygrogan (PA Ref: 22378 and ABP 318041-23) solar farms to the national grid. The method of connection to the national grid for the new substation will be a 110kV tail-fed connection into the existing Thornsberry Substation.

2.4. The Proposed Development will consist of:

- 1No. substation compound comprising of No.3 work areas with CCTV and associated drainage which will be enclosed by 2.6m high palisade fencing and gates:
- 1No. Eirgrid control building, 110kV bay arrangements, 4No. lightning poles, compound road,
- Crane hardstand, 2No. transformers and 2. No auxiliary transformers, 110kV electrical equipment, back up generator,
- 2No. Independent Power Purchaser (IPP) control buildings and compound including toilet, 2No. grid code compliance equipment, 2No. harmonic filters, car parking and telecoms pole),
- Property boundary fencing;
- Access tracks (upgraded existing and new);
- Temporary construction compound and temporary access track,
- Temporary and permanent road re-alignment of a section of O of Wood local road;
- c.7.5km of underground 110kV cabling with joint bays, over and under watercourse crossing and a potential horizontal directional drill on access track and local roads;
- c.610m of medium voltage underground interconnection cable with associated horizontal directional drill.

2.5. Please see Figure 103 in Volume 2 for a layout of the Proposed Development.

Site Description

2.6. The Proposed Development is situated within the townlands of Ballyteige Little, Wood of O, Corndarragh, Derrynagall or Ballydaly, Ardan and Puttaghan, Co. Offaly.

2.7. The Colehill 110kV Substation is proposed to be located in one relatively flat agriculture field. The proposed 7.5km grid route will run in a northeast direction from the proposed Colehill 110kV substation to the existing ESB Thornsberry 110kV substation via private land and local roads. Interconnection cables from the eastern sections of Derrygrogan Solar Farm will be installed via horizontal directional drilling on a section of an agricultural field underneath the dry canal into the proposed access and track of Colehill 110kV Substation.

2.8. The Proposed Development lies at an elevation of c. 71.7 to 77.8m AOD and covers a total area of c. 11.2 hectares. The approximate Irish Grid Reference points (ITM) of the proposed Colehill 110kV substation are X 639234 and Y 727175. Access to the proposed substation will be from the Wood of O road to the east of the Substation "Proposed Substation Site" which is the same entrance point for the consented Ballyteige Solar Farm (PA Ref: 2198).

2.9. The grid route and substation boundaries are approximately 250m and 5.8km northeast from Tullamore Town.

3. GUIDANCE

3.1. Biodiversity is declining across Ireland; however, recent agri-environment schemes indicate that through appropriate management of the land, biodiversity can significantly increase. Through appropriate management, solar farm developments have the potential to support wildlife and increase biodiversity when located on agricultural land.

3.2. Due to the nature of solar farm developments, a large proportion of the site is accessible for plant growth and potential wildlife enhancements. Currently no standard guidance is available in Ireland regarding the enhancement of solar farms for the benefit of local wildlife. In the UK each solar farm development requires a Biodiversity Management Plan (BMP), the purpose of which is to identify objectives for biodiversity and the means by which these objectives will be achieved. This can include the protection of existing species and habitats and the establishment of new habitats, as well as their maintenance and monitoring. Given the similarities between the species and habitats present in the UK and Ireland, it has been deemed that the adoption of the UK standard guidance is appropriate in the current absence of Irish guidance.

3.3. According to 'Biodiversity Guidance for Solar Developments'[1], the BMP should:

- *identify key elements of biodiversity on site, including legally protected species, species and habitats of high conservation value such as those listed on Section 41 of Natural Environmental and Rural Communities (NERC) Act 2006[2], and designated areas in close proximity to the proposed site;*
- *identify any potential impacts arising from the site's development, and outline mitigations to address these;*
- *detail specific objectives for the site to benefit key elements of biodiversity and the habitat enhancements that are planned to achieve these;*
- *contribute to biodiversity in the wider landscape and local ecological network by improving connectivity between existing habitats;*
- *identify species for planting and suitable sources for seed and plants;*
- *consider wider enhancements such as nesting and roosting boxes;*
- *summarise a management regime for habitats for the entire life of the site; and*

[1] BRE (2014) Biodiversity Guidance for Solar Developments. Eds G E Parker and L Greene
[2] Natural Environmental and Rural Communities Act (NERC) 2006, available at www.legislation.gov.uk; broadly equivalent legislation exists in Ireland

- *provide a plan for monitoring the site; and adapting management as appropriate to the findings of this monitoring."*

The BMP has also been informed by the Fossitt habitat survey that was conducted on the 9th and 10th of October 2024

OBJECTIVE OF THE BIODIVERSITY MANAGEMENT PLAN

3.4. The objective of this BMP is to minimise any potential negative impacts arising from the proposed development, while increasing the habitat diversity. The enhancement of the land within the development boundary will increase the site's capability of supporting wildlife, through generation of renewable energy.

3.5. This will be achieved by:

- Creating and maintaining Species-Rich and Wildflower Grassland; Creation of wildlife shelters;
- Ensuring minimal loss of biodiversity on the site as a result of the habitat creation scheme, and
- Maximising the floral and faunal biodiversity of the created and retained habitats.

4. CURRENT CONSERVATION & BIODIVERSITY

NATIONAL CONSERVATION

National Biodiversity Action Plan ("NBAP") 2023-2030 [3]

4.2. Ireland's 4th National Biodiversity Action Plan 2023-2030 sets out a vision and five strategic objectives to halt the decline of biodiversity across Ireland, as follows:

- Objective 1 - Adopt a Whole of Government, Whole of Society Approach to Biodiversity
- Objective 2 - Meet Urgent Conservation and Restoration Needs
- Objective 3 - Secure Nature's Contribution to People
- Objective 4 - Enhance the Evidence Base for Action on Biodiversity
- Objective 5 - Strengthen Ireland's Contribution to International Biodiversity Initiatives

4.3. This document outlines that special protection to sites of highest nature value and species most at risk, including designated sites, should be afforded. However, effective conservation and sustainable use of biodiversity should also occur within the wider countryside, as this is where much of the biodiversity lies.

4.4. The primary threat to biodiversity both within and outside protected areas is from habitat degradation, fragmentation and loss due to changes in agricultural practices (such as intensification), commercial forestry, fisheries over-exploitation, peat extraction, air and water pollution, invasive alien species, land clearance and development, tourism and recreational activities, and climate change.

National Biodiversity Action Strategy 2022-2026[4]

4.5. The National Biodiversity Action Strategy was created by the Office of Public Works to identify strategic actions to help government delivery of the National Biodiversity Action Plan. The Plan outlines 48 strategic actions, each with an expected outcome and key performance indicators defined. These actions are divided into five strategic themes;

- Strategic Theme 1 Planning for Nature
- Strategic Theme 2 Natural Leaders

[3] 4th_National_Biodiversity_Action_Plan.pdf (npws.ie)
[4] OPW (2022) Biodiversity Action Strategy 2022-2026 - gov - OPW Biodiversity Action Strategy 2022 - 2026 (www.gov.ie)

- Strategic Theme 3 Working with Water and Wildlife
- Strategic Theme 4 Diversity by Design
- Strategic Theme 5 Natural Knowledge

County Offaly Biodiversity Action Plan –2025-2030[5]

4.6. The aim of the County Offaly Biodiversity Action Plan 2025-2030 is to build on previous works within the county to protect and enhance natural areas to benefit biodiversity and people. The strategic objectives of the plan are concerned with:

- Surveys and monitoring
- Actions for biodiversity
- Alien invasive species
- Building resilience
- Awareness and engagement

All Ireland Pollinator Plan 2021-2025[6]

4.7. On the 17th of September 2015, Ireland joined a small number of countries in Europe who have developed a strategy to address pollinator decline and protect pollination services. In March 2021, a new Plan was released.

4.8. This new Plan has six objectives and has identified 186 actions in order to achieve its objectives. The six objectives are as follows:

- **Making farmland pollinator friendly**. Working together with the farming community, increase awareness of pollinators and the resources they need in order to survive on farmland.
- **Making public land pollinator friendly**. Working with Councils, Transport Authorities, Local Communities and others, to strengthen links between this plan and other initiatives and to increase shelter and food resources for pollinators.

[5] Offaly County Council (2025) *Offaly Biodiversity Action Plan 2025-2030*. Available at: https://www.offaly.ie/app/uploads/Offaly-Biodiversity-action-Plan-2025-2030.pdf

[6] National Biodiversity Data Centre (2015) All Ireland Pollinator Plan 2021-2025. Available at: https://pollinators.ie/wp-content/uploads/2021/03/All-Ireland-Pollinator-Plan-2021-2025-WEB.pdf

- **Making private plan pollinator friendly**. Work together with the public and community groups to create networks of biodiversity-friendly habitat across the landscape.
- **All-Ireland honeybee strategy**. Working with beekeepers, achieve healthy, sustainable populations, and for honeybees to be part of a cohesive pollinator message that balances managed and wild pollinator populations.
- **Conserving rare pollinators**. Improving our knowledge on rare pollinators, and raising awareness through dedicated initiatives, achieve a Plan that protects as much wild pollinator diversity as possible.
- **Strategic coordination of the Plan**. Continually raising awareness; addressing gaps in knowledge through research, tracking where pollinators occur and how populations are changing, work from an evidence base that enables us to coordinate a dynamic plan that is targeted and effective.

4.9. The enhancements set out within this BMP will create areas of flower-rich habitat that will support Ireland's pollinator species, including bees and flies.

LOCAL CONSERVATION

4.10. The Proposed Development Site does not occur within any European Designated sites. Within the 15km zone of influence surrounding the Proposed Development Site there are six Special Areas of Conservation (SACs), namely, Charleville Wood SAC, Raheenmore Bog SAC, Spilt Hills and Long Esker SAC, Clara Bog SAC, River Barrow and River Nore SAC and Lough Ennel SAC. In addition, within the 15km zone of influence surrounding the Proposed Development Site there are two Ramsar sites, namely, Clara Bog Ramsar site and the Raheenmore Bog Ramsar site.There are no Special Protection Areas (SPAs) identified within the 15km study zone.

4.11. Please refer to the supporting Natura Impact Statement (NIS) for details of all Natura 2000 sites within 15km of the Application Boundary.

4.12. From the findings of the Ecological Appraisal and NIS it is considered that, with the implementation of design, best practice and mitigation measures, the Proposed Development will **not significantly impact upon any of the designated and non-designated sites** located within 15km.

5. HABITATS & SPECIES PRESENT

5.2. An updated Fossitt habitat survey was carried out on the 9th and 10th of October 2024 by Louis Maloney, a former Principal Ecologist at Neo Environmental as part of the ecology assessment for the Proposed Substation site and a 50m buffer around the site.

5.3. This highlighted the presence of the following habitat types:

- Buildings and Artificial Surfaces (BL3);
- Improved Agricultural Grassland (GA1);
- Mixed Broadleaved Woodland (WD1);
- Scrub (WS1);
- Depositing/Lowland Watercourses (FW2);
- Dry canals (FW3)
- Drainage Ditches (FW4);
- Hedgerows (WL1); and
- Treelines (WL2).

RECORDED SPECIES

5.4. The Fossitt habitat survey covered all land within the Proposed Substation Site and a 50m buffer around the entire site, where access allowed.

5.5. A list of flora species present onsite was compiled as part of the habitat survey, details of species observed can be found in Table 5-1.

Table 5-1 Flora identified within the Study area.

Scientific Name	Common Name
Holcus lanatus	Yorkshire fog
Trifolium pratense	Red clover
Trifolium repens	White clover
Urtica dioica	Common nettle
Asteraceae sp.	Thistle
Polygala vulgaris	Common milkwort
Rumex obtusifolius	Broadleaved dock
Juncus effusus	Common rush
Potentilla anserina	Silverweed
Lolium perenne	Perennial ryegrass
Cirsium vulgare	Spear thistle
Crataegus monogyna	Hawthorn
Fraxinus excelsior	Ash
Fagus sylvatica	Beech
Salix cinerea	Grey willow
Corylus avellana	Hazel
Rosa canina	Dog rose
Rubus fruticosus	Bramble
Hedera helix	Ivy
Cirsium arvense	Creeping thistle
Asplenium scolopendrium	Hart's-tongue fern
Filipendula ulmaria	Meadowsweet
Ulex europaeus	Gorse
Viburnum opulus	Guelder rose
Calystegia sepium	Hedge bindweed
Nasturtium officinale	Watercress

Sium latifolium	Water parsnip
Phragmites australis	Common reed
Iridaceae sp.	Iris
Salix sp.	Willow

Fauna

5.6. The potential presence of protected species within the study area was assessed though a data search conducted through the NBDC. This identified records of invasive, rare, scarce and protected species within 2km of the Proposed Development Site location.

5.7. The element of the proposed development that is located within greenfield land class is located within the 2km grid square N32Y. A database search was also carried out for adjacent grid squares to ensure a full assessment of the 2km radius (N32U, N32Z, N42E, N32T, N32Y, N42D, N32S, N32X, N42C), of the Irish National Grid Reference (ITM) N 39363 27330.

5.8. Additional information on the suitability of habitat in the surrounding area for bats was also obtained from the NBDC in the form of a habitat suitability map. The map provided enhanced information on the recorded distribution of bats and broad-scale geographic patterns of occurrence and local roosting habitat requirements for Irish bat species.

5.9. In addition, the Fossitt habitat survey included a species scoping survey in order to assess the potential of the site to support protected species.

5.10. During the field survey there was no evidence of species utilising the habitats on site. Habitats present on site offer potential for habitat and are suitable for commuting and foraging behaviours for species including badger and otter. These include the agricultural grassland, treelines and watercourses.

5.11. The movement of otter between suitable habitats cannot be fully ruled out, as otter are highly mobile species and can travel significant distances across land while foraging. No field signs of this species were observed during the survey work undertaken, and use of the Proposed Development Site by otter is likely to be restricted to foraging and commuting otter.

5.12. Pollution from contaminated surfaces or ground waters can potentially enter the aquatic system and affect otter indirectly. Best practice pollution prevention measures and integral design measures have been adopted to minimise any effects from pollution.

5.13. There is potential for any otters using the site during the construction phase to become trapped in trenches excavated during works. However, in line with best practice, all excavations during the construction phase of the Proposed Development will be securely covered and will therefore prevent the accidental trapping of this species.

5.14. No definitive signs of badger activity were noted at the time of the Species Scoping survey, although habitats such as hedgerow and treeline within the substation boundary are suitable for sett building and improved agricultural grassland is suitable for foraging and commuting badger.

5.15. The construction phase has the potential to impact upon badger by causing disturbance or destruction of badger setts. During the construction phase, the Proposed Development can cause undue stress if accidently trapped within any exposed excavations left overnight. During the operation phase the security fencing used within the Proposed Development can affect access to foraging areas within the Proposed Development Site which are part of a clan's territory. In the absence of mitigation, badgers may be significantly affected by the Proposed Development.

5.16. Hedgerows, treelines and mixed broadleaved woodland within the Proposed Development Site and ESA provide suitable habitat for breeding birds. Improved grassland may offer potential nesting and feeding habitat for farmland breeding birds as areas of the Proposed Development Site sward are between five and fifteen centimetres high due to grazing.

5.17. Breeding birds are highly susceptible to disturbance, and therefore where works are to commence during the breeding season (March to August inclusive) bird surveys should be undertaken prior to the initiation of construction works. A 5m buffer from hedgerows within the Proposed Substation will be in place, as well as tree buffers to ensure that disturbance is minimal. Where vegetation removal is required for access, mitigation measures are outlined within table 2-13 to include Pre-construction breeding bird survey on all vegetation to be removed.

5.18. Suitable habitat was also identified for bats, with treelines and mature trees on site offering foraging, commuting, and roosting opportunity. One standalone mature ash tree (see Table 2-8 & Appendix 2A – Figure 2.2) within a hedgerow was identified as having Low Bat Roost potential adjacent to the Proposed Substation and along proposed substation track.

5.19. In the event that Proposed Development necessitates the removal/trimming of the ash tree with Low Bat Roost Potential, soft felling techniques will be used, following the precautionary principle, if roost potential exists, to ensure that no cavities are cut through and branches or trunk sections with cavities are lowered carefully to the ground and left with the access hole upward-facing overnight to allow any bats potentially present to leave safely. Such works will also be overseen by a suitably qualified and experienced ECoW.

Invasive Non-Native Species

5.20. Records of widespread invasive non-native Jenkins' Spire Snail species were identified within the data search please see the Technical Appendix 2: Ecological Impact Assessment in Volume 3 for further information.

6. POTENTIAL IMPACTS

6.2. Potential impacts which could arise from the Proposed Development include:

- Potential habitat loss and fragmentation,
- Disturbance during construction, and
- Potential contamination of surface waters.

6.3. Each of these potential impacts have been considered below in relation to the Proposed Development.

POTENTIAL HABITAT LOSS AND FRAGMENTATION

6.4. Habitat loss will only occur under the Proposed Development footprint in regard to structures such as substation compound, access tracks, cable trenches and hardstanding for buildings. With the implementation of the Biodiversity Management Plan (BMP) under which retained areas are managed for the benefit of biodiversity to compensate for habitat loss occurring as a result of the Proposed Development.

6.5. The construction of the Proposed Development that occurs over greenfield contains mainly improved agricultural grassland, bounded by treelines, hedgerows, drainage ditches and streams. Lands within the 50m ESA mainly comprise of improved agricultural grassland. These habitats are considered to be of low ecological value and currently offer limited potential to support wildlife, these habitats are abundant within the greater area where the small percentage loss will not create a significant effect.

6.6. Existing habitats are to be retained where possible and identified local species will be protected. It is therefore determined that the proposal will have no significant adverse impact on local habitats and will indeed deliver biodiversity enhancements to the benefit of the site and wider area.

6.7. To allow for the construction at the site entrance, 6m of hedgerow will be removed and one lamp post will be relocated. Further to this, approximately 21.0m hedgerow is proposed to be removed and reinstated and two telegraph poles are proposed to be relocated at pinch point 1. Pre-commencement surveys will be conducted prior to removal, particularly during Bird Breeding season. 5 trees will be required for removal, as well as 110.7m of hedgerow removal and 43.6m of tree trimming to enable the construction of an access track. To compensate, there is 7681m^2 of proposed species rich grassland and wildflower seed to be planted within a confined area outside of the substation compound. The addition of species rich grassland, which is high ecological value habitat, will greatly increase the ability of the Proposed Development Site to support local wildlife by providing foraging habitat.

DISTURBANCE DURING CONSTRUCTION

6.8. The construction phase of a development have the potential to impact upon local wildlife.

6.9. Measures will be implemented prior to construction work taking place to minimise any potential disturbance to wildlife. Mitigation measures recommended within the supporting Ecological Appraisal include:

- Pre-commencement badger survey;
- Pre-commencement otter survey;
- Breeding bird check if works are to begin within the bird breeding season (considered to be March- August inclusive);
- Potential Roost Feature (PRF) survey of any mature trees to be removed;
- Securely covering all excavations at the end of each working day to prevent accidental trapping of badger, otter or other small mammals;
- If any badger setts are established a buffer will be required; and
- Mammal gates to be installed within security fencing at locations determined during the pre-commencement check. This is in order to allow the unrestricted movement of wildlife across the local area.

During the operational phase, the disturbance to local wildlife will not be significantly greater than the levels of disturbance that the land is currently subject to from current farming practice.

Potential Contamination of Surface Waters

6.10. The construction phase of a development has the potential for contamination of surface waters and watercourses, if appropriate measures are not implemented. As part of the integral design of the Proposed Development, swales have been implemented to control the movement of surface waters within the Proposed Development Site with mitigation outlined above regarding HDD practice. Buffers including; 2m from drains, 5m from boundary watercourse and 10m from OPW watercourses have been implemented. During the construction phase all contractors working onsite will follow current best practice measures, which include the appropriate use and storage of fuels, oils and chemicals as required.

Trenching

- The Contractor, and their appointed Site Manager, will prepare a targeted Method Statement concisely outlining the construction methodology and incorporating all mitigation and control measures included within the Planning Application and accompanying reports;
- All existing underground services shall be identified on site prior to the commencement of construction works;
- The proposed grid connection is circa 7.5km in length (with the majority on public roads) and is to be installed along private agricultural land, public roads, and ESB owned land. The last section within ESB land will be a section 5 and is not included in this application.
- The excavated trench will be approximately 825mm in width and approximately 1315mm deep.
- The base of the excavated trench will be lined with Cement Bound Granular Mixture B (CBGM B). The UGC will consist of 3 No. 160mm diameter HDPE power cable ducts, 2 No. 125mm diameter HDPE communications duct and 1 no. 125mm diameter earth continuity duct. It is anticipated that this work along the public road will be carried out on the carriageway apart from the joint bays which will be situated within the verge and public road;
- At watercourse crossings, the contractor will be required to adhere to the proposed typical culvert undercrossing drawing (051064-DR-117 P3), typical culvert overcrossing (051064-DR-118 P2), Figure 116 cable crossing over existing culverts, Figure 117 Proposed open ditch crossings and 051064-DR-122 HDD Crossing details and environmental control measures outlined within the Planning Application and accompanying reports, the detailed Construction Environmental Management Plan (CEMP) to be prepared prior to the commencement of construction, and best practice construction methodologies;
- A HDD may also be required where the grid route intersects the Corndonagh Stream on the L1025 at Chainage 4180m shown on Figure 103 (volume 2) and indicative drilling options in 051064-DR-122 in Volume 2.

- The proposed cable route may require a Horizontal Directional Drilling (HDD) crossing where the route intersects the Corndarragh Stream. In this case, the cable will cross under the watercourse using a trenchless HDD method, subject to detailed design and liaising with Offaly County Council.
- Where the cable route or cable interconnection intersects any small culverts, bridges or dry canals, the culvert, bridges or dry canals will remain in place and the ducting will be installed above/below it and provide minimum separation distances in accordance with ESB/ Eirgrid, Irish Water and Waterways Ireland specifications;
- The proposed development does not involve the draining or modifying of any of the minor or major tributary watercourses;
- No installation will take place during extreme weather warnings. No construction personnel, operation or maintenance personnel will be permitted to carry out any works during extreme flood events;
- No more than a 100m section of trench will be opened at any one time. The second 100m section will only be excavated once the majority of reinstatement has been completed on the first;
- The excavation, installation and reinstatement process will take an average of one day to complete a 100m section;
- Following the installation of ducting, pulling the cable will take approximately one day between each joint bay; and
- Where required, grass will be reinstated by either seeding or by replacing with grass turf.

Interconnection Trenching Methodology

- The Contractor, and their appointed Site Manager, will prepare a targeted Method Statement concisely outlining the construction methodology and incorporating all mitigation and control measures included within the Planning Application and accompanying reports;
- All existing underground services shall be identified on site prior to the commencement of construction works;

- The proposed interconnection route is circa 610m in length and is to be installed along private agricultural land/ track and public road. A HDD is required to cross the dry canal – please refer to **Figure 105 Volume 2** for the HDD location and **Figure 106 Volume 2** for the indicative drilling option.
- The excavated trench will be approximately 840mm in width and approximately c.1200mm deep and will contain 3 x 33kV circuits.

Horizontal Directional Drilling (HDD)

HDD Methodology

- A works area of circa 40m2 for the HDD entry side and circa 20m2 on the HDD exit side will be required for the HDD equipment and vehicles. These areas will be fenced off during the HDD implementation.
- The drilling rig and fluid handling units will be located on the entry side and will be appropriately bunded using sandbags, which will contain any fluid spills and stormwater run-off.
- Entry and exit pits (2m x 3m x 1m) will be excavated; the excavated material will be temporarily stored within the works area and used for reinstatement or disposed to a licensed facility.
- The HDD pilot bore will be undertaken using a wireline guidance system. Assembly will be set up by the drilling team and steering engineer.
- The pilot bore will be drilled to the pre-determined profile and alignment under the dry canal and Wood of O road.
- The steering engineer and drill team will monitor the drilling works to ensure that modelled stresses and pressures are not exceeded.
- The drilled cuttings will be flushed back by drilling fluid to the entry and exist pits and recycled for re-use.
- Once the first pilot hole has been completed a hole-opener or back reamer will be fitted in the exit side which will then be pulled back to the entry side as part of the pre-reaming/hole opening process to enlarge the hole to the correct size.

- When the pre-reaming/hole opening/hole cleaning has been completed, a reamer of slightly smaller diameter than the final cut will be installed on the drill string to which the ducts will be attached for installation.
- The drilling fluid will be disposed of to a licensed facility.
- The ducts will be cleaned and proven and their installed location surveyed.
- The entry and exit pits will be reinstated to the specification of ESB Networks and any requirements of Offlay County Council.
- During periods of forecasted rain, HDD will not be performed.

HDD Mitigation

6.11. The use of horizontal directional drilling can pose indirect risks such as sediment and pollution risks. As such, HDD-specific mitigation is required to avoid adverse effects on ecological receptors and maintain habitat integrity. The following best-practice measures will be implemented along areas of HDD where appropriate:

- Drill entry and exit pits will be located a minimum of 10m from dry channels, with all excavated spoil also stockpiled at least 10m away to reduce the risk of runoff or sediment transport.
- Silt barriers, consisting of fencing fitted with geotextile fabric, will be constructed along the base of any spoil stockpiles and positioned on sloped ground to prevent surface water runoff.
- Filter fabric will be trenched into the ground to trap coarse particles in surface water, particularly during periods of heavy rainfall.
- The drill path will be designed to maintain a depth of at least 3m beneath the canal bed, to minimise the risk of ground fracture (frac-out) and to ensure the cable remains protected from any future re-watering or natural erosion.
- Although the canal is dry, an Ecological Clerk of works will be assigned to monitor the HDD alignment during drilling activities to detect any potential frac-out or surface migration of drilling fluid. If any signs are observed, all drilling will cease immediately.
- A precautionary containment boom will be placed downslope (if applicable) to intercept any accidental spills or drilling residues.

- Any groundwater or drilling fluid extracted from the pits will be temporarily stored in baffled settlement tanks and discharged to adjacent grassed areas, avoiding direct discharge into drainage channels or the canal bed.
- Excess drilling lubricant will be tankered off-site for recycling, with a tractor and tanker on standby at the entry pit throughout operations.

7. HABITAT CREATION & MANAGEMENT

7.2. Currently the improved agricultural grassland, which make up the majority of habitat on site, offers limited benefit to wildlife. Species rich grassland mix will be planted in a confined area outside of the substation. Approximately 6m of hedgerow will be required for removal at the entrance, as well as 21.0m of hedgerow to be removed and reinstated along pinch point one. There will be 5 trees required for felling; however, these will be subject to a preliminary roost assessment before felling can commence.

7.3. The potential of the site to support wildlife will be significantly increased by the habitat creation measures outlined within this report. These habitats will remain in place and be managed for the duration of the development.

7.4. There are multiple means by which the ecological value of a site can be retained and improved. These can include; the planting of ecologically important habitats, the installation of wildlife shelters, retention and maintenance of hedgerows and field margins, and more.

7.5. Habitats that will be created as part of the proposed solar farm development will include:

- Section of species-rich grassland and wildflower seed mix;
- 2 No. Bird boxes;
- 2 No. Bat boxes;

7.6. These habitats individually offer shelter and a food source for supporting a variety of wildlife. The creation of these new habitats, combined with the existing hedgerows and treelines, will support the existing wildlife within the site. They also have excellent potential to allow the biodiversity of the site to increase, by offering a wider range of habitats that benefit local wildlife.

7.7. The implementation of Species Rich Grassland and Wildflower Seed mix will provide foraging habitat by supporting a large population of invertebrates. This will provide foraging grounds for a wide variety of species which will increase the ability of the Proposed Development Site to support local wildlife. The percentages of seed mixes for species rich grassland and agricultural grassland seed mix have been recommended, however these ratios can be refined to best suit the soil and site conditions following approval by an ecologist.

GRASSLAND

7.8. Within the Proposed Substation Site, two seed mixes will be planted; Species Rich Grassland Seed Mix and Wildflower Seed Mix.

Species-Rich Grassland Seed Mix

7.9. The Species-Rich Grassland Seed mix to be sown will compose of the species listed in Table 7-1, at the specified percentages.

7.10. It is important to consider that species-rich grasslands must be managed in order to be retained. This includes measures such as; weed control and controlled grazing or mowing.

7.11. Weed control measures will be put in place in these areas, as weed species such as spear thistle (*Cirsium vulgare*), broadleaved dock (*Rumex obtusifolius*) and common dandelion (*Taraxacum officinale*), once established, can become dominant and outcompete various wildflower species. Weed control measures can include spot treatment or spraying of herbicide using a knapsack sprayer. Spot treatment is recommended here as spraying may cause herbicide to come into contact with wildflower, leading to rapid degradation of the habitat over a period of time.

Table 7-1: Species Rich Grassland Mix Component

SCIENTIFIC NAME	COMMON NAME	PERCENTAGE MIX (%)
Agrostis capillaris	Common bent	4
Cynosurus cristatus	Crested dog's tail	4
Festuca ovina	Sheep's fescue	27
Festuca rubra	Red fescue	35
Poa trivialis	Rough stalk meadow grass	15
Poa pratensis	Smooth stalked meadow grass	15

Table 7-2 Wildflower Grassland Mix Component

SCIENTIFIC NAME	COMMON NAME	PERCENTAGE MIX (%)
Lotus corniculatus	Birds foot trefoil	10
Centaurea nigra	Black knapweed	5
Medicago lupulina	Black medick	3
Vicia sativa	Common vetch	4
Galium verum	Lady's bedstraw	2
Lathyrus pratensis	Meadow vetchling	3
Ranunculus acris	Meadow buttercup	3
Leucanthemum vulgare	Ox-eye daisy	8
Silene dioicia/latifolia	Red/White campion	2

Trifolium repens	Red clover	10
Prunella vulgaris	Selfheal	5
Onobrychis viciifolia	Sainfoin	36
Achillea milliefolium	Yarrow	6
Rhinanthus minor	Yellow rattle	3

Management in Years 1-3

7.12. The Species-Rich Grassland Seed mix should be sown in Early Autumn (August, September and October) or Spring (February, March, and April). This will allow for proper establishment prior to fertilisation and setting seed, which will occur in the summer months (May, June and July).

7.13. Prior to sowing, pre-seeding granular fertiliser will be applied to the proposed area at a rate of 70g/m^2. Once fertiliser has been applied, the seeds will then be sown, applied to the soil surface and gently rolled to firm them.

7.14. Seed will be sown at a rate of 20 kg per ha with an 80% grass and 20% wildflower ratio.

WILDLIFE SHELTERS

7.15. The creation of wildlife shelters, placed strategically throughout the Proposed Substation Site, will provide shelter to a wide range of species.

Bat Boxes

7.16. Providing bat boxes will increase opportunities for roosting bats within the local area. Approximately two bat boxes should be erected in suitable locations throughout the site. It can, however, take bats a long time to make use of artificial roosts. Therefore, a number of factors must be considered when installing a new bat box.

7.17. Microclimate within a new roost is a very important factor in terms of increasing the chance of successful uptake by bats. In line with Bat Conservation Trust guidelines[7] bat boxes should be draught-proof and made from a thermally stable material. They should be located 2m above the ground in locations where they will receive full/partial sunlight (southeastern or southwestern orientation). Access points should also be clear of any obstructions.

7.18. To allow a choice of roosting, bat boxes should be installed in more than one aspect. Bat boxes located on a shady side will be cooler and may be suitable as a hibernation roost or used by male bats throughout the entire year.

[7] Bat Conservation Trust – Bat Box Information Pack. Available at: http://www.bats.org.uk/data/files/publications/Bat_Box_Information_Pack_FINAL.pdf

7.19. There is a wide range of bat boxes currently available, some which are more suitable for certain species. A variety of bat boxes are recommended in **Table 7-4** below. It is recommended that a mixture of two bat boxes detailed below (or similar) be installed on site.

Table 7-4 Details of Bat Boxes

BAT BOX	DETAILS	IMAGE
Schwegler 2F[8]	Standard box and most popular. Simple entrance role. Used as summer roosting space.	
Schwegler 1FD[9]	Specific for smaller bats such as common pipistrelle, Nathusius' pipistrelle, Daubenton's bat and brown long-eared.	

7.20. It is recommended that two Bat Boxes, one of each box detailed in **Table 7-4**, in total be implemented within the Proposed Substation Site.

Bird Boxes

7.21. In order to enhance the site for nesting birds, two bird boxes shall be placed throughout the site. Several types of nest boxes will be installed at suitable locations to favour a variety of bird species.

7.22. Open-fronted boxes will provide enhanced nesting opportunities for species such as robins, pied wagtails and spotted flycatchers. Boxes with entrance holes are suitable for tits, wren and tree sparrow.

7.23. Bird boxes should be mounted so that they face between the south-east and north to avoid direct sunlight. They should be tilted forwards so that rain is directed away from the entrance.

[8] Full specification available at: http://www.nhbs.com/title/158629

[9] Full specification available at: http://www.nhbs.com/title/177076/1fd-schwegler-bat-box

Table 7-5: Details of Bird Boxes

BIRD BOX	DETAILS	IMAGE
1B Schwegler Nest Box (32mm)[10]	This nest box will attract a wide range of species and is available with different entrance hole sizes to prevent birds from competing with each other for the boxes. The 32mm entrance hole will attract great, blue, marsh, coal tit, redstart, nuthatch, flycatcher, wryneck, tree and house sparrow and bats. The 26mm entrance hole suits blue, marsh, coal tit and possibly wren. All other species are prevented from using the nest box due to the smaller entrance hole.	
2H Schwegler Robin Box[11]	This traditional design has proved to be highly effective in attracting robins, as well as other small species such as black redstart, spotted flycatcher and wren.	

7.24. It is recommended that two in total of the above bird boxes (or similar) are installed on site.

Management in Years 1-3

7.25. The wildlife shelters can be installed at any stage within the first year. The final location and number of bird nest boxes and bat boxes will be determined on site by an ecologist.

7.26. Bird boxes should be cleaned annually to ensure that parasite build up doesn't occur. These boxes should be cleaned in October. This prevents the build-up of parasites and avoids the risk of disturbing birds using it as a roosting site during the cold winter months.

[10] Full specification available at: http://www.nhbs.com/title/158587/1b-schwegler-nest-box

[11] Full specification available at: http://www.nhbs.com/title/161277/2h-schwegler-robin-box

7.27. All bats and their roosts are protected by law and it is an offence to deliberately disturb, handle or kill bats. If a bat box need needs to be opened at any stage, a suitably licenced bat worker must be present. This includes during cleaning of the bat boxes.

RECOMMENDED MANAGEMENT

7.28. Management recommendations in this BMP have been made:

- to maintain and improve the biodiversity of species within the site;
- to enhance the quality of habitats present;
- to increase the site's potential for supporting wildlife, and
- to avoid any potential negative impacts arising from the development of the site.

7.29. Recommendations of management actions required to achieve the desired condition of the site are summarised within Table 7-8 of this document. The table also provides a brief summary of the rationale and possible constraints to adopting the recommended management.

Table 7-8: Recommended Management

Objective	Action Plan Task	Timescale	Notes
To enhance the quality of habitats present	Create a diverse grassland with varied structure After the development of the substation, sections of species-rich grassland and wildflower grassland seed mix will be sown across the site.	Year 1	This will maximise the potential for high value habitats to establish. This will compensate for vegetation removal associated with the Proposed Development.
Creating a diversity of habitats within the site	Species-Rich Grassland seed mix to contain: Common bent (*Agrostis capillaris*), red fescue (*Festuca rubra*), meadow fescue (*Festuca pratensis),* and meadow grass species (*Poa spp.*) Wildflower seed mix to include: Sainfoin (*Onobrychis viciifolia*), birds foot trefoil (*Lotus*	Year 1	Fine grasses contain an ideal nesting habitat for ground-nesting birds such as skylarks. This will also provide habitat for small mammals and larvae of pollinating insects, including butterflies and moths.

	corniculatus) and ox-eye daisy (*Leucanthemum vulgare*) These are listed in Table 7-1.		
Ensure fencing does not inhibit the movement of wildlife	To allow movement of badgers, and other small mammals across the development area mammal gates/10cm gaps under fencing will be installed within deer fencing.	Year 1 (during construction phase)	Gates are to be located where mammal paths are present and where badger buffers are present, where necessary.
Creating a diversity of habitats within the site	Creation of bat roosting habitat 2 bat boxes will be placed on mature trees within the site	Year 1	The creation of roosting habitat, along with the creation of species-rich habitat that will encourage an abundance of invertebrate life (a potential food source) will be beneficial to local bats.
Creating a diversity of habitats within the site	Creation of bird nesting habitat 2 bird boxes will be placed on mature trees within the site	Year 1	The creation of nesting habitat, along with the creation of species rich habitat that will encourage an abundance of invertebrate life (a potential food source). Boxes installed should include a mixture of single-hole and open-fronted bird boxes.
Maintaining the retained hedgerows	Section of hedgerow to be cut	Each year between January and February	Cutting on a rotational basis, following standard advice[12], to ensure the optimal availability of berry and blossom for wildlife throughout the

[12] Hedgelink UK, The Complete Hedge Good Management Guide, Available at www.hedgelink.org.uk

			year as a potential food source. Management will also ensure a good base is maintained within the hedgerow, providing suitable habitat for a range of wildlife.

8. GENERAL CONSIDERATIONS

Obligations

8.1. During each of the development phases there are a number of legal obligations that should be considered by all those involved in site work:

- Ensure obligations of the European Communities (Birds and Natural Habitats) Regulations 2011 are met by all involved with the site.
- Ensure obligations of the Wildlife Act 1976 and Wildlife (Amendment) Act 2000 are met on the same basis.
- Ensure all relevant Health & Safety at Work Act obligations are met on the same basis.

Good Ecological Practice

8.2. Whilst management practices should only be altered if there is a good ecological reason for doing so, they should not be rigidly adhered to if they are obviously detrimental.

9. INDICATIVE MANAGEMENT SCHEDULE

9.1. Appendix C of this document shows possible months in which activities will commence within the initial planting period after the construction phase.

10. APPENDICES

APPENDIX A-INDICATIVE MANAGEMENT SCHEDULE

Timeframes for Management Activities

MANAGEMENT ACTIVITY	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Year 1 – Initial Habitat Enhancement												
Removal of existing vegetation and seeds within Proposed Development Site			✓	✓	✓							
Cultivate and allow soil to settle						✓	✓					
Species rich Grassland sowing around areas available in proximity to substation element of Proposed Development								✓	✓			
Field margin cutting									✓	✓		
Installation of bat and bird boxes, invertebrate hotels and herptile hibernacula	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Year 2 - Annual Habitat Management												

Light pruning of hedgerow sections	✓	✓							✓			
Checks by contractor through the initial maintenance period to comprise weed clearance, watering and pruning			✓	✓	✓	✓	✓	✓				
Replacement of any dead, dying or diseased hedgerow										✓	✓	✓
Existing hedgerows cut on a 2- or 3-year cycle, with no more than 1/3 cut in any one year	✓	✓										
Ongoing Annual Management – Year 3-4												
Field margin cutting									✓	✓		
Ongoing Annual Management – Year 4 onwards												
Grassland margin cutting (after year three)									✓	✓		
Light pruning of hedgerow sections	✓	✓							✓			
Existing hedgerows cut on a 2- or 3-year cycle. All hedgerows from year 5, with no more than 1/3	✓	✓										

cut in any one year												

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