APPENDIX C

December 2023

Biodiversity Management Plan

Proposed Solar PV Farm and Battery Storage System at Grangeford, Co. Carlow

On Behalf of

Prt Solar Limited

MALONE O'REGAN ENVIRONMENTAL

QUALITY
I.S. EN ISO 9001:2015
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MALONE O'REGAN ENVIRONMENTAL

Ground Floor – Unit 3
Bracken Business Park
Bracken Road, Sandyford
Dublin 18, D18 V32Y
Tel: +353- 1- 567 7655
Email: enviro@mores.ie

Title: Biodiversity Management Plan, Proposed Solar PV Farm and Battery Storage System at Grangeford, Co. Carlow for Prt Solar Limited

Job Number: E2096

Prepared By: Emma Dolan **Signed:** _____

Checked By: Kathryn Broderick **Signed:** _____

Approved By: Kevin O'Regan **Signed:** _____

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Biodiversity Management Plan
Proposed Solar PV Farm and Battery Storage System at Grangeford, Co. Carlow
Prt Solar Limited

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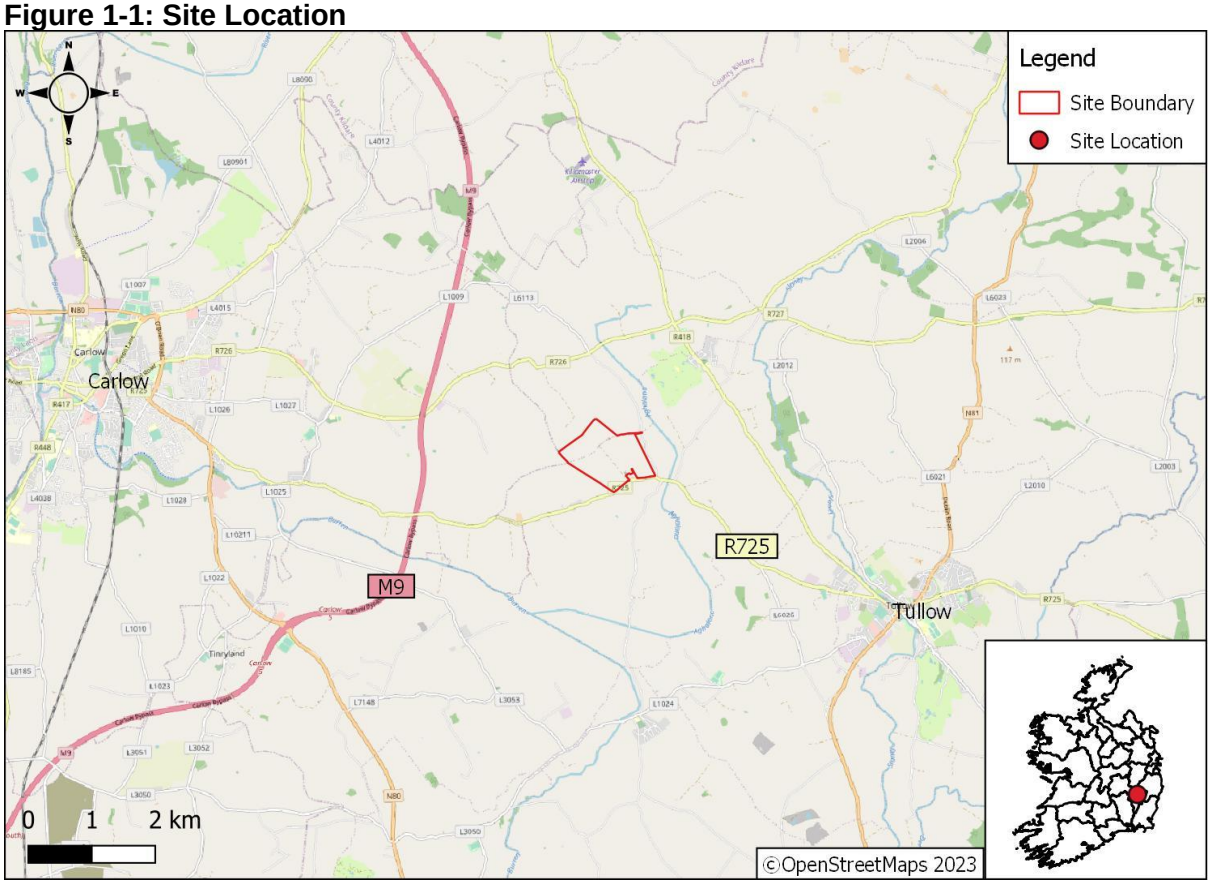
1 INTRODUCTION

Malone O'Regan Environmental (MOR) has been commissioned by Prt Solar Limited ('the Applicant') to develop a Biodiversity Management Plan (BMP) in respect of the construction and operational phases of a proposed PV Solar Farm, an on-site 38kV substation and Battery Energy Storage System (BESS) and all associated works ('the Proposed Development') at Grangeford, Co. Carlow (OS ITM Reference 076106 336077).

The Proposed Development will be located on a site that is ca. 91.2 hectares (ha) in size and is located within the townland of Grangeford Old and Friarstown, Co. Carlow, ca. 5.6km east of Carlow town and is shown in Figure 1-1 ('the Site').

Figure 1-1: Site Location



1.1 Purpose of the BMP

The Proposed Development provides a number of opportunities for providing biodiversity enhancement measures within the development design for the Proposed Development. The purpose of this plan is to maximise the value of the natural features on-site and to outline measures that will be incorporated as part of the proposed design to enhance the biodiversity of the proposed solar farm and the surrounding area. As part of the Proposed Development, the BMP which aim to enhance the Site and achieve an overall Biodiversity Net Gain.

1.2 Background

Two solar farm developments have already been permitted on the Site. However, to take account of advancement in technology the Proposed Development will supersede the previous permitted solar developments. Details on these previous permitted solar developments are outlined below and also please refer to Figure 1-2.

Carlow County Council Ref No. 16325– Granted and Expired

Permission for development of a Solar PV Panel Array consisting of up to 48,000m^2 of solar panels on ground mounted steel frames, electricity control room, power inverter unit, underground cable ducts, CCTV and lighting, security fence and all associated works at Friarstown, Tullow Co. Carlow.

As per condition 8, grant of planning: '*The period during which the development hereby permitted may be carried out shall be 5 years from the date of the order unless an extension of the appropriate period is granted pursuant to the Planning and Development Act 2000 (as amended)'.*

The order was received on the 4th December 2017. No extension was applied for and therefore this permission has expired as of the 4th December 2022.

Carlow County Council PR 2123 (ABP Ref No. 309987-21) – Granted.

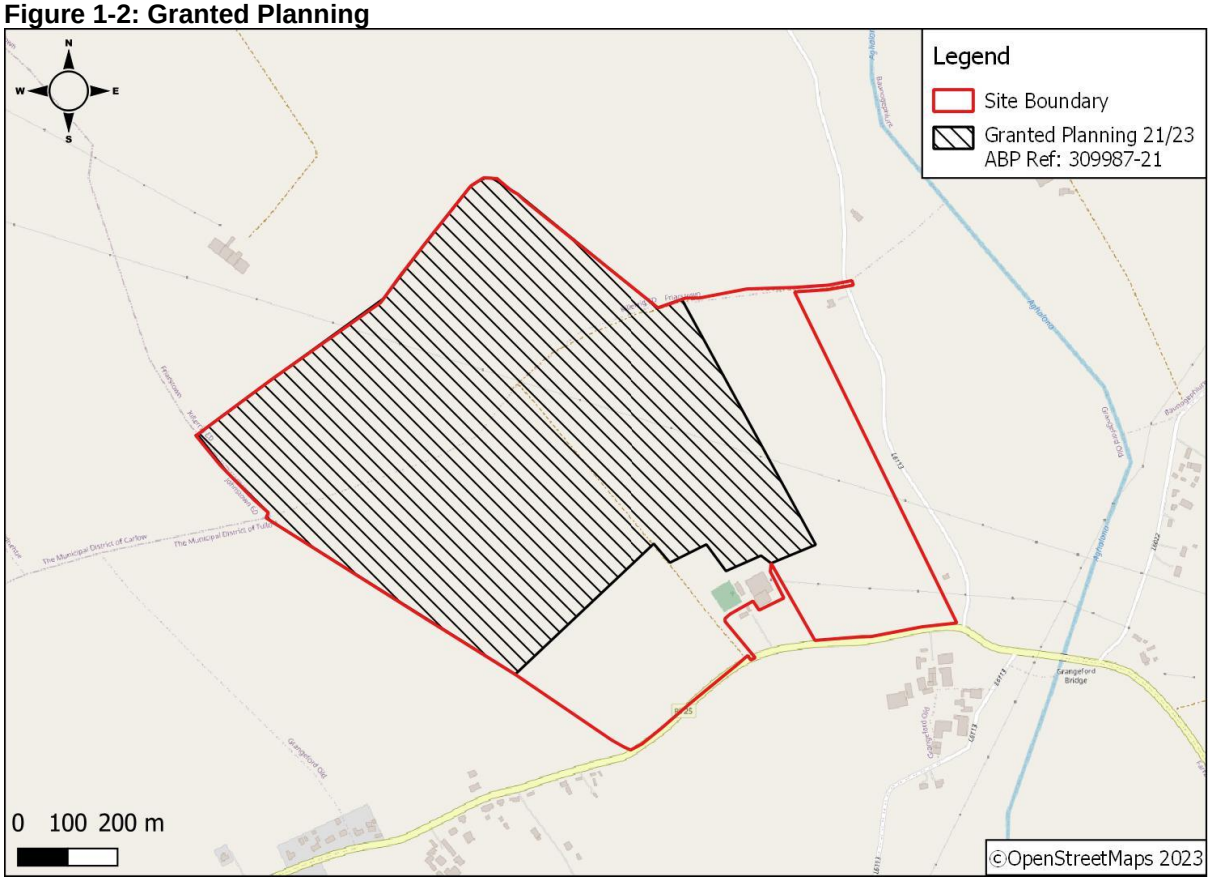
10 Year permission for development consisting of the construction of a Solar PV development comprising photovoltaic panels laid out in arrays over a total development site area will be ca. 65.6 ha, the construction of a 38kV substation (ca 114.4m^2 x 4.75 tall) a transformer unit (ca. 18m^2 x 4m tall) and associated bund (ca. 55m2), along with ancillary development including; 24 no. Power Hubs (ca. 15.25m^2 x 2.4m) which incorporate an inverter and a transformer, 1 no. single storey communications building (11.1m^2 x 2.5m), 1 no. single storey client side sub-station building (15.25m^2 x 2.9m), 1 no. single storey equipment storage building (7.5m^2 x 2.7m), 10 no. CCTV cameras mounted on 4m high poles, perimeter security fencing, site access, site egress and all ancillary works.

Proposed Development

MOR would like to clarify that as part of this new planning application, all items outlined and approved for the permitted development (21/23) have been incorporated into this application. The key differences between this planning application and the permitted development are as follows:

1. The total development area has increased from 65.6ha to 91.24ha;
2. Design of the panels to be installed have been revised. They now consist of both pile-driven structures and ballast solutions to ensure that there would be no ground penetration or disturbance during the installation works in areas of potential archaeological significance;
3. 38kV Substation has been relocated within the Site. Please note this substation design is as per ESB Networks Specification;
4. BESS are now included as part of the development reflecting their increased importance on renewable development;
5. Increased buffer zones are proposed across the Site; and,
6. The Proposed Development is now inclusive of a Biodiversity Enhancement Zone.

Figure 1-2: Granted Planning



1.3 Site Context

The Site is ca. 91.2 hectares (ha) in size and is within the townland of Grangeford Old and Friarstown Co. Carlow. The Site is located within a predominately rural landscape and is accessed via the R725 and the L6113.

The Site is predominately comprised of agricultural land, which at the time of writing this report is under arable crop with sections of treeline and vegetation forming the perimeter of the Site.

The Site is bordered to the north and west by agricultural grassland, beyond which are multiple residential properties and areas of farmyard. The Killerig Golf Club is located ca. 1km northeast of the Site at the closest point. The Site is bordered to the south by the R725 regional road, followed with further farmyard and agricultural grassland. The Site is bordered to the east by a single residential property currently occupied by the Nolan Residents, followed by the L6113 local road.

Figure 1-3 illustrates the proposed redline boundary of the Site ('the Site Boundary').

Figure 1-3: Site Context

1.4 Watercourses within the Vicinity of the Site

As per EPA maps, there are three (3No.) hydrological features of note within close proximity of the Site, the Ardnehue River, the Aghalona River and the Grangeford Old Stream.

1. The Ardnehue River.

The river is located directly adjacent to a small section of the north-western Site Boundary. This river flows in a south westerly direction, draining into the Burren 14 River, ca. 2.3km downstream of the Site. The Burren 14 flows in a west / north-westerly direction, eventually discharging into the River Barrow, ca. 7.4km downstream. The River Barrow forms part of the River Barrow and River Nore SAC.

2. The Aghalona River

The Aghalona River is located ca. 200m east of the Site boundary at its closest point. This river flows in a south-westerly direction before discharging into the Burren River ca. 2.5km northwest of the Site Boundary. This Aghalona River is not hydrologically connected to the Site.

3. Grangeford Old Stream

The EPA maps indicate that the Grangeford Old Stream is located within the Site Boundary within the north-western section of the Site, joining the Ardnehue River as described above at the Site perimeter.

However, this watercourse **was not identified** as part of the 2023 site inspection. The absence of this watercourse remains consistent with the findings of the Site Survey completed on 15th September 2021 as part of the permitted development (PR: 21/23). This portion of the Site is noted as being 'benefited land' that was drained as part of the Drainage District and has been infilled. Refer to Figure 1-5.

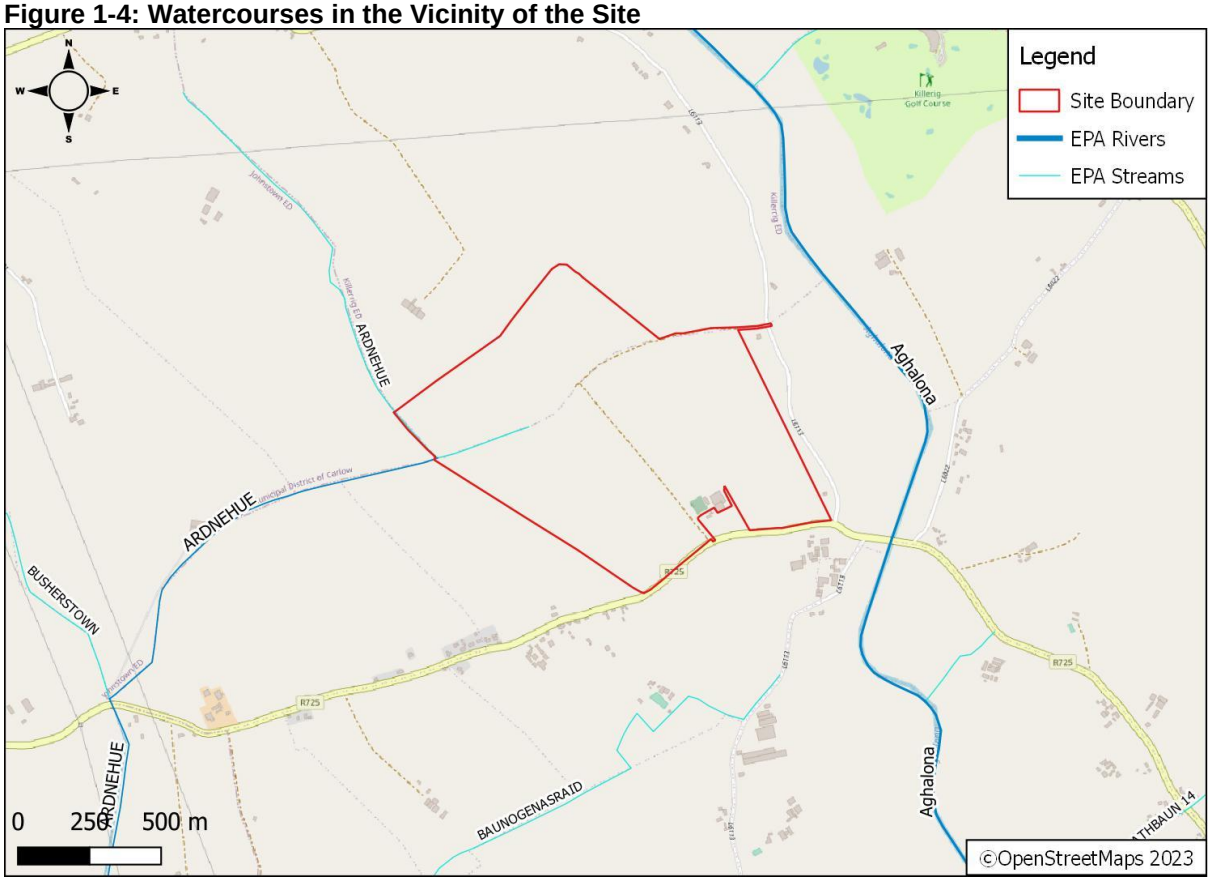
The Site is situated within the Barrow WFD Catchment [Catchment_ID: 14] and the Barrow_SC_090 subcatchment [Subcatchment_ID: 14_13] [1].

Under the Water Framework Directive (WFD) 2000/60/EC, the EPA classifies the status and the risk of not achieving good water quality status for all waterbodies in Ireland [1]. According to the river waterbody WFD 2016-2021 [1], the water quality status and risk for the above-mentioned watercourses is as follows:

- The Ardnehue River has a *'moderate'* water quality status and is considered to be *'not at risk.'*
- The Aghalona River has a *'moderate'* water quality status and is classified as *'at risk.'*
- The Burren River has a *'moderate'* water quality status and is deemed *'not at risk'* along the section of river into which the Ardnehue and Aghalona rivers drain. Approximately 3.5km downstream, the Burren River is considered to be '*at risk'* of not achieving a *'high'* water quality status even though its water quality remains *'moderate;'* and,
- The River Barrow is similarly classified as *'moderate'* and *'at risk.'*

The location of the key surface water features in the vicinity of the Site are illustrated in Figure 1-4 below.

Figure 1-4: Watercourses in the Vicinity of the Site



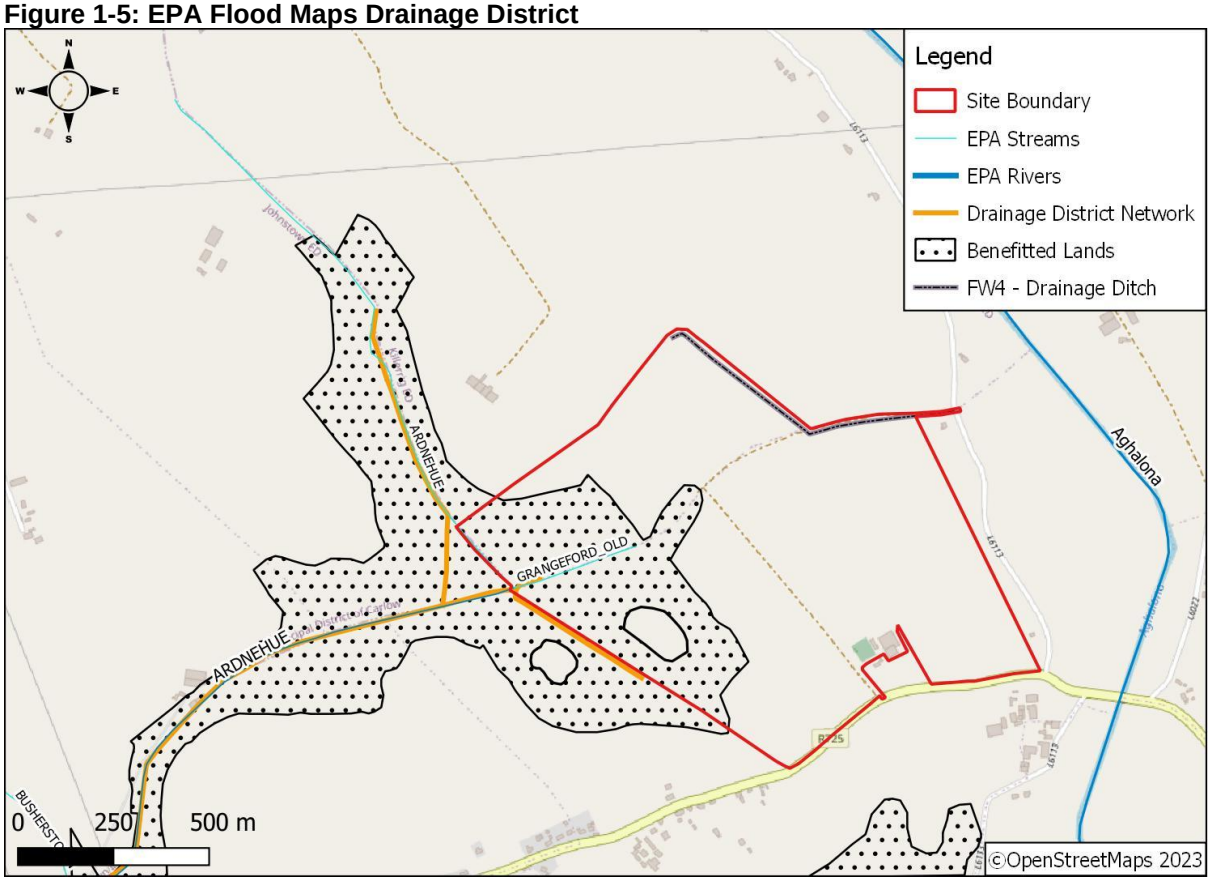
1.4.1 EPA Flood Maps

As per EPA Flood Maps, the Benefitted land identifies land that was drained as part of the Drainage District with the aim to improve land and to mitigate flooding. The western portion of the Site forms part of the Benefitted Lands Scheme.

As per EPA Flood Maps, a drainage ditch channel was also identified within the Site, under the Barrow Drainage District Scheme. The drainage ditch channel is located predominately along the western perimeter of the Site.

Following the Site survey, a drainage ditch was located along the northeastern section of the Site. This drainage ditch was not hydrologically connected to the Ardnehue River. See figure 1-5.

Figure 1-5: EPA Flood Maps Drainage District



1.5 Description of the Proposed Development

The Applicant intends to apply for permission for development at Grangeford, Co. Carlow. The Proposed Development will involve the construction of associated ancillary development including:

- Solar PV panels laid out in arrays across the Site;
- 12 No. inverter units (ca. 6.05m x ca.2.45m);
- 352 No BESS Units – Comprised of 22 Modules (ca. 21.9m x ca.5.2m) comprised of 16 number cabinet units within each module (352 total cabinets);
- 15 No. transformer integrated units (PCS Hubs) (ca. 10.5m x ca. 2.7m);
- 1 No. single storey control 38kV substation building (6.1m (h) x 20.9m (l) and 7.3m (w);
- 1 No. transformer unit (ca. 6m x ca. 3.6m) and associated bund;
- 3m high acoustic barrier, comprised of berm and fencing;
- 7 No. CCTV cameras mounted on 4m high poles;
- Perimeter security fencing (2m high);

- Security fencing around the DNO substation (2.4m high); and,
- All associated ancillary development.

The on-site CCTV would be remotely monitored via a 24/7 operational team who would alert all relevant personnel in the event of a break-in or vandalism at the Site. The cameras will only be focused along the fence line and will not be focused on any neighbouring dwellings.

The perimeter fence which will be installed to provide security, restrict access, and will be deer proof. The fence will, however, be fitted with small mammal gates, 300mm x 150mm, at approximate points to enable access for wildlife such as rabbits, badgers, and foxes to move freely throughout the landscape.

Emergency lighting only will occur as part of the Proposed Development.

2 LEGISLATION POLICY CONTEXT GUIDANCE

Biodiversity loss in Ireland has accelerated in recent decades predominately due to human induced activities, resulting in increased damage to habitats, loss of species, reduced abundance of wildlife and degradation of our surrounding environment.

However, recent agri-environment schemes indicate that land use change from intensively managed agricultural land, with use of both herbicides and pesticides, to pastoral fields will result in a positive impact from an ecological perspective and that through appropriate management of the land, biodiversity can increase significantly. Furthermore, solar farm developments situated on agricultural land have the potential to increase biodiversity and support wildlife through appropriate enhancement measures and appropriate management.

2.1 National Planning Context

Project Ireland 2040 was launched by the Government in February 2018 [1] and incorporates two policy documents - the National Planning Framework and the National Development Plan.

2.1.1 National Planning Framework

Under the biodiversity section "*Project Ireland 2040 National Planning Framework*", the National Policy Objective 59 is to:

'Enhance the conservation status and improve the management of protected areas and protected species by:

- *Implementing relevant EU Directives to protect Ireland's environment and wildlife.*
- *Integrating policies and objectives for the protection and restoration of biodiversity in statutory development plans.*
- *Developing and utilising licensing and consent systems to facilitate sustainable activities within Natura 2000 sites; and,*
- *Continued research, survey programmes and monitoring of habitats and species.'*

The National Policy Objective 60 in the same document is to:

> *'Conserve and enhance the rich qualities of natural and cultural heritage of Ireland in a manner appropriate to their significance.'*

2.1.2 The National Development Plan

The National Development Plan [2] also lists the following items as strategic investment priorities in relation to National Heritage and biodiversity:

- *'Implementation of the current and future National Biodiversity Action Plan, delivery of National Parks and Wildlife Service Farm Plans and LIFE projects, enhanced wildlife crime investigation capacity and identification and delivery conservation measures at designated sites as identified in the Prioritised Action Framework for Ireland (2021-2027).'*
- *'Investment in nature and biodiversity, to improve the quality of natural habitats and support native plants and animals, including those under threat, and to bolster broader societal wellness and sustainability goals.'*
- *'Future-proofing obligations under the Biodiversity Strategy 2030, including potential national designations and the preparation and delivery of a National Restoration Plan.'*

There is currently no standard guidance in Ireland regarding the enhancement of Solar Farms for the benefit of local wildlife. However, given the similarities between the species and

habitats present in the UK and Ireland, and the absence of current Irish guidance, this BMP adopts the UK standard guidance.

2.1.3 BRE National Solar Centre Biodiversity Guidance for Solar Developments

This UK document provides high level guidance on solar farms and biodiversity, with specific reference to the planning process.

This document states that

> '*Biodiversity enhancements should be selected to fit the physical attributes of the site and should tie in with existing habitats and species of value on and around the site*.' The plan details that best practice in solar farm development is to seek to "*optimise biodiversity enhancement measures*."

According to the 'Biodiversity Guidance for Solar Development' [3] 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 National Environmental and Rural Communities Act 2006, and designated areas in close proximity to the 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;
- Provide a plan for monitoring the site; and adapting management as appropriate to the findings of this monitoring; and,
- Set out how the Site will be decommissioned.

This BMP will demonstrate how the proposed development will support in achieving these targets.

2.1.4 Ireland National Biodiversity Action Plan 2023-2027

The National Biodiversity Action Plan has been released for public consultation and is in the process of being reviewed [4]. The Plan will set the national biodiversity agenda for the period of 2023 – 2027 and aims to deliver the transformative changes required to the ways in which we value and protect nature.

Objective 4 of the Action Plan aims to:

> '*Embed biodiversity at the heart of climate action.'*

This BMP outlines effective conservation of biodiversity within the wider countryside and will demonstrate how the proposed development will support in achieving this objective.

2.1.5 All Ireland Pollinator Plan 2021-2025

Irish pollinators are in decline and in response, Ireland joined a small number of countries in Europe who have developed a strategy to address pollinator decline and protect pollination services. The All-Ireland Pollinator Plan was developed by a fifteen-member All-Ireland steering group, with the aim to build a foundation to bring about a landscape where pollinators

can flourish, revers pollinator losses, help restore populations to a healthy level and make Ireland pollinator friendly [5].

The plan identifies targets that can incorporated by actions undertaken voluntarily by both public and private landowners to make Ireland more pollinator friendly:

- Increase the area of Council land that is managed in a pollinator-friendly way.
- Make transport corridors more pollinator friendly.
- Organisations with site networks on public land to manage these in a pollinator-friendly way.
- Make local communities more pollinator friendly.
- Make protected land in a pollinator-friendly way where appropriate.
- Manage protected land in a pollinator-friendly way where appropriate.
- Complete policy investigations.
- Strengthen links between the AIPP and other national initiatives.
- Track changes in pollinations on public and private land.
- Increase the number of gardens that are pollinator friendly.
- Increase the network of AIPP business supporters.
- Remove invasive non-native species and develop an Invasive Species Management Plan if necessary.
- Create nesting sites for wild bees to provide safe breeding and hibernation spaces for pollinators.

The BMP recommends enchantments which will support the targets and actions as set out by the Irelands Pollination Plan, including the creation of wildflower habitats.

2.2 Local Planning Context

2.2.1 Carlow County Development Plan (CCDP) 2022-2028

The CCDP 2022-2028 contains several objectives which relate directly to the protection of biodiversity and natural heritage in the context of the Proposed Development [6]. These include objectives to ensure compliance with EU Habitats Directives, to ensure the protection of the integrity of European sites and makes reference to the importance of hedgerows and treelines in an ecological context. The CCDP includes the following objectives:

BE15-1: Support and comply with national biodiversity protection policies.

> **a)** *'Support and comply with the objectives of the National Biodiversity Plan 2023-2027 (and any future National Biodiversity Plan which may be adopted during the period of this Plan) as appropriate,'*
>
> **b)** '*Implement the current County Biodiversity Action Plan and any future updated Plan;*'
>
> **c) '***Support and comply with biodiversity policy set out in other national and regional policy documents as appropriate.'*

BE15-2: Protect sites, habitats, and species.

> **a)** '*Protect all natural heritage sites which are designated or proposed for designation under European legislation, National legislation, and International Agreements. Maintain and where possible enhance appropriate ecological linkages between these.*

This includes Special Areas of Conservation, Special Protection Areas, Marine Protected Areas, Natural Heritage Areas, proposed Natural Heritage Areas, Statutory Nature Reserves, Refuges for Fauna, and Ramsar Sites.'

b) '*Provide protection to species listed in the Flora Protection Order 2015, to Annexes of the Habitats and Birds Directives, and to animal species protected under the Wildlife Acts in accordance with relevant legal requirements.'*

c) '*Protect and where possible enhance areas of local biodiversity value, ecological corridors and habitats that are features of the County's ecological network. This includes rivers, lakes, streams and ponds, peatland and other wetland habitats, woodlands, hedgerows, tree lines, veteran trees, natural and semi-natural grasslands as well as coastal and marine habitats.'*

BE 15-3: Local Authority Plan Making

a) Ensure that biodiversity issues are considered at the earliest possible stages of plan making.

b) Ensure that plans and strategies comply with nature conservation legislation and policy as required (fulfil Strategic Environmental Assessment and Appropriate Assessment requirements); and,

c) Carry out ecological impact assessment of plans and strategies as appropriate.

BE15-4: Local Authority Development and Projects

a) Ensure that biodiversity protection is considered at design stage for works and development planned and progressed by Cork County Council and that all such projects comply with nature conservation legislation and policy as required; and,

b) Fulfil Appropriate Assessment and Environmental Impact Assessment requirements and carry out Ecological Impact Assessment in relation to Local Authority plans and projects as appropriate.

BE15-6: Biodiversity and New Development

Provide for the protection and enhancement of biodiversity in the development management process and when licensing or permitting other activities by:

b) '*Encouraging the retention and integration of existing trees, hedgerows and other features of high natural value within new developments*;'

c) '*Requiring the incorporation of primarily native tree and other plant species, particularly pollinator friendly species in the landscaping of new developments*;'

d) '*Fulfilling Appropriate Assessment and Environmental Impact Assessment obligations and carrying out Ecological Impact Assessment in relation to development and activities, as appropriate;* and,

f) '*Ensuring that the implementation of appropriate mitigation (including habitat enhancement, new planting or other habitat creation initiatives) is incorporated into new development, where the implementation of such development would result in unavoidable impacts on biodiversity - supporting the principle of biodiversity net gain.*'

BE15-7: Control of Invasive Alien Species

'Implement best practice to minimise the risk of spread of invasive alien species, on Council owned or managed land, and require the development and implementation of Invasive Alien Species Management Plans for new developments where required.'

BE15-8: Trees and Woodlands

a) *Protect trees the subject of Tree Preservation Order.*

b) *Make use of Tree Preservation Orders to protect important trees or groups of trees which may be at risk or any tree(s) that warrants an order given its important amenity or historic value.*

d) *Preserve and enhance the general level of tree cover in both town and country. Ensure that development proposals do not compromise important trees and include an appropriate level of new tree planting*; and,

e) *Where appropriate, to protect mature trees/groups of mature trees and mature hedgerows that are not formally protected under Tree Preservation Orders*.

2.2.2 Carlow Biodiversity Action Plan 2023 – 2028

A Biodiversity Action Plan (BAP) for Co. Carlow was published in 2023 by the Carlow Country Council [7]. The BAP provides a framework to manage biodiversity in the area. The BAP outlines a series of actions which are listed under each of the six (6No.) objectives of the plan:

- **Objective 1** '*To map and conserve what is valuable*.'
- **Objective 2** '*To rehabilitate where possible'*.
- **Objective 3** '*To enhance where possible'*.
- **Objective 4** '*To adopt Biodiversity friendly policies*.'
- **Objective 5** '*To improve the understanding of stakeholder's roles in biodiversity conservation*.'
- **Objective 6 '***To strengthen existing, and develop new, partnerships to deliver the above actions*.'

3 CURRENT BASELINE

3.1 Methodology

3.1.1 Desk Study

This BMP has been prepared in accordance with best practice guidelines and legislation including:

- The Carlow County Development Plan 2022-2028 [6];
- The Carlow Biodiversity Action Plan 2023-2028 [7];
- The National Biodiversity Action Plan [4];
- The All-Ireland Pollination Plan [5];
- BRE National Solar Centre Biodiversity Guidance for Solar Developments [7]; and,
- The National Planning Framework, Project Ireland 2040 (Ireland, 2018).

In addition, a desk-based review of information sources was completed, which included the following sources of information:

- Review of aerial maps of the Site and surrounding area;
- The National Parks and Wildlife Service (NPWS) website was consulted with regard to the most up to date detail on conservation objectives for the Natura 2000 sites relevant to this assessment [8];
- The National Biodiversity Data Centre (NBDC) website was consulted with regard to species distributions [9]; and,

- The EPA Maps website was consulted to obtain details about watercourses in the vicinity of the Site [1].

3.1.2 Field Survey

3.1.2.1 Habitat Survey

A habitat survey was undertaken on the 30th of May 2023 by a suitably qualified and experienced MOR ecologist.

The habitat survey undertaken for the Site aimed to identify the extent and quality of habitats present within the Site. The habitat classification followed:

- *'A Guide to Habitats in Ireland*' (Fossitt, 2000) [10];
- The floral nomenclature outlined in '*Webb's An Irish Flora'* (Parnell and Curtis, 2012) [11]; and,
- '*Census catalogue of the flora of Ireland*' (Scannell and Synnott, 1987) [12].

Furthermore, the habitat survey followed the methodology given by the Joint Nature Conservancy Council (JNCC) '*Handbook for Phase 1 Habitat Survey'* [15] for habitat assessment.

The assessment was extended to also identify the potential for these habitats to support other features of nature conservation importance, such as species afforded legal protection under either Irish or European legislation.

3.1.2.2 Protected / Notable Species

The methodologies used to establish the presence / potential presence of faunal species are summarised below. These relate to those species / biological taxa that the desk study and habitat types of presents indicated could occur on the Site.

Mammal names and status information were taken from '*Exploring Irish Mammals' (*Hayden and Harrington, 2000) [13] and *'Ireland Red List No. 12 terrestrial Mammals'* (Marnell *et al.,* 2009) [14].

Flora

The Site was assessed for the presence of notable / protected flora species in accordance with the following:

- Flora (Protection) Order 2022 (S.I. No. 235/2022); and,
- Ireland Red List No. 10: Vascular Plants [17].

Amphibians

The Site was assessed for its potential to provide sheltering, foraging, and breeding habitat for amphibians in line with the NRA, now TII, '*Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes,*' [18]. These included waterbodies suitable for egg-laying, and terrestrial habitats comprising open areas with mixed-height vegetation, such as heathland, rough grassland, open scrub, or waterbody margins. Suitable well drained and frost-free areas are needed to enable amphibians to survive the winter.

Badger

The survey aimed to identify and examine areas where badgers (*Meles meles*) might occur by noting any evidence of badger activity. This included:

- Mammal paths;
- Badger hairs caught in sett entrances / fences / vegetation;

- Paw prints;
- Evidence of foraging (usually in the form of 'snuffle holes');
- Badger Scat (isolated badger droppings);
- Latrines; and,
- Badger setts.

A mammal path was assumed to be used by badgers if the character of the path (in terms of size) was appropriate and / or if any other signs were in close vicinity (e.g., a badger sett).

The field survey of the Site was conducted in line with the following relevant guidance for badger:

- Scottish Badgers, '*Surveying for Badgers: Good Practice Guidelines,*' [19];
- The Mammal Society, 'Surveying Badgers,' [20]; and,
- NRA, now TII, '*Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes*,' [18].

Otter

The survey aimed to identify and examine areas where otter might occur by noting any evidence of otter observed. Evidence of otter searched for included:

- Holts (features log piles, caves, and cavities).
- Slides (flattered areas of mud or vegetation).
- Paw prints.
- Evidence of foraging (usually in the form of feeding remains such as fish scales and shellfish); and,
- Spraints.

The field survey of the Site was conducted in line with the following relevant guidance for otter:

- SNH, 'Technical Advice Note #2: Otter Surveys' [21];
- DoAHG, 'National Otter Survey of Ireland 2010 / 12' [22]; and,
- NRA, now TII, 'Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes,' [18].

Bats

An assessment of the suitability of the habitats within the Site to support bat roosting, foraging, and commuting was carried out. Mature trees were inspected for evidence of cavities, splits, cracks, loose bark, and dense and woody ivy (*Hedera helix*) growth that could be used by bats for roosting.

The survey was undertaken in accordance with recognised best practice as outlined below:

- DoEHLG, 'Bat Mitigation Guidelines for Ireland' [23]; and,
- BCT, 'Bat Surveys for Professional Ecologists Good Practice Guidelines' [24].

Birds

The Site was assessed for its potential to provide nesting habitat for breeding birds or to support important assemblages of birds of rare or notable species. The survey was undertaken in accordance with the 'Common Bird Census in Bird Monitoring Methods' [25].

Invasive species

The Site was visually assessed for the presence of any noxious / invasive species that are regulated under Regulations 49 and 50 of the European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. 477 of 2011) [26] such as Japanese knotweed (*Fallopia japonica*) and Himalayan balsam (*Impatiens glandulifera*).

Other Species

In addition, as part of the ecological assessment for the Site, an assessment was carried out for the potential of the Site to support any other species considered to be of value for biodiversity, including those that were identified as occurring locally by the desktop study.

3.1.2.3 Survey Constraints

No survey limitations were encountered.

3.2 GIS Mapping

Geographical Information System (GIS) is a computer-based information system designed to store, process, and manipulate geographical data. GIS can be used to analyse data and produce habitat mapping. GIS has been used in this report to prepare a baseline habitat map based on the 2021 field survey information.

All habitats within the Site have been mapped according to 2023 field survey recordings, with their locations and extent uploaded and stored in the GIS as two-dimensional shapes (polygons), or linear shapes habitats like hedgerows or stonewalls. Furthermore, target notes were uploaded for the location of protect / notable species evidence.

4 STUDY RESULTS

4.1 Desk Study

Prior to conducting any Site surveys, a desk-based review of information sources was completed. This baseline information provides a valuable insight to the types of flora and fauna that may occur within the surveyed area and allows for the identification of features / habitats that may require further assessment.

4.1.1 Protected / Nature Conservation Sites

The Site is not located within or directly adjacent to any statutory or non-statutory designated sites for nature conservation. There are three (3No.) European sites located within 15km of the Site.

An Appropriate Assessment (AA) has been prepared in support of this planning application and fully considers the European sites located within 15km of the Site.

4.1.2 Protected / Notable Species

Table 4-1 provides a summary of records from the last 10 years of legally protected or otherwise notable species that occur within a 2km grid square of the Site [9]. CIEEM's guidelines recommend that consideration be given to the biodiversity conservation value of the species that occur within this zone of influence (as appropriate) [29].

Table 4-1: Protected and / or Notable Species within a 2km of the Site.

Common Name	***Scientific Name***	**Date of last record**	**Designation**
Terrestrial Mammal			
Eurasian Badger	*Meles meles*	25/08/2013	Protected Species: Wildlife Acts
West European Hedgehog	*Erinaceus europaeus*	28/05/2022	Protected Species: Wildlife Acts
Birds			
Barn Owl	*Tyto alba*	04/01/2015	Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Red List
Common Swift	*Apus apus*	26/05/2023	Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List
Invasive Species			
Japanese Knotweed	*Fallopia japonica*	01/07/2015	High Impact Invasive Species Regulation S.I. 477
Jenkins' Spire Snail	*Potamopyrgus antipodarum*	22/08/2017	Medium Impact Invasive Species

Common Name	*Scientific Name*	Date of last record	Designation
European Rabbit	*Oryctolagus cuniculus*	08/06/2018	Medium Impact Invasive Species

*Note that only species recorded within the past 10 years were included in this table. The parameter of 10 years was chosen to allow for habitat adaption and modification, it is considered that any records over 10 years old are not representative of the current distribution of species populations.

4.2 Field Survey Results

4.2.1 Ecological Assessment Habitat Descriptions

Key elements of biodiversity, including legally protected species, species and habitats of high conservation value and designated areas were identified within the Site and in the surrounding area. A detailed description of the habitats and features of ecological significance are outlined in the Environmental Report (ER) - Section 6 Biodiversity.

4.2.2 Habitats

The Site is predominately comprised of agricultural land, which, at the time of writing this report, was under arable crop with sections of treeline and vegetation forming the perimeter of the Site. Three (3No.) habitats were noted within the Site boundary, as listed below:

1. Arable Crops (BC1).
2. Drainage Ditch (FW4).
3. Hedgerows (WL1) / Treelines (WL2).

A description of the habitats and features of ecological significance are outlined in the ER. The distribution of the habitats and location of features of interest are shown in Figure 4-1.

4.2.3 Species

Based on identified features, signs of activity and onsite habitats, the following species are currently onsite or have the potential to utilise the proposed development site. A detailed description of the features of ecological significance are outlined in the ER.

- Bats.
- Badgers.
- Amphibians.
- Otter.
- Birds; and,
- Invasive Species.

The potential presence of protected species within the study area was assessed though a data search conducted through the NBDC as outlined in Table 4-1, and included the following species:

- Eurasian Badger
- West European Hedgehog
- Barn Owl
- Common Swift
- Japanese Knotweed
- Jenkins' Spire Snail

- European Rabbit

4.2.4 Other Species

No other protected or otherwise notable species were noted during the Site walkover. However, it is considered that the well-established hedgerows / treelines provide suitable foraging habitat and connectivity to the wider landscape for a wide range of commonly occurring species, such as fox, field mice, hedgehog, pygmy shrews, and rabbit.

Figure 4-1: Habitat Map

5 BIODIVERSITY MANAGEMENT PLAN

The Proposed Development provides a number of opportunities for providing biodiversity enhancement within the development design, through the enhancement of the land within the Site boundary. This will increase the Site's capability of supporting wildlife through generation of renewable energy, resulting in 'Biodiversity Net Gain.'

In order to maximise the floral and faunal biodiversity and to enhance the ecological value of the Site the following measures will be implemented:

- The natural recolonisation of local botanical species from the existing seed bank within the grassland and wet grassland fields;
- The creation and maintenance of species-rich grassland with a varied sward structure;
- Enhancement of existing planted areas with additional hedgerow species-rich planting along the Site boundaries;
- Drainage enhancement to improve existing drainage channels and ditches and to enhance the habitats for breeding amphibians;
- Provision of wildlife shelters providing nesting opportunities for protected and locally important species including bird boxes, bat boxes and habitat piles; and,
- Provision of mammal gates to maintain connectivity for mammals such as badger moving through the landscape.

5.1 Protection of Ecological Corridors

An ecological corridor is generally a linear habitat features (such as water courses, treelines, hedgerows, etc.) that link areas of habitats and allow for different species to move between these areas. Ecological corridors are considered to be important for a variety of different reasons, most notably for the maintenance of genetic diversity and the avoidance of fragmentation within the landscape and risks associated with inbreeding.

The importance of ecological corridors is well documented and there are provisions in both European and Irish legalisation for the protection of such features which provide ecological coherence.

Article 10 of the Directive specifically refers to linear landscape features and steppingstone habitats:

> '*Member States shall endeavour, where they consider it necessary, in their land-use planning and development policies and, in particular, with a view to improving the ecological coherence of the Natura 2000 network, to encourage the management of features of the landscape which are of major importance for wild fauna and flora.*
>
> *Such features as those which, by virtue of their linear and continuous structure (such as rivers with their banks or the traditional systems for marking field boundaries) or their function as steppingstones (such as ponds or small woods), are essential for the migration, dispersal, and genetic exchange of wild species*.'

The Local Government (Planning and Development) Act, 1963 (Third Schedule, Part IV, Paragraph 8A) was amended as a result of adoption of the Habitats Directive, and local authorities can now refuse planning permission without compensation, for developments which threaten functioning ecological corridors or steppingstones. The amendment cites the:

> '*Protection of features of the landscape which are of major importance for wild fauna and flora in accordance with the Habitats Directive.'* (S.I. 94 of 1997, 26(c))

Taking the above into consideration, it is recommended that where possible existing ecological corridors be protected and enhanced. The following measures are recommended for the protection of hedgerow / treeline ecological corridors:

- Annual inspections of hedgerows / treelines to determine health of the plants;
- Where dead trees are identified - removal of dead tree and replacement with new suitably sized native tree species; and,
- Where sparse areas are identified – additional supplementary planting of native tree species should be undertaken.

5.1.1 Habitat Connectivity

Habitat connectivity is generally known as the degree to which the environment facilitates or obstructs species movement and other ecological processes. There are opportunities within the Site to increase the habitat connectivity of the local area such as:

- Implementing mammal fences into the fences around the Proposed Development Perimeter.

5.2 Biodiversity Enhancement Zone and Habitat Creation

The existing agricultural lands on Site offer limited opportunities for wildlife; therefore, habitat creation and enhancement measures will be implemented in order to increase opportunities for a variety of wildlife. The proposed planting will be native and where practically possible of local providence and / or those that have a known attraction or benefit to local fauna.

Within the Site the planting of species rich diverse grassland will occur within a large section along the western boundary, with the management regime ensuring a varied sward structure. The objective of species rich grassland habitat is to enhance the quality of the habitats on-site and provide increase opportunities for wildlife. No development PV Panel or BESS infrastructure will be placed in this zone.

5.2.1 Species Rich Grassland Habitat

It is proposed to create a new species-rich grassland habitat with a varied sward structure using only Irish sourced seeds from a reputable supplier. The proposed species composition of the seed mixture is specified in Table 5-1.

The creation of a species-rich grassland habitat will greatly enhance the biodiversity of the onsite habitats. Following installation of the solar arrays, the areas of grassland will be seeded with additional grass-mix where required, and the vegetation under the panels will be left to revert naturally.

Species rich grasslands support a wide variety of species including insects, amphibians and birds and have the potential to significantly enhance the local biodiversity and can provide a source of nectar and pollen for a range of insect species, which in turn will provide prey for birds and bats to feed on. The vegetation will be managed through mechanical cutting, with one cut in late spring and one cut in late summer. Cuttings will be used to create habitat piles or will be removed off Site.

This commitment will also have a major positive benefit in regard to managing soil conditions onsite as the vegetation cover will also delay surface water runoff and prevent soil erosion.

Table 5-1: Indicative Species Rich Grassland Seed Mixture

Common Name	Scientific Name	Mix %
Meadow Fescue	*Festuca pratensis*	85% Native Grasses

Common Name	Scientific Name	Mix %
Sheep's Fescue	*Festuca ovina*	
Perennial Rye	*Lolium perenne L*	
Creeping Red Fescue	*Festuca rubra*	
Chewings Fescue	*Festuca rubra subsp. commutata*	
Smooth Stalked Meadow Grass	*Poa Pratensis*	
Meadow Foxtail	*Alopecurus pratensis*	
Timothy grass	*Phleum pratense*	
Ribwort Plantain	*Plantago lanceolata*	15% Native Flowers

5.2.2 Soil Stabilisation and sward establishment

Prior to sowing, the area of existing grassland will be sprayed with an approved herbicide, with repeat application where necessary to kill off any persistent weeds and regrowth of grasses. The ground will be harrowed to a fine tilth and rolled to make the surface firm. This shall be undertaken prior to the removal of the GCN exclusion fencing, to prevent injury to this species.

A grass seed comprised of the mixture set out in Table 5-1 above, or a mix further tailored to the soil conditions will be sowed. The grass seed will be applied at a low-density rate which will allow for natural regeneration.

5.2.3 Natural Recolonisation Grassland Habitat

It is proposed to allow the grassland fields to be naturally recolonised by local botanical species from the existing seed bank. The grassland will be grazed by sheep and, if necessary, the grassland habitat will be cut / mowed once per year in September. The cuttings will be removed off-site.

There will be no fertilisers, pesticides or herbicides used within the Site in order to maintain suitable soil conditions for natural recolonisation.

Should areas not re-established from the seedbank supplementary seeding with locally sourced species mix may be required. The proposed species composition of the seed mixture for the wet grassland are specified in Table 5-1. Seeding will take place in either spring or autumn and will simply comprise broadcasting the seeds, in an appropriate quantity, throughout the identified zone. Because the soil will already have been disturbed to installation of panels, further soil penetration is considered unlikely to be required.

The exact location of the supplementary seeding will be determined by a suitably qualified and experienced ecologist and only after the panels have been installed. This is to allow the ecologist to make an assessment of the exact conditions that have been created and thus to ensure that the seeding is sited in the most appropriate location possible.

5.2.4 Sward Establishment

Species such as common couch, broad-leaved dock, stinging nettle, and creping thistle can be difficult to eradicate and may cause problems with sward establishment. These species should therefore be targeted when undertaking weed control measures on-site.

Low intensity sheep grazing will ensure that areas of shorter swards will be managed and maintained. Due to selective grazing habits, sheep grazing can lead to a diverse sward

structure, if stocked at correct numbers. Sheep grazing the grassland areas post-development benefits local biodiversity by eliminating the requirement of pesticides used as part of the current management regime for crops in the arable field.

5.2.5 Hedgerow / Treeline Enhancement and Planning

A total of ca. 3,596m of additional planting will be undertaken as part of the Proposed Development. This includes reinforcement planting to both supplement (ca. 731m) and strengthen existing hedgerows (ca. 2,865m). The primary function of the proposed mitigation planting is for screening as presented in the Landscape Plan (Appendix B of the ER). However, it will also enhance the ecological corridors that are already present within the hedge / treelines.

The additional hedgerow planting will provide shelter and a source of food for a variety of species throughout the year including birds, small mammals, amphibians, and butterflies. It will also allow movement of species such as badger and other small mammals across the Site and provide connectivity to the wider landscape.

All planting will consist of a mixture of native hedgerow species that are prevalent in the immediate area as listed in Table 5-2.

Table 5-2: Native Hedgerow Species Planting

Common Name	*Scientific Name*	Percentage Mix (%)
Hawthorn	*Crataegus monogyna*	60%
Blackthorn	*Prunus spinosa*	15%
Holly	*Ilex aquifolium*	15%
Guelder Rose	*Viburnum opulus*	2.5%
Hazel	*Corylus avellana*	2.5%
Dog Rose	*Rosa canina*	2.5%
Spindle	*Euonymus europaeus*	2.5%

Figure 5-1: Hedge / Treeline Habitats

5.1 Chemical Free

Herbicides and pesticides can have unintended consequences on both flora and fauna. Where possible, the use of herbicides and pesticides should be avoided, and other methods of pest control should be used.

Fertilisers are generally unnecessary, and infertile habitats are often some of the most species rich. When planting new trees and shrubs, manure, bone meal or a similar slow-release fertiliser can be incorporated into the soil.

5.1.1 Drainage Ditches

It is proposed to utilise the existing network of on-site drainage ditches to create habitats suitable for breeding amphibians. This work will be carried out with care so as not to remove all the marginal vegetation around the fringes of the drainage ditches.

In addition, the placement of habitat piles around the margins of the drainage ditches will create refuges for amphibians and provide features to enhance the Site for protected / notable species.

5.1 Bare Ground Scrapes

Bare ground scrapes will be left around some of the drainage ditches to provide a diversity of habitats, most notable for invertebrate species that specialise in these types of habitats. These will also be large enough to be utilised by ground nesting bird species.

5.2 Fauna and Wildlife Shelters

The recommendations proposed below detail measures that will enhance the attractiveness of the Site to wildlife in the surrounding areas. The locations and quantity of the following measures will be specified by an ecologist following completion of works.

5.2.1 Re-use of Coarse Woody Debris

Any re-use will be used to enhance habitat values in existing vegetation and rehabilitated areas including native grassland. The re-use of the woody debris can provide:

- Habitat for micro-invertebrates;
- Habitat for macro-invertebrates;
- Habitat for vertebrates using fallen timber for shelter;
- Habitat for vertebrates using fallen timber for foraging; and,
- Increased habitat complexity.

The woody debris will be placed throughout the Site.

5.2.2 Hibernaculum and Habitat Piles

Hibernacula and habitat piles are a valuable habitat and support a range of biodiversity including, insects, amphibians, and small mammals. These habitats act as refuges and hibernation sites for amphibians as well as a host of other species of inverts and small mammals. The objective is to create a diversity of habitats within the Site.

Hibernacula and habitat piles can be created through the placement of either piles of rocks or logs around the margins of hedgerows / treelines, near wetland habitats and adjacent to drainage ditches. It is proposed to create these enhancement measures using the material generated by the vegetation clearance works on-site. Refer to examples below Figure 5-2 and 5-3.

Figure 5-2: Typical hibernaculum and cross section

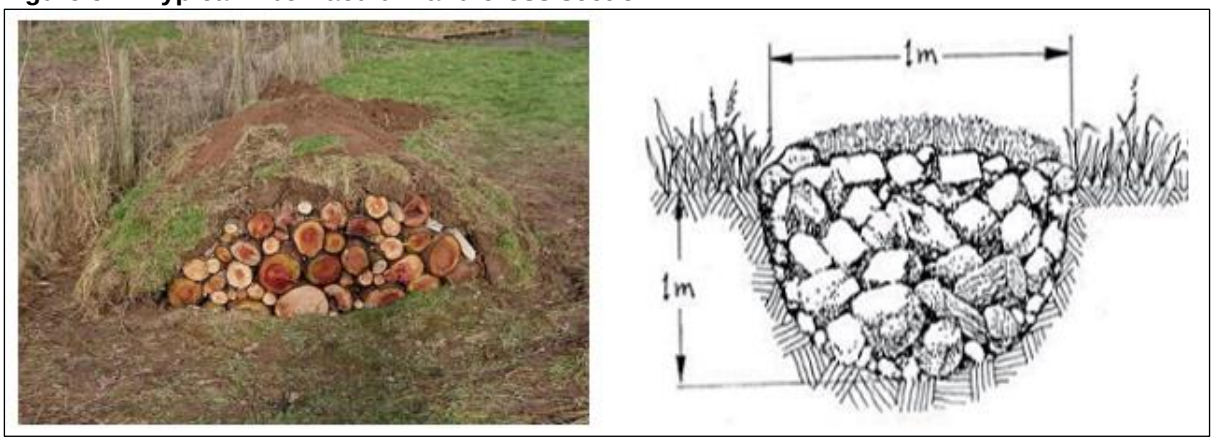


Figure 5-3: Habitat Piles

5.2.3 Insect Hotels and Creating Deadwood Habitat

The primary purpose of insect hotels, also referred to biodiversity towers, is to provide additional habitat space for small organisms, insects, and other invertebrates. The objective is to create a diversity of habitats within the Site.

They can be built from a variety of natural and / or repurposed materials. Dead wood provides habitat for beetles, centipedes, woodlice and spiders, and materials with holes act as shelter for solitary bees, which are crucial for pollination. The artificial shelters can come in a variety of sizes and can be used by a range of smaller animals, such as toads and hedgehogs who can use these artificial habitats for hibernation or breeding (see Figure 5-4).

Insect hotels should be positioned in areas sheltered from wind and rain and with access to sunlight. The artificial shelters should be placed 1.5m off the ground to reduce access to insect

predators. Insect hotesl can be free standing or attached to existing features such as trees, posts or walls.

The exact location of the insect hotels will be determined by an experienced ecologist after the completion of the proposed works. This is to allow the ecologist to assess the exact conditions that have been created and thus to ensure that the insect hotels are situated in the most appropriate location.

Figure 5-4: Artificial Deadwood Habitats

5.2.4 Bird Boxes

A variety of bird nest boxes designed to attract a variety of nesting bird species will be erected on suitable trees within the Site. The creation of nesting habitat, along with the creation of species rich habitat will encourage an abundance of invertebrate life (a potential food source) will be beneficial to local birds. General bird boxes designed to cater for a variety of species will be used, the number and location of which will be specified by an ecologist. Refer to examples provided in Figure 5-5.

An example is the 1B Schwelger Nest Box - 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.

Different bird species require difference entrance sizes as outlined below:

- The circular 26mm entrance hole suits blue, marsh, coal, and crested tit and possibly wren. All other species are prevented from using the nest box due to the smaller entrance hole.
- The circular 32mm entrance hole will attract great, blue, marsh, coal and crested tit, redstart, nuthatch, collared and pied flycatcher, wryneck, tree, and house sparrow.
- The 45mm entrance hole will attract starling.
- Open-fronted nest boxes will attract robins, wrens, pied and grey wagtail, song thrush and blackbirds.

The exact location of the bird boxes will be determined by an experienced ecologist after the completion of the proposed works. This is to allow the ecologist to assess the exact conditions that have been created and thus to ensure that the bird boxes are sited in the most appropriate location possible. However, it is recommended that bird boxes be facing between north and south-east to avoid strong winds, rain, and sunshine. In addition, bird boxes should be tilted slightly forward to ensure that rain runs off the top and there should be a clear flight path to access the nestbox hole. Also, bird boxes with a hole should be placed ca. 2-4m off the ground,

whereas open-fronted bird boxes should be placed lower than 2m among dense vegetation where predators won't easily see it.

It should be noted that the distance between nest boxes can vary. Species such as house sparrow and starling have a preference for nesting in colonies and therefore the bird boxes should be placed closer to each other, whereas species robins and tits can be highly territorial and therefore the nest boxes should be separate by a greater distance.

Figure 5-5: Bird Box Examples

5.2.5 Bat Boxes

Hedge / treelines are a linear habitat that provide a continuous pathway across the Site, which provides a suitable commuting corridor / foraging habitat for bats. These habitats will be enhanced as detailed in Section 4.1.3.

Artificial bat boxes will also be erected on suitable trees within the Site. Artificial bat roost boxes can provide vital roosting places in habitat devoid of natural roosting opportunities. These should be placed in a position sheltered from strong wind and exposed to the sun for part of the day. The objective being to create roosting habitat, along with the creation of species rich habitat will encourage an abundance of invertebrate life (a potential food source) will be beneficial to local bats.

The boxes will be located in / close to linear features, such as the treelines and placed a minimum of 2m above the ground. The number and location of which will be specified by an ecologist. Figure 5-6 suitable bat roost box examples including a Pole Mounted Bat Box, Bat Box Schwegler 1FF and Vivara Small Bat Box.

The exact location of the bat boxes will be determined by an experienced ecologist after the completion of the proposed works. This is to allow the ecologist to assess the exact conditions that have been created and thus to ensure that the bat boxes are sited in the most appropriate location possible.

Figure 5-6: Suitable Bat Roost Boxes

Lighting Restrictions

Many bats are averse to light and will avoid areas with high intensity lighting. Therefore, in order to minimise any potential impacts from light spillage consideration should be given to the lighting strategy on-site.

Where lighting is essential, i.e., for security reasons, low pressure sodium lamps would be preferable to high pressure sodium or mercury lamps, in order to keep the brightness as low as possible. The lighting should also be directional, aimed only where it is needed (with no upward lighting).

Dark Corridors

Dark corridors can be created to encourage / guide bats away from lit areas or around lit obstacles. Dark Corridors can be created of man-made or natural materials (e.g., fences, brick walls, tree lines or hedges). This could be achieved through alterations to the lighting strategy and incorporation of additional planters creating dark fly ways sheltered from predators and the elements. This would help to maintain habitat linkages and continuity of the habitats for these species.

5.1 Mammal Gates

Mammal gates will be installed along the perimeter fence of the proposed Site. The objective of the mammal gates is to ensure fencing does not inhibit the movement of wildlife, and to allow movement of badgers, otters, and small mammals across the development.

Sections of the fencing will be raised or will include ‘access gates’ (300mm x 150mm) which allow small mammals to move freely across the Site. The ‘access gates’ will be suitably located at points along the perimeter fence in order to ensure connectivity for small mammals such as rabbits, badgers, and foxes.

Additional mammal gates will also be located along identified mammal runs to ensure that these establish routes are not disrupted. Figure 5-7 provides an example of a mammal gate.

Figure 5-7 Mammal Gate Examples

Figure 5-8: Biodiversity Management Plan

6 IMPLEMENTATION AND AFTERCARE

6.1 Species Rich Grassland & Wet Grassland Habitat

Year 1

Following installation of the solar arrays, the project Ecologist will assess the success of planting within the first growing season. If it is deemed necessary by the Ecologist, any areas identified as being disturbed by the construction works or unsuccessful following initial seeding, will be reseeded within the next planting season.

In the establishment year, grazing is the preferred management method. Grazing (sheep) can suppress weeds and prevent a few kinds of grasses dominating the sward. It improves grassland structure through the recycling of nutrients and by creating gaps in the sward for seed germination. Breeds of sheep used commonly used for grazing orchards such as 'Shropshire sheep' should be utilised where possible. These breeds have been bred for managing herbage in tight confined spaces such as under solar panels.

Years 2-5

Following the first year of establishment, sheep grazing will continue as the main management for the grassland. The grassland will be grazed between autumn (September) and winter (March) as an alternative to mowing. The meadows will then be allowed to grow between mid-March and early September. Meadows and grassland can be maintained by grazing alone.

6.2 Bare Ground Scrapes

Areas of bare ground located at drainage ditches on-site will be left unseeded and maintained as bare ground.

These areas will need to be monitored bi-annually for injurious weeds, and encroaching scrub or wildflower species, which are to be removed if identified.

6.3 Hedgerow / Treeline Enhancement

Within the first year after the construction works, the new native hedgerow planting will take place within the first available planting season (November – March).

The new sections of hedgerow will be a triple staggered row of native species to provide a well-structured hedgerow and dense screening. A height of 3-4m will be established along all hedge / treelines after 2-3 years (3-4 growing seasons).

Annual inspections of the trees will take place for a period of five years to ensure tree health and establishment. Trees that fail to become established within 5 years of planting will be replaced by trees of a similar size and species within the next planting season.

All newly planted hedgerows will be lightly managed / pruned in Year 2 with the existing hedgerows cut on a 2- or 3-year cycle, with no more than 1/3 cut in any one year. All pruning / management should take place outside of the nesting and breeding bird season, typically March 1st to August 31st.

6.4 Fauna Enhancement Measures

The hibernaculum and habitat piles created will not require any maintenance or monitoring once created.

The bird boxes, bat boxes and insect hotels should be inspected each year and any required maintenance carried out:

- Bird boxes should be checked outside of the nesting and breeding bird season, typically March 1st to August 31st.

- Bat boxes should be inspected outside of the breeding season (mid-May to mid-August) to ensure no disturbance to breeding females or young bats occur.

Bird boxes and bat boxes may require cleaning to prevent the accumulation of biological waste and parasites. Boxes should be cleaned with warm water and no additional substances should be used in order to prevent introduction of harmful chemicals.

6.5 Implementation of BMP

In advance on the development works commencing the BMP will be revised and updated to provide details on the source of seeds. The report will also provide details on the mechanics of how the works will be undertaken. This report will be prepared in consultation with the local conservation officer and issued to the Planning Authority for approval.

6.5.1 Monitoring

In order to ensure that the recommendations made within this Biodiversity Management Plan have been implemented correctly, a suitably qualified and experience ecologist should monitor the installation works.

Furthermore, in order to monitor the effects of the implemented recommendations, annual ecological surveys should be undertaken by suitably qualified and experienced ecologists - this includes for periodical dissemination of monitoring and survey results to relevant bodies including the Planning Authority as required. 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.

Should an updated plan be required arising from observations collected during the ecological monitoring, this will be submitted as required to the Planning Authority.

Following the fifth year of assessment and management, a report will be submitted to the Planning Authority summarising the status of the created habitat and overall biodiversity gain achieved through the project. The report will also outline the recommendations for both future management options and monitoring works.

7 INDICATIVE MANAGEMENT SCHEDULE

Management Activity	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Year 1 – Initial Habitat Enhancement												
Hedgerow and tree planting	✓	✓	✓								✓	✓
Removal of existing vegetation and seeds beneath solar panels			✓	✓	✓							
Cultivate and allow new soil to settle						✓	✓					
Sowing grasslands beneath solar panels								✓	✓			
Field margin cutting									✓	✓		
Installation of bat and bird boxes				✓	✓	✓	✓	✓	✓	✓		

Management Activity	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Installation of habitat piles and hibernaculum						✓	✓	✓	✓			
Installation of insect hotels						✓	✓	✓	✓	✓		
Grazing by sheep (if sward established)	✓	✓							✓	✓	✓	✓
Creation of bare ground scapes												
Year 2 – Annual Habitat Management												
Grazing by sheep (if sward established)	✓	✓							✓	✓	✓	✓
Field margin cutting									✓	✓		
Light pruning of newly planted hedgerow sections	✓	✓							✓			

Management Activity	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Weed clearance, watering and pruning through initial maintenance period			✓	✓	✓	✓	✓	✓				
Replacement of dead, dying or diseased plants in newly planted hedgerows and treelines										✓	✓	✓
Cutting of existing hedgerow (1/3 cut on a 2- or 3-years cycle)	✓	✓										
Maintenance of bare ground scrapes			✓	✓	✓	✓	✓	✓				
Inspection and	✓	✓							✓	✓	✓	✓

Management Activity	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
maintenance of bird boxes												
Inspection and maintenance of bat boxes	✓	✓	✓	✓					✓	✓	✓	✓
Inspection and maintenance of insect hotels	✓	✓	✓						✓	✓	✓	✓
Year 3 – Ongoing Annual Management												
Grazing by sheep (if sward established)	✓	✓							✓	✓	✓	✓
Field margin cutting	✓	✓										
Maintenance of bare ground scrapes			✓	✓	✓	✓	✓	✓				
Inspection and	✓	✓							✓	✓	✓	✓

Management Activity	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
maintenance of bird boxes												
Inspection and maintenance of bat boxes	✓	✓	✓	✓					✓	✓	✓	✓
Inspection and maintenance of insect hotels	✓	✓							✓	✓	✓	✓
Year 4 onwards – Ongoing Annual Management												
Grazing by sheep (if sward established)	✓	✓							✓	✓	✓	✓
Field margin cutting	✓	✓										
Maintenance of bare ground scrapes			✓	✓	✓	✓	✓	✓				
Inspection and	✓	✓							✓	✓	✓	✓

Management Activity	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
maintenance of bird boxes												
Inspection and maintenance of bat boxes	✓	✓	✓	✓					✓	✓	✓	✓
Inspection and maintenance of insect hotels	✓	✓							✓	✓	✓	✓
Cutting of existing hedgerow (1/3 cut on a 2- or 3-years cycle)	✓	✓										
Light pruning of newly planted hedgerow sections	✓	✓										
Grassland margin cutting (after year 3)									✓	✓		

8 CONCLUSIONS

In summary, it is considered that the BMP is an integral part of the Proposed Development to ensure that in the long-term, benefits to flora and fauna can be maximised. It can be concluded that the implementation of the measures outlined will not only support the protection and enhancement of the environmental quality of the area but will also result in an overall significant positive impact to the local biodiversity.

9 REFERENCES

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