Ecological Impact Assessment

Ballyglass Grid Connection

Co. Clare

Report prepared for Reeve Wave Limited

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1 Introduction

Greenleaf Ecology was commissioned by Reeve Wave Limited to undertake an Ecological Impact Assessment (EcIA) of the proposed development of a 110kV Air Insulated Switchgear (AIS) electricity substation and grid connection.

This report forms part of the Strategic Infrastructure Development (SID) application for the same development which has been submitted to An Coimisiún Pleanála in accordance with section 182A of the Planning and Development Act 2000. The proposed 110kV substation and grid connection will facilitate the connection of the permitted Ballyglass Solar Array Phase 1 (Clare County Council Reference P22-591 and An Coimisiún Pleanála Reference ABP-316043-23) and proposed Phase 2 (Clare County Council Reference P24-60485 and An Coimisiún Pleanála Reference PL-500253-CE-25) to the national grid.

The proposed site is located in the townlands of Ballyglass, Blackwater, Castlebank, Lakyle, Mountcatherine, Oakfield, Parkroe, Reanabrone, Rosmadda West and Ruanard (townlands), Ardnacrusha, County Clare.

The location of the proposed development is illustrated in Figure 1-1.

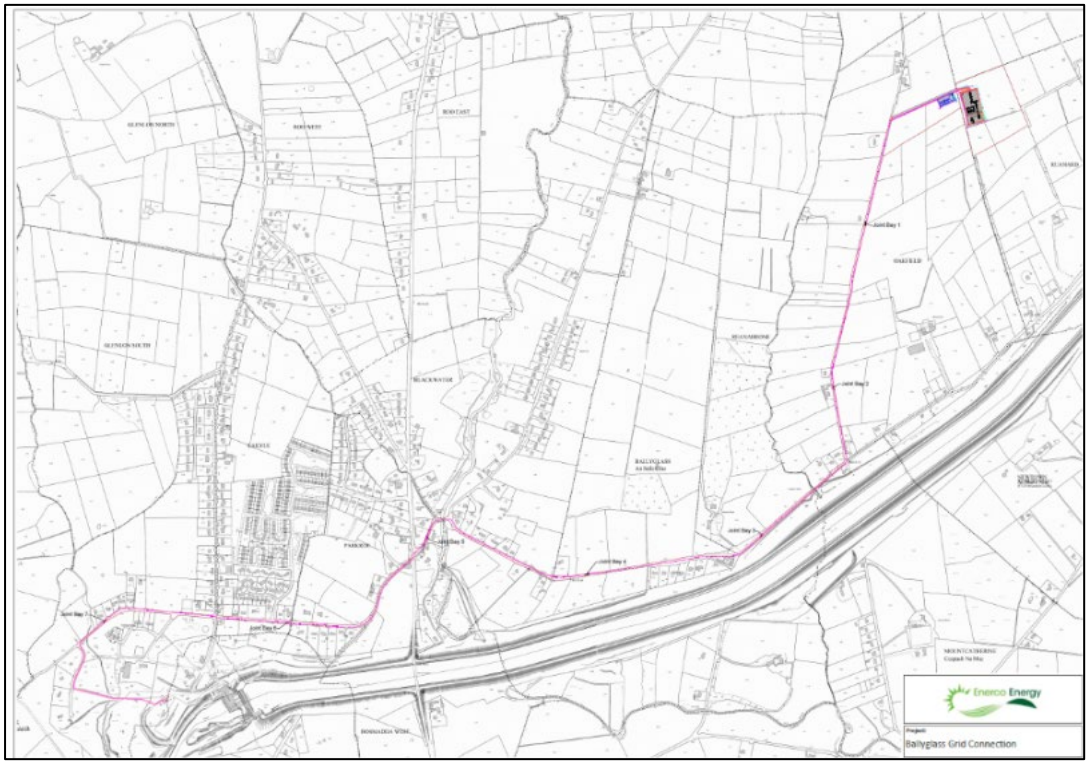


Figure 1-1: Proposed 110kV substation and grid connection route to Ardnacrusha substation.

For clarity, the location of Ballyglass Solar Array Phase 1 and Phase 2 lands, as well as the substation and grid connection which is subject to this application to An Coimisiún Pleanála are shown in Figure 1-2.

The substation is located within Parcel 3 of Ballyglass Solar Array Phase 2 lands, therefore, this EcIA provides information on the existing environment within both the SID development site and the wider Ballyglass Solar Farm Phase 2 to enable a complete and robust assessment of the entire project. A specific impact assessment of the proposed Ballyglass Grid Connection development is provided in Section 4 of this report.

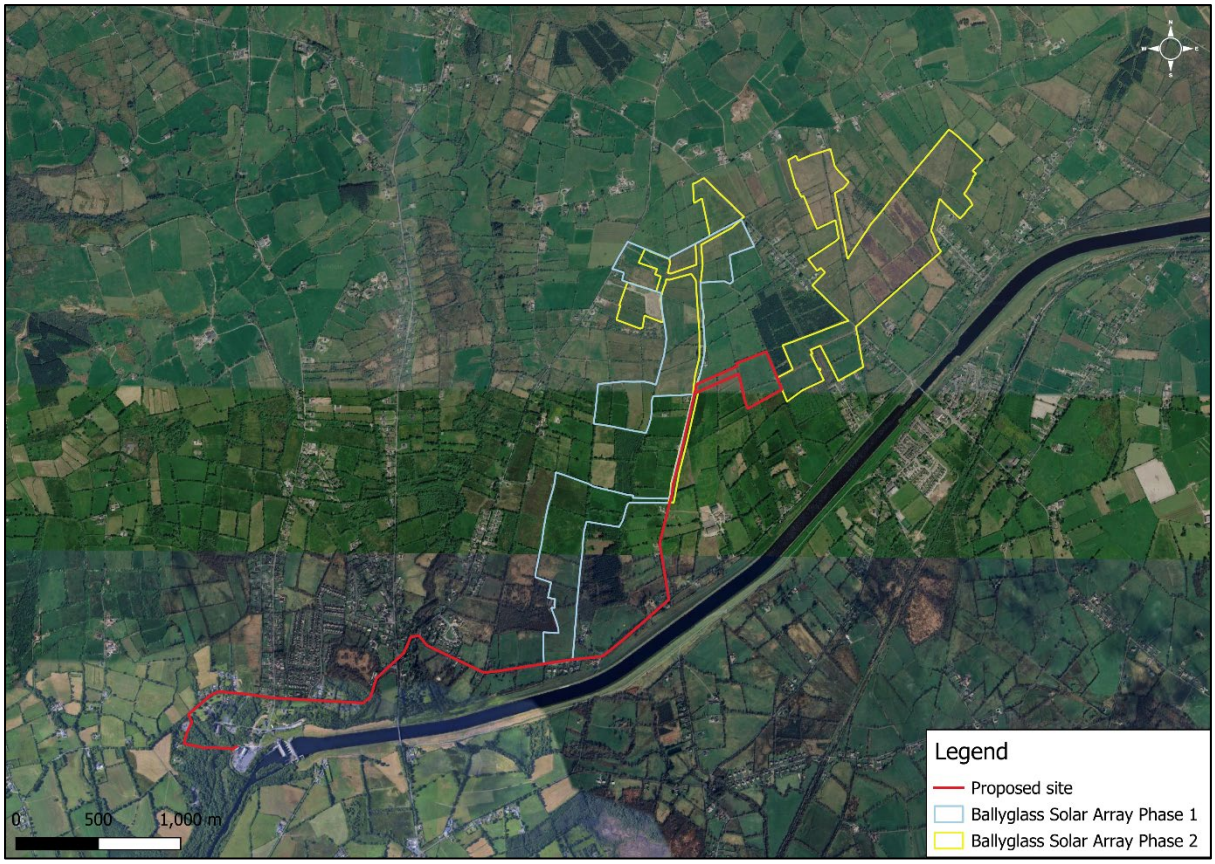


Figure 1-2: Ballyglass Solar Array (Phase 1 and Phase 2), Grid Connection Route & 110kV Substation Location Map

The aims of this ecological impact assessment are to:

- Establish baseline ecological data for the proposed development site;
- Determine the ecological value of the identified ecological features;
- Identify, describe and assess the likely significant effects of the proposed development on biodiversity;
- Propose effective mitigation measures to avoid, prevent or reduce and, if possible, offset adverse effects on biodiversity; and
- Identify any residual effects predicted to arise after mitigation.

This report focuses on terrestrial ecology. An Aquatic Ecological Impact Assessment prepared for the proposed development by Lauren Williams accompanies the application under separate cover.

1.1 Statement of Competence

This ecological impact assessment was undertaken by Karen Banks, MCIEEM. Karen is an ecologist with Greenleaf Ecology and has 19 years' experience in the field of ecological assessment. Karen has extensive experience in the production of Ecological Impact Assessments (EcIA) including those for solar farms, transport infrastructure, small to large scale housing and mixed-use developments, flood alleviation schemes and wind farms.

1.2 Project Description

The proposed development will consist of the provision of the following:

A 110 kilovolt (kV) Air-Insulated Switchgear (AIS) electrical substation, including 2 no. single-storey control buildings with staff welfare facilities, underground wastewater storage tank, all associated

electrical plant, cabling, equipment and apparatus, and security fencing, within a substation compound with a total footprint of approximately 0.8 ha; 5.6 kilometre (km) 110kV underground cabling route, with 4.75km following the public road corridor and 0.85km along new proposed access track across agricultural grassland and private access tracks (including joint bays, communication and earth sheath link chambers and all ancillary works along the route); 1 no. temporary construction compound (including offices and staff welfare facilities); temporary construction and operational access from a new entrance from the L70382; Spoil management, landscaping and earthworks; Site drainage; All ancillary works and apparatus.

The development subject to this application forms part of grid connection and access arrangements which will facilitate the connection of the permitted Ballyglass Solar Array Phase 1 (Clare County Council Reference P22-591 and An Coimisiún Pleanála Reference ABP-316043-23) and Phase 2 (Clare County Council Reference P24-60485 and An Coimisiún Pleanála Reference PL-500253-CE-25) to the national grid.

This application is accompanied by a Natura Impact Statement (NIS).

The proposed development works can be summarised as follows:

- Construction of new 110kV substation;
- Underground 110kV underground cable grid connection to the existing Ardnacrusha 110kV substation, including associated joint bays, communication chambers and earth sheath link chambers;
- Temporary construction compound;
- Provision of vehicular construction and operational entrance and access track from the L70382.
- Site drainage;
- Spoil management, landscaping and earthworks

Site Access

The site will be accessed for both the construction and operational phases by means of a new entrance from the L70382. The entrance will be suitably splayed and has been subject to sight line and autotrack analysis, with the latter including modelling of abnormal load delivery for the transformer. Operational sightlines will be maintained by trimming back hedgerows with all necessary land within ownership.

A 4.5 metre wide compacted access track will extend from the entrance to the substation compound, approximately 330m in length. The access track material will be made of porous aggregate material to support percolation to ground. The autotrack analysis has demonstrated that delivery of the substation transformer can be safely accommodated.

Substation

The 110kV substation involves two separate compounds namely (i) the 110kV compound which will be in the ownership of ESB Network and (ii) the IPP compound which will be in the ownership of the customer. Please refer to the enclosed drawings by Reeve Wave Limited for site configuration and design layout. The main construction elements will include two substation buildings of concrete block construct with tiled roof, which will accommodate staff welfare facilities for the operational phase, High Voltage (HV) electrical equipment and associated infrastructure including palisade fences and concrete post and rail fences. The installation of HV electrical equipment will include a Transformer (TRAFO) with associated equipment along with:

- Cable Sealing End (CSE);
- Surge Arrestor (SA);
- Earth Disconnect (DA, DB, DL, DT);
- Current /Voltage Transformer (CT/VT);

- House Transformer (HoT);
- Circuit Breaker (CB);
- Lightning Masts (LM);
- Diesel Generator;
- Harmonic filters if required by EirGrid;
- Capacitor Bank if required by EirGrid;
- Underground cable trench for the grid connection to the existing Ardnacrusha 110kV substation comprising of 3 no. power ducts, 2 no. telecom ducts and 1 no. earth continuity ducts.

The substation compound has a total area of approx. 0.8ha. Earthworks will be undertaken so the compound is level, with a finish compound level of 44m.

Connection to National Grid

In order to connect to the transmission network, it is proposed to connect the proposed 110kV substation to the existing 110kV Ardnacrusha substation by means of a 110kV underground grid connection which is approximately 5.6 km in length. The cable ducts will be installed in an excavated trench, typically to a depth of 1.30m. The cable will run west from the proposed substation through private lands for 0.33km to where it will join the local road network via the L70382. The cable will run south along the L70382 for approximately 1.3km to where it meets the R463. The cable will then run westward for circa 1.95km to where it will join the L3056. It will then travel west and south for approximately 1.45km along the L3056 until it leaves the public road corridor and enters private track. The cable continues along this track for 0.57 km before connecting with the existing Ardnacrusha substation. The exact connection point within the existing Ardnacrusha 110kV substation compound will be determined by ESB and EirGrid requirements.

Joint bays are required at approximately 750 metre intervals along the underground cable route to facilitate the jointing of cable lengths and comprise pre-cast concrete chambers (typically c. 2.5m x 6m x 2.05m) installed below finished ground level. Communication chambers and earth sheath link chambers will also be provided at each joint bay and approximately every second joint bay respectively, in accordance with ESB Networks and EirGrid requirements. All joint bays, communication chambers and earth sheath link chambers will be backfilled to finished ground level upon completion of cable installation, with no above-ground manifestation in the completed development.

All works will be carried out in accordance with international best practice and full compliance with health and safety requirements.

The underground cable route will involve five watercourse crossings. The crossing of the Blackwater River will be undertaken by means of Horizontal Directional Drilling (HDD) beneath the watercourse. The crossings of the Oakfield and West Roo watercourses will be undertaken by means of flatbed crossing methodology. All watercourse crossings will be carried out in accordance with Inland Fisheries Ireland guidelines. There is no requirement for instream works at any proposed crossing.

The construction phase of the proposed development is anticipated to take approximately 9 to 12 months to complete over an 18-month period, with construction anticipated to commence in Q3 2027 subject to the granting of planning permission. Construction activities will be carried out during normal daytime working hours of 07:00 to 19:00 hours Monday to Saturday. To ensure that optimal use is made of good weather periods or at critical periods within the programme, it may on occasion be necessary to work outside of these hours; any such out-of-hours working will be agreed in advance with Clare County Council.

Where vegetation removal is required (e.g. segments of hedgerow), this will be undertaken outside of the bird breeding season, which runs from 1st March to 31st August inclusive, in order to minimise

the potential for impacts on nesting birds. Construction may commence in the September to February period so that construction activities are ongoing by the time the next bird breeding season comes around, with works continuing through that breeding season subject to the vegetation-removal restriction above.

Temporary Construction Compound

As outlined in the submitted site layout plans, it is proposed to provide a temporary construction compound west of the proposed substation, accessed from the entrance from the L70382. The temporary compound will include the following facilities at a minimum:

- Adequate canteen space to allow for all workers during the peak period;
- Office space with lighting, heating and internet facilities;
- Toilets and adequate welfare facilities for construction staff in accordance with the relevant statutory Health & Welfare guidelines;
- Parking space for both light and heavy vehicles;
- Designated skips and temporary storage areas.

Surface Water Drainage and Water Services

Surface water drainage proposals for the development have been developed to mimic the natural drainage patterns of the site and thereby be in accordance with the best management practices of Sustainable Drainage Systems (SuDS) including those set out in the SuDS Manual (C753) published by CIRIA in 2015. Specifically, this includes the following:

- The proposed access track to the substation compound will be permeable allowing rainwater to infiltrate through the stone structure to the subsoil below;
- The compound construction is formed with permeable stone thus mimicking a soakaway scenario. ESB compound stone is single sized for the first 150mm for safety purposes. It then changes to a graded 6F2 material;
- The area to be drained includes the roofs and the bunded plinths. These equate to 786.5m² which is relatively minor in comparison to the overall compound area;
- Assuming even the most basic of infiltration rates down through the permeable compound stone, it is clear that the existing greenfield situation will be easily maintained;
- The surface water generated in the hardstanding and bunded areas will discharge to soakaways via a Class 1 Full Retention Oil Separator.

In relation to wastewater, a 5m^3 foul holding tank is proposed as part of the operational development. These tanks are normally used in ESB substations. It will be emptied periodically, with the capacity in excess of modelled holding requirements.

The control buildings will include staff welfare facilities for the operational phase of the Proposed Development. Toilet facilities will be installed with a low-flush cistern and low-flow wash basin. Due to the specific nature of the proposed 110kV onsite substation, there will be a very small water requirement for occasional toilet flushing and hand washing, and therefore a potable water source is not required. It is proposed to either harvest rainwater from the roofs of the buildings or, alternatively, install a groundwater well adjacent to the proposed 110kV onsite substation in accordance with the Institute of Geologists Ireland, Guide for Drilling Wells for Private Water Supplies (IGI, 2007). The well will be flush to the ground and covered with a standard manhole. A pump house is not required as an in-well pump will direct water to a water tank within the roof space of the control building. Bottled water will be supplied for drinking, if required. Section 3 of the submitted Construction and Environmental Management Plan includes a detailed summary of surface water, waste water and water supply requirements for the proposed development.

Site Reprofiling

The subject site is relatively flat in nature but analysis of topographic data confirms that cutting and filling of the existing terrain will be required to establish a level platform for the substation compound. Cutting into the existing terrain and the requirement to relocate soil has been minimised by establishing the compound level to 44 m. The excavation area of the substation site is approximately 0.9 ha. It is estimated that approximately 4,600m^3 of soil will need to be removed to form a level substation compound and approximately 650m^3 of soil will need to be removed to build up the access track from competent strata. It is envisaged that the majority of this excavated soil will be reused on site as part of landscaping measures, including the formation of perimeter berms and reinstatement works. Any residual surplus soil that cannot be accommodated on site will be disposed of offsite at an appropriately licensed waste recovery or disposal facility, with the option of an Article 27 by-product declaration to the EPA (under the European Communities (Waste Directive) Regulations 2011, S.I. No. 126 of 2011) pursued where the material meets the relevant criteria. Similarly, the necessary amounts of fill material which must be to ESB Networks specification will be transported onto site, supplemented by suitable material won from the site excavation. This is expected to be 13,650m3.

Site Restoration and Landscaping

This will involve the reinstatement of all other excavated materials and associated landscaping works. It will include the replacement of topsoil in disturbed ground areas such as access tracks and the removal of the construction compound and other temporary work areas. The proposed landscaping is consistent with that proposed under Clare County Council and An Coimisiún Pleanála References P22-591/ ABP-316043-23 and P24-60485 / PL-500253-CE-25.

Within the boundary of the proposed development, the Proposed Ballyglass Solar Array (Phase 2) application includes for the removal of some c. 25 linear meters of existing hedgerow required to facilitate the construction of access track throughout the proposed solar parcels. Notwithstanding the above areas of removal, this will be offset by the planting of new native hedgerow (outside of the SID application boundary) and the bolstering of some c.1,400 linear metres. The removal of hedgerow to facilitate the SID substation is limited to 3 linear metres, where it is proposed to add levelling batter to the access track. Overall, there is an additional c. 175m of proposed bolstered hedgerow, with no further removal or new hedgerow planting required as part of the proposed SID substation development as it is wholly contained within the parcels that form part of the proposed Ballyglass Solar Array.

Other Planned Works

Permitted Phase 1 of Ballyglass Solar Array *(Clare County Council Reference P22-591 and An Coimisiún Pleanála Reference ABP-316043-23)*

On 21st November 2023, planning permission was granted by An Coimisiún Pleanala for Phase 1 of Ballyglass Solar Array comprising:

A 10-year planning permission for a solar array at Ballyglass, Coolderry, Dromintobin North, Reanabrone, and Oakfield (townlands), Ardnacrusha, Co. Clare. The development will consist of c.265,000 m2 of solar panels on ground mounted frames, 8 no. single storey control cabins with associated electrical transformer units and hardstand areas, 2 no. ring main units, underground cabling within the solar array site and within the L70382 public road to connect solar array field parcels, security fencing, CCTV, access tracks (upgrade of existing and new), upgrades to four existing agricultural field entrances on the R463, L3046 and L70382 and creation of new entrance on L70382, temporary construction compound, landscaping and all associated ancillary apparatus and development works.

Proposed Phase 2 of Ballyglass Solar Array *(Clare County Council Reference P24-60485 and An Coimisiún Pleanála Reference PL-500253-CE-25)*

Phase 2 of Ballyglass Solar Array was submitted to Clare County Council on the 4th October 2024, comprising:

A 10-year planning permission for a solar array at Coolderry, Dromintobin North, Dromintobin South, Knockbrack Lower, Knockbrack Upper, Monaskeha, Oakfield and Ruanard (townlands), Ardnacrusha, County Clare. The development will consist of c. 330,000 m2 of solar panels on ground mounted frames, 13 no. single storey control cabins with associated electrical transformer units and hardstand areas, 2 no. ring main units, underground cabling within the solar array site and within the R471 public road to connect solar array field parcels, security fencing, internal CCTV, access tracks (upgrade of existing and new), upgrade to 1 no. existing agricultural field entrance and creation of 2 no. new entrances on the R471 and 1 no. new entrance on the L70382, 2 no. temporary construction compounds (including site offices and welfare facilities), landscaping and all associated ancillary apparatus and development works.

The proposed development provides for minor modifications to the solar array permitted under Clare County Council Reference P22/591 / An Coimisiún Pleanála Reference ABP-316043-23. These modifications comprise the omission of 1 no. single storey control cabin and associated electrical transformer unit, omission of solar panels and access track, and reconfiguration of internal cabling. The solar array will connect to the national grid and will have an operational lifespan of 40 years

Clare County Council granted conditional permission on the 16th October 2025. First and Third Party appeals were submitted to An Coimisiún Pleanála regarding same, An Coimisiún Pleanála Reference PL-500253-CE-25 refers. This case was due to be decided by 17th June 2026.

2 Methodology

This report will describe the existing environment for the proposed Ballyglass Grid Connection development and, for clarity, also includes a description of the proposed Phase 2 solar array site. The proposed solar array site comprises four distinct field parcels, the proposed substation development is located within Parcel 3 of the proposed solar farm site. The description of the site will refer to these land parcels where relevant. A specific impact assessment of the proposed development is provided in Section 4 and specific mitigation is provided in Section 5. Enhancement opportunities across the Ballyglass Solar Array Phase 2 lands are then provided in Section 6.

2.1 Relevant Planning Policy and Legislation

This report has been prepared with regards to the following legislation, policy documents and guidelines as relevant:

- CIEEM (2017) Guidelines for Ecological Report Writing. Chartered Institute of Ecology and Environmental Management, Winchester;
- CIEEM (2018) Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine. Chartered Institute of Ecology and Environmental Management, Winchester;
- DoEHLG (2010) Appropriate Assessment of Plans and Projects in Ireland Guidance for Planning Authorities. Department of the Environment, Heritage and Local Government;
- European Communities (2000) Managing Natura 2000 Sites: the provisions of Article 6 of the 'Habitats' Directive 92/43/EEC, Office for Official Publications of the European Communities, Luxembourg. European Commission;
- EC (2021) European Commission Notice Brussels C(2021) 6913 final 'Assessment of plans and projects in relation to Natura 2000 sites - Methodological guidance on Article 6(3) and (4) of the Habitats Directive 92/43/EEC';
- EC (2007) Guidance document on Article 6(4) of the 'Habitats Directive' 92/43/EEC – Clarification of the concepts of: alternative solutions, imperative reasons of overriding public interest, compensatory measures, overall coherence, opinion of the commission. European Commission;
- EC (2013) Interpretation Manual of European Union Habitats. Version EUR 28. European Commission;
- EPA (2022) Guidelines on the information to be contained in Environmental Impact Assessment Reports. Environmental Protection Agency;
- Fossitt, J., 2000. A Guide to Habitats in Ireland. The Heritage Council, Kilkenny;
- National Parks and Wildlife Service (NPWS) (2019) The Status of EU Protected Habitats and Species in Ireland. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht;
- NRA (2009) NRA Guidelines on Ecological Surveying Techniques for Protected Flora and Fauna on National Road Schemes). National Roads Authority; and

Studies were also carried out in accordance with the following legislation:-

- Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora (Habitats Directive) and Directive 2009/147/EC (codified version of Directive (79/409/EEC as amended (Birds Directive)) – transposed into Irish law as European Communities (Birds and Natural Habitats) Regulations 2011;
- European Communities (Environmental Impact Assessment) Regulations, 1989 to 2006;
- European Communities (Environmental Liability) Regulations, 2008 (S.I. No. 547 of 2008);
- European Communities (Quality of Salmonid Waters) Regulations, 1988 (S.I. No. 84 of 1988);
- Flora Protection Order, 2022;
- Planning and Development Act, 2000 (as amended);
- Water Framework Directive (2000/60/EC); and

- Wildlife Act 1976, as amended.

2.2 Desk Study

The sources of published material that were consulted as part of the desk study for the purposes of the ecological appraisal are as follows:

- Review of the National Parks & Wildlife Service (NPWS) natural heritage database for designated areas of ecological interest and sites of nature conservation importance within the proposed site and its environs;
- Review of Ordnance Survey maps and ortho-photography;
- Review of the National Biodiversity Data Centre (NBDC) database for records of rare and protected species within a 0.5km radius of the proposed solar array, including:
  - Annex I habitats, Annex II species and their habitats, and Annex IV species and their breeding sites and resting places (wherever they occur) as identified in the EU Habitats Directive;
  - The presence of species of flora and fauna as identified and strictly protected under the European Communities (Birds and Natural Habitats) Regulations, 2011;
  - Species of fauna and flora which are protected under the Wildlife Acts (Revised), 'Protected species and natural habitats' as defined in the Environmental Liability Directive (2004/35/EC) and European Communities (Environmental Liability) Regulations, 2008;
- Review of the NBDC database of records of bats within a 4km radius of the proposed solar array[1];
- 1:50,000 Ordnance Survey (OS) Map; Discovery Series; and
- Environmental Protection Agency mapping (http://gis.epa.ie/Envision).

2.3 Field Survey

A walkover survey of the proposed grid connection route was carried out by ecologist Ms Karen Banks in conjunction with a walkover survey for Ballyglass Solar Array Phase 1 on 12th January 2022. Survey of Ballyglass Solar Array Phase 2 lands, including the location of the proposed substation in Parcel 3, was conducted on 1st August 2024 and 13th September 2024. A further survey of the proposed grid connection route was conducted on 5th February 2026.

Flora and habitats within the study area were surveyed using the methodology outlined in the guidance document *Best Practice Guidance for Habitat Survey and Mapping* (Smith *et al.*, 2011). The habitats found in the study area (shown on Figure 3-3), were classified in accordance with the guidelines set out in '*A Guide to Habitats in Ireland*' (Fossitt, 2000), which classifies habitats based on the vegetation present and management history. The classification is a standard scheme for identifying, describing and classifying wildlife habitats in Ireland. The classification is hierarchical and operates at three levels, outlining the correlation between its habitat categories and the phytosociological units (plant communities) of botanical classifications. Dominant species, indicator species and/or species of conservation interest were recorded and species recorded were given both their Latin and common names, following the nomenclature as given in the '*New flora of the British Isles*' (Stace, 2010). Habitat potentially linked to European Annex I habitats was assessed based on the *Interpretation Manual of EU Habitats* (European Commission, 2013) and *The Status of EU Protected Habitats and Species in Ireland* (NPWS, 2019).

A survey for invasive species was conducted during the habitat and botanical survey undertaken between 2022 and 2026. This survey included the identification and mapping of Invasive Alien Plant

[1] A 4km radius search distance was selected to encompass records of bat roosts within Core Sustenance Zones (CSZ) of the site for Irish species of bat. A CSZ refers to the area surrounding a communal bat roost within which habitat availability and quality will have a significant influence on the conservation status of the colony using the roost (Collins, 2016).

Species (IAPS). This survey was conducted in accordance with the NRA publication "*Guidelines for the Management of Noxious Weeds and Non- Native Invasive Plant Species on National Roads*".

The site walkover surveys included an assessment of the presence, or likely presence, of protected species. The survey was conducted in accordance with the standard protected species survey guidelines contained in the National Roads Authority publication '*Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes*' (2009). The surveys were conducted for areas of habitat that might support protected mammals in addition to recording any field signs, such as well-used pathways, droppings, places of shelter and features or areas likely to be of particular value as foraging resources. Any badger setts present were recorded during the site walkover, along with potential pine marten den sites. In addition, the suitability of the habitat for pygmy shrew, hedgehog, Irish stoat, pine marten, amphibians and invertebrates were recorded.

Targeted faunal surveys were undertaken as detailed in Section 2.3.1 to Section 2.3.4 below.

2.3.1 Badger Survey

A badger survey was conducted within the proposed site boundary on 1st August 2024, 13th September 2024 and 5th February 2026. The badger survey was conducted in accordance with Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes (NRA, 2009).

Field signs of badger activity are characteristic and sometimes quite obvious and can include tufts of hair caught on barbed wire fences and scrub, conspicuous badger paths, footprints, small excavated pits or latrines in which droppings are deposited, scratch marks on trees, and snuffle holes, which are small scrapes where badgers have searched for insects and plant tubers (NRA, 2009).

Notes were made on signs of other mammals in order to deduce the likelihood of faint tracks and/or feeding signs belonging to badgers. The objectives of the badger survey were to:

- Confirm whether or not badger setts occur within the area surveyed.
- Confirm where possible the status of any setts identified in survey.
- Describe field signs of badger activity.

2.3.2 Otter Survey

An otter survey of the accessible areas of the Oakfield Stream, Blackwater (Clare) and West Roo watercourses within and adjoining the proposed site boundary was conducted on 13th September 2024 and 5th February 2026.

The banks of the watercourses were searched for field signs including:

- Sleeping and resting places including holts, couches and natal dens;
- Breeding sites;
- Spraints;
- Pathways/ trails;
- Slides;
- Hairs;
- Footprints; and
- Food remains.

Natal dens tend to be well hidden and therefore can be hard to locate. Survey for natal dens was undertaken by searching for field signs including:

- Any heavily used path or paths from the water into dense cover or an enclosed structure;
- Bedding within the structure which may consist of grass, ferns or reeds (bedding may also be present in other types of resting places);

- A latrine containing a large number of spraints at the den or within 2m of it (however, it is important to note that there are often no droppings at a natal den as the female will excrete in the water to ensure that there are no signs of occupation near the natal den);
- A cub play area which may be a well-worn area around a tree or on a bank; and
- Different sized otter prints.

2.3.3 Bats

2.3.3.1 Preliminary Roost Assessment

Trees

Trees were surveyed in conjunction with the site walkover for potential roost sites and signs of bats. A detailed inspection of the exterior of trees was undertaken to look for features that bats could use for roosting (Potential Roost Features, or PRFs) from ground level. The aim of the survey was to determine the actual or potential presence of bats and the need for further survey and/or mitigation.

A detailed inspection of each tree within the site was undertaken. The inspection was carried out in daylight hours from ground level, and information was compiled about the tree, PRFs and evidence of bats. All trees, or groups of trees, surveyed were numbered and marked on a map and a description of each PRF observed was recorded. PRFs that may be used by bats include:

- Rot holes;
- Hazard beams;
- Other horizontal or vertical cracks or splits (e.g. frost cracks) in stems or branches;
- Lifting bark;
- Knotholes arising from naturally shed branches or branches previously pruned back to the branch collar;
- Man-made holes (e.g. flush cuts) or cavities created by branches tearing out from parent stems;
- Cankers in which cavities have developed;
- Other hollows or cavities;
- Double leaders forming compression forks with included bark and potential cavities;
- Gaps between overlapping stems or branches;
- Partially detached ivy with stem diameters in excess of 50mm; and
- Bat or bird boxes.

Signs of a bat roost (excluding the actual presence of bats), include:

- Bat droppings in, around or below a PRF;
- Odour emanating from a PRF;
- Audible squeaking at dusk or in warm weather; and
- Staining below the PRF.

It should be noted that bats or bat droppings are the only conclusive evidence of a roost and many roosts have no external signs. In the current survey, potential roost sites were viewed by a bat specialist working from ground level. Trees were categorised according to the highest suitability PRF present.

Structures

Buildings within Ballyglass Solar Array Phase 2 lands were surveyed for potential roost sites and signs of bats. The survey utilised a high-powered torch, close focussing binoculars and an endoscope (Explorer Premium 8803 with 9mm camera) where appropriate. The external inspection involved looking for bat droppings on the ground, stuck to walls, windowsills or in crevices in the stonework and recording suitable entry and exit points. The internal inspection involved looking for features that may be suitable for roosting bats, such as joints and crevices in wood, holes or crevices between stonework in the walls and searching for bat droppings, urine stains and feeding signs on the floor.

The criteria for categorisation of suitability for bats is described further in Table 2-2[2].

Table 2-1: Suitability of Habitats for Bats

Suitability	Description Roosting habitats in structures	Potential flight paths and foraging habitats
None	No habitat features on site likely to be used by any roosting bats at any time of the year (i.e. a complete absence of crevices/ suitable shelter at all ground/ underground levels).	No habitat features on site likely to be used by any commuting or foraging bats at any time of the year (i.e. no habitats that provide continuous lines of shade/ protection for flight-lines, or generate/ shelter insect populations available to foraging bats).
Negligible	No obvious habitat features on site likely to be used by roosting bats; however, a small element of uncertainty remains as bats can use small and apparently unsuitable features on occasion.	No obvious habitat features on site likely to be used as flight-paths or by foraging bats; however, a small element of uncertainty remains in order to account for non-standard bat behaviour.
Low	A structure with one or more potential roost sites that could be used by individual bats opportunistically at any time of the year. However, these potential roost sites do not provide enough space, shelter, protection, appropriate conditions and/or suitable surrounding habitat to be used on a regular basis or by larger numbers of bats (i.e. unlikely to be suitable for maternity and not a classic cool/stable hibernation site, but could be used by individual hibernating bats).	Habitat that could be used by small numbers of bats as flight-paths such as a gappy hedgerow or un-vegetated stream, but isolated, i.e. not very well connected to the surrounding landscape by other habitat. Suitable, but isolated habitat that could be used by small numbers of foraging bats such as a lone tree (not in a parkland situation) or a patch of scrub.
Moderate	A structure with one or more potential roost sites that could be used by bats due to their size, shelter, protection, conditions and surrounding habitat but unlikely to support a roost of high conservation status (with respect to roost type only, such as maternity and hibernation- the categorisation described in this table are made irrespective of species conservation status, which is established after presence is confirmed).	Continuous habitat connected to the wider landscape that could be used by bats for flight paths such as lines of trees and scrub or linked back gardens. Habitat that is connected to the wider landscape that could be used by bats for foraging such as trees, scrub, grassland or water.
High	A structure with one or more potential roost sites that are obviously suitable for use by larger numbers of bats on a more regular basis and potentially for longer periods of time due to their size, shelter, protection, conditions and surrounding habitat. These structures have the potential to support high conservation status roosts e.g. maternity or classic cool/ stable hibernation site.	Continuous, high-quality habitat that is well connected to the wider landscape that is likely to be used regularly by bats for flight paths such as river valleys, streams, hedgerows, lines of trees and woodland edge. High quality habitat that is well connected to the wider landscape that is likely to be used regularly by foraging bats such as broadleaved woodland, tree-lined watercourses and grazed parkland. Site is close to and connected to known roosts.

[2] Collins, J. (ed.) (2023) Bat Surveys for Professional Ecologists: Good Practice Guidelines (4th edn). The Bat Conservation Trust, London

Passive Monitoring

Passive monitoring was completed across Ballyglass Solar Array Phase 2 lands in May and June 2025 (i.e. a bat detector is left in the field, there is no observer present and bats which pass near enough to the monitoring unit are recorded and their calls are stored for later analysis). The passive detectors record bat ultrasonic calls on a continuous basis and store the information onto an internal SD card. Each time a bat is detected, an individual time-stamped (date and time to the second) file is recorded.

Monitoring was conducted between 21st and 27th May 2025 and 11th and 18th June 2025 during appropriate weather conditions (temperatures at dusk 10°C or above, wind below Beaufort 5, no heavy rain), noting that temperatures fell quite low during the night during the monitoring period in May. Seven Anabat Swift monitors were deployed for the survey and were positioned in or adjacent to hedgerows that will be subject to removal to facilitate access. The detectors were set to record from approximately 30 minutes before sunset until sunrise and recorded for 8 nights at each location. Data were then downloaded and bat echolocation calls were later analysed by the Anabat Insight software analysis programme version 2.1.4. Each time-stamped file was analysed and the species of bat recorded was noted as a bat pass. The location of the passive monitors is illustrated in Figure 2-1.

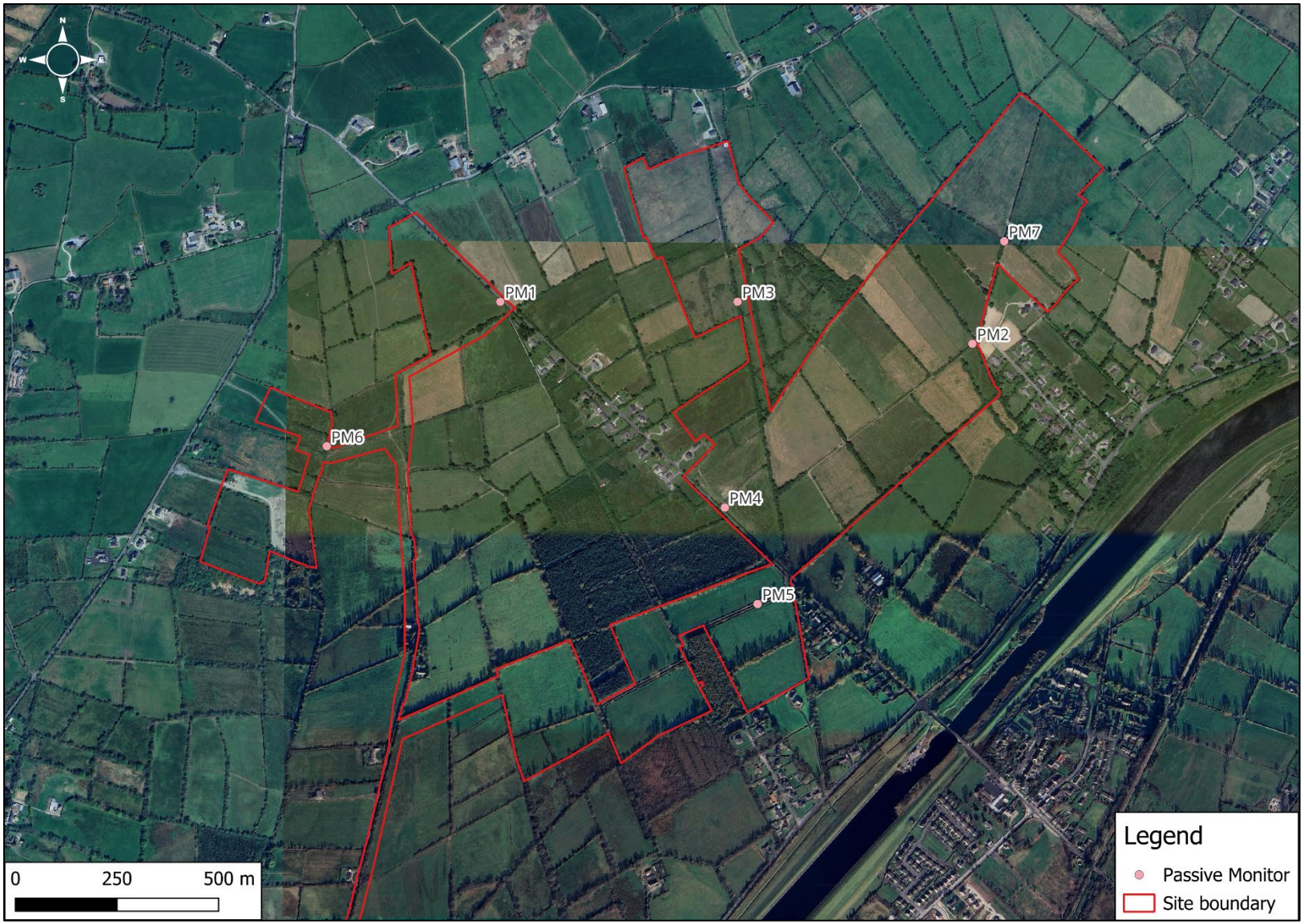


Figure 2-1: Ballyglass Phase 2- location of passive monitors recording in May and June 2025

2.3.4 Marsh Fritillary

During the walkover survey conducted on 1st August 2024, the area of acid grassland located at the north of Parcel 4 of the solar array lands was observed to support Devil's-bit Scabious (*Succisa pratensis*) the food plant of the caterpillar larvae of Marsh Fritillary. The eggs of the Marsh Fritillary are laid in batches on the underside of leaves of the Devil's-bit Scabious plant and after emergence the larvae spin a large web on the ground and numerous caterpillars will hibernate together until the spring.

This acid grassland at the north of Parcel 4 was systematically searched for occupied Marsh Fritillary larval webs on 13th September 2024. The location of any occupied webs found was marked on a map.

2.4 Impact Assessment Criteria

The information gathered from desk study and survey has been used to make an ecological impact assessment (EcIA) of the proposed development upon the identified ecological features. The EcIA has been undertaken following the methodology set out in CIEEM (2018). EcIA is based upon a source-pathway-receptor model, where the source is defined as the individual elements of the proposed development that have the potential to affect identified ecological features. The pathway is defined as the means or route by which a source can affect the ecological features. An ecological feature is defined as the species, habitat or ecologically functioning unit of natural heritage importance. Each element can exist independently however an effect is created where there is a linkage between the source, pathway and feature.

A significant effect is defined in CIEEM (2018) as:

"*an effect that either supports or undermines biodiversity conservation objectives for 'important ecological features'…. or for biodiversity in general*".

Further, BS 42020:2013 states that if an effect is sufficiently important to be given weight in the planning balance or to warrant the imposition of a planning condition, e.g. to provide or guarantee necessary mitigation measures, it is likely to be "significant" in that context at the level under consideration. The converse is also true: insignificant effects would not warrant a refusal of permission or the imposition of conditions.

The geographical reference used for ecological valuation follows NRA (2009) *Guidelines for the Assessment of Ecological Impacts of National Road Schemes* Rev. 2., as detailed in Appendix A. Ecological features might also be important because they play a key functional role in the landscape as 'stepping stones' for migratory species to move during their annual migration cycle, as well as for species to move between sites, to disperse populations to new locations, to forage, or move in response to climate change.[3] Features of lower ecological value are not assessed.

[3] Ref Article 10 of the Habitats Directive: http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:31992L0043:EN:HTML

3 Receiving Environment

3.1 Designated Sites

A review of European designated sites within a 15km radius of the proposed site was undertaken (www.npws.ie). Special Areas of Conservation (SACs) are sites of international importance due to the presence of Annex I habitats and / or Annex II species listed under the EU Habitats Directive. Special Protection Areas (SPAs) are designated for birds based on the presence of internationally significant populations of listed bird species.

A review of nationally designated sites within a 10km radius of the proposed site was also undertaken. Natural Heritage Areas (NHAs) are sites deemed to be of national ecological importance and are afforded protection under the Wildlife Acts. The proposed Natural Heritage Area (pNHA) have not been statutorily proposed or designated; however they do have some protection under agri-environmental farm planning schemes such as Rural Environment Protection Scheme (REPS 3 and 4) and Agri Environmental Options Scheme (AEOS), Forest Service requirement for NPWS approval for afforestation grants in pNHA lands and recognition of the value of pNHAs by Planning and Licensing Authorities.

There are eleven European sites within 15km of the proposed site. The proposed site is located c.1.5km from the Lower River Shannon SAC at its closest point. A review of nationally designated sites indicates that there are three Natural Heritage Areas (NHAs) and eight proposed Natural Heritage Areas (pNHAs) within 10km of the proposed development.

A list of European sites recorded within 15km of the proposed development is presented in Table 3-1 and a list of nationally designated sites is presented in Table 3-2. European sites are illustrated in Figure 3-1 and proposed Natural Heritage Areas are illustrated in Figure 3-2.

A Natura Impact Statement (Greenleaf Ecology, 2026) addressing likely significant effects on European designated sites (SACs and SPAs) within the zone of influence of the proposed development is provided as a separate report with the current planning application.

Table 3-1: European sites within 15km of the proposed development

Site Name and Code	Qualifying Interests	Distance from Proposed Site (km)[4]	Connectivity
Kilkishen House SAC (Site Code: 002319)	**Annex II Species** *Rhinolophus hipposideros* (Lesser Horseshoe Bat) [1303]	*Solar Farm* 14.3 *Substation and Grid Connection* 14.1	There is no connectivity via surface water, groundwater or any other pathway.
Ratty River Cave SAC (Site Code: 002316)	**Annex I Habitats** Caves not open to the public [8310] **Annex II Species** *Rhinolophus hipposideros* (Lesser Horseshoe Bat) [1303]	*Solar Farm* 12.4 *Substation and Grid Connection* 11.9	There is no connectivity via surface water, groundwater or any other pathway.

[4] Straight line distance. "Solar Farm" refers to Ballyglass Solar Array Phase 2.

Site Name and Code	Qualifying Interests	Distance from Proposed Site (km)[4]	Connectivity
Clare Glen SAC (Site Code: 000930)	**Annex I Habitats** Old sessile oak woods with Ilex and Blechnum in the British Isles [91A0] **Annex II Species** *Trichomanes speciosum* (Killarney Fern) [1421]	*Solar Farm* 11.3 *Substation and Grid Connection* 12.2	There is no connectivity via surface water, groundwater or any other pathway.
Danes Hole, Poulnalecka SAC (Site Code: 000030)	**Annex I Habitats** Caves not open to the public [8310] Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles [91A0] **Annex II Species** *Rhinolophus hipposideros* (Lesser Horseshoe Bat) [1303]	*Solar Farm* 10.0 *Substation and Grid Connection* 10.5	There is no connectivity via surface water, groundwater or any other pathway.
Lower River Shannon SAC (Site Code: 002165)	**Annex I Habitats** Sandbanks which are slightly covered by sea water all the time [1110] Estuaries [1130] Mudflats and sandflats not covered by seawater at low tide [1140] Coastal lagoons [1150] Large shallow inlets and bays [1160] Reefs [1170] Perennial vegetation of stony banks [1220] Vegetated sea cliffs of the Atlantic and Baltic coasts [1230] Salicornia and other annuals colonising mud and sand [1310] Atlantic salt meadows (Glauco-Puccinellietalia maritimae) [1330] Mediterranean salt meadows (Juncetalia maritimi) [1410] Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation [3260] *Molinia* meadows on calcareous, peaty or clayey-silt-laden soils (Molinion caeruleae) [6410] Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (Alno-Padion, Alnion incanae, Salicion albae) [91E0] **Annex II Species** *Margaritifera margaritifera* (Freshwater Pearl Mussel) [1029]	*Solar Farm* 1.3km *Substation and Grid Connection* 1.5	There is hydrological connectivity via the Oakfield stream, which confluences with the Blackwater (Clare) River c.2.8km downstream of the solar array site. The Blackwater (Clare) River flows into this SAC c.6.4km downstream of the solar array site at its closest point. Proposed roads and internal cabling cross the Oakfield stream. The proposed grid connection will cross the Oakfield stream and Blackwater River, which flows into this SAC c.6km downstream and the West Roo stream, which flows into this SAC c.1.8km downstream.

Site Name and Code	Qualifying Interests	Distance from Proposed Site (km)[4]	Connectivity
	Petromyzon marinus (Sea Lamprey) [1095] *Lampetra planeri* (Brook Lamprey) [1096] *Lampetra fluviatilis* (River Lamprey) [1099] *Salmo salar* (Salmon) [1106] *Tursiops truncatus* (Common Bottlenose Dolphin) [1349] *Lutra lutra* (Otter) [1355]		
Slieve Bernagh Bog SAC (Site Code: 002312)	**Annex I Habitats** Northern Atlantic wet heaths with Erica tetralix [4010] European dry heaths [4030] Blanket bogs (* if active bog) [7130]	*Solar Farm* 7.4 *Substation and Grid Connection* 8.9	There is no connectivity via surface water, groundwater or any other pathway.
Glenstal Wood SAC (Site Code: 001432)	**Annex II Species** *Trichomanes speciosum* (Killarney Fern) [1421]	*Solar Farm* 13.8 *Substation and Grid Connection* 14.0	There is no connectivity via surface water, groundwater or any other pathway.
Glenomra Wood SAC (Site Code: 001013)	**Annex I Habitats** Old sessile oak woods with Ilex and Blechnum in the British Isles [91A0]	*Solar Farm* 1.7 *Substation and Grid Connection* 2.9	There is no connectivity via surface water, groundwater or any other pathway.
River Shannon and River Fergus Estuaries SPA (Site Code: 004077)	**Bird Species** Cormorant (*Phalacrocorax carbo*) [A017] Whooper Swan (*Cygnus cygnus*) [A038] Light-bellied Brent Goose (*Branta bernicla hrota*) [A046] Shelduck (*Tadorna tadorna*) [A048] Wigeon (*Anas penelope*) [A050] Teal (*Anas crecca*) [A052] Pintail (*Anas acuta*) [A054] Shoveler (*Anas clypeata*) [A056] Scaup (*Aythya marila*) [A062] Ringed Plover (*Charadrius hiaticula*) [A137] Golden Plover (*Pluvialis apricaria*) [A140] Grey Plover (*Pluvialis squatarola*) [A141] Lapwing (*Vanellus vanellus*) [A142] Knot (*Calidris canutus*) [A143]	*Solar Farm* 5.4 *Substation and Grid Connection* 4.8	There is hydrological connectivity via the Oakfield stream, which confluences with the Blackwater (Clare) River c.2.8km downstream of the site. The Blackwater (Clare) River flows into the River Shannon c.6.6km downstream of the solar array site at its closest point and, in turn, this SPA a total of 14.9km downstream of the solar array site. Proposed roads and internal cabling cross the Oakfield stream. The proposed grid connection will cross the Oakfield stream and Blackwater River, which flows into the River Shannon and, in turn, this SPA 14.1km

Site Name and Code	Qualifying Interests	Distance from Proposed Site (km)[4]	Connectivity
	Dunlin (*Calidris alpina*) [A149] Black-tailed Godwit (*Limosa limosa*) [A156] Bar-tailed Godwit (*Limosa lapponica*) [A157] Curlew (*Numenius arquata*) [A160] Redshank (*Tringa totanus*) [A162] Greenshank (*Tringa nebularia*) [A164] Black-headed Gull (*Chroicocephalus ridibundus*) [A179] Wetland and Waterbirds [A999]		downstream and the West Roo stream, which flows into this SPA c.5.7km downstream.
Slievefelim to Silvermines Mountains SPA (Site Code: 004165)	**Bird Species** Hen Harrier (*Circus cyaneus*) [A082]	*Solar Farm* 11.2 *Substation and Grid Connection* 12.3	There is no connectivity via surface water, groundwater or any other pathway.
Lough Derg (Shannon) SPA (Site Code: 004058)	Cormorant (*Phalacrocorax carbo*) [A017] Tufted Duck (*Aythya fuligula*) [A061] Goldeneye (*Bucephala clangula*) [A067] Common Tern (*Sterna hirundo*) [A193] Wetland and Waterbirds [A999]	*Solar Farm* 11.2 *Substation and Grid Connection* 13.1	There is no connectivity via surface water, groundwater or any other pathway.

Table 3-2: Nationally designated sites within 10km of the proposed development

Site Name and Code	Qualifying Interests	Distance from Proposed Development (km)[5]	Connectivity
Doon Lough NHA (Site Code: 000337)	The site comprises a raised bog, that includes both areas of high bog and cutover bog, woodlands, lakes, marsh, fen and wet meadows. Doon Lough Bog NHA is a site of considerable conservation significance, comprising as it does, a raised bog, a rare habitat in the E.U. and one that is becoming increasingly scarce and under threat in Ireland. The site is especially important due to its location, as it is one of the most westerly raised bogs in the country.	*Solar Farm* 8.6 *Substation and Grid Connection* 9.8	There is no connectivity via surface water, groundwater or any other pathway.

[5] Straight line distance. "Solar Farm" refers to Ballyglass Solar Array Phase 2.

Site Name and Code	Qualifying Interests	Distance from Proposed Development (km)[5]	Connectivity
Gortacullin Bog NHA (Site Code: 002401)	Gortacullin Bog NHA is a site of considerable conservation significance containing upland blanket bog and wet heath. The site supports a good diversity of blanket bog microhabitats, including hummock/hollow complexes, flushes and regenerating cutover with willow and birch scrub. Blanket bog habitat is a globally scarce resource.	*Solar Farm* 7.3 *Substation and Grid Connection* 8.3	There is no connectivity via surface water, groundwater or any other pathway.
Woodcock Hill Bog NHA (Site Code: 002402)	Woodcock Hill Bog NHA is a site of considerable conservation significance comprising upland blanket bog and wet heath. Blanket bog habitat is a globally scarce resource.	*Solar Farm* 4.8 *Substation and Grid Connection* 4.5	There is no connectivity via surface water, groundwater or any other pathway.
Garrannon Wood pNHA (Site Code: 001012)	The importance of this site is that it is a good example of a fairly intact and mature oak wood. It is likely that the site has been wooded for a long period.	*Solar Farm* 11.5 *Substation and Grid Connection* 8.3	There is no connectivity via surface water, groundwater or any other pathway.
Glenomra Wood pNHA (Site Code: 001013)	See Glenomra Wood SAC, Table 3.1	*Solar Farm* 1.8 *Substation and Grid Connection* 2.9	There is no connectivity via surface water, groundwater or any other pathway.
Knockalisheen Marsh pNHA (Site Code: 002001)	No Site Synopsis available.	*Solar Farm* 1.9 *Substation and Grid Connection* 1.5	There is no connectivity via surface water, groundwater or any other pathway.
Fergus Estuary And Inner Shannon, North Shore pNHA (Site Code: 002048)	See Lower River Shannon SAC and River Shannon and River Fergus Estuaries SPA, Table 3.1.	*Solar Farm* 4.4 *Substation and Grid Connection* 4.0	There is hydrological connectivity via the Oakfield stream, which confluences with the Blackwater (Clare) River c.2.8km downstream of the site. The Blackwater (Clare) River flows into the River Shannon c.6.6km downstream of the solar array site at its closest point and, in turn, this pNHA a total of

Site Name and Code	Qualifying Interests	Distance from Proposed Development (km)[5]	Connectivity
			13.9km downstream of the site. Proposed roads and internal cabling cross the Oakfield stream. The proposed grid connection will cross the Oakfield stream and Blackwater River, which flows into the River Shannon and, in turn, this pNHA 13.1km downstream and the West Roo stream, which flows into this pNHA c.4.6km downstream.
Cloonlara House pNHA (Site Code: 000028)	This bat site is located in a three-storey domestic dwelling house and contains over l00 Leisler's Bats (Nyctalus leisleri) during the summer months.	*Solar Farm* 0.7 *Substation and Grid Connection* 0.6	Reasonably well connected via the Oakfield stream and associated riparian vegetation, hedgerows and treelines.
Castleconnell (Domestic Dwelling, Occupied) pNHA (Site Code: 000433)	No Site Synopsis available.	*Solar Farm* 3.4 *Substation and Grid Connection* 3.3	Reasonably well connected via hedgerows and treelines. No hydrological or hydrogeological connectivity.
Inner Shannon Estuary - South Shore pNHA (Site Code: 000435)	See Lower River Shannon SAC and River Shannon and River Fergus Estuaries SPA, Table 3.1.	*Solar Farm* 5.8 *Substation and Grid Connection* 5.4	There is hydrological connectivity via the Oakfield stream, which confluences with the Blackwater (Clare) River c.2.8km downstream of the site. The Blackwater (Clare) River flows into the River Shannon c.6.6km downstream of the solar array site at its closest point and, in turn, this pNHA a total of 15.6km downstream of the site. Proposed roads and internal cabling cross the Oakfield stream. The proposed grid connection will cross the the Oakfield stream and Blackwater River, which flows into the River Shannon and, in turn, this pNHA 14.8km downstream and the West Roo stream,

Site Name and Code	Qualifying Interests	Distance from Proposed Development (km)[5]	Connectivity
			which flows into this pNHA c.6.3km downstream.
Loughmore Common Turlough pNHA (Site Code: 000438)	A variety of plant communities occur, depending on substrate type and degree of wetness. The rare plant species, Opposite-leaved Pondweed (Groenlandia densa), occurs on the site, as does Meadow Barley (Hordeum secalinum). Both of these species are protected under the Flora (Protection) Order, 1999[6]. Loughmore provides suitable winter habitat for Lapwing and Golden Plover, and Snipe breed here. Turloughs are a rare habitat in Europe, and in Ireland are under threat from agricultural intensification. Although affected by drainage, Loughmore is an unusual example of this habitat type. Due to the site's southerly location, its shallowness, its proximity to the sea and some calcium enrichment, the flora of Loughmore includes some unique elements, which enhance the conservation value of this turlough.	*Solar Farm* 12.0 *Substation and Grid Connection* 9.1	There is no connectivity via surface water, groundwater or any other pathway.

[6] Now the Flora (Protection) Order 2022.

Figure 3-1: European sites within 15km of the proposed development

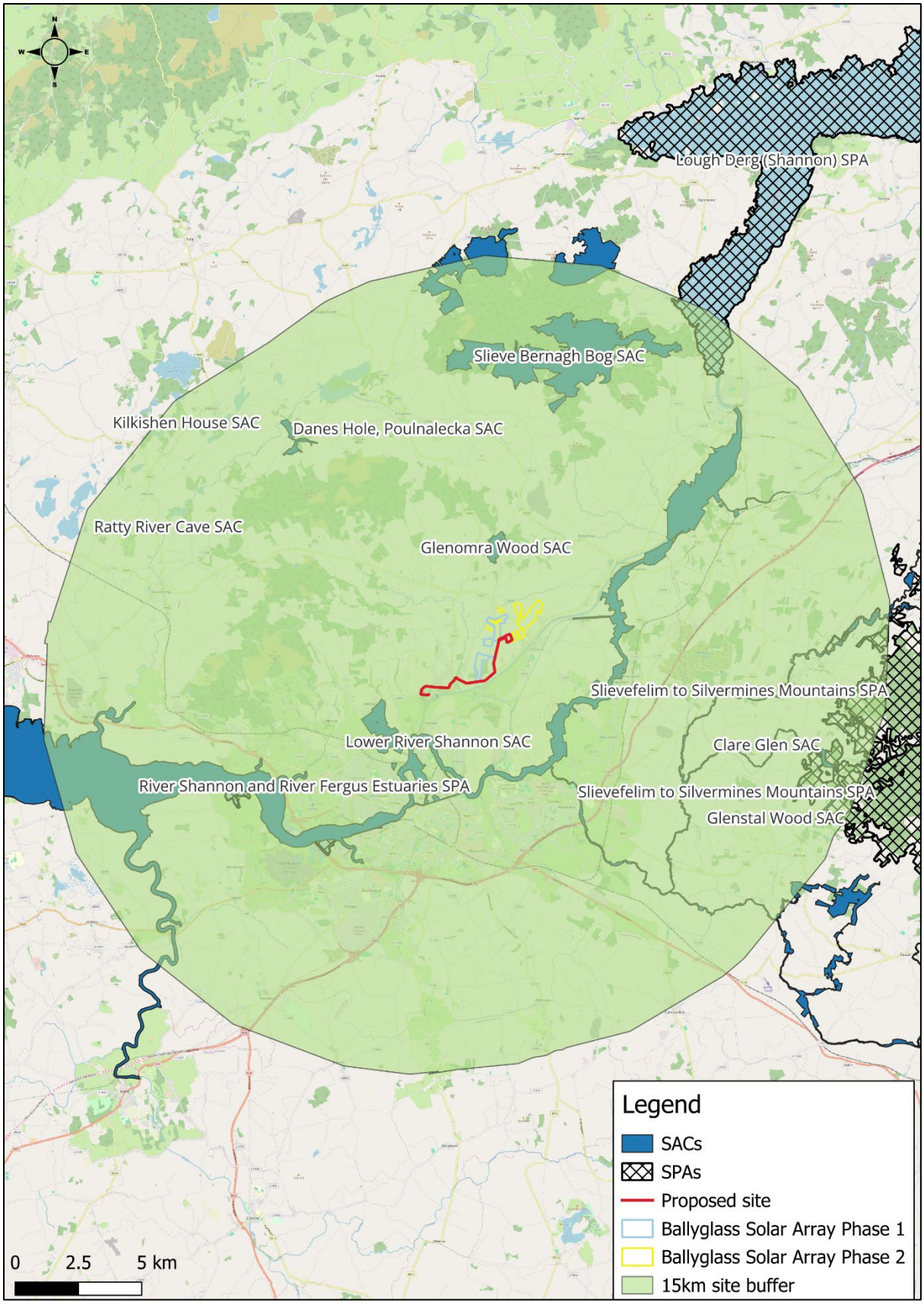
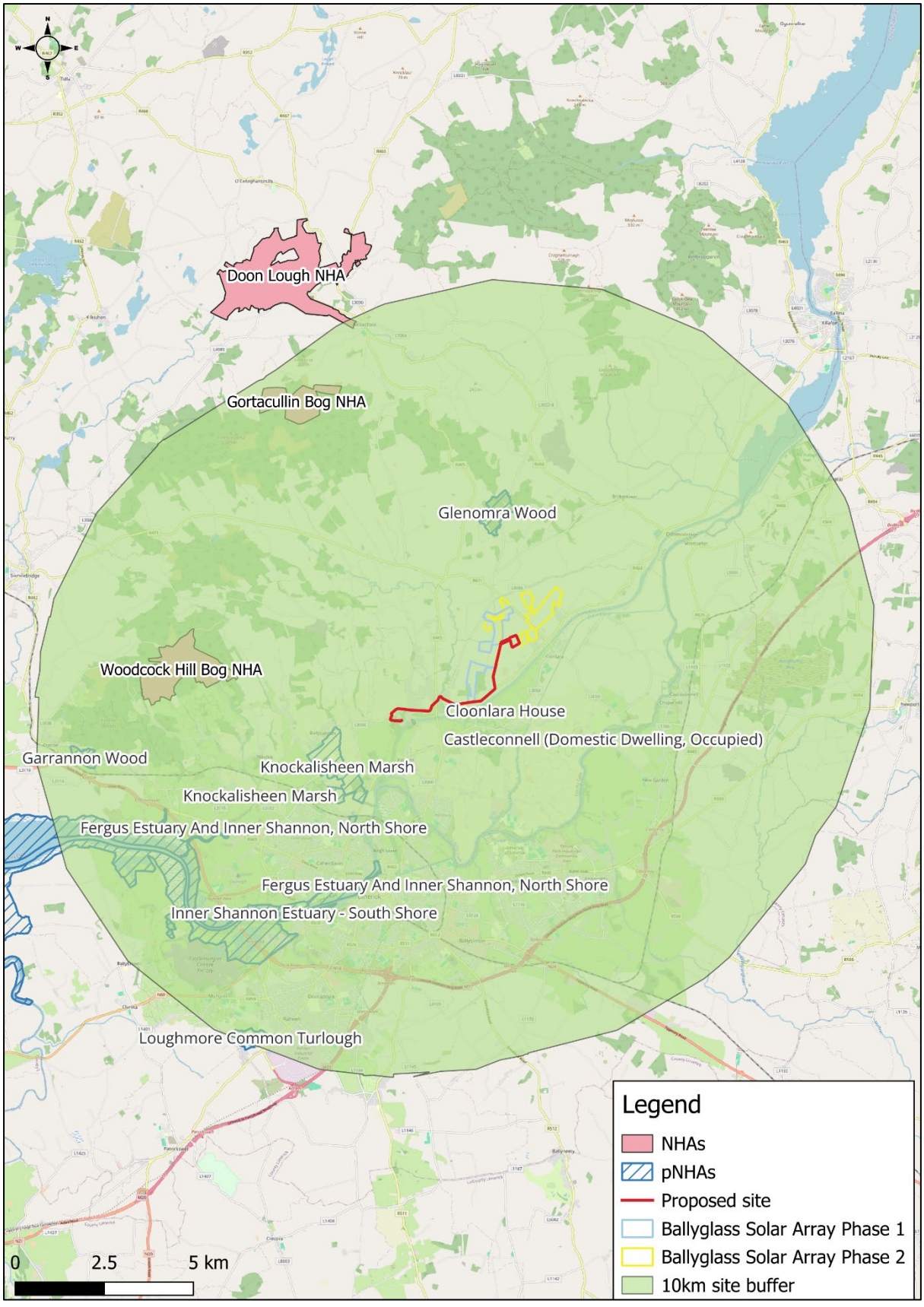


Figure 3-2: Nationally designated sites within 10km of the proposed development



3.2 Terrestrial Ecology

3.2.1 Habitats

A description of the habitats within the proposed Ballyglass Grid Connection and proposed Ballyglass Solar Array Phase 2 site is presented below. A habitat map (See Figure 3-3) has been prepared to illustrate and classify habitats identified within the footprint of the proposed solar array development and its immediate environs. The footprint of the 110kV substation and solar array supports improved agricultural grassland associated with ongoing livestock farming practices. The improved grassland fields are fringed by linear woodland habitats and drainage channels.

Depositing Lowland Rivers (FW2)

The proposed grid connection route, 110 kV substation site and solar array lands drain towards the River Shannon which forms part of the Lower River Shannon SAC (Site Code 002165). There are three water sub-catchment pathways to the SAC via: (1) Blackwater (Clare) River including its tributary the Oakfield 25 stream, (2) "Knockbrack Drain" and (3) West Roo stream.

- The 110 kV substation and a short section (~330m) of the GCR are set in the catchment of the 'Knockbrack Drain' (Shannon (Lower)_060 river water body). The substation site is 4.7 km upstream of the SAC boundary via a tenuous overland and modified (agricultural) drainage pathway that connects to Knockbrack Drain. The proposal does not involve watercourses crossings in this sub catchment.
- The majority of the GCR (~3.5 km) is set within the catchment of the Blackwater (Clare) River (Blackwater (Clare)_020 river water body) including one flatbed over existing culvert crossing at Oakfield 25 stream (site OF4) on the R463, and one HDD crossing of the main channel of the Blackwater (Clare) River (site BWC1). These crossings do not involve instream works. The Oakfield stream crossing is 4.7 km upstream of the SAC boundary. The Blackwater (Clare) HDD crossing is 5.8 km upstream of the SAC boundary.
- A ~2 km section of the GCR is set within the subcatchment of the West Roo stream (North Ballycannan_010 river water body) including two crossings of West Roo main channel by flatbed over existing culverts (sites WR1, WR2) and one crossing of a minor drain that connects to West Roo (site WR3) using concrete flatbed formation alongside the existing culvert - Option D in the CEMP (Enerco, 2026). These three crossings do not involve instream works. The West Roo crossings are, at nearest, 1.3 km upstream of the confluence with Ardnacrusha tailrace canal, which flows a further 520 m to the SAC boundary on the River Shannon.

Further details on the Aquatic Ecology of the receiving environment are provided in the Aquatic Ecology Impact Assessment accompanying the application.

Drainage ditches (FW4)

Drainage ditches are typically associated with hedgerows and treelines throughout the solar array site, including the proposed location of the 110kV substation. These drains generally supported running water, with localised areas of standing water. Instream and marginal plant species include occasional and localised Fool's Watercress (*Apium nodiflorum*), Soft Rush (*Juncus effusus*), Sweet-grass (*Glyceria* spp) and Nettle (*Urtica dioica*).

Hedgerows (WL1) and Treelines (WL2)

The field boundaries within the solar array site, including the proposed location of the 110kV substation, are bound by hedgerows and treelines of varying species composition and conservation importance. Fields at the north of the solar array site are generally bound by species poor hedgerows predominantly comprised of Gorse (*Ulex europaeus*), with locally frequent Willow (*Salix cinerea*) and occasional Holly (*Ilex aquifolium*), Hawthorn (*Crataegus monogyna*) and Crab Apple (*Malus sylvestris*).

Hedgerows with Oak (*Quercus robur*), Beech (*Fagus sylvatica*) and Ash (*Fraxinus excelsior*) standard trees, with Hazel (*Corylus avellana*) and Holly are present within Parcel 1 and Parcel 4.

Field boundaries that have grown out into treelines are present in Parcel 2, Parcel 3 (the proposed 110kV substation is located within Parcel 3) and parts of Parcel 4. Species within the treelines include Beech, Ash, Oak, Rowan (*Sorbus aucuparia*), Sycamore (*Acer pseudoplatanus*) and Birch (*Betula pendula*), with Hazel, Holly, Hawthorn, Elder, Willow and Guelder Rose (*Viburnum opulus*) in the shrub layer.

The proposed grid connection route runs along local and regional roads, which are lined by hedgerows and treelines, with species present as listed above.

Where present, the earth banks associated with the hedgerows and treelines at the site supported woodland and verge herb species including Bramble, Ivy (*Hedera helix*), Herb Robert (*Geranium robertianum*), Cleavers (*Galium aparine*), Cow Parsley (*Anthriscus sylvestris*), Nettle, Hogweed (*Heracleum sphondylium*) and Foxglove (*Digitalis purpurea*); with occasional Polypody (*Polypodium vulgare*) and Hart's Tongue (*Asplenium scolopendrium*) ferns.

Sections of field boundaries within Parcel 1 and Parcel 4 support a line of Gorse and Bramble, these areas have been mapped as linear scrub.

The linear woodland habitats (hedgerow and treelines) within the proposed site provide an important corridor functionality for mammals and avifauna at each site and their surrounding environs.

Improved Agricultural Grassland (GA1)

This is the dominant habitat within the solar array site, including the proposed location of the 110kV substation. The improved grassland habitat supports dominant Perennial Rye-grass (*Lolium perenne*) with occasional Sweet Vernal-grass (*Anthoxanthum odoratum*), Crested Dog's-tail (*Cynosurus cristatus*), Timothy (*Phleum pratense*), Yorkshire Fog (*Holcus lanatus*), White Clover (*Trifolium repens*), Common Mouse-ear (*Cerastium fontanum*), Dandelion (*Taraxacum* agg.) and Creeping Buttercup (*Ranunculus repens*).

In all parcels of the solar array site, sections of this improved grassland habitat support localised abundances of Soft Rush and occasional Sharp-flowered Rush (*Juncus acutiflorus*).

Dry Meadows and Grassy Verges (GS2)

The proposed grid connection runs along the L70382 road, which supports occasional areas of verge that do not appear to be cut or grazed on a regular basis. Species present here include Crested Dog's-tail, Rough Meadow-grass, Yorkshire Fog, Cock's-foot (*Dactylis glomerata*), Soft Rush, Silverweed (*Potentilla anserina*) and Red Clover (*Trifolium pratense*).

Acid Grassland (GS3)

Acid grassland at the north of Parcel 4 comprises Sweet Vernal-grass (*Anthoxanthum odoratum*), Purple Moor-grass (*Molinia caerulea*), Common Sedge (*Carex nigra*) and Sharp-flowered Rush (*Juncus acutiflorus*); with occasional Heather (*Calluna vulgaris*). Devil's-bit Scabious (*Succisa pratensis*) is abundant, and Common Knapweed (*Centaurea nigra*), Meadow Thistle (*Cirsium dissectum*), Self-heal (*Prunella vulgaris*), Creeping Buttercup (*Ranunculus repens*), Tormentil (*Potentilla erecta*) and Greater Bird's-foot-trefoil (*Lotus pedunculatus*) are occasional within the sward and a small number of Orchid stems (not flowering) were also recorded.

Wet depressions in the topography supported locally abundant *Sphagnum cappilifolium* and *Sphagnum denticulatum*, with occasional Bog Pimpernell (*Anagallis tenella*), Bog asphodel (*Narthecium ossifragum*) and Lousewort (*Pedicularis sylvatica*).

Wet Grassland (GS4)

Wet grassland habitat within the solar array site occurs in Parcel 4, and small areas within Parcel 1 and Parcel 2. Soft Rush is dominant in the sward, with occasional Sharp-flowered Rush, Cock's-foot (*Dactylis glomerata*), Rough Meadow-grass (*Poa trivialis*) and Common Bent (*Agrostis capillaris*). Herbs present include Creeping Buttercup, Meadow Buttercup (*R. acris*), Dandelion, Lesser Celandine (*Ficaria verna*) and occasional Lesser Spearwort (*Ranunculus flammula*) and Cuckooflower (*Cardamine pratensis*).

Recolonising Bare Ground (ED3)

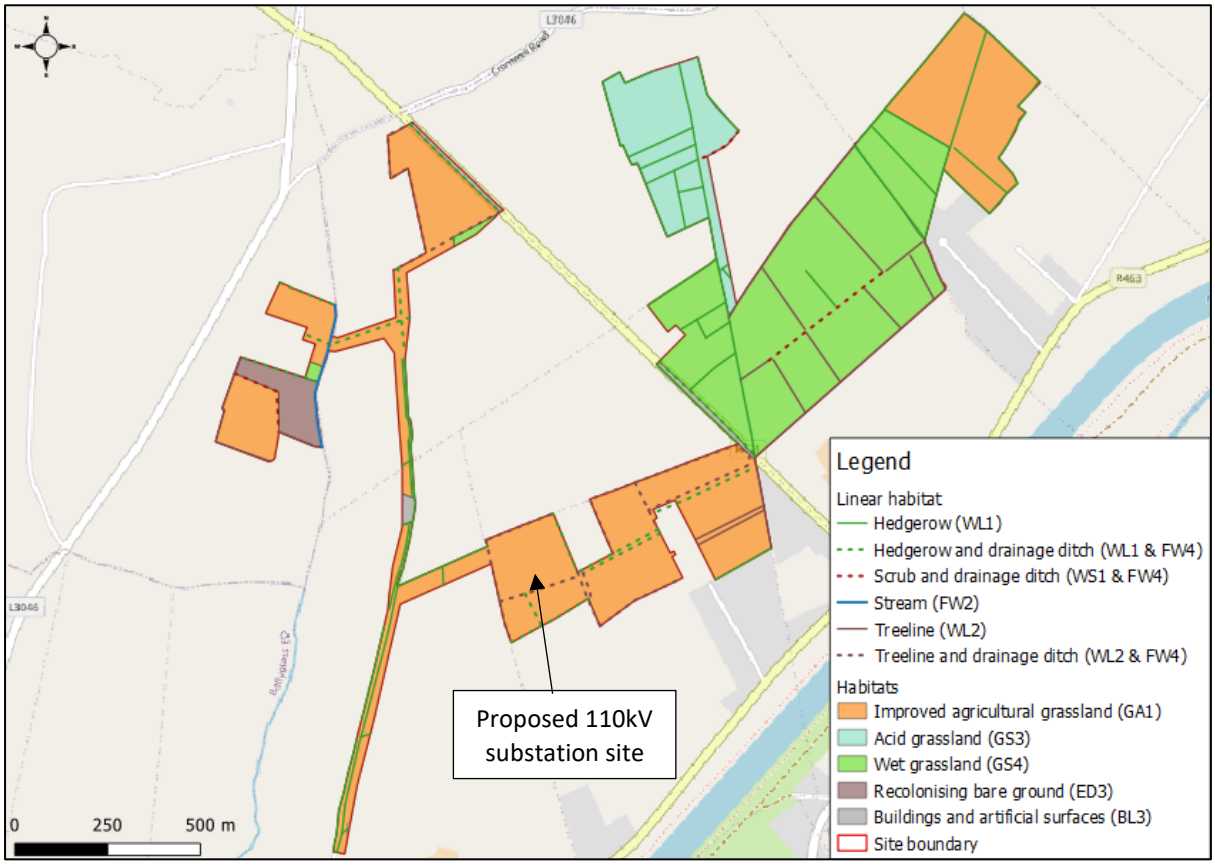
A field within Parcel 1 that is recolonising with Yorkshire Fog, Annual Meadow-grass (*Poa annua*), Red Clover, Nettle (*Urtica dioica*), Redshank (*Persicaria maculosa*), Scentless Mayweed (*Tripleurospermum inodorum*), Broad-leaved Dock (*Rumex obtusifolius*), Silverweed (*Potentilla anserina*), Greater Plantain (*Plantago major*), Poppy (*Papaver rhoeas*) and Hop Trefoil (*Trifolium campestre*).

Buildings and artificial surfaces (BL3)

This habitat is present within a farmyard located at the west of the solar array site and the local roads and access track forming the route of the proposed grid connection.

A habitat map of the site is illustrated in Figure 3-3.

Figure 3-3: Habitats recorded at the proposed 110kV substation site and proposed Ballyglass Solar Array Phase 2 site



3.2.2 Species

This section describes the species that have been recorded historically within the vicinity of the proposed 110kV substation and grid connection and the wider solar farm site, results from site surveys and the potential for the site to support protected species. Species records extracted from the NBDC database are included in Appendix B.

3.2.2.1 Amphibians and Reptiles

The NPWS hold records of common frog from the 10km OS grid square within which the site is located (R66), last recorded in 1979.

Amphibians and reptiles were not recorded during the site walkover survey. The majority of the site is unsuitable for amphibians and reptiles given its lack of standing water and waterlogged habitats. However, the boundaries of fields within the site support networks of drainage channels / ditches that may provide suitable breeding habitat and refugia for common frog (*Rana temporaria*).

3.2.2.2 Avifauna

The NBDC hold records of nine species included in Annex I of the EU Bird's Directive from the 10km OS grid squares within which the proposed solar farm site is located, namely Kingfisher, Corn Crake, Dunlin, Greater White-fronted Goose, Hen Harrier, Little Egret, Merlin, Peregrine Falcon and Whooper Swan. Eight BoCCI Red List species (Gilbert, G. *et al* (2021)) have been recorded from the 10km OS grid squares within which the site is located: Barn Owl, Black-headed Gull, Common Redshank, Corn Crake, Eurasian Curlew, Northern Lapwing, Red Grouse and Yellowhammer.

During the site walkover survey undertaken on 1st August 2024 and 13th September 2024, the occurrence and activity of avifauna using the habitats and hinterland of the site were identified and noted.

A list of avifaunal species identified during the site walkover survey undertaken on 1st August 2024 and 13th September 2024 is presented in Table 3-3 below.

Table 3-3: Avifaunal species identified during the site walkover survey 1st August 2024 and 13th September 2024

Common Name	Species Name	Conservation Status[7]	Activity and occurrence within the study area
Blackbird	*Turdus merula*	Green	Foraging within hedgerows and treelines across the proposed site.
Blue Tit	*Cyanistes caeruleus*	Green	Foraging within hedgerows and treelines within Parcel 1.
Great Tit	*Parus major*	Green	Foraging within hedgerows and treelines within the proposed site.
House Sparrow	*Passer domesticus*	Amber	Foraging within hedgerows within Parcel 1
Long-tailed Tit	*Aegithalus caudatus*	Green	A flock foraging within Parcel 4.
Magpie	*Pica pica*	Green	Within Parcel 4
Mistle Thrush	*Turdus viscivorus*	Green	Heard singing within Parcel 3
Robin	*Erithacus rubecula*	Green	Foraging within hedgerows and treelines across the proposed site.
Starling	*Sturnus vulgaris*	Amber	A flock foraging at the north of Parcel 4.
Swallow	*Hirundo rustica*	Amber	Flying over Parcel 3 and Parcel 4
Wood Pigeon	*Columba palumbus*	Green	Within Parcel 4

[7] Conservation status assigned in accordance with the Birds of Conservation Concern in Ireland (Gilbert *et al*., 2021).

Wren	*Troglodytes troglodytes*	Green	Foraging within hedgerows and treelines across the proposed site.

Avifaunal species recorded at the solar array site, including the proposed substation site, reflected the habitats present. The fields of agriculturally improved pasture supported relatively low levels of avifaunal diversity, with species recorded during the site walkover restricted to corvids and Swallows.

The treeline and hedgerow habitats at the field boundaries supported a higher diversity of bird species. Passerines such as Robin, Wren, Great Tit, Blue Tit and House Sparrow were recorded, in addition to Mistle Thrush and several Blackbird. Of the bird species recorded at the solar array site, House Sparrow, Swallow and Starling are on the Amber List (Moderate Conservation Concern); the remaining species are on the Green List (Least Conservation Concern).

3.2.2.3 Flora

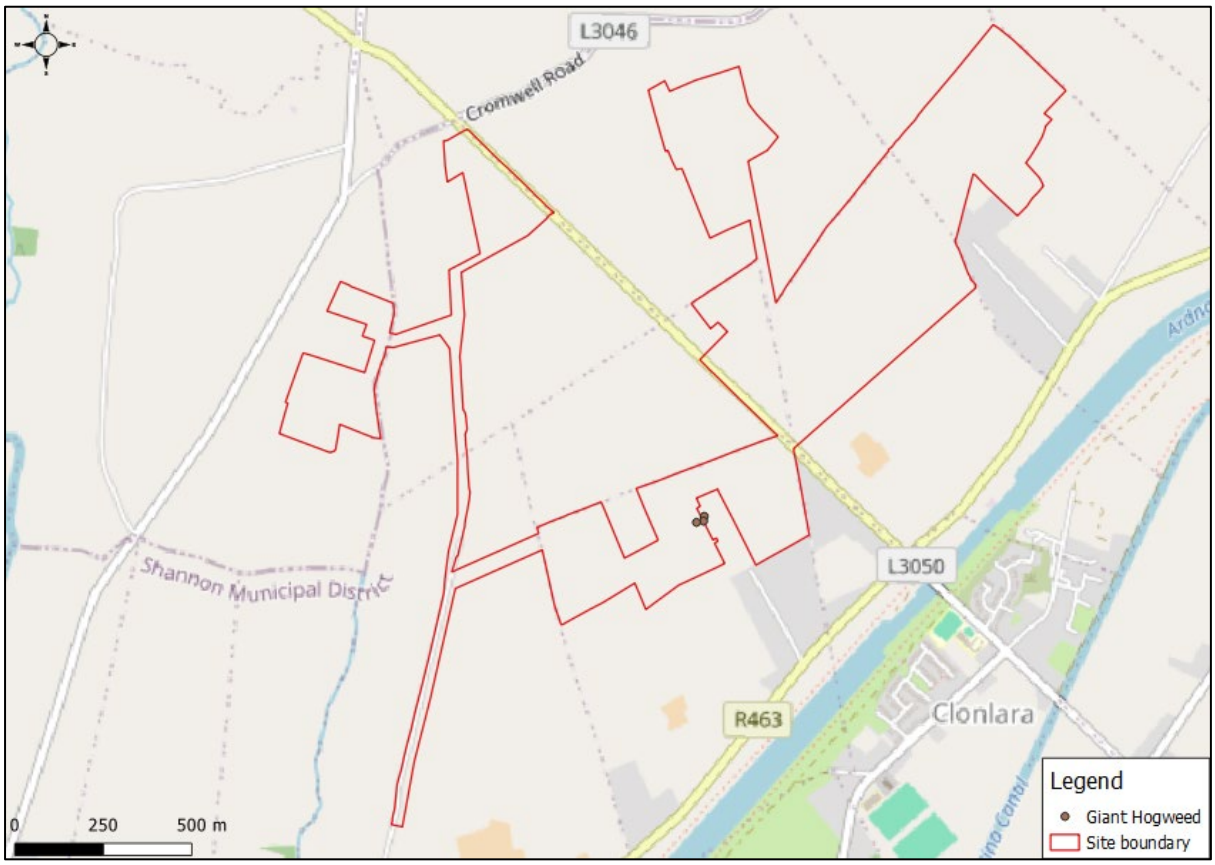
There are no records of protected species of vascular plants or bryophytes from the footprint of the solar array site, and no rare or protected species of flora were recorded during the site survey.

3.2.2.4 Invasive Plant Species

Giant Hogweed has been recorded at Erina Canal, c.0.8km to the south-east of Parcel 4; and Japanese Knotweed has been recorded at a roadside verge located between Parcel 3 and Parcel 4, last recorded in 2009.

Giant Hogweed was recorded alongside access tracks within Parcel 3 during the site survey. The location of the Giant Hogweed within the solar array site is illustrated in Figure 3-4.

Figure 3-4: Ballyglass Solar Array Phase 2, invasive species location map



No invasive plant species were recorded within the proposed 110kV substation and grid connection route site.

3.2.2.5 Invertebrates

NBDC hold records of the Annex II species Marsh Fritillary (*Euphydryas aurinia*), last recorded in 10km OS grid square R66 in 2010. The acid grassland located at the north of Parcel 4 is suitable to support Marsh Fritillary. A dedicated survey for Marsh Fritillary was conducted within Parcel 4 on 13th September 2024. No evidence of Marsh Fritillary was recorded at the solar array site.

3.2.2.6 Bats

The review of existing records of bat species in the area of the proposed solar array site indicates that six of the ten known Irish species of bat have been recorded within a 4km radius of the site. These bats include common and soprano pipistrelle, Leisler's bat, brown long-eared bat, Daubenton's bat and lesser horseshoe bat (Table 3-4). Of these species, Leisler's, brown long-eared and lesser horseshoe bat have been recorded roosting in buildings within a 4km radius of the solar array site, outside of the site boundary.

Table 3-4: Bat records on the NBDC database from within a 4km radius of the site

Common Name	Scientific Name	Present (Y/N)	Date of Last Record	Location of Known Roost (to 1km OS Grid Square Resolution)
Common Pipistrelle	*Pipistrellus pipistrellus*	Y	22/08/2018	None
Soprano Pipistrelle	*Pipistrellus pygmaeus*	Y	22/08/2018	None
Nathusius's Pipistrelle	*Pipistrellus nathusii*	N	n/a	n/a
Leisler's Bat	*Nyctalus leisleri*	Y	22/08/2018	R6163
Brown Long-eared Bat	*Plecotus auritus*	Y	20/09/2005	R5860
Daubenton's Bat	*Myotis daubentonii*	Y	19/08/2021	None
Whiskered Bat	*Myotis mystacinus*	N	n/a	n/a
Natterer's Bat	*Myotis nattereri*	N	n/a	n/a
Lesser Horseshoe Bat	*Rhinolophus hipposideros*	Y	05/07/2012	R5860 & R5861
Brandt's Bat	*Myotis brandtii*	N	n/a	n/a

The bat landscape association model (Lundy *et al,* 2011) suggests that the site is part of a landscape that is of high suitability for bats including common pipistrelle (*Pipistrellus pipistrellus*), soprano pipistrelle, brown long-eared, Leisler's, Daubenton's and natterer's bat; and is of low to moderate suitability for lesser horseshoe, whiskered bat and Nathusius' pipistrelle.

Review of aerial photography and the results of the site walkover indicate that the site comprises agricultural fields bound by hedgerows, treelines, streams and drainage ditches. These linear features connect the site to suitable bat foraging areas in the wider landscape. In accordance with the criteria outlined in Table 2-2, the commuting and foraging habitats at the site and its environs are of moderate to high suitability for bats.

Trees

Trees within the hedgerows and treelines at the solar array site were generally semi-mature, thin boled and did not support large crevices, apertures or dense ivy growth that could provide suitable roosting habitat for bats. A line of large mature Beech trees is present on the southern boundary of Parcel 3. No potential roosting features (PRFs) were recorded within these trees, however there is potential that these large mature trees may have supported PRFs that are hidden from view.

No trees with PRFs were recorded within the proposed substation site.

No evidence of bats (e.g. actual sightings, droppings, feeding remains, scratch marks, urine stains) was observed during the inspection of the trees.

Structures

No evidence of roosting bats was recorded within the outbuildings present within the proposed underground cabling route located between Parcel 1 and Parcel 3. The structures could be used as roosting or resting places for bats but lacked the sheltered conditions required by a roost of high conservation value (i.e. maternity or hibernation roosts). An agricultural shed located at the north of Parcel 4 is not suitable to support roosting bats.

Activity Survey Results

The passive monitors recorded eight species of bat across the solar array site in May and June 2025: common pipistrelle, soprano pipistrelle, Leisler's bat, brown long-eared bat, Natterer's bat, whiskered bat, Daubenton's bat and lesser horseshoe bat. Calls from the *Myotis* genus (unidentifiable to species level) were also recorded.

Common pipistrelle was the most frequently recorded species within the solar array site (77% of activity recorded), followed by soprano pipistrelle then Leisler's bat. Brown long-eared bat was recorded across most of the solar array site, with the highest level of activity recorded in Parcel 3 and Parcel 4. Natterer's bat was also recorded across most of the solar array site, with a higher level of activity recorded on PM2 in Parcel 4. A low level of activity from whiskered bat was recorded in Parcel 1 and Parcel 3 and Daubenton's bat was recorded adjacent to the Oakfield stream in Parcel 1. A relatively low level of lesser horseshoe bat activity was recorded across the solar array site.

Leisler's bat was recorded commuting 6 minutes before sunset on PM3. Common pipistrelle was recorded between 22-26 minutes after sunset on PM2, PM6 and PM7 in May; and was recorded 5 minutes before sunset on PM7 in June. There are no buildings located within the solar array site boundary, however the results of the passive monitoring indicate the likely presence of roosts for Leisler's bat and common pipistrelle in the vicinity of the solar array site.

As detailed in Table 3-5, the level of bat activity recorded during monitoring at the solar array site was both spatially and temporally variable. In particular, a much higher level of common pipistrelle activity was recorded in May than June on PM2 and PM7 in Parcel 4 (the location of monitors is illustrated in Figure 2-1). Overall, a high diversity of bats was recorded across the solar array site.

The number of bat passes per night recorded on the passive monitors is summarised in Table 3-5. The location of the passive monitors is illustrated in Figure 2-1.

Table 3-5: Ballyglass Phase 2- results of passive bat monitoring conducted in May and June 2025

Species	PM1		PM2		PM3		PM4		PM5		PM6		PM7		Total
	May 2025	June 2025	May 2025	June 2025	May 2025	June 2025	May 2025	June 2025	May 2025	June 2025	May 2025	June 2025	May 2025	June 2025	
Common Pipistrelle	1,810	3,504	13,791	5,787	696	615	3,859	3,900	2,584	1,187	4,760	1,710	22,312	4,552	71,067 (77%)
Soprano Pipistrelle	340	408	2,881	4,853	38	309	116	92	1,011	1,990	1,478	490	1,889	1,032	16,927 (18%)
Pipistrelle spp[8]	0	8	11	18	0	5	4	0	4	3	23	0	14	22	112 (0%)
Leisler's	64	170	379	100	66	1,071	128	200	348	379	144	222	374	242	3,887 (4%)
Daubenton's	0	0	0	0	0	0	0	0	0	0	0	14	0	0	14 (0%)
Whiskered	0	0	0	0	0	0	0	0	1	0	0	8	0	0	9 (0%)
Natterer's	0	0	30	8	0	0	4	0	4	2	0	2	4	2	56 (0%)
Myotis sp	0	0	1	7	0	1	6	0	5	1	0	0	4	0	25 (0%)
Brown Long-eared	2	4	0	0	0	0	2	0	10	0	0	2	11	2	33 (0%)
Lesser Horseshoe	4	24	12	6	0	45	0	2	0	4	4	2	8	4	115 (0%)
NoID	0	0	0	1	0	0	2	0	1	0	0	0	0	0	4 (0%)
Total	2,220	4,118	17,105	10,780	800	2,046	4,119	4,194	3,968	3,566	6,409	2,450	24,616	5,856	92,247

[8] *Pipistrellus* spp. which have frequency of maximum energy, FMAXE, of c. 50kHz which cannot reliably be assigned to Common Pipistrelle (typical FMAXE of c. 45kHz) or Soprano Pipistrelle (FMAXE c. 55kHz)

3.2.2.7 Badger

The NBDC hold records of badger from the environs of the proposed solar array site (1km OS grid squares R5964, R6063 and R6364) last recorded in 2014 (see Appendix B); there are no records of badger from within the site. No badger setts were recorded within the site during the site survey, however badger droppings were recorded in Parcel 1, Parcel 3 and Parcel 4 of the solar array site, indicating that the site forms part of the foraging territory of the local badger population. There is suitable habitat for this species within field boundaries and scrub adjacent to the southern boundary of Parcel 1.

3.2.2.8 Other Mammals

The NBDC does not hold any records of otter from the solar array site and its environs. No evidence of otter was recorded during the site survey and the Oakfield stream and West Roo stream are unlikely to provide a sustained foraging resource for this species. However, there is potential for otter to utilise the Oakfield stream and West Roo stream occasionally to commute through the landscape. The Blackwater (Clare) River provides suitable habitat for foraging and commuting otter and it is likely that otter forage and commute along the river at the location of the proposed grid connection crossing.

The NBDC hold records of fallow deer from the 10km OS grid square within which the site is located (R66), last recorded in 2008. The improved agricultural habitats within the site are unsuitable to support this species.

The NBDC hold historical records of Pine marten from Clonlara, to the east of Parcel 4, last recorded in 2020. No evidence of Pine marten was recorded during the site survey and the site is of low suitability for this species.

The NBDC hold historical records of hedgehog from Clonlara, last recorded in 2023. No evidence of hedgehog was recorded during the site survey, however, there is potential for this species to utilise the hedgerows and treelines present at the field boundaries.

3.3 Summary of Ecological Evaluation

Table 3-6 summarises all identified ecological features. Ecological features have been identified as being at risk of potentially significant impacts via a source-pathway-receptor link. Important ecological features are valued as being of local ecological importance (higher value) or above as per the criteria set out in Appendix A**.**

Table 3-6: Ecological features within the site and it's receiving environment

Site/ Habitat/ Species	Ecological Value[9]	Important Ecological Feature
European Site	International. There is hydrological connectivity between the proposed development and the Lower River Shannon SAC (see Table 3-1).	Yes
Natural Heritage Area	National. There is hydrological connectivity between the proposed development and nationally designated sites (see Table 3-2).	Yes
Depositing Lowland Rivers (FW2)	The Oakfield stream is a small trout and brook lamprey stream of Local importance (higher value). The West Roo stream is of Local (higher value) Importance owing to salmonid spawning habitat in the downstream zone of influence. The Blackwater (Clare) river support	Yes

[9] In accordance with NRA (2009) Guidelines for the Assessment of Ecological Impacts of National Road Schemes Rev. 2. National Roads Authority

Site/ Habitat/ Species	Ecological Value[9]	Important Ecological Feature
	habitat for Atlantic salmon and is a tributary of the Lower River Shannon SAC. This river is of County importance (see Aquatic EcIA).	
Drainage Ditches (FW4)	Local importance (higher value). Drainage ditches at the site are not of fisheries value and do not support a diverse flora. However, they provide connectivity in the landscape and are considered to be of local importance to avifauna and small mammals as a viable foraging habitat and localised refuge.	Yes
Hedgerows (WL1)	Local importance (higher value). Linear woodland habitats such as hedgerows and treelines provide valuable ecosystem services for other semi-natural habitats and faunal species in the locality in terms of cover, refuge and connectivity. This is particularly the case for areas dominated by improved grassland habitats, such as the proposed site and its environs.	Yes
Treelines (WL2)	Local importance (higher value). Linear woodland habitats such as hedgerows and treelines provide valuable ecosystem services for other semi-natural habitats and faunal species in the locality in terms of cover, refuge and connectivity. This is particularly the case for areas dominated by improved grassland habitats, such as the site and its environs.	Yes
Scrub (WS1)	As it is represented at the solar array site, scrub is limited to Gorse and Bramble dominated habitat along field boundaries and is of limited ecological value for flora, habitats, small mammals and avifauna. No scrub was recorded within the proposed substation and grid connection site.	No
Improved Agricultural Grassland (GA1)	Local importance (lower value). A habitat of low ecological value for flora, habitats and non-volant mammals comprising poor floristic diversity.	No
Dry meadows and grassy verges (GS2)	Local importance (lower value). This habitat is restricted to part of the verges of the proposed grid connection route alongside local roads. As represented at the site, this habitat is of low ecological value for flora, habitats and non-volant mammals comprising poor floristic diversity.	No
Acid grassland (GS3)	Local importance (higher value). An area of relatively species rich grassland at the north of the solar array site. This area of grassland is of ecological value for floral and invertebrates and, in turn, avifauna and bats. There is no acid grassland within the proposed substation and grid connection site.	No
Wet Grassland (GS4)	Local importance (lower value). As it occurs at the solar array site, this habitat is relatively species poor but is likely to be of local importance to avifauna and small mammals as a viable foraging habitat and localised refuge. There is no wet grassland within the proposed substation and grid connection site.	No
Recolonising bare ground (ED3)	Local importance (lower value). A habitat of low ecological value for flora and habitats comprising poor floristic diversity.	No

Site/ Habitat/ Species	Ecological Value[9]	Important Ecological Feature
Buildings and artificial surfaces (BL3)	Negligible ecological value. This habitat includes the local road network, access tracks and a farmyard at the west of the proposed site.	No
Amphibians & Reptiles	Local importance (higher value). There is potential breeding habitat for common frog within the drainage ditches at the site.	Yes
Avifauna	Avifauna as they occur within the site are considered to be of local importance (higher value).	Yes
Invertebrates	There is suitable habitat for Marsh Fritillary at the north of Parcel 4 of the proposed solar array, however no evidence of this species was recorded during the site survey. There is no suitable habitat for protected invertebrate species within the proposed substation and grid connection site.	No
Bats	The hedgerows and treelines at the site provide good foraging and commuting habitat for bats and eight species of bat were recorded within the wider solar array site. Bats, as they occur at the site, are considered to be of local importance (higher value)	Yes
Otter	No evidence of otter was recorded at the site. However, the Oakfield stream and West Roo stream may provide an occasional commuting route for this species and suitable foraging and commuting habitat for otter occurs in the Blackwater River crossed by the proposed grid connection.	Yes
Badger	Local importance (higher value). No evidence of badger setts was recorded within the site, however badger droppings were recorded in Parcel 1, 3 and 4 of the wider solar array site and there is suitable habitat for badger setts within scrub adjacent to Parcel 1. It is likely that badger forage within the proposed substation site.	Yes
Hedgehog	The presence of hedgehog at the periphery of the site cannot be ruled out.	Yes
Pine Marten	Pine marten has been recorded in the environs of the site. The site is of low suitability for this species and no evidence of Pine marten was recorded during the site survey.	No
Other mammals	The habitats present at the site are not suitable to support other protected species. No evidence of protected species of mammal was recorded at the site.	No

4 Potential Impacts of the Proposed Development

This section identifies in detail the potential effects of the proposed development on habitats and species of conservation value (i.e. important ecological features as identified in Table 3-6) that have been identified as present, or that have the potential to be present, at its receiving environment.

As noted in Section 1, the proposed substation and underground cable grid connection works for the permitted Ballyglass Solar Array Phase 1 and proposed Ballyglass Solar Array Phase 2 are the subject of a separate Strategic Infrastructure Development planning application. Section 4.1 to Section 4.4 of this report consider the potential impacts of the proposed substation and grid connection development, a cumulative assessment of the proposed development with Ballyglass Solar Array Phase 1 and Ballyglass Solar Array Phase 2 is included in Section 4.5.

4.1 Do Nothing Scenario

If the proposed development does not proceed, the proposed site will remain as predominantly improved agricultural grassland bound by treelines for the foreseeable future.

4.2 Construction Phase

The ecological features that, in the absence of mitigation, may potentially be affected by the construction phase of the proposed development and the significance of these effects are set out in the following sections.

4.2.1 Designated Sites

Potential impacts on European sites are considered in the screening for Appropriate Assessment report and Natura Impact Statement accompanying the planning application.

As indicated in Table 3-2, there are eleven sites designated nationally for nature conservation within 10km of the proposed site. Four of these sites are also designated as European sites and so are considered within the Appropriate Assessment report accompanying the planning application.

Two of the pNHA sites located within 10km of the site are designated for the presence of bat roosts (Cloonlara House pNHA and Castleconnell (Domestic Dwelling, Occupied) pNHA) and support reasonable connectivity to the site via hedgerows, treelines and riparian vegetation. Applying the precautionary principle, the potential for bats from these nationally designated sites to forage within the site cannot be discounted. Cloonlara House pNHA is designated for the presence of Leisler's bat. The site's landscaping plan will enhance and increase hedgerow and treeline networks at the site, providing greater foraging and commuting habitat and improving ecological connectivity (see Section 4.2.2). Further, there is an extensive network of hedgerows in the wider landscape and the majority of hedgerows and treelines at the site will remain in place. Therefore, the removal of small sections of hedgerow/ treeline will not result in a significant loss of foraging/ commuting habitat for Leisler's bat, which tends to forage and commute over open ground and is not heavily dependent on hedgerows and treelines.

There is no Site Synopsis available for Castleconnell (Domestic Dwelling, Occupied) pNHA, however NPWS records[10] indicate the presence of a lesser horseshoe bat roost. In 2016, the Bat Conservation Trust (BCT) carried out a review of literature pertaining to mean and maximum bat foraging distances[11]. In their review, a Core Sustenance Zone (CSZ) refers to the area surrounding a communal bat roost within which habitat availability and quality will have a significant influence on the resilience

[10] Available on Maps - Biodiversity Maps and Habitat and Species data | National Parks & Wildlife Service

[11] Collins, J. (ed.) (2016). *Bat Surveys for Professional ecologists: Good Practice Guidelines* (3rd ed.). The Bat Conservation Trust, London

and conservation status of the colony using the roost. The weighted average maximum foraging distance for lesser horseshoe bats was 2.02km. However, as noted in the National Parks and Wildlife Service (NPWS) document *Conservation objectives supporting document – lesser horseshoe bat* (*Rhinolophus hipposideros*)[12], some researchers have found that lesser horseshoe bats normally forage in woodlands/scrub within 2.5km of their roosts, therefore, as specified for the purpose of current site specific conservation objective (SSCO) targets for this species, a 2.5km zone is considered an appropriate distance to foraging areas for each roost. This 2.5km CSZ is also considered an appropriate distance to foraging areas for non-SAC lesser horseshoe bat roosts. Castleconnell (Domestic Dwelling, Occupied) pNHA is located 3.3km from the proposed substation and grid connection at nearest, therefore the CSZ for this pNHA does not overlap with the proposed site.

The proposed substation and grid connection development will not have a significant effect on the designated interests of Cloonlara House pNHA and Castleconnell (Domestic Dwelling, Occupied) pNHA.

An assessment of potential source-pathway-receptor links between the proposed development site and the remaining five nationally designated conservation sites within the potential zone of influence of the proposed development did not reveal links to any of these designated sites.

No significant effects on nationally designated sites are anticipated to arise from the proposed works.

4.2.2 Habitats

4.2.2.1 Depositing/ lowland rivers

A detailed assessment of potential impacts on aquatic ecology as a result of the proposed development is provided in the Aquatic EcIA accompanying the SID application.

4.2.2.2 Drainage ditches

The landscaping plan includes for measures including hedgerow enhancement and provision of field margins (see Section 4.2.2.3 for further details). These measures will assist in minimising adverse impacts on water quality within drainage ditches. However, there is potential for export of sediments and other pollutants such as hydrocarbons to drainage ditches during the construction phase to result in a reduction in water quality locally. If this were to occur, it may potentially result in a short term significant adverse effect at the local level.

4.2.2.3 Hedgerows and treelines

Within the boundary of the proposed development, the Proposed Ballyglass Solar Array (Phase 2) application includes for the removal of c. 25 linear meters of existing hedgerow required to facilitate the construction of access track throughout the proposed solar parcels. This will be offset by the planting of new native hedgerow (outside of the SID application boundary) and the bolstering of c.1,400 linear metres. The removal of hedgerow to facilitate the SID substation is limited to 3 linear metres, where it is proposed to add levelling batter to the access track. Overall, there is an additional c. 175m of proposed enhanced hedgerow, with no further removal or new hedgerow planting required as part of the proposed SID substation development as it is wholly contained within the parcels that form part of the proposed Ballyglass Solar Array.

There will be no significant adverse effects as a result of hedgerow loss during the construction phase of the proposed development. Further, hedgerow enhancement planting will improve the biodiversity

[12] NPWS (2018) Conservation objectives supporting document – lesser horseshoe bat (*Rhinolophus hipposideros*) Version 1. Conservation Objectives Supporting Document Series. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht, Dublin, Ireland.

and structure of the site's existing hedgerow and treeline network and will improve their ecosystem value to the wider area.

Trees within the site may offer nesting opportunities for breeding bird species. In the absence of mitigation this work is likely to impact upon breeding birds through disturbance, injury or loss of potential nesting site as discussed in Section 4.2.3.2.

4.2.3 Species

4.2.3.1 Amphibians

The drainage ditches at the proposed site provide potential habitat for common frog. As detailed in Section 4.2.2.2 and Section 4.2.2.3, the landscaping plan includes measures such as hedgerow enhancement and provision of grass buffer strips. These measures will assist in minimising adverse impacts on water quality within drainage ditches. However, there is potential for export of sediments and other pollutants such as hydrocarbons to drainage ditches during the construction phase to result in a reduction in water quality locally. If this were to occur, it may potentially result in a temporary significant adverse effect on amphibians at the local level.

4.2.3.2 Avifauna

The proposed development will result in potential disturbance to breeding avifaunal species currently utilising the improved grassland and adjoining / nearby treeline and hedgerow habitats. In consideration of the presence of suitable alternative habitat surrounding and adjoining the proposed site, the impacts to avifauna in this regard are considered to be of a negligible magnitude. For most bird species, the displacement period is likely to only occur during the construction phase.

The hedgerows and treelines offer suitable habitat for a range of passerines, including three BoCCI Amber List species and a range of Green List species that are common in the agricultural landscape, as recorded during the site surveys (Table 3-3). As hedgerow is an abundant habitat within the application area, and adjacent landscape, the removal of small sections of hedgerow will have a negligible impact on local bird species from loss of habitat. Further, the site's landscaping plan will enhance and increase hedgerow and treeline networks at the site, providing greater foraging and dwelling habitat and improving ecological connectivity.

4.2.3.3 Bats

Loss of Roosting Habitat

No potential roosting habitat was recorded within the proposed substation and grid connection site, therefore the proposed development will not have an adverse impact on roosting bats.

Loss of Foraging and Commuting Habitat

The results of the bat monitoring undertaken for the wider solar array development indicate that the site supports eight species of foraging and commuting bat, with a likely spring roost for common pipistrelle in the vicinity of Parel 4 and a roost for Leisler's bat likely present in the environs of the site.

The hedgerows and treelines present within the proposed substation and grid connection site provide foraging and commuting habitat for a high diversity of bat species. The proposed substation development will require the removal of 3 linear metres of hedgerow. However, it is proposed to enhance c.175 metres of hedgerow at the proposed site; all hedgerow planting will comprise native species from native stock. The site's landscaping plan will enhance hedgerow and treeline networks at the site, providing greater foraging and commuting habitat and improving ecological connectivity overall. Further, there is an extensive network of hedgerows in the wider landscape and the majority of hedgerows and treelines at the site will remain in place. Therefore, the removal of a small section

of hedgerow/ treeline will not result in a significant loss of foraging/ commuting habitat for bats in general and will not have a significant effect on local populations of common pipistrelle, soprano pipistrelle, Leisler's bat, brown long-eared bat and Daubenton's bat.

Lesser horseshoe bat was recorded foraging and commuting at the wider solar farm site. Lesser horseshoe bat is generally considered to be reluctant to cross open areas more than 10m wide. As noted above, hedgerow removal to facilitate the proposed substation and grid connection development is limited to 3 linear metres. This will have a negligible effect on foraging and commuting lesser horseshoe bat.

Lighting

Woodland edge habitat provides important flyways and feeding sites for a diversity of bats. Artificial lighting at night may have an adverse effect on foraging bats as light-averse bats may be repelled from lit areas and restrict their use of commuting or feeding space. In the absence of mitigation, disturbance of bats due to lighting used during the construction phase, should it be required, would have a significant adverse effect at the local (site) level. The effect would be temporary and would persist for the duration of construction.

4.2.3.4 Otter

The Oakfield stream and West Roo stream are small watercourses that would not provide a sustained foraging resource for otter but may be used occasionally by this species for foraging and commuting through the landscape. The potential for temporary visual and noise disturbance to otters within the Oakfield and West Roo stream in the vicinity of the site during construction cannot be discounted. However, otters are generally nocturnal, with a peak of activity occurring around dawn and dusk, therefore the main activity period for otter is outside standard construction working hours. In view of these factors, and in consideration of the abundance of available aquatic habitat downstream of the site, disturbance impacts would not be expected to have a significant adverse effect on otters. The proposed development will not form a barrier to otter commuting through the landscape.

There is potential for a reduction in water quality to have an adverse effect on aquatic organisms and in turn a reduction in prey species available for otter that forage along the Blackwater (Clare) river downstream of the proposed grid connection crossing site. However, any reduction in water quality is likely to be temporary and localised. The high mobility and large foraging range of otter means that they are likely to be able to accommodate such localised temporary changes in prey distribution and abundance.

The potential for disturbance to the breeding or resting place for otter as a result of the proposed crossing of the Blackwater (Clare) river for the grid connection cannot be excluded. This would be a significant adverse effect at the local level.

4.2.3.5 Badger

No evidence of badger setts was recorded within the proposed site. However, badger droppings were recorded within the site and there is potential for disturbance to badgers during construction work, should they be present. In the absence of mitigation, the construction of the proposed development has the potential to affect badger if present at the time of construction. This would be a temporary effect that would be significant at a local level.

4.2.3.6 Hedgehog

The use of the site by hedgehog is likely to be limited to hedgerows and treelines. As noted previously, the site's landscaping plan will enhance hedgerow networks at the site, providing improved foraging

and commuting habitat and improving ecological connectivity. Further, there is an extensive network of hedgerows in the wider landscape and the majority of hedgerows and treelines at the proposed site will remain in place. Therefore, the removal of a small section of hedgerow/ treeline will not result in a significant loss of foraging/ commuting habitat for hedgehog and will not have a significant effect on this species.

4.2.3.7 Invasive Species

No invasive plant species were recorded within the proposed substation and grid connection site.

4.3 Operational Phase

This section details the principle potential impacts of the proposed development during the operational phase, in the absence of mitigation.

4.3.1 Designated Sites

Potential effects on European sites are considered in the Screening for Appropriate Assessment report accompanying the Planning Application.

No adverse effects on nationally designated sites will occur during the operational phase.

4.3.2 Habitats

4.3.2.1 Lowland/depositing Rivers

A detailed assessment of potential impacts on aquatic ecology as a result of the proposed development is provided in the Aquatic EcIA accompanying the SID application.

4.3.2.2 Terrestrial Habitats

No significant adverse effects on terrestrial habitats are anticipated during the operational phase.

The successful implementation of the landscaping proposals (see Section 4.2.2.3) will improve the biodiversity and structure of the site's hedgerow network and will improve their ecosystem value to the wider area. As such, it is anticipated that the proposals will have a positive impact on hedgerow habitats at the site during the operational phase. It is further noted that field margins are to be managed in accordance with the BRIDE project techniques.

4.3.3 Fauna

4.3.3.1 Amphibians

No significant adverse effects on amphibians are anticipated during the operational phase.

4.3.3.2 Avifauna

The grid connection will also be installed underground. As such, the there is no risk to birds from collision with transmission lines as a result of the proposed development.

Potential nesting habitat for birds within hedgerows and treelines at the site will be retained and enhanced. There will be no significant loss of available habitat for ground nesting birds.

No significant adverse effects on avifauna are anticipated during the operational phase.

4.3.3.3 Bats

Roosting Habitat

There will be no effects on roosting habitats during the operational phase.

Foraging and Commuting Habitat

There will be no loss of foraging and commuting habitat during the operational phase. The site's landscaping plan will enhance hedgerow networks at the site, providing greater foraging and commuting habitat and improving ecological connectivity overall, particularly as it establishes and matures during the operational phase.

Lighting

No external lighting at the site is proposed during the operational phase.

4.3.3.4 Otter

No significant adverse effects on otter are anticipated during the operational phase.

4.3.3.5 Badger

While no badger setts were recorded at the site, the site forms part of the foraging area of a badger population. There is potential for fencing at the site perimeter to exclude badger from part of their foraging area. However, the project design includes for 300mm x 300mm gaps at the base of the security fence at 100m distances for mammal access. In view of the incorporation of this feature into the project design, no significant adverse effects on badger are expected during the operational phase.

4.3.3.6 Hedgehog

There is potential for fencing of the site boundary to create a barrier to the movement of hedgehog through the landscape. However, as noted in Section 4.3.3.5, the project design includes for 300mm x 300mm gaps at the base of the security fence at 100m distances for mammal access. In view of the incorporation of this feature into the project design, no significant adverse effects on hedgehog are expected during the operational phase.

4.4 Decommissioning

Once the project is energised, the proposed 110 kV substation and underground GCR will become the property of ESB Networks and will remain in-situ. This infrastructure will have a future long-term use as part of the national electricity transmission system. There is no potential for decommissioning effects on important ecological receptors.

4.5 Cumulative Impacts

Castlebank Green Energy Solar Farm (Clare Co. Co. planning Ref: 2460416) is a proposed solar farm located c.3.5km to the south-west of the Ballyglass Solar Farm Phase 2 site; the grid connection route for this development crosses the West Roo stream at the same two locations as the proposed development. The Ecological Impact Assessment for Castlebank solar farm development found that there is potential for short-term slight negative effects on habitats; and temporary slight negative effects on ground mammals, bats and birds during the construction phase. With the implementation of mitigation by design and specific mitigation measures, residual effects on habitats and flora are expected to be slight positive at a local level. The residual effect on mammals is expected to be neutral overall, and the residual effect on birds is expected to be a slight negative effect at a local level. The residual effect on other taxa and surface water will be neutral.

Lackareagh Wind Farm (Clare Co. Co. planning Ref: 2460411) is a proposed wind farm located c.6.5km to the north of the Ballyglass Solar Farm Phase 2 site; the grid connection for Lackareagh Wind Farm is located at the same place as the grid connection for the proposed development at a short section of the L3046 road. The Biodiversity Chapter of the EIAR identified potential impacts at a local level as a result of habitat loss, degradation of water quality, spread of invasive species, disturbance to badger, loss of foraging habitat for bats, disturbance to bats and potential impacts on aquatic features of International Importance within Lower River Shannon SAC during the construction phase. Potential

impacts identified during the operational phase include degradation of water quality and collision impacts on bats. No significant residual effects were identified.

A residential development (Clare Co. Co. planning Ref: 20740) and subsequent amendment application (Ref: 2460432) is located c.0.64km south of the proposed development site. The EcIA completed for the residential development identified potential impacts on flora and fauna as a result of the development including degradation of water quality, habitat loss and associated impacts on amphibians, birds, invertebrates and bats and barriers to movement for ground mammals. Residual impacts were expected to be limited to small (not significant) impacts on treelines, drainage ditches, bats, mammals, fish and invertebrates.

Drummin Solar Farm is a permitted solar farm development located c.2.1km to the west of the Ballyglass Solar Farm Phase 2 site; the grid connection for Drummin Solar Farm crosses the West Roo stream at three same locations as the proposed development. The Ecological Impact Assessment for the development found that there is potential for impacts on grassland and linear woodland habitats at the site/ local level as a result of habitat disturbance and loss; potential for spread of invasive plant species; effects on bats at the site/local level; temporary effects on otter and badger at the local level and adverse effects on birds at the site/local level as a result of disturbance and habitat loss. With the implementation of embedded and specific mitigation measures, no significant adverse residual effects were identified and the proposals are predicated to have a positive residual effect on hedgerows and grassland.

An area within Parcel 1 of the Ballyglass Solar Farm Phase 2 site has been infilled (Clare Co. Co. planning Ref: 21/796) and now comprises re-colonising bare ground (see Figure 3-3 of this report). The RFI for this development noted potential impacts of this development on surface water drainage and water quality within the Oakfield Stream. A Surface Water Management Plan was prepared in response to the RFI to ensure the protection of the Oakfield Stream. A Surface Water Management Plan (SWMP) was prepared in response to the RFI to ensure the protection of the Oakfield Stream. In view of the requirement for the development to adhere to the measures included within the SWMP, no potential for cumulative impacts has been identified.

The EcIA completed for Carrownagowan Grid connection (ACP Ref: 318505), located c.0.93km from the proposed site at nearest, identified potential impacts on habitats as a result of water quality impairment and habitat alteration, spread of invasive species, habitat loss and disturbance to otter and disturbance/ displacement of aquatic macroinvertebrates and brown trout during the construction phase; and slight temporary impacts on habitats during the operational phase. Residual effects were limited to short term slight to imperceptible negative effects on habitats, otter, aquatic macroinvertebrates and brown trout.

The Biodiversity Chapter for Oatfield Wind Farm (ACP Ref: 318782), located c.1.12km to the north-west of proposed development site, identified potential impacts as a result of habitat loss and fragmentation, spread of invasive species, habitat loss for marsh fritillary butterfly, habitat loss and fragmentation for bats during the construction phase; and the potential for spread of invasive species during the operational and decommissioning phase. It was considered that the mitigation and enhancement measures provided within the EIAR will be sufficient to avoid significant effects on key ecological features, no residual effects are anticipated.

The Biodiversity Chapter of the EIAR for Fahybeg Wind Farm (Ref: ACP 317227), located c.0.94km from the proposed development site, found that potential impacts of the development include habitat loss, spread of invasive species, disturbance and/or habitat loss for otter, red squirrel, Pine marten, Irish

stoat, Irish hare, pygmy shrew and hedgehog and collision impact risk to bats. With the implementation of mitigation measures provided within the EIAR, no significant residual impacts on these ecological receptors are expected. Potential imperceptible residual impacts on marsh fritillary butterfly and aquatic receptors were identified. A collision risk to birds was also identified within the Biodiversity Chapter; with the implementation of mitigation measures, the residual impacts is expected to be slight-imperceptible, with a moderate impact on Kestrel and the local level. Overall, no significant residual impacts from the wind farm site, turbine delivery route and grid connection on biodiversity were identified.

The Biodiversity Chapter of the EIAR for Knockshanvo Wind Farm (Ref: ACP 320705), the grid connection route of which shares the same route as the proposed development for a short distance on the L3056, found that following the detailed surveys undertaken and impact assessment (provided in Section 6.4 of the EIAR) it is concluded that there will be no significant residual habitat loss, disturbance, or deterioration of water quality associated with the Proposed Development.

The EcIA prepared for Blackwater Demense (Clare Co Co Ref: 2660117) found that there is potential for the development to result in loss of and disturbance to habitats for local conservation importance, loss of habitat and disturbance to mammals, disturbance to bats as a result of artificial lighting at night and loss of habitat for birds, amphibians and invertebrates. With the effective implementation of mitigation (as detailed within the EcIA), it was predicted that the development will result in slight negative residual effects on wet grassland and moderate residual impacts on treelines: no potential for significant residual impacts was identified.

The development subject to this application forms part of grid connection and access arrangements which will facilitate the connection of the permitted Ballyglass Solar Array Phase 1 (Clare County Council Reference P22-591 and An Coimisiún Pleanála Reference ABP-316043-23) and proposed Phase 2 (Clare County Council Reference P24-60485 and An Coimisiún Pleanála Reference PL-500253-CE-25) to the national grid. The EcIA completed for the permitted Phase 1 development found that there is potential for adverse effects on water quality, disturbance to ground nesting birds, disturbance to otter and badger during the construction phase. With the implementation of mitigation by design and specific mitigation, it is expected that there will be a positive residual impact over the short to medium term. The EcIA prepared for the Phase 2 development found that there is potential for adverse effects on water quality, disturbance to badger and otter during construction and adverse effects on foraging and commuting bats as a result of habitat loss. With the implementation of mitigation by design and specific mitigation measures, as provided within the EcIA and supporting bat report, it is expected that residual effects will be limited to a slight, but not significant effect on lesser horseshoe bat locally. The potential for cumulative effects on European sites is considered separately within the Natura Impact Statement accompanying the SID application.

Cumulative Impact Assessment Conclusion

The above detailed projects all include mitigation measures to avoid, reduce or offset significant effects on ecological receptors and no potential for significant residual impacts on ecological receptors was identified for any project within the zone of influence of the proposed development. It is noted that all the developments listed above support hydrological connectivity to the Lower River Shannon SAC, as such, there is potential for in-combination impacts on aquatic ecology receptors during construction as a result of degradation of water quality. However, in view of the robust mitigation measures provided within the EIA/EcIA reports, cumulative impacts are not expected to be significant (see the Aquatic EcIA and NIS accompanying the SID application for further details).

The proposed development will facilitate the connection of the permitted Ballyglass Solar Array Phase 1 and proposed Ballyglass Solar Array Phase 2 to the national grid. The proposed development will be located within improved agricultural grassland and buildings and artificial surfaces of low ecological importance; requirement for hedgerow/treeline removal over and above that required for the proposed Ballyglass Solar Array Phase 2 development is limited to c.3m. With the successful implementation of the mitigation by design and specific mitigation provided for the proposed development (Section 5 of this report), no potential for significant cumulative adverse effects on terrestrial ecology with the permitted Ballyglass Solar Array Phase 1 and Ballyglass Solar Array Phase 2 has been identified.

As detailed in the NIS for the permitted Ballyglass Solar Array Phase 1 and Ballyglass Solar Array Phase 2 developments, in the absence of mitigation, there is potential for export of sediment and small amounts of potentially damaging waterborne pollutants (e.g., sediment, wet cement, hydrocarbons) during the construction phase of the solar array developments to result in significant cumulative and in-combination effects on the conservation objectives of aquatic and semi-aquatic QI for the Lower River Shannon SAC present within the Oakfield Stream and Blackwater (Clare) river with the proposed development. Mitigation measures are provided within the NIS and Aquatic EcIA accompanying the SID application.

A map of the projects considered within this cumulative impact assessment is illustrated in Figure 4-1.

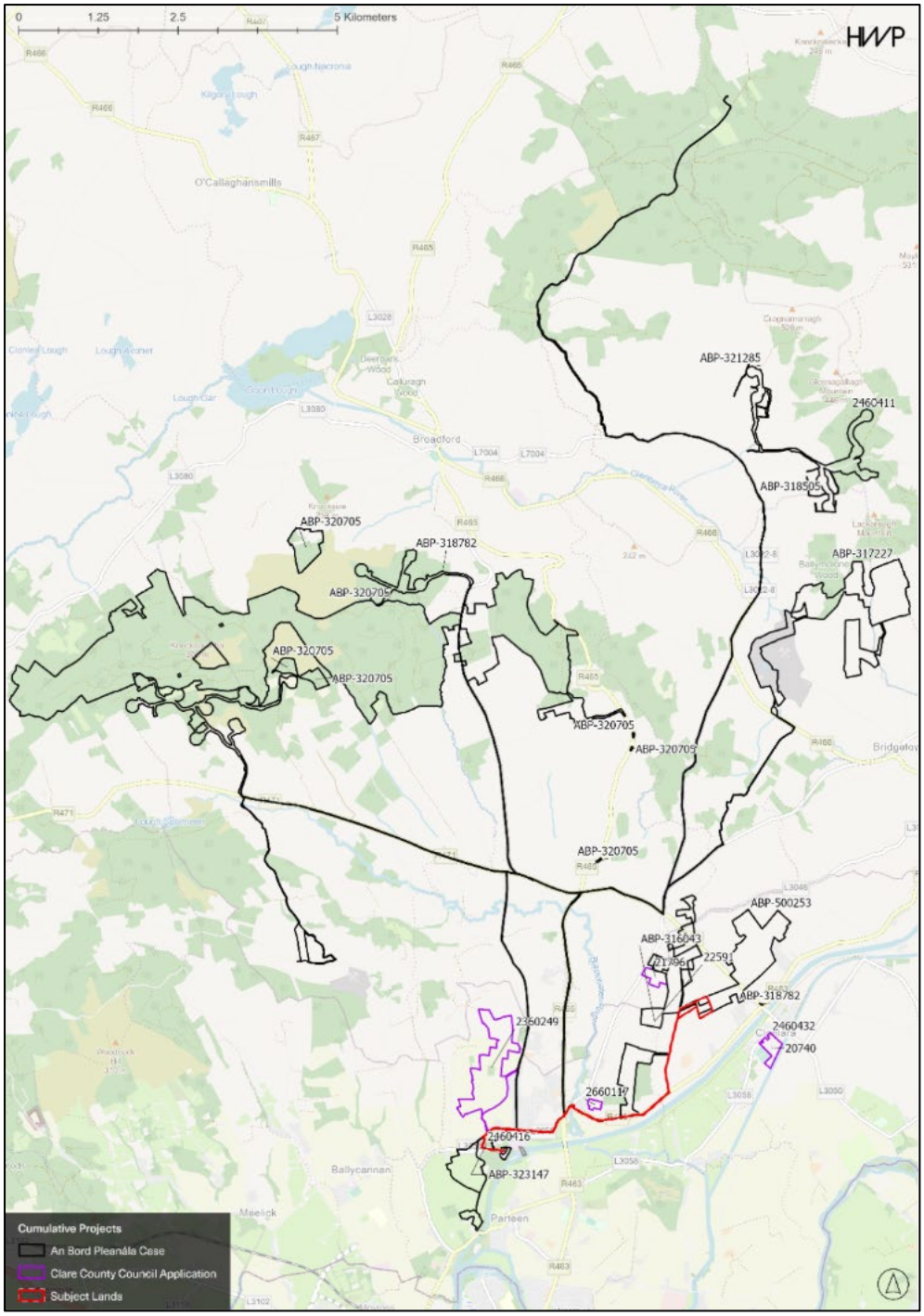


Figure 4-1: Map of projects considered within the cumulative impact assessment

5 Mitigation

5.1 Construction Phase

5.1.1 Designated Sites

Mitigation measures for the protection of European sites are provided within the NIS accompanying the planning application.

No significant adverse effects on nationally designated sites have been identified, therefore no specific mitigation measures are required.

5.1.2 Habitats

5.1.2.1 Aquatic Ecology

Mitigation measures for the protection of aquatic habitats, including active drainage ditches within the proposed substation and grid connection site, are provided in the Aquatic EcIA accompanying the SID application.

5.1.2.2 Hedgerows and Treelines

Taking into consideration mitigation incorporated into the project design (i.e. retention of habitat, planting of new hedgerows and enhancement of existing hedgerows), no significant adverse effects on hedgerows and treelines have been identified, therefore no specific mitigation measures are required.

5.1.3 Species

5.1.3.1 Amphibians

The drainage ditches at the proposed site provide potential habitat for common frog. Comprehensive measures for the protection of water quality within the receiving environment are provided in the Aquatic EcIA accompanying the SID application. No further specific mitigation measures are required.

5.1.3.2 Avifauna

All vegetation clearance will be completed outside of the bird breeding season (1st March to 31st August).

Enhancement measures outlined in Section 6, such as installing bird boxes, are recommended to provide further breeding opportunities for the local bird population.

5.1.3.3 Bats

Potential Roosting Habitat

In accordance with best practice, pre-construction Potential Roost Feature (PRF) inspection/presence absence surveys of all trees scheduled for felling shall be undertaken. Following this examination, should any of the trees be identified as a bat roost then a derogation licence application will be made to the NPWS to exclude the bats and fell the tree.

Where bats are recorded roosting in the trees scheduled for felling, the following mitigation will be required:

- Timing: tree-felling can be undertaken from late August to late October/early November and all works should ideally be undertaken in this period. During this period bats are still capable of flight having not entered hibernation and undertaking works in this period may reduce the risks of tree-felling if proper measures are undertaken. To carry out the works any later in the bat season creates an additional risk that bats may be in hibernation and thus unable to fly out from a tree that is being felled, although bats can be removed by hand by a licenced bat

handler if required. Additionally, disturbance during winter may reduce the likelihood of survival as the bats' body temperature is too low and they may have to consume too much body fat to survive.

Trees to be felled under the supervision of the bat specialist (as identified during the pre-construction survey) will be examined and where bats are found, they will be translocated to an area where bat boxes will already be installed on appropriate trees within the proposed site.

The proposed process for felling the trees with PRFs is outlined below:

- The bat specialist will be present during the tree felling works;
- Works will be undertaken in mild weather to ensure that if bats are found during works that they can be released or safely removed;
- Tree(s) identified as having potential to support bats will be surveyed during the daytime for bats prior to felling, on the day the felling is due to take place. The bat specialist will inspect all potential bat roost features of the tree, including those above ground level. This will require the services of a qualified arborist to climb the trees/ use a cherry picker and fell the tree in sections and lower potential roost features slowly to the ground to allow the bat specialist to inspect them. This will include visual inspection as well as use of an endoscope to inspect cavities/crevices;
- The arborist will be briefed on the technique to be followed prior to the commencement of operations. Felling will follow best practice and mitigation measures, including wedging open cracks/crevices prior to load removal and cutting limbs in sections and lowering to the ground. Trees will only be felled in longer sections if the bat worker is satisfied that there are no potential roost features present;
- When using a chainsaw, the rate of fall of branches will not be accelerated by the use of a chain and vehicle;
- Any bats found in the trees will be removed by hand to a bat box and will then be relocated to the bat boxes installed in advance of works. Notes of any such activities will be maintained;
- The tree and/or tree sections will be left on the ground for a minimum period of 24 hours to enable any unidentified bats residing in deeper crevices to make good their escape during night time hours.

Foraging and Commuting Habitat

No specific mitigation is required within the proposed substation and grid connection site.

Lighting

To minimise disturbance to bats and other fauna that are active at night, construction operations during the hours of darkness will be kept to a minimum. If construction lighting is required during the bat activity period (April to September), lighting shall be directed away from all known roosts and woodland habitats to be retained. This can be achieved by using directional lighting (i.e. lighting which only shines on the proposed works and not nearby countryside) to prevent overspill. This shall be achieved by the design of the luminaire and by using accessories such as hoods, cowls, louvres and shields to direct the light to the intended area only.

5.1.3.4 Otter

Pre-construction otter surveys of the Blackwater (Clare) river will be undertaken prior to the commencement of any works for the grid connection in order to identify any changes in otter activity and holt locations since surveys for this report were completed to address possible impacts on otters during the grid connection works. It is also important to ensure that no new holts have been created in the intervening period.

The removal of otters from affected holts, and the subsequent destruction of these holts, can only be conducted under a Section 25 derogation under the 1997 Habitats Regulations. Derogations are also required for any works likely to cause disturbance to active breeding holts (when present within c.150m of a project /scheme).

In the event of otter holts being identified within proximity to the proposed works area, the following mitigation measures are proposed to ensure no disturbance of the local otter population during the construction phase of the proposed works (NRA 2008):

- No works should be undertaken within 150m of any holts at which breeding females or cubs are present. Following consultation with NPWS, works closer to such breeding holts may take place – provided appropriate mitigation measures are in place, e.g. screening and/or restricted working hours on site.
- No wheeled or tracked vehicles (of any kind) should be used within 20m of active, but non-breeding, otter holts. Light work, such as digging by hand or scrub clearance should also not take place within 15m of such holts, except under licence.
- The prohibited working area associated with otter holts should, where appropriate, be fenced with temporary fencing prior to any possibly invasive works. Appropriate awareness of the purpose of the enclosure should be conveyed through notification to site staff and sufficient signage should be placed on each exclusion fence. All contractors or operators on site should be made fully aware of the procedures pertaining to each affected holt.
- Where holts are present in close proximity to invasive construction works but are determined not to require destruction, construction works may commence once recommended alternative mitigation measures to address otters have been complied with.

5.1.3.5 Badger

A pre-construction survey of the proposed development site shall be undertaken prior to the commencement of construction to re-confirm the finding of this ecological assessment and to identify potential active badger setts occurring within the site.

In the event of badger setts being identified within proximity to the proposed works area, the following mitigation measures shall be undertaken to ensure no disturbance of the local badger population during the construction phase of the proposed works (NRA 2005):

- A buffer distance of 10m from sett entrances shall be employed in instances where light works such as digging by hand or in the event of scrub clearance.
- A buffer distance of 20m from Badger sett entrances shall be incorporated where light machinery (generally wheeled vehicles) are in operation within the site.
- A buffer distance of 30m from Badger setts shall be employed where heavy machinery is in operation within the site.
- None of the above activities shall be undertaken within 50m of active setts during the breeding season (1st December to 31st June inclusive).
- In the unforeseen event that the project requires works to be undertaken within the recommended buffer distances outlined above, further measures as outlined in NRA (2009) will be adopted in liaison with local NPWS staff.

All excavations shall be securely covered or a suitable means of escape provided at the end of each working day to prevent accidental trapping of badgers.

5.1.3.6 Hedgehog

No significant adverse effects on hedgehog have been identified, therefore no specific mitigation measures are required.

5.1.3.7 Invasive Species

No invasive plant species have been recorded within the proposed substation and grid connection site, therefore no specific mitigation measures are required.

5.2 Operational Phase

5.2.1 Designated Sites

Mitigation measures for the protection of European sites are provided within the NIS accompanying the planning application.

No significant adverse effects on nationally designated sites have been identified, therefore no specific mitigation measures are required.

5.2.2 Habitats

No significant impacts on habitats have been identified during the operational phase. However, in accordance with best practice, the vegetation of buffer zones present adjacent to wet ditches shall be protected by exclusion of continual grazing to maintain uncropped tussocky grassland.

Site management options, as outlined in Section 6, are recommended to further enhance the habitats at the site for biodiversity.

5.2.3 Species

5.2.3.1 Amphibians

No significant impacts on amphibians have been identified during the operational phase, therefore no specific mitigation measures are required.

5.2.3.2 Avifauna

No significant impacts on avifauna have been identified during the operational phase, therefore no specific mitigation measures are required.

5.2.3.3 Bats

No significant impacts on bats have been identified during the operational phase, therefore no specific mitigation measures are required.

5.2.3.4 Otter

No significant adverse effects on otter have been identified, therefore no specific mitigation measures are required.

5.2.3.5 Badger

No significant impacts on badger have been identified during the operational phase, therefore no specific mitigation measures are required.

5.2.3.6 Hedgehog

No significant impacts on hedgehog have been identified during the operational phase, therefore no specific mitigation measures are required.

5.3 Residual Impacts

A summary of residual impacts is presented in Table 5-3 below.

Table 5-1: Summary of residual impacts, Ballyglass Grid Connection

Ecological Features	Residual Impacts
Habitats and Flora	Hedgerows and treelines are considered to be of local importance (higher value) given their value to wildlife

Ecological Features	Residual Impacts
	and biodiversity. It is estimated that approximately 3m of hedgerow will be removed to accommodate the proposed substation. However, the landscaping proposals include the enhancement of approximately 175m of existing hedgerows at the site using native hedgerow species. The successful implementation and establishment of landscaping proposals for this development will result in a **positive impact** over the short to medium term.
Fauna	In the absence of mitigation, the proposals have the potential to impact on protected/notable species, through loss of habitat, damage to habitat and potential disturbance during the construction phase. However, with the successful implementation of landscaping proposals for the site and the specific mitigation measures outlined in Section 5, no significant adverse residual impacts to fauna are anticipated. Landscaping proposals will enhance the existing hedgerows at the proposed site. These proposals will provide foraging, commuting and shelter for mammals, birds and invertebrates and an enhanced ecological network; as such this is expected to have a **positive impact** over the short to medium term.

6 Enhancement Opportunities

As noted previously, the proposed substation is located within Parcel 3 of the proposed Ballyglass Solar Array Phase 2. For information, this Section provides a summary of the proposed biodiversity enhancement measures proposed for the proposed solar farm site, including the proposed substation site, and the Biodiversity Management Plan is enclosed in Appendix C.

Solar array developments that are sensitively located and designed to the surrounding area have the potential to support wildlife and increase biodiversity when constructed using best practice guidance[13]. The following enhancement measures have been included within the project design (as illustrated in Landscaping Plan drawings accompanying the planning application):

- C.17,650 linear metres of existing hedgerows/treelines will be maintained and enhanced as required to fill gaps throughout the site.
- C.385 linear metres of new hedgerow will be planted within the site for screening.
- All hedgerow planting will comprise native species from native stock.
- Field margins across will be managed in accordance with the BRIDE project EIP techniques.
- The development includes a 10m set-back at a minimum from the Oakfield stream. This buffer, which is currently grassed, with a low riparian strip of native shrubs, will be enhanced through management as uncropped tussocky grassland with perennial grasses and wildflowers.

The following sections provide options that can be taken to enhance the biodiversity within the site and contribute to biodiversity in the wider landscape.

6.1 Site Management

6.1.1 Hedgerows

Where possible, hedges will be cut on a minimum 3 year cycle instead of annually. This reduces disturbance to the habitat, enhances structure and promotes flowering and fruiting. Where hedgerows must be cut along the roadside for safety, allow the inside to flower.[14]

6.1.2 Grazing

The site may be grazed by sheep at a low stocking rate so that the grassland obtains structural diversity and may encourage a higher diversity of wildflowers within the sward, as well as benefiting invertebrates, ground nesting birds and mammals.[15]

6.2 Artificial Structures

A variety of structures can be built to provide suitable habitat for nesting, roosting and hibernation. The following structures are recommended to enhance biodiversity at the proposed site.

Hibernacula

Hibernacula: log, rock and stone piles designed to create suitable conditions for reptiles and amphibians to hibernate[16]. The wide field margin proposed towards the north of Parcel 4 would be ideal for a hibernacula.

Habitat for Invertebrates

[13] BRE (2014) Biodiversity Guidance for Solar Developments. Eds G E Parker and L Greene.

[14] https://pollinators.ie/wordpress/wp-content/uploads/2018/04/Farmland_actions-to-help-pollinators-2018-WEB.pdf

[15] BRE (2014) Biodiversity Guidance for Solar Developments. Eds G E Parker and L Greene

[16] For an example see https://www.froglife.org/info-advice/log-piles-and-rockeries/

As recommended in the All-Ireland Pollinator Plan, additional invertebrate habitat can be created by creating log piles or installing bug or bee hotels[17]. Log piles should consist of a mixture of hard wood and soft wood and left undisturbed to rot down. Log piles should be placed in both sunny and shady habitats to benefit the widest variety of invertebrates. Butterflies and solitary bees prefer sunny areas while stag beetles prefer shade. Log piles can also provide suitable conditions for reptiles, amphibians, lichens and fungi. The wide field margins proposed to the south and east of Parcel 4 would be ideal for invertebrate habitat.

Bat Boxes

Providing bat boxes will increase opportunities for roosting bats within the proposed site. The boxes can be located on existing mature trees in treelines at the site boundary.

The Schwegler 1FF bat box is recommended, due to the open bottom design preventing the build-up of bat droppings[18]. It is recommended that 12. No bat boxes are installed at the site in consultation with the EcOW or a bat specialist.

Bird Boxes

In order to enhance the site for nesting birds, it is recommended that a number of bird boxes are placed throughout the site. Several types of nest boxes should be installed at suitable locations to favour a variety of bird species.

Open-fronted boxes will provide enhanced nesting opportunities for species such as robins, pied wagtails and spotted flycatchers. Boxes with entrance holes (26mm and 32mm) are suitable for tits, wren and tree sparrows.

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.

It is recommended that ten 1B Schwegler nest boxes (five 32mm and five 26mm holes) and five 2H Schwegler robin boxes are installed[19].

For further details please refer to the Biodiversity Management Plan accompanying the planning application.

[17] https://www.biodiversityireland.ie/wordpress/wp-content/uploads/Pollinator-How-to-Guide-1-ALT_FINAL.pdf
[18] For an example of the 1FF please see: https://www.nhbs.com/1ff-schwegler-bat-box-with-built-in-wooden-rear-panel
[19] See https://www.nhbs.com/1b-schwegler-nest-box

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Appendix A: Geographic Reference for Ecological Assessment

Ecological Valuation
International Importance: 'European Site' including Special Area of Conservation (SAC), Site of Community Importance (SCI), Special Protection Area (SPA) or proposed Special Area of Conservation. Proposed Special Protection Area (pSPA). Site that fulfils the criteria for designation as a 'European Site' (see Annex III of the Habitats Directive, as amended). Features essential to maintaining the coherence of the Natura 2000 Network. Site containing 'best examples' of the habitat types listed in Annex I of the Habitats Directive. Resident or regularly occurring populations (assessed to be important at the national level) of the following: Species of bird, listed in Annex I and/or referred to in Article 4(2) of the Birds Directive; and/or Species of animal and plants listed in Annex II and/or IV of the Habitats Directive. Ramsar Site (Convention on Wetlands of International Importance Especially Waterfowl Habitat 1971). World Heritage Site (Convention for the Protection of World Cultural & Natural Heritage, 1972). Biosphere Reserve (UNESCO Man & the Biosphere Programme). Site hosting significant species populations under the Bonn Convention (Convention on the Conservation of Migratory Species of Wild Animals, 1979). Site hosting significant populations under the Berne Convention (Convention on the Conservation of European Wildlife and Natural Habitats, 1979). Biogenetic Reserve under the Council of Europe. European Diploma Site under the Council of Europe. Salmonid water designated pursuant to the European Communities (Quality of Salmonid Waters) Regulations, 1988, (S.I. No. 293 of 1988).
National Importance: Site designated or proposed as a Natural Heritage Area (NHA). Statutory Nature Reserve. Refuge for Fauna and Flora protected under the Wildlife Acts. National Park. Undesignated site fulfilling the criteria for designation as a Natural Heritage Area (NHA); Statutory Nature Reserve; Refuge for Fauna and Flora protected under the Wildlife Act; and/or a National Park. Resident or regularly occurring populations (assessed to be important at the national level) of the following: Species protected under the Wildlife Acts; and/or Species listed on the relevant Red Data list. Site containing 'viable areas' of the habitat types listed in Annex I of the Habitats Directive.
County Importance: Area of Special Amenity. Area subject to a Tree Preservation Order. Area of High Amenity, or equivalent, designated under the County Development Plan. Resident or regularly occurring populations (assessed to be important at the County level) of the following: Species of bird, listed in Annex I and/or referred to in Article 4(2) of the Birds Directive; Species of animal and plants listed in Annex II and/or IV of the Habitats Directive; Species protected under the Wildlife Acts; and/or Species listed on the relevant Red Data list. Site containing area or areas of the habitat types listed in Annex I of the Habitats Directive that do not fulfil the criteria for valuation as of International or National importance. County important populations of species or viable areas of semi-natural habitats or natural heritage features identified in the National or Local BAP, if this has been prepared. Sites containing semi-natural habitat types with high biodiversity in a county context and a high degree of naturalness, or populations of species that are uncommon within the county. Sites containing habitats and species that are rare or are undergoing a decline in quality or extent at a national level.

Local Importance (higher value):

Locally important populations of Priority species or habitats or natural heritage features identified in the Local BAP, if this has been prepared;

Resident or regularly occurring populations (assessed to be important at the Local level) of the following:

Species of bird, listed in Annex I and/or referred to in Article 4(2) of the Birds Directive;

Species of animal and plants listed in Annex II and/or IV of the Habitats Directive;

Species protected under the Wildlife Acts; and/or

Species listed on the relevant Red Data list.

Sites containing semi-natural habitat types with high biodiversity in a local context and a high degree of naturalness, or populations of species that are uncommon in the locality;

Sites or features containing common or lower value habitats, including naturalised species that are nevertheless essential in maintaining links and ecological corridors between features of higher ecological value.

Local Importance (lower value):

Sites containing small areas of semi-natural habitat that are of some local importance for wildlife;

Sites or features containing non-native species that are of some importance in maintaining habitat links.

Appendix B: NBDC Records

NBDC Species Records from within a 0.5km radius of the Proposed Site

Species name	Date of last record	Designation
Common Frog (*Rana temporaria*)	31/12/1979	Annex V; Wildlife Acts
Barn Owl (*Tyto alba*)	31/07/1991	Wildlife Acts; Red List
Barn Swallow (*Hirundo rustica*)	31/12/2011	Wildlife Acts; Amber List
Black-headed Gull (*Larus ridibundus*)	31/12/2011	Wildlife Acts; Red List
Common Coot (*Fulica atra*)	31/12/2011	Wildlife Acts; Amber List
Common Goldeneye (*Bucephala clangula*)	31/12/2011	Wildlife Acts; Amber List
Common Grasshopper Warbler (*Locustella naevia*)	31/12/2011	Wildlife Acts; Amber List
Common Kestrel (*Falco tinnunculus*)	31/12/2011	Wildlife Acts; Amber List
Common Kingfisher (*Alcedo atthis*)	31/12/2011	Wildlife Acts; Annex I Bird Species; Amber List
Common Linnet (*Carduelis cannabina*)	31/12/2011	Wildlife Acts; Amber List
Common Pheasant (*Phasianus colchicus*)	31/12/2011	Wildlife Acts
Common Pochard (*Aythya ferina*)	31/12/2011	Wildlife Acts; Amber List
Common Redshank (*Tringa totanus*)	31/12/2011	Wildlife Acts; Red List
Common Sandpiper (*Actitis hypoleucos*)	31/12/2011	Wildlife Acts; Amber List
Common Shelduck (*Tadorna tadorna*)	31/12/2011	Wildlife Acts; Amber List
Common Snipe (*Gallinago gallinago*)	31/12/2011	Wildlife Acts; Amber List
Common Starling (*Sturnus vulgaris*)	31/12/2011	Wildlife Acts; Amber List
Common Swift (*Apus apus*)	31/12/2011	Wildlife Acts; Amber List
Common Wood Pigeon (*Columba palumbus*)	31/12/2011	Wildlife Acts
Corn Crake (*Crex crex*)	31/07/1991	Wildlife Acts; Annex I Bird Species; Red List
Dunlin (*Calidris alpina*)	31/12/2011	Wildlife Acts; Annex I Bird Species; Amber List
Eurasian Curlew (*Numenius arquata*)	31/12/2011	Wildlife Acts; Red List
Eurasian Oystercatcher (*Haematopus ostralegus*)	31/12/2011	Wildlife Acts; Amber List
Eurasian Teal (*Anas crecca*)	31/12/2011	Wildlife Acts; Amber List
Eurasian Wigeon (*Anas penelope*)	31/12/2011	Wildlife Acts; Amber List
Eurasian Woodcock (*Scolopax rusticola*)	31/12/2011	Wildlife Acts; Amber List
Gadwall (*Anas strepera*)	31/12/2011	Wildlife Acts; Amber List

Goosander (*Mergus merganser*)	31/12/2011	Wildlife Acts; Amber List
Great Black-backed Gull (*Larus marinus*)	31/12/2011	Wildlife Acts; Amber List
Great Cormorant (*Phalacrocorax carbo*)	31/12/2011	Wildlife Acts; Amber List
Great Crested Grebe (*Podiceps cristatus*)	31/12/2011	Wildlife Acts; Amber List
Greater Scaup (*Aythya marila*)	31/12/2011	Wildlife Acts; Amber List
Greater White-fronted Goose (*Anser albifrons*)	31/12/2011	Wildlife Acts; Annex I Bird Species; Amber List
Greylag Goose (*Anser anser*)	31/12/2011	Invasive Species Regulation S.I. 477 (Ireland); Wildlife Acts; Amber List
Hen Harrier (*Circus cyaneus*)	31/12/2011	Wildlife Acts; Annex I Bird Species; Amber List
House Martin (*Delichon urbicum*)	31/12/2011	Wildlife Acts; Amber List
House Sparrow (*Passer domesticus*)	31/12/2011	Wildlife Acts; Amber List
Lesser Black-backed Gull (*Larus fuscus*)	31/12/2011	Wildlife Acts; Amber List
Little Egret (*Egretta garzetta*)	31/12/2011	Wildlife Acts; Annex I Bird Species
Little Grebe (*Tachybaptus ruficollis*)	31/12/2011	Wildlife Acts; Amber List
Mallard (*Anas platyrhynchos*)	31/12/2011	Wildlife Acts
Merlin (*Falco columbarius*)	31/07/1972	Wildlife Acts; Annex I Bird Species; Amber List
Mew Gull (*Larus canus*)	31/12/2011	Wildlife Acts; Amber List
Mute Swan (*Cygnus olor*)	31/12/2011	Wildlife Acts; Amber List
Northern Lapwing (*Vanellus vanellus*)	31/12/2011	Wildlife Acts; Red List
Northern Shoveler (*Anas clypeata*)	31/12/2011	Wildlife Acts; Red List
Northern Wheatear (*Oenanthe oenanthe*)	31/07/1972	Wildlife Acts; Amber List
Red Grouse (*Lagopus lagopus*)	31/07/1991	Wildlife Acts; Red List
Red-breasted Merganser (*Mergus serrator*)	31/12/2011	Wildlife Acts
Ringed Plover (*Charadrius hiaticula*)	31/12/2011	Wildlife Acts; Amber List
Sand Martin (*Riparia riparia*)	31/12/2011	Wildlife Acts; Amber List
Sky Lark (*Alauda arvensis*)	31/12/2011	Wildlife Acts; Amber List
Spotted Flycatcher (*Muscicapa striata*)	31/12/2011	Wildlife Acts; Amber List
Stock Pigeon (*Columba oenas*)	31/07/1991	Wildlife Acts; Amber List
Tufted Duck (*Aythya fuligula*)	31/12/2011	Wildlife Acts; Amber List
Whooper Swan (*Cygnus cygnus*)	31/12/2011	Wildlife Acts; Annex I Bird Species; Amber List
Yellowhammer (*Emberiza citrinella*)	31/07/1972	Wildlife Acts; Red List
Giant Hogweed (*Heracleum mantegazzianum*)	30/08/2018	High Impact Invasive Species; Invasive Species Regulation S.I. 477 (Ireland)
Japanese Knotweed (*Fallopia japonica*)	03/09/2009	High Impact Invasive Species; Invasive Species Regulation S.I. 477 (Ireland)

Marsh Fritillary (*Euphydryas aurinia*)	31/12/2010	Annex II
Sea Lamprey (*Petromyzon marinus*)	01/01/0001	Annex II
Eurasian Badger (*Meles meles*)	31/12/2014	Wildlife Acts
Fallow Deer (*Dama dama*)	31/12/2008	High Impact Invasive Species; Invasive Species Regulation S.I. 477 (Ireland); Wildlife Acts
Greater White-toothed Shrew (*Crocidura russula*)	14/06/2014	Medium Impact Invasive Species
Lesser Noctule (*Nyctalus leisleri*)	30/07/2018	Annex IV; Wildlife Acts
Pine Marten (*Martes martes*)	22/06/2020	Annex V; Wildlife Acts
Soprano Pipistrelle (*Pipistrellus pygmaeus*)	30/07/2018	Annex IV, Wildlife Acts
West European Hedgehog (*Erinaceus europaeus*)	09/08/2023	Wildlife Acts

Appendix C: Biodiversity Management Plan

Biodiversity Management Plan

Ballyglass Solar Farm Phase 2

Co. Clare

Report prepared for Reeve Wave Limited

By Karen Banks MCIEEM

4th October 2024

Greenleaf Ecology

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1 Introduction

Greenleaf Ecology was commissioned by Reeve Wave Ltd. to prepare a Biodiversity Management Plan (BMP) for the proposed development of a Solar Farm with a total area of circa 96 hectares within the townlands of Coolderry, Dromintobin North, Dromintobin South, Knockbrack Lower, Knockbrack Upper, Monaskeha, Oakfield and Ruanard, Co. Clare. The location of the proposed site is illustrated in Figure 1-1 and the proposed development layout is illustrated in Figure 2-4 and Figure 2-5.

Figure 1-1: Site location map

1.1 Project Description

Reeve Wave Ltd., intend to apply for a 10-year planning permission for a solar array at Coolderry, Dromintobin North, Dromintobin South, Knockbrack Lower, Knockbrack Upper, Monaskeha, Oakfield and Ruanard (townlands), Ardnacrusha, County Clare.

The development will consist of c. 330,000 m2 of solar panels on ground mounted frames, 13 no. single storey control cabins with associated electrical transformer units and hardstand areas, 2 no. ring main units, underground cabling within the solar array site and within the R471 public road to connect solar array field parcels, security fencing, internal CCTV, access tracks (upgrade of existing and new), upgrade to 1 no. existing agricultural field entrance and creation of 2 no. new entrances on the R471 and 1 no. new entrance on the L70382, 2 no. temporary construction compounds (including site offices and welfare facilities), landscaping and all associated ancillary apparatus and development works.

1.2 Objective of the Biodiversity Management Plan

Greenleaf Ecology and Macro Works Ltd. have developed a suite of measures that seek to achieve biodiversity net gain and are in keeping with the following relevant objectives of the Clare County Development Plan:

- **CDP15.1:**
  - a) To implement the National Biodiversity Action Plan 2017 2021, the All Ireland Pollinator Plan 2021-2025, the EU A Farm to Fork Strategy 2020, the County Clare Heritage Plan 2017-2023 and the County Clare Biodiversity Plan 2017 2023, or any subsequent plans, in partnership with all relevant stakeholders; and
  - d) To ensure that features of importance to local biodiversity are retained as part of developments and projects being undertaken in the County.
- **CDP15.8:** To ensure the protection and conservation of areas, sites, species and ecological networks/corridors of biodiversity value outside of designated sites throughout the County and to require an ecological assessment to accompany development proposals likely to impact on such areas or species.
- **CDP15.12:**
  - b) To promote the conservation of biodiversity through the protection of sites of biodiversity importance and wildlife corridors, both within and between the designated sites and the wider Plan area;
  - c) To support the implementation of the All Ireland Pollinator Plan, National Biodiversity Action Plan and National Raised Bog SAC Management Plan;
  - d) To ensure there is no net loss of potential Lesser Horseshoe Bat feeding habitats, treelines and hedgerows within 2.5km of known roosts; and
  - f) To promote biodiversity net gain in any new plans/projects/policies to promote development that leaves biodiversity in a better state than before.

The objective of this BMP is to minimise any potential negative impacts arising from the proposed Ballyglass Solar Array, while increasing the habitat diversity. The enhancement of the land within the development boundary will increase the site's capability of supporting biodiversity.

This will be achieved by the following:

- Creating and maintaining a diverse species-rich grassland with a varied sward structure;
- Creating and maintaining native species-rich hedgerows;
- Increasing biodiversity at the site as a result of the habitat creation scheme; and
- Maximising the floral and faunal biodiversity of the created and retained habitats.

2 Proposed Landscaping and Biodiversity Measures

The following measures to achieve biodiversity net gain are laid out in the Landscape Mitigation Plan prepared by Macro Works (September 2024).

These existing and proposed habitats will be in place and managed for the duration of the proposed development (c.40 years).

2.1 Hedgerows

Approximately 17,650 linear meters of existing hedgerow will be enhanced as required by filling gaps throughout the site along with 385 linear meters of new hedgerow planting within the development boundary. These hedgerows will be planted with native Irish species from Irish stock and will provide enhancement of biodiversity corridors throughout the site. The hedgerows will be managed in accordance with the All-Ireland Pollinator Plan, which advises that hedgerow management is an essential part of encouraging biodiversity and maintaining pollinator populations. Hedgerows will be trimmed once every three years (outside of the bird breeding season), thus allowing plants to "grow-out" and flower which in turn will attract a rich population of native species, especially pollinators. These ecological corridors provide food sources, nesting sites and allow connectivity throughout the site for bird, bat and invertebrate species as well as small mammals.

Native Hedgerow species proposed for planting include Hawthorn (*Crataegus monogyna*), Blackthorn (*Prunus spinosa*), Holly (*Ilex aquifolium*), Guelder Rose (*Viburnum opulus*), Hazel (*Corylus avellana*), Dog- rose (*Rosa canina*) and Spindle (*Euonymus europaeus*). Hawthorn will account for 60% of the hedgerow species suggested with Blackthorn and Holly accounting for 15%. The remaining species will make up 2.5% each.

2.2 Field Margins

Field margins will be managed in accordance with the Bride (EU Life Project).[1] The creation of a 2m field margin will provide a habitat for wildflowers, insects, birds and small mammals. The provision of thick vegetation and a wide field margin will be of benefit to ground nesting birds.

Creating a field margin simply involves moving the fence line a minimum of 2m from the base of the adjacent hedgerow. The area should be flailed or grazed every year between September 15th and February 28th to reduce the vegetation and prevent the hedgerow from encroaching onto the field margin.

This management regime, following best practice, will be adhered to and will ensure that the species within the field margin will thrive through natural regeneration.

2.3 Biodiversity Enhancement Zones

Solar panels will be excluded from wide field margins within all 4 land parcels at the proposed site. These areas will be excluded from grazing and will be allowed to 'grow out' allowing various stages of successional growth to occur with time, such as rough grassland and scrub. These areas will provide habitat for small mammals, birds and foraging bats and will also provide space for the provision of artificial structures, as detailed below in Section 2.6.2.

[1] https://www.thebrideproject.ie/wp-content/uploads/2020/04/BRIDE-Project-Farm-Habitat-Management-Guidlines.pdf

2.4 Riparian Zone

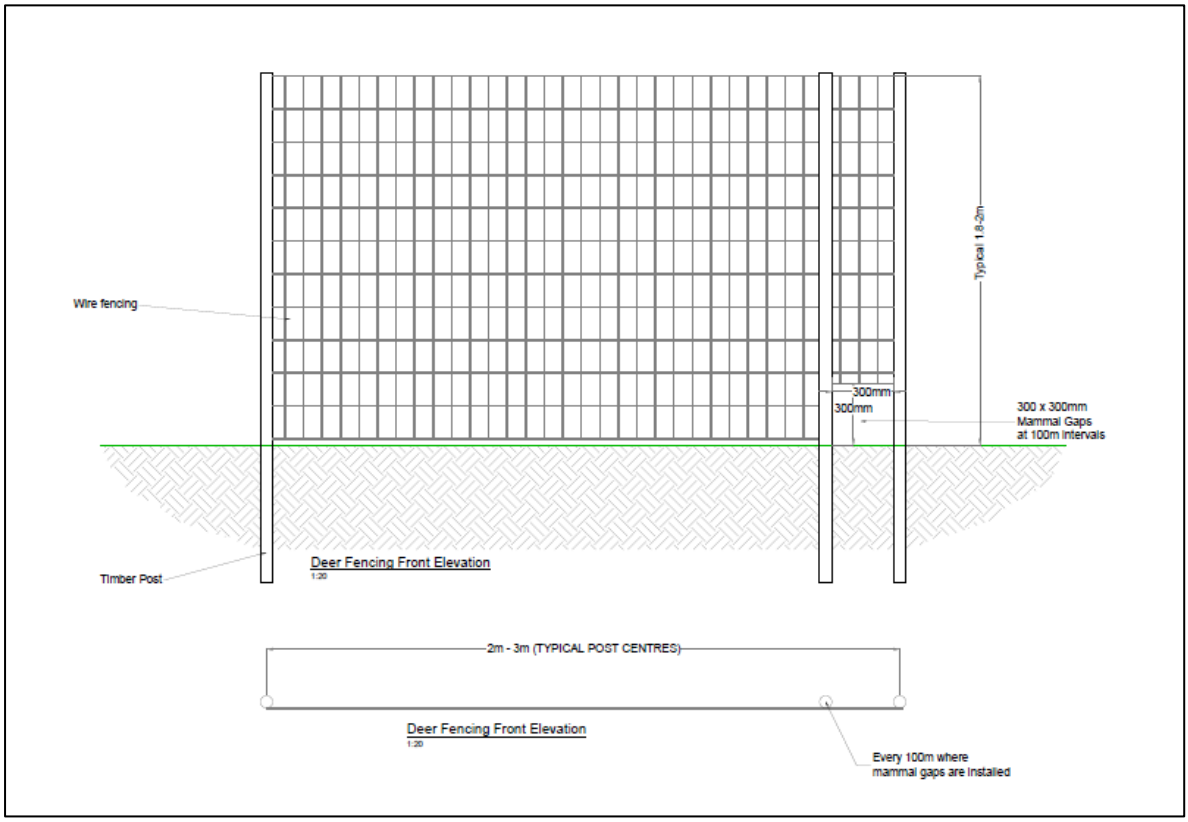
The riparian zone of the Oakfield Stream at Parcel 1 will be enhanced by the bolstering of the existing scrub vegetation with hedgerow planting of native species from Irish stock (as described in Section 2.1). Further, a wide grassy margin will be fenced off, excluded from grazing and allowed to develop into tussocky grassland. This will help to protect water quality within the Oakfield Stream and will provide habitat for invertebrates, small mammals, birds and foraging bats.

2.5 Small Mammals

The site perimeter fencing is stock proof but has been designed to allow for permeability across the landscape for small mammals such as badger and hedgehog.

As illustrated in Figure 2-1, 300mm x 300mm gaps will be included at the base of the security fence at 100m distances for mammal access.

Figure 2-1: Perimeter fencing design showing gaps at base for mammal access



2.6 Other Biodiversity Enhancement Commitments

This section details other biodiversity enhancement measures that are proposed for the solar array, as provided in the Ecological Impact Assessment (EcIA).

2.6.1 Grazing

The site may be grazed by sheep at a low stocking rate so that the grassland obtains structural diversity and may encourage a higher diversity of wildflowers within the sward, as well as benefiting invertebrates, ground nesting birds and mammals.[2]

2.6.2 Artificial Structures

Hibernacula

Hibernacula: log, rock and stone piles designed to create suitable conditions for reptiles and amphibians to hibernate[3] will be provided within the wide field margin proposed towards the north of Parcel 4. An example of a log pile for reptiles and amphibians is illustrated in Figure 2-2.

Figure 2-2: Example of log pile for reptiles and amphibians

Habitat for Invertebrates

As recommended in the All-Ireland Pollinator Plan, additional invertebrate habitat will be provided by creating log piles (Figure 2-2), installing small bug or bee hotels[4] or creating solitary bee nest sites (Figure 2-3). Log piles should consist of a mixture of hard wood and soft wood and left undisturbed to rot down. Log piles should be placed in both sunny and shady habitats to benefit the widest variety of invertebrates. Butterflies and solitary bees prefer sunny areas while stag beetles prefer shade. Log piles can also provide suitable conditions for reptiles, amphibians, lichens and fungi.

[2] BRE (2014) Biodiversity Guidance for Solar Developments. Eds G E Parker and L Greene
[3] For an example see Log piles and rockeries (froglife.org)
[4] Pollinator-Nesting-How-to-Guide-2022-WEB.pdf (pollinators.ie)

Figure 2-3: Examples of Solitary Bee Nesting Sites (Pollinators.ie)[5]

The wide field margins proposed to the south and east of Parcel 4 would be ideal for invertebrate habitat. The final invertebrate habitat type and location will be confirmed by the Project Ecologist prior to construction, based on a detailed review of the site at that time.

Bat Boxes

Bat boxes will increase opportunities for roosting bats within the proposed site. The boxes can be located on existing mature trees in treelines within field boundaries.

The Schwegler 1FF bat box is recommended, due to the open bottom design preventing the build-up of bat droppings[6]. 12. No bat boxes shall be installed at the site in consultation with the EcOW or a bat specialist.

Bird Boxes

In order to enhance the site for nesting birds, 15 no. bird boxes shall be placed throughout the site, as detailed below.

Open-fronted boxes will provide enhanced nesting opportunities for species such as robins, pied wagtails and spotted flycatchers. Boxes with entrance holes (26mm and 32mm) are suitable for tits, wren and tree sparrows.

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.

It is recommended that ten 1B Schwegler nest boxes (five 32mm and five 26mm holes) and five 2H Schwegler robin boxes are installed[7].

[5] ActionSheet_Solitary-Bees-WEB-2.pdf (pollinators.ie)
[6] For an example of the 1FF please see: https://www.nhbs.com/1ff-schwegler-bat-box-with-built-in-wooden-rear-panel
[7] See https://www.nhbs.com/1b-schwegler-nest-box

Figure 2-4: Biodiversity Management Plan Parcel 1, Parcel 2 and Parcel 3

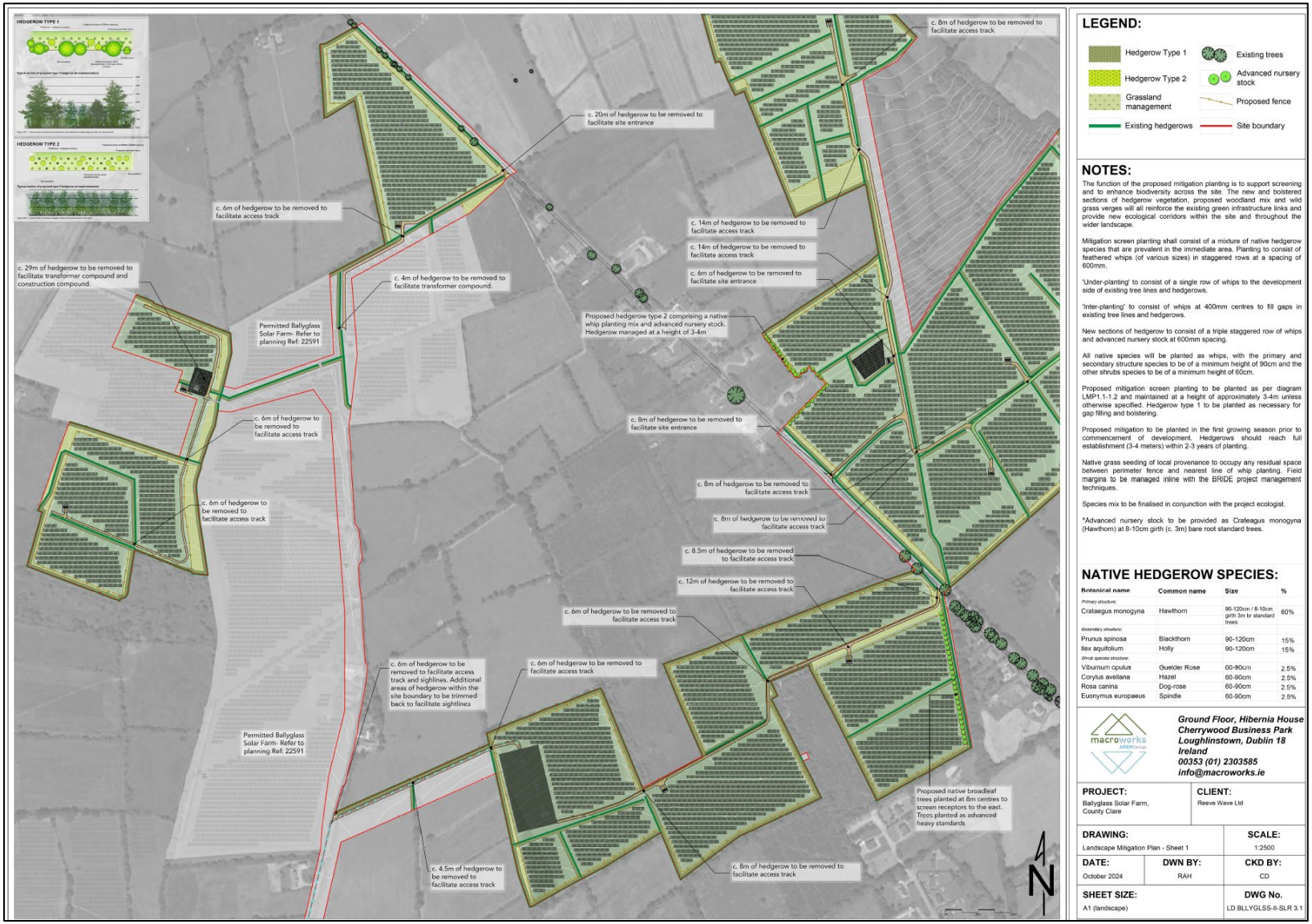


Figure 2-5: Biodiversity Management Parcel 4

3 Monitoring

The monitoring commitments for the proposed landscaping and biodiversity measures are outlined in Table 3-1 below.

Table 3-1: Monitoring of Landscaping and Biodiversity Measures

Monitoring Requirement	Timing	Responsibility
Planted Hedgerows	60 months after the date of completion of all of the initial planting works Weeding Throughout the aftercare period, all shrub planting areas will be weeded regularly. An area of 1m diameter will be kept clear around each planted tree to help ensure the early establishment. A minimum of 3-visits per growing season will be required to keep injurious weeds under control. The growth of herbaceous material between the weeded areas will be controlled by twice yearly strimming. Stakes, Trees, and Ties All stakes and trees shall be maintained in firm positions within the ground and all ties securely fixed and adjusted to allow for the increase in stem girth. Replacements Plants that fail to thrive will be removed and replaced with equivalent plants as soon as possible during the following planting season.	Landscape Architect/ Project Ecologist
Field Margins	Check field margins for hedgerow encroachment and adjust management (outside of the breeding bird season 1st March to 31st August) as required.	Project Ecologist/EcOW
Biodiversity Enhancement Zone	Maintain areas with amphibian hibernacula and invertebrate habitat in an appropriate condition, as guided by the Project Ecologist. Check for excessive scrub encroachment and adjust management (outside of the breeding bird season 1st March to 31st August) as required and as guided by the Project Ecologist..	Project Ecologist/EcOW
Riparian Zone	Check vegetation regrowth and check hedgerow encroachment, adjust management (outside of the breeding bird season 1st March to 31st August) as required.	Project Ecologist/EcOW
Artificial Structures	**Bird Boxes:** Check condition and use of boxes annually between September and February. Boxes to be maintained and replaced as required. **Bat Boxes:** Check condition and use of boxes annually in September to check summer usage. Boxes to be maintained and replaced as required. **Amphibian Hibernacula and Invertebrate Habitat:** Install on completion of the construction phase. Check condition and	Project Ecologist/EcOW

	use of amphibian and invertebrates and maintain/ replace as required.	
Small Mammal Gates	Check that the small mammal gates are free of obstructions such as scrub and heavy undergrowth and clear as appropriate.	Project Ecologist/EcOW

4 Conclusion

The commitments provided for in this plan will enhance the local biodiversity and ensure that there is improved habitat connectivity throughout the development site. The landscaping proposals to plant new hedgerows at the site are an important component of the Biodiversity Management Plan and will provide a net gain of approximately 163m of new hedgerows and will, in time, provide habitats for a wide range of flora and fauna and a lasting biodiversity gain for the project. The existing hedgerows at the proposed site are currently variable in condition, structure and species richness. The enhancement of approximately 17,650m of hedgerows, which constitute critical corridors for wildlife, will improve the structure and species richness of the existing hedgerow network. The management of the hedgerows will be in accordance with the guidance within the All-Ireland Pollinator Plan. The provision of field margins, biodiversity enhancement areas and riparian zone will further enhance the floral diversity of field margins and provide habitat for invertebrates, small mammals and birds.

The proposed site is within a landscape that is considered to be of moderate to high suitability for foraging and commuting bats. The provision of bat boxes will increase the opportunities for roosting bats at the site. Care will also be taken to ensure that non- volant mammals can freely traverse the site. The provision of bird boxes will increase the opportunities for nesting birds at the site.

The provision of hibernacula will create suitable conditions for reptiles and amphibians to hibernate and the provision of log piles or solitary bee nest sites will provide habitat for a range of invertebrates.

The habitats to be maintained, enhanced and established at the proposed site individually offer shelter and a food source for a variety of wildlife. The mosaic of new habitats, combined with the existing hedgerows, ditches and watercourses, will support the existing wildlife within the proposed site. By offering a wider range of habitats that benefit local wildlife, they also have excellent potential to increase the biodiversity of the site. The grassland, hedgerows, and artificial structures such as log piles and solitary bee nest sites will also contribute towards the All-Ireland Pollinator Plan by providing new habitats that will support important pollinator species.

These measures together with the aftercare commitments will benefit local biodiversity and are in keeping with Objectives CDP 15.1, 15.8 and 15.12 of Clare County Development Plan 2023-2029.