



Pinewoods Wind Farm Substation and Grid Connection

Chapter 5: Biodiversity

Pinewood Wind Ltd

Galetech Energy Services

Clondargan, Stradone, Co. Cavan Ireland

Telephone +353 49 555 5050

www.galetechenergy.com



Contents

5.1	Introduction	1
5.1.1	Background	1
5.1.2	Purpose of this Chapter	1
5.1.3	General Description of the Site	1
5.1.4	Development Description	2
5.1.4	Statement of Authority	2
5.1.5	Policy and Legislation	2
5.2	Methodology	3
5.2.1	Scope	3
5.2.2	Identification of the Zone of Influence	3
5.2.3	Desk Study	3
5.2.4	Scoping and Consultation	4
5.2.5	Field Survey	5
5.2.6	Limitations	5
5.2.7	Assessment Methodology	5
5.3	Description of Existing Environment	8
5.3.1	Sites Designated for Nature Conservation	8
5.3.2	Habitats	9
5.3.3	Species	10
5.3.4	Summary of Important Ecological Features	12
5.4	Description of Likely Effects	12
5.4.1	Do Nothing Impact	13
5.4.2	Likely Effects	13
5.5	Mitigation Measures	16
5.5.1	Natura 2000 Sites	16
5.5.2	Hedgerows	17
5.5.3	Eroding/upland river	17
5.5.4	Bats	18
5.6	Residual Effects	18
5.6.1	Construction Phase	18
5.6.2	Operational Phase	18
5.6.3	Decommissioning Phase	19
5.7	Cumulative Effects	19
5.7.1	Pinewoods Wind Farm	19
5.7.2	Laois-Kilkenny Grid Reinforcement Project	19



5.7.3 Laois County Development Plan 2017-2023;	19
5.7.4 Projects on Laois County Council Planning Portal	19
5.7.5 Assessment of Cumulative Effects	19
5.8 Summary	20



5.1 Introduction

This biodiversity chapter was prepared by SLR Consulting Ltd (SLR) and forms part of the Environmental Impact Assessment Report (EIAR) prepared for the proposed development.

5.1.1 Background

In September 2019, the Applicant was granted planning permission by An Bord Pleanála for a wind farm comprising 11 no. wind turbines, each with a maximum height of up to 136.5 m, and all associated site development and ancillary works. The permitted wind farm development straddles the county boundary between Co. Laois and Co. Kilkenny in the townlands of Knockardagur, Boleybawn Garrintaggart, Ironmills (Kilrush) and Graiguenahown, County Laois and Cruitt, County Kilkenny^{1,2}.

In deciding to grant planning permission, An Bord Pleanála determined that the then-proposed substation constituted Strategic Infrastructure Development (SID) and excluded the substation, by way of condition, from the permitted development. Accordingly, a planning application, which this EIAR supports, is now being made directly to An Bord Pleanála.

5.1.2 Purpose of this Chapter

The purpose of this biodiversity chapter is to provide supporting information to assist the competent authority, in this case, An Bord Pleanála, to carry out an Environmental Impact Assessment (EIA) of the proposed development.

The aim of this chapter is to:-

- Describe the baseline data collection and assessment methodologies used;
- Identify and describe all likely significant effects;
- Set out the mitigation and/or compensation measures required to ensure compliance with nature conservation legislation;
- Provide an assessment of the significance of any residual effects on biodiversity; and,
- Set out the requirements for post-construction monitoring (if required).

5.1.3 General Description of the Site

The proposed development site ("the Site") is located in the townland of Knockardagur, Co. Laois, approximately 4 km north-east of Ballinakill, 8 km south-east of Abbyleix and 8 km north-west of Castlecomer. The Site is centred at approximate Irish Transverse Mercator (ITM) Grid Reference 650427, 682395.

The topography of the landscape surrounding the Site is dominated by an upland area known as the Castlecomer Plateau, characterised by undulating hills and steep escarpments at its fringes. Dissecting the lowlands on either side of the plateau are the rivers Barrow and Nore, which lie to the east and west respectively. The lowlands are a mixture of pasture and tillage with fields bordered by mature broadleaf tree lines and hedgerows. Agricultural land-uses extend into the upland areas in the form of marginal grazing with scrubby hedgerow field boundaries. Conifer plantations are frequent on the slopes of the plateau along with occasional small areas of demesne woodland.

The Knockardagur stream, flows in a westerly direction from the Site to join the

¹ An Bord Pleanála Reference PL11.248518

² An Bord Pleanála Reference PL10.248392

Owenbeg (Owveg) River approximately 1.4 km east. The Owenbeg (Owveg) River discharges to the River Nore approximately 10.8 km downstream of the Site. The Knockardagur rises from a small spring approximately 10 m south of the footprint of the proposed substation. Water levels in the Knockardagur stream are highly dependent on prevailing weather conditions and the stream is only likely to contain flow following rainfall events.

5.1.4 Development Description

In summary, the main components of the proposed development are as follows:-

- 1 no. 110 kV 'loop-in/loop-out' air-insulated switchroom (AIS) substation including control buildings, transformers and all ancillary electrical equipment; and
- All associated site development, access and reinstatement works.

Due to the sloping nature of the proposed development site, and in order to minimise the volume of material to be excavated to provide the substation footing; the design of the proposed development has incorporated a split-level approach.

The entirety of the proposed development is located within the administrative area of County Laois; while the overall project (Pinewoods Wind Farm) is partly located within County Laois and County Kilkenny. Candidate quarries that may supply construction materials are located within County Kilkenny and County Carlow.

A full description of the proposed development is presented in **Chapter 3** of the EIAR.

5.1.4 Statement of Authority

SLR Consulting (Ireland) Ltd (SLR) was commissioned to provide ecological services, including the preparation of the biodiversity chapter and Natura Impact Statement (NIS), for the proposed development. SLR has a European Ecology Team of approximately 35 permanent ecologists. The ecologists that provided technical expertise for the proposed development are based in Ireland and listed below.

Dr Úna Nealon, senior ecologist with SLR, carried out the field surveys, and prepared this chapter. The technical review of the chapter was carried out by Elaine Dromey MCIEEM.

Úna Nealon holds a BSc (Hons) Environmental Science from NUI Galway and a PhD in Ecology from University College Dublin. Úna has prepared Biodiversity chapters, and Natura Impact Statements, for a range of projects in different sectors.

Elaine Dromey holds a BSc in Earth Science from University College Cork and an MSc in Vegetation Survey and Assessment from the University of Reading, UK. She is a full member of the Chartered Institute of Ecology and Environmental Management.

5.1.5 Policy and Legislation

The following legislation are relevant to this report:-

- The EIA Directive (2014/52/EU);
- The Habitats Directive (92/43/EEC);
- The Birds Directive (2009/147/EC);
- The Wildlife Acts 1976 to 2018;
- The Floral (Protection) Order 2015;
- Planning and Development Act 2000, as amended;
- The EU Water Framework Directive (WFD) (2000/60/EC), as amended
- The European Communities Environmental Objectives (Freshwater Pearl Mussel)

Regulations 2009 (S.I. No. 296 of 2009).

Further details of the above legislation is summarised at **Annex 5.1, Volume II**.

This chapter has also been prepared having regard to the relevant policies and objectives of the Laois County Development Plan 2017–2023 which, for ease of reference, have been provided at **Annex 5.1**.

5.2 Methodology

5.2.1 Scope

The study area for field surveys was defined by the planning application boundary. The zone of influence of the proposed development, as identified in **Section 5.2.2** below, was used as, the study area for the desk study and assessment of cumulative effects.

5.2.2 Identification of the Zone of Influence

The 'zone of influence' for a project is the area over which ecological features may be subject to significant effects as a result of activities associated with the project (CIEEM, 2018). This is likely to extend beyond the project site, for example where there are ecological or hydrological links beyond the site boundaries. The zone of influence will vary for different ecological features depending on their sensitivity to an environmental change (CIEEM, 2018).

The zone of influence for the proposed development was identified through a review of the nature, size and location of the project, the sensitivities of the ecological receptors, known impacts likely to arise as a result of the type of project and the potential for in-combination effects with other plans and projects.

Construction activities will be restricted to the Site and will be localised in nature i.e. the works area will be largely contained to the footprint of the development and immediately adjacent. During the operational phase, other than routine maintenance and monitoring, there will be no other activities associated with the proposed development. The Site drains, via the Knockardagur stream, to the Owenbeg (Owveg) River which forms part of the River Barrow and River Nore SAC (002162) located approximately 1.4 km³ from the Site boundary. Given this surface water connection, the potential for effects on the aquatic environment and the SAC, the potential zone of influence considered to be appropriate for the project is 2 km.

5.2.3 Desk Study

A desk study of the Site and the zone of influence of the proposed development (i.e. within a 2 km radius of the Site), was carried out to collate the available existing ecological information. The Site and the surrounding 2 km area were viewed using existing available satellite imagery including Google maps⁴ and Bing maps⁵.

The National Parks and Wildlife Service (NPWS)⁶ and the National Biodiversity Data Centre (NBDC)⁷ websites were accessed for information on sites designated for nature conservation and on protected habitats and species. Only records for the

³ Measured in a straight line from the closest point of the proposed development.

⁴ <https://www.google.ie/maps> (last accessed 12 June 2020)

⁵ <https://www.bing.com/maps> (last accessed 12 June 2020)

⁶ <https://www.npws.ie/> (last accessed 12 June 2020)

⁷ <https://maps.biodiversityireland.ie/> (last accessed 12 June 2020)

past 10 years are considered within this chapter as older records are unlikely to be relevant given their age and the changes in land management that are likely to have occurred in the intervening period. Environmental Protection Agency (EPA) Maps⁸ were accessed for other environmental information, such as surface water features, relevant to the preparation of this chapter.

Birds of Conservation Concern in Ireland (BoCCI), published by BirdWatch Ireland and the RSPB NI, is a list of priority bird species for conservation action on the island of Ireland. The BoCCI lists birds which breed and/or winter in Ireland and classifies them into three separate lists; Red, Amber and Green; based on the conservation status of the bird and hence their conservation priority. Birds on the Red List are those of highest conservation concern, Amber List are of medium conservation concern and Green List are not considered threatened. The BirdWatch Ireland website⁹ was accessed for information on birds of conservation concern.

All bird species are protected under the Wildlife Acts 1976 – 2018 but, for the purposes of this chapter, only records of species within the last 10 years which are Red or Amber-listed on BoCCI or listed on Annex 1 of the Birds Directive are subject to assessment. Species which are green-listed are considered to be of least conservation priority (Colhoun & Cummins, 2013).

The conservation status of mammals within Ireland and Europe is evaluated using one or more of the following documents; Wildlife Acts (1976 - 2018), the Red List of Terrestrial Mammals (Marnell *et al.*, 2009) and the EU Habitats Directive 92/43/EEC. The importance of the mammal population of the Site was evaluated using these documents.

Laois County Council's website¹⁰ was accessed for information on relevant planning policy. The Laois planning portal¹¹ was accessed for information on other proposed or permitted developments within the Site and within the zone of influence.

The detailed description of the proposed development (see **Chapter 3**), detailed design drawings of the proposed development and other relevant chapters of this EIAR (e.g. **Chapter 7, Water**) were also reviewed as part of the desk study to fully understand the nature and extent of the proposed development and the likelihood of interactions between biodiversity and other environmental topics.

The Site has previously been subject to comprehensive ecological evaluation as part of the Pinewoods Wind Farm EIAR/EIS (see **Volume III**), all relevant documents associated with this EIAR/EIS; including **Chapter 4 (Flora & Fauna)**, the Natura Impact Statement, preliminary Construction & Environmental Management Plan (CEMP) and Surface Water Management Plan (SWMP); have been reviewed to allow for a comprehensive cumulative assessment of the proposed development in combination with the permitted Pinewoods Wind Farm.

5.2.4 Scoping and Consultation

A scoping request, providing details of the Site and the proposed development, was prepared by GES and circulated to consultees in February 2020. There was no response from consultees on biodiversity matters as of 14 August 2020. Full details of the scoping exercise, including scoping responses, are included in **Chapter 1** of this

⁸ <http://gis.epa.ie/> (last accessed 12 June 2020)

⁹ <https://birdwatchireland.ie/> (last accessed 12 June 2020)

¹⁰ <https://laois.ie/> (last accessed 12 June 2020)

¹¹ <http://www.eplanning.ie/LaoisCC/searchtypes> (last accessed 12 June 2020)

EIAR.

5.2.5 Field Survey

The Site was visited on 22 April 2020 and walked by Dr Úna Nealon. Weather conditions were clear and dry with a light breeze. The temperature was c. 17 °C. The objective of the site visit was to describe and evaluate the biodiversity of the Site.

Habitats within the Site were identified and classified using 'A Guide to Habitats in Ireland' (Fossitt, 2000). The dominant plant species present in each habitat type were recorded. Species nomenclature follows Parnell & Curtis (2012) for scientific and English names of vascular plants.

Incidental sightings or evidence of birds, mammals or amphibians, or suitable habitat to support these species, was noted during the habitat survey. The habitats present were evaluated for their potential to support protected flora and fauna including foraging, commuting and roosting bats using Bat Conservation Trust Guidelines (Collins, 2016).

5.2.6 Limitations

Desk study data is unlikely to be exhaustive, especially in respect of species, and is intended mainly to set a context for the study. It is therefore possible that important habitats or protected species not identified during the data search do in fact occur within the vicinity of the Site but have not been previously recorded. Interpretation of maps and aerial photography has been carried out using recent imagery, but it has not been possible to verify the accuracy of any statements relating to land use and habitat context outside of the field study area.

The field survey was carried out under suitable weather conditions and all areas of the Site were accessible. While April is early in the growing season the habitats present are all commonly occurring and floristically species poor, thereby allowing confident habitat classification. The timing of the survey is not considered to be a limitation.

5.2.7 Assessment Methodology

The impact assessment methodology used in this chapter is based on the 2018 *Guidelines for Ecological Impact Assessment in the United Kingdom and Ireland* ("CIEEM guidelines").

5.2.7.1 Important Ecological Features

Ecological features can be important for a variety of reasons. Importance may relate, for example, to the quality or extent of the site or habitats therein; habitat and/or species rarity; the extent to which such habitats and/or species are threatened throughout their range, or to their rate of decline.

5.2.7.2 Determining Importance

The importance of an ecological feature should be considered within a defined geographical context. The following frame of reference has been used in this case, relying on known/published accounts of distribution and rarity where available, and professional experience:-

- International (European);
- National (Ireland);
- Regional (Leinster);
- County (Laois)

- Townland (Knockardagur);
- Local (intermediate area between Site and Townland); and
- Site (the planning application boundary of the development).

The above frame of reference is applied to the ecological features identified during the desk study and field surveys to inform this chapter.

In assigning a level of value to a species, it is necessary to consider its distribution and status, including a consideration of trends based on available historical records. Examples of relevant lists and criteria include species of European conservation importance (as listed on Annexes II, IV and V of the Habitats Directive or Annex 1 of the Birds Directive), species protected under the Wildlife Acts 1976 - 2018 and Birds of Conservation Concern (Colhoun & Cummins 2013).

The approach to impact assessment, as set out in CIEEM guidelines, only requires that ecological features (habitats, species, ecosystems and their functions/processes) that are considered to be important and potentially affected by the project are carried forward to detailed assessment. It is not necessary to carry out detailed assessment of receptors that are sufficiently widespread, unthreatened and resilient to impacts from the project and will remain viable and sustainable. Therefore, for the purposes of this chapter, only ecological features of Local importance or greater and/or subject to legal protection have been subject to detailed assessment.

5.2.7.3 Impact Assessment

The impact assessment process involves the following steps:-

- Identifying and characterising potential impacts;
- Incorporating measures to avoid and mitigate (reduce) these impacts;
- Assessing the significance of any residual effects after mitigation;
- Identifying appropriate compensation measures to offset significant residual effects (if required); and
- Identifying opportunities for ecological enhancement.

When describing impacts, reference has been made to the following characteristics, as appropriate:-

- Positive or negative;
- Extent;
- Magnitude;
- Duration;
- Timing;
- Frequency; and
- Reversibility.

The impact assessment process considers both direct and indirect impacts: direct ecological impacts are changes that are directly attributable to a defined action, e.g. the physical loss of habitat occupied by a species during the construction process. Indirect ecological impacts are attributable to an action, but which affect ecological resources through effects on an intermediary ecosystem, process or feature, e.g. the creation of roads which cause hydrological changes, which, in the absence of mitigation, could lead to the drying out of wet grassland.

Consideration of conservation status is important for evaluating the effects of impacts on individual habitats and species and assessing their significance:-

- Habitats – conservation status is determined by the sum of the influences acting on the habitat that may affect its extent, structure and functions as well as its distribution and its typical species within a given geographical area; and
- Species – conservation status is determined by the sum of influences acting on the species concerned that may affect its abundance and distribution within a given geographical area.

5.2.7.4 Significant Effects

The concept of ecological significance is addressed in paragraphs 5.24 through to 5.28 of CIEEM guidelines. Significance is a concept related to the weight that should be attached to effects when decisions are made. For the purpose of this chapter, a 'significant effect' is an effect that either supports or undermines biodiversity conservation objectives for 'important ecological features' or for biodiversity in general. Conservation objectives may be specific (e.g. for a designated site) or broad (e.g. national/local nature conservation policy) or more wide-ranging (e.g. enhancement of biodiversity). Effects can be considered significant at a wide range of scales from international to Site, and the scale of significance of an effect may or may not be the same as the geographic context in which the feature is considered important.

5.2.7.5 Cumulative Effects

Cumulative effects can result from individually insignificant but collectively significant actions taking place over a period of time or concentrated in a location. Cumulative effects can occur where a project results in individually insignificant impacts that, when considered in-combination with impacts of other proposed or permitted plans and projects, can result in significant effects.

Other plans and projects that should be considered when establishing cumulative effects include:-

- Proposals for which consent has been applied but which are awaiting determination;
- Projects which have been granted consent, but which have not yet been started or which have been started but are not yet completed (i.e. under construction);
- Proposals which have been refused permission, but which are subject to appeal, and the appeal is undetermined;
- Constructed developments whose full environmental effects are not yet felt and therefore cannot be accounted for in the baseline; or
- Developments specifically referenced in a National Policy Statement, a National Plan or a Local Plan.

5.2.7.6 Avoidance, Mitigation, Compensation & Enhancement

Where likely significant effects have been identified, the mitigation hierarchy has been applied, as recommended in the CIEEM Guidelines. The mitigation hierarchy sets out a sequential approach beginning with the avoidance of impacts where possible, the application of mitigation measures to minimise unavoidable impacts and then compensation for any remaining impacts. Once avoidance and mitigation measures have been applied, residual effects are then identified along with any necessary compensation measures, and incorporation of opportunities for enhancement.

It is important for the impact assessment to clearly differentiate between avoidance

mitigation, compensation and enhancement and these terms are defined here as follows:-

- Avoidance is used where an impact has been avoided, e.g. through changes in scheme design;
- Mitigation is used to refer to measures to reduce or remedy a specific negative impact in situ;
- Compensation describes measures taken to offset residual effects, i.e. where mitigation in situ is not possible; and
- Enhancement is the provision of new benefits for biodiversity that are additional to those provided as part of mitigation or compensation measures, although they can be complementary.

5.3 Description of Existing Environment

This section sets out the baseline biodiversity conditions within the Site using the findings of the desk study and field survey.

5.3.1 Sites Designated for Nature Conservation

5.3.1.1 Natura 2000 Sites

The likelihood of significant effects on Natura 2000 sites is addressed in the Appropriate Assessment Screening Report and Natura Impact Statement (NIS) prepared for the proposed development (SLR Consulting, 2020). There are no Natura 2000 sites within or adjacent to the Site.

The Knockardagur stream drains from the Site to join the Owenbeg (Owveg) River c. 1.4 km to the east of the Site. The Owenbeg (Owveg) River forms part of the River Barrow and River Nore SAC 002162. The Site is considered to be connected to this Natura 2000 site via Knockardagur stream.

The next closest SAC is Lisbigney Bog SAC (000869), located c. 5.9 km south-west of the Site. Effects on this SAC are not considered likely given its distance from the Site, the features for which the SAC is designated and the lack of landscape¹² or ecological¹³ connectivity.

The closest SPA is the River Nore SPA 004233, located c. 5.7 km west of the Site. This SPA includes the lower reaches of the Owenbeg (Owveg) River, downstream of the Site. The site is designated for the conservation of a single species, kingfisher *Alcedo atthis*. Effects on kingfisher are not considered likely due to the nature and scale of the proposed development, the distance between the Site and the SPA and the absence of suitable habitat features for kingfisher within the development site.

Further distant Natura 2000 sites are located in excess of 5.9 km from the Site and are not considered likely to be affected by the proposed development due to the nature and scale of the proposed development, in addition to their distance from the Site, the absence of landscape or ecological connectivity and the features for which the Natura 2000 sites are designated.

The River Barrow and River Nore SAC 002162 is within 2 km of the Site and is included

¹² Landscape connectivity is a combined product of structural and functional connectivity, i.e. the effect of physical landscape structure and the actual species use of the landscape (Kettunen *et al.* 2007)

¹³ Connectivity is defined as a *measure of the functional availability of the habitats needed for a particular species to move through a given area. Examples include the flight lines used by bats to travel between roosts and foraging areas or the corridors of appropriate habitat needed by some slow colonising species if they are to spread* (CIEEM, 2018).

for detailed assessment due to its proximity and the discharge of surface water from the Site to the Knockardagur stream. A map of the Site location relative to Natura 2000 sites is available at **Annex 5.2 (Volume II)**.

5.3.1.2 Natural Heritage Areas/Proposed Natural Heritage Areas

There are no Natural Heritage Areas (NHAs) or proposed Natural Heritage Areas (pNHAs) within 2 km (i.e. zone of influence) of the proposed development. The closest is Lisbigney Bog pNHA (000869), located approximately 5.9 km south-west of the Site. The Site is not connected via ecological or landscape features such as hedgerows or treelines or surface water pathways to any NHA/pNHA.

There is no likelihood of impacts on NHAs/pNHAs given the nature and scale of the project, the localised nature of any likely impacts and the distance between the Site and the NHAs/pNHA. Therefore, NHAs/pNHAs are scoped out and excluded from any further consideration in this chapter.

5.3.2 Habitats

Habitats present within the Site are described in this section. A habitat map for the Site is presented at **Annex 5.2**. Photographs of the sites are provided as plates at **Annex 5.3 (Volume II)**.

Improved agricultural grassland GA1

The dominant habitat type within the Site is improved agricultural grassland used for cattle grazing (**Plate 1**). Plant species recorded within this habitat include sweet-venal grass *Anthoxanthum odoratum*, Yorkshire fog *Holcus lanatus*, meadow buttercup *Ranunculus acris*, creeping buttercup *Ranunculus repens*, clover *Trifolium* sp., daisy *Bellis perennis*, dandelion *Taraxacum officinale* agg. and ribwort plantain *Plantago lanceolata*.

Small isolated areas of more disturbed grassland contained frequently occurring dock *Rumex obtusifolius*, nettle *Urtica dioica* and common ragwort *Senecio jacobaea*. In areas close to the Knockardagur stream, soft rush *Juncus effuses* was the dominant species.

This habitat type is species-poor, and commonly occurring throughout Ireland. This habitat is evaluated as not important and, as a result, is scoped out and not considered further in this chapter.

Hedgerows WL1

There is approximately 712 m of hedgerows within the Site (**Plate 2**). Hedgerows border the western and southern boundaries and are present along the Knockardagur stream, bisecting the Site from east to west.

Hedgerows are dominated by hawthorn *Crataegus monogyna*, blackthorn *Prunus spinosa*, willow *Salix* sp., holly *Ilex aquifolium*, gorse *Ulex europaeus* and bramble *Rubus fruticosus* agg. Several mature beech *Fagus sylvatica* and ash *Fraxinus excelsior* trees are also present in the hedgerows.

Hedgerows within the Site are associated with dry drainage ditches.

The dry drainage ditches are vegetated with species such as lesser stitchwort *Stellaria graminea*, bush vetch *Vicia sepium*, bluebell *Hyacinthoides non-scripta*, common mouse-ear *Cerastium fontanum* and herb Robert *Geranium robertianum*.

Hedgerows within the Site are species poor, overgrown, lack a dense base and are

gappy. The hedgerows within the Site are connected to the wider network of hedgerows in the surrounding area. The hedgerows provide ecological connectivity between the Site and the surrounding landscape. Hedgerows within the Site are evaluated as important at the Local level.

Eroding/upland river FW1

The Knockardagur stream is classified as an Eroding/Upland River (FW1) (see **Volume II, Annex 5.3, Plate 3**). The stream rises approximately 10 m south of the substation footprint and flows in a westerly direction to meet the Owenbeg (Owveg) River, approximately 1.4 km east of the Site.

During the field survey in April 2020, water levels in the stream were extremely low with no apparent flow and water present only in muddy or rocky puddles. The substrate in this watercourse is varies between mud and gravel. Given the absence of flow within the stream during the field survey, it is considered that the presence of water is highly dependent on prevailing weather conditions and is only likely to contain flow following rainfall events.

The Knockardagur stream connects to watercourses downstream of the Site and provides connectivity with the River Barrow and River Nore SAC. This habitat within the Site is evaluated as important at the Local level.

5.3.3 Species

5.3.3.1 Rare and Protected Species

The NBDC database was searched for records of rare and/or protected species within the 2 km grid square S58B within which the Site is located. One record was returned for little egret *Egretta garzetta*. Little egret is listed on Annex I of the EU Birds Directive and is green-listed on BoCCI. There was no evidence of little egret recorded during field surveys carried out at the Site and habitats within the Site are unsuitable for this wetland species.

The absence of records of species from the NBDC database does not necessarily imply that a species does not occur within the search area, rather it has not formally been recorded as present. However; there was no evidence of other rare or protected species recorded during the field survey and the habitats present are not likely to support protected species.

5.3.3.2 Amphibians

Common frog *Rana temporaria* and smooth newt *Lissotriton vulgaris* are protected under the Wildlife Acts 1976 to 2018. Species protected under the Wildlife Act are those listed on Schedule 5. Since the publication of the Wildlife Act 1976, the list of Schedule 5 species has been extended through the publication of Wildlife Act 1976 (Protection of Wild Animals) Regulations in 1980 and 1990. Common frog and smooth newt were added to the Wildlife Act 1976 by regulations made in SI 282/1980.

During the field survey, no evidence of amphibians was recorded and no habitat suitable for breeding amphibians was noted. Drainage ditches and the Knockardagur stream were dry, offering no suitable amphibian habitat.

Therefore, it is considered that the proposed development will not result in any effect on the amphibian population of the Site. Amphibians can therefore be scoped out of further consideration in this chapter.

5.3.3.3 Birds

Bird species recorded during the site visit include wood pigeon *Columba palumbus*, hooded crow *Corvus cornix*, magpie *Pica pica*, robin *Erithacus rubecula*, blackbird *Turdus merula*, song thrush *Turdus philomelos* and chaffinch *Fringilla coelebs*. All species recorded during the field visit are commonly occurring, widespread in Ireland and are all Green-listed (least concern) species on BoCCI. The bird assemblage of the Site would be evaluated as important at the Site level.

5.3.3.4 Mammals

Bats

All species of bat occurring in Ireland are protected under the Annex IV of EU Habitats Directive, which is transposed into Irish law through the EC (Birds and Natural Habitats) Regulations 2011 - 2015. Bats are also protected under the Wildlife Acts 1976 - 2018. Under this legislation, it is an offence to intentionally kill or injure a bat or intentionally destroy or disturb a breeding place or resting place.

Potential roost features (PRFs) that may be used by bats, in the form of splits, rot holes and butt rot, were noted in mature ash trees within the hedgerow immediately south of the footprint of the proposed substation. These roost features were inspected from ground level and were assessed as moderate suitability for roosting bats (Collins, 2016). In addition, hedgerow habitats within the Site are considered to be moderately suitable for foraging and commuting bats (Collins, 2016). The bat population using the Site is evaluated as important at the Local level.

Otter

Otter *Lutra lutra*, and their breeding and resting places, are protected under the Wildlife Acts. Otter are also listed in Annex II and Annex IV of the EU Habitats Directive.

The Knockardagur stream and drainage ditches within the Site were inspected for signs of otter during the site visit. There was no evidence of otter present and neither the drainage ditches nor the stream offers suitable habitat to support foraging, commuting or breeding otter. Therefore, otter is scoped out and not considered further within this chapter.

Other Mammals

During the field survey, no evidence of the presence of other mammals, such as badger *Meles meles*, were noted within the Site. Due to the intensively farmed nature of the Site, there is not likely to be usage of the Site by mammals for breeding. While mammals such as badger may occasionally use the Site for foraging, there were no signs of this noted during the site visit. Therefore, due to lack of suitable breeding and foraging habitats within the Site, other mammals, such as badger, are excluded from further consideration in this chapter.

5.3.3.5 Invasive Species

The NBDC database was searched for records of non-native invasive species listed under the Third Schedule of the European Communities Regulations 2011 (as amended) (S.I. 477 of 2015) within the 2 km grid square S58B within which the Site is located. No records were returned.

There was no evidence of any invasive species recorded during the walkover survey carried out at the Site and invasive species are excluded from further consideration

within this chapter.

5.3.4 Summary of Important Ecological Features

The ecological features to be carried forward for detailed assessment are summarised in **Table 5.1** below.

Ecological Feature	Scale at which the feature is important	Comments on Legal Status and/or Importance
Natura 2000 sites	International	SACs and SPAs are designated under the EU Habitats Directive and EU Birds Directive. The River Barrow and River Nore SAC 002162 is included for detailed assessment due to its indirect connection to the Site and the discharge of surface water from the Site to the Knockardagur stream.
Hedgerows	Local	This habitat provides connectivity with hedgerows in the surrounding landscape.
Eroding/upland rivers	Local	The Knockardagur stream provides connectivity to watercourses downstream of the Site including the River Barrow and River Nore SAC.
Bats	Local	All species of bat occurring in Ireland are protected under the Annex IV of EU Habitats Directive and the Wildlife Acts 1976 - 2018. Habitats within the Site are suitable for foraging, commuting and roosting bats.

Table 5.1: Summary of Important Ecological Features

5.4 Description of Likely Effects

The iterative design process applied to the development has incorporated a series of design principles, good practice environmental and pollution control measures in line with current industry good practice guidance and 'designed-in' mitigation.

- An outline Construction Environmental Management Plan (CEMP) has been prepared and incorporates site specific environmental protection and pollution prevention measures;
- A site specific surface water drainage design, incorporating the principles of Sustainable Drainage Systems (SuDS), has been prepared for the development. The design includes surface water drainage infrastructure to ensure that deleterious matter will not be discharged to the Knockardagur Stream;
- The lighting design for the development has minimised the number of lamp posts/lights in order to minimise light pollution and light intensity. The proposed lamp posts/lights are cowled to ensure that adjacent vegetation is not illuminated. The substation lighting will only be used when maintenance personnel are present;
- Landscaping measures are incorporated into the design of the proposed development. These are listed in full in **Chapter 9** of this EIAR and include features to minimise loss of biodiversity on-site. Such measures include the following:-
 - Any hedgerows that are to be retained will be protected from damage during construction;
 - The hedgerows will be planted atop the embankment along the northern

and eastern boundaries of the proposed substation. The hedgerow species will reflect the species composition of hedgerows being removed and those being retained;

- The hedgerows along the southern and western boundaries of the proposed substation will be retained and will be supplemented by additional planting as appropriate; and
- Hedgerows within the Site will be managed post-construction to maintain a height of approximately 3-4 m.

Taking the above into account, the principal likely effects of the proposed development are outlined in the following sections.

5.4.1 Do Nothing Impact

In the absence of the proposed development, it is likely that current agricultural activities within the Site will continue and the Do-Nothing Impact will result in no significant change in the ecological interest of the Site.

5.4.2 Likely Effects

5.4.2.1 Natura 2000 Sites

An Appropriate Assessment Screening Report and NIS has been prepared to provide the information necessary for the competent authority, in this case An Bord Pleanála, to undertake an appropriate assessment of the proposed development. The NIS considers that the proposed development, either individually or in combination with other plans or projects, will not have an adverse effect on the integrity of the River Barrow and River Nore SAC.

As per EPA draft Guidance (2017), "a biodiversity section of an EIAR, should not repeat the detailed assessment of potential effects on European sites contained in a Natura Impact Statement" but should "incorporate their key findings as available and appropriate". This section provides a summary of the key findings with regard to the River Barrow and River Nore SAC.

Construction Phase

The proposed development is not located within the River Barrow and River Nore SAC and will not directly impact on this Natura 2000 site. However, surface water run-off during the construction phase will be discharged to the Knockardagur stream and has the potential to indirectly affect the SAC.

The proposed surface water drainage infrastructure, as described in the SWMP, has been designed with regard to greenfield runoff rates and volumes. The surface water drainage system will mimic these rates and is sufficient to accommodate a 1-in-100 year rainfall event. Therefore, no changes to the flow regime are anticipated and effects from hydrological changes are not considered likely.

There is potential, in the absence of mitigation and good working practices, for the discharge of surface water to affect water quality within the Knockardagur stream during construction and subsequently, the SAC. The discharge of contaminated surface water (silt/sediment laden runoff, hydrocarbons, cementitious water) to the existing surface water network has the potential to cause negative effects through the deterioration of water quality, increases in siltation or suspended solids, changes in water chemistry and reduction in habitat.

The following key aquatic species and habitats of the River Barrow and River Nore SAC were identified as being at risk from a deterioration in water quality:-

- Water courses of plain to montane levels with the Ranunculion fluitantis and Callitriche-Batrachion vegetation [3260];
- *Austropotamobius pallipes* (White-clawed Crayfish) [1092];
- *Petromyzon marinus* (Sea Lamprey) [1095];
- *Lampetra planeri* (Brook Lamprey) [1096];
- *Lampetra fluviatilis* (River Lamprey) [1099];
- *Alosa fallax* (Twaite Shad) [1103];
- *Salmo salar* (Salmon) [1106];
- *Margaritifera margaritifera* (Freshwater Pearl Mussel) [1029]
- *Margaritifera durrovensis* (Nore Pearl Mussel) [1990].

The proposed development is not likely to affect any other features of interest associated with SAC due to the nature and/or distribution of these features of interest within the SAC. The effect on the water quality of the SAC arising from the construction phase, in the absence of mitigation, is likely to be significant at an International (European) level.

Operational Phase

During the operational phase, there is no potential for direct impacts on the River Barrow and River Nore SAC. However, the discharge of surface water from the completed development to the Knockardagur stream has the potential to indirectly affect the SAC.

There will be no storage of oils/fuels/lubricants outside of the substation building and therefore there is no risk to surface water quality from hydrocarbon/chemical spillage during the operational phase. Stormwater, arising from the transformer area and car park areas will be discharged to the Knockardagur Stream via a soakaway (and oil interceptor) to an existing agricultural drain to the west of the Site. Stormwater discharge will be limited to greenfield runoff rates and volumes. The incorporation of these design measures is sufficient to prevent any effects due to stormwater runoff during the operational phase.

Decommissioning Phase

As set out at **Chapter 3 (Sections 3.2 and 3.8)**, the proposed development will form part of the national electricity network and decommissioning of the substation is not proposed. Therefore, decommissioning phase effects will not occur.

5.4.2.2 Hedgerows

Construction Phase

A short section of the hedgerow running from east to west along the southern perimeter of the proposed substation will be removed to facilitate construction of the proposed access track. Similarly, a short section of hedgerow along the southern perimeter of the Site boundary will also require removal to accommodate the construction of the proposed site entrance. The progressive reinstatement and landscaping of the site will remediate any short term adverse effects on hedgerows within and bordering the Site. Therefore, the effect of the loss of hedgerow would be significant at the Site level.

Operational Phase

Hedgerow planting around the perimeter of the proposed development will be implemented during the operational phase resulting in an overall net gain in hedgerow habitats within the Site over the medium term.

Decommissioning Phase

As set out at **Chapter 3 (Sections 3.2 and 3.8)**, the proposed development will form part of the national electricity network and decommissioning of the substation is not proposed. Therefore, decommissioning phase effects will not occur.

5.4.2.3 Knockardagur stream

Construction Phase

The proposed surface water drainage infrastructure has been designed to prevent any changes to the flow regime within the Knockardagur stream. There will be no discharge of wastewater effluent on-site and the proposed development is not likely to generate emissions other than surface water runoff.

The discharge of surface water from the Site during the construction phase is not likely to affect water quality downstream due to the incorporation of environmental protection measures in the drainage design for the development. Measures to protect water quality will be put in place before site clearance works commence. There will be no significant effect on the water quality of the Knockardagur stream during the construction phase of the development.

Operational Phase

Stormwater will be treated prior to discharge to the Knockardagur stream and will be limited to greenfield runoff rates and volumes, ensuring no adverse water quality effects within the local stream. With these measures incorporated into the drainage design, there will be no significant effect due to stormwater runoff during the operational phase.

Decommissioning Phase

As set out at **Chapter 3 (Sections 3.2 and 3.8)**, the proposed development will form part of the national electricity network and decommissioning of the substation is not proposed. Therefore, decommissioning phase effects will not occur.

5.4.2.4 Bats

Construction Phase

Hedgerows within the Site were evaluated as moderately¹⁴ suitable for foraging and commuting bats. The loss of small sections of hedgerow to facilitate access is not likely to affect foraging and commuting bats' use of these hedgerows. Construction activities associated with the project will be temporary and will largely take place during daylight hours when foraging and commuting bats are absent.

Trees within the hedgerow south of the proposed substation footprint contain PRFs of moderate suitability for roosting bats. A number of these trees will be removed to facilitate the construction of the proposed access track. The effect on the bat population of the loss of short sections of some hedgerows and the loss of trees with PRFs would be significant at the Townland level.

Operational Phase

The proposed hedgerow planting will, in the medium term, once established provide replacement foraging and commuting habitat for bats. The majority of maintenance works at the Site will be undertaken during daytime hours. However,

¹⁴ Criteria used for evaluation is from Bat Conservation Trust (BCT) 2016 guidance

occasionally emergency works may be required during night-time hours. Artificial lighting for the development will only be used when maintenance personnel are present at night. Lighting has been designed to incorporate measures to avoid light spill in to surrounding vegetation. The effects on bats during the operational phase will not be significant.

Decommissioning Phase

As set out at **Chapter 3 (Sections 3.2 and 3.8)**, the proposed development will form part of the national electricity network and decommissioning of the substation is not proposed. Therefore, decommissioning phase effects will not occur.

5.5 Mitigation Measures

5.5.1 Natura 2000 Sites

The Surface Water Management Plan (SWMP) and detailed drainage design for the development incorporates a large number of tried and tested measures that are used as standard by industry for protection of water quality. The design and mitigation measures are set out in detail in the SWMP but can be summarised as measures to prevent sediment release to surface water features during the construction phase of the development. The SWMP standard measures also include regulation of flow to prevent scouring and allow settlement of sediment to occur.

Erosion and sediment control will be put in place to protect the Knockardagur stream before commencement of any site clearance and earthworks. Exposed soil is to be kept to a minimum throughout construction to further reduce risk of sediment release during rainfall events. Vegetation cover will be re-established as soon as practical on all areas where soil has been exposed. Erosion and sediment controls will be monitored and maintained on a continuous basis throughout the construction phase.

5.5.1.1 Construction Phase

Measures to be employed during the construction phase to prevent the transport of deleterious substances to the Knockardagur stream and potentially downstream to the River Barrow and River Nore SAC are as follows:

- Surface water will pass through interception, such as silt traps, to ensure suspended solids will not reach any watercourses;
- Silt traps/settlement ponds and temporary interceptors and traps will be put in place on site prior to any site clearance/earthworks and will be used until such time as permanent facilities are constructed;
- All fuels, lubricants and hydraulic fluids will be kept in secure bunded areas, within the permitted Pinewoods Wind Farm construction compound, away from watercourses. The bunded area will accommodate 110% of the total capacity of the containers within it;
- Containers will be properly secured to prevent unauthorised access and misuse. An effective spillage procedure will be put in place and spill kits provided with all staff properly briefed and trained;
- Any waste oils or hydraulic fluids will be collected, stored in appropriate containers and disposed of offsite in an appropriate manner;
- Fuelling and lubrication will not be conducted within 50 m of any surface water feature including the Knockardagur stream;
- Attenuation ponds have been designed to accommodate Greenfield runoff rates + 20% for climate change.

Measures specific to protection of water quality for freshwater pearl mussel

These measures have been included to further reduce any risk of effects on water quality during the construction phase. The specific measures are as follows:-

- The measures described in Altmüller and Dettmer (2006) to protect water quality within freshwater pearl mussel catchments have been adapted for the proposed development and are incorporated in the SWMP. It is not proposed to adopt the measures in full but, instead, to adapt and implement them in accordance with the characteristics of the Site; and
- Disturbed Sediment Entrainment Mats - SEDIMATS (see http://www.hytex.co.uk/ht_bio_sed.html) will be used in the Knockardagur stream. These will be installed according to the manufacturer's instructions at suitable locations along the stream.

In advance of any works taking place, the appointed contractor will be required to finalise the CEMP and provide site-specific Method Statements detailing specific measures to protect the surface water drainage network. The final CEMP, along with the SWMP, will be submitted to and agreed with the Planning Authority.

5.5.1.2 Operational Phase

The following surface water protection measures will be implemented to avoid effects from hydrocarbon/chemical spillage:-

- All storage containers will be labelled appropriately, including hazardous markings;
- All holding tanks will be constructed of material appropriate for fuel/chemical storage and will be bunded to at least 110% of the maximum tank volume or 25% of the total capacity of all the tanks within the bund, whichever is greatest;
- Bunds will be to standard specified in CIRIA Report 163 '*Construction of bunds for oil storage tanks*' and CIRIA Report C535 '*Above-ground proprietary prefabricated oil storage tank systems*';
- Barrels and bunded containers will be stored upright and internally where appropriate and always on drip trays or sump pallets;
- Appropriate spill kits will be available at all storage locations;
- All fuel/chemical storage facilities will be subject to weekly inspection; and,
- Leaking or empty drums will be removed from the Site immediately and disposed of via a registered waste disposal contractor.

5.5.1.3 Decommissioning Phase

As set out at **Chapter 3 (Sections 3.2 and 3.8)**, the proposed development will form part of the national electricity network and decommissioning of the substation is not proposed. Therefore, no decommissioning phase mitigation measures are required.

5.5.2 Hedgerows

The loss of small sections of hedgerow during the construction phase will be mitigated by the 'designed-in' measures outlined in **Section 5.4**. These measures involve replanting and, where appropriate, the bolstering or reinforcing of existing hedgerows. There are no further mitigation measures proposed or required for the construction, operation and decommissioning phases.

5.5.3 Eroding/upland river

The protection of water quality during the construction phase will be addressed by the incorporation of surface water management measures, as outlined in **Sections**

5.5.1 and **5.5.1.1**, into the design of the development. These measures are tried and tested and are used as standard by industry for protection of water quality. These measures prevent sediment release to surface water features along with regulation of flow to prevent scouring and allow settlement of sediment to occur. There are no further mitigation measures proposed or required for the construction, operation and decommissioning phases.

5.5.4 Bats

5.5.4.1 Construction Phase

Bats are highly mobile animals that use a number of roost sites within and between years. Bats use different parts of the tree for different reasons, depending on the time of year and temperature. Trees identified with Potential Roost Features (PRF) during the site visit in April 2020 will be clearly marked and at pre-construction stage these trees be visually inspected from the ground, as a minimum, during the daytime to check for signs of use by bats and to reevaluate their suitability for bats. This inspection and evaluation will be informed by the findings of the survey work in April 2020. The trees will be inspected by a suitably qualified and experienced ecologist sufficiently in advance of felling so that there is sufficient time to seek a derogation licence, if required, in advance of felling. The appointed ecologist will also advise on the need, if any, for additional pre-construction bat surveys based on the findings of their daytime inspection.

In the event that bats are present, or it is clear that the tree is used by roosting bats, in a tree to be removed, a derogation licence will be obtained from the NPWS prior to tree removal. The licence application would be supported by a Method Statement detailing appropriate measures to ensure no bat is harmed during the felling of the trees. Mitigation measures for the loss of the roost would also be provided. All of the trees will be visually inspected again within 48 hours of tree removal and removal will be carried out under the supervision of the ecologist named on the derogation licence.

5.5.4.2 Operational Phase

Other than 'designed-in' measures relating to hedgerow planting and lighting, as described in **Section 5.4**, no specific mitigation measures are proposed for the operational phase.

5.5.4.3 Decommissioning Phase

As set out at **Chapter 3 (Sections 3.2 and 3.8)**, the proposed development will form part of the national electricity network and decommissioning of the substation is not proposed. Therefore, no decommissioning phase mitigation measures are required.

5.6 Residual Effects

5.6.1 Construction Phase

With 'designed-in' measures in place and with the implementation of mitigation measures, as detailed above, residual effects during the construction phase of the proposed development will not be significant.

5.6.2 Operational Phase

With 'designed-in' measures in place and with the implementation of mitigation measures, as detailed above, residual effects during the operational phase of the proposed development will not be significant.

5.6.3 Decommissioning Phase

As set out at **Chapter 3 (Sections 3.2 and 3.8)**, the proposed development will form part of the national electricity network and decommissioning of the substation is not proposed. Therefore, residual decommissioning phase effects will not occur.

5.7 Cumulative Effects

Cumulative effects can result from individually insignificant but collectively significant actions taking place over a period of time or concentrated in a location. Cumulative effects can occur where a proposed development results in individually insignificant impacts that, when considered in-combination with impacts of other proposed or permitted plans and projects, can result in significant effects (CIEEM, 2018).

The following plans and projects, located within the 2 km zone of influence and identified in **Chapter 1**, were reviewed for the likelihood of in-combination effects with the proposed development:-

- Pinewoods Wind Farm;
- Laois-Kilkenny Grid Reinforcement Project;
- Laois County Development Plan 2017-2023; and
- Laois County Council planning portal was accessed to examine planning applications in the vicinity of the Site.

5.7.1 Pinewoods Wind Farm

The permitted Pinewoods Wind Farm was reviewed to evaluate the likelihood of cumulative biodiversity effects arising. The construction, operation and decommissioning of the Pinewoods Wind Farm was subject to EIA and AA and is not likely to result in any significant residual effects on the ecological environment.

5.7.2 Laois-Kilkenny Grid Reinforcement Project

The permitted Laois-Kilkenny Grid Reinforcement Project will reinforce the network in the Laois-Kilkenny region through the development of a new transmission line between the two counties. The EIA for the project concluded that, with appropriate mitigation and good practice, ecological impacts of the project are likely to be imperceptible. In addition, the NIS determined the project would not adversely affect the integrity of the River Barrow and River Nore SAC, in view of the site's conservation objectives.

5.7.3 Laois County Development Plan 2017-2023;

There are no strategies or objectives in the County Development Plan that are likely to result in significant effects when considered in-combination with the proposed development.

5.7.4 Projects on Laois County Council Planning Portal

Planning applications within 2 km of the Site typically consist of single rural dwellings, extensions to dwellings and small agricultural developments and are not considered likely to result in any significant effects when considered in-combination with the proposed development.

5.7.5 Assessment of Cumulative Effects

The likelihood of the proposed development interacting with other plans and projects resulting in cumulative effects on water quality within the Knockardagur

stream, the Owenbeg (Owveg) River and hence, the River Barrow and River Nore SAC is considered. The proposed development includes a range of measures to ensure all surface water runoff generated during construction, operation and decommissioning is comprehensively attenuated such that no silt or sediment laden waters or any deleterious material is discharged to the local drainage system. The implementation of these measures ensures that there is no likelihood of significant cumulative effects on any downstream receptors, in combination with other plans or projects.

The proposed development will not result in any significant residual effects on any habitats or species. With 'designed-in' measures in place and with the implementation of the mitigation measures provided, it is not considered likely that the proposed development will result in cumulative effects on any habitats or species.

Taking into consideration the reported residual effects of other plans and projects within the zone of influence and the residual effects of the proposed development, no cumulative effects have been identified with regard to any ecological receptor.

5.8 Summary

The following table presents important ecological features which have been identified as likely to be affected by the proposed development; identifies the impacts which are assessed as likely to occur and outlines the residual impacts predicted to occur following the implementation of mitigation measures. Residual impacts on these features are at the lower end of the significance spectrum and range from 'none' to 'slight-negative'.

Ecological Features	Predicted Effects	Mitigation Measures	Residual Effects
Natura 2000 Sites	Surface water runoff during construction, operation & decommissioning may cause a deterioration of water quality in the Knockardagur Stream & hence the River Barrow & River Nore SAC.	Surface water protection measures to ensure runoff is comprehensively attenuated such that no silt or sediment laden waters or any deleterious material is discharged to the local drainage system or the SAC.	No significant residual effects.
Hedgerows	There will be no significant effect on hedgerows.	The mitigation is 'designed-in'.	No significant residual effects.
Eroding/upland river	Surface water runoff during construction, operation & decommissioning may cause a deterioration of water quality in the Knockardagur Stream & the downstream aquatic environment.	Surface water protection measures to ensure runoff is comprehensively attenuated such that no silt or sediment laden waters or any deleterious material is discharged to the local drainage system.	No significant residual effects.
Bats	There will be no	A pre-construction	No significant

	<p>significant effect on bats due to 'designed-in' measures relating to landscaping and lighting design.</p> <p>The loss of some sections of hedgerow and the potential loss of trees containing PRFs would be significant at the Townland level.</p>	<p>inspection of trees to be removed.</p> <p>In the event that bats are present in one, or more, of the trees then, a bat derogation licence will be required prior to tree removal.</p>	<p>residual effects.</p>
--	---	--	--------------------------

Table 5.2: Summary of impacts, mitigation and residual impacts on Important Ecological Features

References

- Altmüller, R., & Dettmer, R. (2006). Successful species protection measures for the freshwater pearl mussel (*Margaritifera margaritifera*) through the reduction of unnaturally high loading of silt and sand in running waters. *Inform. D. Naturschütz Niedersachs*, 26(4), 192-204.
- Colhoun, K. & Cummins, S. (2013). *Birds of Conservation Concern in Ireland 2014–2019*. *Irish Birds* 9: 523-544.
- CIEEM (2018). *Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater and Coastal*. Chartered Institute of Ecology and Environmental Management.
- Collins, J. (Ed.). (2016). *Bat surveys for professional ecologists: good practice guidelines*. Bat Conservation Trust.
- Ecofact (2017) *Pinewoods Wind Farm Natura Impact Statement*.
- Fossitt J.A. (2000). *A Guide to Habitats in Ireland*. Published by The Heritage Council, Kilkenny.
- Galetech Energy Services (2016) *Environmental Impact Statement Volumes I & II on behalf of Pinewood Wind Ltd in relation to Pinewoods Wind Farm*.
- IFI (2016) *Guidelines on Protection of Fisheries during Construction Works in and Adjacent to Waters*. Inland Fisheries Ireland.
- Kettunen, M., Terry, A., Tucker, G., & Jones, A. (2007). *Guidance on the maintenance of landscape connectivity features of major importance for wild flora and fauna. Guidance on the implementation of Article, 3*.
- Laois County Council (2017) *Laois County Development Plan 2017- 2023. Volume 1 – Written Statement*.
- Marnell, F., N. Kingston & D. Looney (2009) *Ireland Red List No. 3: Terrestrial Mammals*. National Parks and Wildlife Service.
- Parnell J. and Curtis T. (2012). *Webb's An Irish Flora (8th edition)*. Cork University Press
- Pinewoods Wind Ltd. (2017a) *Pinewoods Wind Farm, Ballinakill Co. Laois: Preliminary Construction Environmental Management Plan (CEMP)*.
- Pinewoods Wind Ltd. (2017b) *Pinewoods Wind Farm, Ballinakill, Co. Laois: Surface Water Management Plan (SWMP)*.
- Pinewoods Wind Ltd. (2020) *Pinewoods Substation and Grid Connection: Surface Water Management Plan (SWMP)*.
- SLR Consulting (2020) *Appropriate Assessment Screening Report & Natura Impact Statement: Pinewoods Wind Substation*

Websites

- An Bord Pleanála <http://www.pleanala.ie/>
- Bing Maps <https://www.bing.com/maps>
- BirdWatch Ireland <https://birdwatchireland.ie/>
- EPA Mapping <http://gis.epa.ie/>
- Google Maps <https://www.google.ie/maps>

Laois Planning Portal <http://www.eplanning.ie/LaoisCC/searchtypes>

NPWS <https://www.npws.ie/protected-sites>

NBDC <https://maps.biodiversityireland.ie/>