MWP

Chapter 06 - Biodiversity

Ballynisky Wind Farm

Ballynisky Green Energy Ltd.

December 2025

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6. Biodiversity

6.1 Introduction

This chapter of the Environmental Impact Assessment Report (EIAR) considers any potential effects on Biodiversity (excluding Ornithology) which may arise from the proposed construction, operation and eventual decommissioning of a six-turbine wind energy development and connection to the National Grid. A full description of the proposed development, development lands and all associated project elements is provided in Chapter 03 Description of the Proposed Development of this EIAR.

This chapter does not include Ornithology, which is addressed in Chapter 07 Ornithology of this EIAR.

This chapter considers potential impacts and effects on biodiversity arising from the proposed development. The assessment comprises:

- A review of the existing receiving environment;
- Prediction and characterisation of likely impacts;
- Evaluation of effects significance; and
- Consideration of mitigation measures, where appropriate.

This chapter is supported by baseline ecology reports and other documentation included as several appendices within Volume III of the EIAR The full suite of Appendices attached to this chapter are as follows:

- Appendix 6A Photographic Plates;
- Appendix 6B Evaluation of Ecological Resources & Significance of Impact;
- Appendix 6C Aquatic Survey Report (MWP, 2022);
- Appendix 6D Bat Survey Report (Eire Ecology, 2024 including Addendum 6D-1);
- Appendix 6E Marsh Fritillary Report (RSK Biocensus, 2025); and
- Appendix 6F Biodiversity Enhancement Management Plan (BEMP).

A Screening for Appropriate Assessment (AA) report and a Natura Impact Statement (NIS) report which consider any potential impacts of the proposed development on the integrity of the relevant Natura 2000 site(s), either alone or in combination with other plans or projects, with respect to the Conservation Objectives of the Natura 2000 sites in question, have been prepared as standalone documents which are submitted with the planning application. The Screening has taken into account 'standard features', i.e., all constituent elements of that project inherent in it/elements that are incorporated into a project's design not with the aim of reducing its negative effects including where these have the effect of reducing harmful effects on a Natura 2000 site. This means that 'measures/features' incorporated into a project design not aiming directly to reduce negative effects (i.e., are good practice/industrial standard/make sense practically but do have the effect of reducing impacts on Natura 2000 sites) can be used to determine the outcome of the screening.

6.1.1 Proposed Development

Refer to Chapter 03 Description of the Proposed Development for a detailed description of the proposed development. An outline of the development for which planning permission is sought in the planning application (the proposed development) consists of the following core elements:

- Six (6) wind turbines with a tip height of 158m, a rotor diameter of 136m and all associated foundations and hardstanding areas.
- A 38kV on-site substation compound containing a substation building, associated electrical equipment and transformers with separate client side and ESB entrances. The building will contain a control room, switchgear room, ESB room and storeroom.
- Underground electrical and communications cabling between the wind turbines and the new on-site substation.
- Grid Connection Option A: 2.54km-long 38kV underground cable connection from the new on-site substation to the existing Carrons substation to the west of the site.
- Grid Connection Option B: Loop into the existing 38kV overhead line via the proposed new 38kV substation.
- A new temporary site entrance off the L1219 local road to the west of the permanent site entrance for the construction phase only.
- Upgrade of an existing farm entrance and access track off the L1219 local road in the northwest of the site to serve as a permanent site entrance for the wind farm when operational.
- Approximately 3.4km of new site access tracks with associated turning areas and drainage. This includes approximately 490m of temporary access tracks which will be reinstated following construction.
- Upgrade of approximately 470m of existing site access tracks.
- A 9m-long clear span bridge crossing of the Ahacronane River by an internal site access track to the northwest of turbine T1 and an associated 1.5m x 1.0m relief culvert.
- A permanent meteorological mast with a height of 90m, a foundation and hardstand.
- Two (2) material storage areas with a total capacity of approximately 39,300m^3.
- A temporary construction compound with an area of approximately 1,375m^2.
- All associated site development works, including drainage, diversion or undergrounding of low voltage powerlines, landscaping and revegetation.

Other Associated project components assessed in this EIAR but for which planning permission is not being sought within the current application include:

- Temporary works which may be required on sections of the public road network along the turbine delivery route such as hedge/tree cutting, relocation of powerlines/poles, lampposts, signage and road widening where required.

6.1.2 Grid Connection

There are two proposed routes and associated connection point options for connecting the proposed Ballynisky Wind Farm to the National Grid considered in the EIAR as shown in Figure 3-2 and described in the following subsections. The chosen grid connection option to the National Grid will be determined by ESB/Eirgrid to consist of either Option A or Option B

6.1.2.1 Grid Connection - Option A

To connect the proposed wind turbines to the National Grid, approximately 2.54km of 38kV underground electrical cable will be installed to link the new substation to an existing off-site substation at Carrons Wind Farm. The cable will run along the L1219 Local Road extending westwards before turning southwards through private lands before connection to Carrons Wind Farm substation.

Laying of underground cabling will require trenching in accordance with standard ESB Networks requirements, to a typical depth of approximately 1.2m and width of 0.60m, insertion of ducting, backfilling of trenches and subsequent pulling of cable (typically 400mm^2 XLPE insulated cable). Trenching and surface finishing will be completed in accordance with '*Guidelines for Managing Openings in Public Roads*'[1] as discussed with Limerick City and County Council (LCCC). A typical cable trench detail is provided in Drawing 22569-MWP-00-00-DR-C-5415.

Cable trenching in the public road will be carried out within the road edge. This will be done under the terms of road opening licences from Limerick City and County Council. Road closure applications may also be required. All works will be planned and undertaken in full consultation with Limerick City and County Council, in particular the Roads Department and the Roads Engineer for the area.

6.1.2.2 Grid Connection - Option B

This connection route and connection point consists of an underground electrical cable running through private lands along the proposed new access track within the townland of Graigoor, extending north eastwards to the proposed new 38kV substation.

This proposed connection route will loop into an existing 38kV overhead line that transects the site before continuing to the 110kV substation in Rathkeale. To facilitate this loop-in connection to the proposed new 38kV substation, the existing electricity line will be terminated at two poles to the south of the proposed location of the new Meteorological Mast. The line will then be routed underground to the substation and back out to reconnect with the overhead line.

As outlined above, laying of underground cabling will require trenching in accordance with standard ESB Networks requirements, to a typical depth of approximately 1.2m and width of 0.60m, insertion of ducting, backfilling of trenches and subsequent pulling of cable (typically 400mm^2 XLPE insulated cable). All aforementioned works are also encompassed within the proposed red line boundary.

6.1.3 Watercourse Crossings

The network of internal site tracks will require the crossing of one watercourse, namely the Ahacronane River. Two watercourses will require crossing for the grid connection route Option A, namely Creeves Stream and Knockardnacorlan River, while there are no watercourse crossings required for grid connection route Option B.

[1] guidelines-for-managing-openings-in-public-roads.pdf Accessed: 19th September 2025

The location of each watercourse crossing and the expected crossing methodologies for each are summarised in Table 6-1, below, with further details provided in Chapter 03 Description of Proposed Development in Volume II of the EIAR.

All crossings will be in accordance with this application and/or conditions attached to a grant of planning permission and agreed with the Office of Public Works (OPW) and Inland Fisheries Ireland (IFI) prior to construction. No in-stream works will be necessary for any of the watercourse crossings.

Table 6-1. Summary of watercourse crossings required to install infrastructure of proposed development.

Watercourse	Infrastructure to cross watercourse	Crossing methodology	ITM coordinates of crossing
Ahacronane River	Internal site service track	9-m-long clear span bridge	529753, 643274
Creeves Stream	Grid connection cable – Option A	Horizontal directional drilling	528553, 643979
Knockardnacorlan River	Grid connection cable – Option A	Horizontal directional drilling	527662, 644377

6.1.3.1 Internal Access Track

A clear span bridge will be constructed where the internal site access track crosses the Ahacronane River northwest of the proposed T1 location. On the approach to the proposed crossing, the new internal access track will be raised above existing ground levels up to flood level. The bridge will consist of a 9-metre-long deck of precast concrete beams with an *in-situ* concrete slab poured on top. The deck will sit on *in-situ* concrete abutments pushed back from the riverbank, and edge protection for vehicles and pedestrians will be provided.

The deck soffit will allow for a 310-mm freeboard ensuring the capacity of the bridge to operate should a 1-in-100-year flooding event occur. Bridge construction will require installation of a temporary crane hardstanding area adjacent to the bridge that will be reinstated after installation is completed. Cable ducting will be installed within the bridge structure and no in-stream works will be required.

Additionally, a flood relief culvert will be constructed under the site access track approximately 24m south of the southern riverbank within the Ahacronane River floodplain. A precast box culvert will be used to create a conduit with a width of 1.5m and a height of 1m while the culvert's base will be set a minimum of 300mm below existing ground levels before being reinstated with spoil and topsoil. Cable trenching will be installed in a trench adjacent to the site access track above the top of the relief culvert.

The bridge and culvert layouts and details are shown on Drawing 22569-MWP-00-00-DR-C-5413 and 5414, and in Appendices 3B and 3C in Volume III of the EIAR.

6.1.3.2 Grid Connection Route (Option A) Water Crossings

The proposed export cable route Option A will require two (2) watercourse crossings, one at Creeves Stream and one at Knockardnacorlan River. Creeves Stream will be crossed along the L1219 local public road, while the Knockardnacorlan River will be crossed within private lands at the western end of the grid route. Horizontal directional drilling (HDD) will be employed to facilitate both watercourse crossings, a process that involves deepening the cable trench at a defined slope as it approaches the watercourse to a sufficient depth below the watercourse. The trench will then pass under the watercourse and begin to raise at a defined slope until it reverts to the standard trench depth of 1.2 metres. No in-stream works will be required.

Details and layouts of the directional drilling under the watercourses are shown on Drawing 22569-MWP-00-00-DR-C-5415, 5416 and 5417 enclosed with the Planning Application, and described in further detail in Section 3.5.5.5 in Chapter 03 Description of Proposed Development in Volume II of the EIAR.

6.1.4 Legislation and Guidance

The Legislation identified in this section has been considered in this chapter, in the assessment of the effects on biodiversity occurring in and surrounding the Development.

6.1.4.1 European Legislation

EIA Directive 2011/92/EU as amended by Directive 2014/52/EU

Directive 2011/92/EU as amended by Directive 2014/52/EU (together, the EIA Directive) requires projects that are likely to have significant effects on the environment to be subject to an environmental impact assessment prior to development consent being given. Biodiversity (for example flora and fauna) is specifically mentioned in Annex IV of the EIA Directive as one of the aspects of the environment which should be addressed in an EIAR.

EU Habitats Directive 92/43/EEC

The Habitats Directive provides the basis of protection for Natura 2000 sites, or European sites, namely Special Areas of Conservation (SACs). The full title of this Directive is 'Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora' (the Habitats Directive). Article 6 of the Habitats Directive requires that any plan or project that may have a significant effect on a Natura 2000 site must be subject to an Appropriate Assessment (AA). An AA is required to ascertain the potential impact of a development on the conservation objectives of the site designated and thereby ascertain the potential for significant adverse effects on the integrity of the site. The report outlining whether a development may significantly adversely affect the integrity of a European site is known as a Natura Impact Statement (NIS).

The Habitats Directive also provides for the protection of species listed under Annex IV wherever they occur. The Annex IV species of relevance in the Irish context and to terrestrial ecology include all bat species, otter, natterjack toad and Kerry slug.

In compliance with the Habitats and Birds Directives, the potential impacts associated with the Development, how these might affect the conservation objectives of the European site(s), and the mitigation measures that will be implemented so that adverse effects on site integrity do not arise, are considered and assessed in full detail in the Appropriate Assessment Screening Report and Natura Impact Statement (NIS) submitted as part of the Planning Application. The AASR & NIS are standalone documents to the EIAR.

EU Birds Directive 2009/147/EC

The Birds Directive establishes a system of general protection for all wild birds throughout the European Union. The full title of this Directive is 'Directive 2009/147/EC of the European Parliament and of the Council of 30 November 2009 on the conservation of wild birds' (the Birds Directive). Annex I of the Birds Directive lists 194 bird species that are rare, vulnerable to habitat changes or in danger of extinction within the European Union. For these species, Member States must conserve their most suitable territories in number and size as Special Protection Areas (SPAs), which are Natura 2000 sites, or European sites. Similar actions should be taken by Member States regarding migratory species, even if they are not listed in Annex I. In compliance with the Habitats and Birds Directives the potential adverse effects associated with the Development, how these might affect the

conservation objectives of the European site(s), and the mitigation measures that will be implemented to ensure that adverse effects on site integrity do not arise, are considered and assessed in full detail in the Appropriate Assessment Screening Report (AASR) and Natura Impact Statement (NIS) submitted as part of the Planning Application, see MWP Ballynisky Wind Farm Screening for Appropriate Assessment Report Ballynisky Green Energy Limited, September 2025 and MWP Ballynisky Wind Farm Natura Impact Statement Ballynisky Green Energy Limited.

Nature Restoration Regulation

Nature Restoration Regulation came into force in 2024. The full title of the regulation is 'Regulation (EU) 2024/1991 of 24 June 2024' (published in OJ 29 July 2024; in force on 18 August 2024). It establishes binding, area-based restoration targets across the EU and amends Regulation (EU) 2022/869. It forms part of the EU Biodiversity Strategy and provides relevant policy context for ecosystem restoration and enhancement measures considered in this chapter.

6.1.4.2 National Legislation

European Communities (Birds and Natural Habitats) Regulations 2011

The European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. No. 477 of 2011, as amended) (the Birds and Habitats Regulations) together with Part XAB of the Planning and Development Act 2000 (as amended), transpose both the Habitats and Birds Directives into Irish law. The 2011 Regulations also contains regulations (49 and 50) that deal with invasive species (those included within the Third Schedule of the Birds and Habitats Regulations). Regulations 49 and 50 prohibit the introduction and dispersal of the invasive species of flora and fauna that are included on the Third Schedule list of these regulations.

The Wildlife Act 1976 (as amended)

The Wildlife Act 1976 (as amended) (the Wildlife Act) gives protection to a wide variety of birds, animals and plants in Ireland. The Wildlife Act also provides a mechanism to give statutory protection to Natural Heritage Areas (NHAs). The amendment in 2000 of the Wildlife Act extends protection under this legislation to most species, including the majority of fish and aquatic invertebrate species which were excluded from the 1976 Act.

The Planning and Development Act 2000

In the context of land use planning, the EIA Directive is transposed by Part X of the Planning and Development Act 2000 (as amended) and Part 10 of the Planning and Development Regulations 2001 (as amended). As part of the planning application process, the planning authority must carry out an EIA for projects which are subject to EIA in accordance with the EIA Directive and the role of an EIAR is to aid in the consideration of the competent authority in determining an application under the Planning and Development Act 2000. As a key component of an EIAR, the likely significant effects of a project on biodiversity are part of this consideration.

In the context of land use planning, the Birds and Habitats Directives are transposed by Part XAB of the Planning and Development Ac 2000 (as amended) and Part 20 of the Planning and Development Regulations 2001 (as amended). As part of the planning application process, the planning authority must consider if the proposed development is likely to have a significant effect on any European Sites and where this cannot be ruled out, carry out an Appropriate Assessment in accordance with the Habitats Directive as transposed under the Planning and Development Act, 2000 and the Planning and Development Regulations, 2001.

The Flora (Protection) Order, 2022

The Flora (Protection) Order (FPO), 2022 (S.I. 235 of 2022), supersedes orders made in 1980, 1987, 1999 and 2015. Under this order, it is illegal to cut, uproot or damage the listed species in any way, or to offer them for sale. This prohibition extends to the taking or sale of seed. In addition, it is illegal to alter, damage or interfere in any way with their habitats. This protection applies wherever the plants are found and is not confined to sites designated for nature conservation.

6.1.4.3 Plans and Policies

The following plans, and their policies relevant to biodiversity, were considered in this chapter and the assessment of effects on biodiversity occurring within the Development site.

- Limerick Development Plan 2022-2028[2]
- Limerick Biodiversity Action Plan 2025-2030[3]
- National Biodiversity Action Plan 2023-2030[4]
- All-Ireland Pollinator Plan 2021-2025[5]
- All-Ireland Species Action Plan for Bats (NPWS, 2008)[6]
- The Lesser horseshoe bat species action plan 2022-2026[7].

6.1.4.4 Guidelines

In considering ecological survey and assessment of effects of the Development, regard was made to the following guidance and information documents:

- CIEEM (2018) Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine. Version 1.3 September 2024. Chartered Institute of Ecology and Environmental Management, Winchester.
- CIEEM (2019) Advice Note on the Lifespan of ecological Reports and SurveysEPA (2022) Guidelines on the Information to be Contained in Environmental Impact Assessment Report (May 2022). Environmental Protection Agency, Dublin.
- National Roads Authority (NRA) currently known as Transport Infrastructure Ireland (TII) (2009a) Guidelines for the Assessment of Ecological Impacts of National Road Schemes (Rev 2). National Roads Authority, Dublin.
- (NRA) (Now TII, 2006a) Guidelines for the Treatment of Badgers prior to the Construction of National Road Schemes. National Roads Authority.
- NRA (Now TII, 2008) Guidelines for the Treatment of Otters prior to the Construction of National Road Schemes. National Roads Authority.
- NRA (Now TII, 2009b) Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes (Rev 2). National Roads Authority.
- Bat Conservation Ireland (2025). Using Species Distribution Models to Identify Potential New Roosting Sites of the Lesser Horseshoe Bat in Ireland. Fossitt (2000) A Guide to Habitats in Ireland. Heritage Council, Kilkenny.
- Smith *et al.* (2011) Best Practice Guidance for Habitat Survey and Mapping in Ireland.

[2] Limerick County Council (2022) Limerick Development Plan 2022-2028. May 2023.
[3] Limerick City and County Council (2025) Limerick Biodiversity Action Plan 2025-2030.
[4] Department of Housing, Local Government and Heritage (2024) Ireland's 4th National Biodiversity Action Plan. Draft for Public Consultation.
[5] National Biodiversity Data Centre (2021) All-Ireland Pollinator Plan 2021-2025. March 2021.
[6] National Parks and Wildlife Service, and Environment & Heritage Service (2008) All-Ireland Species Action Plan: Bats. April 2008.
[7] NPWS & VWT (2022) Lesser Horseshoe Bat Species Action Plan 2022- 2026. National Parks and Wildlife Service, Department of Housing, Local Government and Heritage, Ireland.

- NatureScot (2021) Bats and Onshore Wind Turbines: Survey, Assessment and Mitigation. Scotland's Nature Agency. Version: August 2021 (updated with minor revisions).
- NatureScot (2024) Pre-application guidance for onshore wind farms
- Northern Ireland Environment Agency, Natural Environment Division (2021) Guidance on Bat Surveys, Assessment and Mitigation for Onshore Wind Turbine Developments in Northern Ireland. Version 1.1. Belfast: Department of Agriculture, Environment and Rural Affairs (Northern Ireland).
- Marnell, F., Kelleher, C. & Mullen, E. (2022) Bat Mitigation Guidelines for Ireland. V2. Irish Wildlife Manuals, No. 134. National Parks and Wildlife Service, Department of Housing, Local Government and Heritage. Dublin, Ireland.

This is not an exhaustive list; additional guidance can be found within the relevant sections of this chapter. A comprehensive list of reference sources is provided in Section 6.13.

Additional sources of information used in this chapter included Chapter 3 Project Description, Chapter 7 Ornithology, Chapter 8 Water, Chapter 9 Land and Soils, and Chapter 10 Air Quality within the Environmental Impact Assessment Report (EIAR).

6.1.5 Competency of Assessors

All assessments have been carried out by appropriately qualified, trained and competent professionals with extensive experience in ecology survey and assessment.

Chapter Author and Senior Ecologist

This Biodiversity assessment has been prepared by Gerard Hayes. Gerard is a senior aquatic ecologist with over fifteen years' experience in environmental consultancy. He is a Member of the Chartered Institute of Ecology and Environmental Management (CIEEM), a Member of the Freshwater Biological Association (FBA) and has Certified FBA accreditation in 'Identification of Freshwater Invertebrates' to Family Level. Gerard has wide-ranging experience in all aspects of wind farm development relating to aquatic and terrestrial ecology and has authored numerous biodiversity assessments and enhancement plans for wind farm EIAR's.

Habitat and Flora

Habitat and flora assessments were carried out by Michelle O'Neill of Cluain Ecology. With more than ten years' experience working as an ecological consultant within the public and private sector, Michelle's expertise include habitat and botanical surveying, ornithological surveying (breeding and winter), mammal surveying, data analysis, and assessment/report writing for a range of projects including National Surveys, Ecological Monitoring, Ecological Impacts Assessments (EcIA/EIAR) and Appropriate Assessment (AA/NIS). With a particular interest in botany and habitats, she worked on an Irish semi-natural grassland survey and habitat mapping project for Teagasc as part of the development of a pilot methodology for farmland habitat assessment sustainability scheme. Michelle has also contributed to dozens of ecological impact assessments for a range of developments including Rossmore Quarry Extraction Works at Carrigtwohill in Cork Harbour; Janssen Sciences Ireland Expansion Works at Ringaskiddy in County Cork; and Aughinish Alumina Borrow Pit Extension Works at Askeaton in County Limerick.

Bats

Bat surveys were designed by John Curtin, a highly-experienced ecologist who has been working in the industry since graduating in Environmental Science from NUI Galway in 2010. John has been conducting bat surveys at windfarm sites since 2012. John has also completed the Bat Conservation Ireland, Bat Detector Workshop and Bat Handling Workshop which are the standard training for carrying out of bat surveys in Ireland. John is chairperson of Bat Conservation Ireland - an organisation that monitors Irish bat populations and facilitates public education events regarding bats and bat communities. Ciara Morrin and Karolina Illien supported John with carrying out

night-time detector surveys. Ciara has a degree in Wildlife Biology and has completed CPD courses on Fundamentals of Biodiversity Considerations for Engineering Projects, Bat License Training & Bat Sound Analysis. Karolina has a master's degree in environmental leadership and has worked as an ecologist since 2022.

Aquatic Ecology

The freshwater aquatic surveys, aquatic and fish habitat evaluations were completed by Gerard Hayes (BSc.), Úna Williams (BSc. MSc.), Noreen Lynch (BSc).

Úna has worked with MWP for over six years and is an experienced field ecologist. She is familiar with various ecological survey methodologies including habitat/survey mapping and zoological surveys and has worked on research teams both in Ireland and abroad. She has undertaken assessments for a wide variety of projects including for renewable energy developments, and infrastructural and coastal developments. Úna has designed and carried out several Collision Risk Models for proposed wind farms and has authored many ecological reports including Screenings for Appropriate Assessment Reports (Stage 1), Natura Impact Statements (Stage 2), and Ecological Impact Assessments. She graduated from Queen's University Belfast in 2018 with an MSc in Animal Behaviour and Welfare, and from Trinity College Dublin in 2008 with an Environmental Science degree.

Noreen Lynch is a project ecologist with six years of ecological consultancy experience. She is familiar with various ecological survey methodologies including terrestrial and aquatic survey types and has undertaken assessments for a wide variety of projects including renewable energy developments and large infrastructure projects. Noreen has authored several ecological documents including Screenings for Appropriate Assessment Reports (Stage 1), Natura Impact Statements (Stage 2), and Ecological Impact Assessments (EcIAs).

Water Sampling, Camera Deployment, and Site Walkovers

Ecological walkover surveys, wildlife camera deployment and water sampling surveys were conducted by Deirdre O'Brien (BSc) and Petr Dobes.

Deirdre O'Brien (BSc.) graduated with a first-class Bachelor of Science Honours Degree in Wildlife Biology from the Institute of Technology Tralee (IT Tralee) (now Munster Technological University - MTU) and has worked at MWP since 2018. She is highly experienced at carrying out field work including surveys for invasive plant/animal species, birds, and freshwater macroinvertebrate sampling and identification, (sensu Q' value assessment), collection of water samples and assistance with freshwater pearl mussel survey. She has also gained experience in standard field survey methodologies including mammal surveying and habitat mapping and has been formally trained in Stage 1 and Stage 2 freshwater pearl mussel surveying by Dr Evelyn Moorkens. She has completed many Screening for Appropriate Assessment Reports, Natura Impact Statements, Ecological Impact Assessments (EcIA) and other various ecological reports including reports for bird survey work. Additionally, she is experienced in the collation of data and in field ecology survey techniques

Petr Dobes is a graduate of Kerry College's Ecology programme and qualifying member of CIEEM. He has undergone training in macroinvertebrates identification (Freshwater Biological Association), biological water quality assessment by the Q-value method, surveying for white clawed crayfish and Stage 1&2 freshwater pearl mussels surveying with Pascal Sweeney.

Marsh Fritillary

Field surveys for marsh fritillary (*Euphydryas aurinia*) were undertaken by Thomas Webb and Ellis Perry of RSK Biocensus.

Thomas is a consultant ecologist responsible for assisting with and managing ecological consultancy projects. He has worked at RSK Biocensus for over three years after obtaining a BSc in Zoology and an MSc in Species Identification and Survey Skills, which included time spent working within the ecology industry. He is familiar with relevant wildlife legislation both within the UK and Ireland and has specialist skills in designing and leading surveys

for habitats, birds and protected species, undertaking impact assessments, technical report writing and management and coordination of ecological projects and other related services. He has undertaken training in marsh fritillary survey and identification skills and is a Qualifying member of CIEEM.

Ellis is a consultant ecologist at RSK Biocensus and has a breadth of ecological knowledge after undertaking his undergraduate Zoology and postgraduate Species Identification and Surveying Skills degrees. He currently has a Qualifying membership of the Chartered Institute of Ecology and Environmental Management (CIEEM) and is working towards Associate membership. Ellis is an ecologist with a keen interest in protected species, botany and ornithology and has undertaken training in marsh fritillary survey and identification skills. He has three years of experience within the industry.

6.1.6 Scope of Assessment

This assessment considers any potential effects with regard to each phase of the development: construction phase, operational phase and decommissioning phase. Appropriate mitigation measures are described to avoid, reduce or offset potential negative impact(s).

The specific objectives of the assessment were to:

- Identify and document protected habitats and species in the study area and extending away from it through a desk top study of available ecological data;
- Undertake baseline ecological surveys at the study area and evaluate the nature conservation importance of the ecological resources identified using a scientifically robust and objective methodology based on current National and International best practice;
- Predict the potential direct, indirect and cumulative effects of the proposed development on biodiversity;
- Prescribe measures to mitigate the potential negative effects of the proposed development on biodiversity; and
- Identify habitats within the study area that can benefit from ecological management for the purpose of local biodiversity enhancement.

The study area associated with this chapter and appendices included all lands within the land holding, including the proposed development site boundary, as well as the adjacent habitats and downstream watercourses ecologically connected to them, including the designated sites and features of interest which are hydrologically connected to the proposed development site.

The scope of ecological surveys within the land holding extended to identification of habitats and flora species, terrestrial mammals and marsh fritillary (*Euphydryas aurinia*) butterfly. Surface water features were surveyed upstream, within and downstream of the proposed development site. With regard to potential roost features (PRFs) for bats the study area was set as being the area within 200m of the proposed turbine locations plus the length of the rotor radius (NIEA, 2021). Given the ability of water to transfer substances over considerable distances, the aquatic surveys extended to downstream areas far beyond the site boundary..

Special Protection Areas (SPAs), including Ramsar sites are not considered in this chapter as the Special Conservation Interest (SCI) species of these designated sites are birds and are assessed in a separate Ornithology Chapter (Chapter 07 Ornithology) of this EIAR.

6.1.7 Zone of Influence (ZOI)

"The Zone of Influence (ZOI) for a project is the area over which ecological features may be affected by changes as a result of the Proposed Development and associated activities. This is likely to extend beyond the Site, for example where there are ecological or hydrological links beyond the Site boundaries' (CIEEM, 2018). The ZOI will vary with different ecological features, depending on their sensitivities to an environmental change. The following were considered when identifying the potential ZOI at the initial stages of the proposed development:

- The nature, size and location of the proposed development;
- Sensitive habitats and species;
- Identification of suitable habitats for high conservation value species;
- Ecological connectivity between the proposed development and the wider landscape;
- The sensitivities of the relevant key ecological receptors;
- Identification of potential effect pathways to key ecological receptors; and
- Habitat connectivity and foraging ranges of fauna.

The proposed development will comprise six (6) turbines and associated infrastructure including grid connection on a site area of approximately 43.02ha. The site and surrounding area are in a rural setting with landcover comprising mainly agricultural land, farmsteads and one-off residential houses.

The proposed development site lies within the Ordnance Survey Ireland (OSI) National Grid hectad[8] R24 (western side of site) and hectad R34 (eastern side of site). Following an initial desk study which identified previously recorded ecological features within these two hectads, initial ecological walkovers within and around the proposed development site and grid route were undertaken in spring 2022, to define the scope of the surveys, the scale of the field study area and to identify any ecological constraints to the proposed development. Follow-up surveys were carried out in 2023 and 2024. The following outlined below were considered when identifying the potential ZOI at the initial stages of the proposed development.

The main study area for the proposed development included all lands within the overall landholding boundary, which encompasses the proposed wind farm site and proposed grid connection route options, as well as the adjacent habitats and downstream watercourses ecologically connected to them, as shown in Figure 6-1, below.

The potential ZOI, encompassed the land holding, and the full extent of surface waters to their coastal outfalls, including the designated sites and features of interest which are hydrologically connected to the proposed development with reference to the Source-Pathway-Receptor (SPR) framework as outlined in the Practice Note PN01 'Appropriate Assessment Screening for Development Management' (OPR, 2021), produced by the Office of the Planning Regulator (OPR) in Dublin. This note was published to provide guidance on screening for Appropriate Assessment (AA) during the planning process, and although it focuses on the approach a planning authority should take in screening for AA, the methodology is also readily applied in the preparation of Biodiversity Chapters of EIARs to identify relevant designated sites potentially linked to the proposed development site.

[8] Hectad - unit of land area measuring 10 km x 10 km.

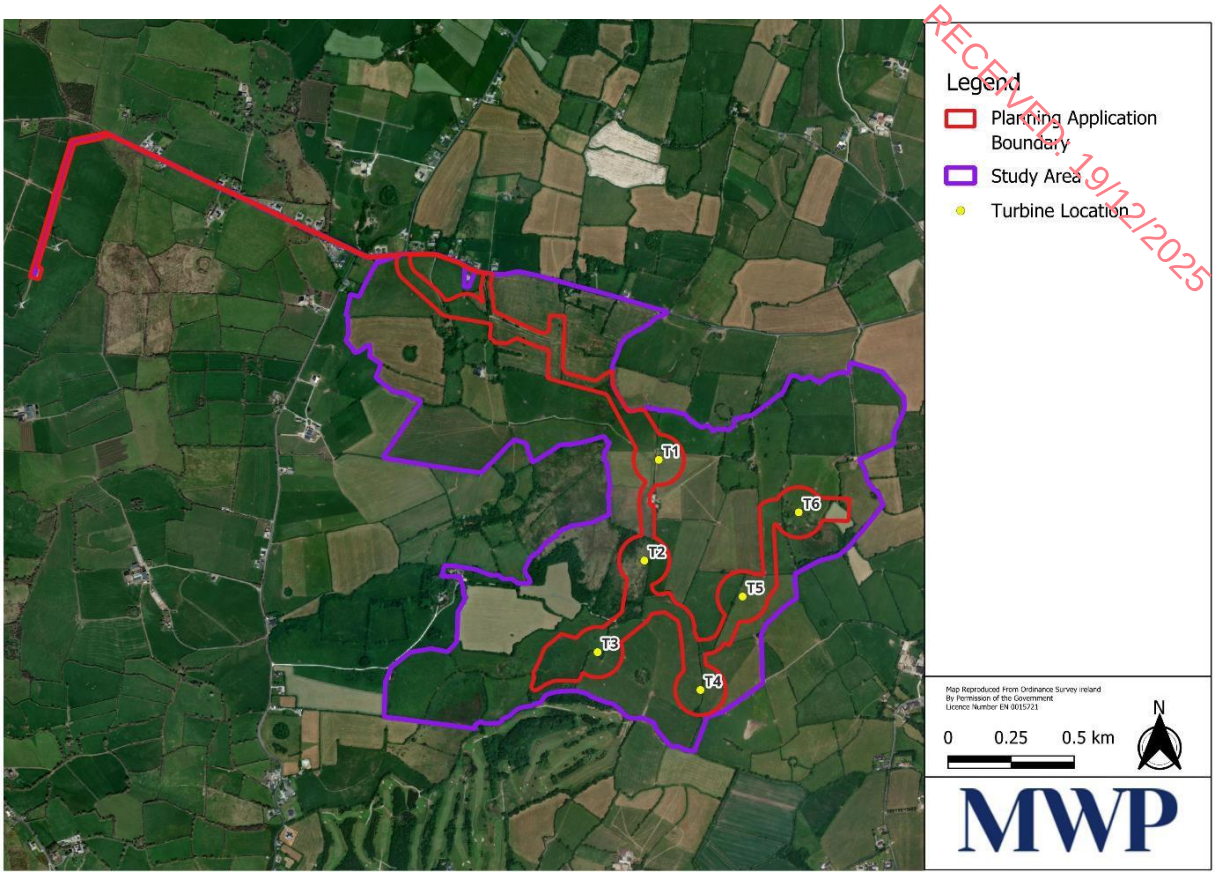

Figure 6-1: Proposed development site boundary and study area at Ballynisky in County Limerick.

6.1.8 Key Ecological Receptors (KERs)

A Key Ecological Receptor (KER) is defined as a site, designated site, habitat, ecological feature, assemblage of species or individual protected species that may be affected by the proposed development and should be subject to detailed assessment. Features of ecological significance occurring or likely to occur within the ZOI of the proposed development are classified as KERs and are taken to be those features deemed to have a 'Locally Important (higher value)' or higher classification based on NRA (2009). The significance of the ecological effects on each KER is assessed in Section 6.6, below.

Features of ecological significance are designations for nature conservation, i.e. habitats and species protected under the Habitats Directive, the Birds Directive, the Wildlife Acts 1976 to 2021 and the Flora Protection Order 2022 and species subject to restrictions listed on the Third Schedule to the European Communities (Birds and Natural Habitats) Regulations, 2011 (as amended), i.e. invasive alien plants species (IAPS). A KER can therefore be defined as any site, habitat, ecological feature, vegetative assemblage, community, species or individual:

- Occurring within the ZOI of the proposed development;
- Considered likely to be impacted upon by the proposed development; and
- Requiring further survey in order to more accurately predict the nature, magnitude and significance of those impacts.

6.2 Methodology

6.2.1 Desktop Study

For this assessment, the desktop study commenced in 2022 and included a review of available published data on sites designated for nature conservation, and data on other ecologically sensitive sites, habitats and species of interest within the vicinity of the study area. Accessed available ecological data included the following:

- Ordnance Survey Ireland (OSI) aerial photography, 1:50000 mapping, GeoHive and online satellite imagery sources;
- National Parks and Wildlife Service (NPWS) online datasets and literature;
- National Biodiversity Data Centre (NBDC) online mapping tool;
- Teagasc soil area maps (NBDC website);
- Geological Survey Ireland (GSI) online area maps;
- Environmental Protection Agency (EPA) water quality data and online mapping;
- Shannon International River Basin District (ShIRBD) datasets (Water Framework Directive);
- Water Framework Directive (WFD) Cycle 2 and Cycle 3 datasets (online);
- Map of Irish Wetlands (online)[9];
- BirdWatch Ireland (BWI) on-line resources;
- Bat Conservation Ireland (BCI);
- Inland Fisheries Ireland (IFI);
- Review of requested records from NPWS Rare and Protected Species database and BCI bat records/roost database;
- Limerick Development Plan 2022-2028[10]; and
- Other information sources and reports listed in Section 6.13 or footnoted throughout the report.

Species records for the hectads R24 and R34 encompassing the footprint of the proposed windfarm site and grid connection route options were downloaded from the NBDC database. The results of this database search for protected fauna and flora records from these hectads are provided below in the relevant sections.

OSI mapping and digital aerial photography of the proposed development site were utilised to determine the range of habitats with the potential to support protected fauna within the study area including ecological connecting features within the landscape (e.g. hedgerows/treelines, woodland edge habitat, and watercourses). Online aerial mapping and satellite imagery were used in conjunction with publicly available GIS files to generate mapping, which together, helped inform the desktop study.

In relation to bat species, the desktop study included an assessment of the Bat Conservation Ireland (BCI) database, NBDC records, BCI landscape model for bat suitability, OSI mapping and aerial photography. A preliminary assessment of the availability of landscape features of importance to bats within the proposed wind farm area and the geographical area extending away from it was carried out. Also reviewed

[9] http://www.fossenvironmentalconsulting.com/wetland-survey-ireland--map/wetland-survey-ireland--.html Accessed 10th October 2022.
[10] Limerick Development Plan 2022-2028 | Limerick.ie Accessed: 6th July 2025

was the NBDC's Bat Habitat Suitability Index (BHSI)[11] which is derived from an analysis of the habitat and landscape associations of Irish bat species (Lundy *et al.*, 2011). The index evaluation ratings range from 0 to 100 with 0 being the least favourable for bats and 100 being the most favourable for bats. Index evaluations are available for each species individually and as an overall rating for all species combined. For more information on the desk-top study on bats, please refer to the 'Bat Survey Report' for the proposed development in Appendix 6D.

6.2.2 Data Requests

On 11th February 2022, a request was made to NPWS for Sensitive Data Access and for records of rare or protected species within a 5-kilometre radius of the proposed development site encompassing hectads R24 and R34, as well as smaller northern sections of hectads R23 and R33. Information was provided by NPWS on 17th February 2022. On 28th November 2022, an additional request was made to NPWS for Sensitive Data Access for hectads R24 and R34, and the information was provided by NPWS on 30th November 2022.

A data request was submitted to Bat Conservation Ireland (BCI) on 21st January 2023 and again on 17th December, 2025 for the provision of bat records within a 10-kilometre radius of the proposed development site. All available records were provided by BCI on 24th January 2023 and 18th December 2025 respectively. This provision of bat records by Bat Conservation Ireland does not constitute a consultation with Bat Conservation Ireland regarding the proposed wind farm development. The records received include roost locations, results from transect surveys, and Ad-hoc observation.

The bodies listed in Table 6-2, below, were consulted in August 2022 in relation to the proposed project. A full list of consultees and their responses is available in Appendix 1B of Volume III of the EIAR.

Table 6-2. Two bodies consulted in August 2022 in relation to the proposed development, and the biodiversity issue(s) raised by each.

Consultee	Biodiversity issue raised/observations
Inland Fisheries Ireland (IFI)	Any stream crossings for access roads or grid connections should adhere to the IFI Guidelines and may be subject to the annual close season for in-stream works – 1st October to June 30th. Spoil storage areas should be sited away from watercourses on site.
National Parks and Wildlife Service (NPWS)	The Department could not make specific comment on this particular referral at the time but would await the completed assessment since it is not within or affecting any designated site. However, no inference should be drawn that the Department is satisfied or otherwise with the proposed activity. The Department may submit observations/recommendations at a later stage in the process.

6.2.3 Field Surveys

Field surveys were undertaken to document and assess ecological features of interest within the site and connected to the site and then, subsequently, enable identification of the site's KER(s). The following literature was referred to during field surveys and throughout the ecological assessment of the study area:

- Animal Tracks and Signs (Bang & Dahlstrom, 2006);
- Irish Red Lists: Terrestrial Mammals (Marnell, *et al.*, 2019); Amphibians, Reptiles and Freshwater Fish (King *et al.*, 2011);

[11] Maps - Biodiversity Maps (biodiversityireland.ie) Accessed: 16th July 2025

- Checklists of protected and threatened species in Ireland (Nelson *et al.*, 2019);
- Irish Red Data Book for Vascular Plants (Curtis & McGough, 1988);
- Proposed Red Data List of Vascular Plants Consultation Document (Kingston, 2005); and
- Review of records of plant species protected under the Flora (Protection) Order of 2015 and the Irish Red Data Book (Wyse-Jackson *et al.*, 2016).

A range of ecological field surveys have been undertaken by both MWP staff ecologists and other external consultants. Ecological surveys and survey dates are shown in Table 6-3, and summaries of field survey methodologies are provided in the sub-sections thereafter.

Table 6-3: Summary list of completed ecological surveys and survey dates.

Survey	Survey Date(s)	Surveyor(s)
Habitat surveys – Phase I / Fossitt level	5th April 2022 11th May 2022 9th August 2022 5th May 2023 23rd April 2024 16th January 2025	Michelle O'Neill (Cluain Ecology) Gerard Hayes, Petr Dobes, Deirdre O'Brien (MWP)
Terrestrial mammal surveys – site walkovers	15th October 2022 20th December 2022 11th February 2023 23rd April 2024 16th January 2025	Gerard Hayes, Petr Dobes, Deirdre O'Brien (MWP)
Terrestrial mammal surveys – camera traps	See Table 6-4, below	Gerard Hayes, Petr Dobes and Deirdre O'Brien (MWP)
Marsh fritillary habitat and larval web surveys	14th & 15th September 2023 19th & 20th August 2025	Thomas Webb, Ellis Perry (RSK Biocensus)
Terrestrial invertebrate surveys	11th May 2022 6th July 2022 9th August 2022 23rd April 2024	Gerard Hayes (MWP)
Amphibian survey	2nd March 2022 23rd April 2024.	Gerard Hayes (MWP)
Biological sampling	14th – 16th June 2022	Gerard Hayes, Noreen Lynch, Úna Williams (MWP)
Physico-chemical Water Quality	14th – 16th June 2022 16th – 17th January 2025	Gerard Hayes, Noreen Lynch, Úna Williams, Petr Dobes, Deirdre O'Brien (MWP)
Electrofishing survey	11th July & 15th August 2022	Gerard Hayes, Noreen Lynch, Úna Williams (MWP)
Bat surveys	Mayo November 2023 January 2024 December 2025	John Curtin (Eire Ecology)

6.2.3.1 Habitats and Flora

A desktop review of botanical data available for the study area was undertaken before the field survey was completed. This included a review of available online databases to identify if any botanical species of conservation interest (*e.g.* rare, legally protected, invasive) have been recorded within the relevant national grid squares that

overlap the study area. In this case, a review was undertaken for R24 and R34 (10km grid squares) and R24W and R34B (2km grid squares) from the NBDC.

A habitat and flora assessment was carried out by Michelle O'Neill, Cluain Ecology on 11th April 2022. To supplement the findings of Cluain Ecology after proposed development layout amendments, additional surveying was carried out by Gerard Hayes of MWP. Further confirmatory surveys were completed by Gerard Hayes on 23rd April 2024. Additional habitat surveys to identify any ecological changes within the proposed development site were carried out on 16th January 2025 by Petr Dobes and Deirdre O'Brien.

The habitat and flora site assessment was carried out in accordance with best practice guidance (Smith *et al.* 2011). This involved a walkover of the study area, where the dominant habitats present were classified to Level 3 according to Fossitt (2000). In this instance, the study area was confined to the proposed development landholding. The botanical survey was conducted in-parallel with the habitats survey, where botanical species were identified and recorded according to dominant habitat type.

Habitat extent was recorded on a field map and notes of the botanical species present and their relative abundance was documented using the DAFOR (Dominant, Abundant, Frequent, Occasional and Rare) scale. Any other relevant observations of interest (*e.g.* invasive plant species, rare plants *etc.*) were recorded using a Garmin GPS handheld unit. Where applicable, additional vegetative community classification was completed with reference to the online resource ERICA; a web-based application provided by NBDC (in association with BEC Consultants Ltd. and NPWS), which can be used to assign dominant vegetative data collected to groups or communities as defined by the new Irish Vegetation Classification IVC system (Perrin 2019, See NBDC online IVC system database).

The conservation status of habitats and flora was considered with respect to the following: Annex I of the EU Habitats Directive (92/43/EEC) with reference to the European Commission (2013) and NPWS (2013); Irish Red Data Book for Vascular Plants (Wyse Jackson *et al*. 2016); Red List of Bryophytes (Lockhart *et al.* 2012); Flora Protection Order (2022). Evaluation of the habitats present in terms of their biodiversity value was assessed using the Biodiversity Evaluation Scheme (NRA 2009).

6.2.3.2 Non-Native/Invasive Flora

The proposed development site was surveyed for Invasive Alien Plant Species (IAPS) by MWP staff ecologists in August 2022, with follow-up surveys carried out in April 2024 and January 2025. During these surveys, particular focus was given to species listed on the Third Schedule of the European Communities (Birds and Natural Habitats) Regulations 2011 (as amended).

6.2.3.3 Non-Volant Mammals

The scope of the non-volant mammal (land-based mammals that cannot fly) surveys was informed by the initial ecological surveys carried out onsite and the desktop study identifying species previously recorded within the 10km squares R24 and R34.

Non-volant mammal surveys were completed between October 2022 and February 2023, with further confirmatory surveys in April 2024 and January 2025. The surveys targeted species protected under the Wildlife Acts Wildlife Acts 1976 to 2021, species listed in Annex II, Annex IV and Annex V of the Habitats Directive, and Irish Red Listed species (Marnell *et al*. 2019). Given the type of habitat features present within the study area and the species records listed by the NBDC for hectads R24 and R34, particular focus was placed on protected species such as badger (*Meles meles*), Irish hare (*Lepus timidus hibernicus*), pine marten (*Martes martes*) and otter (*Lutra lutra*). Surveys for all species were undertaken on lands within the landholding boundary with downstream areas

also surveyed for otter. The otter survey was focussed on the corridors of the Ahacronane River and Riddlestown Stream upstream, within/adjacent to and downstream of the proposed development site.

These surveys involved a comprehensive search for all mammal activity in the form of prints, scats, resting places, feeding signs, mammal trails and direct observations. These surveys followed the guidance outlined in *'Animal Tracks and Signs'* (Bang & Dahlstrom, 2004). In addition, eleven (11) no. wildlife trail cameras were deployed between May 2022 and January 2023 under licence (Licence No. 55/2020) at locations specified in Table 6-4 and illustrated in Figure 6-2. Summary details on specific species surveys are outlined below.

Details of the trail cameras deployed on 15th October and 20th December 2022 are set out in Appendix 6A. Additionally, eight (8) trail cameras were deployed between 16th January and 31st January 2025 to record any further evidence of non-volant mammal species within the proposed development site.

Table 6-4. Summary details of trail cameras deployed at the proposed development site.

Camera ID	Deployment date	Retrieval date	Location details	ITM Coordinates	
				X	Y
1	10-1-23	23-1-23	Hedgerow west of farm buildings	529504	643777
2	10-1-23	23-1-23	Worn area within scrub	529517	643777
3	20-12-22	9-1-23	East side of hedgerow over faint trail	529521	643452
4	30-9-22	11-10-22	West of western bridge over Ahacronane River	529700	643217
5	15-10-22	2-11-22	Stone wall next to drainage ditch	529698	643127
6	2-12-22	20-12-22	Gap in stone wall over trail	530100	643105
7	11-5-22	9-6-23	Downstream of eastern bridge within site	530273	643260
8	11-5-22	9-6-22	Overlooking faint trail	529700	642851
9	11-5-22	9-6-22	Overlooking faint trail	529864	642713
10	11-5-22	9-6-22	West of Ballynisky Pond, view east over pond	530439	642814
11	11-5-22	9-6-22	Scrub in wet grassland between T2 and T3	529784	642499
12	16-01-25	31-01-25	In the hedgerow close to faint trail	529341	643445
13	16-01-25	31-01-25	Facing ditch overlooking well-worn path	529720	642831
14	16-01-25	31-01-25	Trail leading into hedgerow	529565	642163
15	16-01-25	31-01-25	Worn trail over drainage ditch	530035	642084
16	16-01-25	31-01-25	Trail leading into the next field by drainage ditch	530449	642633
17	16-01-25	31-01-25	Trail by drainage ditch	530419	643079
18	16-01-25	31-01-25	Proximity to snuffle holes	530169	642926
19	16-01-25	31-01-25	Faint trail by the river	530178	643192

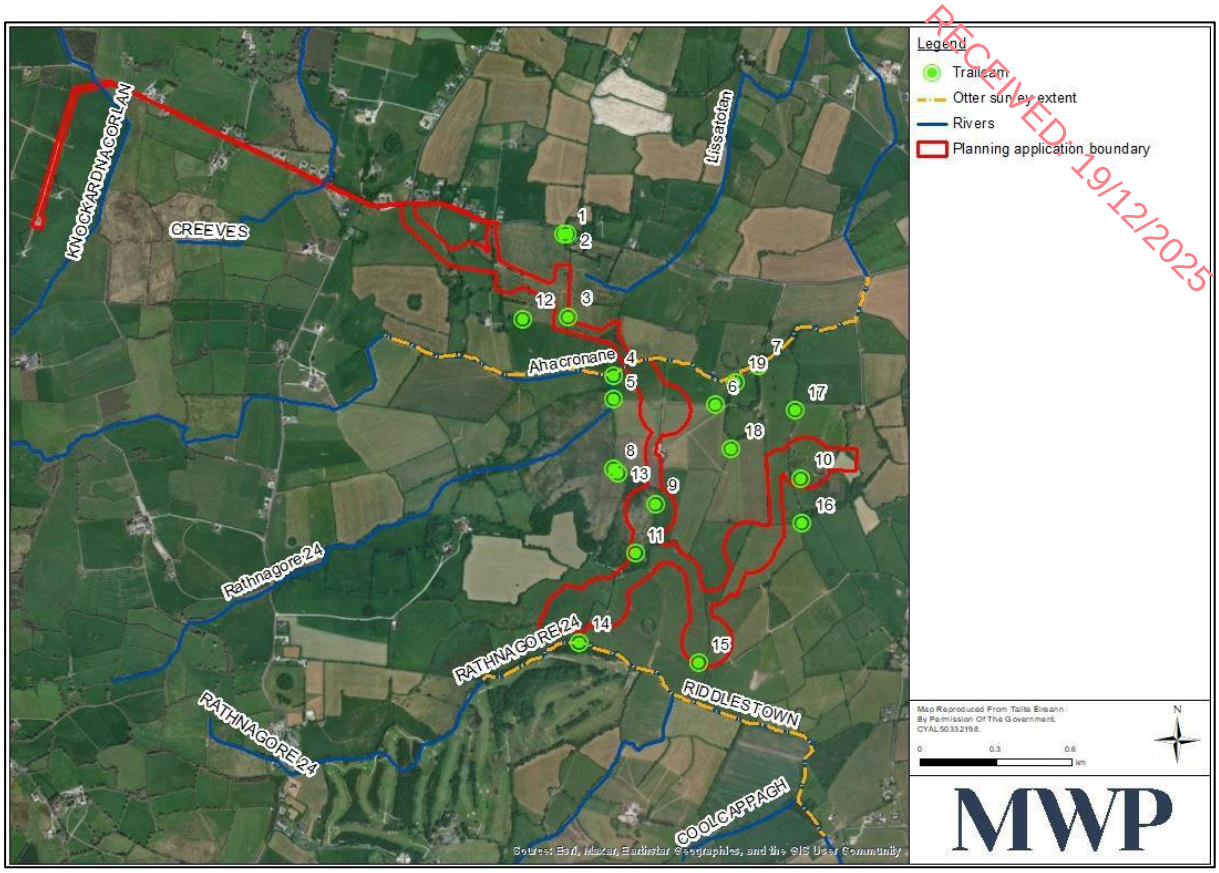

Figure 6-2: Trail camera locations and otter survey extent along watercourses.

Badger

Evidence of badger activity including latrines, hair, foraging activity (snuffle holes), commuting movements (badger tracks), setts and bedding was searched for and recorded during dedicated badger surveys carried out in October 2022 and January 2025, and during other multi-disciplinary ecological field surveys within the study area. This was followed up with the deployment of trail cameras (in 2022, 2023 and 2025) and additional confirmatory surveys in April 2024 and January 2025.

Surveying for badgers followed methodology in '*Surveying for Badgers: Good Practice Guidelines*' (Scottish Badgers, 2018).

Otter

Otter surveys were carried out with a particular focus given to watercourses within the study area. Surveys of existing stream crossings, both animal-made and human-made, were completed as part of the mammal surveys conducted in June and July 2022. The proposed crossing over the Ahacronane Stream was visited in October 2022 and additional surveys were carried out in January 2025. Otter signs searched for included spraints, footprints, tracks, couches and holts. Additional visual surveys were carried out in April 2024.

Survey methodology had regard to '*Monitoring the Otter* Lutra lutra' (Chanin, 2003a) and '*Ecology of the European Otter'* by Chanin (2003b).

Pine Marten

Pine marten surveys were completed as part of the overall non-volant mammal surveys between October 2022 and February 2023. Surveys for this species primarily focused on woodland areas present within the study area.

Any evidence of pine marten activity in the form of scat and prints was recorded. Additional visual surveys were carried out in April 2024 and January 2025.

Survey methodology had regard to '*Animal Tracks and Signs*' (Bang & Dahlstrom, 2004).

6.2.3.4 Bats

Bat surveys were conducted during the spring, summer, and autumn of 2023 with GLTA[1] undertaken in January 2024, further site walkover and repeated PRA assessments undertaken in December 2025(see Appendix 6D Bat Report). The surveys had regard to best practice guidance for bat surveys within the Republic of Ireland and the UK, including guidance developed specifically for wind farm proposals, as follows:

- Bats and Onshore Wind Turbines – Survey, Assessment and Mitigation (SNH, 2021; 2019);
- Guidance on Bat Surveys, Assessment and Mitigation for Onshore Wind Turbine Developments in Northern Ireland (NIEA, 2021);
- Bat Surveys for Professional Ecologists: Good Practice Guidelines (3rd edition) (Collins, 2016); and

Bat Surveys for Professional Ecologists: Good Practice Guidelines (4th edition) (Collins, 2023).A comprehensive suite of bat surveys was undertaken within the study area, and further survey details and information is presented in the Bat Survey Report in Appendix 6D.

Static Bat Detector Surveys

Song meter mini and SM4BAT full spectrum bat recorders were deployed for 10 consecutive nights during each season of spring, summer and autumn in 2023. The static surveys were undertaken in compliance with SNH (2021) and NIEA (2021) with regard to minimum survey effort, and number and location of detectors.

Preliminary Roost Assessments (PRAs)

Preliminary Roost Assessments (PRAs) were carried out to gather information on and determine the presence of actual or potential bat roosting sites within 200m plus rotor radius of the proposed turbines i.e., 268m. The survey involved extensive daytime inspections of potential bat roosting sites such as structures and trees that would typically be used by roosting bats. A PRA of farm buildings and other built structures within the study area was completed in 2023 and repeated again in December 2025.

Emergence/bat activity surveys (walked / driven transects and emergence)

Presence/absence surveys, comprising dusk and dawn detector surveys, were undertaken examining habitats and potential roost features, at those structures/trees located within 268m of the proposed development site identified as having the potential to contain roosting bats, in line with Collins (2023). Walked and driven transect surveys of favourable bat habitats including linear features such as roadside margins, woodland edges, hedgerows, treelines and waterbodies were also undertaken.

6.2.3.5 Aquatic Surveys

The aquatic ecology surveys comprised aquatic assessment at fifteen representative sites on watercourses within and downstream of the study area (see Figure 6-3). These sites were selected at/near roads and/or tracks. For each of the fifteen survey sites some/all of the following surveys were completed, depending on the suitability/accessibility of the survey site and flow conditions:

- Evaluation of aquatic habitats for fish and macroinvertebrates;
- Fish survey;
- Biotic assessment using aquatic macroinvertebrates; and,

[1] GLTA: Ground Level Tree Assessments

- Water sampling for analysis of physico-chemical water quality parameters.

Biological sampling and water quality indices, as well as macroinvertebrate functional feeding group analysis were used to evaluate watercourses as selected locations.

Field work pertaining to aquatic habitats and macroinvertebrates was carried out during the summer months of 2022 - from 14th to 21st June, and on 11th July and 15th August. Supplemental visual surveys were carried out on 23rd April 2024. Additional water samples were taken from survey sites on 16th/17th January 2025 and then sent to the laboratory at Southern Scientific Services at Farranfore in County Kerry for comprehensive ex-situ water quality analyses to assess key physico-chemical parameters.

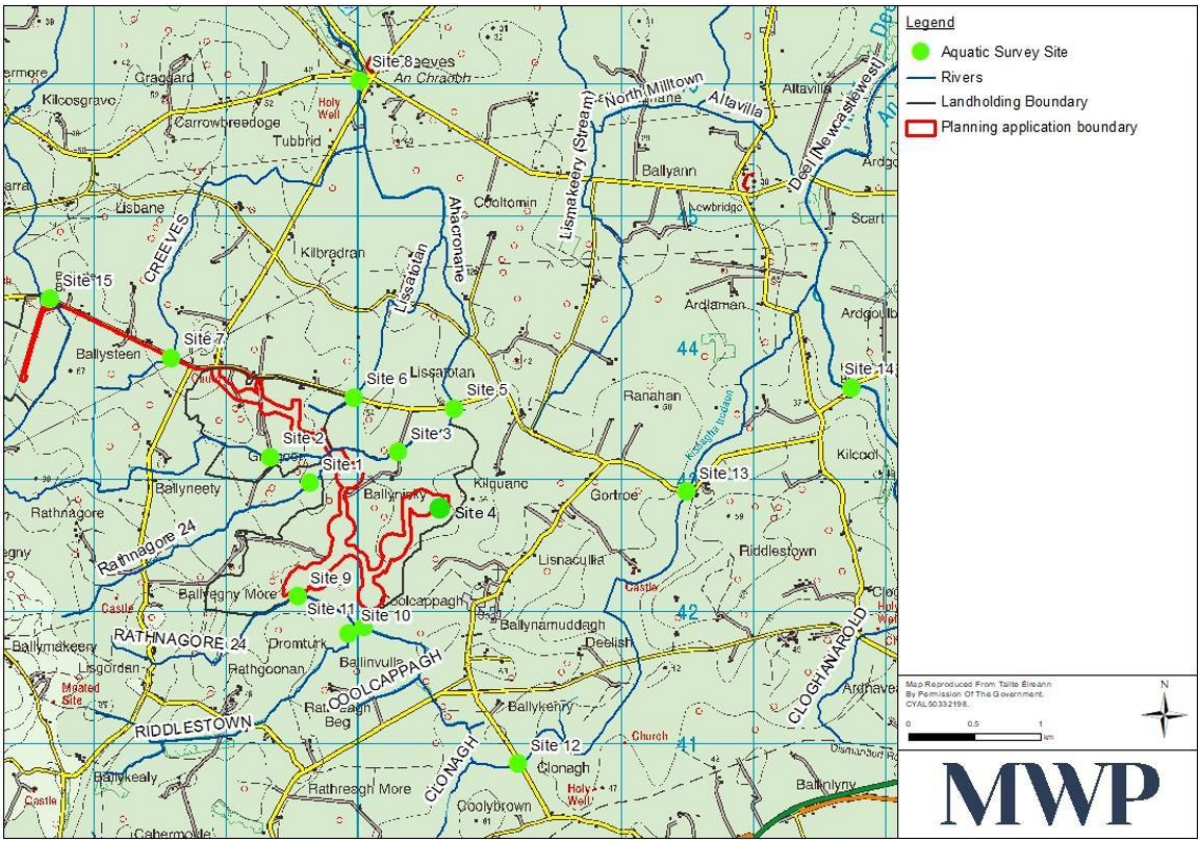

Figure 6-3: Watercourses and aquatic survey sites examined as part of the freshwater aquatic ecology studies for the proposed Ballynisky Wind Farm.

Aquatic Habitats

The study area was defined as the fluvial habitats (watercourses) potentially affected by the proposed development, including within the proposed development site, and those downstream, within the receiving environment.

Habitat assessment was carried out at selected survey site locations using the methodology given in the Environment Agency's *'River Habitat Survey in Britain and Ireland Field Survey Guidance Manual 2003*' (EA, 2003) and the Irish Heritage Council's *'A Guide to Habitats in Ireland*' (Fossitt, 2000). Watercourses were photographed at survey site locations and at various locations throughout the study area. Anthropogenic and livestock influences on fluvial and riparian habitats were noted along the surveyed stretches.

Aquatic survey sites were assessed in terms of physical characteristics. The publication '*Quantification of the freshwater salmon habitat asset in Ireland*' by McGinnity *et al.* (2003) was also reviewed to assist in classifying the salmonid habitats encompassed within the study area. Watercourse names follow EPA nomenclature. Stream

order is described using the classification system in Strahler (1964) which defines stream size based on a hierarchy of tributaries (with 1st order streams being the smallest).

More detail on aquatic survey methods (electrical fishing, macroinvertebrate sampling, biotic indices) is available in the Aquatic Ecology Survey Report in Appendix 6C of Volume III, of the EIAR.

The proposed development site was surveyed for frog spawning locations on 2nd March 2022 and 23rd April 2024. The focus of these surveys was on wetter parts of the site, namely drainage ditches and depressions holding water. The locations of any frog spawn were recorded. The number of clumps of frog spawn at each location was recorded.

6.2.3.6 Invertebrates

Any terrestrial invertebrates seen during walkover surveys were noted and photographed where possible.

A dedicated assessment for marsh fritillary (*Euphydryas aurinia*) butterfly was undertaken after some areas of wet grassland within the study area were found to support the food plant of the species i.e. Devil's bit scabious (*Succissa pratensis*). This survey is summarised below and detailed within Appendix 6E.

6.2.3.6.1 Marsh Fritillary (*Euphydryas aurinia*)

Surveying for marsh fritillary involved a combined habitat suitability survey and a larval web survey conducted on the 14th and 15th September 2023 and repeated on 19th and 20th August 2025. The area surveyed was the wet grassland within the development boundary at the proposed location of turbine T2 and the wet grassland outside the development boundary extending westwards from T2 as indicated in Figure 6-4, below. A specific Marsh Fritillary Report including associated figures is contained in Appendix 6E.

6.2.3.6.1.1 Habitat Suitability Survey

The method used for this survey was produced by the National Biodiversity Data Centre (NBDC) for 'Habitat Condition Monitoring for Marsh Fritillary'[12]. The habitat suitability survey involved habitat recording along the transects, allowing for an assessment to be made on habitat quality. Appropriate stopping distances along the routes were established where recordings of habitat condition were made. Measurements of vegetation height at each stopping point were made and data categorised in accordance with the NBDC grading system. The vegetation was only measured to the top of the leaves, all flowers of grasses and plants were ignored.

In order to assess the level of devil's-bit scabious abundance, an imaginary box with sides of 1m was used at each stopping point and the abundance of the plant was recorded by noting its abundance category in relation to the criteria set out by the NBDC. Also assessed within the imaginary 1m box was other specified habitat attributes which were; structured vegetation, low (<25cm tall) invading scrub with a cover of >10%, and evidence of livestock (poaching, tracks, dung). These habitat attributes were recorded when present.

The habitats/sites were assessed and the concluded condition was categorised to one of the following categories listed below in Table 6-5.

[12] HABITAT CONDITION MONITOIRNG Accessed: 20th July 2025

Figure 6-4: Transect for the combined marsh fritillary habitat suitability and larval web surveys.

Table 6-5. Marsh fritillary habitat condition assessment criteria (adapted from NBDC).

Habitat Suitability				
	Good Condition (GC):	Suitable (Under-grazed) (SU):	Suitable (Over-grazed) Habitat (SO):	Unsuitable habitat (US):
Parameters	>20% freq. of Scabious of category B/C abundance growing in 12-25 cm tall swards and <10% cover of tall scrub (> 0.5 m tall).	>20% freq. of Scabious of category B/C abundance growing in >25 cm tall swards and <20% freq. of Scabious of category B/C abundance growing in 12-25cm tall swards.	>20% freq. of Scabious of category B/C abundance growing in <12cm tall swards and <20% freq. of Scabious of category B/C abundance growing in 12-25cm tall swards.	<5% freq. of Scabious of category B/C abundance growing in >25 cm tall swards.

6.2.3.6.1.2 Larval Web Survey

The larval web survey was conducted to search for direct evidence of marsh fritillary. Any occupied larval webs were recorded. As per NBDC guidance, the survey covered at least 100 metres per hectare, or a size similar to this ratio in proportion to the actual site size. Areas with devil's-bit scabious were not treated preferentially in the selection of the walked routes, whose path covered a representative sample of the total area of the suitable habitat.

6.2.4 Statement of Limitations and Difficulties Encountered

Limitations that can arise during an ecological assessment include those related to methodologies, procedures, equipment, and/or weather events. Some limitations may be foreseen and can be accounted for while others may not be apparent until the actual assessment has taken place.

Electrical fishing efficiency was reduced at some locations due to dense instream vegetation. Cattle were unexpectedly present in some parts of the study area during survey work which occasionally limited surveyor access due to health and safety concerns. However, surveyors ensured that any areas which could not be accessed on the day for this reason were revisited in due course, such that all areas were surveyed over the course of the ecology field surveys.

Vegetation within the proposed development boundary at the proposed T2 location was very dense so that during the Marsh Fritillary habitat suitability and larval web survey, seeing and counting devil's-bit scabious plants and marsh fritillary larval webs was difficult, particularly in areas of longer swards and within encroaching scrub. However, every effort was made to thoroughly hand-search the vegetation at stopping points (for devil's-bit scabious plants) and along the transect route (for larval webs). Surveyors were confident that habitat suitability was estimated fairly and that few larval webs were missed.

The information contained within this chapter includes robust data which has been used to assess any potential likely significant effects of the proposed development on biodiversity. No substantial limitations were identified in terms of scale, scope or context in the preparation of this assessment.

6.2.5 Ecological Value

The value of the ecological receptors was determined using the ecological evaluation guidance given in the National Roads Authority (NRA – now TII) Ecological Assessment Guidelines published in 2009 (NRA, 2009). This evaluation scheme seeks to provide value ratings for ecological receptors, with values ranging from 'Locally Important' to 'Internationally Important' within an Irish context.

The function of this evaluation scheme is primarily to assess the ecological value of a site. In this case, the scheme has been adapted to assess the value of habitats and species. The value of a habitat is assessed based on its condition, size, rarity, conservation, and legal status. Biodiversity value is based on its national distribution, abundance or rarity, and associated trends.

Key Ecological Receptors (KERs) containing rare ecological features (*i.e*. sites designated for nature conservation, habitats and/or species), which are evaluated as being Locally Important (higher value) or higher and are likely to be impacted by the proposed development were assessed. The features that were evaluated as being of Local Importance (higher value) and higher in this study were selected as KERs after which impact significance on each of these features was assessed.

6.2.6 Assessment Criteria

Determination of the significance of an effect will be made in accordance with the terminology outlined in the EPA guidance document '*Guidelines on Information to be contained in Environmental Impact Assessment Reports*' (2022) (as set out in Table 6-6, below).

Table 6-6. Summary of criteria for assessing impacts based on EPA (2022).

Parameter	Term	Description
Quality of Effects	Positive	A change which improves the quality of the environment
	Neutral	No effects or effects that are imperceptible, within normal bounds of variation or within the margin of forecasting error
	Negative /adverse	A change which reduces the quality of the environment
Significance of Effects	Imperceptible	An effect capable of measurement but without significant consequence
	Not significant	An effect which causes noticeable changes in the character of the environment but without significant consequences
	Slight	An effect which causes noticeable changes in the character of the environment without affecting its sensitivities
	Moderate	An effect that alters the character of the environment in a manner that is consistent with existing and emerging baseline trends
	Significant	An effect which, by its character, magnitude duration or intensity alters a sensitive aspect of the environment
	Very Significant	An effect which, by its character, magnitude duration or intensity alters most of a sensitive aspect of the environment
	Profound	An impact which obliterates sensitive characteristics
Extent and Context of Effect	Extent	Describe size of area, number of sites, proportion of a population affect by an effect
	Context	Describe the extent, duration, frequency will conform or contrast with baseline conditions (is it the biggest, longest effect ever?)
	Likely Effects	The effects can be reasonably expected to occur because of the planned project if all mitigation measures are properly implemented
	Unlikely Effects	The effect that can reasonably be expected not to occur because of the planned project if all mitigation measures are properly implemented
Duration of Effect	Momentary	Effects lasting from seconds to minutes
	Brief	Effects lasting less than a day
	Temporary	Effects lasting less than a year
	Short-term	Effects lasting one to seven years
	Medium-term	Effects lasting seven to fifteen years
	Long-term	Effects lasting fifteen to sixty years
	Permanent	Effects lasting over sixty years
	Reversible	Effects than can be undone e.g. through remediation or restoration
	Frequency	How often the effect will occur (once, rarely, occasionally, frequently, constantly – or hourly, daily, weekly, monthly, annually)
Types of Effects	Indirect	Impacts on the environment, which are not a direct result of the project, often produced away from the project site or because of a complex pathway.
	Cumulative	The addition of many minor or significant effects, including effects of other projects, to create a larger, more significant effect.
	'Do Nothing'	The environment as it would be in the future should subject project not be carried out.
	'Worst case'	The effects arising from a project where mitigation measures substantially fail.

Parameter	Term	Description
	Indeterminable	When full consequences of a change in the environment cannot be described.
	Irreversible	When the character, distinctiveness, diversity or reproductive capacity of an environment is permanently lost.
	Residual	The degree of environmental change that will occur after the proposed mitigation measures have taken effect.
	Synergistic	Where the resultant effect is of greater significance than the sum of its constituents, (e.g. combination of SOx and NOx to produce smog).

The following scale was applied to assess the likelihood that a change will occur as anticipated, and that the impact on ecological structure and function will manifest as predicted:

- Near certain: >95% chance of occurring as predicted;
- Probable: 50-95% chance of occurring as predicted;
- Unlikely: 5-50% chance of occurring as predicted; and
- Extremely unlikely: <5% chance of occurring as predicted.

6.3 Baseline Environment

6.3.1 Site Location and Description

The proposed development site (approximately 43.02ha) is located in the townlands of within the townlands of Ballynisky, Graigoor, Ballyegny More, Kilbradran, Ballysteen, Dunmoylan, Lisbane, and Carrons, to the west of Coolcappa in County Limerick. It lies approximately 9km north of Newcastle West and 6km northwest of Rathkeale. The site and surrounding area are in a rural setting with landcover comprising mainly agricultural land, farmsteads and one-off residential houses.

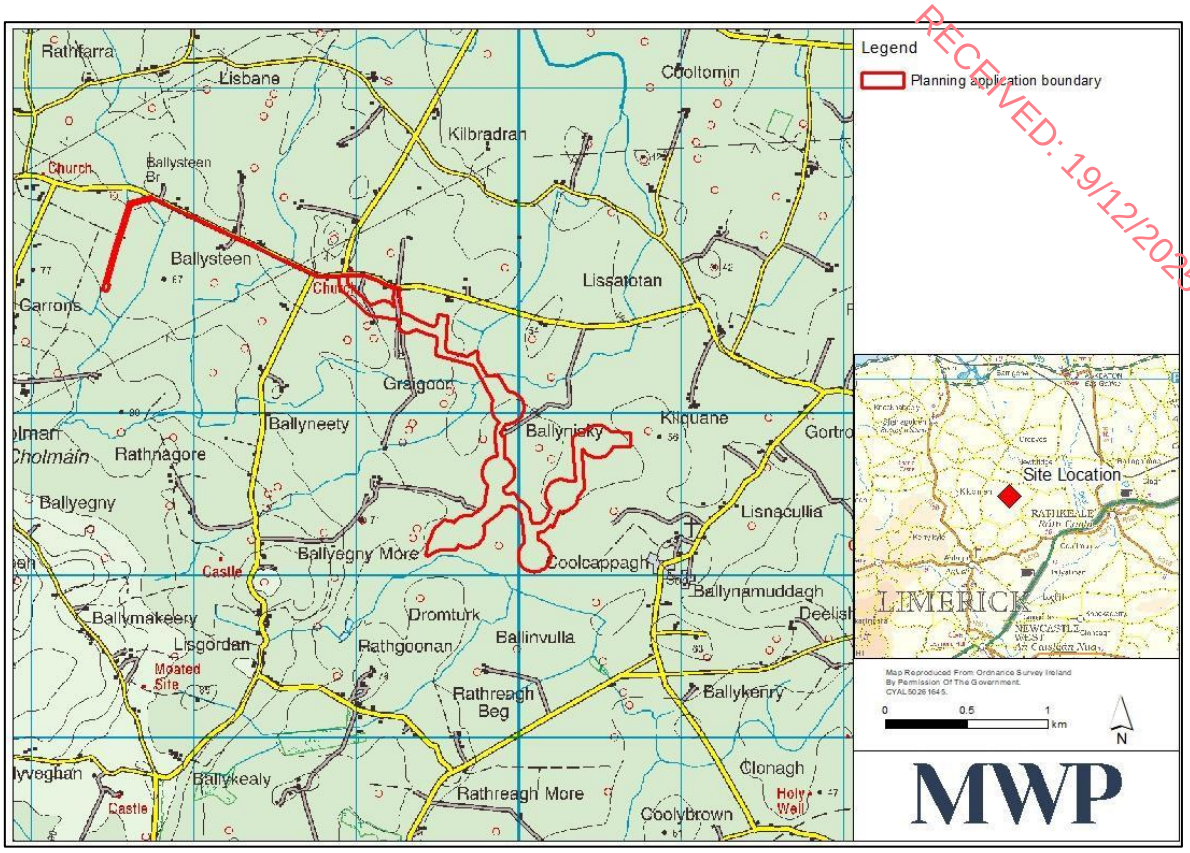

Figure 6-5: Location of the proposed development site at Ballynisky in County Limerick.

6.3.2 Local Hydrology

Surface drainage from the proposed development is to the north via the 2nd order Ahacronane River (subbasin Ahacronane_020) and to the south via the 2nd order Riddlestown Stream (subbasin Deel (Newcastlewest_130), the latter watercourse also referred to as the Kissaghtrodaun Stream. Refer to Figure 6-6, below.

The Ahacronane River rises west of Kilcolman, approximately 4km west of the proposed wind farm and flows east to the north of the proposed development. It is fed by the 1st order Rathnagore Stream upstream of the proposed development site. Downstream of the proposed development site, the Ahacronane River changes course north northwest for approximately 7km, flowing through Creeves and discharging to the Shannon Estuary near Barrigone at Robertstown Creek. Along the upper part of this reach, it receives the 1st order Lissatotan and Creeves Streams. The Ballynisky pond is a seasonal waterbody located in a field south of the Ahacronane River in the Ahacronane catchment. While it is a significant waterbody during the winter, it corresponds to the habitat 'Poor fen and flush' (PF2) during spring and summer when the water table drops. This pond is connected to the Ahacronane River by the local drainage network.

The Riddlestown Stream (also known as the Kissaghtrodaun Stream) rises approximately 2km west southwest of the proposed development. It is fed by the 1st order Rathnagore Stream which drains the southwestern extent of the proposed development site. Downstream of the proposed development site, the Riddlestown Stream flows in a general north easterly direction for approximately 7km before meeting the 6th order River Deel 1km downstream of Kilcool Bridge.

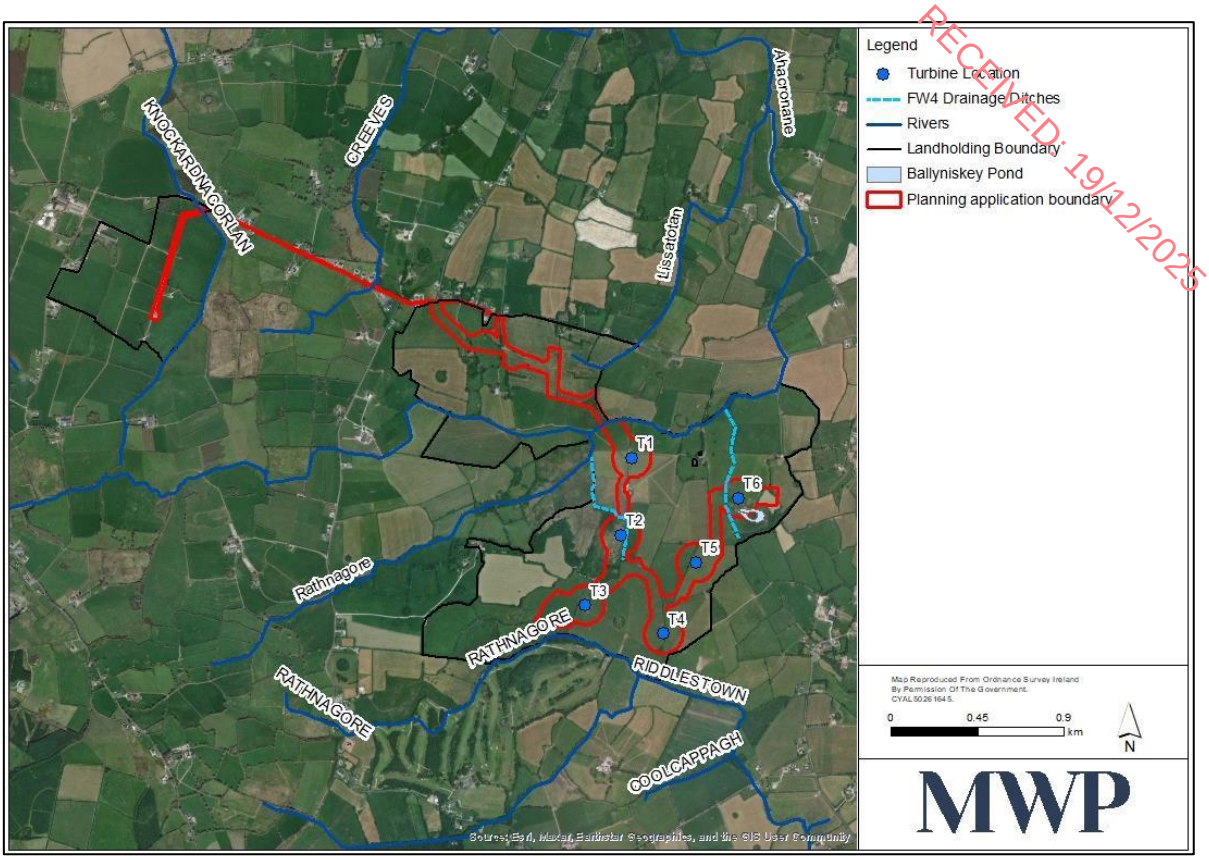

Figure 6-6: Rivers and other surface water features within the vicinity of the proposed development site.

6.3.3 Designated Sites

This section describes the designated sites considered to be within the ZOI of the proposed development, including their qualifying features, distance from the proposed development, and whether it is considered that a source-receptor ecological pathway exists between the proposed development and each designated site.

6.3.3.1 Sites of International Importance

Natura 2000 sites are sites of international importance for nature conservation and are designated and protected under European legislation. Two types of sites are incorporated within the Natura 2000 network; Special Areas of Conservation (SACs) and Special Protection Areas (SPAs). SACs are protected under the Habitats Directive 92/43/EEC. In Ireland, these European Directives are transposed into Irish legislation under the European Communities (Birds and Natural Habitats) Regulations 2011, as amended. Collectively, SACs and SPAs are referred to as Natura 2000 sites or European sites.

All surface water drainage is to the Shannon Estuary to the north, which is designated both as an SPA and an SAC. To determine the ZOI of the Proposed Development for designated sites, reference was made to OPR (2021) and in line with the precautionary principle, Natura 2000 sites that were within or overlapped with the WFD catchments within which the proposed development is located were considered. With regard to the nature of the proposed development, it is considered however that any designated site beyond 15km is highly unlikely to experience any impact from proposed works.

Natura 2000 sites with no hydrological or ecological connection to the proposed development site were not considered to be within the ZOI. For example, Askeaton Fen Complex SAC (002279) and Curraghchase Woods SAC

(000174) are located between 10km and 15km east of the proposed development site and are hydrologically separated from the site by the River Deel and/or are in a separate surface hydrological catchment. It has been objectively concluded during the screening process that the proposed construction, operation and eventual decommissioning of a 6-turbine wind farm at Ballynisky in County Limerick, either individually or in combination with other plans or projects, is not likely to have significant effects on the following Natura 2000 sites in view of those sites' Conservation Objectives, and further assessment of these sites is deemed unnecessary:

- Askeaton Fen Complex SAC (002279);
- Barrigone SAC (000432);
- Curraghchase Woods SAC (000174);

A screening for Appropriate Assessment report and a Natura Impact Statement (NIS) have both been prepared in relation to the proposed development. These were undertaken in accordance with the European Commission Methodological Guidance on the provisions of Article 6(3) and 6(4) of the 'Habitats' Directive 92/43/EEC (EC, 2001) and European Commission (EC) Guidance 'Managing Natura 2000 sites' (EC, 2018) and guidance prepared by the NPWS (DoEHLG, 2009). More information on internationally important sites can be found in these reports.

The study area of the proposed development does not lie within the boundary of any designated Natura 2000 site and, therefore, does not form part of any SAC or SPA. All Natura 2000 sites located within 15km of the proposed development site are shown in Figure 6-7. Two Natura 2000 sites located within the potential ZOI of the proposed development have been identified and listed in Table 6-7 and a synopsis of each provided below.

For assessment purposes, within this chapter it is considered that the River Shannon & River Fergus Estuaries SPA and Lower River Shannon SAC are the only Natura 2000 sites located within the potential ZOI of the proposed development due to the pathways which exist. A third site also located within the potential ZOI, namely Stack's to Mullaghareirk Mountains, West Limerick Hills and Mount Eagle SPA (004161), is considered further in Chapter 07 Ornithology.

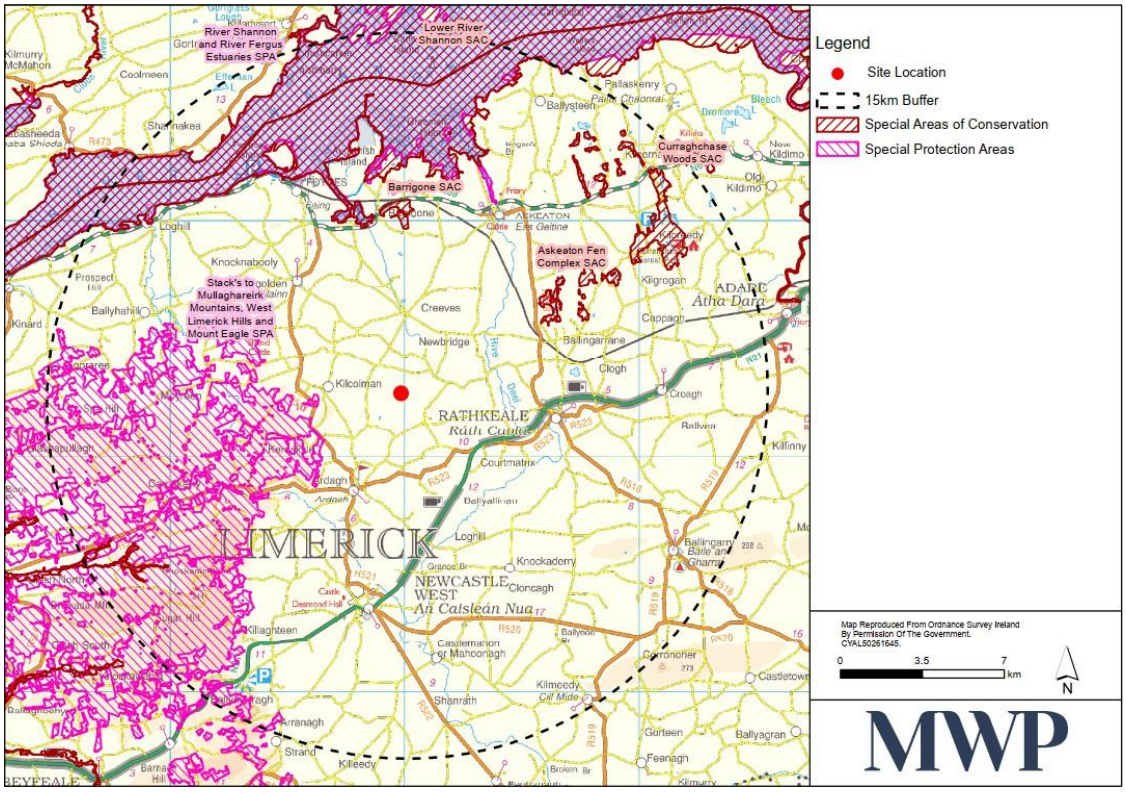

Figure 6-7: Natura 2000 sites within the potential ZOI of the proposed development.

Table 6-7. Two Natura 2000 sites located within the potential ZOI of the proposed development site (PDS).

Designated Site	Proximity of Natura 2000 site to nearest point of PDS	Qualifying Features of Conservation Interest
River Shannon & River Fergus Estuaries SPA (004077)	6.8km north of proposed development site	- 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] - 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]
Lower River Shannon SAC (002165)	6km north of proposed development site	- 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 *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] - *Margaritifera margaritifera* (Freshwater Pearl Mussel) [1029] - *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]

6.3.3.1.1 River Shannon and River Fergus Estuaries SPA (004077)

The River Shannon and River Fergus Estuaries SPA encompasses the largest estuarine complex in Ireland. The site comprises the entire estuarine habitat from Limerick City westwards as far as Doonaha in County Clare and Dooneen Point in County Kerry. This site overlaps with the Lower River Shannon SAC.

The site has vast expanses of intertidal flats which contain a diverse macro-invertebrate community, e.g. *Macoma-Scrobicularia-Nereis*, which provides a rich food resource for wintering birds. Saltmarsh vegetation frequently fringes the mudflats providing important high tide roost areas for wintering birds. Elsewhere within the site, the shoreline comprises stony or shingle beaches. The SPA is designated for 21 no. species of waterbird that utilise the habitats within the SPA for foraging and roosting purposes. The E.U. Birds Directive pays particular attention to wetlands and, as these form part of this SPA, the site and its associated waterbirds are also of special conservation interest for 'Wetland & Waterbirds'.

6.3.3.1.2 Lower River Shannon SAC (002165)

The Lower River Shannon SAC encompasses the Shannon, Feale, Mulkear and Fergus estuaries, the freshwater lower reaches of the River Shannon (between Killaloe and Limerick), the freshwater stretches of much of the Feale and Mulkear catchments and the marine area between Loop Head and Kerry Head. Rivers within the sub-catchment of the Feale include the Galey, Smearlagh, Oolagh, Allaughaun, Owveg, Clydagh, Caher, Breanagh and Glenacarney. Rivers within the sub-catchment of the Mulkear include the Killeenagarriff, Annagh, Newport, the Dead River, the Bilboa, Glashacloonaraveela, Gortnageragh and Cahernahallia. This SAC overlaps with the River Shannon and River Fergus SPA.

This site is of great ecological interest as it contains a high number of habitats and species listed on Annexes I and II of the E.U. Habitats Directive, including the priority habitats 'Coastal lagoons [1150]' and 'Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (Alno-Padion, Alnion incanae, Salicion albae) [91E0]', the only known resident population of bottle-nosed dolphin in Ireland and all three Irish lamprey species. The SAC is designated for 14 no. habitats that are estuarine, freshwater, marine and terrestrial in nature, and is designated for 7 no. aquatic species (NPWS, 2013).

6.3.3.2 Sites of National Importance

In Ireland, sites of national importance for nature conservation are designated as Natural Heritage Areas (NHAs) or proposed Natural Heritage Areas (pNHAs) under the Wildlife Acts 1976 to 2021. NHAs are areas considered important for the habitats present or which hold species of plants and animals whose habitat needs protection. A list of pNHAs was published on a non-statutory basis in 1995, but these have not since been statutorily proposed or designated. Prior to statutory designation, pNHAs are subject to limited protection including in the areas of agri-environmental farm planning schemes, certain forest service requirements pertaining to payment of afforestation grants and recognition of the ecological value of pNHAs by Planning and Licencing Authorities.

The proposed development site does not lie within the boundary of any NHA or pNHA site. Glenastar Wood proposed Natural Heritage Area (pNHA) and Carrigkerry Bogs NHA are both located between 5km and 10km to the west of the proposed development site, but neither are hydrologically connected to it. Due to the intervening distance and terrestrial nature of the woodland and peatland habitats for which these two pNHAs are designated, there is no potential pathway for likely significant indirect effects, and therefore no further assessment is required.

Three pNHAs have been identified as being within the ZOI of the proposed development and are listed in Table 6-8 and shown in Figure 6-8, below. No NHAs are located within the ZOI of the proposed development.

Table 6-8: pNHA sites within potential ZOI of the proposed development site

Designated Site	Proximity of pNHA to nearest point of subject site	Special features
Ardagh Church, Newcastlewest (Disused) (000430)	3.3km to the southwest	Natterer's bat (*Myotis nattereri*) colony
Inner Shannon Estuary - South Shore (000435)	6.0km to the north	No site synopsis available (see SAC 002165)
Fergus Estuary And Inner Shannon, North Shore (002048)	11.5km to the north	No site synopsis available (see SAC 002165)

Ardagh Church, Newcastlewest (Disused) pNHA (000430)

This site lies approximately 3.3km southwest of the proposed development site. It is selected for a colony of Natterers bat (*Myotis nattereri*). According to Bat Conservation Ireland (BCI)[13], the Natterer's bat prefers woodland, mature hedgerow and pasture habitats and can fly with great manoeuvrability among trees and around hedgerows. Its usual roost sites are tree holes, under bridges and old stone buildings such as churches and barns.

Inner Shannon Estuary – South Shore pNHA (000435) and Fergus Estuary and Inner Shannon, North Shore pNHA (002048)

These pNHAs are part of a large estuarine complex that forms an essential part of the south shore of both the Lower River Shannon SAC (002165) and the River Shannon and River Fergus SPA (004077). The sites comprise a range of wetland habitats including intertidal mudflats that are often fringed with saltmarsh vegetation, and marshlands and reed-beds.

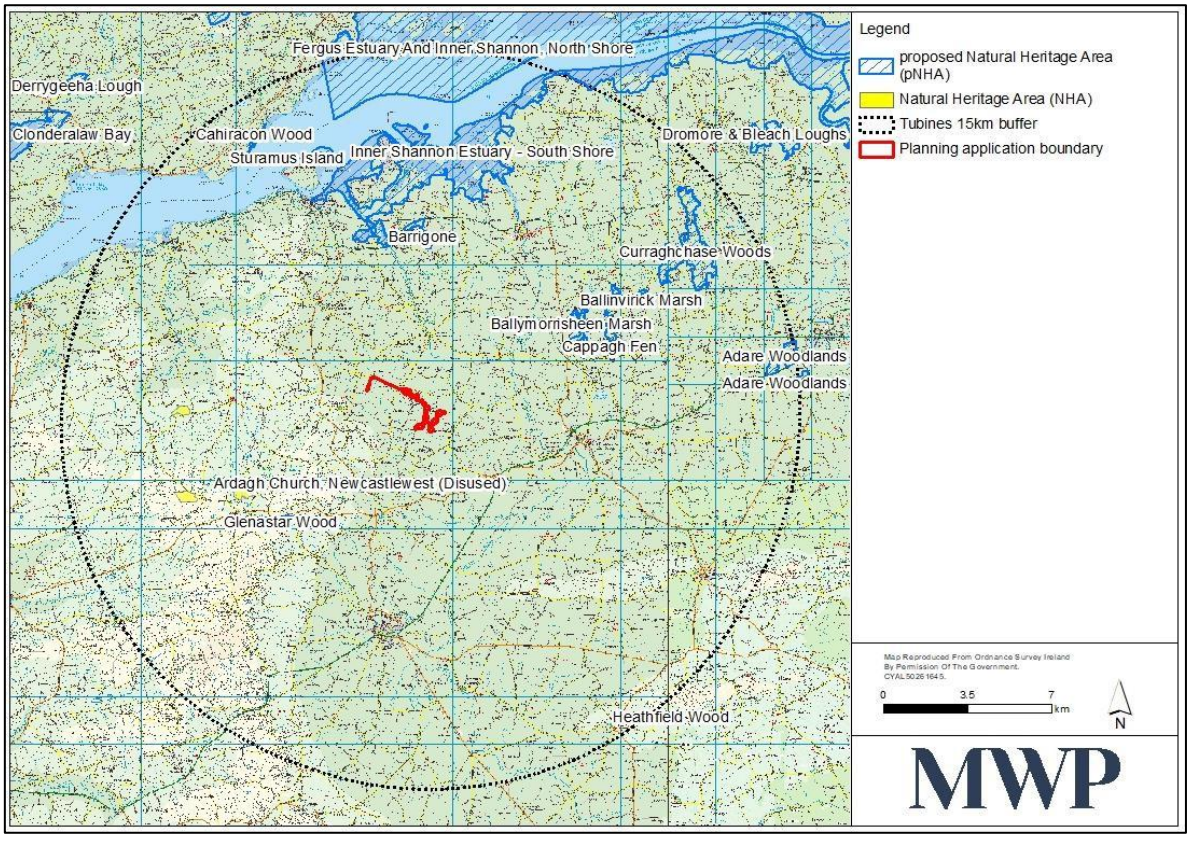

Figure 6-8: NHAs and pNHAs within 15km of the proposed development site.

[13] https://www.batconservationireland.org/irish-bats/species/natterers-bat

6.3.3.3 Additional Sites

6.3.3.3.1 Salmonid Rivers

Water channels in Ireland may be designated as a Salmonid River in line with the European Communities (Quality of Salmonid Waters) Regulations, 1988. None of the watercourses within the study area or hydrologically connected to it are designated as Salmonid Rivers[14].

6.3.4 Habitats and Flora

Habitats within the proposed development area were classified according to Fossitt (2000). A habitat map is presented below in Figure 6-9 and Figure 6-10 and the habitats at the proposed development site are described in Section 6.3.4.

6.3.4.1 Desk Study

There are no records of rare or protected flora (*i.e.* under the Flora (Protection) Order 2022, listed in Annex II or IV of the EU Habitats Directive (92/43/EEC)), or red-listed in Ireland (Wyse-Jackson *et al.* 2016, Lockhart *et al.* 2012) for the 10km grid square R24 or for the 2km grid squares R24W and R34B, as listed on the NBDC database. There is one record for the protected species hairy violet (*Viola hirta*) for the 10km grid square R34 (NBDC database). Hairy violet is a native species found in calcareous habitats (e.g. dry grassland, limestone rock) and the dominant habitats recorded for the study area (improved agricultural grassland (GA1), wet grassland (GS4)) provide limited suitable habitat for this protected species.

The NPWS Article 17 datasets for Annex I habitats were downloaded from the NPWS website and reviewed. These spatial datasets documented the occurrence of the Annex I habitats outlined below. There are no Article 17 habitats mapped within the Proposed Development site or directly adjacent to same, noting that most of these habitats collectively occur within Askeaton Fen Complex and Barrigone SAC. The table below shows records for habitats present in the 10km hectads R24 and R34. A more precise location for these habitats was not available.

Table 6-9. Article 17 Annex I habitats in the 10km grid squares relevant to the proposed development.

Habitat	Code	R24	R34
Blanket bogs (* if active bog)	7130	✓	
Depressions on peat substrates of the *Rhynchosporion*	7150	✓	
Calcareous fens with *Cladium mariscus* and species of the *Caricion davallianae*	7210	✓	✓
Alkaline fens	7230	✓	✓
Hard oligo-mesotrophic waters with benthic vegetation of *Chara* spp.	3140		✓
Turloughs	3180	✓	✓
Semi-natural dry grasslands and scrubland facies on calcareous substrates (*Festuco-Brometalia*) (* important orchid sites)	6210	✓	✓
Molinia meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*)	6410	✓	
Northern Atlantic wet heaths with *Erica tetralix*	4010	✓	

[14] https://gis.epa.ie/EPAMaps/Water Accessed: 20th July 2025

Habitat	Code	R24	R34
European dry heaths	4030	✓	
Limestone pavements	8240	✓	

Asterisk (*) denotes a priority habitat considered to be in danger of disappearance.

6.3.4.2 Field Surveys

No botanical species protected under the Flora (Protection) Order 2022, listed in Annex II or IV of the EU Habitats Directive (92/43/EEC), or red-listed in Ireland (Wyse-Jackson *et al.* 2016, Lockhart *et al.* 2012) were recorded. In general, the flora species recorded during the botanical survey are considered common for the habitat types present.

The following habitats were recorded within the study area:

- Improved agricultural grassland (GA1);
- Hedgerow (WL1);
- Treeline (WL2);
- Eroding river (FW1);
- Lowland/depositing river (FW2);
- Drainage ditch (FW4);
- Scrub (WS1);
- Wet grassland (GS4);
- Buildings and artificial surfaces (BL3);
- Stone walls and other stonework (BL1);
- (Mixed) broadleaved woodland (WD1);
- Spoil and bare ground (ED2); and
- Poor fen and flush (PF2).

An overview of the typical habitats within the study area are provided in photographic plates in Appendix 6A.

6.3.4.2.1 Improved Agricultural Grassland (GA1)

Improved agricultural grassland (GA1) is the dominant habitat present within the study area (landholding boundary). This grassland habitat is intensively managed for agricultural purposes and as such is considered a highly modified grassland habitat comprised of a relatively uniform sward of Perennial Rye-grass *Lolium perenne*. Other typical agricultural species indicative of ongoing enrichment such as Broad-leaved Dock *Rumex obtusifolius*, White Clover *Trifolium repens*, Dandelion *Taraxacum officinalis* agg., Common Mouse-ear *Cerastium fontanum* and Common Chickweed *Stellaria media* are abundant and frequent in the sward. Most of the improved agricultural fields present were being strip grazed by livestock (cattle herds) at the time of the site surveys with two fields to the north potentially reserved for silage. As described above, this is the dominant habitat present within the proposed development footprint and as such, the main habitat present in the proposed locations for the temporary construction compound, met mast, the operational substation and turbines T1, T3, T4 and T5 and associated site access tracks.

Improved agricultural grassland GA1 is a highly modified and intensively managed grassland, dominated by a few agricultural species, which are indicative of ongoing nutrient enrichment, with limited biodiversity and as such is evaluated as being of local importance (lower value).

6.3.4.2.2 Hedgerows (WL1)

Hedgerow (WL1) is the second most common habitat present within the study area and as such associated within the proposed development footprint/layout. The hedgerows present are typically associated with the improved agricultural grassland field boundaries systems present. Each of the hedgerows recorded are comprised of native hedgerow flora including abundant Hawthorn *Crataegus monogyna*, and frequent Blackthorn *Prunus spinosa,* Grey Willow *Salix cinerea* agg. and Gorse *Ulex europaeus* shrubs and rarely Hazel *Corylus avellana*. Ash *Fraxinus excelsior* is also frequent within the main hedgerow WL1 structure and occurs as single semi-mature Ash and/or occasional mature Ash trees in some of the hedgerows present. Typical understory species recorded for the hedgerows WL1 include abundant Bramble *Rubus fruticosus* agg., Ivy *Hedera helix*, occasional Dog Rose *Rosa canina* and Honeysuckle *Lonicera periclymenum*. The hedgerows WL1 are associated with low to medium height earthen banks with occasional stone that support limited ground flora except for occasional Primrose *Primula vulgaris*, Ground Ivy *Glechoma hederacea,* Common Dog-violet *Viola riviniana*, Bush Vetch *Vicia sepium*, Lords and Ladies *Arum maculatum* and Hart's-tongue *Phyllitis scolopendrium*. Species such as Cleavers *Galium aparine* and Common Nettle *Urtica dioica* are frequent along the hedgerow WL1 and agricultural field GA1 narrow verges in places. Four of the hedgerows are associated with drainage channels (FW4) and one hedgerow is associated with a semi-natural watercourse (FW1) feature (see below for descriptions of these habitat types).

The hedgerows present are all managed to varying degrees, with some cut along the sides only and as such are overgrown/top heavy. Others, in particular those present to the east/south-east, are managed to maintain a lower growing box-shaped hedgerow with occasional/rare individual trees. Many of the hedgerow bases were found to have a large proportion of stones, so these linear features may have been stone walls in the past.

Due to their overall semi-natural state and biodiversity in a local context, WL1 contained within the study area are evaluated as being of local importance (higher value).

6.3.4.2.3 Treelines (WL2)

Some field boundaries within the study area feature semi-mature and some mature trees, and where these occur continuously, the habitat is classified as treeline (WL2). The most common species is ash, with some sycamore (*Acer pseudoplanatus*) and lime (*Tilia* spp.) also present. Numerous ash trees were found to be affected by ash dieback (*Hymenoscyphus fraxineus*), a fungal disease.

This habitat is evaluated as being of local importance (higher value).

6.3.4.2.4 Drainage Ditches (FW4)

Drainage ditches (FW4) are present along some of the hedgerows / margins of some fields within the study area. These are considered man-made or modified watercourse features, which are generally managed to improve drainage from the surrounding agricultural lands. The drainage channels present are comprised of relatively wide, straight sided muddy channels, containing shallow, stagnant to slow moving water. Some stretches of drainage ditches are prone to drying out. Some drainage ditches were seen to be mechanically maintained but these recover quite quickly, being revegetated within one year. When the site was surveyed in February 2022, a drainage ditch that discharges to the Rathnagore Stream had been recently managed by excavator. This was found to have a well-established plant community in May 2023, with fool's watercress *Apium nodiflorum*, water cress *Rorippa nasturtium-aquaticum*, stonewort *Chara* sp., bulrush *Typha latifolia,* pondweed *Potamogeton* sp. and marsh horsetail *Equisetum fluviatile* occurring. Other species recorded in this habitat were yellow iris *Iris pseudacorus,* starwort *Callitriche* sp., soft rush *Juncus effusus* and lesser water-parsnip *Berula erecta*. Most

drainage ditches recorded ultimately flow into the Ahacronane River, with only one flowing into the Riddlestown Stream. This plant assemblage was also recorded in April 2024.

Some drainage ditches were found to support frogs and a macroinvertebrate community, including snail *Lymnaea peregra* and diving beetles (Dytiscidae).

Drainage channels are modified watercourse features, and some are managed for the purpose of enhancing drainage from the surrounding agricultural lands. These features recover following management and, therefore, this habitat is evaluated as being of local importance (higher value), overall.

6.3.4.2.5 Lowland/Depositing River (FW2)

There are three semi-natural watercourses within the study area: the 1st order Rathnagore Stream, the 2nd order Ahacronane River, and the 1st order Knockardnacorlan Stream.

The Rathnagore Stream has been modified for agricultural/drainage purposes. The Ahacronane River, while somewhat modified, still maintains more semi-natural characteristics overall. The river flows in an easterly direction through the proposed development site and is culverted (piped) beneath an existing farm access track. The river bed is approximately 2-3m wide and flows over a predominately rock/stone substrate where flow is relatively fast, with generally finer substrates in sluggish reaches. The river is bordered by agricultural and wet grassland, and hedgerows, with some bank erosion evident.

The 1st order Knockardnacorlan Stream will be crossed via horizontal direction drilling (HDD) below the watercourse by the Option A grid connection cable that runs to the existing Carrons substation to the west of the proposed wind farm.

Due to their semi-natural state and local biodiversity value, these three watercourses - Rathnagore Stream, Ahacronane River, and Knockardnacorlan Stream are considered to be of local importance (higher value).

The 1st order Creeves Stream is an ephemeral watercourse that will also be crossed by the Option A grid connection cable via HDD below the watercourse to the west of the proposed wind farm. Due to its degraded state and low biodiversity value, this stream is considered of local importance (lower value).

6.3.4.2.6 Scrub (WS1)

Scrub (WS1) habitat is common in parts of the proposed development footprint/layout in areas associated with the proposed location of T2 and also along the access track to T3. This habitat is establishing and/or has established along the edges of a semi-natural wet/damp areas, where there appears to be some livestock grazing, but limited other agricultural land management improvements/inputs. In the location of proposed T2 and associated access track, the scrub (WS1) is typically comprised of abundant Gorse and Blackthorn shrubs, with frequent Bramble which is dense and impenetrable. Bramble, Blackthorn and Gorse are also progressing into the open area here. Further south, the proposed access track will also travel through an area of more established/mature scrub where Grey Willow shrubs and small trees become more frequent. Where trees and shrubs are more developed, the understory is more open. The ground here is poached by livestock but supports occasional ground flora such as Lesser Celandine (*Ranunculus ficaria)*, Common Nettle, Ground Ivy, Primrose, Ivy, Meadow Sweet (*Filipendula ulmaria)* and Bramble.

Due to its semi-natural state and local biodiversity value, scrub (WS1) is evaluated as being of local importance (higher value).

6.3.4.2.7 Wet Grassland (GS4)

As described above (for Scrub WS1) an area of semi-natural habitat is present towards the western section of the study area, which appears largely unmanaged except for low intensity cattle grazing. This area of the study area

is associated with a proposed site access track to T2 and T3 (5m wide) and one turbine (T2) hardstanding area. This open wet/damp grassy habitat is comprised of a purple moor grass *Molinia caerulea* dominated wet grassland (GS4) community type (e.g. purple moor grass – tormentil – creeping bent GL1D, purple moor grass – devils-bit Scabious GL1C, see Perrin 2021; NBDC online IVC database), which is generally unmanaged, grass-dominated, and rank in parts. Other flora recorded for this wet grassland GS4 community include occasional soft rush, creeping bent *Agrostis stolonifera*, carnation sedge *Carex panicea*, red fescue *Festuca rubra*, Meadowsweet, tormentil *Potentialla erecta*, devil's-bit scabious and rarely water mint *Mentha aquatica*. The moss *Calliergonella cuspidata* is frequent, with occasional *Rhytidiadelphus squarrosus* and *Scleropodium purum* recorded. Further south, purple-loose strife *Lythrum salicaria*, meadow thistle *Cirsium dissectum* and wild angelica *Angelica sylvestris* are present (but rare) in the sward. Young grey willow and blackthorn shrubs have also established in this area, with both shrubs becoming more frequent towards the boundary here and transitioning to scrub habitat.

Towards the northern boundary of this open habitat area there is a small section that becomes slightly wetter underfoot and Black Bog Rush *Schoenus nigricans* occurs (occasional to frequent) in the Purple-moor Grass dominated sward. Heathland species such as Heather *Calluna vulgaris* and Cross-leaved Heath *Erica tetralix* are present. Mosses *Sphagnum cuspidatum*, *Pleurozia purpurpea* and *Hypnum jutlandicum* are also present (but rare) here. Gorse becomes more frequent along the boundary. The site hedgerow and adjacent land use may be influencing this habitat area and encouraging the spread of scrub habitat along/out from the boundary here. This open grassland habitat extends west (outside the survey area/study area) where it becomes more extensive and may include other wetland habitat types. The proposed track between T2 and T3 will travel close to the eastern edge of this more expansive area.

This open wet grassland (GS4) habitat area may historically correspond to an example of the Annex I habitat type '6410' *Molinia* Meadow. However, the area has been affected by limited grassland management and surrounding land-use/drainage/improvements and is currently degraded. Therefore, it is in an unfavourable – condition overall, with a high abundance of rank Purple-moor Grass and corresponding low occurrence/relative abundance of positive indicator (flora) species for this grassland habitat type. Similarly, in general, poor vegetation structure (*e.g.* forb to graminoid ratio) and scrub encroachment suggest poor future prospects for this habitat in its current condition and in relation to current management practice (after O'Neill *et al.* 2012).

Towards the east of this open area, the ground becomes drier underfoot, the soil appears less heavy and the occasional stone was noted. There is a corresponding shift in the wet grassland (GS4) community recorded with species such as Common Knapweed *Centaurea nigra*, Red Fescue, Cock's-foot *Dactylis glomerata*, Creeping Buttercup *Ranunculus repens*, Common Sorrel *Rumex acetosa*, Tufted Vetch *Vicia cracca*, Dandelion, Ribwort Plantain *Plantago lanceolata* and Meadow Vetchling *Lathyrus pratensis* becoming more occasional in the sward. This grassland community is present within the proposed location of T2 and associated hardstanding area. Scrub SW1 (as described above) is also common in this area and is encroaching onto the grassland area.

A section of the proposed site access track is proposed north west of T1, close to an existing farm track and along the edge of the wet grassland GS4 habitat area. This wet grassland GS4 community here is comprised of abundant Creeping Bent, Yorkshire Fog *Holcus lanatus*, Hard Rush *J. Inflexus* and occasional Perennial Rye-grass, Daisy, Lesser Spearwort, Creeping Buttercup and Yellow Flag Iris. This wet grassland GS4 becomes more diverse as it expands to the north of (and away from) the proposed access track location. The area is grazed by livestock, with poaching common, resulting in bare ground.

Wet grassland also occurs at the proposed soil storage area to the north west of T1. *Molinia* dominated wet grassland GS4 is situated in the vicinity of T2 and the proposed 5m site access track. While in a degraded condition, at present this habitat area is considered of higher local importance overall. As this wet grassland GS4 extends west, it is of higher local importance. Similarly, wet grassland GS4 situated in farmland to the north (where the

proposed access track will travel along its edge) is influenced by grazing/poaching but has biodiversity in a local context and is also of local importance (higher value).

6.3.4.2.8 Buildings and Artificial Surfaces (BL3)

The hard surfaces associated with farmyards, including buildings for housing cattle, a derelict dwelling house and concrete yards are classified as buildings and artificial surfaces BL3.

Due to limited biodiversity value, this habitat is evaluated as being of local importance (lower value) in the case of modern farmyards.

6.3.4.2.9 Stone Walls and other Stonework (BL1)

There are a number of old derelict stone buildings and walls, and due to the ecological niches provided by this habitat, this habitat is evaluated as being of local importance (higher value).

6.3.4.2.10 (Mixed) Broadleaved Woodland (WD1)

A few stands of woodland of mixed deciduous species occurs within the confines of the study area. Trees in this habitat are mainly ash, with some sycamore. Whitethorn, hazel, blackthorn and willow sometimes feature in this habitat, the latter at the margins on areas of wetter ground. In areas, this habitat has an associated understory of scrub. Much of the mature trees in this habitat have considerable ivy cover, a potential roost niche for bats.

This habitat is regarded as an important resource for wildlife, provides landscape connectivity, offers shelter and food and as such is evaluated as being of local importance (higher value).

6.3.4.2.11 Spoil and Bare Ground (ED2)

The unpaved tracks that are used to access farms correspond to this habitat. Some of these tracks have been surfaced with limestone aggregate and most have a grassy centre.

This habitat is highly disturbed and does not support a diverse floral assemblage. It is evaluated as being of local importance (lower value).

6.3.4.2.12 Poor Fen and Flush (PF2)

A small area of this habitat occurs to the southeast of proposed T6. This area is a wetland and is also discussed in the aquatic ecology report (Appendix 6C), where it is referred to as the Ballynisky Pond. The habitat at Ballynisky Pond corresponds to the Fossitt (2000) habitat Poor fen and flush (PF2) and 'Bottle Sedge – Bogbean mire' community as per the Irish Vegetation Classification (IVC)[15]. Bottle sedge *Carex rostrata* is the principal species of the community of Ballynisky pond, with bogbean *Menyanthes trifoliata*, marsh horsetail *Equisetum fluviatile*, pondweed *Potamogeton natans,* common spike-rush *Eleocharis palustris*, yellow iris *Iris pseudacorus* and water mint *Mentha aquatica* also occurring.

This habitat is rare in the locality and as such is evaluated as being of County Importance (CI).

6.3.4.2.13 Immature Woodland (WS2)

A small stand of immature ash occurs in an isolated cover of a field to the south of T4. This woodland has been affected by ash dieback disease and is not in a healthy condition.

This woodland will likely perish but is evaluated as being of local importance (higher value) because it likely supports an array of terrestrial invertebrates.

[15] https://biodiversityireland.ie/ivc-classification-explorer/fe2/fe2d/ Accessed: 5th July 2025

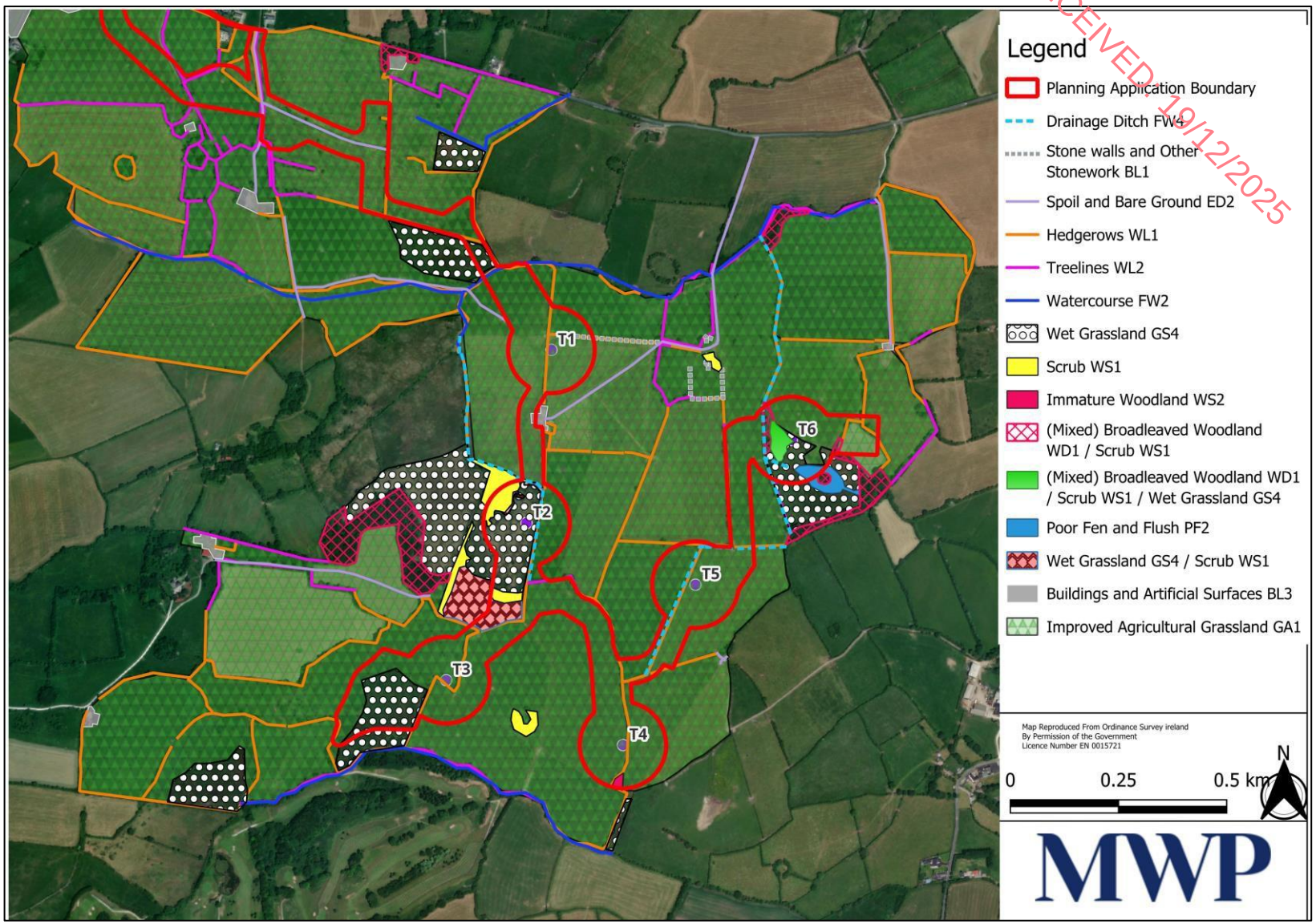

Figure 6-9: Habitats identified at the proposed development site (Sheet 1 of 2).

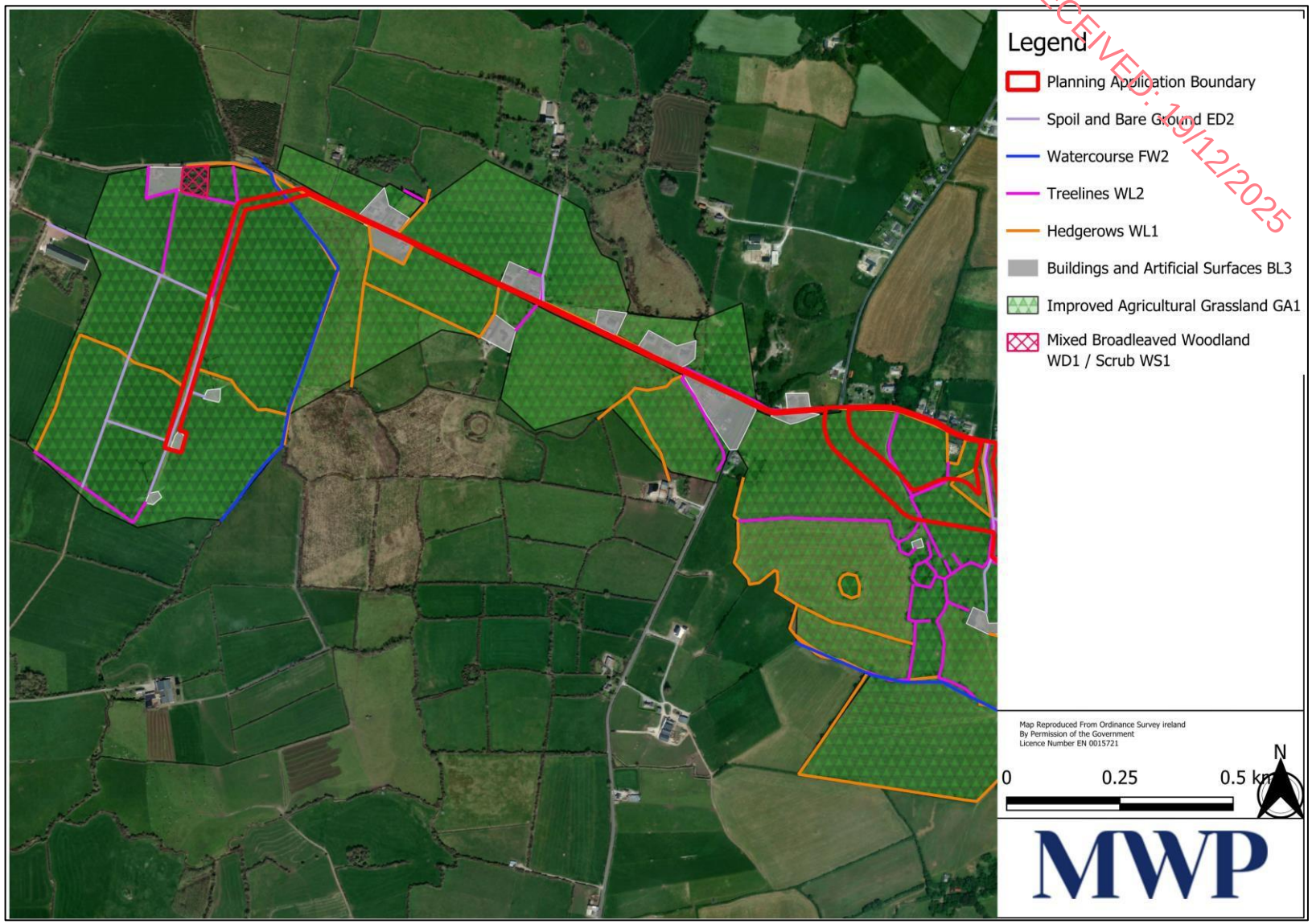

Figure 6-10: Habitats identified at the proposed development site (Sheet 2 of 2).

6.3.5 Invasive Alien Plant Species (IAPS)

6.3.5.1 Desktop Study

A search for invasive alien plant species recorded in the NBDC database R24 and R34 hectads encompassing the study area was carried out, with a focus on non-native plant species listed under the Third Schedule of the European Communities Regulations 2011 (S.I. 477 of 2015).

Documented records of high-impact invasive species listed on the Third Schedule include Himalayan balsam (*Impatiens glandulifera)*, Japanese knotweed (*Fallopia japonica),* Indian balsam (*Impatiens glandulifera*) and Canadian waterweed (*Elodea canadensis*). Documented records of medium-impact invasive species not listed on the Third Schedule include Himalayan honeysuckle (*Leycesteria formosa*), sycamore (*Acer pseudoplatanus*), traveller's-joy (*Clematis vitalba*) and hairy rocket (*Erucastrum gallicum*).

6.3.5.2 Field Study

No invasive alien plant species; including non-native species considered to be 'high impact' species (Kelly *et al*. 2013), or listed on the Third Schedule of the European Communities (Birds and Natural Habitats) Regulations 2011 (i.e. species of which it is a legal offense to disperse, spread or otherwise cause to grow in any place) and/or listed as being of European Union concern (IAS Regulation 1143/2014) were recorded during field surveys of the study area, including along the proposed grid connection route.

6.3.6 Aquatic Habitat Assessment

6.3.6.1 Description of Surface Water Features

The proposed development site features fields used primarily for agricultural purposes. Drainage is by overland flow, percolation to ground and aided by occasional field drains along field boundaries. The watercourses into which these drains discharge are low gradient watercourses categorised as 'depositing/lowland rivers' with reference to Fossitt (2000). They drain lands predominantly over limestone geology where the overburden is mostly till derived from limestone and deep well-drained mineral soil derived from mainly calcareous parent. There are therefore naturally nutrient rich. Surface drainage from the proposed development is to the north via the 2nd order Ahacronane River (subbasin Ahacronane_020) and to the south via the 2nd order Riddlestown Stream (subbasin Deel (Newcastlewest_130), the latter watercourse also referred to as the Kissaghatrodaun Stream.

The watercourses draining the proposed development site collectively support great willowherb *Epilobium hirsutum*, fool's watercress (*Apium nodiflorum*), brooklime (*Veronica beccabunga*) and lesser water-parsnip (*Berula erecta*), with some yellow iris recorded on bankside habitats.

The Ahacronane River rises west of Kilcolman, approximately 4km west of the proposed wind farm and flows east to the north of the proposed development. It is fed by the 1st order Rathnagore Stream upstream of the proposed development. Downstream of the proposed development, the Ahacronane River changes course north northwest for , approximately 7km, flowing through Creeves and discharging to the Shannon Estuary near Barrigone at Robertstown Creek. Along the upper part of this reach, it receives the 1st order Creeves Stream which is crossed by the proposed grid connection route.

The Ballynisky Pond (south east of proposed T6) is a seasonal waterbody located in a field south of the Ahacronane River in the Ahacronane subbasin. This pond is connected to the Ahacronane River by the local drainage network. It is connected to a drainage ditch to the west by a minor drain. The water level of this pond is dependent on

groundwater levels up to a point where it flows into the minor drain. When the rising water level reaches the floor of the minor drain, water flows out of the pond so the extent of this wetland is governed by this drainage feature. The area associated with the pond to the east of the drain has shallow humic deposits resting on clay/marl, suggesting that this area was once more regularly prone to seasonal flooding, and was perhaps a turlough. The area is now largely species rich wet grassland, but its value is diminished somewhat by cattle trampling. The outflow from the pond is to the Ahacronane River, approximately 650m downstream.

Wetland Surveys Ireland have an area around T6 indicated as a wetland assigned a site name (Ballynisky) and code (WMI_LI194). This area has not been surveyed by Wetland Surveys Ireland but the main wetland types are indicated as wet grassland, scrub, marsh, fen and artificial pond.

Bottle sedge (*Carex rostrata*) is the principal species of the community of Ballynisky Pond with bogbean (*Menyanthes trifoliata*), marsh horsetail (*Equisetum fluviatile*), pondweed (*Potamogeton natans*), common spike-rush (*Eleocharis palustris*) and water mint (*Mentha aquatica)* also occurring. The habitat at Ballynisky pond corresponds to the Fossitt (2000) habitat 'Poor fen and flush (PF2)' and 'Bottle Sedge – Bogbean mire' community as per the Irish Vegetation Classification (IVC)[16].

The Riddlestown Stream rises approximately 2km east southeast of the proposed development. It is fed by the 1st order Rathnagore Stream which drains the southeastern extent of the proposed development site. Downstream of the proposed development, the Riddlestown Stream flows in a general north easterly direction for approximately 7km before meeting the 6th order River Deel 1km downstream of Kilcool Bridge.

The River Deel within the wider aquatic study area is a 6th order lowland/depositing river. It is a drained river.

The grid route connection extends west into subbasin Dooncaha Stream_010 and crosses the 1st order Knockardnacorlan Stream at Ballysteen Bridge. The Knockardnacorlan Stream flows north and discharges to the 3rd order Shanagolden Stream, which then flows into Robertstown Creek. The lower reaches of this system are also drained. The 1st order Creeves Stream, a tributary of the Ahacronane River is also crossed by the grid connection.

6.3.7 Fauna

6.3.7.1 Terrestrial Mammals

6.3.7.1.1 Desk Study

The information received from the NPWS after a data request for rare and protected species was reviewed. A number of protected native non-volant mammal species are recorded from the hectads overlapping the proposed development (see Table 6-10, below).

Table 6-10. Non-volant mammal records in the study area (source NBDC).

Species name	Common name	10km grid square (hectad)		Level of protection
		R24	R34	
Lutra lutra	Otter	✓	✓	Annex II & IV, Wildlife Acts
Meles meles	Badger	✓	✓	Wildlife Acts
Martes martes	Pine marten	✓	✓	Annex V, Wildlife Acts
Mustela erminea subsp. hibernica	Stoat		✓	Wildlife Acts

[16] https://biodiversityireland.ie/ivc-classification-explorer/fe2/fe2d/ Accessed: 5th July 2025

Species name	Common name	10km grid square (hectad)		Level of protection
		R24	R34	
Mustela vison	Mink		✓	Not protected- Invasive Species
Sciurus vulgaris	Red squirrel	✓	✓	Wildlife Acts
Lepus timidus subsp. hibernicus	Irish mountain hare	✓	✓	Wildlife Acts
Oryctolagus cuniculus	European rabbit		✓	Not protected
Erinaceus europaeus	Hedgehog		✓	Wildlife Acts
Myodes glareolus	Bank vole	✓	✓	Not protected- Invasive Species
Sorex minutus	Pygmy shrew	✓	✓	Wildlife Acts
Dama dama	Fallow deer	✓		Wildlife Acts
Vulpes vulpes	Fox	✓	✓	Not protected
Apodemus sylvaticus	Wood mouse	✓	✓	Not protected

6.3.7.1.2 Survey Results

The records of protected mammals recorded within the landholding boundary are illustrated in Figure 6-11 below. Table 6-11 presents the trail camera faunal records. Appendix 6A provides photographic plates of mammal records within the survey site.

6.3.7.1.2.1 Badger (*Meles meles*)

Badger activity was recorded within the study area, with the most commonly recorded signs of activity were snuffle holes, where badgers have dug the topsoil in search of food. Snuffle holes were rare and largely confined to improved pasture in close proximity to field boundaries. Trail cameras recorded badger activity, with highest occurrence in the eastern part. January 2025 accounted for the majority of badger activity recorded on trail cameras. Camera 18, located in the eastern part, captured badgers almost every night, except for three. Additional sightings were also recorded on trail cameras 6, 14, 15 and 16 (location of trail cameras outlined in Figure 6-11). It is considered that this badger was foraging along the field boundary as some fresh snuffle holes were also recorded in this area at the time of trail camera deployment and retrieval. Badger prints were recorded on occasion on exposed soil. Badger setts were not recorded within the landholding.

Badger is a protected species under the Wildlife Acts and considered an important ecological feature, and as such, is evaluated as being of local importance (higher value).

6.3.7.1.2.2 Otter (*Lutra lutra*)

No evidence of otter was recorded during the surveys. The watercourses draining the proposed development site are not considered important foraging habitats for otter taking account of their poor water quality status, small size and associated lack of a reliable food source for this species. Otter is not identified as an important ecological feature within the environs of the proposed development. An otter dropping was found at the N69 Bridge of the Ahacronane River approximately 7km from the proposed development in August 2022. This indicates that the species does use at least the lower reach of this watercourse. It is thus evaluated as being of local importance (higher value) given that the Ahacronane River is a receptor. The River Deel into which the Riddlestown Stream flows is an important watercourse for this species. During the additional surveys in January 2025 no evidence of otter was recorded.

6.3.7.1.2.3 Irish Mountain Hare (*Lepus timidus hibernicus*)

Irish mountain hare occurs at the proposed development site. A drove of five hares was seen near the centre of the site in May 2022. The open grassland at the proposed development site provides suitable foraging habitat for this species. This species was also recorded at Ballynisky Pond by trail camera. There was no record of hare during the mammal surveys in January 2025.

This species is evaluated as being of local importance (higher value).

6.3.7.1.2.4 Hedgehog (*Erinaceus europaeus*)

Footprints of a hedgehog were found alongside the Ahacronane River downstream of the proposed development site. This species likely occurs within the proposed development site as some suitable habitat occurs in the form of scrub and hedgerows. No records of hedgehog during the additional surveys in January 2025. This species is evaluated as being of local importance (higher value) due to its protection status under the Wildlife Acts.

6.3.7.1.2.5 Other Terrestrial Mammal Species

The proposed development site was found to be used by native fox (*Vulpes vulpes),* mice, non-native American mink (*Mustela vison*) and brown rat (*Rattus norvegicus*). Pygmy shrew (*Sorex minutus*) and bank vole (*Clethrionomys glareolus*) also likely occur at the proposed development site, though not detected during trail camera operational times. Bank vole is a medium impact invasive species while pygmy shrew is protected under the Wildlife Acts.

These other non-volant mammal species recorded are evaluated as being of local importance (lower value).

Table 6-11. Trail camera faunal records at the proposed development site.

Camera ID	Location	Species Recorded
1	Hedgerow west of farm buildings	Fox, mouse, robin, blackbird
2	Worn area within scrub	Cat, rat, mouse
3	East side of hedgerow over faint trail	Song thrush, blackbird, sparrow, mouse
4	West of western bridge over Ahacronane River	Pheasant
5	Stone wall next to drainage ditch	Fox, mink
6	Gap in stone wall over trail	Badger, fox, mouse, robin, song thrush, blackbird
7	Downstream of eastern bridge within site	Cattle instream
8	Overlooking faint trail	Nothing
9	Overlooking faint trail	Nothing
10	West of Ballynisky Pond, view east over pond	Hooded crow, hare, wood pigeon, little egret
11	Scrub in wet grassland between T2 and T3	Nothing
12	In the hedgerow	Fox, rabbit, jackdaw, woodpigeon, rabbit, rook
13	Next to drainage ditch and well-worn path	Fox, rook, robin
14	Trail leading into hedgerow	Badger, fox
15	Worn trail over drainage ditch	Badger, fox, rook, blackbird,
16	Trail leading into the next field by drainage ditch	Badger, fox
17	Trail by drainage ditch	Nothing
18	Proximity to snuffle holes	Badger, fox, blackbird, pheasant
19	Faint trail by the river	Fox

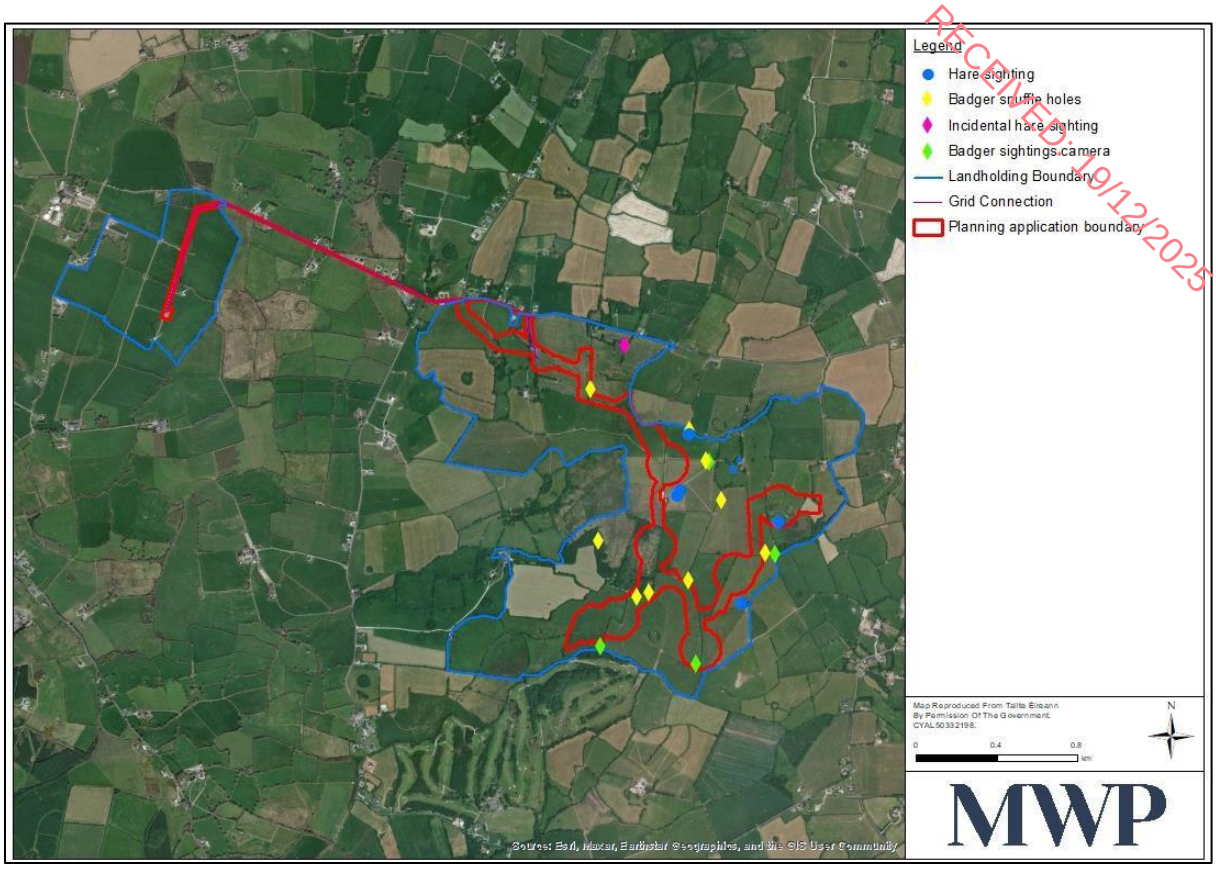

Figure 6-11: Protected mammals recorded within the landholding boundary during field surveys.

6.3.7.2 Bats

Summary results are presented hereunder with detailed results provided in the Bat Survey Report in Appendix 6D in Volume III of the EIAR.

6.3.7.2.1 Desktop Study

Records of the following are retained by BCIreland for locations within a 10km radius of the proposed wind farm development site:

- Brown long-eared bat (*Plecotus auritus*) ;
- Common pipistrelle (*Pipistrellus pipistrellus*);
- Daubenton's bat (*Myotis daubentonii)*;
- Natterer's bat (*Myotis nattereri*);
- Leisler's bat (*Nyctalus leisleri*);
- Lesser horseshoe bat (*Rhinolophus hipposideros*);
- Nathusius' pipistrelle (*Pipistrellus nathusii)*;
- *Pipistrellus* spp. (45kHz/55kHz);
- Soprano pipistrelle (*Pipistrellus pygmaeus*);
- Whiskered bat (*Myotis mystacinus*); and

- Unidentified bat.

The proposed development site is not situated near any area with a high density of known bat roost locations, with reference to Bat Conservation Ireland and NPWS records. With regard to the area within the proposed development site and its surroundings, the Bat Habitat Suitability Index (BHSI) rating for all bat species (29.78) is low, and no species has a rating above 50. While four species do have ratings between 40 and 50, the remaining species have ratings below 40. Three species - whiskered bat, lesser horseshoe bat, and Nathusius' pipistrelle – all have rating values of less than 20 which is a clear indication that the site is evaluated by the BHSI criteria as effectively having little or no potential value for these three species. This characteristic of the location and its extended surrounds is significant in light of the known strong correlation between bat activity and the habitat mix of an area.

A review of the NBDC and BCI databases shows 15 roosts within 5km of the proposed development site. The most significant is a Natterer's maternity roost at Ardagh Church (designated as Ardagh Church, Newcastlewest (Disused) pNHA – refer to Section 6.3.3.2, above) since the proposed development is located within the 4km core sustenance zone (CSZ) of the roost.

6.3.7.2.2 Survey Results

A comprehensive suite of bat activity surveys were carried out in 2023 across three survey periods: spring (April to May), summer (July to early August) and autumn (September to November) (see Appendix 6D).

During the 2023 survey period eight bat species were recorded - Common pipistrelle, Soprano pipistrelle, Nathusius' pipistrelle, Leisler's bat, brown long-eared bat, Natterer's bat, Daubenton's bat, and lesser horseshoe bat. In cases where species could not be identified, the identification was determined to the highest possible level such as *Myotis* sp. Of the bat species recorded, all are considered to have Favourable conservation status, apart from lesser horseshoe bat which is assessed as having an Unfavourable conservation status.

Due to the availability of treelines and hedgerows, particularly within the field boundary system, it is reasonable to infer that the site has an extrinsic biodiversity value to bats as these features are considered to be of high value to all species resident in Ireland and, while the agricultural grassland habitats that comprise the bulk of the proposed development site are only of medium value to bats, the hedgerows and treelines that bound them support complexity and variety - in terms of 3-dimensional structure, and species richness - in terms of plant communities. These characteristics are likely to support high macroinvertebrate productivity and, thereby, provide ample prey biomass for bats. These features also function as windbreaks and shelterbelts along which prey will accumulate and bats forage.

The site is typical of the rolling pastureland present at and adjacent to the proposed development site and within the wider geographical area more generally. High-quality connectivity to the wider area, evidenced by the extensive field boundary system, provides consistent and uninterrupted flyways and foraging corridors linking the proposed development site to other locations of similar biodiversity value that are abundantly available in the extended geographical area. Consequently, the site is unlikely, based on habitat quality alone, to comprise a hub or hotspot of bat activity relative to other locations in area.

Nine potential roost structures situated within 268m of the proposed development site were examined and all buildings were assigned a rating of negligible, low, medium or high with regard to its suitability. There are only two bridges within the study area - one over the Creeves Stream and another over the Knockardnacorlan Stream – and both were examined for roost potential. The bridge over the Knockardnacorlan had a single crevice that could be of use to bats but there was no roost potential within the bridge over the Creeves Stream. A total of eight PRF trees were recorded within 268m of the proposed turbines.

6.3.7.3 Fish

Detailed results can be found in Appendix 6C. Below are the summarised results. There were some obvious water quality problems associated with siltation and enrichment which reduce the quality of salmonid spawning and nursery habitat within the watercourses draining the proposed development site.

6.3.7.3.1 Desk Study

Brown trout (*Salmo trutta*), European eel (*Anguilla anguilla*), minnow (*Phoxinus phoxinus*), stone loach (*Barbatula barbatula*) and three-spined stickleback (*Gasterosteus aculeatus*) occur in the aquatic study area.

In McGinnity *et al.* (2003), which classifies Irish rivers in terms of salmonid habitats:

- The Ahacronane River is indicated as 'Producers of sea trout only' with the remaining watercourses in this subcatchment indicated as 'Not considered a significant producer of Salmonids'; and
- The reaches of the Riddlestown Stream >1st order are indicated as producers of salmon/seatrout.

These reaches are illustrated in Figure 6-12. The distribution and range of protected fish in the 10km grid squares containing the proposed development are illustrated in Table 6-12. This is based on Article 17 (2013 - 2018) Assessments in NPWS (2019) and includes three lamprey species.

Table 6-12 . Distribution and range of aquatic Annex II species in hectads R24 and R34.

Species	R24		R34		Likely reason for distribution within hectads
	CD*	CR^	CD*	CR^	
Sea lamprey (*Petromyzon marinus*) [1095]	No	No	No	No	n/a
River lamprey (*Lampetra fluviatilis*) [1099]	No	No	No	No	n/a
Brook lamprey (*Lampetra planeri*) [1096]	No	Yes	No	Yes	Common species likely to occur in most fluvial habitats with suitable spawning and nursery habitats.
Atlantic salmon (*Salmo salar*) [1106]	Yes	Yes	Yes	Yes	Owvane River ca. 7km west of and beyond ZOI of proposed development site supports salmon in R24. River Deel in R34 also supports salmon.
White-clawed crayfish (*Austropotamobius pallipes*) [1092]	No	No	Yes	Yes	River Deel within R34 once supported species but population was decimated in 2017. Not recorded during EPA biological sampling in 2020.

* CD: Current Distribution, ^ CR: Current Range

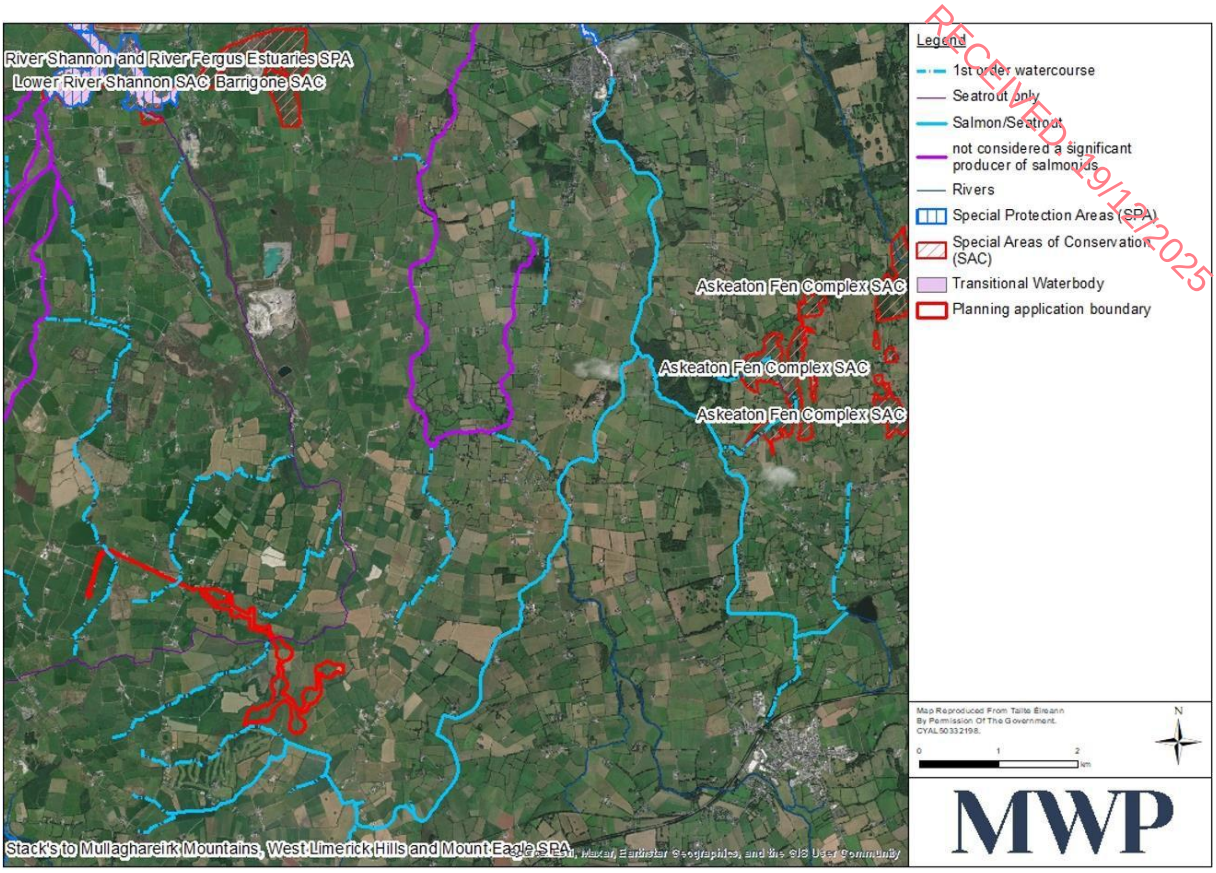

Figure 6-12: Salmonid classification of watercourses following McGinnity *et al.*, (2003).

6.3.7.3.2 Survey Results

Brown trout, European eel and three-spined stickleback were recorded during the electrical fishing investigations of watercourses draining the proposed development site. Table 6-13 gives length descriptive statistics for all fish species captured at the aquatic survey sites. Figure 6-13 illustrates fish presence records.

Table 6-13. Length descriptive statistics for fish species captured during the 2022 electrofishing survey of watercourses draining the proposed development site.

Site[17]	Species	Total number of fish captured	Fish Length (cm)			Standard deviation
			Mean	Min	Max	
1	Three-spined stickleback	2	3.3	3.5	0.1	3.4
2	Three-spined stickleback	14	3.7	2.4	5.3	0.8
3	Three-spined stickleback	6	3.8	3.2	5.4	0.8
5	European eel	6	33.2	29.5	37.0	2.4
	Three-spined stickleback	11	3.6	2.3	5.8	1.0
6	Three-spined stickleback	5	4.3	3.4	5.2	0.8
8	Brown trout	11	10.8	8.6	17.6	2.8
	European eel	5	29.2	22.0	35.7	4.8
	Three-spined stickleback	11	4.0	2.8	6.0	1.2
9	Three-spined stickleback	5	3.7	3.3	4.2	0.3

[17] Site 7 and Site 13 were unsuitable for fisheries assessment due to the small size/poor habitat present, and Site 4 is located at Ballynisky Pond.

Site[17]	Species	Total number of fish captured	Fish Length (cm)			Standard deviation
			Mean	Min	Max	
10	Three-spined stickleback	3	3.5	3.1	3.8	0.3
11	No fish detected	-	-	-	-	
12	Three-spined stickleback	6	4.2	3.1	5.8	0.9

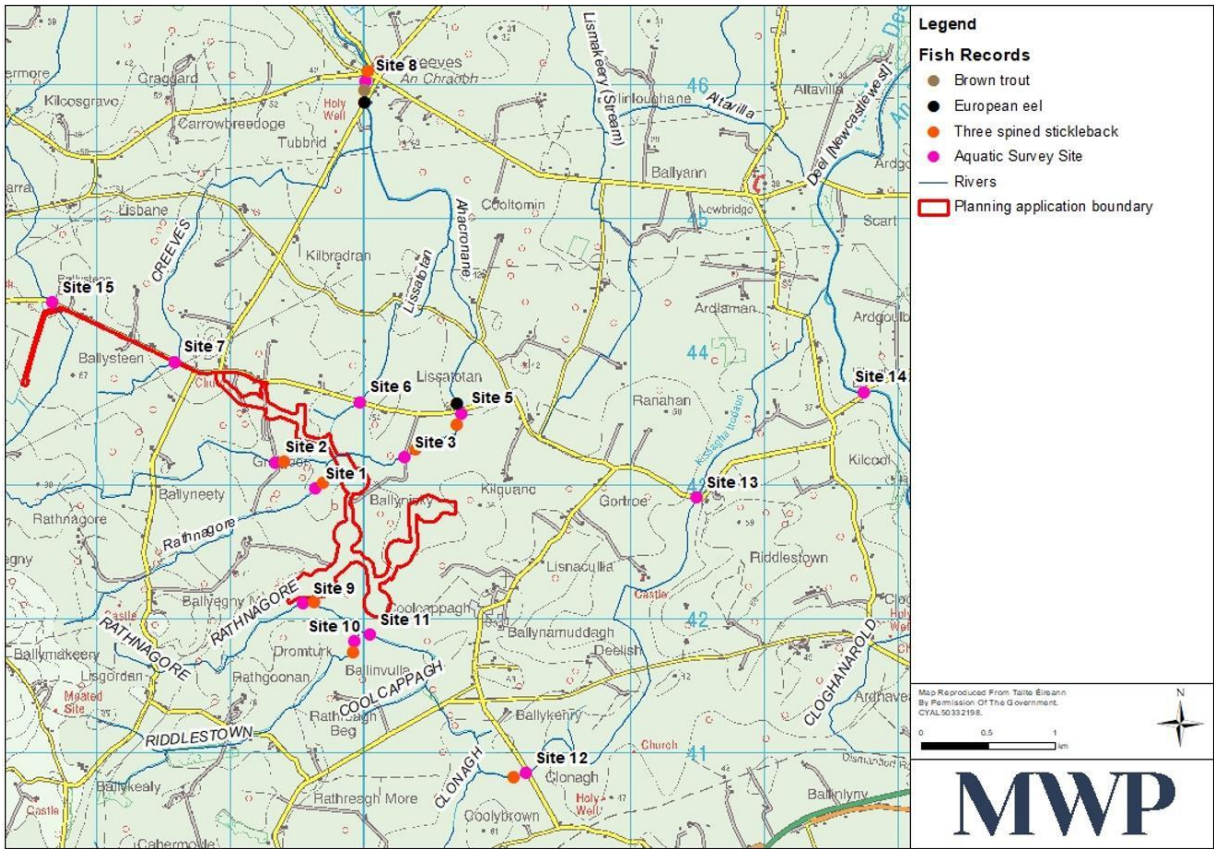

Figure 6-13: Fish species recorded at survey sites during electrical fishing surveys.

6.3.7.4 Amphibians and Reptiles

6.3.7.4.1 Desk Study

NBDC mapping holds records of both Common Frog (*Rana temporaria*) and Smooth Newt (*Lissotriton vulgaris)* in the 10km grid squares overlapping the proposed development site.

6.3.7.4.2 Survey Results

The proposed development site has some habitat suitable for frog (*Rana temporaria*). The drainage ditches at the proposed development site provide spawning habitat. Frog spawn was identified at three locations in a drainage ditch during March 2022, as in Table 6-14. It is noted that this drainage ditch had been recently maintained and therefore had little/no plant life. It is likely however that the drainage ditch used for spawning dried out prior to development of froglets and may therefore have perished taking account of its shallow nature and uniform bed gradient. It is considered that most of the spawn, estimated to be 75 clumps, had been washed downslope to a point where there was change in bed gradient of the drain – represented by a slight hump. The spawn had lodged here and it was noticed that some clumps at the margin had already began to desiccate. When spawning, frogs

seem to prefer waterbodies with some open water, probably to allow spawn to rise and fall with water levels. No evidence of spawning was recorded in the other drainage ditches examined.

Frog can be expected to occur in the streams within the proposed development site also, as they will sometimes use streams during the summer when flows are low. For example, the Ahacronane River is generally sluggish as it flows through the proposed development site and could be used by frogs during the summer. The Ballynisky Pond may be used by hibernating frogs. The wet grassland habitats are considered important for feeding froglets and adults.

The proposed development is of no particular value to reptiles as there is little suitable habitat present.

Table 6-14. Frog spawning records at the proposed development site in March 2022.

Code	Habitat	Coordinate (ITM)		Number of clumps
		X	Y	
1	Drainage ditch	529863	642633	24
2	Drainage ditch	529865	642643	26
3	Drainage ditch	529880	642722	75

6.3.7.5 Terrestrial Invertebrates

Several species of butterfly were recorded on the wing during surveys carried out in summer 2022: green-veined white *Pieris napi*, large heath *Coenonympha tullia*, meadow brown *Maniola jurtina*, large white *Pieris brassicae* and red admiral *Vanessa atalanta*.

Other invertebrates recorded were the seven-spot ladybird *Coccinella septempunctata*, noon fly *Mesembrina meridiana,* wolf spider *Pardosa amentata*, common cockchafer *Melolontha melolontha* and green dock beetle *Gastrophysa viridula*.

The hedgerow, treeline, wet grassland and scrub habitats are all important features for the production of terrestrial invertebrates. The species recorded are common and widely distributed across Ireland.

This group are evaluated as being of local importance (higher value) as they are the basis of food webs for the local ecosystem, sustaining higher organisms like birds and bats. Appendix 6A gives photographic plates of terrestrial invertebrates recorded within the survey site.

6.3.7.5.1 Marsh Fritillary

During marsh fritillary larval web surveys carried out during September 2023 and August 2025, evidence of larval webs was recorded in three locations within fields 1, 2, and 6, see Figure 3 in Appendix 6E. In the field containing proposed T2 and track, the wet grassland to the west was found to support one larval web.

The larval web in Field 1 appeared damaged, possibly by the rainfall that occurred the previous evening, with only one caterpillar visible. The web in Field 2 was empty, meaning that species could not be confirmed. The larval web in Field 6 was active and in good condition, with numerous caterpillars present.

As per the Marsh Fritillary Report (2025), Fields 1, 2, and 5 were “Suitable but Under-Grazed” habitat for Marsh Fritillary. The limiting factor in condition for these fields was the sward height, which was typically higher than 50cm. Across the fields that had been previously surveyed in 2023 (with the exception of Field 3), occurrences of low invading scrub and tall scrub were higher in 2025 than in 2023, with less structured vegetation. This, along with a lack of evidence of stock grazing in Fields 1, 2, and 3 suggests that a lack of management may have reduced the suitability for Marsh Fritillary. Whilst evidence of stock grazing was identified in Fields 4, 5, and 6, the intensity

may still be insufficient to reduce scrub growth and sward height, and to promote structural variety within the sward itself.

Field 1 was at the lower limit of suitability in regard to Devil's-bit Scabious abundance, with 20% frequency of category B/C abundance growing in swards taller than 25 cm. This had decreased from 55% in 2023. This field had an estimated population of 48 webs, with one larval web identified on the transect, which was consistent with the results of the 2023 survey. This larval web found in Field 1 was within the proposed development boundary but outside of the proposed site layout (i.e., construction footprint) (see Figure 3, Appendix 6E).

A Marsh Fritillary Report is contained in Appendix 6E, which illustrates the location of the survey transects, habitat suitability and larval webs.

6.3.7.6 Aquatic Invertebrates

Detailed results can be found in Appendix 6C. Below are outline results.

6.3.7.6.1 Desk Study

The River Deel in the wider aquatic study area supports an array of macroinvertebrate life, including larvae of mayfly (*Ephemera danicaBaetis rhodani, Seratella ignita, Caenis* sp.), caddisfly (*Limnephilus* sp,, Glossosomatidae, Phyrganeidae, Polycentropodidae, Hydropsychidae), molluscs (*Ancylus fluviatilis, Theodoxus fluviatilis, Potamopyrgus antipodarium, Radix balthica*), the dragonfly *Agrion* sp. and the crustacean *Gammarus* sp. The River Deel was once a stronghold for white-clawed crayfish (*Austopotamobius pallipes*), but the population was decimated by crayfish plague (*Aphanomyces astaci*) in 2017.

6.3.7.6.2 Field Survey

The macroinvertebrate assemblages in the Ahacronane River and Riddlestown Stream, watercourses that drain agricultural lands coincided with those that generally occur in the Deel catchment, i.e. pollution tolerant taxa. Family diversity at the aquatic study sites is shown in Table 6-15 (see also Appendix 6C, Table 2).

Table 6-15. Family diversity of aquatic invertebrate at the aquatic survey sites.

	Site											
	1	2	3	4	5	6	7	8	9	10	11	12
Family Richness	7	15	18	9	9	9	6	11	13	9	7	12

6.3.8 Water Quality

Detailed results can be found in Appendix 6C. Below are outlined results.

6.3.8.1 Desk Study

The EPA carries out biological monitoring at stations at various locations along the watercourses that drain the proposed development site. The results of these are given hereunder. The following is the most recent EPA biological assessments[18] for the watercourses draining the proposed development, based on EPA surveys in 2023:

- Ahacronane: Ecological conditions at both stations continuing Poor in 2023;

[18] http://www.epa.ie/QValue/webusers/PROPOSED_DEVELOPMENTFS/HA24.proposed_developmentf?Submit=Get+Results

- Shanagolden Stream: The lack of pollution sensitive macroinvertebrate species continues to indicate unsatisfactory Poor ecological conditions at both stations surveyed on the Shanagolden Stream in 2023. Station 1700, at the bridge south of Shanagolden, continues with moderate ecological conditions while station 2200 continues with poor ecological conditions;
- Unsatisfactory ecological conditions continue at station 1000 on the Dooncaha stream. However, an improvement from poor to moderate ecological status was recorded in 2023; and
- Deel (Newcastlewest): Seven stations were surveyed on the Deel (Newcastlewest) in 2023. All stations surveyed were in an unsatisfactory condition. The macroinvertebrate fauna indicates moderate ecological conditions at all stations surveyed. This includes station 1000 which recorded a decline in ecological condition from good to moderate. Siltation and enrichment continue to be problems along the Deel (Newcastle) River. It is noted that the White-clawed crayfish was not recorded in the Deel (Newcastlewest) river during the 2023 surveys.

Nutrient concentrations were available for the Shanagolden Stream at the bridge southeast of Shanagolden (monitoring station code 24S021800) and Kilcool Bridge on the River Deel (24D021300) as part of WFD surface water monitoring. The results of the key parameters are summarised in Table 8 in Appendix 6C and are deemed representative of conditions in streams draining the proposed development site, taking account of catchment characteristics and land use.

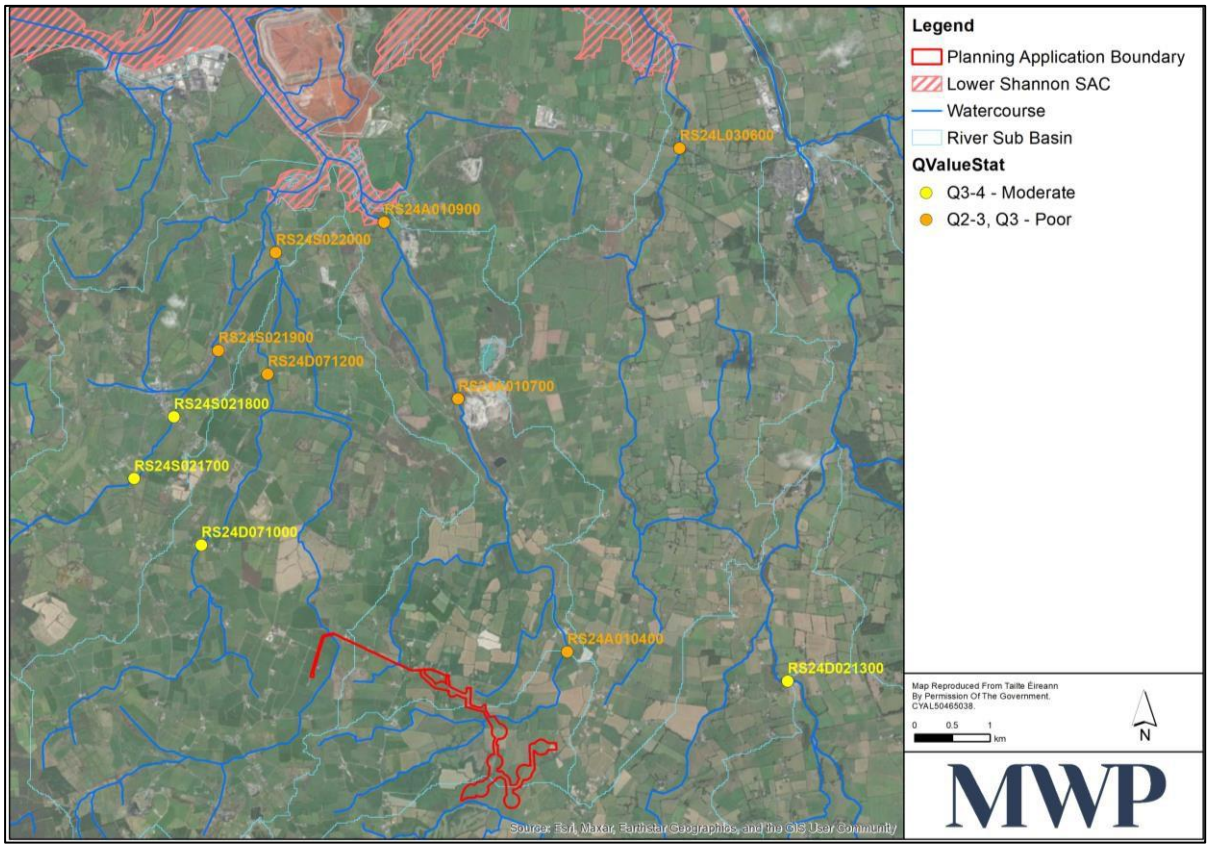

Figure 6-14: EPA biological water quality ratings for 2023 at sites on watercourses draining the proposed development site.

6.3.8.1.1 Field Study

The biological water quality of the watercourses in the receiving environment is impacted to the degree that no 'Group A' pollution sensitive taxa were recorded.

Another biological metric of water quality, the Salmonidae, were absent from most sites examined. This is attributed mostly to habitat suitability but also in part to water quality, noting that these two parameters were inter-related in the small channels draining the site. Biological water quality is largely compromised in the study area. Based on macroinvertebrate assemblages, the EPA scheme and Water Framework Directive (WFD) intercalibration, 'Poor' ecological conditions were recorded at all locations. Apart from Site 1, Site 4 and Site 7, the biological water quality at all sites was rated Q3, corresponding to 'Moderate status'. Site 1 and Site 7 were unsuitable for the Q-rating scheme due to the small size/poor habitat present, and Site 4 at Ballynisky Pond is an unsuitable waterbody for the EPA scheme, as this index is relevant only for flowing waters.

On 16th and 17th January 2025, water samples were collected from aquatic sites on streams draining the proposed development and sent to the laboratory for comprehensive water quality analysis. The testing was carried out by Southern Scientific Services in Farranfore in County Kerry to assess key physico-chemical parameters.

Water quality varied across sites, with localized pollution concerns. While total ammonia was low at most locations (0.02–0.06 mg/l), Site 14 on the River Deel had a significantly elevated level of 0.34 mg/l. BOD exceeded the salmonid tolerance of 5 mg/l at Site 9 (Rathanagore Stream, 5.2 mg/l) and Site 14 (River Deel, 5.3 mg/l), suggesting organic pollution. Nitrate levels were generally high, with only five sites below 8 mg/l NO_3, and none reaching 'high' quality status (<4 mg/l NO_3). Site 6 (Lisasatotan Stream) had the highest nitrite level (26.26 mg/l NO_3). Orthophosphate exceeded the 'good' quality threshold (>0.05 mg/l) at Site 1, Site 7, and Site 14. Water hardness varied significantly, with Sites 1, 2, and 3 classified as 'moderately soft' (79 mg/l $CaCO_3$), while Site 15 (Knockardnacorlan Stream) had 'hard' water (286 mg/l $CaCO_3$). Most other sites (5–14) had 'very hard' water (>300 mg/l $CaCO_3$), indicating mineral enrichment. Overall, agricultural runoff and nutrient enrichment appear to be the main pressures affecting water quality.

6.4 Identification and Evaluation of Key Ecological Receptors (KERs)

The habitats and associated flora, fauna and other ecological features or resources identified in Section 6.3 are now evaluated on the basis of their local, national, and international conservation importance using the evaluation criteria described in Section 6.2.6 above. Based on these evaluations, an assessment will then be made as to which of these habitats or species are considered sensitive ecological receptors that may be affected during the proposed construction, operation or decommissioning phases of the project.

An evaluation of the designated sites to identify those that are key ecological receptors (KERs) is also presented below.

6.4.1 Designated Sites

6.4.1.1 Site of European Importance

Two sites of European importance (Natura 2000 sites) designated for nature conservation located within the ZOI of the proposed development site - Lower River Shannon SAC (002165) and River Shannon and River Fergus Estuaries SPA (004077) – are each reviewed as potential KERs in Table 6-16.

6.4.1.2 Sites of National Importance

The Inner Shannon Estuary – South Shore pNHA (000435) and Fergus Estuary and Inner Shannon, North Shore pNHA (002048) both share their boundaries and qualifying interests (QIs) with the Lower River Shannon SAC and the River Shannon and River Fergus Estuaries SPA. A review of each pNHA as a KER is provided in Table 6-16.

With regards to Ardagh Church, Newcastlewest (Disused) pNHA, the Feature of Interest is a Natterer's bat roost. This designated site has been excluded from further assessment due to distance and lack of connectivity to the proposed development. While the core foraging range of Natterer's bat is up to 4km from day roosts with an occasional foraging range of up to 6 kilometres, it appears that populations are sustained by the relatively small areas of preferred habitats within their home range (Smith, 2000)[19]. According to Smith (2000), mature, semi-natural, broad-leaved woodland, tree-lined river corridors, and ponds are this species' preferred foraging habitat. Furthermore, Natterer's bat does not seem especially adapted for foraging in open situations (Siemers & Schnitzler, 2000). Hence, the proposed development site is not favourable for Natterer's bat with respect to their foraging habitats.

Given that only ten recordings of Natterer's bat occurred out of an overall total of 44,196 bat recordings obtained during static detector surveys carried out over three survey seasons in 2023 (see Appendix 6D, Table 4-4), the proposed development site is considered of low importance for Natterer's bat. Furthermore, considering the abundance of optimal habitat closer to Ardagh church, it is highly unlikely that the ten Natterer's bat recordings obtained during the static surveys at the proposed development site were made by individuals from the roosting Natterer's bat population of the Ardagh Church, Newcastlewest (Disused) pNHA. For example, the wooded margins of the Slewaun Stream running west and south of the pNHA offer infinitely better foraging opportunities for this species. Finally, given the low altitude foraging nature of Natterer's bat and their evident tendency to not use the proposed development site, the risk of collision or barotrauma impacts effecting the Ardagh Church pNHA Natterer's bat colony is low. Consequently, the Ardagh Church, Newcastlewest (Disused) pNHA (000430) is not considered further as a KER.

[19] https://ptes.org/wp-content/uploads/2014/06/nattererbook.proposed_developmentf Accessed: 5th July 2025

Table 6-16. Evaluation of sites of European and National Importance within the ZOI and rationale for inclusion or exclusion as a KER.

Designated site	Distance from designated site to proposed dev. site	Assessment of pathways for effect	KER (Yes/No)	Rationale for inclusion/exclusion
Lower River Shannon SAC (002165)and River Shannon & River Fergus Estuaries SPA (004077)	SAC - 6km to the north SPA - 6.8km to the north SAC & SPA - both 7.4 rkm[20] downstream from proposed Option A grid connection route crossing point of Knockardnacorlan Stream.	Proposed development site is hydrologically connected to two Natura 2000 sites - Lower River Shannon SAC, and River Shannon and River Fergus Estuaries SPA - via watercourses draining the site. Potential for water quality impacts through erosion and run-off of silt, and/or ingress of fuels/oils, cementitious material, or other such substances via overland flow and/or the existing/proposed drainage network to local watercourses and the estuarine waters of the River Shannon into which they drain. Potential for groundwater contamination via spillage of oils, fuels, chemicals. Potential for indirect alteration of wetland habitats located outside the proposed development site but hydrologically linked to it. Potential for indirect species disturbance/ displacement due to *in-situ* or *ex-situ* habitat loss/alteration impacts, impairment of water quality and/or impacts on prey availability.	Yes	The Lower River Shannon SAC and the River Shannon & River Fergus Estuaries SPA were identified within the screening for AA report as being located within the likely ZOI of the proposed development and are both assessed fully in the NIS that accompanies this application. The SAC and SPA are assigned International Importance and are included here as KERs because there is potential for indirect effects via surface water run-off, particularly during the construction phase of the proposed development.
Ardagh Church, Newcastlewest (Disused) pNHA (000430)	3.3km to the southwest	The conservation interest of this site is a Natterer's bat roost. There is potential foraging habitat loss for this species in the form of hedgerow removal at construction stage. There is potential collision and barotrauma risk at operation stage.	No	Based on the preference of this species for foraging in woodland, the species low occurrence at the proposed development site, intervening distance from pNHA to proposed development and the abundance of foraging in close proximity to the pNHA, this pNHA is not identified as a KER. See additional discussion in Section 6.4.1.2, above. All bat species are considered below in Section 6.4.5.
Inner Shannon Estuary - South Shore pNHA (000435)	6 km to the north 7.4 river km downstream	Shares qualifying interests (QIs) and boundaries with the Lower River Shannon SAC and River Shannon and River Fergus SPA. The proposed development is	Yes	The pNHA is assigned National Importance and is located 7.4 rkm downstream so there is potential for indirect effects on

[20] River kilometres (rkm) - Measure of the distance in kilometres along the path of a river

Designated site	Distance from designated site to proposed dev. site	Assessment of pathways for effect	KER (Yes/No)	Rationale for inclusion/exclusion
		hydrologically connected to this pNHA via watercourses draining the site. Potential for water quality impacts through erosion and run-off of silt, and/or ingress of fuels/oils, cementitious material, or other such substances via overland flow and/or the existing/proposed drainage network to local watercourses and the estuarine waters of the River Shannon into which they drain. Potential for groundwater contamination via spillage of oils, fuels, chemicals. Potential for indirect alteration of wetland habitats located outside the proposed development site but hydrologically linked to it. Potential for indirect species disturbance/ displacement due to *in-situ* or *ex-situ* habitat loss/alteration impacts, impairment of water quality and/or impacts on prey availability.		marine/estuarine habitats and species via surface water run-off particularly during the construction phase of the proposed development. Therefore, the pNHA is included here as a KER.
Fergus Estuary And Inner Shannon, North Shore pNHA (002048)	11.5 km to the north	Shares QIs and boundaries with Lower River Shannon SAC and River Shannon and River Fergus SPA, and the proposed development is hydrologically connected to this pNHA via watercourses draining the site.	No	The pNHA is located a significant distance from the proposed development site. Although there is a hydrological connection to the proposed development site via the Shannon Estuary and watercourses draining the site, the pNHA is located within the more eastern reaches of the Shannon Estuary and is, therefore, considered upstream of any watercourses draining the proposed development site. Consequently, this pNHA is not considered as a KER here.

6.4.2 Habitats

The habitat types identified within the receiving environment of the proposed development are evaluated below in Table 6-17 for their conservation importance, before a rationale is given as to their inclusion or exclusion as a KER.

Table 6-17: Evaluation of habitats within study area and rationale for inclusion or exclusion as a Key Ecological Receptor (KER).

Habitat type	Ecological value relative to study area (NRA, 2009)	KER	Rationale
Improved agricultural grassland (GA1)	Local importance (lower value)	No	Modified, intensively managed habitat. Species-poor.
Hedgerow (WL1)	Local importance (higher value)	Yes	Supports and provides ecological link for some species of high conservation importance, potentially including bats and protected non-volant mammals.
Treeline (WL2)	Local importance (higher value)	Yes	Habitat not directly affected within main wind farm site. Roots of trees along grid route may be affected.
Lowland/depositing river (FW2)	Local importance (higher value)	Yes	Potential for runoff and water quality impacts via preferential flow pathways to Ahacronane River and Riddlestown Stream and associated feeder channels. Semi-natural state and local biodiversity value, supports trout and other aquatic fauna, drinking water source for wildlife.
Drainage ditch (FW4)	Local importance (higher value)	Yes	Artificial and/or modified watercourse features, some managed for the purpose of enhancing drainage from the surrounding agricultural lands. Prone to drying out at some locations but supports unusual flora community in the locality and frogs.
Scrub (WS1)	Local importance (higher value)	Yes	Semi-natural state and local biodiversity value, insect production.
Wet grassland (GS4)	Local importance (higher value)	Yes	Semi-natural state and local biodiversity value, insect production.
Buildings and artificial surfaces (BL3): roads, tracks, agricultural buildings	Local importance (lower value)	No	Artificial habitat of limited biodiversity value.
Buildings and artificial surfaces (BL3): old farmhouse	Local importance (higher value)	Yes	Potential to support roosting bats.
Stone walls and other stonework (BL1)	Local importance (lower value)	No	Ecological niche for small mammals and invertebrates but maximum length of ca. 30m affected. Insignificant in local context.
(Mixed) broadleaved woodland (WD1)	Local importance (higher value)	Yes	Potentially supports some species of high conservation importance, including bats and protected non-volant mammals.
Spoil and bare ground (ED2)	Local importance (lower value)	No	Habitat highly disturbed, does not support diverse floral assemblage.
Poor fen and flush (PF2)	County importance	Yes	Habitat rare in locality, can potentially support aquatic species and bird life (e.g. teal, mallard, snipe). Rare habitat undergoing decline in quality and extent at national level due to increased demand on

Habitat type	Ecological value relative to study area (NRA, 2009)	KER	Rationale
			agricultural land, expressed in the Irish landscape as land drainage.
Immature woodland (WS2)	Local importance (higher value)	Yes	Local biodiversity value, insect production.

6.4.3 Rare and Protected Flora Species

Based on the desk and field studies, it is considered that no rare or protected flora occur at the proposed development site, so as such, nothing in this group is selected as a KER.

6.4.4 Fauna (excluding bats species)

The non-volant fauna species identified within the receiving environment of the proposed development are evaluated below in Table 6-18 for their conservation importance, before a rationale is given as to their inclusion or exclusion as a KER.

Table 6-18. Evaluation of non-volant fauna within the study area and rationale for the inclusion or exclusion of each as a KER.

Species	Ecological value relative to study area (NRA, 2009)	KER	Rationale
Otter	Local importance (higher value)	Yes	Otter occurs in the larger watercourses downstream of the proposed development site. Reduction in water quality has the potential to indirectly effect species via a reduction in prey resource (mainly fish) and habitat availability. Annex II & IV Species, afforded protection under Wildlife Acts.
Badger	Local importance (higher value)	Yes	Badgers were recorded on trail cameras deployed within the site. Suboptimal foraging habitat within the site boundary. Protected under Wildlife Acts.
Pine marten	Local importance (higher value)	No	Not recorded on-site, suboptimal habitat and foraging opportunities within the proposed development site.
Stoat	Local importance (lower value)	No	Not recorded, suboptimal habitat and foraging opportunities within the proposed development site.
Mink	Local importance (lower value)	No	Not protected- Invasive Species.
Red Squirrel	Local importance (lower value)	No	Not recorded, no suitable habitat for species within the proposed development site.
Irish Mountain hare	Local importance (higher value)	Yes	Utilises proposed development site. Protected under Wildlife Acts.
European Rabbit	Local importance (lower value)	No	No records within the proposed development site. Not protected.
Hedgehog	Local importance (higher value)	Yes	Suitable habitat and likely occurs within the proposed development site. Protected under Wildlife Acts.
Bank vole	Local importance (lower value)	No	Common, not protected- invasive species.

Species	Ecological value relative to study area (NRA, 2009)	KER	Rationale
Pygmy Shrew	Local importance (higher value)	Yes	Suitable habitat and likely occurs within the proposed development site. Protected under Wildlife Acts.
Fallow Deer	Local importance (lower value)	No	No records within proposed development site, unlikely to occur.
Fox	Local importance (lower value)	No	Common, not protected.
Wood mouse	Local importance (lower value)	No	Common, not protected.
Sea lamprey	Local importance (lower value)	No	No records for within the study area. The only potentially accessible watercourse, the Ahacronane River, is deemed too small as a spawning watercourse for the species. Due to the presence of rapids and a dam associated with a hydroelectric scheme, sea lamprey would not be able to ascend the River Deel beyond Askeaton. The link between the proposed development site and the lower River Deel is too weak for species to be impacted should it occur within lower reaches of River Deel.
River lamprey	Local Importance (higher value)	Yes	Occurs in Ahacronane River draining the proposed development site and probably confined to lower reaches. Rare species, however, protected under Annex II of EU Habitats Directive.
Brook lamprey	Local Importance (higher value)	Yes	Likely occurs in low densities within watercourses draining proposed development site, protected under Annex II of EU Habitats Directive.
Atlantic salmon	Local Importance (higher value)	Yes	The River Deel which receives drainage from the southern extent of the proposed development supports salmon, a species protected under Annex II & V of EU Habitats Directive.
Brown trout	Local Importance (higher value)	Yes	Species present in the larger watercourses draining the proposed development, prey item for otter and heron.
European eel	Local Importance (higher value)	Yes	Occurs in receiving watercourses. Critically Endangered Red List status.
Three-spined stickleback	Local importance (lower value)	No	Very common pollution tolerant species, not protected.
White-clawed crayfish	Local importance (lower value)	No	No records in the receiving watercourses surveyed within the study area. No longer occurs in the receiving environment after the advent of plague in 2017.
Other aquatic macroinvertebrates	Local Importance (higher value)	Yes	Potential for runoff and water quality impacts via preferential flow pathways. Support fish in some watercourses draining proposed development site.
Marsh fritillary	Local importance (higher value)	Yes	Potentially occurs within proposed development site, protected under Annex II of EU Habitats Directive.
Terrestrial Invertebrates	Local importance (lower value)	No	No records of rare or protected species within proposed development site and unlikely to occur. Proposed development site includes wet grassland, hedgerow and treeline as well as poor fen and flush habitats which collectively support a diversity of insect life. This group helps sustain higher organisms such as frogs, bats and birds.
Smooth newt	Local importance (lower value)	No	No records within proposed development site, unlikely to occur.
Common frog	Local Importance (higher value)	Yes	Occurs within proposed development site EU Habitats Directive Annex V, Wildlife Acts protection.

6.4.5 Bat Species

The results of the static detector surveys deployed over spring, summer, autumn 2023 recorded eight bat species Common Pipistrelle, Soprano Pipistrelle, Nathusius' pipistrelle, Leisler's bat, Brown Long-eared bat, Natterer's bat, Lesser Horseshoe and Daubenton's bat. Table 6-19 presents an evaluation of the bat species identified and the rationale for their inclusion or exclusion as a KER. The overall risk assessment for the proposed development, based on the most recent round of surveys (in 2023) was based on the activity level of high-collision risk bat species (Common pipistrelle, Soprano pipistrelle, Leisler's and Nathusius's pipistrelle).

Table 6-19. Evaluation of bat species within study area and rationale for inclusion or exclusion as a KER.

Species	Ecological value relative to study area (NRA, 2009)	KER	Rationale
Myotis sp. Bats (*M. daubentonii, M. nattereri, M. mystacinus)*	Local importance (lower value)	No	Very low incidence over the course of three seasonal surveys. No direct impacts on roost habitats, low collision risk species. Suboptimal foraging within the proposed development site. Favourable conservation status.
Brown long-eared	Local importance (lower value)	No	Very low incidence over the course of three survey seasons – activity comprised 502 recordings out of 44,196 recordings. No direct impacts on roost habitats. Low collision risk species.
Leisler's	Local importance (higher value)	Yes	High level of activity over the course of three seasonal surveys – activity comprised 8,339 recordings out of 44,196 recordings. No direct impacts on roost habitats (no roosts identified within 268m of proposed turbine locations) but collision risk during operation phase is considered a likely significant effect.
Lesser horseshoe	Local importance (lower value)	No	Unfavourable conservation status and listed on Annex II & IV of the EU Habitat Directive. Very low incidence over the course of three survey seasons – activity comprised only 10 recordings out of 44,196 recordings within the proposed development site. No direct impacts on roost habitats. Low collision risk species.
Common pipistrelle Soprano pipistrelle Nathusius's pipistrelle	Local importance (higher value)	Yes	During walked (transect surveys) the most recorded species were Common and Soprano Pipistrelle (50.5% and 40%, respectively). Common and Soprano Pipistrelle had high level of activity throughout the 2023 deployment. Nathusius's pipistrelle had a moderate to high activity level in 2023 survey season. No direct impacts on roost habitats (none identified within 268m of proposed turbine locations) but collision risk during operation phase is considered a likely significant effect.

6.5 Do Nothing Scenario

The existing environment is typically characterised by agricultural fields separated by hedgerow/treelines, with some drainage ditches along these boundaries. Under the 'do nothing scenario', the subject landscape can be expected to continue to be used for agricultural purposes, with continued associated activities including application of artificial fertilisers, spreading of slurry, hedgerow flailing, drainage maintenance, silage cutting and cattle grazing. With increased incentives/demands on grass production, there may be further agricultural intensification. An increase in the drainage density at the proposed development site could convert areas of wet grassland to improved grassland, with an associated loss in biodiversity. Similarly, any removal of scrub or field

boundaries for increased grass production would lead to biodiversity loss. In a "do nothing" scenario, cattle will likely continue to access Ballynisky Pond and the other watercourses at the site, thereby reducing the quality of these habitats. Many of the trees at the proposed development site are ash and are affected by ash dieback disease and will eventually perish prematurely.

If the proposed development were not to proceed, the opportunity to create areas of biodiversity value i.e., mixed/broadleaved woodland, wildflower habitat and pond creation to enhance the biodiversity of the development site and surrounding areas would be lost. Creation of a riparian setback zone to form an intact and permanent buffer area of natural vegetation alongside the aquatic zone , in order to protect water quality and aquatic ecosystems would also be lost. Refer to Appendix 6F Biodiversity Enhancement Management Plan (BEMP) for more details.

Furthermore, the opportunity to generate renewable energy and electrical supply to the national grid would also be lost if the proposed development were not to proceed. The opportunity to further contribute to meeting EU, Government and Limerick City and County Council targets for the production and consumption of electricity from renewable sources and the reduction of greenhouse gas emissions would also be lost. Compliance with the Climate Change and Low Carbon Emissions Act 2015-2021 would be impeded.

6.6 Likely and Significant Effects of the Proposed Development

Wind farm developments have the potential to impact the natural environment (habitats, flora, fauna, water quality and fisheries) if not carried out in a responsible manner and without control measures. The construction phase is likely to have the potential for the most significant effect. This section will identify in detail the potential ecological impacts of the construction, operational, and decommissioning phases of the proposed development on the local natural environment. The potential effects of the proposed development were considered and assessed to ensure that all effects on KERs are adequately addressed, and no significant residual effects are likely to remain following the implementation of mitigation measures/best practice.

During the project design phase, where significant ecological impacts were identified, in the first instance wind farm infrastructure was moved to a less sensitive location. A considerable effort was spent by the project ecologists and engineers avoiding or minimising ecological effects throughout the design process. Examples of the outcomes of this include the relocation of turbines and associated hardstands and reorienting hard stands. The iterations of the layout of the proposed development are outlined in Chapter 04 Alternatives. Mitigation measures were incorporated into the project design to remove or reduce impacts. Examples of this include the designed drainage system that will be used to ensure the control of water runoff containing suspended sediments from site earthworks and to channel it to the tiered sediment ponds for cleaning before being released back onto the land. In addition, no work will take place within the 50m buffer zones of watercourses (identified in the Chapter 08 Water of the EIAR) except for drainage / stream crossings and associated access track construction. The following assessment considers the aspects of the proposed development where the ecological effects were, or could not, be 'designed out' or avoided. In other words, it addresses the remaining effects, prior to the implementation of appropriate mitigation measures.

6.6.1 Construction Phase Effects

6.6.1.1 Designated Sites

Two sites of International Importance - River Shannon SAC and River Shannon and River Fergus SPA – and one site of National Importance - Inner Shannon Estuary, South Shore pNHA – have been selected as KERs. The three sites share QIs and spatially overlap, either partially or entirely, with each other within the Shannon Estuary. Water

quality is a key environmental factor underpinning the conservation condition of the complex of wetland habitats and species that these three designated sites are all selected for. Several watercourses drain the study area and their proximity to the proposed development site boundary provides an indirect hydrological pathway between the proposed development site and the downstream designated sites located approximately 7.3 river kilometres downstream from the proposed Option A grid route crossing of the Knockardnacorlan River, and approximately 8.7 river kilometres downstream from where the proposed new bridge will be constructed across the Ahacronane River. The existing drainage network within the development site, together with the network of drains in the surrounding area, create the potential for an indirect hydrological link between the proposed wind farm site and the designated site downstream.

During the construction phase, earthworks have the potential to adversely impact water quality due to soil erosion. The subsequent suspension of soil sediment particles in site run-off and overland flow can eventually reach the natural watercourses draining the site. Nutrients such as phosphorous can be bound to soil from past fertilisation of grassland crops and can become transported in overland flow. Potential also exists for accidental ingress of fuel and oils, concrete and cementitious material and other such substances considered harmful to the aquatic environment that could enter the streams draining the proposed development site - including the Ahacronane River, the Creeves Stream, the Knockardnacorlan River, and the Lissatotan Stream - via run-off, overland flow or the existing drainage network and tributary streams.

Contaminated water entering the designated sites creates potential for habitat alteration (or indirect habitat loss) of riverbeds downstream due to sediments suspended in overland flows that may clog up gravels suitable for spawning salmon or lamprey because of the unmitigated proposal. Otter habitat may be indirectly affected by a reduction in water quality which can significantly alter the suitability of a site for otters and their requirements. The habitats of the subtidal and intertidal animal communities living within the different regions of sediment, silt, mud and rock of estuaries, mudflats and reefs of the downstream designated sites have the potential to be altered or lost should there be a reduction in the quality of water. Similarly, siltation of the substrate and eutrophication leading to increased biomass of filamentous algae would adversely affect the wetland habitats and the halophytic vegetation of the soft intertidal salt marshes which provides foraging and roosting habitat to the many waterbird species of the Shannon Estuary.

Without implementation of appropriate mitigation measures, the potential effects of the construction phase on the aquatic/water-dependant habitats and species within the three designated sites located downstream, namely River Shannon SAC, River Shannon and River Fergus SPA, and Inner Shannon Estuary, South Shore pNHA are assessed as Temporary to Short-term, Likely, Moderate, Negative effects.

Although less likely to occur due to the intervening distances between the proposed development site and each of the designated sites, disturbance or displacement impacts to the QI species of the River Shannon SAC, River Shannon and River Fergus SPA, and Inner Shannon Estuary, South Shore pNHA because of noise and/or human activity associated with construction of the development are assessed as Temporary, Likely, Not Significant, Negative effects.

6.6.1.2 Habitats

Habitat loss, damage and fragmentation will result from the construction of turbine bases and hardstands, the construction of the electrical substation, construction of new access tracks and widening of existing tracks, erection of the site compound, spoil deposition and installation of underground electrical and communications cabling connecting the turbines to the onsite substation.

Figure 6-9 and Figure 6-10, above, illustrate the habitat at the proposed development site overlain by the proposed development boundary (which has a total area of approximately 43.02 ha) and the proposed infrastructure (total area of ca. 6.98 ha). These habitats and habitat mosaics will be directly impacted where they occur under infrastructure.

The area of a single hardstand is approximately 69m long by 25m wide with an approximate area of 1,725m^2. Internal access tracks will have a running width of generally 5m along straight sections, with localised wider areas at bends to accommodate the efficient transport of the wind turbine components. The habitats recorded and their areas of loss, or, in the case of linear habitats, the length of habitat which will be lost to facilitate construction of the proposed development, are provided in Table 6-20 and Table 6-21.

The majority of infrastructure proposed is to be located within habitats of low ecological value i.e. improved agricultural grassland (GA1) of which a total of 35.51 ha will be lost, and buildings and artificial surfaces (BL3) which are not selected as KERs. It is noted that some hedgerows have isolated mature trees and other woody features with ivy which have the potential to be used by roosting bats. Details in relation to tree assessments undertaken for bat suitability are detailed in Appendix 6D.

Table 6-20. Predicted hectares of KER habitat loss associated with the construction phase of the proposed development.

KER Habitat Type	Area of Habitat Loss (Ha)
Mixed broadleaved woodland/ Scrub (WD1/ WS1)	0.234
Mixed broadleaved woodland/ Wet grassland / Scrub (WD1/GS4/WS1)	0.288
Scrub (WS1)	0.344
Immature woodland (WS2)	0.039
Poor fen and flush (PF2)	0.097
Wet grassland (GS4)	4.89
Wet grassland (GS4)/Scrub (WS1)	0.33

Table 6-21. Predicted length in metres of linear KER habitat loss associated with the construction phase of the proposed development.

KER Linear Habitat Type	Length of Habitat Loss (m)
Hedgerows (WL1)	2,835
Treelines (WL2)	717
Drainage ditches (FW4)	1,662

Table 6-22, below, assesses the direct and potential indirect construction phase effects on the habitats included as Key Ecological Receptors, without the implementation of appropriate mitigation measures.

Table 6-22. Construction stage potential effects on Key Ecological Receptors (habitats) prior to mitigation.

Key Ecological Receptor	In-situ Impact	In-situ/Ex-situ effect	Description of Unmitigated Impact	Significance of Unmitigated effects (NRA, 2009 & EPA, 2022)
Scrub (WS1)	Habitat Loss	Habitat loss, loss of habitat connectivity, alteration	Habitat Loss The proposal will require 0.344 ha loss of this habitat type at the proposed new track between T2 and T3. Habitat Alteration/Disturbance Habitat disturbance may occur due to encroachment from works areas, side-casting of materials or spread of invasive species.	Direct habitat loss effects are assessed as Permanent, Likely Moderate, Negative Effects. Habitat disturbance effects are assessed as Short-term, Likely Slight Negative Effects.
Wet grassland (GS4)	Habitat Loss	Habitat loss, alteration	Habitat Loss The proposal will require 4.89 ha loss of this habitat type. Wet grassland will be lost from within a low-lying field west of T3 for establishment of deposition area, and near T2 and T6 for infrastructural development. Habitat Alteration/Disturbance Habitat disturbance may occur due to encroachment from works areas, side-casting of materials or spread of invasive species and/or hydrological impacts due to the proximity of the construction zone at T3.	Direct habitat loss effects are assessed as Permanent, Likely Moderate Negative Effect Habitat disturbance effects are assessed as Long-term, Likely Slight Negative Effects.
Wet Grassland (GS4)/ Scrub (WS1)	Unlikely	Loss of habitat connectivity	Habitat Loss The proposal will require 0.33 ha loss of this habitat type from an area just south of T2 for infrastructural development. Habitat Loss / Alteration Habitat loss and alteration may occur due to encroachment from works areas, side-casting of materials, spread of invasive species and/or hydrological impacts due to the proximity of the construction zone at T2.	Habitat Loss/Alteration effects are assessed as Short-term, Likely Slight Negative Effects
Hedgerows (WL1) / Treelines (WL2)	Habitat Loss	Habitat loss and loss of habitat connectivity.	Habitat Loss The proposal will require the loss of 2,835m of hedgerows due to infrastructure at T1, T3, and T4, and at other smaller areas along the L1219. The proposal will require a loss of 717m of treeline	Direct habitat loss effects are assessed as Permanent, Likely Significant, Negative Effects.

Key Ecological Receptor	In-situ Impact	In-situ/Ex-situ effect	Description of Unmitigated Impact	Significance of Unmitigated effects (NRA, 2009 & EPA, 2022)
			habitat along parts of the proposed Option A grid route and new internal access tracks. Habitat Alteration/Disturbance Habitat disturbance may occur due to encroachment from works areas, side-casting of materials or spread of invasive species.	Habitat disturbance effects are assessed as Short-term, Likely Slight Negative Effects.
Eroding/upland rivers (FW1)	Impairment of water quality	Impairment of downstream water quality	Habitat Loss There will be no loss of this habitat because of the proposed development. As set out in Section 6.1.3, above, this habitat will be crossed three times to accommodate internal site tracks and Option A grid route connection along the L1219. There will be no in-stream works required for any of the crossings and no direct loss of this habitat. Habitat Alteration/Disturbance Potential indirect effects due to deterioration of water and stream habitat quality due to potential run-off of silt/sediment, ingress of cementitious material, fuel or oil and /or impacts on flow regime and in-stream vegetation.	No loss of this habitat required. Habitat alteration effects are assessed as Permanent, Likely Moderate Negative Effects. Short-term Moderate Negative Effects with regards to aquatic ecology and water quality.
Mixed broadleaved woodland (WD1)/ Scrub (WS1)	Habitat Loss	Habitat loss, loss of habitat connectivity, alteration	Habitat Loss The proposal will require 0.234ha loss of this habitat type at T6 for infrastructural development. However, majority of areas of this habitat-type have been avoided and are outside the planning application boundary. Habitat Alteration/Disturbance Habitat disturbance may occur due to encroachment from works areas, side-casting of materials or spread of invasive species.	Habitat loss effects are assessed as Permanent, Likely Not Significant Negative Effects. Habitat disturbance effects are assessed as Short-term, Likely Moderate Negative Effects.
Poor fen and flush (PF2)	Habitat loss Impairment of water quality	Habitat loss/alteration, disturbance	Habitat Loss The proposal will require 0.097ha loss of this habitat type at T6 for infrastructural development. However, majority of the habitat has been avoided and is outside the planning application boundary.	Direct habitat loss effects are assessed as Permanent, Likely Significant, Negative Effects.

Key Ecological Receptor	In-situ Impact	In-situ/Ex-situ effect	Description of Unmitigated Impact	Significance of Unmitigated effects (NRA, 2009 & EPA, 2022)
			Habitat Alteration Potential indirect effects due to deterioration of water quality due to potential run-off of silt/sediment, ingress of cementitious material, fuel or oil and /or impacts on flow regime and aquatic vegetation within the pond.	Habitat disturbance effects are assessed as Short-term, Likely Slight Negative Effects.
Drainage ditch (FW4)	Habitat loss	Impairment of water quality	Habitat Loss There will be approximately 1662m (total length) of this habitat type within the proposed development site covered by turbine hardstands at T2, T5, and T6, and access tracks. Habitat Alteration Potential indirect effects due to deterioration of water and stream habitat quality because of potential run-off of silt/sediment, ingress of cementitious material, fuel or oil and /or impacts on flow regime and in-stream vegetation.	Direct habitat loss effects are assessed as Permanent, Likely Moderate Negative Effects. Habitat alteration effects are assessed as Short-term, Likely Slight Negative Effects.
Mixed broadleaved woodland (WD1)/ Wet grassland (GS4)/ Scrub (WS1)	Habitat Loss	Habitat loss and loss of habitat connectivity.	Habitat Loss The proposal will require 0.288ha loss of this habitat type at T6 for infrastructural development. Habitat Alteration/Disturbance Habitat disturbance may occur due to encroachment from works areas, side-casting of materials or spread of invasive species.	Direct habitat loss effects are assessed as Permanent, Likely Significant, Negative Effects. Habitat disturbance effects are assessed as Short-term, Likely Slight Negative Effects.
Immature woodland (WS2)	Habitat Loss	Habitat loss, loss of habitat connectivity, alteration	Habitat Loss The proposal will require 0.05ha loss of this habitat type in a field south of T4. This is the entire area of this habitat; however, it has been affected by ash die-back disease and will likely perish in the coming years.	Habitat loss effects are assessed as Permanent, Likely Not Significant Negative Effects.

6.6.1.2.1 Invasive Alien Plant Species (IAPS)

No invasive alien plant species were recorded within the study area. The proposed works will involve the localised movement of soil and subsoil on the site and will create disturbed ground. There will be no requirement for working at locations identified as supporting IAS, so construction related activity within the proposed development does not have the potential to result in the introduction, establishment or spread of IAS. IAS could be imported to the proposed development via vehicles such as excavators and dumpers, especially tyres of vehicles, however.

The significance of imported IAS on habitats is assessed as long-term moderate negative.

6.6.1.3 Faunal Species (excluding bat species)

The proposed development has the potential to result in disturbance and/or displacement of the fauna within the receiving environment due to habitat loss, habitat fragmentation, vibrations and human presence. Where fauna of particular ecological value or potential habitat for such species was recorded, these were included as KERs. The following sections assesses the likely effect to the species or groups of species identified in Section 6.4. Table 6-23 gives an assessment of potential construction phase impacts on mammals and terrestrial invertebrates.

6.6.1.3.1 Otter

No otter holts were recorded during the various ecological walkovers, but the fluvial habitats downstream of the development area are considered suitable for, and used by, otter. Water crossing works on the Ahacronane River are highly unlikely to displace foraging otters. Potential impacts on otter are related to the degree of water quality impairment. These impacts are considered to be limited given the localised and temporary nature of the works and the wide availability of suitable habitat downstream of the works. The significance of the impact on otter can be expected to be temporary to short-term moderate negative.

6.6.1.3.2 Hare

The open habitats at the proposed development site are used by foraging hare, however it is expected the species will avoid areas of development during the construction phase. Any avoidance of the development area by hare is expected to be a temporary moderate negative impact. A long term moderate negative impact is likely due to habitat loss and fragmentation of habitat.

6.6.1.3.3 Hedgehog and Pygmy Shrew

The hedgerow and scrub habitats at the proposed development site are considered suitable for hedgehog and pygmy shrew. These species are expected to forage throughout the area. Hedgehog will avoid areas of development during the construction phase. Any avoidance of the development area by these species is expected to be a temporary slight negative impact. A long term significant negative impact is likely due to loss of habitat. The impact to small mammals such as hedgehog and pygmy shrew becoming entangled in construction materials or dying due to construction is assessed as a short term significant negative impact at the local scale.

6.6.1.4 Bats

The potential construction phase impacts to bats are:

- Loss of habitats / alteration of habitats; and

- Disturbance and displacement of bats may occur during the construction phase due to the operation of vehicles, presence of staff, excavations etc.

6.6.1.4.1 Habitat loss/alteration

The construction of access tracks, foundations, and hardstandings around the turbines will result in foraging and commuting habitat damage and loss. The habitat loss will be the total area covered by the access tracks plus the footprint of each of the proposed turbines and all other wind farm infrastructure. Bats are known to exhibit a high level of site loyalty and will frequently return to the same foraging sites night after night (Entwistle *et al*., 2001). The levels of activity recorded during the surveys, detailed in Appendix 6D and 6E, provide direct evidence as to the suitability of the proposed development in that the extent to which the species were recorded will be related to the suitability of the site. Based on the results obtained for two survey periods, the site is of no particular value to foraging bats and is apparently not used by roosting bats, though some trees could be occasionally used by roosting bats.

The loss of hedgerow, scrub and wet grassland habitats that are used by bats for foraging will take place. It is concluded that habitat loss, fragmentation or alteration impacts on bats will be long term moderate negative.

6.6.1.4.2 Disturbance or Displacement

Disturbance to breeding, sheltering, or foraging by the KER bat species as a result of human activity and the operation of machinery is a potential impact during the construction phase of the proposed development, as site enabling and engineering work and turbine erection is expected to last 12- 16 months. However, as there is no evidence that any bat roosts are present on the site or within the study area (268 m from proposed turbine locations), bats will not be exposed to any disturbance or displacement impacts ensuing from fugitive noise from the construction activities. Impacts on hibernating bats or to breeding or nursing bats, during the active season, are not reasonably foreseeable. With regard to foraging activities, as bats only utilise the site for foraging at night, and only during the active period[21], they will not be present when construction work is taking place and will not, therefore be exposed to any disturbance or displacement impacts ensuing from fugitive noise from daily construction activities. It is expected that any disturbance or displacement impacts will be short-term imperceptible negative, localised and would not extend beyond the construction phase.

6.6.1.5 Terrestrial Invertebrates

The proposed development site includes wet grassland, hedgerow and treeline as well as poor fen and flush habitats which collectively support a diversity of insect life. Loss of areas of these habitats will reduce habitat available for insect production and therefore reduce the abundance and potentially the diversity of this group. There will be some knock-on effects on higher organisms such as frogs, bats and birds which feed on insects, and other invertebrates such as snails and worms also taken by birds. The impact of the proposed development is at a local scale. While infrastructure such as hardstands and access tracks will feature post construction, habitats affected elsewhere during construction of cable trenches and track verges will be reinstated.

Impacts on terrestrial macroinvertebrate habitats are assessed as long term moderate negative where infrastructure remains post construction. This impact will be of small scale, however. Impacts on terrestrial macroinvertebrates are considered temporary moderate negative where temporary infrastructure is removed post construction.

The location of the web identified within Field 1 (west of T2) is outside of the proposed Site Layout footprint however within the development boundary of the Project. The transect route in Field 1 did not result in the

[21] From approximately March/April to October/November

identification of any larval webs within the footprint of the proposed development. Any clearance or disturbance to Devil's-bit scabious within Field 1 has the potential to result in marsh fritillary mortality and/or significant reduction in the quality of marsh fritillary habitat should the species be present at the time of construction. Impacts on marsh fritillary are assessed as long term moderate negative.

Table 6-23. Ecological impact assessment of potential construction phase impacts on mammals and terrestrial invertebrates.

KER	Evaluation	Magnitude	Duration	Reversible?	Positive/ Negative	Geographical scale	Significance, confidence
Otter	Local importance (higher value)	Low	Short term	Yes (water quality recovery)	Negative	Local	Moderate, unlikely
Badger	Local importance (higher value	Medium	Short term	Yes	Negative	Local	Moderate, probable
Hare	Local importance (higher value)	Medium	Long term	Partial (related to habitat reinstatement)	Negative	Local	Moderate, probable
Hedgehog and pygmy shrew	Local importance (higher value)	Medium	Long term	Yes (hedgerow & woodland planting)	Negative	Local	Significant, probable
Pipistrelle bats	Local importance (higher value)	Medium	Long term	Yes (hedgerow & woodland planting)	Negative	Local	Moderate, probable (habitat loss/ alteration). Imperceptible, probable (disturbance/ displacement)
Leisler's bat	Local importance (higher value)	Medium	Long term	Yes (hedgerow & woodland planting)	Negative	Local	Slight, probable
Marsh fritillary	Local importance (higher value)	Medium	Long term	Yes (hedgerow & woodland planting)	Negative	Local	Moderate, probable
Terrestrial invertebrates	Local importance (higher value)	Medium	Long term	Yes (hedgerow & woodland planting)	Negative	Local	Moderate, probable

6.6.1.6 Aquatic Life

The diversity and quality of aquatic life in the waterbodies downslope of the Proposed Development is dependent on both the physical character and water quality of the water features. Since water quality dictates what aquatic ecosystems occur, this section concerns habitats and species extant in the receiving waterbodies that could be affected by water pollution i.e. trout, salmon, brook and river lamprey, eel, frog and macroinvertebrates.

Mobilisation of fine sediment during construction activities, or following erosion, can have important consequences downstream. There is potential for earthworks associated with the construction phase to cause impacts to water quality owing to entrainment of suspended solids and nutrient release in surface watercourses (e.g. via surface water run-off). There is also the potential for the release of pollutants used during the construction phase (e.g. hydrocarbon fuels, hydraulic fluids, etc.) into surface waters.

Pathways from proposed construction areas to receiving watercourses, including the Ahacronane River and Riddlestown Stream will be via overland flows and drainage ditches during periods of high rainfall, so potential source-pathway-receptor linkages do exist at the proposed development site. There is a risk of transfer of silt laden water from construction areas to watercourse during periods of heavy rainfall, especially if falling on dry

ground, as in the case of thundershowers during summer time. Any water quality impacts in such a scenario would be confined locally as flows in watercourses at such times are low.

Potential impacts on water quality are considered short-term and slight negative, given the already degraded water quality in the receiving waterbodies.

Impacts to aquatic life are related to water quality as outlined above. The aquatic biota selected as KERs are the fish species listed below and aquatic macroinvertebrates, which help support these fish. Table 6-21 outlines the potential impact assessment of the construction phase on aquatic life and water quality.

Construction of the bridge over the Ahacronane River as discussed in Section 6.1.3, above, may indirectly effect the aquatic life within the river via reduced levels of primary in-stream production due to potentially lower levels of sunlight reaching the river. However, considering the clear-span design of the bridge structure and its set back from the river channel, and because any potential impact will be indirect and exerted only over a short length of the river, the impact is assessed as imperceptible – none, taking account of the habitat availability elsewhere in the channel.

6.6.1.6.1 Fish Species

Fish selected as KERs are Brown Trout (Ahacronane River and lower reaches of Riddlestown Stream), Brook Lamprey (probably low densities in both the Riddlestown Stream and Ahacronane River), Atlantic Salmon (River Deel), River Lamprey (lower reaches of River Deel and Ahacronane River) and European Eel (Ahacronane River and River Deel, probably low densities in the Riddlestown Stream). As discussed in Section 6.1.3, above, the construction phase of the proposed development will require three watercourse crossings, however, none will require in-stream works, thereby, ensuring no direct loss of habitat for any of the KER fish species. However, potential water quality impacts as a result of construction activities could result in indirect disturbance/ displacement impacts on fish species downstream of the site. Potential indirect impacts may include increased sediment loads to watercourses which can potentially result in increased sedimentation within salmonid breeding and nursery areas. The effects of excessive deposition of fine sediment on salmonid spawning success and egg survival as documented in Crisp (2000) are: mortality; reduction in suitable spawning habitat and declines in egg/early life stage success; gill irritation/trauma; altered blood physiology; altered movement/swimming performance; changed foraging behaviour and reduced territoriality. Additional, excessive siltation events upstream often lead to negative impacts on fish further downstream, or habitats that support fish and their food.

Potential impacts on water quality and any ensuing impacts on fish species are considered short-term and slight - moderate negative, given the already degraded water quality in the receiving waterbodies and that any impact is likely to diminish with increased downstream from the proposed development site.

Table 6-24 outlines the potential impact assessment of the construction phase on the fish species selected as KERs aquatic life and the aquatic macroinvertebrates which help support these fish.

6.6.1.6.2 Aquatic Macroinvertebrates

The aquatic macroinvertebrate communities in watercourses draining the proposed development site have been selected as a KER. Aquatic communities are adaptable, and hence able to cope with natural 'baseline' sediment inputs which have been recorded during recent field investigations as high, but nonetheless tolerance thresholds of these pollution tolerant organisms could be exceeded with further inputs of sediment. Healthy freshwater ecosystems require sediment inputs to maintain habitat and nutrient fluxes, but excessive loading can have catastrophic effects on watercourse ecosystem function. The main direct physical effects are reduction in habitat availability and modification of habitat biogeochemical conditions through reduction of oxygen and increased

concentrations of toxic compounds (Kemp *et al*. 2011; Jones *et al*. 2012). The macroinvertebrate communities of watercourses draining the proposed development are already degraded as indicated by biological water quality indices – no survey site attained a Q-rating greater than Q3, suggesting ongoing water quality issues in the study area. Nonetheless, though unlikely, the proposed development could potentially cause further reduction in water quality in an already stressed system and therefore increase the ecological pressures on aquatic macroinvertebrate diversity.

Sediment can trigger invertebrate decline in various ways including scour damage, burial of heavy or immobile species, the clogging of gills or feeding structures, and reduction in interstitial habitat and primary production (Crisp, 2000). Negative impacts of high and persistent sediment loads on invertebrate assemblages and abundances are well documented with Ephemeroptera, Plecoptera, Trichoptera (EPT) taxa exhibiting the greatest negative response to increased sediment. It is noted that larvae of stoneflies (Plecoptera) were not recorded in the subject watercourses as this group are pollution sensitive.

Potential impacts on water quality and ensuing impacts on macroinvertebrates are considered short-term and slight - moderate negative, given the presence of pollution tolerant species.

6.6.1.6.3 Frogs (*Rana temporaria*)

Common frog occurs in the study area. The loss and alteration of wet grassland habitats will result in a reduction of foraging habitat for this species. Impacts on habitats of this species are considered long term significant negative in the absence of mitigation.

Table 6-24. Ecological impact assessment of potential construction phase effects on watercourses, and Key Ecological Receptor fish species, aquatic macroinvertebrate species, and frogs prior to application of any mitigation measures.

Receptor	Evaluation	Supporting habitat	Magnitude	Duration	Reversible	Positive / Negative	Geographical scale	Significance, confidence
Watercourses (water quality)	Local Importance (higher value)	All receiving waterbodies	Medium	Short term	Yes	Negative	Local, reducing with distance downstream	Moderate, unlikely
Brown trout	Local Importance (higher value)	Ahacronane River and lower reaches of Riddlestown Stream	Ahacronane: Medium Riddlestown: Low	Short term	Yes	Negative	Local, diminishing with distance downstream	Moderate, unlikely
Brook lamprey	Local Importance (higher value)	Probably low densities in Riddlestown Stream and Ahacronane River	Ahacronane: Medium. Riddlestown: Low	Short term	Yes	Negative	Local, diminishing with distance downstream	Moderate, unlikely
Atlantic salmon	Local Importance (higher value)	River Deel	Low.	Short term	Yes	Negative	Lower Deel catchment	Moderate, extremely unlikely
River lamprey	Local Importance (higher value)	Lower reaches of River Deel and Ahacronane River	Ahacronane: Low. Deel: None	Short term	Yes	Negative	Lower Deel and Ahacronane catchments	Slight - None, extremely unlikely
European eel	Local Importance (higher value)	Ahacronane River and River Deel, probably low densities in the Riddlestown Stream	Ahacronane and Deel: Medium. Riddlestown: Low	Short term	Yes	Negative	Local, diminishing with distance downstream	Ahacronane and Deel: Medium, unlikely. Riddlestown: Extremely unlikely
Aquatic macro invertebrates	Local Importance (higher value)	All receiving waterbodies	Medium	Short term	Yes	Negative	Local, diminishing with distance downstream	Moderate, unlikely
Frogs	Local Importance (higher value)	Wet grassland, rich fen and flush, waterbodies within proposed development and downstream.	High	Long term	No (habitat loss will occur)	Negative	Local	Significant, probable

6.6.2 Operational Phase Effects

The proposed wind farm development is likely to operate for up to 35 years. Hence impacts during the operational phase, although they may be lower in magnitude than the construction phase impacts, they will last for a longer time.

6.6.2.1 Designated Sites

Two sites of International Importance - River Shannon SAC and River Shannon and River Fergus Estuaries SPA – and one site of National Importance - Inner Shannon Estuary, South Shore pNHA – have been selected as KERs. During the operational phase of the proposed development, a reduction in water quality of the watercourses draining the development site is the predominant method by which the QI habitats and species of the downstream designated sites may be significantly impacted.

As discussed in Section 6.6.1.1, above, surface water run-off entering watercourses that are hydrologically connected to the designated sites downstream can adversely affect the complex of wetland species and habitats for which the sites are designated. However, following completion of the construction phase, on-site levels of traffic and excavation works will be extremely low, and the risk of sediment run-off will be negligible. Nevertheless, if operational maintenance personnel do not carry out regular inspections of the operations-phase surface water drainage system, silt, hydrocarbons and other pollutants may accidentally enter the watercourses at the wind farm site and adversely affect the downstream QI habitats and species of the designated sites in the same manner detailed in Section 6.6.1.1, above.

Without implementation of appropriate mitigation measures, the potential effects of the operational phase of the proposed wind farm on the aquatic/water-dependant habitats and species within the three designated sites located downstream, namely River Shannon SAC, River Shannon and River Fergus SPA, and Inner Shannon Estuary, South Shore pNHA are assessed as Temporary to Short-term, Slight, Negative effects.

The Special Conservation Interest (SCI) bird species for which the River Shannon and River Fergus Estuaries SPA is designated are also at risk during the operational phase of a wind farm of suffering displacement effects and increased mortality rates due to turbine strikes. These risks and effects are discussed further in Chapter 07 Ornithology and in the Natura Impact Statement (NIS) that accompanies the planning for this development.

6.6.2.2 Habitats

Long term potential impacts on habitats concern only wet grassland, poor fen and flush, and depositing/lowland rivers. These impacts are associated with the permanent site infrastructure such as tracks, turbine bases, soil deposition area and hard standings. Impacts can include alteration of surface and groundwater flow patterns, soil subsidence, sediment release and chemical pollution. Changes to wet grassland can lead to changes in the vegetation, habitat complexity and biodiversity. Surface flows may be locally altered by new drainage systems. Groundwater flow patterns may also be locally modified by turbine bases, the foundations of the substation and cable trenches, which may act as groundwater conduits or barriers. There may be localised disruption of flow paths near the turbines and a slight lowering of the groundwater table near drainage ditches. The fact that the proposed development site is set in a low-lying landscape where gradients are slight means the magnitude of these effects will be minimal.

Operational impacts on wet grassland, poor fen and flush, and depositing/lowland rivers are assessed as short-term to medium-term slight - moderate negative associated with alteration of surface and groundwater flow patterns.

The impact on habitats or species of routine and unscheduled maintenance in the form of accidental spillages, and subsequent discharge to watercourse has also been considered. Operational impacts on the hydrologically sensitive habitats wet grassland, poor fen and flush and depositing/lowland rivers are assessed as medium-term slight negative and highly unlikely, as movements will be limited to the area of infrastructure, and activities will be largely at hardstands and substation on insensitive habitats.

The proposed substation and ancillary buildings are located within improved agricultural grassland of low ecological value and sufficiently distant from treeline habitat to avoid any significant impacts on this KER habitat. Operational impacts on treeline habitat is assessed as short-term negligible.

6.6.2.3 Faunal Species (excluding bats)

6.6.2.3.1 Otter

It is considered that once the construction phase of the proposed development has been completed, otters that may have been temporarily displaced owing to construction activity will utilise the habitats within and adjacent to the development area within a short period of time. Any impacts to otters during operation will be related to water quality and assessed as short-term imperceptible negative.

6.6.2.3.2 Badger

It is considered that once the construction phase of the proposed development has been completed, badgers that may have been temporarily displaced owing to construction activity will utilise the habitats within and adjacent to the development area within a short period of time. The impact on badger is therefore assessed as neutral during the operation.

6.6.2.3.3 Hare

It is considered that once the construction phase of the proposed development has been completed, hares that may have been temporarily displaced owing to construction activity will utilise the habitats within and adjacent to the development area within a short period of time. The impact on hare is therefore assessed as neutral during operation.

6.6.2.3.4 Hedgehog and Pygmy Shrew

The hedgerow and scrub habitats at the proposed development site are considered suitable for hedgehog and pygmy shrew. These species are expected to forage throughout the area. Hedgehog will avoid areas of development during the operation phase. Any avoidance of the development area by these species is expected to be a negligible negative impact.

6.6.2.4 Bats

All Irish bat species are protected under the Wildlife Acts 1976 to 2021 and by the Habitats Directive (92/43/EEC) which protects rare species, including bats, and their habitats. All bat species are listed in Annex IV of the Habitats Directive as species protected across their entire natural range and the lesser horseshoe bat is further listed, under Annex II, as a species for which core areas of their habitat must be protected within the Natura 2000 network of protected sites.

6.6.2.4.1 Overview

Bat mortality may result from collision or barotraumas with the new turbine structures or turbine blades. Bats can also be adversely affected by barotraumas associated with flying close to moving turbine rotors. Barotrauma

describes injuries that occur when a bat (or other animal) encounters sudden and extreme changes in atmospheric pressure. The rapid pressure fluctuations can rupture air-containing structures in the bodies of mammals which causes internal bleeding and potentially death. Durr *et al*. (2001) hypothesised that the low-pressure regions that form over the convex surfaces of rotating turbine blades and within vortices that are shed from the blade tips might cause pressure fluctuations of sufficient magnitude to injure bats that fly too close to operating turbines. A study by Baerwald *et al.* (2008) was the first to find evidence for barotrauma as a cause of bat death. Rollins *et al*. (2012) found that the vast majority (94%) of bat deaths were directly attributable to impact trauma, with only a minor percentage (6%) potentially linked to barotrauma.

6.6.2.4.2 Initial Site Risk Assessment

To characterise potential risks that may exist at the proposed development site, SNH (2019, 2021) recommends that an Initial Site Risk Assessment (ISRA) of site-based risk factors be carried out. This ISRA, which comprises an evaluation of the site's risk level, is based on a consideration of the habitat and development-related features of the proposed wind farm area. Using the risk criteria outlined in Table 6-25, below, in combination with a highly precautionary approach, the proposed development site is evaluated as 'High' risk. Habitats surround the proposed turbines are ranked as High given the connectivity to the wider landscape with the presence of hedgerows and treelines. Watercourses border the proposed development and multiple bat roosts have historically been recorded in the wider area. Regarding project size, the project size is downgraded from Large to Medium, as although the turbines are over 100m in height, the proposed development is of a low number of turbines.

Table 6-25. Initial Site Risk Assessment.

Project Risk Rating			
Project Size	Small	Medium	Large
Habitat Risk Rating	Site Risk Assessment*		
Low	1	2	3
Moderate	2	3	4
High	3	4	5
Habitat Risk Level			
Habitat Risk	Description		
Low	• Small number of potential roost features, of low quality. NO • Low-quality foraging habitat that could be used by small numbers of foraging bats. NO • Isolated site not connected to the wider landscape by prominent linear features. NO		
Moderate	• Buildings, trees, or other structures with moderate-high potential as roost sites on or near the site. NO • Habitat could be used extensively by foraging bats. NO • Site is connected to the wider landscape by linear features such as scrub, tree lines, and streams. NO		
High	• Numerous suitable buildings, trees (particularly mature ancient woodland), or other structures with moderate-high potential as roost sites on or near the site, and/or confirmed roosts present close to or on the site. YES • Extensive and diverse habitat mosaic of high quality for foraging bats. YES • Site is connected to the wider landscape by a network of strong linear features such as rivers, blocks of woodland, and mature hedgerows. YES • At/near edge of range and/or on an important flyway. NO • Close to key roost and/or swarming site. NO		

Project Size Risk Level	
Project Size	Description
Small	• Small scale development (≤10 turbines). YES • No other wind energy developments within 10 km. NO • Comprising turbines <50 m in height. NO
Medium	• Larger developments (between 10 and 40 turbines). NO • May have some other wind developments within 5 km. YES • Comprising turbines 50-100 m in height. NO
Large	• Largest developments (>40 turbines) with other wind energy developments within 5 km. NO • Comprising turbines >100 m in height. YES

* Key: (1-2) - low/lowest site risk; (3) - medium site risk; (4-5) - high/highest site risk.

6.6.2.4.3 Collision Risk

The primary impact associated with operational wind farms, one that pertains to all bat species, is the risk of mortality due to collision with rotating turbine blades (Natural England, 2014). At the species level, the risk of collision with rotating turbines is correlated to the flight behaviours of each species. However, at the population level the risk of significant impacts from wind turbines is correlated to the level of bat activity – the level of exposure to the risk. The extent of this risk is, therefore, site specific and correlated to the numbers of bats utilising an area, the frequency of their usage and the duration of bat activity. Of the ten bat species that have been recorded in Ireland[22] all, apart from Leisler's bat, are normally low fliers that forage and commute at heights of less than 10m above ground level and as such are considered to be at a lower risk from turbine impacts (BCI, 2012).

SNH (2019, 2021) provides evaluations, at the population level, of the relative vulnerability to risk of collision of each bat species resident in the UK and places them into low, medium or high risk categories based on each species' behaviour and ecology in combination with evidence of casualty rates in the UK and Europe. These evaluations are summarised in Table 6-26 and are outlined in detail in Table 6-27, below.

Table 6-26. Level of potential vulnerability of populations of bat species.

Low collision risk	High collision risk
Brown long eared bat	Common pipistrelle
Myotis species	Soprano pipistrelle
Lesser horseshoe bat	Nathusius' pipistrelle
	Leisler's bat

Table 6-27. Potential vulnerability to collision based on physical and behavioural characteristics[23].

Factor	Low Risk	Medium Risk	High Risk
Habitat preference	Bats preferring cluttered habitat	Bats able to exploit background cluttered space	Bats preferring to use open habitat
Echolocation characteristics	Short range High frequency Low intensity Detection distance ~15m	Intermediate – more plastic in their echolocation	Long range Low frequency High intensity Detection distance ~80m[24]

[22] 9 of which are resident populations
[23] Adapted from SNH (2019) modified to exclude species not resident in Ireland
[24] Except *Pipistrellus* spp.

Factor	Low Risk	Medium Risk	High Risk
Wing shape	Low wing loading Low aspect ratio Broadest wings	Intermediate	High wing loading High aspect ratio Narrow wings
Flight speed	Slow	Intermediate	Fast
Flight behaviour and use of landscape	Manoeuvres well Will travel in cluttered habitat Keeps close to vegetation Gaps may be avoided	Some flexibility	Less able to manoeuvre May avoid cluttered habitat Can get away from unsuitable habitat quickly Commute across open landscape
Hunting techniques	Hunt close to vegetation Exploit richer food sources in cluttered habitat Gleaners	Hunt in edge and gap habitat Aerial hawkers	Less able to exploit insect abundance in cluttered habitat Aerial hawker Feed in open
Migration	Local or regional movements.	Regional migrant in some parts of range	Long-range migrant in some parts of range
Conclusion	*Myotis* species Brown long-eared bat Lesser horseshoe bat	No medium risk species resident in Ireland	Common pipistrelle Soprano pipistrelle Nathusius' pipistrelle Leisler's bat

6.6.2.4.4 Risk Assessments

The bat species selected as KERs are categorised by likely risk vulnerability, as outlined in Table 6-26 and Table 6-27, above, and in the paragraphs hereunder. The survey data is then used to assess the extent of each species' exposure to collision risk based on the level of each species' presence on the site. The risk assessment included in Appendix 6D summarises the bat survey data and the output from the initial risk assessment to derive an overall risk assessment for the high collision risk species Leisler's bat and pipistrelles (Common, Soprano and Nathusius's). The impact assessments below are based on the sensitivities of these species and level of incidence at the Proposed Development site.

Pipistrelle bats

Notwithstanding the low level of activity recorded, foraging common and soprano pipistrelle bats using the site will likely continue to do so during the operational stage. While the risk of collision is minimal it is concluded, on the basis of the precautionary principle, that significant unmitigated impacts on individuals frequenting the site are reasonably foreseeable. Pipistrelle bats forage along hedgerow and treeline features at the proposed development site and where these occur near turbine bases, there is some risk of collision. It is considered probable that any potential unmitigated impact would be long-term moderate negative to those individuals. Mitigation measures to further reduce the level of risk are included in further sections below.

Leisler's bats

Leisler's bats are primarily a broadleaf woodland species but will occupy parklands and urban areas that can provide all their habitat requirements. They can travel up to 10 km from the roost to a feeding site and tend to hunt most regularly over open deciduous or mixed woodland types and are known to preferentially select parkland/amenity grassland, deciduous woodland edge and rivers/canals and avoid improved grassland and hedgerows. The general trend in the numbers of bat passes recorded and the frequency with which this occurred

are such that even at the level of individual bats there is, at most, moderate exposure to any measurable or tangible risk of impacts. As a result, there is only limited population level exposure, even locally, to the proposed development. The general trend in the numbers of bat passes recorded and the frequency on which this has occurred are such that even at the level of individual bats there is, at most, moderate exposure to any measurable or tangible risk of impacts.

The level of activity recorded is consistent with the known habitat preferences of this species outlined above. The habitat surveys described in Section 6.3.4 determined that these habitat types are suboptimal in the intensively managed grassland that dominates the proposed wind farm site, thereby, rendering the site less valuable, relative to much of its surroundings, which comprise more structurally diverse habitats that are of higher ecological value to all bat species. For example, the golf course to the southwest of the proposed development site and the proposed development site itself are of a similar geographical spread but the golf course has preferable habitat in terms of Leisler's bat foraging.

Notwithstanding the low level of activity recorded, foraging Leisler's bats using the site may, in future, do so during the operational stage. While the level of exposure to collision risk is low, it is concluded, on the basis of the precautionary principle, that significant unmitigated impacts on individuals frequenting the site are reasonably foreseeable and it is considered probable that any potential unmitigated impact would be long-term significant to those individuals. Mitigation measures to further reduce the level of risk are included in further sections below.

Conclusion

Notwithstanding the low level of activity recorded for all species, foraging bats using the site may be impacted by mortality due to collision with rotating turbine blades or by barotrauma. As a result, it is concluded that long-term significant negative unmitigated impacts on bat species are reasonably foreseeable, and it is considered probable that any potential unmitigated impact may be significant. While the level of exposure to collision risk is minimal for certain species and low for the remaining species, mitigation measures to further reduce the level of risk are included in further sections below.

6.6.2.5 Terrestrial Macroinvertebrates

The impact on terrestrial macroinvertebrates is assessed as imperceptible negative. This includes marsh fritillary butterfly, of which a population exists in the wet grassland to the west of proposed turbine T2.

6.6.2.6 Water Quality

Impacts on water quality will be similar to those expected to occur during construction but can be expected to be less in scale and magnitude as any maintenance works will be significantly shorter in extent and duration. Adverse effects on water quality owing to infrastructure, maintenance, vehicular access and other operational activities at the proposed development are assessed as Long-term imperceptible negative in the absence of mitigation. Such impacts are deemed highly unlikely, as movements will be limited to the area of infrastructure, and activities will be largely at hardstands and substation on insensitive habitats.

6.6.2.7 Aquatic Flora and Fauna

Impacts to aquatic life in the surface waters within and downstream of the proposed development site are related to water quality as outlined above. Adverse effects on fish, macroinvertebrates and frogs are assessed as short-term slight negative in the absence of mitigation. Atlantic salmon, brown trout and European eel are variably vulnerable to pollution, the former species considered more sensitive.

6.6.3 Decommissioning Phase Effects

At the end of the estimated 35-year lifespan of the proposed development, the Developer will make the decision whether to repower or decommission the turbines. Any further proposals for development at the site during or after this time will be subject to a new planning permission application. If planning permission is not sought after the end of life of the turbines, the site will be decommissioned and partially reinstated with all 6 No. wind turbines and towers removed. Removal of infrastructure will be undertaken in line with landowner and regulatory requirements and best practice applicable at the time. The information below outlines the likely decommissioning tasks based on current requirements and best practice.

Prior to wind turbine removal, due consideration would be given to any potential impacts arising from the operations. Aspects to be considered and agreed with the Local Authority prior to decommissioning may include:

- Potential disturbance by the presence of cranes, heavy goods vehicles and personnel on-site.
- On-site temporary compound would need to be located appropriately.
- Time of year and timescale (to be outside sensitive periods).
- Prior to the decommissioning work, a comprehensive plan will be drawn up to ensure the safety of the public and workforce and the use of best available techniques at the time.
- Prior to the decommissioning work, a comprehensive reinstatement proposal, including the implementation of a programme that details the removal of structures and landscaping, will be submitted to the Planning Authority.

Any disturbance associated with the removal and disposal of the material may likely be more deleterious than leaving them in place. In the event of decommissioning being progressed, full engagement with the Local Authority and relevant departments including planning, environment and roads would take place to agree and ensure that any potential effects are minimised and controlled. A decommissioning plan would be agreed, and this would guide the process and control any potential effects.

Overall, the impacts of decommissioning a wind farm are potentially similar to construction impacts and will comprise temporary disturbance such as noise associated with decommissioning of turbines and on-site machinery. Ecological impacts of the decommissioning phase are assessed as temporary slight negative.

6.7 Potential for Cumulative Impacts

Cumulative effects are defined by CIEEM (2018) as; 'Additional changes caused by a proposed development in conjunction with other developments or the combined effect of a set of developments taken together'.

The effects on KERs arising from the proposed development in conjunction with other developments, either in planning, construction or operational within 20 km, was assessed in order to determine potential cumulative effects. A 20 km radius was taken as a standard distance for the cumulative impact assessment of larger-scale projects, based on the Wind Energy Development Guidelines (2006) and the Draft Wind Energy Guidelines (2019).

The potential for cumulative effects on biodiversity arise from those effects that have been identified to potentially occur during the construction and operational phases where other plans or projects have the potential to add to these identified effects.

It is generally anticipated that disturbance and displacement effects on fauna, will not extend beyond a 300 m radius of construction activities. This is because noise from typical construction work is expected to decrease to levels similar to the ambient environment at approximately this distance (Cutts *et al*., 2009).

6.7.1 Plans

The proposed development was considered in combination with other plans in the area that could result in significant cumulative effects on KERs. Other plans considered include:

- Limerick Development Plan 2022-2028[25];
- '*A River Basin Management Plan for Ireland 2022 - 2027*'[26]; and
- '*Food Wise 2025: A 10-year vision for the Irish agri-food industry*' published by the Department of Agriculture, Food and the Marine[27].

Projects arising from the Limerick Development Plan (LDP), and successors to the LDP, will be subject to AA/EIA. Therefore, unless projects can be provided for in line with the LDP, in-combination effects with the proposed development are not predicted. Strategic Environmental Assessment (SEA) and Habitat Directive Assessment (HDA) have been carried out in relation to the Limerick Development Plan, which has also incorporated the Wind Energy Strategy and associated SEA and HDA reports.

The Food Wise 2025 strategy identifies significant growth opportunities across all subsectors of the Irish agri-food industry. Growth projection includes increasing the value of the agri-food, fisheries and wood products sectors by 70% to more than €13 billion. Growth is to be achieved through sustainable intensification to maximise production efficiency whilst minimising the effects on the environment. However, there is increased risk of nutrient discharge from agricultural lands to receiving waters and in turn a potential risk to biodiversity and European Sites if not controlled. With the required mitigation in the Food Wise 2025 Plan, including cross compliance with statutory management requirements, EIA, Agricultural Regulations 2011 and Screening for AA, no significant in-combination impacts are predicted.

The Proposed Development Site is located in the Shannon International River Basin District. To implement the WFD whereby EU member states must ensure waters achieve at least good status, generally by 2027 at the latest, and that the status does not deteriorate in any waters, a management plan was prepared for the Shannon International River Basin District with the aim of achieving the objectives of the directive.

No significant cumulative effects are predicted with the plans listed above because of the temporal and geographical scale of the proposed development; effects are assessed as imperceptible negative.

Other plans/policies designed to improve the environment, such as the Water Framework Directive (2000/60/EC) and Ireland's 4th National Biodiversity Action Plan, pose no risk of likely significant in-combination effects. The primary purpose of these is to improve ecological status and improve the governance of biodiversity.

It is considered that without mitigations and compliance with standard best practice construction techniques, the proposed development could potentially result in Short-term Moderate, Significant Negative water quality effects in combination with these on-going activities.

6.7.2 Permitted and Proposed Developments in the Locality

A search of LCCC's online planning enquiry system for granted or on-going planning applications for the townlands within the site boundary - Ballynisky, Graigoor, Ballyegny More, Kilbradran, Lisbane, Ballysteen, Dunmoylan, , and Carrons - was undertaken in May 2025. The results are included in Table 5 of the Screening for Appropriate Assessment report. The projects relate largely to agricultural sheds and shed extensions, dwelling houses and their extensions, installation of domestic wastewater treatment systems, garages, demolitions and retention

[25] Limerick Development Plan 2022-2028 | Limerick.ie Accessed: 16th June 2025
[26] River Basin Management Plan 2022 - 2027 Accessed: 16th June 2025
[27] https://www.gov.ie/en/department-of-agriculture-food-and-the-marine/publications/food-wise-2025/ Accessed: 10th July 2025.

permission applications. Such minor domestic/agricultural development will not introduce cumulative effects due to the nature, scale and dispersed locations of these applications. These applications will not introduce complex or significant issues and are therefore not considered any further in the cumulative assessment.

6.7.3 EPA Licenced Facilities

A review of the EPA online mapping system was carried out to determine what ongoing emissions occur in the study area, namely Section 4 discharges, EPA integrated pollution control (IPC) and industrial emissions (IE) licensed facilities, urban wastewater treatment plants and extractive industries. Section 4 discharges (under the Water Pollution Acts) are Local Authority Licensed discharges of trade effluent into waters. Mapped emissions to watercourses and activities that may be impacting water quality in the study area are shown in Figure 6-15. These may be negatively affecting water quality in the River Deel and Ahacronane. These facilities and associated discharge limits will not introduce complex or significant issues and are therefore not considered any further in the cumulative assessment.

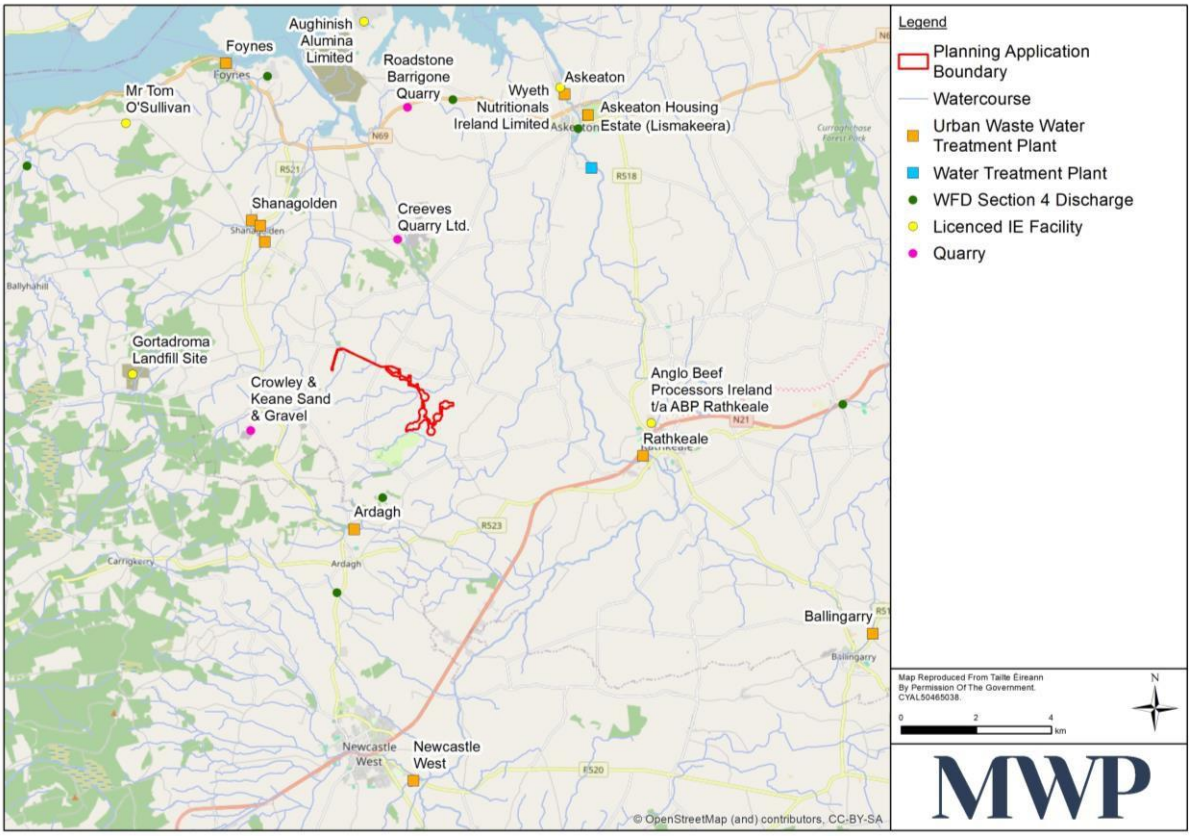

Figure 6-15: Activities potentially impacting water quality in the study area.

6.7.4 Renewable Developments

Within a 20-kilometre radius of the proposed development site, there are twelve operational wind farms, two of which are within a 10 km radius of the proposed development, the 2-turbine Carrons Wind Farm and the 6-turbine Grouselodge Wind Farm to the west – refer to Table 6-28, below, for more details.

The Limerick City and County Council online planning databases and the An Coimisiún Pleanála website were consulted to identify solar energy developments within 20 km of the proposed development. Refer to Chapter 2, Table 2-4 for a list of solar farms.

There were eight in total identified with only one application likely to have a significant effect, in the absence of mitigation. Harmony Solar Rathkeale Ltd. have received a 10-year planning permission for the development of a solar farm on a site of 63.4 ha located approximately 3.5 km northeast of the proposed Ballynisky development.

Cumulative effects from the proposed development and other renewable developments include:

- Downstream water quality effects within the catchment that, while imperceptible or not significant for the individual wind farm, result in a significant effect when viewed on a larger or catchment basis.
- Habitat loss
- Disturbance and displacement of fauna

In terms of adverse effects on individual species, the species that occur at the proposed development site that may be affected by the project (notably bat species, otter, and amphibians) are those that are likely to occur as somewhat distinct populations with significant suitable habitat occurring in the wider area.

In relation to the two operational windfarm developments and one proposed solar farm, located within a 5 km radius of the site, these developments involved (or will involve) the construction of impermeable areas and storm water drainage systems similar to those in the proposed development.

Both operational wind farms and the proposed solar fam site will have resulted (or will result in) in an increase in the volume of rainwater run-off compared to greenfield conditions; however, design mitigation measures will have ensured that the run-off rate does not exceed greenfield rates and that the quality of the run-off is not significantly affected. They also result in an insignificant reduction in groundwater recharge. These effects however are localised and given their distance away from the proposed development site are not considered to have any significant cumulative impact on the hydrology, surface or groundwater quality.

It is reasonable to assume that any approved and operational cumulative development has demonstrated no adverse environmental effects and the incorporation of good practice measures (e.g., construction phase and permanent SuDS, pollution prevention measures) into their designs. Such measures would manage surface water runoff rate, quantity, and quality, resulting in negligible effects on hydrology and hydrogeology.

In the absence of mitigation, there is potential for water quality deterioration arising from an accidental pollution event, which will have a deleterious effect on downstream ecological receptors. This effect would be temporary, adverse, likely significant effect at a local geographical scale.

Table 6-28. Wind energy developments located within 20 kilometres of proposed development.

Wind Farm	Status	Number of Turbines	Approximate distance and direction from proposed development
Carrons	Operational	2	2.5 km west of proposed development
Grouse Lodge	Operational	6	4.5 km southwest of proposed development
Dromada	Operational	19	13 km southwest of proposed development
Kilmeedy	Operational	2	14.5 km southeast of proposed development
Rathcahill	Operational	5	15.3 km southwest of proposed development
Tournafulla	Operational	18	16.8 km southwest of proposed development
Ballagh	Operational	2	18.1 km south of proposed development
Gortnacloghy	Operational	2	18.5 km south of proposed development
Cratloe West	Operational	5	18.8 km southwest of proposed development
Kilathmoy	Operational	7	19.4 km southwest of proposed development
Tooradoo	Operational	2	19.2 km southwest of proposed development
Upper Athea	Operational	2	19.5 km southwest of proposed development

6.7.5 Climate Change

Climate is an important environmental influence on ecosystems. Changing climate affects ecosystems in a variety of ways. For instance, warming may force species to migrate to higher latitudes or higher elevations where temperatures are more conducive to their survival. Similarly, as sea level rises, saltwater intrusion into a freshwater system may displace species or cause mortality, thus removing predators or prey that are critical in the existing food chain. Climate change not only affects ecosystems and species directly, it also interacts with other human stressors such as development. Although some stressors cause only minor impacts when acting alone, their cumulative impact may lead to dramatic ecological changes (Settele *et al*, 2014). Because species differ in their ability to adjust, asynchronies can develop, increasing species and ecosystem vulnerability. These asynchronies can include mismatches in the timing of migration, breeding, pest avoidance, and food availability. Growth and survival are reduced when migrants arrive at a location before or after food sources are present (Horton *et al*. 2014).

Ecosystems can serve as natural buffers from extreme events such as wildfires, flooding, and drought. Climate change and human modification may restrict ecosystems' ability to temper the impacts of extreme conditions, and thus may increase vulnerability to damage. An example of a biotope is the riparian zone that acts as buffer zones protecting riverine ecosystems from runoff of silt/nutrient laden waters via overland/pluvial flow, by absorbing/attenuating surface floodwaters. Land along the river watercourses may become vulnerable to erosion if climate change leads to increases in heavy rain-storms. This could lead to uncontrolled erosion of riverbanks, and riparian areas and loss of soil from fields, resulting in unnatural sediment loads and associated siltation of rivers. Climate change and shifts in ecological conditions could also support the spread of pathogens, parasites, diseases and non-native biota, with potentially serious effects on agriculture and aquatic ecosystems. Together with the proposed development, the aforementioned effects of climate change could exacerbate potential impacts associated with the proposed development.

Taking into account the nature of the wider study area (existing water quality impacts), the potential for cumulative effects are considered unlikely to be significant, and likely, long term, imperceptible, negative at most.

The proposed development will reduce the need for fossil fuels to generate electricity so will have a positive impact by reducing CO_2 emissions. In this regard, the long-term effect is assessed as certain, long-term, significant positive, cumulative effect.

6.7.6 Existing Land-use and On-going Activities

Hedgerow maintenance along roads, human presence and associated domestic activities, agricultural practices and commercial forestry are the prevalent activities that can act to negatively affect the environment at and in the environs of the proposed development.

The proposed development overlaps two subcatchments: Shanagolden [Stream]_SC_010 (Code 24_5); and Deel [Newcastlewest]_SC_040 (Code 24_1). Assessments for these subcatchments have been produced as part of the national characterisation programme undertaken for the second cycle of the Water Framework Directive river basin management planning. The Ballynisky Aquatic Survey report (Appendix 6C) contains more detailed information on the ecological pressures on water quality within the aquatic study area, including hydromorphological pressures, water abstraction, hydroelectricity and climate change.

There are three operational quarries located within ten kilometres of the proposed development site as presented Table 6-29.

Table 6-29. Details of operational quarries located within 10 km of the proposed development site (PDS).

Quarry name	Quarry number	Rock type	Operation type	Product summary	Approximate distance and direction from PDS
Hogan's Quarry	LK009	Limestone	Crushed rock	General fill, aggregates, blocks	3.3 km north of PDS
Knockbowheen Quarry	LK004	Limestone	Crushed rock	Graded shale products	1.7 km southwest of PDS
Michael O'Donovan Quarries	LK005	Shale/pencil	Crushed rock	Variously sized screened shale rock	2.2 km southwest of PDS

Considering the level of current activities at the proposed development site, and the nature of the wider study area (past and present land uses in the area), the potential for cumulative impacts is considered imperceptible negative because of the duration and scale of the proposed development. This impact assessment is based on the design of the Proposed Development, which has been informed by desk and field studies, which have identified the ecological sensitivities at the site, and which have been considered by engineers during site layout options. The final layout has been arrived at with ecological constraints heavily weighted, and in liaison with the developer who has consulted with landowners to avoid and minimise loss and degradation of habitats. Inherent in the design of the project are measures to avoid and reduce habitat loss and water quality impacts within and downslope of the Proposed Development site.

6.8 Mitigation Measures

6.8.1 Mitigation by Design

6.8.1.1 Habitats

The project has been designed to minimise the footprint of the proposed development on sensitive habitats, noting that minimum distances are required between turbine locations. This has been achieved in collaboration with engineering constraints by taking account of habitat value and areas of habitats affected. The project design has followed the basic principles outlined below to reduce/eliminate the potential for significant effects on ecological receptors:

- Avoidance/minimisation of turbine array and wind farm infrastructures at sensitive habitats (e.g. hardstanding areas designed to the minimum size necessary to minimise habitat loss);
- Avoiding wildlife refuge sites (e.g. waterbodies) insofar as possible;
- Grid connection route and internal tracks selected to utilise existing built infrastructure for the majority of its length (i.e. cables to be laid within public roads and existing tracks); and
- Cables laid underground to avoid effects on roadside hedgerows and disturbance to nesting birds.

6.8.1.2 Bats

For sites, such as at the proposed development site, SNH (2021) recommends a buffer distance of 50m between a turbine blade tip and the nearest woodland. In the case of the proposed turbines, the foraging features pertain largely to hedgerow habitats. The 50m buffer creates a clearance setback of 50m between the arc of the blade's sweep and the nearest hedgerow which could be used by bats. To calculate the clearance distance, the formula here is used to calculate (D), the distance between the edge of the hedgerow and the centre of the tower:

$$D = [(50 + bl)^2 – (hh – fh)^2]^{½}$$

Where bl = blade length, hh = hub height, fh = feature height (*all in metres*).

Based on this formula, a clearance distance of 91m around proposed turbines T1, T2, T4, T5 and T6 will be maintained to comply with Natural England (2014) guidelines for minimising impacts to foraging bats. A clearance distance of 98.4m will be maintained at T3. Clearance will be undertaken at each of the proposed turbines where hedgerow occurs within these areas, as illustrated in Figure 6-16.

To ensure that the buffer areas do not develop into the types of habitats that support high value macroinvertebrate production that would be a prey resource for bats, the lands around the turbines will be used for production of grass corresponding to the improved agricultural grassland that occurs at the site.

Trees will be felled where they occur in line with the infrastructure footprint and/or for bat buffer purposes. Eight trees were identified as supporting PRFs (see Appendix 6D, Figure 4-2). Emergence surveys were undertaken in summer 2023 and no bat tree roosts were confirmed.

Best practice measures will be undertaken in the felling of any trees with PRFs as follows.

- Trees with low potential roost features[2] will be 'soft' felled via section or limbs being cut and lowered to the ground or the tree shall be felled and left in situ for 24 hours prior to sectioning;
- Trees with negligible potential can be felled without consideration; and
- Trees with high or moderate potential, not found to support bats when surveyed would be 'soft felled' as per the methods presented on trees of low roost suitability.

2

Lights on turbines can reduce the potential risk of collision to bats; however, the use of "white lights" on the turbines will be avoided as these can attract insects, which in turn can attract bats. Any form of lighting on the turbines or other structures will have to be agreed in advance with the Irish Aviation Authority. Any lighting introduced to the development site will follow guidance in the document:

- Bat Mitigation Guidelines for Ireland. Irish Wildlife Manuals, No. 25 (Marnell *et al.* 2022)
- The proposed lighting around the Site will be designed in accordance with the Institute of Lighting Professionals Guidance Note 08/2311 Bats and artificial lighting at night.

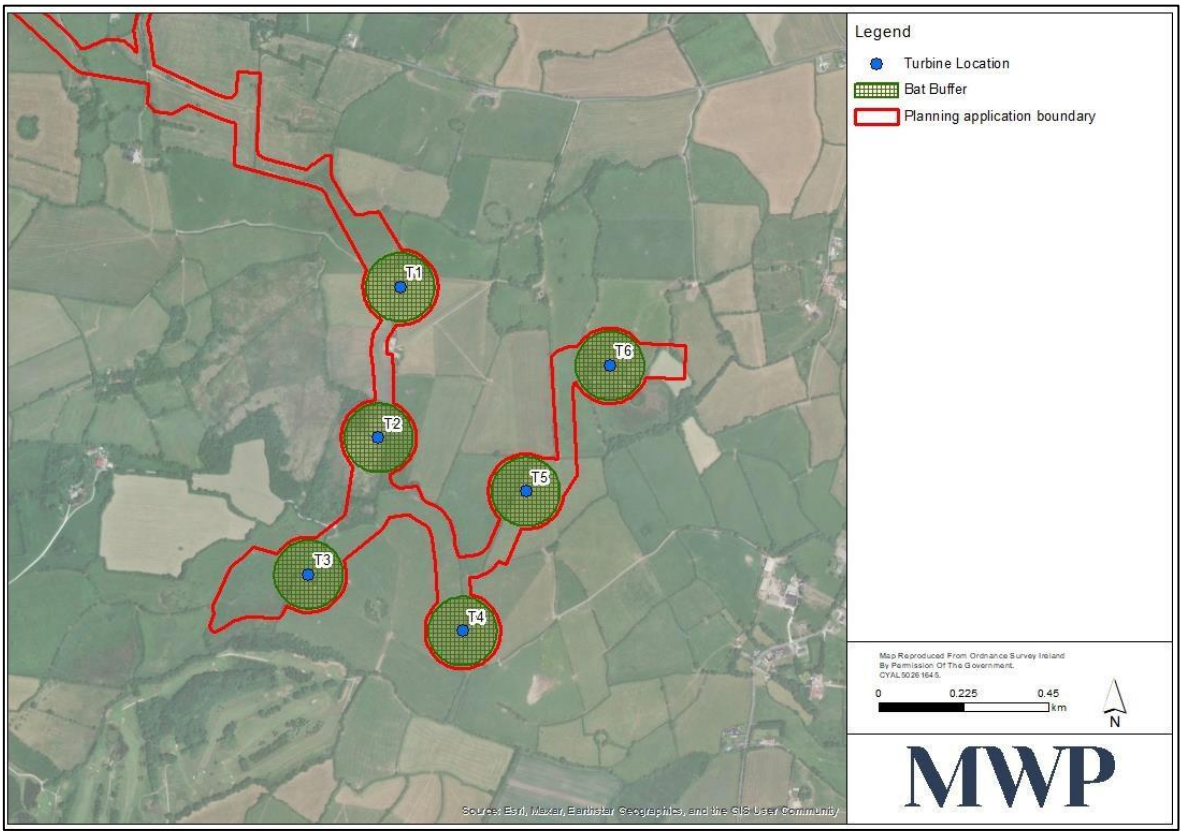

Figure 6-16: Bat foraging buffer required at the proposed wind farm development site.

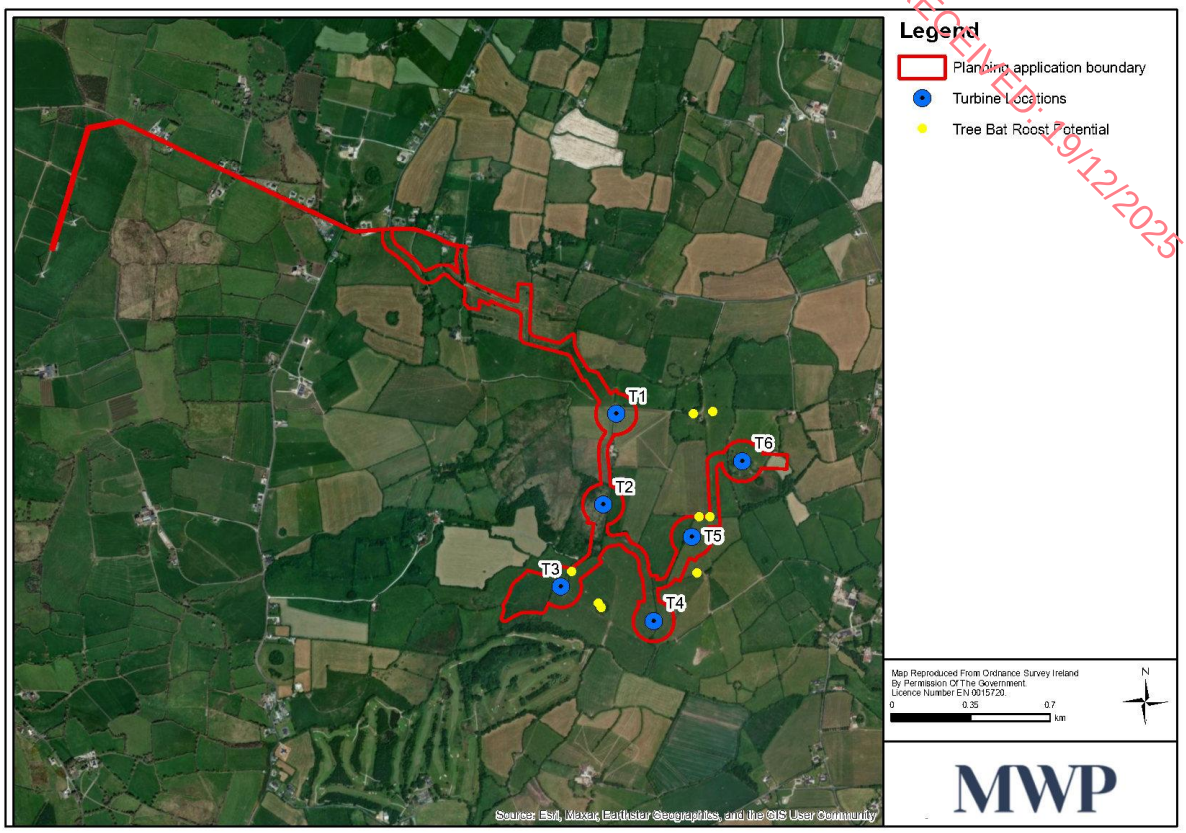

Figure 6-17: Trees with potential roost features (PRF) at the proposed wind farm development site.

6.8.1.3 Water Quality

The site drainage system was designed integrally with the wind farm infrastructure layout as a measure to ensure that the proposed development will not change the existing flow regime across the site, will not deteriorate water quality and will safeguard existing water quality status of the catchments from wind farm related sediment runoff.

Silt control will be a primary concern during the construction stage. Measures outlined below are included in the design of the development to avoid or minimise water quality impacts from arising during the construction phase of the development. Protecting water quality will protect aquatic fauna in fluvial habitats downslope of the proposed development site.

The selection criteria for crossing natural / artificial drains and streams within the site were:

- Avoid crossing drains or streams at acute angles where possible;
- Avoid meanders at the crossing location;
- Cross where foundations could be constructed without excess excavation; and
- Consider vertical alignment requirements.

The two (2) permanent deposition areas onsite are located 50 metres away from the nearest watercourses. For example, the larger of the two permanent deposition areas is separated from the Riddlestown Stream by an area of wet grassland. This habitat will act as a buffer for overland flow, attenuating runoff from the deposition area and preventing the ingress of sediment to this stream. There will be no light spillage to the Ahacronane River or Riddlestown Stream during either construction or operation phases.

All design and works in proximity to watercourses shall follow the generic best practice guidance outlined in the following documents:

- '*Guidelines on Protection of Fisheries during Construction Works in and adjacent to Waters*' (IFI, 2016)
- '*Guidelines for the Crossing of Watercourses during Construction of National Road Schemes*' (TII, 2008).

6.8.2 Mitigation by Avoidance

No work will take place within 50m buffer zones of watercourses identified in Chapter 08 Water of the EIAR, except for drainage / stream crossings and associated track construction.

Working near watercourses during or after intense or prolonged rainfall events will be avoided and work will cease entirely near watercourses when it is evident that there is a risk of pollution occurring.

The proposed site layout boundary will be marked by secure posts and robust high visibility tape. These areas will be marked out with reference to design drawings, under supervision of the project engineer/manager and the site ecologist. This will ensure sensitive areas such as the wet grassland area to the west of proposed turbine T2 and Ballynisky Pond (PF2) will be avoided and an exclusion zone put in place. . Machinery will not be permitted to breach these agreed boundaries during the construction phase. If there is scope for avoidance of KERs or habitats of potential use to KERs within the boundary, then these areas will be avoided.

6.8.3 Mitigation by Management

6.8.3.1 Habitats

In areas where works take place on habitats that have been selected as KERs, and where these areas will not be required during the operational stage, such areas will be reinstated. Reinstatement protocols will be incorporated into the CEMP. This does not apply to hedgerows, as bat buffers are required (Section 6.8.1.2). Seasonal restrictions for vegetation removal will apply in relation to the ecological features listed in Table 6-30

Spraying of vegetation using pesticides (herbicides, fungicides and insecticides) will not be permitted at any stage of development. Fluvial habitats will be protected by maintaining water quality in the receiving waterbodies.

Any clearance or disturbance of Devil's-bit scabious from the proposed T2 location (Field 1 in Appendix 6E) has the potential to result in the mortality of marsh fritillary and/or significant reduction in the quality of habitat for marsh fritillary, should the species be present at the time of construction. Appropriate mitigation measures therefore need to be implemented to ensure this species and its habitat are not significantly affected by the proposed works in Field 1. This will comprise of a check for larval webs 24 hours in advance of any vegetation clearance and, should any Devil's-bit scabious plant be found supporting marsh fritillary, the plant will be dug out by hand and translocated to an area of suitable retained habitat.

A Biodiversity Enhancement Management Plan (BEMP) will be implemented onsite, as compensation measures are considered necessary to off-set significant residual effects. These enhancements will also result in an improvement and future proofing of habitats on site and prevent further deterioration in these areas, leading to a net gain in biodiversity on Site. These measures are described in Appendix 6F. They will be delivered under the guidance of an experienced Ecological Clerk of Works (ECoW) (see Section 6.8.3.3).

Specific construction methodologies are outlined in the Construction Environmental Management Plan (CEMP). This includes management of soil (excavation, transportation and storage), drainage and water quality protection measures. For more detail see the CEMP (Appendix 2B).

Table 6-30. Vegetation removal restrictions for various ecological features.

Ecological Feature	January	February	March	April	May	June	July	August	September	October	November	December
Breeding Birds	Vegetation clearance permissible		Nesting bird season No clearance of vegetation or works to relevant structures permitted unless under guidance from the NPWS.						Vegetation clearance permissible			
Hibernating mammals (namely Hedgehog, excluding bats)	Mammal hibernation season No clearance of vegetation or works to relevant structures permitted unless confirmed to be devoid of hibernating mammals by an ecologist.					Vegetation clearance permissible					Mammal hibernation season No clearance of vegetation or works to relevant structures permitted unless confirmed to be devoid of hibernating mammals by an ecologist.	
Bats	Tree felling to be avoided unless confirmed to be devoid of bats by an ecologist.	Preferred period for tree-felling on mild days	Tree felling to be avoided						Preferred period for tree-felling on mild days			Tree felling to be avoided unless confirmed to be devoid of bats by an ecologist.
Common Frog	Preferred period for vegetation clearance	Vegetation clearance to be avoided unless confirmed to be devoid of common frogs by an ecologist							Preferred period for vegetation clearance			

6.8.3.2 Construction and Environmental Management Plan (CEMP)

A CEMP has been prepared for the proposed development (See Appendix 2B in Volume III of the EIAR). The implementation of proposed mitigation measures, environmental commitments of the development, as well as the monitoring and supervision of these measures will be managed through the CEMP. Mitigation measures to prevent significant negative impacts to the ecological receptors identified in this chapter and Chapter 08 Water will be implemented during the construction phase of the proposed project through strict adherence to the CEMP. Some content of the CEMP has been included here in Section 6.8.3.4.1 as it is relevant for water quality protection.

6.8.3.3 Environmental Clerk of Works (ECoW)/Project Ecologist

A suitably qualified and experienced project ecologist will be employed during the construction phase of the development. Duties will include the review of all method statements, delivery of toolbox talks and monitoring of construction phase activities to ensure all environmental controls and EIAR mitigation is implemented in full. The project ecologist will be awarded a level of authority and will be allowed to stop construction activity if there is potential for adverse environmental effects other than those predicted and mitigated for in the EIAR.

6.8.3.4 Protection of Water Quality during Construction Phase

6.8.3.4.1 Construction and Environmental Management Plan (CEMP)

The following measures have been taken from the CEMP and the Surface Water Management Plan (SWMP) (see EIAR Appendix 3E as they are integral to water quality mitigation.

During the construction phase of the proposed development, there is potential for sedimented surface water run-off from the construction works areas to contaminate downstream watercourses. Fundamental to any construction project, is the need to keep water (i.e. runoff from adjacent ground upslope of the permitted development footprint) clean and manage all other run-off and water from construction in an appropriate manner. A site-specific drainage system has been designed taking account of the following:

- Knowledge of the ground and hydrological conditions at the site;
- Previous construction experience of wind farm developments in similar environments;
- Previous experience of environmental constraints and issues from construction of wind farms in similar environmental conditions; and
- Technical guidance and best management practice manuals.

The following are the key elements of the proposed drainage system:

- Tracks will be cambered to ensure dirty water flows towards the dirty water drain installed adjacent;
- Settlement ponds will be placed on the dirty water drains prior to discharge to local drains and then into the existing watercourses;
- Discharge from the settlement ponds will be filtered prior to travelling through overland flow/percolation to existing watercourses;
- 3 rows of vertical Terrastop barriers will slow flows and provide further settlement of suspended solids prior to discharge reaching watercourses;
- Check dams will be placed at maximum 50m c/c in trackside drains to limit erosion and provide attenuation volumes during times of high rainfall; and
- To ensure effective drainage from the permanent internal access track network, the drainage network installed for the construction phase will remain in place for the operational life of the wind farm its operational status checked on a quarterly basis.

The proposed drainage layout and details are shown in Planning Drawing 22569-MWP-00-00-DR-C-5006.

For the construction of access tracks, the following best practice construction measures will be implemented:

- Construction of interceptor drains to divert run-off away from the upgradient side of tracks, with clean run-off being diverted under the tracks to the down gradient side where the need arises i.e. if there is significant gradient between the up and down slope sides of the access tracks. In general, the tracks will be constructed along relatively shallow slopes where run-off is likely to be negligible;
- Culverts will be used where required to divert clean water to run-off to vegetated areas; and
- Temporary swales and or ponds will be provided on the down-gradient side of the tracks to collect dirty water running off from the construction area prior to construction of main infrastructure. If necessary, silt curtains or silt busters will be used to clean sediment laden run-off prior to distribution over vegetation on the down gradient side of the tracks.

For construction of the turbine bases the following mitigation measures will be implemented:

- Construction of interceptor drains to divert run-off away from the up-gradient side of the excavations, with clean run-off being diverted around excavations to the down-gradient side so there is significant gradient between the up and down slope sides of the excavations;
- Excavations will have a level base with a sump to allow sediment laden water either to percolate to ground or, where required, to be pumped out to the surface water management system; and
- Temporary ponds will be constructed to contain sediment water collected from the excavations. The ponds will be designed to allow flow through the end via a silt curtain, or alternatively silt busters will be used to contain silt and clean water allowed to disperse over vegetation downstream of the temporary pond. Some temporary ponds and culverts will be back-filled post construction and the areas revegetated as soon as possible.

In areas where potentially hazardous materials are handled the following will be implemented:

- All refuelling of plant and equipment will take place either off-site or at a dedicated impervious refuelling area in the construction compound;
- Where plant such as construction cranes require refuelling, this will be undertaken using fuel bowsers provided with double containment. The refuelling bowser shall also be fitted with spill containment kits;
- Where fuels are stored on-site, they will located in bunded containment areas;
- No concrete batching will be undertaken on the site;
- No disposal of excess concrete will be permitted on the site, only cleaning of concrete delivery chutes at discrete areas according to CEMP; and
- Concrete works will only be permitted in favourable weather conditions.

6.8.3.4.2 Watercourse Crossings

There will be some works within 50m of watercourses at the following locations:

- Bridge for the river crossing of the Ahacronane River for the access track;
- Directional drilling for cable route crossing along the public road; and
- Directional drilling for cable route crossing in private land at the western end of the export cable route.

Where possible existing drains will remain untouched. No other areas of works will take place within 50m buffer zones of EPA mapped watercourses identified Chapter 08 Water except for drainage/stream crossings and associated track construction. Working near watercourses during or after intense or prolonged rainfall events will be avoided and work will cease entirely near watercourses when it is evident that there is a risk that pollution could occur.

All construction method statements will be developed in consultation with Inland Fisheries Ireland and in accordance with the details in the proposed development CEMP. All crossings will be subject to a Section 50 application to ensure flood risk upstream and downstream of the crossing is not increased. The proposed bridge crossing structure is a 9m clear span bridge. A flood relief culvert has been added, c.23m from the right bank abutment to comply with the Office of Public Works (OPW) Section 50 requirements for such structures (refer to Planning Drawing 22569-MWP-00-00-DR-C-5414).

Clear span pre-cast concrete culverts are advantageous in several manners for this type of installation. As spans increase the height can increase accordingly allowing significant light penetration under the culvert. The increase in height is complimentary to the vertical alignment requirements for access track design. The design of a clear span pre-cast concrete culvert crossings will ensure that:

- The existing channel profile within the watercourse is maintained;
- Gradients within the watercourse are not altered;
- There is unrestricted passage for all size classes of fish by retaining the natural watercourse stream / river bed;
- There are no blockages within the watercourse. The large size of a clear span culvert allows for the passage of debris in the event of flood flow conditions;
- The watercourse velocity is not changed; and
- The clear span of a culvert will ensure that the existing stream / riverbank is maintained during construction which will in turn avoid the occurrence of in-stream works.

Construction of the clear span crossings will be supervised by the Construction Manager, a suitably qualified engineer, the project manager, and the environmental manager in accordance with the following:

- Inland Fisheries Ireland *"Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters, 2016"*, and
- Office of Public Works *"Construction, Replacement or Alteration of Bridges and Culverts, 2013"*.

6.8.3.4.3 Dewatering

All ground water/surface water that may enter turbine foundations or cable trenches/joint bays will be removed, treated and disposed of appropriately, in accordance with the CEMP. Any dewatering (if/where required) will adhere to the following measures:

- Ground water/surface water will not be pumped directly into trackside drains/watercourses;
- Ground water/surface water which has become silted within the turbine foundations will be pumped to the surface water drainage system; and
- Ground water/surface water which has become silted within the trenches/joint bays will be pumped and allowed to infiltrate to a designated percolation area (area designated by a competent person in the construction team). This percolation area will be situated in improved agricultural grassland.

6.8.3.4.4 Fuel Management

All plant will be refuelled off- site or at a dedicated impervious refuelling area in the construction compound. At construction stage, a Fuel Management Plan (which will form part of the CEMP) will be developed specific to the site and the particular plant and equipment required for construction. The plan outlined will have regard to the following elements:

- Mobile bowsers, tanks and drums will be stored in a secure, impermeable storage area, away from drains and open water;
- Fuel containers will be stored within a secondary containment system e.g. bund for static tanks or a drip tray for mobile stores;
- Ancillary equipment such as hoses, pipes will be contained within the bund;
- Taps, nozzles or valves will be fitted with a lock system;
- Fuel and oil stores, including tanks and drums, will be regularly inspected for leaks and signs of damage;
- Only designated trained operators will be authorised to refuel plant on site;

- Procedures and contingency plans will be set up to deal with an emergency accidents or spills; and
- An emergency spill kit with oil boom and absorbers will be kept on site in the event of an accidental spill.

6.8.3.4.5 Refuelling of Construction Plant On-Site

The following measures will be undertaken to avoid or minimise negative effects to water quality as a result of the use of hydrocarbons:

- Refuelling to take place on level ground, at least 50m from watercourses
- Refuelling will be carried out using 110% capacity double bunded mobile bowsers. The refuelling bowser will be operated by trained personnel. The bowser will have spill containment equipment which the operators will be fully trained in using;
- Plant nappies or absorbent mats will be placed under refuelling points during all refuelling to absorb drips;
- Mobile bowsers, tanks and drums will be stored in a secure, impermeable storage area, away from drains and open water;
- To reduce the potential for oil leaks, only mechanically sound vehicles and machinery will be allowed onto the site. An up-to-date service record will be required from the main contractor;
- Should there be an oil leak or spill, the leak or spill will be contained immediately using oil spill kits; the nearby dirty water drain outlet will be blocked with an oil absorbent boom until the fuel/oil spill has been cleaned up and all oil and any contaminated material removed from the area. This contaminated material will be properly disposed of in a licensed facility;
- The site Environmental representative will be immediately informed of the oil leak/spill and will assess the cause and the management of the clean-up of the leak or spill. They will inspect nearby drains for the presence of oil and initiate the clean-up if necessary;
- Immediate action will be facilitated by easy access to oil spill kits. An oil spill kit that includes absorbing pads and socks will be kept at the site compound and also in site vehicles and machinery;
- Correct action in the event of a leak or spill will be facilitated by training all vehicle/machinery operators in the use of the spill kits and the correct containment and cleaning up of oil spills or leaks. This training will be provided by the Environmental Manager at site induction;
- In the event of a major oil spill, a company who provide a rapid response emergency service for major fuel spills will be immediately called for assistance, their contact details will be kept in the site office and in the spill kits stored within site vehicles and machinery;
- Collision with oil stores will be prevented by locating oils within a steel container in a designated area of the site compound away from vehicular movements; and
- Long term storage of waste oils will not be allowed on-site. These waste oils will be collected in leak-proof containers and removed from the site for disposal or re-cycling by an approved service provider.

6.8.3.4.6 Daily Inspections

The following drainage control measures will also be included in the plan:

- Daily inspection and immediate maintenance of all elements of the drainage system including clean and dirty water drains and settlement ponds;

- Monitoring data will inform the pond management to ensure the freeboard is not exceeded and pond operates as an effective sediment containment system
- Daily turbidity monitoring at outflows from the settlement ponds; and
- Weekly laboratory water quality monitoring at outflows from the settlement ponds.

6.8.3.4.7 Concrete Residue

Wet concrete pollution is silty and very alkaline (high pH) and can have a serious effect on watercourses and aquatic life. Concrete should not enter site water. The following measures will also be implemented regarding concrete:

- Designate a concrete washout area away from drains and watercourses;
- Washout of concrete trucks will occur off-site at a designated, contained impermeable area; and
- No disposal of concrete remnants will be permitted on site.

6.8.3.4.8 Construction Wheel Wash

A Construction Wheel Wash will be used to wash truck tyres leaving the construction site. Water residue from the wheel wash will be fed through a settlement pond, interceptor and then discharge to a grassed area within improved agricultural grassland. The wheel wash area will be cleaned regularly to avoid the build-up of residue.

6.8.3.4.9 Temporary Construction Compound

The following measures will be undertaken to avoid or minimise negative effects to water quality as a result of the erection of the temporary compound:

- Drainage within the temporary site compound will be directed to an oil interceptor to prevent pollution if any spillage should occur;
- A bunded containment area will be provided within the compound for the storage of fuels, lubricants, oils etc.; and
- The compound will be in place for the duration of the construction phase and will be removed once commissioning is complete.

6.8.3.4.10 Storage

The storage of materials, containers, stockpiles and waste, however temporary, will follow best practice at all times and be stored at designated areas as per the CEMP. Signage will be provided throughout the site to highlight such areas and facilitate this. Storage will be located as follows:

- Away from drains and sensitive habitats (KERs);
- On an impermeable base;
- Under cover to prevent damage from the elements;
- In secure areas; and
- Well away from moving plant, machinery and vehicles.
- All containers will be stored upright and clearly labelled. Sufficient storage will be supplied near to all working areas.

6.8.3.4.11 Excavation Works

The following measures will be undertaken to avoid or minimise negative effects to water quality as a result of excavation works:

- Earth movement activities will be suspended during periods of prolonged rainfall events;
- The earthworks material will be placed and compacted in layers to prevent water ingress and degradation of the material; and
- Drainage and associated pollution control measures will be implemented on site before the main body of construction activity commences.

6.8.3.4.12 Excavated Materials and Soil Management

All soils generated from excavation works within the wind farm associated with turbines, tracks and internal cable construction will be retained on site and reused in bunding, landscaping and restoration of the permanent deposition areas. No soils will be removed from the site. Permanent stockpiling of soils will be avoided on site.

During access track excavations, excavated material will be temporarily stockpiled adjacent to the section of trench, with appropriate material used as backfill. Appropriate siltation measures will be put in place prior to excavations. Stockpiles will be stored a minimum of 50m back from rivers/streams on level ground with a silt barrier installed at the base. For all grid connection trenching along the local/public road, any unsuitable backfill material excavated will be immediately taken off site in trucks and disposed of under license from LCCC. This will prevent any contaminated run-off to roadside drains during heavy rainfall.

6.8.3.4.13 Material Stockpiles

To avoid or minimise negative effects to water quality as a result of the storage and stockpiling of excavated earth at the two permanent deposition areas onsite, the stockpiles will be located at least 50m away from drainage systems. In addition, silt-retaining measures (silt fence / silt curtain or other suitable materials) will be installed to reduce risk of silt run-off along the down-gradient edges of stockpiled earth materials when in proximity to drainage pathways connecting the storage areas to nearby watercourses.

6.8.3.5 Protection of Fauna during Construction

The following measures will be implemented during construction:

- Pre-construction mammal surveys to be undertaken by ecologist before any vegetation removal;
- Habitat disturbance to fauna will be limited by controlling the movement of maintenance vehicles. Construction vehicles will not encroach onto habitats beyond the proposed development footprint.
- Duration of construction activities will be restricted to between the hours 07.00am – 7.00pm, Monday to Friday, and 07.00am to 2.00pm on Saturdays and in accordance with the timings detailed in Chapter 03 Description of the Proposed Development. Construction work will not take place at night unless in exceptional circumstances to reduce potential disturbance to fauna.
- In the unlikely event that protected faunal species are found actively using the site for breeding/roosting during the construction phase, works will cease immediately, and the area will be cordoned off until advice is sought from a suitably qualified expert or member of NPWS.
- Should the resting or breeding places of any protected species be discovered within the site during construction works, the NPWS will be informed. Any mitigations required will be carried out under license from NPWS and using NRA Guidelines (2005b) (now known as TII) where applicable.

6.8.3.6 Protection of Fisheries and Aquatic Life during Construction

Given that there will be no direct impacts on fluvial habitats, the only mechanism by which aquatic life, including fish, can be affected is via indirect negative water quality impacts. Protection of all aquatic life is therefore dependent on protecting water quality as outlined above in Section 6.8.3.4.

6.8.3.7 Prevention of Spread/Treatment of Invasive Species, Biosecurity

While no invasive alien species were recorded at the proposed development site, there is potential for introduction of same to site during the construction phase. Prior to being brought onto the site, all plant and equipment will need to be clean and free of soil/mud/debris or any attached plant or animal material. Prior to entering the site, all plant/equipment will be visually inspected to ensure all adherent material and debris have been removed. Wheel wash facilities will be implemented at the site entrance from the public road to facilitate removal of any material collected by vehicles entering or leaving the site.

A pre-construction survey for invasive species will be conducted by an appropriately qualified ecologist. Should invasive species be recorded at works locations along the grid connection route or within the development footprint, an Invasive Species Management Plan will be prepared prior to construction works commencing.

All footwear/waders and all equipment that will be placed within the water will be treated to prevent foreign flora/fauna entering the water and after use to prevent the spread to other catchments. Non-native species control will be practised according to the following documents, noting that some works components are located at/near watercourses:

- '*The Management of Noxious Weeds and Non-native Invasive Plant Species on National Roads*' (NRA 2010); and
- '*IFI Biosecurity Protocol for Field Survey Work*' (IFI, 2010).

6.8.4 Operation Stage Mitigation

Mitigation as outlined for the construction phase will apply for any maintenance activities. No further mitigation is required at the operation stage. Protocols as set out in the CEMP prepared for construction activities will also be followed.

There will be no requirement to retain the wheel wash during operation stage as it is envisaged that no plant will be required to access the site at this stage.

Various measures will be implemented which lower the risk of bat fatalities throughout the lifespan of the windfarm. Buffer zones surrounding each turbine will dissuade bats that depend on landscape features for guidance from flying near turbines. The two following methods will be used to further reduce bat fatalities and are described in detail in Appendix 6D in Volume III:

- Feathering (reduced speed rotation when turbines are idling); and
- Curtailment (turbines remain off when conditions are optimal for bat activity i.e. when air temperature is >10^{o}C at nacelle height and wind speeds <5m/s at 2.5m). Cut-in speeds will be increased between April and September, inclusive, from 30 minutes prior to sunset and 30 minutes after sunrise at all turbines, except T6.

Mitigation relating to bird species is outlined in Chapter 07, Ornithology.

6.9 Significance of Residual Effects

Residual effects on the KERs are described in Table 6-31. While mitigation measures will reduce and alleviate likely significant effects, some temporary residual effects may occur during the construction phase that cannot be fully mitigated against. These include temporary habitat loss of hedgerows, treelines and woodland habitat until replacement planting is re-established, temporary habitat loss for mammals until temporary construction compounds are decommissioned and hedgerows and treelines are re-established.

Table 6-31 gives an assessment of scale and significance of residual effects once mitigation has been implemented.

The habitat enhancement and replanting plan (Appendix 6F BEMP) will offset the effects of habitat loss that were identified in Section 6.6.1. Any hedgerows due to be intersected will be reinstated with a similar species or native species. Any hedgerow lost permanently will be replanted in a more appropriate area, which will aid in guiding bats to safer areas away from areas of proposed construction works and minimise disturbance. Habitat monitoring and the BEMP will ensure no significant effects remain. This will ensure residual effects relating to habitat loss are not likely significant.

There will be no significant adverse residual effects on the receiving drainage ditches or the Ahacronane or Riddlestown Rivers, associated with the Development.

Table 6-31. Assessment of scale and significance of residual effects on Key Ecological Receptors.

Group/ attribute	KER	Evaluation[1]	Construction impact (pre-mitigation)				Operation impact (pre-mitigation)				Positive / Negative*	Geographical scale*[4]	Mitigation measures	Ecological significance following mitigation	Residual Effects
			Magnitude[2]	Duration[3]	Reversible	Significance, confidence	Magnitude[2]	Duration[3]	Reversible	Significance, confidence					
Habitat	Scrub (WS1)	LI (higher value)	H	L	Y (at a remove from original location)	Significant, probable	N	N/a	N/a	N/a	N	L	Habitat avoidance as insofar as possible	Significant	Short-term (until planting established 3-5) significant residual effect at local geographic scale. Long-term biodiversity gain from BEMP lands
	Wet grassland (GS4)	LI (higher value)	H	L	N (naturally low areas made higher by soil deposition)	Significant, probable	L	S	Y	Not significant, probable	N	L	As above	Significant	No likely significant residual effect.
	Wet grassland / Scrub (GS4)/(WS1)	LI (higher value)	H	L	N: GS4 (as above) Y: WS1 (as above)	Significant, probable	L	S	Y	Not significant, probable	N	L	As above	Significant	No likely significant residual effect.
	Mixed broadleaved woodland/Scrub (WD1/WS1)	LI (higher value)	H	L	Y (at a remove from original location)	Significant, probable	L	S	Y	Not significant, probable	N	L	As above	Moderate	No likely significant residual effect.
	Mixed broadleaved woodland/Wet grassland/ Scrub (WD1/GS4/WS1)	LI (higher value)	H	L	N: GS4 (as above) Y: WS1 & WD1 (as above)	Significant, probable	L	S	Y	Not significant, probable	N	L	As above	Moderate	No likely significant residual effect.
	Poor fen and flush (PF2)	CI	M	L	N	Moderate, unlikely	L	S	Y	Slight, unlikely	N	L	[28]Site management	Slight	No likely significant residual effect.
	Hedgerow (WL1)	LI (higher value)	H	L	Y (at a remove from original location)	Significant, probable	N	N/a	N/a	N/a	N	L	As above	Significant	Short-term (until planting established 5+ years) significant

[28] A 20m exclusion zone will be put in place before site clearance stage and will remain in place for the duration of construction phase

Group/ attribute	KER	Evaluation[1]	Construction impact (pre-mitigation)				Operation impact (pre-mitigation)				Positive / Negative*	Geographical scale*[4]	Mitigation measures	Ecological significance following mitigation	Residual Effects
			Magnitude[2]	Duration[3]	Reversible	Significance, confidence	Magnitude[2]	Duration[3]	Reversible	Significance, confidence					
															residual effect at local geographic scale. Long-term biodiversity gain from BEMP lands
	Treeline (WL2)	LI (higher value)	H	L	N (considering growth time relative to project duration)	Significant, probable	N	N/a	N/a	N/a	N	L	As above	Significant	Medium-term (until planting established 8-10 years) significant residual effect at local geographic scale. Long-term biodiversity gain from BEMP lands
	Lowland/ depositing river (FW2)	LI (higher value)	M	L	N	Moderate, unlikely	L	S	Y	Slight, unlikely	N	L	Site management	Slight	No likely significant residual effect.
Mammal	Otter	LI (higher value)	L	S	Y: water quality recovery	Moderate, unlikely	L	S	Y	Imperceptible, unlikely	N	L	Water quality protection	Slight	No likely significant residual effect.
	Hare	LI (higher value)	M	L	Partial: related to habitat reinstatement	Moderate, probable	Ne	N/a	N/a	N/a	N	L	Minimising footprint of development	Moderate	No likely significant residual effect.
	Hedgehog and pygmy shrew	LI (higher value)	M	L	Y: hedgerow & woodland planting	Significant, probable	N	N/a	N/a	N/a	N	L	Avoidance of habitat insofar as possible	Moderate	No likely significant residual effect.
	Pipistrelle bats	LI (higher value)	M	L	Y: hedgerow & woodland planting	Moderate, probable (habitat loss/ alteration) Imperceptible, probable (disturbance/ displacement	M	L	N	Moderate	N	L	Avoidance of habitat insofar as possible. Bat foraging buffer.	Slight	No likely significant residual effect.

Group/ attribute	KER	Evaluation[1]	Construction impact (pre-mitigation)				Operation impact (pre-mitigation)				Positive / Negative*	Geographical scale*[4]	Mitigation measures	Ecological significance following mitigation	Residual Effects
			Magnitude[2]	Duration[3]	Reversible	Significance, confidence	Magnitude[2]	Duration[3]	Reversible	Significance, confidence					
													Establish foraging corridor continuity		
	Leisler's bat	LI (higher value)	M	L	Y (hedgerow & woodland planting)	Slight, probable	M	L	N	Significant	N	L	Avoidance of habitat insofar as possible.	Slight	No likely significant residual effect.
Invertebrates	Terrestrial invertebrates	LI (higher value)	M	L	Y (hedgerow & woodland planting)	Moderate, probable	L	L	N	Imperceptible negative	N	L	As above	Moderate	No likely significant residual effect.
	Aquatic macroinvertebrates	LI (higher value)	M	S	Y	Moderate, unlikely	L	L	Y	Imperceptible	N	LD	Water quality protection	Slight	No likely significant residual effect.
Water quality		LI (higher value)	M	S	Y	Moderate, unlikely	L	L	Y	Imperceptible	N	LD	Drainage system designed to retain sediment	Slight	No likely significant residual effect.
Fish	Brown trout	LI (higher value)	Ahacronane: M Riddlestown: L	S	Y	Moderate, unlikely	L	L	Y	Imperceptible	N	LD	Water quality protection	Slight	No likely significant residual effect.
	Brook lamprey	LI (higher value)	Ahacronane: M Riddlestown: L	S	Y	Moderate, unlikely	L	L	Y	Imperceptible	N	LD	Water quality protection	Slight	No likely significant residual effect.
	Atlantic salmon	LI (higher value)	L (River Deel only)	S	Y	Moderate, extremely unlikely	L	L	Y	Imperceptible	N	Lower Deel catchment	Water quality protection	Imperceptible	No likely significant residual effect.
	River lamprey	LI (higher value)	Ahacronane: L Riddlestown and Deel: N	S	Y	Slight - None, extremely unlikely	L	L	Y	Imperceptible	N	Lower Deel & Ahacronane catchments	Water quality protection	None	No likely significant residual effect.
	European eel	LI (higher value)	Ahacronane & Deel: M Riddlestown: L	S	Y	Ahacronane & Deel: medium, unlikely Riddlestown: extremely unlikely,	L	L	Y	Imperceptible	N	LD	Water quality protection	Slight	No likely significant residual effect.

Group/ attribute	KER	Evaluation[1]	Construction impact (pre-mitigation)				Operation impact (pre-mitigation)				Positive / Negative*	Geographical scale*[4]	Mitigation measures	Residual Effects	
			Magnitude[2]	Duration[3]	Reversible	Significance, confidence	Magnitude[2]	Duration[3]	Reversible	Significance, confidence				Ecological significance following mitigation	
Amphibian	Frogs	LI (higher value)	H	L	N (habitat loss will occur)	Significant, probable	L	L	Y	Imperceptible	N	L	Avoid habitat insofar as possible. Water quality protection.	Slight	No likely significant residual effect.

[1] Evaluation: LI – Local Importance, CI – County Importance, HV – Higher Value
[2] Magnitude: H – High, M – Medium, L – Low, N – None, Ne – Neutral
[3] Duration: L – Long term, S – Short term
[4] Geographical scale: L – Local, C – County, LD – Local, diminishing with distance downstream

*applies to construction and operation stages

6.10 Monitoring

6.10.1 Water Quality

6.10.1.1 Physico-chemical Monitoring

A programme for water monitoring will be prepared prior to the commencement of the wind farm construction and issued to Limerick City and County Council and IFI. The plan will include monitoring of water before and regularly during the construction phase.

It is proposed to undertake baseline water quality monitoring of the Ahacronane River along the northeast site boundary and of its tributary stream along the northwest site boundary before the construction works commence. Monitoring will also be undertaken on a monthly basis over the course of the construction programme to ensure that the works are not impacting on surface water quality downstream of the proposed development.

The parameters analysed will include:

- pH;
- Suspended solids;
- Ammonia;
- Orthophosphate and total phosphorous;
- Nitrate;
- Nitrite;
- Chloride; and
- Biochemical Oxygen Demand (BOD).

The results will be compared to the Surface Water Environmental Quality Standards (EQS) in the Surface Water Regulations (SI-272 of 2009 and subsequent amendments 2017 and 2019). The Construction Site Manager will also be responsible for undertaking routine inspections of the surface water drainage system (drains, streams and rivers) to ensure that their maintenance is effective and recorded, and the construction works do not impact on surface water quality.

6.10.1.1.1 Biological Monitoring

It is important to keep ecological disruption of watercourses to a minimum and to maintain the aquatic ecosystem in a healthy, functional condition, with aquatic KERs. Progress towards this goal can be monitored by chemical or biological means or using a combination of both. In general, it could be said that whilst physico-chemical analysis may measure the causes of pollution (i.e. the pollutants), biological analysis is the only means whereby the ecological effects of pollution can be measured[29]. It is considered that biological water quality monitoring is sufficient for surface water quality monitoring during the operation phase. Macroinvertebrates will be sampled prior to construction and immediately post construction and thereafter in Operational Years 1, 2, 3, 5, and 10 at aquatic sites listed in the aquatic survey report. Biotic indices corresponding with those used in the aquatic survey report will be used. A key biotic index in this regard is the Quality Rating System. This biotic index has been shown

[29] https://www.epa.ie/pubs/reports/water/rivers/Interim%20Report_2006_web.proposed_developmentf Accessed: 20th July 2025

to be a robust and sensitive measure of riverine water quality and has been linked with both chemical status and land use pressures in catchments (Clabby *et al.*, 1992).

6.10.2 Fish Stocks

The use of fish communities as indicators for the ecological quality of running water is becoming more common. Fish provide powerful tools for assessing aquatic environments and have proved their suitability as indicators of human disturbances for many reasons and provide a dramatic impact when mortality occurs. Fish have a number of advantages as indicator organisms for biological monitoring programmes as outlined in Kelly *et al*. (2007). Given the baseline information obtained for fish in the receiving environment, fish stock surveys will be undertaken at the same sites and at the same frequency as biological water quality (Q sampling) surveys in the previous section. Methodology will replicate that outlined in the aquatic survey report.

6.11 Overall Findings of the Assessment

The proposed development site is largely composed of improved agricultural grassland interspersed with areas of wet grassland.

Most of the habitats directly affected by the proposed development are evaluated as being of local value (lower importance). No habitats conforming to EU Annex I habitats are located within the proposed development boundary. Those habitats of local value (higher importance) have been avoided, where possible, and where directly impacted, loss has been kept to a minimum by the iterative design process.

There are some locally important habitats in poorly drained wetter parts of the site, the dominant habitat in such areas being wet grassland, evaluated as being of local importance (higher value) and found to support the Annex II species Marsh Fritillary Bufferfly.

Field boundaries comprising hedgerows and some treelines are also evaluated as being of local importance (higher value), as they serve as links and ecological corridors between features of higher ecological value. These linear features are considered to support protected species such as hedgehog and pygmy shrew and used to some degree by foraging bats. The poor fen and flush habitat at Ballynisky pond is evaluated as a feature of County Importance and will be avoided during construction.

Some of the ecologically important habitats within the site boundary will be lost as the footprint of the proposed development overlies them. With implementation of design and avoidance mitigation, and working according to a CEMP, the direct impact footprint can be significantly reduced, thereby lessening the scale of impacts on habitats. Loss of these habitats, which have been selected as KERs will constitute a significant negative ecological impact on these habitats within the proposed development site boundary. However, these habitats are common in the wider local environment so in terms of habitat loss, the impact of the proposed development on habitats and wildlife at the local level is not assessed as significant.

The quantities of habitats lost is presented in Table 6-32. This table shows the entire area of KER polygons and entire lengths of linear features within the proposed development boundary under two scenarios:

- The worst-case scenario where all habitats within the ‘site boundary’ are theoretically taken as being lost.
- Loss of habitats that occur on the footprint of the infrastructure, or ‘site layout’, representing the long-term impact.

This proposed development includes habitat compensation and enhancement measures to offset habitat loss, as per Section 6.10.

Table 6-32 includes estimated maximum habitat loss (boundary data) and estimated quantities of compensation/enhancement habitat. There will be an overall biodiversity net gain (BNG) at operation stage when compared to the existing situation in the short (1-7 years) to medium term (7-15 years). Hedgerow, wildflower habitats, scrub and woodland will take time to establish, grow and mature and will become more ecologically significant in proportion to age.

While there will be a maximum loss of 5.813 ha. of KER habitats (using 'site boundary'), the actual loss is more likely to be closer to 2.678 ha. (using 'site layout'). There will be more than 13 ha. provided by compensation/enhancement. Taking the maximum loss, there will still be an overall net gain of 7.4 ha. of KER habitats, and using the 'site layout' values, the overall net gain will be 10.56 ha.

While gains of KER habitat mosaics are not provided, overall, there will be a significant net gain and mosaics of habitats corresponding to KERs will develop and/or improve under the proposal. Pond features can be expected to be quickly colonised by aquatic macroinvertebrates, adding significantly to the biodiversity value of the locality.

Hedgerow is identified as the linear habitat KER most affected by the proposed development. With implementation of bat buffer zones, there will be ca. 960 m of hedgerow lost where this habitat occurs within 82m of the proposed turbines. Approximately 1065 m of hedgerow will be removed to allow construction of access tracks, so the total minimum length of hedgerow to be removed will equate to ca. 1.065 km. Again, it is considered that construction can be managed to limit removal to no more than 1.065 km, and with proposed planting of 1,748 m of hedgerow, there will be an overall net gain of 1,087 m of hedgerow.

Riparian buffer zones will be achieved by fencing along the Ahacronane and Rathnagore waterbodies and will help protect 932 m of habitats adjacent to watercourses. Currently, these channels are accessible to livestock and have ongoing water quality problems associated with same, but proposed fencing will help recovery of riparian habitats, attenuate overland flows and therefore help filter surface waters, with water quality and aquatic ecology benefits. Enhancement of drainage ditches 556 m will improve breeding conditions for amphibians.

Rough tussocky grassland field margins, ca. 1,748 m, will be created outside of the proposed development boundary to the north and north east, in proximity to confirmed barn owl nest locations and adjacent to riparian habitat / mature hedgerows. Rough tussocky grassland provides the optimal habitat for small mammals such as voles, and so providing additional areas of such habitat will provide enhancements for barn owls and raptors.

Overall, there will be a total net gain of ca. 3 km of linear KERs.

There will be no actual loss of lowland depositing river (Ahacronane River) as the proposed development involves construction of a clear-span over this watercourse. The bridge will result in minimal alteration of riverine habitat as light conditions in the river will change in the vicinity of the bridge.

Habitat succession will occur as some parts of the area get wetter and scrub develops and expands. While the subject area will take time to establish, grow and mature, it will become more ecologically significant in proportion to age. The climax habitat is considered native woodland, noting that a climax community is the "endpoint" of succession within the context of a particular climate/geography. This point is unlikely to be reached by the end of life of the proposed wind farm but there could be potential for retaining this area with the prospect of repowering or adoption of an environmental scheme by relevant landowners or via agreement with the developers.

The site is suboptimal for most protected non-volant fauna and for bats. Hare, badger and a number of bat species were recorded at the proposed development site but only badger, hare, Leisler's bat, and pipistrelle bats were selected as KERs. The ecological significance of the proposed development on mammalian fauna following mitigation is assessed as moderate in the case of hare, hedgehog, pygmy shrew and Leisler's bat, and slight for otter, badger, soprano pipistrelle bat and common pipistrelle bat. There will be some habitat fragmentation caused by construction and associated disruption of mammals, however, links will be re-established with the compensation measures proposed.

The aquatic macroinvertebrate community is degraded in all receiving waterbodies draining the Proposed Development, including the Ahacronane River and the Riddlestown Stream, the two primary waterbodies draining the site. The Ahacronane River does support a population of brown trout and European eel and potentially brook lamprey. The fish community of the Riddlestown Stream is less diverse with only three-spined stickleback recorded at survey sites near the proposed development site. The watercourses that drain the site become increasingly important for fish and protected fauna as they increase in size with distance downstream of the proposed development site. The River Deel, into which the Riddlestown Stream flows, supports otter, eel, salmon, brook lamprey and brown trout. The fact that the proposed development is largely setback from watercourses, that no in-stream works are required, that the proposed development site is low gradient, that the site-specific drainage system is designed to capture wind farm-related sediment run-off, and with implementation of mitigation, the impacts on water quality and dependent aquatic fauna will not be significant (assessed as slight negative following mitigation). Currently, there are no/limited buffers along the Ahacronane River and Rathnagore-Riddlestown Stream. The development of riparian buffer zones (932m) and installation of cattle drinkers along these watercourses can be expected to benefit water quality and aquatic life adjacent to and downstream of the proposed development site.

Table 6-32. Habitat loss/alteration/net gain quantities for KERs at proposed development site and compensation.

	Habitat	Construction Loss		Gain via compensation / enhancement	Net gain (reference to site boundary)	Net gain (reference to site layout)
		Site boundary	Site layout			
Area of KER (Hectares)	WS4 Wet grassland	4.484	2.572	10.96	6.29	8.388
	WS1 Scrub	0.344	0.041			
	GS4/WS1 Wet grassland / scrub	0.33	0.044			
	WD1/WS1 Mixed broadleaved woodland / scrub	0.234	0.003	0.33	0.096	0.327
	WD1/GS4/WS1 Mixed broadleaved woodland/wet grassland/scrub	0.288	0.018			
	*PF2 Poor fen and flush	0.097	0			
	Immature woodland	0.036	0			
	Wildflower Habitat			2.5	2.055	2.055
	FL8 Artificial Pond			0.09	0.09	0.09
Total (polygon KERs)		5.813	2.678	13.89	7.426	10.561
KER Length (metres)	FW2 Lowland/depositing river					
	WL1 Hedgerow[1]	2835	1065[2]	1748	1087	683
	WL2 Treeline	717	34			
	BL1 Stone walls	82	17			
	FW4 Drainage ditch	1662	156			
	Riparian buffer zone			932	932	932
	Frog habitat			556	556	556
	Field Margins (Rough Tussocky Grassland)			1428	1428	1428
Total (linear KERs)		5296	10859	4664	1829	3599

[1] *For bat buffering purposes, ca. 960 m of hedgerow lost where this habitat occurs within 82m of the proposed turbines*

[2] *Bat buffering + site layout*

** Ballynisky Pond, a habitat of County Importance will be avoided during construction by way of an exclusion zone*

6.12 Summary of Assessment

Residual impacts on biodiversity will remain including impacts to habitats, flora, fauna and water quality but these impacts are not considered significant since mitigation measures will be fully implemented during the construction and operational phases of the proposed development.

Provided that the proposed wind farm development is constructed and operated in accordance with the design, best practice and the described mitigation, significant effects on ecology are not anticipated at the international, national or county scales on any of the identified Key Ecological Receptors (KERs).

Most biodiversity and ecosystem services within the wider countryside are facing multiple pressures. Ireland's report to the EU on the condition of habitats and species of European interest (DCHG, 2017) showed that the main pressures and threats to biodiversity in Ireland are: agricultural intensification, natural system modifications (drainage, illegal burning, reclamation, land use change, coastal protection), invasive and problematic species, and human intrusion and disturbances. While the proposed development involves intrusion and disturbance, the overall outcome for biodiversity will be positive given the commitments made by the Applicant to set aside lands that will not be managed for grass production and associated drainage, reseeding and regular fertilisation but instead will be the subject of a comprehensive Biodiversity Enhancement Management Plant (BEMP) (for details, refer to Appendix 6F).

The proposed development aligns with Objective 3 of Ireland's 4th National Biodiversity Action Plan (NBAP) 2023-2030[30] i.e. "Secure Nature's Contribution to People' whereby the complex relationship between nature and Irish people is highlighted and explored. . Actions under this Objective include 'recognising the tangible and intangible values of biodiversity, promoting nature's importance to our culture and heritage and recognising how biodiversity supports our society and our economy'. It also tallies with Ireland's vision for biodiversity as set out in the NBAP: "that biodiversity and ecosystems in Ireland are conserved and restored, delivering benefits essential for all sectors of society and that Ireland contributes to efforts to halt the loss of biodiversity and the degradation of ecosystems in the EU and globally".

The proposed development aligns with and complies fully with the Limerick City and Council Biodiversity Objectives as stipulated within Appendix 6H of the Limerick Development Plan 2022-2028 (see Appendix 6F BEMP).

The Applicant is committed to the mitigation, compensation to offset habitat losses and enhancement measures set out in this assessment and have landowner legal agreement to ensure the effective implementation of the measures outlined within Appendix 6F BEMP. The Applicant will engage fully with the planning authority, with input from a professional ecologist to deliver biodiversity net gain at the proposed development site through proper implementation of the BEMP. This will include a detailed explanation of what is to be done, how it will be achieved, where and when it is to be carried out, and who is responsible for ensuring that works are undertaken as proposed.

[30] https://www.gov.ie/en/publication/93973-irelands-4th-national-biodiversity-action-plan-20232030/ Accessed 22nd July 2025

6.13 References

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National Roads Authority Site Evaluation Scheme (NRA, 2009)

Importance	Criteria
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' (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: o Species of bird, listed in Annex I and/or referred to in Article 4(2) of the Birds Directive; and/or o 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: o Species protected under the Wildlife Acts; and/or o Species listed on the relevant Red Data list. ▪ Site containing 'viable areas' of the habitat types listed in Annex I of the Habitats Directive.

Importance	Criteria
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: o Species of bird, listed in Annex I and/or referred to in Article 4(2) of the Birds Directive; o Species of animal and plants listed in Annex II and/or IV of the Habitats Directive; o Species protected under the Wildlife Acts; and/or o 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: o Species of bird, listed in Annex I and/or referred to in Article 4(2) of the Birds Directive; o Species of animal and plants listed in Annex II and/or IV of the Habitats Directive; o Species protected under the Wildlife Acts; and/or o 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 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.

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