6 BIODIVERSITY

6.1 INTRODUCTION

6.1.1 Background

This chapter of the Environmental Impact Assessment Report (EIAR) assesses the effects of the Development on biodiversity. Furthermore, where negative effects are predicted, the chapter identifies appropriate mitigation strategies therein. The assessment considers the potential effects during the following phases of the Development:

- Construction of the Development
- Operation of the Development
- Decommissioning of the Development (final phase)

The Development refers to all elements of the application for the construction and operation of the proposed Dyrick Hill Wind Farm (**Chapter 2: Development Description**).

A Construction Environmental Management Plan (CEMP) is appended to the EIAR in **Appendix 2.1**. The CEMP will be further developed post consent/pre-construction once a contractor has been appointed and will cover the construction of the Development. It will include all of the mitigation recommended within the EIAR (see section 6.7). For the purpose of this application, a summary of the mitigation measures is included in **Appendix 17.1.** In addition, a Draft Habitat Management Plan (Draft HMP) is appended to the EIAR in **Appendix 6.4.**

The potential for the Development to have adverse effects on the integrity of any designated European Sites has been assessed within a Natura Impact Statement (NIS).

Common acronyms used throughout this EIAR can be found in **Appendix 1.2**

This chapter of the EIAR is supported by Figures provided in **Volume III** and the following Appendices documents provided in **Volume IV** of this EIAR:

- **Appendix 6.1**: Statement of Authority
- **Appendix 6.2**: Bat Survey 2020 Report
- **Appendix 6.3**: Target Note Survey Results 2021 - 2023
- **Appendix 6.4:** Habitat Management Plan

This Chapter includes the following elements:

- **6.1 Introduction**

- **6.2 Overview of the Development**
- **6.3 Assessment Methodology and Significance Criteria**
- **6.4 Baseline Description**
- **6.5 Existing Ecological Baseline**
- **6.6 Assessment of Potential Environmental Effects**
- **6.7 Mitigation Measures**
- **6.8 Monitoring**
- **6.9 Residual Effects of the Development**

6.1.2 Scope

Doherty Environmental Consultants (DEC) Ltd. was commissioned by Jennings O'Donovan (JOD), on behalf of Dyrick Hill Windfarm Limited to undertake an ecological impact assessment of the Development to inform the Biodiversity Chapter of an Environmental Impact Assessment Report (EIAR). The scope of this work is set out in further detail in Section 6.3. This Chapter has been prepared by Mr. Pat Doherty, BSC, MSc, MCIEEM of DEC Ltd.

6.1.3 European and International Legislation

6.1.3.1 Council s Directive 92/43/EEC on the conservation of natural habitats and wild fauna and flora ("the Habitats Directive"

The Habitats Directive provides the basis of protection for Natura 2000 sites, namely Special Protection Areas ("SPAs") and Special Areas of Conservation ("SACs"). Article 6 of the EU Habitats Directive requires that any proposal that is likely to have a significant effect on any Natura 2000 site in view of its conservation objectives , individually or in combination with other projects must be subject to an Appropriate Assessment. An Appropriate Assessment is required in order to ascertain the potential impact of a proposal on the reasons for which the site is designated, and thereby ascertain the potential for adverse effect on the integrity of the site. An NIS has been prepared. This concludes that the proposed Development will not, adversely affect the integrity of any European Site (Natura 2000 site).

The Habitats Directive also provides for the protection of species listed under Annex IV of the Directive wherever they occur. These species include otter and all bat species.

6.1.3.2 The Habitats Directive is transposed into Irish law inter alia by Part XAB of the Planning and Development Act 2000 as amended. EU Birds Directive

Directive 2009/147/EC on the conservation of wild birds (codified version) ("the Birds Directive") establishes a system of general protection for all wild birds throughout the European Union. Annex I of the Birds Directive comprises 175 bird species that are rare,

vulnerable to habitat changes or in danger of extinction within the European Union. Article 4 establishes clearly that wherever those species occur, they must be the subject of special conservation measures concerning their habitat in order to ensure their survival and reproduction in the area of distribution. Similar actions must be taken by Member States regarding migratory species, even if they are not listed in Annex I.

6.1.3.3 Bern and Bonn Convention

The Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention 1982) exists to conserve all species and their habitats. The Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention 1979, enacted 1983) was instigated to protect migrant species across all European boundaries.

6.1.3.4 EU Water Framework Directive 2000/60/EC

The Water Framework Directive (WFD), which was passed by the European Union (EU) in 2000, and came into legal effect in December 2015, is wide-reaching legislation which replaces a number of the other water quality directives (for example, those on Water Abstraction) while implementation of others (for example, The Integrated Pollution Prevention and Control and Habitats Directives) will form part of the 'basic measures' for the Water Framework Directive. The fundamental objective of the Water Framework Directive aims at maintaining "high status" of waters where it exists, preventing any deterioration in the existing status of waters and achieving at least "Good" in relation to all waters by 2027 (WFD).

6.1.3.5 UN Convention on Biological Diversity (CBD)

The CBD entered into force on 29 December 1993. It has 3 main objectives: 1. The conservation of biological diversity. 2. The sustainable use of the components of biological diversity. 3. The fair and equitable sharing of the benefits arising out of the utilization of genetic resources. National Legislation.

Parties to the CBD are required to submit a National Biodiversity Action Plan and report annually on the status of biodiversity and measures to address and reverse loss of biodiversity. Ireland's National Biodiversity Strategy and Action Plan (2017-2021) was submitted December 2017.

6.1.3.6 The Wildlife Act (1976) as amended and associated Regulations

The Wildlife Act 1976 gives protection to a wide variety of birds, animals and plants in Ireland. It is unlawful to disturb, injure or damage their breeding or resting place wherever these occur without an appropriate licence from National Parks and Wildlife Service (NPWS). The Act

(as amended in 2000) protects all birds, their nests and eggs. Wilful destruction of an active nest from the building stage until the chicks have fledged is an offence. The Act also provides a mechanism to give statutory protection to Natural Heritage Areas (NHAs). The amendment in 2000 broadens the scope of the Wildlife Acts to include most species, including the majority of fish and aquatic invertebrate species which were excluded from the 1976 Act.

6.1.3.7 EC (Birds and Natural Habitats) Regulations 2011

The Habitats Directive is transposed into Irish law inter alia through the EC (Birds and Natural Habitats) Regulations 2011.

Annex IV of the Habitats Directive provides protection to a number of named species wherever they occur. These species are protected inter alia under Regulations 27, 29 and 51 of the Habitats Regulations 2011.

6.1.3.8 Planning and Development Act 2000, as amended

For the purposes of an application for planning permission the protection of biodiversity is provided for in the 2000 Act, as amended, and the Planning and Development Regulations 2001, as amended, which transpose provisions of the Habitats and Birds Directives.

6.1.3.9 Flora (Protection) Order (FPO), 2022

The current list of plant species protected by Section 21 of the Wildlife Act, 1976 is set out in the Flora (Protection) Order, 2022, which supersedes orders made in 1980, 1987, 1999 and 2015.

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.

6.1.3.10 The European Communities Environmental Objectives (Surface Waters) Regulations 2009 (S.I. 272 of 2009) and as amended

The regulations establish legally binding quality objectives for all surface waters and environmental quality standards for pollutants for purposes of implementing provisions of E.U. legislation on protection of surface waters. These regulations clarify the role of public authorities in the protection of surface waters and also concern the protection of designated habitats.

6.1.3.11 European Union Environmental Objectives (Freshwater Pearl Mussel) (Amendment) Regulations 2009 to 2018

The purpose of these Regulations is to support the achievement of favourable conservation status for freshwater pearl mussels. To that end, they:

(a) Set environmental quality objectives for the habitats of the freshwater pearl mussel populations named in the First Schedule to these Regulations that are within the boundaries of a site notified in a candidate list of European sites, or designated as a Special Area of Conservation, under the European Communities (Natural Habitats) Regulations, 1997 (S.I. No. 94/1997).

(b) Require the production of sub-basin management plans with programmes of measures to achieve these objectives.

(c) Set out the duties of public authorities in respect of the sub-basin management plans and programmes of measures.

6.1.4 Policy

6.1.4.1 National Policy

The National Heritage Plan (published in 2002) is currently under review and a new plan is proposed by the Government to run in Ireland up to 2030[1]. Along with the Heritage Plan, The National Biodiversity Action Plan 2017 - 2021[2] and the draft National Biodiversity Action Plan 2023 - 2028 set out strategies for the conservation and management of our heritage. A key element of both plans is an enhanced role for local authorities in heritage awareness and management, to be given effect through the preparation and implementation of County Heritage Plans and Biodiversity Action Plans. The draft National Biodiversity Action Plan 2023-2028 (NBAP) emphasises the requirement for National, Regional and Local Governments to ensure that the conservation and sustainable use of biodiversity for human well-being is at the forefront of their work. This stemmed from the United Nations 'Convention on Biological Diversity's Cancun Declaration' (CBD, 2016) which defines biological diversity, or biodiversity, to mean *"the variability among living organisms from all sources including inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes genetic diversity within species, across species and of ecosystems."* Ireland's Vision for Biodiversity is set out in the NBAP and states: *"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."*

[1] The National Heritage Plan - Available online at: https://www.chg.gov.ie/heritage/heritageireland2030/ [Accessed March 2023].
[2] The National Biodiversity Action Plan – Available online at: https://www.npws.ie/legislation/national-biodiversity-plan [Accessed March 2023].

6.1.5 Local Policy

The management and conservation of heritage, including natural heritage, in County Waterford is set out in the Waterford County Heritage Plan 2017 - 2022[3] which is the most recent county level heritage plan published. The Natural Heritage section of the plan set out a range of objectives under themes that include the implementation of best practice method for the conservation and management of heritage sites; the promotion of projects pertaining to Waterford's wetlands and waterways; management of hedgerows; and the continued development of a Waterford Habitat Map.

The Waterford County Development Plan 2022 – 2028 came into effect on the 19th July 2022. Chapter 9: Biodiversity, of the County Development Plan sets out Policies and Objectives for Biodiversity. This chapter of the County Development Plan sets out two strategic objectives, the second of which pertains to biodiversity. This strategic objective states:
"We will protect, manage and enhance the natural heritage, biodiversity, landscape and environment of Waterford City and County in recognition of its importance as a non-renewable resource, providing a unique identity and character for the City and County as a natural resource asset."

Policy BD1 seeks to protect and conserve natural heritage sites designated under EU and National Legislation and to contribute towards the protection and enhancement of biodiversity and ecological connectivity.

Policy BD3 sets out the approach to proposed development with respect to biodiversity through their consideration in terms of compliance with the standards and legal requirements that include relevant guidelines pertaining to Appropriate Assessment, ecological impact assessment and the protection of watercourses.

Policy BD4 sets out the requirements for all project and plans arising from the County Development Plan with respect to Appropriate Assessment., whilst Policy BD5 describes the protections to European Sites that will be implemented during the lifetime of the plan. In addition to the above other Policy Objectives are provided for the protection, preservation and management of NHAs, pNHAs, local sites of biodiversity value, wetlands, hedgerows, trees and woodlands.

[3] People and Place Waterford Heritage Plan 2017-2022 https://www.waterfordcouncil.ie/media/heritage/Heritage%20Plan%202017-2022.pdf

6.1.6 Guidance

6.1.6.1 Appropriate Assessment of Plans and Projects in Ireland – Guidance for Local Authorities (2010)

The 'Appropriate Assessment of Plans and Projects in Ireland – Guidance for Local Authorities' ("the Appropriate Assessment Guidance")[4] provides methodological and legislative guidance on Appropriate Assessment for any developments that may impact on Natura 2000 sites in Ireland. These guidelines are highly relevant in assessing the potential impact on Natura 2000 sites.

6.1.6.2 CIEEM Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater and Coastal

The 'CIEEM Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine'[5] (the CIEEM Guidelines"), published by the Chartered Institute of Ecology and Environmental Management ("CIEEM"), are the acknowledged reference on ecological impact assessment and reflect the current thinking on good practice in ecological impact assessment across the UK and Ireland. They are consistent with the British Standard on Biodiversity, which provides recommendations on topics such as professional practice, proportionality, pre-application discussions, ecological surveys, adequacy of ecological information, reporting and monitoring. These CIEEM Guidelines have the endorsement of the Institute of Environmental Management and Assessment ("IEMA"), the Chartered Institute of Water and Environmental Management (CIWEM), Northern Ireland Department of the Environment (DoeNI), Scottish Natural Heritage (SNH), The Wildlife Trusts and other leading environmental organisations.

6.1.6.3 Guidelines on the information to be contained in Environmental Impact Assessment Reports

The Environmental Protection Agency (EPA) 'Guidelines on the information to be contained in Environmental Impact Assessment Reports', which were published in 2022, were prepared in accordance with the 1992 Environmental Protection Agency Act (Section 72), which requires the EPA to prepare guidelines on information to be contained in environment impact assessment reports.

[4] Department of Environment, Heritage and Local Government (2010) Appropriate Assessment of Plans and Projects in Ireland – Guidance for Local Authorities – Available at: https://www.npws.ie/sites/default/files/publications/pdf/NPWS_2009_AA_Guidance.pdf (Accessed March 2023).

[5] CIEEM (2018 v 1.1) Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine. Chartered Institute of Ecology and Environmental Management, Winchester. Version 1.1. Updated September 2019 – Available online at: https://cieem.net/wp-content/uploads/2018/08/ECIA-Guidelines-Sept-2019.pdf (Accessed March 2023).

The Guidelines have been drafted with the primary objective of improving the quality of EIARs with a view to facilitating compliance with the EIA Directive (Directive 2014/52/EU). By doing so they contribute to a high level of protection for the environment through better informed decision-making processes. They are written with a focus on the obligations of developers who are preparing EIARs.

The Guidelines are also intended to provide all parties in the EIA process, including competent authorities (CAs), with an authoritative reference to be regarded when considering an EIAR.

6.2 OVERVIEW OF THE DEVELOPMENT

The Development will comprise of the following main components:

- Erection of 12 no. 6.0-7.2 MW wind turbines (Note* this is the current output available for the turbine of this size. It is possible that, with improvements in technology, the output may increase at the time of construction.) with an overall ground tip height of 185m. The candidate wind turbines will have a 162m rotor diameter and a hub height of 104m.
- Construction of Crane Hardstand areas and Turbine Foundations.
- Construction of new internal Site Access Tracks and upgrade of existing Site roads, to include passing bays and all associated drainage.
- Construction of a new wind farm Site entrance with access onto the R671 regional road in the townlands of Lickoran.
- Improvement of existing Site entrances with access onto local roads in the townlands of Broemountain.
- Improvements and temporary modifications to existing public road infrastructure to facilitate delivery of abnormal loads and turbine delivery.
- Construction of one Temporary Construction Compound with associated temporary site offices, parking area and security fencing.
- Development of on-site Borrow Pit.
- Installation of one Permanent Meteorological Mast up to a height of 110m.
- Development of a Site drainage network.
- Construction of one permanent 110 kV Substation.
- All associated Wind Farm Internal Cabling connecting the wind turbines to the Onsite Substation.
- All works associated with the connection of the wind turbines to the national electricity grid, which will be via 110 kV underground cable connection approximately 16.1km in length to the existing Dungarvan 110 kV Substation.

- Upgrade works on the Turbine Delivery Route from Waterford Port.
- Ancillary forestry felling to facilitate construction and operation of the Development.

A 15-year planning permission and 40-year operational life from the date of commissioning of the entire wind farm is being sought.

6.3 ASSESSMENT METHODOLOGY AND SIGNIFICANCE CRITERIA

Ecology surveys of the Site were undertaken following specific guidelines for habitats and species as outlined in the following sections, and with reference to the legislation and policy outlined in **Section 6.2**.

The importance of the habitats and species present is evaluated using the guidance document Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal, and Marine published by the Chartered Institute of Ecology and Environmental Management (CIEEM, 2018 v.1.1). This document outlines an accepted approach for the evaluation of potential impacts from such developments.

6.3.1 Desktop Survey

A desktop assessment was carried out to collate available information on the ecological baseline of the proposed land-holding and surrounding area. Consultation was undertaken with current land owners as well as relevant statutory and non-statutory agencies. In addition to the above the following research was also undertaken:

- A review of the National Biodiversity Database Centre (NBDC) to identify the presence or otherwise of protected species occurring within close proximity to the proposed Site;
- A review of the NPWS online database to identify the presence or otherwise of designated conservation areas (i.e. SPAs, SACs, NHAs etc.);
- A review of Site-specific Conservation Objectives (SSCO) mapping, published by the NPWS, for SACs and SPAs;
- A review of EPA water quality data, on-line mapping and catchment information;
- A review of relevant Inland Fisheries Ireland (IFI) reports;
- A review of the online Bat Conservation Ireland Batlas;
- A review of the New Atlas of the British and Irish Flora (Preston et al., 2002);
- Review of aerial photography, satellite imagery and historical mapping for the proposed Site.

6.3.1.1 Existing Ecological Records

The NPWS and NBDC were consulted in order to establish historic records of important and protected species, or the likelihood of their occurrence (through range information).

Important and protected species includes those identified in the Wildlife Act (as amended), listed under the FPO, and in the EU Habitats and Birds Directive.

Records for bird species are not included here, and have been dealt with in **Chapter 7: Ornithology**.

NBDC collects and manages biodiversity data for the island of Ireland and incorporates data from a number of different sources. The NBDC records were reviewed to inform this assessment. An area of search was used to collate all records held for the proposed Development Site and a surrounding buffer area of 2km. A 2km distance was set as this buffer area will provide adequate coverage for all terrestrial non-volant mammal species, invertebrate species and flora species that may be sensitive to the proposed Development. For instance, terrestrial mammals species are sensitive to proposed Development activities to a distance of c. 150m from the source of the activity (NRA, 2007). The area of search is shown on **Figure 6.1**. A wider search area was used to collate records for bat species in the surrounding area. All records for bat species held for the hectad S10 were explored. A Data Information Request was issued to the NPWS for all protected species records occurring within the area of search shown on **Figure 6.1**.

6.3.1.2 Consultations

Scoping letters were issued to the list of stakeholders outlined in **Chapter 1: Introduction**. In relation to this Biodiversity chapter, consultation responses have been received from the National Parks and Wildlife Service (NPWS) / Development Applications Unit (DAU), Inland Fisheries Ireland (IFI), the Irish Peatland Conservancy Council (IPCC) and An Taisce. A summary of the responses received is provided in **Table 6.1**. These responses are provided in full in **Appendix 1.1** of this EIAR.

Table 6.1: Biodiversity Consultation Conducted to Inform the Development

Consultee	Response Details
DAU / NPWS	Acknowledge receipt of your recent consultation no response received
IFI	Acknowledge receipt of your recent consultation no response received

Consultee	Response Details
IPCC	Advise that the developer planning construction in, or within close proximity to peatland habitat to be familiar with the Environmental Protection Agency funded project BOGLAND (www.ucd.ie/bogland). This project recommends the best practice guidelines to ensure no damaging development occurs on, or affects peat soils and peatlands of conservation value. Identified a number of designated sites within the proximity of the proposed wind farm which need to be given due attention in ascertaining the impacts to biodiversity from the proposed project. The following pNHAs were identified as occurring within 10km of the project site: Lismore Woods (Sitecode: 667), Glenboy Woods (Sitecode: 952) and the Blackwater River and Estuary (Sitecode: 72). The following SACs were identified within 10km of the project site: Lower River Suir SAC (Sitecode: 2137), Comeragh Mountains (Sitecode: 1952), Nier Valley Woodlands (Sitecode 668) and the Blackwater River (Cork/Waterford) (Sitecode: 2170). The proposed development needs to account for nitrogen within pre-planning coupled with a nitrogen monitoring agenda which could highlight possible pathways of nutrient enrichment. Peatlands are naturally nutrient poor and the excessive loads can decimate botanical species Peatlands are susceptible to invasive species when they are drained and/or degraded as when the peat dries out it allows species which would not normally survive in the wet acidic conditions to take hold. Wetland Surveys Ireland (***www.wetlandsurveysireland.com***) have identified a number of wetlands which have had or need to have an ecological survey to ascertain the biodiversity and ecological value within them.
An Taisce	No response received

6.3.2 Site Investigations Undertaken

6.3.2.1 Habitat Survey

Habitat surveys have been carried out at the proposed Development Site between June 2021 and March 2023. Habitat surveys were carried out to identify, describe, map and evaluate habitats and to verify information gathered at the desk study stage. The habitat surveys were completed on the 24th & 25th June 2020; 9th & 10th September 2021; 9th September 2022; 15th February 2023; and 21st March 2023.

ArcGIS and ESRI Field Maps were used to collect information on vegetation and habitats during the initial Phase 1 Habitat Survey, which was completed on the 24th and 25th June 2021. A preliminary habitat map was drawn using ArcMap following the completion of the initial Phase 1 Habitat Survey. The preliminary habitat map was then further interrogated during subsequent habitat and vegetation community surveys as described below.

6.3.2.1.1 Vegetation Community Surveys

The Irish Vegetation Classification (IVC) has been developed as a collaboration between the NPWS, BEC Consultants and the NBDC over a series of phases commencing in 2015 when the vegetation community classification for the grassland division was completed along with the development of the ERICA[6] analysis tool and associated hosting website. Since 2015

[6] ERICA - Engine for Releves to Irish Communities Assignment: https://biodiversityireland.shinyapps.io/vegetation-classification [Accessed: March 2023]

community classifications have been completed for woodlands, heaths, bogs, fens, mires, rocky habitat as well as other community divisions.

The IVC now provides a comprehensive and systematic catalogue and description of the plant communities of Ireland. The IVC is a system of classifying natural plant communities in Ireland according to the species they contain and provides a standardised methodology for detailed environmental assessments. The methodology is repeatable and incorporates the use of quadrat and/or target note sampling within which the types and relative abundance of plant species is recorded. From these results, plant community types can be classified.

Detailed target note surveys to identify IVC plant communities and sub-communities were completed in areas of semi-natural habitat occurring within the project Site. These include:

- Heathland, dry acid grassland, wet grassland and poor fen and flush habitats associated with commonage lands at Broemountain between the proposed turbines T10 and T13;
- Waterford wetland sites 172 and 239 to the east and west of the proposed turbine T4;
- A historic spring location to the west of Lisleagh House

The study area covered by the IVC survey is shown in **Figure 6.2** and focused effort on the area within the wind farm Site layout. A digital camera was used to take representative photographs of the Site and vegetation communities. Vegetation recorded at each quadrat/target note location was analysed using ERICA software.

The target notes that were chosen to represent the range of plant communities found within and surrounding the proposed wind farm Site area are mapped in **Figure 6.2**. Due to the complexity of the Site, ground-truthing aerial imagery as well as the initial Phase 1 habitat Surveys were used in combination with the results of the IVC surveys to delineate habitat and community boundaries to enable mapping to be produced to the highest possible degree of accuracy.

Plant species were identified and recorded using the keys and nomenclature of Stace (2010) for higher plants and Atherton *et al*. (2010) for bryophytes (mosses and liverworts).

IVC communities were recorded by taking detailed target notes of representative samples of vegetation communities. Each location was given a 'TN' number, as indicated in the tables in **Appendix 6.3**. Plant species abundances were made using the DAFOR scale, as defined below.

DAFOR definitions, where applied, are as follows:

- Dominant
- Abundant
- Frequent
- Occasional
- Rare

6.3.2.1.2 Aquatic Surveys

Macroinvertebrates & Biological Water Quality

Biological macro-invertebrate surveys were completed at four number locations along three separate watercourses that flow through and adjacent to the wind farm site. These streams are the Farnane Stream, Aughkilladoon Stream, Lisleagh Stream and the Finisk River. The location of these sampling points are shown on **Figure 6.3**. The biological water quality survey was based on the Biotic Index or Q-value system as outlined by the EPA (McGarrigle, 2002).

Fish Habitat Assessment

Fisheries habitat assessment along these watercourses in the vicinity of the Site was completed by recording the following parameters along each of the watercourses:

- Stream width and depth
- Substrate type, i.e. relative dominance of large rocks, cobble, gravel, sand, mud etc..
- Flow type, i.e. relative dominance of riffle, glide and pool in the sampling area.
- Dominant bank-side vegetation.
- In-stream vegetation.
- Estimated degree of shade by bank-side vegetation

Salmonid and lamprey habitat quality was assessed, taking into account the factors listed above and the quality of salmonid habitat was evaluated in line with the Department of Agriculture's (Northern Ireland) Fisheries Division Advisory Leaflet "*The Evaluation of Habitat for Salmon and Trout*".

6.3.2.1.3 Survey for Rare or Protected Flora

Whilst undertaking habitat and vegetation surveys particular attention was paid to searching suitable habitat for rare or protected flora species, to determine whether they were present within, or close to, the Development. Surveys were conducted during the optimum time of year for these species to occur, in order to assist in ascertaining their presence within, or close to the Site. It is noted that no FPO species were identified on the Site during the surveys completed between 2020 and 2023.

6.3.2.1.4 Terrestrial Mammal Surveys

A survey for field signs indicating the presence of terrestrial mammals and particularly otters was undertaken during the field surveys. This survey was undertaken during the daytime and particular attention was given to habitat features normally associated with otters and other protected terrestrial mammals. Any mammal field signs typical of otter activity were recorded during the surveys. These field signs, as described in Neal & Cheeseman (1996) (7) and Bang & Dahlstrom (1990) (8), include:

- mammal breeding and resting places, such as setts, holts, couches, lairs;
- pathways;
- prints;
- spraints and faecal deposits;
- latrines (and dung pits used as territorial markers);
- prey remains and feeding signs (snuffle holes);
- hair; and
- scratch marks

Camera traps (Bushnell Trophy Cam HD E3) were erected at three locations to sample mammal activity at the selected monitoring locations over a 10 night monitoring period. The camera traps were installed along the Farnanes Stream to the west of the proposed wind farm site, in the vicinity of the proposed turbine T4 towards the centre of the site and along the Aughkilladoon Stream, upstream of its confluence with the Finisk River and at the site entrance in the southeast of the proposed wind farm site. **Figure 6.4** shows the location of camera traps. The camera trap locations were selected to provide coverage of potential otter habitat along the rivers as well as badger habitat along hedgerows within improved agricultural grassland habitat.

Limitations in the effectiveness of trail cameras to record otters have been reported in previous studies (Lerone et al. 2011 & 2015) as body surface temperatures of otters emerging from water do not differ from surrounding ambient temperatures. In order to overcome this limitation each of the three trail cameras, in addition to being set to trigger via heat sensitive motion detection, were set to record still photo images at one minute intervals through each night of recording.

All photographs logged by each of the cameras were reviewed for the presence of otters.

(7) Neal, E., & Cheeseman, C., (1996). 'Badgers'. Poyser Natural History, London.
(8) Bang, P., & Dahlstrom, P., 'Animal Tracks and Signs'. Oxford University Press, Oxford.

6.3.2.1.5 Bats

Bat activity surveys were completed at the proposed wind farm site during the 2020, 2021 and 2022 bat activity season. A total of four no. bat activity manual transect surveys, and three no. roost surveys were conducted in 2021. Static detectors were placed at proposed turbine locations for three rounds in 2020 and 2021. An at height static detector was placed on the existing met mast in 2022. The surveys followed the requirements of 'Bats and Onshore Wind Turbines: Survey, Assessment and Mitigation' (NatureScot 2021).

Further detail on the methods used and results are presented in **Appendix 6.2**.

6.3.2.1.6 Herpetofauna

Incidental records of herpetofauna were noted during all field surveys undertaken between 2021 and 2023.

6.3.2.1.7 Other species

Incidental observations of other species such as terrestrial invertebrates were recorded during field surveys.

The prevalence of the marsh fritillary foodplant devil's-bit scabious *Succisa pratensis* is overall rare at the Site, with the only areas of potentially suitable habitat occurring in wet grassland habitat to the west and outside of the proposed wind farm footprint. Given the absence of suitable habitat occurring within the footprint of the proposed wind farm layout no dedicated surveys for marsh fritillary butterfly were completed.

6.3.2.1.8 Grid Connection Route Surveys

The grid connection route will be 16.8km in length and will be installed within the public road for its entire length between the entrance to the Site and the substation at Dungarvan. The electrical cable will be installed within the formation of the road along its length. A total of 3 watercourses will be crossed by the grid connection route. These watercourses will be crossing using horizontal directional drilling.

6.3.2.1.9 Haul Route Surveys

The haul route will be restricted to the existing public road corridor between Belview Port and the Site. It is proposed to provide road widening for turbine deliveries at three locations along the R671 section of the haul route. A habitat survey of each of these three locations was completed during March 2023. The Level 3 habitat occurring at these locations and the vegetation associated with these habitats was recorded during the surveys.

6.3.2.2 Limitations and Coverage

Limitations can arise during the course of ecological assessments. These limitations may be foreseen, whilst others will not present themselves until the assessment is underway. The limitations can be associated with methods, equipment and health and safety considerations.

Habitat surveys were completed throughout the year, during the optimum growing season as well as outside of the growing season. Habitat surveys were completed during optimum weather conditions, with low winds and dry and bright conditions prevailing.

Fisheries were completed at a suitable time of the year in accordance with established guidelines as set out above. Low flow conditions were noted along sections of the upper Finisk River to the east and south of the Site. The low flow conditions are indicative of the natural state of this section of the river and were not identified as a limitation during the completion of the fisheries surveys.

Limitations noted during bat surveys, analysis and assessment include:
Difficulties inherent in assigning all bat calls to species level;
The sensitivity of bat detector equipment to the calls of different bat species, with calls of some species more easily detected (e.g Leisler's bat) that others (e.g. brown long-eared bat).

6.3.3 Impact Assessment Methodology

6.3.3.1 Establishing the Potential Zone of Influence (ZoI) of the Development

The 'zone of influence' for a development is the area over which ecological features may be subject to significant impacts as a result of the Development and associated activities. The Zone of Influence (ZoI), or distance over which a likely significant effect may occur will differ across the Ecological Receptors identified for the proposed Development, depending on the potential impact pathway(s). The results of both the desk study and the suite of ecological field surveys undertaken has established the habitats and species present at and surrounding the Site. The ZoI is then informed and defined by the sensitivities of each of the ecological receptors present, in conjunction with the nature and potential impacts associated with the Development.

The ZoI of the proposed development in relation to terrestrial habitats is generally limited to the footprint of the proposed development, and the immediate environs. Disturbances to the hydrological regime of wetland/aquatic habitats from impact sources can often result in impacts occurring at distances beyond the immediate adjacent areas of the impact source.

With regard to hydrological impacts, the distances over which aqueous pollutants are likely to remain at concentrations that have potential to result in perturbations to water quality and associated freshwater habitats is difficult to quantify. The potential for such effects to occur are also highly site-specific and related to the predicted magnitude of any pollution event. The impact of a pollution event will depend on the volumes of discharged waters, concentrations and types of pollutants (in the case of the proposed development these being comprised of sediment, hydrocarbons, cement-based products and other related construction solutions), volumes of receiving waters, and the sensitivity of the ecology of the receiving waters. With respect to the Development, this includes all freshwater habitat and ecological receptors downstream of the Development that have been identified as ecological receptors.

The ZoI for other terrestrial mammals in terms of potential impacts to breeding and resting places is 150m from the Development. This distance is in line with the maximum distance for potential disturbance to terrestrial mammals (otters and badgers) as specified by TII guidance documentation (NRA, 2009 a & b).

The ZoI for herpetofauna is considered to be limited to the direct habitat loss arising from the Development.

6.3.3.2 Evaluating Ecological Features within the Zone of Influence

The nature conservation value of habitats and ecological sites occurring within the Site are based upon an established geographic hierarchy of importance as outlined by the National Roads Authority (NRA, 2009). The outline of this geographic hierarchy is provided below and this has been used to determine ecological value in line with the ecological valuation examples provided by the NRA (see NRA, 2009). The geographic evaluation hierarchy is as follows:

- International Sites (Rating A)
- National Importance (Rating B)
- County Importance (Rating C)
- Local Importance (higher value) (Rating D)
- Local Importance (lower value) (Rating E)

Table 6.2: Geographic frame of reference used to determine value of ecological resources[9]

Importance	Criteria

International Importance (Rating A)	• 'European Site' including Special Area of Conservation (SAC), Site of Community Importance (SCI), Special Protection Area (SPA) or proposed Special Area of Conservation.
	• Proposed Special Protection Area (pSPA).
	• Site that fulfils the criteria for designation as a 'European Site' (see Annex III of the Habitats Directive, as amended).
	• Features essential to maintaining the coherence of the Natura 2000 Network.
	• Site containing 'best examples' of the habitat types listed in Annex I of the Habitats Directive.
	• Resident or regularly occurring populations (assessed to be important at the national level) of the following:
	  ○ Species of bird, listed in Annex I and/or referred to in Article 4(2) of the Birds Directive; and/or,
	  ○ Species of animal and plants listed in Annex II and/or IV of the Habitats Directive.
	• Ramsar Site (Convention on Wetlands of International Importance Especially Waterfowl Habitat 1971).
	• World Heritage Site (Convention for the Protection of World Cultural & Natural Heritage, 1972).
	• Biosphere Reserve (UNESCO Man & The Biosphere Programme).
	• Site hosting significant species populations under the Bonn Convention (Convention on the Conservation of Migratory Species of Wild Animals, 1979).
	• Site hosting significant populations under the Berne Convention (Convention on the Conservation of European Wildlife and Natural Habitats, 1979).
	• Biogenetic Reserve under the Council of Europe.
	• European Diploma Site under the Council of Europe.
	• Salmonid water designated pursuant to the European Communities (Quality of Salmonid Waters) Regulations, 1988, (S.I. No. 293 of 1988).

National Importance (Rating B)	• Site designated or proposed as a Natural Heritage Area (NHA).
	• Statutory Nature Reserve.
	• Refuge for Fauna and Flora protected under the Wildlife Acts.
	• National Park.
	• Undesignated site fulfilling the criteria for designation as a Natural Heritage Area (NHA); Statutory Nature Reserve; Refuge for Fauna and Flora protected under the Wildlife Act; and/or a National Park.
	• Resident or regularly occurring populations (assessed to be important at the national level) of the following:
	  • Species protected under the Wildlife Acts; and/or,
	  • Species listed on the relevant Red Data list.
	  • Site containing 'viable areas' of the habitat types listed in Annex I of the Habitats Directive.

County Importance (Rating C)	• Area of Special Amenity. • Area subject to a Tree Preservation Order.

[9] Adapted from CIEEM 2018 v 1.1 - Available online at: https://cieem.net/wp-content/uploads/2018/08/ECIA-Guidelines-Sept-2019.pdf and NRA 2009 - Available at: http://www.tii.ie/technical-services/environment/planning/Guidelines-for-Assessment-of-Ecological-Impacts-of-National-Road-Schemes.pdf [Accessed March 2023].

Importance	Criteria

	• Area of High Amenity, or equivalent, designated under the County Development Plan.
	• Resident or regularly occurring populations (assessed to be important at the County level) of the following:
	  • Species of bird, listed in Annex I and/or referred to in Article 4(2) of the Birds Directive;
	  • Species of animal and plants listed in Annex II and/or IV of the Habitats Directive;
	  • Species protected under the Wildlife Acts; and/or
	  • Species listed on the relevant Red Data list.
	• Site containing area or areas of the habitat types listed in Annex I of the Habitats Directive that do not fulfil the criteria for valuation as of International or National importance.
	• County important populations of species; or viable areas of semi-natural habitats; or natural heritage features identified in the National or Local BAP; if this has been prepared.
	• Sites containing semi-natural habitat types with high biodiversity in a county context and a high degree of naturalness, or populations of species that are uncommon within the county.
	• Sites containing habitats and species that are rare or are undergoing a decline in quality or extent at a national level.

Local Importance (Higher Value) (Rating D)	• Locally important populations of priority species or habitats or natural heritage features identified in the Local BAP, if this has been prepared. • Resident or regularly occurring populations (assessed to be important at the Local level) of the following: • Species of bird, listed in Annex I and/or referred to in Article 4(2) of the Birds Directive; • Species of animal and plants listed in Annex II and/or IV of the Habitats Directive; • Species protected under the Wildlife Acts; and/or • Species listed on the relevant Red Data list. • Sites containing semi-natural habitat types with high biodiversity in a local context and a high degree of naturalness, or populations of species that are uncommon in the locality. • Sites or features containing common or lower value habitats, including naturalised species that are nevertheless essential in maintaining links and ecological corridors between features of higher ecological value.
Local Importance (Lower Value) (Rating E)	• Sites containing small areas of semi-natural habitat that are of some local importance for wildlife. • Sites or features containing non-native species that is of some importance in maintaining habitat links.

The Ecological Receptors of the Development are those features which are within the ZoI and are evaluated as being of Local Importance or greater.

6.3.3.3 Identification and Characterisation of Effects

When describing the magnitude or scale of ecological impacts reference should be made to the following characteristics:

- Positive or negative
- Extent: the size of the affected area/habitat and/or the proportion of a population affected by the effect
- Duration: the period of time over which the impact will occur. The EPA's guidelines on information to be included in Environmental Impact Assessment Reports (EPA, 2022) sets out the following terms for defining the duration of an impact: Momentary Effects - effects lasting from seconds to minutes; Brief Effects - effects lasting less than a day; Temporary Effects - effects lasting less than a year; Short-term Effects - effects lasting one to seven years; Medium-term Effects - effects lasting seven to fifteen years; Long-term Effects - effects lasting fifteen to sixty years; Permanent Effects - effects lasting over sixty years.
- Frequency & Timing: how often the effect will occur; particularly in the context of relevant life-stages or seasons; and,
- Reversibility: will the effect be permanent or temporary. Will an impact reverse, either spontaneously or as a result of a specific action.

The assessment describes those characteristics relevant to understanding the ecological effect and determining the significance, and as such it does not need to incorporate all stated characteristics (CIEEM, 2018 v.1.1).

6.3.3.4 Significant Effects on Important Ecological Features

For the purpose of Ecological Impact Assessment, a 'significant effect', is an effect to an ecological feature from an impact, that either supports or undermines biodiversity conservation objectives for those ecological features which have been identified as important. Conservation objectives may be specific (e.g. for a designated site) or broad (e.g. national/local nature conservation policy). As such, effects can be considered significant in a wide range of geographic scales from international to local. Consequently, 'significant effects' should be qualified with reference to the appropriate geographic scale (CIEEM, 2018 v.1.1).

In order to predict likely ecological impacts and effects, the assessor must take account of the relevant aspects of the ecosystem structure and function, which include (CIEEM, 2018 v.1.1):

- The resources available (e.g. territory, prey availability, habitat connectivity etc.);
- Environmental processes (e.g. eutrophication, drought, flooding etc.);
- Ecological processes and relationships (e.g. population / vegetation dynamics, food webs etc.);
- Human influences (e.g. fertilisation, turbary, grazing, burning etc.);
- Historical context (natural range, trends etc.);
- Ecosystem properties (e.g. the carrying capacity, fragility etc.); as well as,
- Other environmental influences such as air quality, hydrology, water quality, nutrient inputs and salinity etc.

The determination of significance is made in line with the terminology set out in the EPA's guidelines on information to be included in Environmental Impact Assessment Reports. These criteria are as follows:

- No change – no discernible change in the ecology of the affected features
- Imperceptible effect – An effect capable of measurement but without noticeable consequences
- Not Significant – An effect which causes noticeable changes in the character of the
- environment but without significant consequences.
- Slight effect – An effect which causes noticeable changes in the character of the
- environment without affecting its sensitivities.
- Moderate effect – An effect that alters the character of the environment that is consistent
- with existing and emerging trends.
- Significant effect – An effect which, by its character, its magnitude, duration or intensity alters
- a sensitive aspect of the environment
- Very Significant – An effect which, by its character, magnitude, duration or intensity
- significantly alters most of a sensitive aspect of the environment
- Profound effect – An effect which obliterates sensitive characteristics

6.3.3.4.1 Integrity

The integrity of an ecological receptor refers to the coherence of the ecological structure and function that enables the ecological receptor to be sustained (NRA, 2009). The term 'integrity'

is most often used when determining impact significance in relation to designated areas for nature conservation (e.g. SACs, SPAs or pNHA/NHAs) but can often be the most appropriate method to use for non-designated areas of biodiversity value where the component habitats and/or species exist with a defined ecosystem at a given geographic scale.

An impact on the integrity of an ecological site or ecosystem is considered to be significant if it moves the condition of the ecosystem away from a favourable condition: removing or changing the processes that support the sites' habitats and/or species; affect the nature, extent, structure and functioning of component habitats; and/or, affect the population size and viability of component species.

6.3.3.4.2 Conservation Status

An impact on the conservation status of a habitat or species is considered to be significant if it will result in a change in conservation status.

As per the definitions provided in the EU Habitats Directive, the conservation status of a habitat is favourable when:

- Its natural range and areas it covers within that range are stable or increasing
- The specific structure and functions which are necessary for its long-term maintenance exist and are likely to continue to exist for the foreseeable future
- The conservation status of its typical species is favourable as defined below under species

The conservation status of a species is favourable when:

- Population dynamics data on the species concerned indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats
- The natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future
- There is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis

According to the TII/CIEEM methodology, if it is determined that the integrity and/or conservation status of an ecological feature will be impacted on, then the level of significance of that impact is related to the geographical scale at which the impact will occur (i.e. local, county, national, international). In some cases, an impact may not be significant at the geographic scale at which the ecological feature has been valued but may be significant at a lower geographical level. For example, a particular impact may not be considered likely to have a negative effect on the overall conservation status of a habitat which is considered to

be internationally important. However, an impact may occur at a lower geographic scale on this internationally important habitat. Under such a scenario, such an impact on an internationally important habitat is considered to be significant only at the lower scale e.g. local, county, rather than international scale.

6.3.3.5 Assessment of Residual Effects

After characterising the potential impacts of the Development, and assessing the potential effects of these impacts on the 'Important ecological features', mitigation measures are proposed to avoid and / or mitigate the identified ecological effects. Once measures to avoid and mitigate ecological effects have been finalised, assessment of the residual impacts and effects should be undertaken to determine the significance of their effects on the 'Important ecological features'.

6.3.3.6 Assessment of Cumulative Effects

Cumulative effects can result from individually insignificant but collectively significant actions taking place over a period of time or concentrated in a location (CIEEM, 2018 v.1.1). Different types of actions can cause cumulative impacts and effects. As such, these types of impacts may be characterised as:

- Additive/incremental – in which multiple activities/projects (each with potentially insignificant effects) add together to contribute to a significant effect due to their proximity in time and space (CIEEM, 2018 v.1.1); and,
- Associated/connected – a development activity 'enables' another development activity e.g. phased development as part of separate planning applications. Associated developments may include different aspects of the project which may be authorised under different consent processes. It is important to assess the potential impacts of the 'project' as a whole and not ignore impacts that fall under a separate consent process (CIEEM, 2018 v.1.1).

6.4 BASELINE DESCRIPTION

Baseline conditions represent a summary of the existing environment within the Site before the commencement of the Development. This section of the report provides information regarding these baseline conditions.

6.4.1 General Site Description

The proposed wind farm Development is located within an area of farmland, forestry and upland heath, and is located within the townlands of Ballynaguilkee Upper, Broemountain, Corradoon, Dyrick, Lickoran, Lickoranmountain, Lisleagh, Lisleaghmountain, Lyrattin and

Scartmountain. The Site is located 43km west of Waterford City, 55km northeast of Cork City, and 12.9km northwest of Dungarvan. The proposed grid connection passes through the townlands of Broemountain, Lyrattin, Farnane Lower, Farnane Upper, Castlequarter, Mountaincastle South, Carrigaun (Mansfield), Langanoran, Sleadycastle, Knockaunnaglokee, Garryduff, Colligan More, Garryclone, Colliganwood, Ballymacmague North, Ballymacmague South and Killadangan.

The Site is located across land which is predominantly underlain by sandstone rock and brown podzolic or podzol soils of coarse loamy drift with siliceous stones of the Knockmealdown, Knockboy and Ballycondon series. According to the Soil Information System National Soils Map, pockets of peat may exist at the north-western extent of the site although no peat has been identified at the site during the geotechnical surveys of the site which is discussed in **Chapter 8: Soils and Geology.** The National Soils Hydrology Map classifies the majority of the site as being poorly drained, particularly in the western and northern areas. The remainder of the site is classified as being well drained with the majority of these areas being located in the eastern and southern areas of the Site.

The proposed Site is located beyond the south-eastern extent of the Knockmealdown Mountains mountain range. The western, northern and southern extents of the site are typically more elevated than the central and eastern extents of the Site. The site is broadly surrounded by the three main peaks of Knocknasheega (428m) west of the Site boundary, Broemountain (430m) in the northern extent of the site and Dyrick Hill (286m) within the southern central portion of the site. The eastern and central extents of the site are generally relatively flat with elevations typically ranging from between 130m to 190m. The proposed Site extends to 463.9 hectares (ha).

Forestry and agricultural land uses, including dairy and sheep farming are the predominant land uses within the study area. Forestry plantations border the western extent of the proposed Site on an area of commonage land. Additional areas of forestry exist within the central, north-eastern and southern extents of the proposed Site. The Site is intersected by Broemountain Road (L5058) which is a narrow local secondary road. The Farnane River, which is a tributary of the Finisk River, rises near the north-western extent of the Site and flows along the western extent of the Site. The Lisleagh Stream, which is also a tributary of the Finisk River, rises in the central portion of the Site and flows in a south-easterly direction until it merges with the Finisk River, north of the townland of Woodhouse. The Aughkilladoon Stream, another tributary of the Finisk River rises at the south-eastern extent of the Site and flows in a south-easterly direction until it merges with the Finisk River, east of the townland of Woodhouse.

6.4.1.1 Topography

The topography of the Site is variable, and it is broadly surrounded by or is partially overlapping three elevated areas. These include Knocknasheega (428m) west of the Site boundary, Broemountain (429m) in the northern extent of the site and Dyrick Hill (286m) within the southern central portion of the site. The western, northern and southern peaks of the site are more elevated than the central and eastern extents of the Site which are relatively flat with lower elevations ranging from between 130m to 190m. The Site is generally topographically elevated in the north / north-west and generally topographically low lying in the south and east with the exception of Dyrick Hill (286) near the southern extent of the site. The steepest incline across the Site occurs at the northern extent of the Site near the proposed T8 position. A peat stability risk assessment (PSRA) has not been prepared due to the absence of observed peat at the site during the site surveys which are discussed in the **Chapter 8: Soils and Geology.**

The Farnane River, the Lisleagh Stream and the Aughkilladoon Stream are the main surface water bodies that drain the site. All of these surface waters are tributaries of the Finisk River which flows to the east and south-east of the proposed Site. The site is also drained by a network of artificial drainage ditches, many of which are located adjacent to field boundaries, particularly in the central and western extents of the Site. A number of small natural and artificial drains also exist at the western commonage area of the proposed Site. Two potential wetlands exist at the site located east and west of the proposed T4 position. The Map of Irish Wetlands (2021) identifies these locations as "Other/Unsurveyed", it was notable that highly saturated ground was evident at these locations during the site surveys.

There are no lakes within the site boundary with the closest being a small reservoir north of Mt. Melleray Monastery, approximately 5Km west of the proposed Site boundary.

With the exception of Knocknasheega, Broemountain and Dyrick Hill, elevations typically range from between 140m and 300m across the majority of the Site with areas of relatively flat ground existing within the central and eastern areas of the Site. Elevation contours are included within a 3-D hydrological flow map outlined in **Figure 9.6** in **Volume III**.

6.4.1.2 Review of Historical Mapping

The first edition 6-inch map of 1842 shows the northwest section of the wind farm site at Broemountain to be unenclosed. Numerous pathways are shown running north into the upland area from enclosed pasture land to the south. One of these paths will later form the Broemountain Road (L5058). The existing eastern boundary of the unenclosed commonage

area of Broemountain is depicted on the 6-inch. To the east of this boundary the field patterns and agricultural enclosures start to emerge. Further east at Dyrick hill and Lisleagh Mountain, within the proposed wind farm site and to the south of the Lisleagh Stream, the land remained relatively unenclosed. The rate of enclosure increases further east in the vicinity of Lisleagh House and Aughkilladoon Stream.

The 25-inch map of 1904 depicts a significant increase in the rate of land enclosure and presumably agricultural improvement from that shown on the 6-inch map. Only the existing commonage area at Broemountain and the steep lands around Dyrick Hill remained unenclosed by this time. The presence of the Broemountain Road is also shown on the 1904 map. The last edition 6-inch map from 1923 shows further enclosure of lands surrounding Dyrick Hill and immediately to the east of the existing Broemountain commonage area. This latter area is now under conifer plantation.

The 1995 and 1999 orthophotography for the Broemountain commonage area show a large area of dark colouration indicative of established heather dominated heath. The extent of this remains similar up to the 2013 imagery. However this imagery contrasts with the current satellite imagery for the commonage area which shows a large portion of the commonage area where heather cover has been reduced and replaced by a mosaic of heavily browsed heath with grassland and bracken. **Figure 6.5** provides imagery indicating the change in the extent of heather dominated cover within the commonage area.

The 1995 imagery shows that the conifer plantation immediately to the south of the proposed borrow pit location was planted around this time, while no conifer plantation was in place surrounding the proposed turbines T5 and T6 until after 2000. The 1999 imagery suggests that the land cover occurring in this latter area prior to planting was likely to be representative of semi-natural wet grassland habitat. The 25-inch historical map also marks this area as rough wet pasture. Few other significant changes in land cover are apparent from a comparison of the current satellite imagery with the 1995 to 2013 orthophotography.

6.4.2 Designated Areas

6.4.2.1 Designated sites within the potential Zone of Influence of the Development

Table 6.4 below outlines the designated sites within the potential Zone of Influence of the Development (see also **Figure 6.6a to 6.6c**; and the **NIS (DEC Ltd. 2023)**).

Table 6.3: European Sites, NHAs & pNHAs

Designated Sites	Brief Description	Qualifying Interests (QI's)	Approximate Distance (Km) from Site (at closest point)
Special Area of Conservation (SAC)			
Blackwater River (Cork/Waterford) SAC (Site Code: 2170)	The River Blackwater is one of the largest rivers in Ireland, draining a major part of Co. Cork and five ranges of mountains. The SAC stretches from Co. Kerry in the west to Waterford in the east. At the lower, eastern sections of this river corridor SAC habitats that occur include alluvial wet woodland, Yew woodland and Old oak woodland. An example of alluvial woodland occurs at the lower reach of the Finisk River at its confluence with the main channel of the River Blackwater. Other examples of semi-natural woodland habitat occur along the Finisk River, upstream of this confluence. Numerous Annex 1 coastal and estuarine qualifying habitats of the SAC occur downstream of the project site near the River Blackwater estuary at and upstream of Youghal Bay. This SAC is designated for its role in supporting freshwater pearl mussel. However the populations of this species are located at remote distance from the Development and the Finisk River sub-catchment is not designated as a freshwater pearl mussel sensitive catchment. The Finisk River is known to be an important watercourse for Atlantic salmon and river lamprey and brook lamprey are known to breed along this watercourse downstream of the Development. Otters occur throughout this SAC are known to be associated with the Finisk River catchment in which the Development is located.	Estuaries [1130] Mudflats and sandflats not covered by seawater at low tide [1140] Perennial vegetation of stony banks [1220] Salicornia and other annuals colonising mud and sand [1310] Atlantic salt meadows (Glauco-Puccinellietalia maritimae) [1330] Mediterranean salt meadows (Juncetalia maritimi) [1410] Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation [3260] Old sessile oak woods with Ilex and Blechnum in the British Isles [91A0] Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae) [91E0] Margaritifera margaritifera (Freshwater Pearl Mussel) [1029] Austropotamobius pallipes (White-clawed Crayfish) [1092] Petromyzon marinus (Sea Lamprey) [1095]	200m to the west of the proposed wind farm site. Crossed by the grid connection route and the haul route.

Designated Sites	Brief Description	Qualifying Interests (QI's)	Approximate Distance (Km) from Site (at closest point)
		Lampetra planeri (Brook Lamprey) [1096] Lampetra fluviatilis (River Lamprey) [1099] Alosa fallax fallax (Twaite Shad) [1103] Salmo salar (Salmon) [1106] Lutra lutra (Otter) [1355] Trichomanes speciosum (Killarney Fern) [1421]	
Comeragh Mountains SAC (Site Code: 1952)	The Comeragh Mountains are situated approximately 11 km south-west of Carrickon-Suir in Co. Waterford. The central plateau of the Comeragh Mountains is at an altitude of about 700 m and supports areas of blanket bog. Dry heath is found at this site in a number of forms. A form dominated by Heather is found on rocky terrain at the south of the site, and is considered good quality dry heath. At the east and south-east of the site the vegetation is found in mosaic with Bracken (Pteridium aquilinum), upland grassland (grasses such as Agrostis spp. and Festuca spp. are common) and Gorse (Ulex europaeus). Here the habitat is sometimes associated with moraines, an interesting and uncommon feature. However, the Heather element is much reduced in this area due to sheep grazing pressure. A form of wet heath which is dominated by Deergrass, in association with Heath Rush (Juncus squarrosus), Mat-grass (Nardus stricta), Bell Heather, Bilberry, Tormentil and wood-rushes (Luzula spp.). Alpine heath has been documented as occurring in the corries associated with the Sgilloge and Coumshingaun Loughs. Coumshingaun Lough, which is located on the	[3110] Oligotrophic Waters containing very few minerals [3260] Floating River Vegetation [4010] Wet Heath [4030] Dry Heath [4060] Alpine and Subalpine Heaths [7130] Blanket Bogs (Active)* [8110] Siliceous Scree [8210] Calcareous Rocky Slopes [8220] Siliceous Rocky Slopes [1393] Slender Green Feather-moss (Drepanocladus vernicosus)	8km to the east of the proposed wind farm. 5km to the east of the haul route. 6km to the east of the grid connection route.

Designated Sites	Brief Description	Qualifying Interests (QI's)	Approximate Distance (Km) from Site (at closest point)
	eastern slope, is an excellent example of an ultra-oligotrophic lake. Water-crowfoots (Ranunculus spp.) are known to occur in at least some of the many upland rivers in this site, and particularly those to the east.		
Lower River Suir SAC (Site Code: 2137)	Lower River Suir SAC consists of the freshwater stretches of the River Suir immediately south of Thurles, the tidal stretches as far as the confluence with the Barrow/Nore immediately east of Cheekpoint in Co. Waterford, and many tributaries including the Clodiagh in Co. Waterford, the Lingaun, Anner, Nier, Tar, Aherlow, Multeen and Clodiagh in Co. Tipperary.	[1330] Atlantic Salt Meadows [1410] Mediterranean Salt Meadows [3260] Floating River Vegetation [6430] Hydrophilous Tall Herb Communities [91A0] Old Oak Woodlands [91E0] Alluvial Forests* [91J0] Yew Woodlands* [1029] Freshwater Pearl Mussel (Margaritifera margaritifera) [1092] White-clawed Crayfish (Austropotamobius pallipes) [1095] Sea Lamprey (Petromyzon marinus) [1096] Brook Lamprey (Lampetra planeri) [1099] River Lamprey (Lampetra fluviatilis) [1103] Twaite Shad (Alosa fallax) [1106] Atlantic Salmon (Salmo salar) [1355] Otter (Lutra lutra)	6km north of the proposed wind farm site. 7km north of the haul route. 11km north of the grid connection route.
Glendine Wood SAC (Site Code: 2324)	Glendine Wood lies 3-4 km north-east of Dungarvan, Co. Waterford and consists of a steep-sided, narrow ravine cut through a low ridge of Old Red Sandstone by the Glendine River. Woodland covers the valley	[1421] Killarney Fern (Trichomanes speciosum)	12.5km southeast of the proposed wind farm. 4.5km east of the grid connection route and the existing Dungarvan substation.

Designated Sites	Brief Description	Qualifying Interests (QI's)	Approximate Distance (Km) from Site (at closest point)
	sides and the land to the east and west of the mouth of the ravine. The rare and Annex II-listed species Killarney Fern (Trichomanes speciosum) is found at this site. It is found in large numbers here, and forms a very important population in the national, and international, context.		150m north of the N25 section of the haul route.
Helvick Head SAC (Site Code: 0665)	Helvick Head is situated on the southern side of Dungarvan Harbour in Co. Waterford. It forms the eastern extremity of a broad Old Red Sandstone ridge which extends as far west as Cork City, and is the most northern of the (Hercynian) parallel folds in the rocks of the south-west of Ireland. The cliff top supports coastal heath of a type characteristic of shallow soils on acid rocks. Sea cliffs are particularly well developed at the eastern end of the site and are well vegetated with Thrift, Ivy (Hedera helix), Common Scurvygrass (Cochlearia officinalis), Sea Campion (Silene vulgaris subsp. maritima), Rock Sea-spurrey (Spergularia rupicola), Buck's-horn Plantain, lichens, and a variety of other species.	[1230] Vegetated Sea Cliffs [4030] Dry Heath	20km southeast of the proposed wind farm site. 9.5km southeast of the grid connection route. 7km south of the N25 section of the haul route.
Nier Valley Woodlands SAC (Site Code: 0668)	Nier Valley Woodlands comprises an area of mixed semi-natural deciduous forest lying on the flanks of the Nier Valley, 3 km east of Ballymacarbry in Co. Waterford. . It consists of several separate tracts of woodland which were once joined up but have now been fragmented by afforestation and housing developments. One large tract occupies the flanks along the north side of the Nier Valley extending up the Glennanore River. The second large area extends over 3 km along the southern banks of the River Nier. A third area is situated just south of the river to the east of Ballymacarbry Bridge.	[91A0] Old Oak Woodlands	8km northeast of the proposed wind farm site. 7km north of the haul route. 11km north of the grid connection route.

Designated Sites	Brief Description	Qualifying Interests (QI's)	Approximate Distance (Km) from Site (at closest point)
Special Protection Areas (SPAs)			
Blackwater Estuary SPA (Site Code: 4028)	The Blackwater Estuary SPA is a moderately-sized, sheltered south-facing estuary, which extends from Youghal New Bridge to the Ferry Point peninsula, close to where the river enters the sea. The Blackwater Estuary is of high ornithological importance for wintering waterfowl, providing good quality feeding areas for an excellent diversity of waterfowl species. At high tide, the birds roost along the shoreline and salt marsh fringe, especially in the Kinsalebeg area. It is an internationally important wetland site on account of the population of Black-tailed Godwit it supports. It is also of high importance in a national context, with seven species having populations which exceed the thresholds for national importance.	Wigeon (Anas penelope) [A050] Golden Plover (Pluvialis apricaria) [A140] Lapwing (Vanellus vanellus) [A142] Dunlin (Calidris alpina) [A149] Black-tailed Godwit (Limosa limosa) [A156] Bar-tailed Godwit (Limosa lapponica) [A157] Curlew (Numenius arquata) [A160] Redshank (Tringa totanus) [A162] Wetland and Waterbirds [A999]	20km south of the proposed wind farm site. 19km to the southwest of the grid connection route. 19km to the southwest of the haul route.
Dungarvan Harbour SPA (Site Code: 4032)	Dungarvan Harbour SPA is located in south-west Co. Waterford and lies at the eastern end of the former valley of the River Blackwater - this river now turns south at Cappoquin, vacating its original course. The site is also of special conservation interest for holding an assemblage of over 20,000 wintering waterbirds. 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 of special conservation interest for Wetland & Waterbirds.	Great Crested Grebe (Podiceps cristatus) [A005] Light-bellied Brent Goose (Branta bernicla hrota) [A046] Shelduck (Tadorna tadorna) [A048] Red-breasted Merganser (Mergus serrator) [A069] Oystercatcher (Haematopus ostralegus) [A130] Golden Plover (Pluvialis apricaria) [A140] Grey Plover (Pluvialis squatarola) [A141] Lapwing (Vanellus vanellus) [A142]	11.5km to the southeast of the proposed wind farm site. 600m to the south of the grid connection route. 500m to the south of the N25 section of the haul route.

Designated Sites	Brief Description	Qualifying Interests (QI's)	Approximate Distance (Km) from Site (at closest point)
		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] Turnstone (Arenaria interpres) [A169] Wetland and Waterbirds [A999]	
Blackwater Callows SPA (Site Code: 4094)	The Blackwater Callows SPA comprises the stretch of the River Blackwater that runs in a west to east direction between Fermoy and Lismore in Counties Cork and Waterford, a distance of almost 25 km. The site is of high ornithological interest on account of its wintering waterfowl populations. Whooper Swan occurs in numbers of international importance	Whooper Swan (Cygnus cygnus) [A038] Wigeon (Anas penelope) [A050] Teal (Anas crecca) [A052] Black-tailed Godwit (Limosa limosa) [A156] Wetland and Waterbirds [A999	12km to the west of the proposed wind farm site. 12.5km to the west of the grid connection route. 13.5km to the west of the haul route.
Helvick Head to Ballyquin SPA	Helvick Head to Ballyquin SPA is a linear site situated on the south-west coast of Co. Waterford. It includes the sea cliffs and land adjacent to the cliff edge between Helvick Head in the east and Ballyquin townland in the south-west. The site supports a nationally important population of breeding Chough, a Red Data Book species that is listed on Annex I of the E.U. The site is also of importance for its Peregrine population. In addition, the site has important breeding seabird populations, centered around Helvick Head.	Cormorant (Phalacrocorax carbo) [A017] Peregrine (Falco peregrinus) [A103] Herring Gull (Larus argentatus) [A184] Kittiwake (Rissa tridactyla) [A188] Chough (Pyrrhocorax pyrrhocorax) [A346]	20km southeast of the proposed wind farm site. 9.5km southeast of the grid connection route. 7km south of the N25 section of the haul route.

Designated Sites	Brief Description	Qualifying Interests (QI's)	Approximate Distance (Km) from Site (at closest point)
Mid-Waterford Coast SPA (Site Code: 4193)	The Mid-Waterford Coast SPA encompasses the areas of high coast and sea cliffs in Co. Waterford between Newtown Cove to the east and Ballyvoyle to the west. The site includes the sea cliffs and the land adjacent to the cliff edge. The site supports an internationally important population of breeding Chough, a Red Data Book species that is listed on Annex I of the E.U. Birds Directive. The site supports a nationally important Peregrine population and holds nationally important populations of Cormorant (79 pairs) and Herring Gull (147 pairs)	Cormorant (Phalacrocorax carbo) [A017] Peregrine (Falco peregrinus) [A103] Herring Gull (Larus argentatus) [A184] Chough (Pyrrhocorax pyrrhocorax) [A346]	20km southeast of the proposed wind farm site. 10km east of the grid connection route. 3.5km east of the N25 section of the haul route.
Proposed Natural Heritage Areas (pNHAs)			
Blackwater River And Estuary (Site Code: 0072)	Overlaps with River Blackwater SAC and Blackwater Estuary SPA. See above for description.	See qualifying features of interest listed for River Blackwater SAC and Blackwater Estuary SPA.	20km south of the proposed wind farm site. 19km to the southwest of the grid connection route. 19km to the southwest of the haul route.
Blackwater River Callows (Site Code:0073)	Overlaps with Blackwater Callows SPA. See above for description.	See special conservation interests listed for Blackwater Callows SPA.	12km to the west of the proposed wind farm site. 12.5km to the west of the grid connection route. 13.5km to the west of the haul route.
Dungarvan Harbour (Site Code:0663)	Overlaps with Dungarvan Harbour SPA. See above for description.	See special conservation interests listed for Dungarvan Harbour SPA.	11.5km southeast of proposed wind farm site. 0.8km southeast of grid connection route. 0.4km south of haul route.
Helvick Head (Site Code:0665)	Overlaps with Helvick Head SAC. See above for description.	See qualifying features of interest listed for Helvick Head SAC.	20km southeast of the proposed wind farm site. 9.5km southeast of the grid connection route. 7km south of the N25 section of the haul route.
Lismore Woods (Site Code:0667)	No description provided in pNHA site synopsis portfolio.	Semi-natural woodland.	8.5km west of proposed wind farm site. 10km west of grid connection route. 11.5km west of haul route.

Designated Sites	Brief Description	Qualifying Interests (QI's)	Approximate Distance (Km) from Site (at closest point)
Nier Valley Woodlands (Site Code:0668)	Overlaps with Nier Valley Woodlands SAC.	See qualifying features of interest listed for Nier Valley Woodlands SAC.	8km northeast of the proposed wind farm site. 7km north of the haul route. 11km north of the grid connection route.
Cahir Park Woodland (Site Code:0947)	No description provided in pNHA site synopsis portfolio.	Semi-natural woodland.	16km northwest of the proposed wind farm site. 21km northwest of the grid connection route. 19.5km northwest of the haul route.
Glenboy Wood (Site Code:0952)	Glenboy Wood lies in a deep valley just south of Newcastle on the north-east end of the Knockmealdown Mountains. There has been extensive planting of conifers, most of which are now nearing maturity (2002), but patches of the original woodland and individual trees remain, especially where the planting has failed, and there is a more or less continuous, although narrow, belt of native species beside the main river and its tributaries. These remnants are very species-rich. Sessile Oak (*Quercus petraea*) and Downy Birch (*Betula pubescens*) are the dominant trees on the drier, upper parts of the slopes, forming a *Blechno-Quercetum* var. *coryletosum* community. Bluebell (*Hyacinthoides non-scripta*) and ferns are abundant with patches of Great Wood-rush (*Luzula sylvatica*). The valley sides are very wet with seepage areas in which Enchanter's-nightshade (*Circaea lutetiana*), Remote Sedge (*Carex remota*), ferns and Golden-saxifrage (*Chrysosplenium oppositifolium*) are prominent. The main stream has a narrow valley floor dominated by Ash (*Fraxinus excelsior*) and Alder (*Alnus glutinosa*).	Semi-natural woodland	2.5km north of the proposed wind farm site. 6km north of the grid connection route. 8.5km northwest of the haul route.
Ballyeelinan Wood (Site Code:1692)	This site is situated about 4km north-east of Ardmore. It comprises a small wooded valley running down to the sea. The major habitat is semi-natural woodland. The northern part is dominated by In contrast, the southern end of the wood is dominated by Sycamore	Semi-natural woodland – WN2 Oak-ash-hazel woodland.	21km south of proposed wind farm site. 14km south of grid connection route. 14km south of haul route.

Designated Sites	Brief Description	Qualifying Interests (QI's)	Approximate Distance (Km) from Site (at closest point)
	(*Acer pseudoplatanus*) and Beech (*Fagus sylvatica*) with little understorey vegetation. Pedunculate Oak (*Quercus robur*) and Ash (*Fraxinus excelsior*) with occasional elm (*Ulmus* spp.). Ballyeelinan Wood is of interest as semi-natural woodland containing many native tree species. Its coastal position is unusual and its relatively undisturbed nature makes it a good wildlife refuge.		
Ballyvoyle Head To Tramore (Site Code:1693)	Overlaps with the Mid-Waterford Coast SPA.	See special conservation interests listed for Mid-Waterford Coast SPA.	19km southeast of proposed wind farm site. 10km east of grid connection route 3.5km east of haul route.
Glenanna Wood (Site Code:1698)	Glennana Wood lies in this steep gorge along the Ballymacart River. Despite the river occupying the valley, the woodland is dry by nature, and contains a rich variety of deciduous native trees, especially Ash (*Fraxinus excelsior*), and Hazel (*Corylus avellana*), with elm (*Ulmus* spp.), oak (*Quercus* spp.), Elder (*Sambucus nigra*), Hawthorn (*Crataegus monogyna*) and some non-native Sycamore (*Acer pseudoplatanus*). Despite the attentions of cattle and sheep, protected by its steep gradients, this site has remained in a notably natural condition, and thus, although small, it is one of the few representatives of typical semi-natural woodland left in the area		23km south/south 13km south of grid connection route. 13km south of haul route.
Stradbally Woods (Site Code:1707)	The composition of the woodland at Stradbally Wood is varied according to past and present management, some areas are composed of scrub, there are some planted conifer stands and some areas comprise Downy Birch (*Betula pubescens*) and Sycamore (*Acer pseudoplatanus*). The east facing slope of Stradbally cove is dominated by Ash (*Fraxinus excelsior*) and Sycamore, this is probably the most natural area of the wood. Most of the rest of the wood is dominated by oak (*Quercus* spp.) and Beech (*Fagus sylvatica*).	WD1 broad-leaved woodland	19km southeast of the proposed wind farm site. 12km east of the grid connection route. 4km southeast of the haul route.

Designated Sites	Brief Description	Qualifying Interests (QI's)	Approximate Distance (Km) from Site (at closest point)
	In general the woodland is mature, and although it is artificial, probably mainly planted in origin, such extensive mature woodlands are of conservation interest.		
Toor Wood (Site Code:1708)	Along the flanks of the Glasha River Valley in the gently rolling foothills of the Comeragh Mountains, north County Waterford, Toor Woods occurs as a small area of mixed deciduous woodland largely surrounded by conifer plantations. These woods contain patches of mature relict oak woodland with a good diversity of native species including oak (*Quercus* spp.), Ash (*Fraxinus excelsior*), Rowan (*Sorbus aucuparia*), Hazel (*Coryllus avellana*) and Holly (I*lex aquifolium*). Toor Woods have been somewhat damaged by the invasion of exotic species such as Rhododendron (*Rhododendron ponticum*) and Cherry Laurel (*Prunus laurocerasus*). However, in addition to being of ecological interest, they are of high amenity value and are used for pheasant shooting, picnicing and walking.	WN1 Oak-birch-holly woodland	18km northeast of the proposed wind farm site. 20km northeast of the grid connection route. 16km northeast of the haul route.
Glenmore Wood (Site Code:1933)	Overlaps with Glendine Wood SAC.	See qualifying features of interest listed for Glendine Wood SAC.	15km west of proposed wind farm site. 16km west of grid connection route. 17.5km west of haul route.
Comeragh Mountains (Site Code:1952)	Overlaps with Comeragh Mountains SAC.	See qualifying features of interest listed for Comeragh Mountains SAC.	8km east of the proposed wind farm site. 5.5km east of haul route. 5.5km east of grid connection route.
Marlfield Lake (Site Code:1981)	Marlfield Lake is a small lake, situated 3km west of the town of Clonmel. Although relatively small in size, this lake is one the most important wetlands in south Tipperary as it supports a large number of waterfowl particularly in the winter. The lake is surrounded by mixed deciduous woodland comprised predominantly of Alder (*Alnus glutinosa*) with some Beech (*Fagus sylvatica*), oak (*Quercus* spp.) and Ash (*Fraxinus excelsior*). It also has several springs, a stream and an area of freshwater marsh with a variety of wetland species. There is a notable profusion of Water-violet	Wetland habitat	15km north of the proposed wind farm site. 16.5km north of the haul route. 18km north of the grid connection route.

Designated Sites	Brief Description	Qualifying Interests (QI's)	Approximate Distance (Km) from Site (at closest point)
	(*Hottonia palustris*). The removal of scrub growth around the perimeter of the lake in recent times threatens to disturb the wildlife on the lake and should be prevented from occurring in the future.		
Glencairn (Site Code:2095)	This is a nursery roost for Leisler's Bat (*Nyctalus leisleri*) which roost in a hipped roof of an old privately owned dwelling house approximately 3km west of Lismore. Over one hundred bats were recorded at the house in l994, which was the first year the bats had used the house so it is probable that the number will increase in the future. It is already a site of national importance. The present owners are well disposed towards the bats, which is an important consideration when trying to protect roosts of this species, the largest and possibly the noisiest of the seven bat species. Although the Leisler's Bat is considered common in Ireland, the numbers of safe nursery roosts are small.	Leisler's bat	18.5km northeast of the proposed wind farm site. 15.5km northeast of the haul route. 19.5km northeast of the grid connection route.

6.4.3 Desktop study for recorded rare, threatened and/or protected species

The results of the desk study are provided in **Table 6.4** below:

Table 6.4: Rare, threatened or protected Species Recorded within 2km of the Application Site (10km for bat records)[10]

Species	Scientific Name	Habitats Dir. (Annex II / IV)	Birds Dir. (Annex I)	Wildlife Acts (as amended)	Red List Status	Flora Protection Order	Birds of Conservation Concern (2021– 2026)	Likelihood on the Site	Likelihood within 2 km	Most recent record	Record Source
Mammals											
Otter	*Lutra lutra*	Y	-	Y	LC	-	-	3	1	2010	NBDC & NPWS
Badger	*Meles meles*	-	-	Y	LC	-	-	3	1	2018	NBDC & NPWS
Red squirrel	*Sciurus vulgaris*	-	-	Y	LC	-	-	3	2	2015	NBDC
Irish hare	*Martes martes*	-	-	Y	LC	-	-	4	1	2021	NBDC
Irish stoat	*Cervus elaphus*	-	-	Y	LC	-	-	2	1	2015	NBDC
Hedgehog	*Erinaceus europaeus*	-	-	Y	LC	-	-	3	2	2013	NBDC
Pygmy Shrew	*Sorex minutus*	-	-	Y	LC	-	-	3	1	2015	NBDC
Bats (within 10 km)											
Soprano pipistrelle	*Pipistrellus pygmaeus*	Y	-	Y	LC	-	-	3	1	2014	NBDC
Common pipistrelle	*Pipistrellus pipistrellus*	Y	-	Y	LC	-	-	3	1	2009	NBDC
Leisler's bat	*Nyctalus leisleri*	Y	-	Y	LC	-	-	3	1	2009	NBDC
Herpetofauna											
Common frog	*Rana temporaria*	-	-	Y	Vulnerable	-	-	2	1	2018	NBDC
Common lizard	*Zootoca vivipara*	-	-	Y	Vulnerable	-	-	2	1	2020	NBDC

[10] (Sources: NPWS, NBDC & BCI databases) – Please note the below list is not an exhaustive species list for the area.

Species	Scientific Name	Habitats Dir. (Annex II / IV)	Birds Dir. (Annex I)	Wildlife Acts (as amended)	Red List Status	Flora Protection Order	Birds of Conservation Concern (2021– 2026)	Likelihood on the Site	Likelihood within 2 km	Most recent record	Record Source
Plants											
Green Field-speedwell	*Veronica agrestis*	Y	-	-	Near threatened	-	-	2	3	2008	NBDC
Invasive Species											
Butterfly bush	*Buddleja davidii*	-	-	-	-	-	-	2	1	2018	NBDC
Rhododendron	*Rhododendron ponticum*	-	-	-	-	-	-	1	1	2003	NBDC
Cherry laural	*Prunus laurocerasus*	-	-	-	-	-	-	1	1	2004	NBDC
Field penny-cress	*Thlaspi arvense*	-	-	-	-	-	-	3	1	2004	NBDC
Giant rhubarb	*Gunnera tinctoria*	-	-	-	-	-	-	3	1	2009	NBDC
Japanese Knotweed	*Fallopia japonica*	-	-	-	-	-	-	1	1	2006	NBDC
Sycamore	*Acer pseudoplatanus*	-	-	-	-	-	-	1	1	2018	NBDC
Three-cornered garlic	*Allium triquetrum*	-	-	-	-	-	-	1	1	2004	NBDC
Virginia-creeper	*Parthenocissus quinqufolia*	-	-	-	-	-	-	3	1	2004	NBDC
Jenkin's spire snail	*Potamopyrgus antipodarum*	-	-	-	-	-	-	3	1	2012	NBDC
American mink	*Mustela vison*	-	-	-	-	-	-	2	1	2012	NBDC
Bank vole	*Myodes glareolus*	-	-	-	-	-	-	2	1	2012	NBDC
Brown rat	*Rattus norvegicus*	-	-	-	-	-	-	2	1	2011	NBDC
Rabbit	*Oryctolagus cuniculus*	-	-	-	-	-	-	1	1	2015	NBDC

Species	Scientific Name	Habitats Dir. (Annex II / IV)	Birds Dir. (Annex I)	Wildlife Acts (as amended)	Red List Status	Flora Protection Order	Birds of Conservation Concern (2021– 2026)	Likelihood on the Site	Likelihood within 2 km	Most recent record	Record Source
Fallow deer	*Dama dama*	-	-	-	-	-	-	1	1	2015	NBDC
Feral ferret	*Mustela furo*	-	-	-	-	-	-	2	1	2006	NBDC

Key to likelihood of species presence: 1 = Confirmed; 2 = Likely; 3 = Possible; 4 = Unlikely

6.4.3.1 Marsh fritillary

There are no marsh fritillary records held by the NBDC for marsh fritillary within the area of search as shown on **Figure 6.1**. There are no records for the presence of marsh fritillary within the hectad S10 within which the proposed wind farm site is located. The nearest record for marsh fritillary in the wider surrounding area is from the 100m square X150 950, located approximately 8km to the south of the Development.

6.4.4 Article 17 Habitats

Under Article 17 of the EU Habitats Directive Ireland is required to report to the European Commission every six years on the status of habitats and species listed in the Annexes of the Directive. The latest Article 17 Report prepared for Ireland were published by the NPWS in 2019. Article 17 Reports provide estimates for the area of Annex 1 habitats occurring in Ireland. This area calculation is based upon the overall area of these habitats occurring within the country, as mapped by the NPWS. As part of the Article 17 publication, the digital mapping dataset for the location of Annex 1 habitats has also been made publicly available. This dataset was reviewed to identify the presence of any area of Annex 1 habitat occurring within or adjacent to the Development that forms part of the current national area of these habitats. **Figure 6.7** shows the location of Annex 1 habitats that form part of the national area of these habitats within/or surrounding the Site.

The Article 17 mapping for Annex 1 habitats has been used by the NPWS to establish the favourable conservation range (FCR) of these habitats nationally.

Examples of Annex 1 dry heath and wet heath polygons are mapped to the west and northwest of the proposed Development Site within and to the north of the Broemountain Commonage Area. The area of mapped Annex 1 dry heath and wet heath habitat have been sourced by the NPWS from the Commonage Framework Plan. The NPWS have used a

"certainty rating" to rate the accuracy of Commonage Framework Plan data with respect to the distribution mapping of both wet heath and dry heath. The Certainty rating ranges from 1 to 3 with 1 being 'least certain' and 3 being 'certain'. The NPWS have assigned a Certainty rating of 1 – least certain – to Commonage Framework Plan dry heath and wet heath polygons as shown on **Figure 6.7**.

6.5 EXISTING ECOLOGICAL BASELINE

6.5.1 Designated Sites with Potential Ecological / Hydrological Connections with the Development

Designated Sites are referred to above in **Table 6.4** in Section 6.4.2.

A NIS has been prepared for the Development (DEC, 2023) which assesses if the integrity of European Sites will be adversely affected. As such, this EIAR Chapter focusses on the potential for impacts upon National and Local Sites of Ecological Importance such as Waterford Wetland sites and does not reassess impacts upon European Sites. The findings of the NIS report are nonetheless referred to within this Chapter.

The European Sites occurring in the wider area surrounding the Site are shown on **Figure 6.6a**.and **6.6b.** Those European Sites that are hydrologically connected to the project site include the River Blackwater SAC and the Blackwater Estuary SPA. The Blackwater River and Estuary pNHA, which overlaps with the River Blackwater SAC and the Blackwater Estuary SPA is also hydrological connected to the Development.

The grid connection route intersects the Colligan River. This river drains to the Dungarvan Harbour SPA and pNHA.

6.5.2 Habitats occurring at the proposed wind farm site

6.5.2.1 Level 3 Fossitt Habitats

A description of the Level 3 Habitats, as per the Guide to Habitats in Ireland, occurring within the Site is provided below. The extent and distribution of these habitats within the Site are shown on **Figure 6.8**. A total of 14 habitats have been identified as occurring within the Site. These habitats are described in **Table 6.5** below.

Table 6.5: Primary Fossitt 2000 Habitat Communities recorded at the proposed wind farm site during surveys

Fossitt 2000 Code (s)	Name of Fossitt 2000 Habitat Communities	Brief Description* *The brief descriptions below, are based on the Site Habitat Surveys – refer to the Guide for Habitats in Ireland (Fossitt, 2000) for further information regarding these Habitat Classifications.
FW1	Eroding Watercourse	A description of the eroding watercourses occurring within and adjacent to the proposed wind farm site is provided under Secton 6.5.5 and 6.5.6.4 below.
FW4	Drainage ditches	Drainage ditches are predominantly located towards the west of the proposed wind farm site in areas of improved habitat underlain by peat substrate and with wet heath and blanket bog habitat. These drains are dominated by stands of species poor *Juncus effusus* and *Sphagnum cuspidatum*.
FP2	Non-calcareous spring	Two examples of a non-calcareous spring occur within the proposed development site. One spring is located immediately to the south of the proposed access track at approximately Chainage 1,840 while the second is located further south and to the west of the proposed access track at approximate Chainage 1,350. The more northerly spring is identified and labelled on the 25-inch historical map from 1906. The southerly spring is indicated on the 1842 first edition 6-inch map as an irregular linear feature commencing near the centre of the field, which is depicted as a marginal, poorly drained plot. The detail on the 1902 and 1922 OS maps indicates that this feature was no longer marginal and was recut/regularised along its current line in the late 19th century and it is clearly shown commencing in the centre of the field (labelled as "rises" on 1922 map). Both springs are surrounded by improved pasture grassland and it is possible that higher nutrient levels has influenced the species occurring at the springs. The dominant species recorded here were *Rorippa nasturtium-aquatica, Apium nodiflorum, Epilobium palustre, Glyceria fluitans, Ranunculus repens* and *Urtica dioica*. Other species noted include *Potentilla anserina, Ranunculus acris, Trifolium repens, Trifolium pratensis, Lotus corniculatus, Stellaria gramminea* and *Polygonum aviculare*.
GS3	Acidic grassland	Acid grassland occurs towards the west of the Site in the upland commonage area of Broemountain. This is located in an area where acid grassland forms a natural component of the upland commonage area. The extent of acid grassland in this area is likely to have increased as a result of past land management where grazing pressure has converted areas of dry heath to grassland habitat. The area is now grazed by livestock in the form of both sheep and cattle. The sward is dominated by acidic grasses that comprise *Deschampsia flexuosa, Agrostis stolonifera, Agrostis capillaris, Nardus stricta, Anthoxanthum odoratum, Festuca ovina, Cynosaurus cristatus,* and *Molinia caerulea*. Other species occurring in this acid include *Juncus squarrosus, Juncus effusus, Carex echinata, Veronica officinalis, Polygala serpyllifolia, Potentilla erecta, Euphrasia nemorosa, Luzula sylvatica, Pedicularis sylvatica, Galium saxatile, Luzula multiflora* and *Ranunculus flammula*. Some low browsed *Calluna vulgaris* and *Erica tetralix* also occur in this habitat. Prominent bryophytes occurring include *Rhytidiadelphus loreus, Rhytidiadelphus squarrosus, Hylocomium splendens* and *Pleurozium schreberi*. Acid grassland in upland areas that occur in a mosaic with heath habitat can correspond to the Annex 1 habitat Species-rich *Nardus* grassland (6230). This Annex 1 habitat requires a source of mineral flushing in order to exist (Hamilton et al., 2021). The majority of the acid grassland occurring within the commonage area at Broemountain is not influenced by mineral flushing and does not meet this requirement of species-rich *Nardus* grassland. O'Neill et al. (2013) have identified assessment criteria for identifying species-rich *Nardus* grassland at favourable conservation condition. These criteria include parameters such as the presence of high-quality indicator species; negative indicator species; encroachment;

Fossitt 2000 Code (s)	Name of Fossitt 2000 Habitat Communities	Brief Description* *The brief descriptions below, are based on the Site Habitat Surveys – refer to the Guide for Habitats in Ireland (Fossitt, 2000) for further information regarding these Habitat Classifications.
		sward height; grazing pressures etc. For favourable conservation condition to be achieved the threshold for all criteria have to be passed. Examples of acid grassland occurring within the commonage area support a number of positive indicator species associated with this habitat. A presence of at least 7 positive indicator species is required for this criteria to be passed. No high quality indicator species for this Annex 1 habitat were recorded during surveys. Negative indicator species, particularly in the form of *Senecio jacobaea, Juncus effusus, Bellis perennis and Eriophorum* species were recorded in this habitat. Signs of grazing are evident throughout this habitat; and encroachment from dense bracken and gorse scrub was also noted. Based on the above the acid grassland habitat occurring within the proposed wind farm site at Broemountain is representative of a poor quality example of species-rich *Nardus* grassland, with this habitat currently assessed as being at unfavourable status.
GS4	Wet grassland	The wet grassland habitats occurring to the east of the proposed wind farm site are examples of improved agricultural grassland on wet and heavy soils where swards are dominated by stands of Juncus effusus. This habitat is generally enriched as a result of livestock and farming activity and are generally species-poor. The examples of wet grassland habitat occur at the west of the site, within the Broemountain commonage area, generally to the west of the proposed wind farm layout are dominated by dense stands of *Molinia caerulea*. Stands of *Molinia caerulea* on thin peaty soils, such as the substrate occurring in this area of the proposed wind farm site can correspond to the Annex 1 habitat *Molinia* meadow 6410. However this Annex 1 habitat is characterised by a relatively tall-sward species-rich habitat where *Molinia caerulea* should be prominent (i.e. frequent to abundant) but not dominant. *Molinia caerulea* is overwhelming dominant within the areas of wet grassland at Broemountain resulting in an overall species-poor sward that is not representative of this habitat. Some other indicator species of the Annex 1 habitat 6410 habitat, such as *Circium dissectum, Potentilla erecta, Succisa pratensis, Carex panicea, Carex nigra* and *Anthoxanthum odoratum* do occur but their presence is overall rare to occasional in the sward. This example of wet grassland occurring within the proposed wind farm site is not representative of the Annex 1 habitat *Molinia* meadow 6410.
GA1	Improved agricultural grassland	Improved agricultural grassland dominates the land cover within the proposed wind farm site boundary to the west of Broemountain and the commonage area. This habitat is nutrient enriched and intensively managed for cattle grazing and silage. Species indicative of high nutrient conditions in the habitat were noted throughout the land holding. These species include an abundance of *Lolium perenne, Holcus lanatus, Alopecurus pratensis, Ranunculus repens, R. acris, Trifolium repens, Trifolium pratense, Cirsium arvense, Cirsium vulgare* and *Urtica dioica*. Overall, the improved agricultural grassland is species-poor and widespread on a local to national scale. This habitat plays a limited function in supporting wildlife although it does provide foraging and dispersal habitat for badgers and can support a limited range of invertebrates.
WD1	Broad-leaved woodland	Small pockets of broad-leaved woodland occur within the Development site. These are dominated by *Fraxinus excelsior* and *Betula pubescens.*
WD2	Mixed Broad-leaved and conifer woodland	An area of mixed broad-leaved and conifer woodland occurs to the south of the proposed turbine location T6. This is situated within and adjacent to the Waterford Wetland Site 173

Fossitt 2000 Code (s)	Name of Fossitt 2000 Habitat Communities	Brief Description* *The brief descriptions below, are based on the Site Habitat Surveys – refer to the Guide for Habitats in Ireland (Fossitt, 2000) for further information regarding these Habitat Classifications.
WD4	Conifer plantation	Conifer plantation occurs to the north of the Development site at higher elevations and at the proposed turbine location T5 and T6. The conifer plantations occurring within and adjacent to the site are of various ages (including semi-mature and mature stands, along with immature pre-canopy areas of both first and second rotation). Sitka spruce (*Picea sitchensis*) is the dominant species making up the stands of plantation within and adjacent to the site.
WS1	Scrub	Scrub habitat occurs adjacent occurs as patches throughout the Development site. Examples of this habitat, in the form of spreading *Ulex europeaus* occur within the acid grassland habitat to the south of the Broemountain commonage area. At other locations scrub is comprised of dense stands of spreading *Rubus fruticosus* agg., whilst elsewhere stands of *Crataegus mongyna* and *Prunus spinosa* dominate this habitat. A stand of non-native invasive *Prunus laurocerasus* occurs within scrub habitat to the north of the proposed T9 location. The *Prunus laurocerasus* occurs within the area of scrub habitat that will be cleared as part of the vegetation clearance surrounding this turbine.
HH1	Dry heath	Expanses of dry heath habitat occur within the Broemountain commonage area of the Site. The dry heath is underlain by thin peat and mineral soils. Exposed bedrock at the surface occurs throughout this habitat. The dry heath vegetation is dominated by tall and sometimes leggy swards of *Calluna vulgaris*. Erica cinerea is constant throughout this habitat. Erica tetralix and Molinia caerulea are also frequent. Acid grass species occur in area of less dense heather cover and include *Agrostis stolonifera, Agrostis capillaris, Deschampsia flexuosa, Festuca ovina* and *Nardus stricta. Juncus squarrosus, Potentilla erecta, Rhytidiadelphus squarrosus, Rhytidiadelphus loreus, Hylocomium splendens* and *Racomitrium lanuginosum* all occur frequent within this habitat. .
HH3	Wet heath	A small area of wet heath habitat is located outside but adjacent to the northwestern boundary of the project site, north of Broemountain.
HD1	Dense bracken	This category is used for areas of open vegetation that are dominated by Bracken (of the fern may be either patchy or continuous, but should exceed 50% overall. Dense bracken is usually associated with areas of dry-humid acid grassland - GS3 or dry siliceous heath - HH1, as is the case within the Development site, where it occurs in the commonage area of Broemountain and also at Dyrick Hill. The stands of dense bracken occurring within the Development site are characterised by mono-specific swards of *Pteridium aquilinum*, many of which reach heights exceeding 1m.
HH1/GS3 /HD1	Dry heath/Acid grassland/dense bracken mosaic	This habitat mosaic occurs within the Commonage area at Broemountain. It occurs in areas where excessive grazing has resulted in a diminution of heather cover and an increase in short sward acid grassland and bracken. The area where this mosaic habitat occurs is shown on Figure 6.4 above, which indicates the relatively recent change in heather cover in these areas of the Broemountain commonage. The vegetation occurring in this mosaic habitat comprises well *browsed Calluna vulgaris, Erica cinerea , Pteridium aquilinum, Festuca ovina, Agrostis capillaris, Agrostis caninia, Deschampsia flexuosa, Anthoxanthum odoratum, Potentilla erecta, Galium saxatile* and *Polygala serpyllifolia*. Pleurocarpous mosses in the form of *Pleurozium schreberi, Hylocomium splendens, Kindbergia praelonga* and *Pseudoscleropodium purum* dominant the bryophyte layer.
PF1	Rich fen and flush	A moderately rich flush area is located towards the southwestern corner of the Broemountain commonage area. the vegetation in this habitat comprises *Anagallis tenella, Narthecium ossifragum, Galium palustre, Succisa pratensis, Huperzia selago, Myrica gale, Erica tetralix, Calluna vulgaris, Ulex galli, Carex cinerea, Carex demissa, Carex nigra, Carex viridula, Ranunculus flammula, Pedicularis palustre, Molinia caerulea, Juncus squarrosus, Juncus acutiflorus, Aulacomium palustre, Sphagnum denticulatum, Sphagnum*

Fossitt 2000 Code (s)	Name of Fossitt 2000 Habitat Communities	Brief Description* *The brief descriptions below, are based on the Site Habitat Surveys – refer to the Guide for Habitats in Ireland (Fossitt, 2000) for further information regarding these Habitat Classifications.
		tenellum, Sphagnum subnitens, Sphagnum capillifolium, Sphagnum rutabullum, Sphagnum palustre and *Breutelia chrysocoma*. The indicator species of at least moderately base conditions, *Scorpidium revolvens, Campylium stellatum* and *Bryum triquetrum* are present in this flushed habitat. *Scorpidium revolvens* forms extensive patches in consistently wetter areas of this habitat. The Annex 2 species *Hamatocaulis vernicosus* is associated with rich flush habitats. There are no records for this species at or in the vicinity of the proposed wind farm site. The nearest record for *Hamatocaulis vernicosus* is in the Comeragh Mountains, approximately 11km to the northeast of the wind farm site. This species was not recorded within the rich flush habitat occurring to the west of the proposed wind farm site layout.
PF2	Poor fen and flush	An area of poor fen occurs to the west of the proposed turbine location T4. This area corresponds to the Waterford Wetland site Lisleagh Mountain (Site Code 173). It is located in a depression area over peat soils. It is heavily grazed and poached resulting in disturbance to the vegetation community. The vegetation within the flush includes *Dactylorhiza fuchsii, Sphagnum recurvum, Potentilla erecta, Luzula multiflora, Anthoxanthum odoratum, Poa trivalis, Holcus lanatus, Circium dissectum, Myosotis secunda, Mentha aquatica, Succisa pratensis, Carex panicea, Carex echinata, Carex nigra, Carex demissa, Carex lasiocarpa, Narthecium ossifragum, Pedicularis palustre, Juncus effusus, Juncus bulbosus, Eriophorum angustifolium, Ranunculus flammula, Galium saxatile* and Ulex galli
BL3	Buildings and artificial surfaces	The examples of this habitat occurring within the Site is characterised by existing public roads, farm access tracks, farm yards and associated structures.
ED3	Recolonising bare ground	Minor areas of recolonising bare ground occur within the Development site in areas of previously disturbed agricultural lands.

6.5.2.2 Annex I Habitats

The Annex 1 habitats identified as occurring within the proposed Development Site are listed in **Table 6.6** below.

Table 6.6: Primary Associated EU Annex I Habitat Types

Annex I Code	Annex I Short Name in this report	Corresponding Level 3 Fossitt Habitat	Annex I Full Title Interpretations of these Annex I habitats in a European context are available from European Commission 2013 (EUR28). *EU Annex I habitats marked by an asterisk (*) are deemed to be priority habitats that are in danger of disappearing within the EU territory.*
4030	Dry heath	Dry heath HH1	European dry heath
Annex 1 habitat Adjacent to the proposed development site			
4010	Wet heath	Wet heath HH3	North Atlantic Wet heath with Erica Tetralix

6.5.3 Habitats occurring at the Three Haul Route Widening Locations

Temporary widening at 3 locations on the haul route to allow a load bearing surface will be provided as part of the EIA Development. The three widening locations are shown on **Figure 6.9**.

At the first temporary widening area the existing R336 will be widened to the north side of the road. The habitats occurring here comprise improved agricultural grassland and a vegetated road side verge dominated by low *Salix* species*, Ulex europeaus* and *Rubus fruticosus agg.* A habitat map showing the habitats occurring at this temporary widening location is provided as **Figure 6.10**.

At the second temporary widening area the existing R336 will be widened to the south side of the local road. The habitats occurring here comprise improved agricultural grassland, a field boundary hedgerow comprised of *Acer pseudoplatanus, Crataegus mongyna, Prunus spinosa* and *Rubus fruticosus* agg. A habitat map showing the habitats occurring this temporary widening location is provided as **Figure 6.11**.

At the third temporary widening area the existing R336 will be widened to the north side of the road. The habitats occurring here comprise improved agricultural grassland, a non-native conifer treeline and managed hedgerow. A habitat map showing the habitats occurring at this temporary widening location is provided as **Figure 6.12**.

6.5.4 Habitats occurring along the grid connection route

The entire stretch of the grid connection route from the proposed wind farm site to the existing ESB substation at Dungarvan will be located within the footprint of existing public road corridors.

Horizontal directional drilling will be used at three locations to cross watercourses along the route. At these bespoke locations the electrical cable ducts will be drilled underground below the watercourses. The launch and receptor pits required for the horizontal directional drilling will be positioned within the existing road corridor.

The habitat occurring along the cable route is entirely comprised of road surface which is representative of buildings and artificial surfaces (BL3).

6.5.5 Results of the Aquatic Habitat Survey

The proposed wind farm site and the grid connection route is located within the Blackwater (Munster) and Colligan Mahon catchment areas in Hydrometric Areas 18 and 17 respectively. The proposed wind farm Development and grid connection to Dungarvan Substation at Killadangan are located within three WFD sub-catchments. These include the Blackwater (Munster) (SC_140), Finisk (SC_010) and Colligan (SC_010) subcatchments. None of these three sub-catchments are listed as a *Margaritifera* Sensitive Area.

At the western extent of the site is the Farnane River which rises to the east of an area of upland forestry between Knocknasheega and Broemountain at an altitude of 290m. Two small unnamed streams merge with the Farnane River from both the east and west near the townland of Graigueavurra, approximately 1.3km southeast of the Site boundary. An additional small unnamed stream merges from the west of the Farnane River at Graigueavurra, approximately 2km southeast of the Site boundary. The total length of the Farnane River and its tributaries is 9.1km and it covers a catchment area of 8.1km^2. The Farnane River flows in a south-easterly direction near parallel to the western Site boundary and then continues further to the south-east until it merges with the Finisk River at Millstreet, County Waterford.

The Lisleagh Stream rises near the central extent of the Site in an area mapped as a potential wetland to the northwest of the proposed T4 position. According to the EPA maps for the area, an unnamed stream is located immediately west of the proposed T04 position which is mapped as flowing in a north-easterly direction for approximately 390m until it merges with the Lisleagh Stream. However, during all site survey visits, there were no indications that this stream was present. It was initially suspected that this stream could be ephemeral, however it was not visible at the site even after periods of heavy rainfall. It could also be the case that land drainage practices, or the construction of an unpaved road near the stream, have resulted in its removal or alteration of its course over time. The Lisleagh Stream flows in south-easterly direction from its source for approximately 1.8km kilometres where it merges with a small unnamed stream that rises near the townland of Corradoon, approximately 1.5km north of this confluence. To the northeast of the proposed T05, at the north-eastern Site boundary, an additional unnamed stream flows in an easterly direction for approximately 660m until it merges with the unnamed stream mentioned above which ultimately merges with the Lisleagh Stream.

At the south-eastern extent of the Site, the Aughkilladoon Stream rises in the townland of Lickoranmountain. The Aughkilladoon Stream flows along the south-eastern site boundary

and continues in a south-easterly direction for approximately 2km until it merges with the Finisk River, east of the townland of Woodhouse. Beyond the northern site boundary, five small unnamed streams flow in a north-easterly direction and merge with the Boolahallagh River. The Boolahallagh River flows along the boundary of Counties Waterford and Tipperary until it merges with the Aughavanlomaun Stream at Priestown Bridge, approximately 1.7km north-east of the Site. Beyond the western site boundary, to the west of Knocknasheega, the Glenshelane River rises to the east of Knocknanask. The Glenshelane River flows in a southerly direction between Knocknansk and Knocknasheega until it merges with the Blackwater River south of Cappoquin. Northeast of Coolagortboy and north of Scarthmountain, an unnamed stream rises approximately 670m west of the Site boundary and flows in a south-westerly direction until it merges with the Glenshelane River.

The proposed Site and its surrounds are located upstream of the Finisk River, into which all rivers and streams within the Site boundary ultimately drain. The Finisk River rises between the Knockmealdown and Monavullagh Mountains to the northeast of the proposed Site. The catchment area of the Finisk River covers an area of approximately 128km^2. It flows in a south-westerly direction, to the south of the proposed site, before ultimately joining the Blackwater River approximately 3km south of Cappoquin. The Finisk River is a large tributary of the Blackwater River which is a designated Special Area of Conservation (SAC) as the Blackwater River (Cork/Waterford) SAC. As one of the larger tributaries of the Blackwater River, the Finisk River is therefore also designated as a part of the Blackwater River (Cork/Waterford) SAC. As a result, all of the rivers which flow through the Site boundary are considered to have tenuous hydrological connectivity to the Blackwater River (Cork/Waterford) SAC via the Finisk river and various tributaries of it described above.

The surface water features associated with the Site are mapped and presented in **Chapter 9, Figure 9.3.**

Figure 6.3 illustrates the locations of rivers and streams within the Site and its environs. This figure also indicates the locations used for Aquatic Monitoring Points (WQ 1 – 4). The results of aquatic surveys are summarised in **Table 6.7** below. Locations surveyed differed between small order streams to larger order rivers surrounding the Site.

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Table 6.7: Summary Results of the Aquatic Surveys that were undertaken at the Site (WQ1-WQ4) on 13th September 2022

Water Quality Site	WQ1	WQ2	WQ3	WQ4
River/Stream Name	Farnane River	Lisleagh Stream	Aughkilladoon Stream	Finisk River
River Sub-basin	Finisk sub-basin	Finisk sub-basin	Finisk sub-basin	Finisk sub-basin
River/Stream Order	1st Order	1st Order	1st Order	1st Order
***Margaritifera* sensitive area**	No	No	No	No
EPA code	18F06	18D06	18L04	18F02
EPA Q-Value	Q5	Not assigned	Not assigned	Q4
Q-Value	Q5	Q4	Q4	Q4
WFD Class	A	A	A	A
WFD Status	Good	Good	Good	Good
Salmonid Suitability	Yes, suitable nursery, spawning and holding habitat. Important salmonid river.	Limited suitable nursery, spawning and holding habitat. Subject to low flows.	No. Stream is subject to low flows and drying out	Yes, suitable nursery, spawning and holding habitat. Important salmonid river.

6.5.6 Fauna

6.5.6.1 Bats

6.5.6.1.1 Existing Desktop Information

BCI and NBDC do not hold records for bats within the five 2km grid squares, S10N, S10L, S10M, S10R, and S10S, which encompass the site.

The UBSS Cave Database for the Republic of Ireland, Ordnance Survey Ireland Karst Landscapes, National Monuments Service, and National Inventory of Architectural Heritage GIS layers did not indicate that there were underground caves or monuments with bat roost potential within or near the site.

The 10km grid square in which the site lies held records for Leisler's bat (2 records, most recent 29/05/2009), soprano pipistrelle (3 records, most recent 29/05/2009) and *Pipistrellus* sp. *Sensu lato* (2 records, most recent 29/05/2009) (NBDC maps, most recent data search 28/03/2023).

For the northern turbines (T03, T04, T05, T06, T08, T10, T11, T12, T13), the bat landscape association model (Lundy et al., 2011) suggests that the development is part of a landscape that is of low-moderate suitability for all bats. The northern turbines and their environs are moderate suitability for brown long-eared bat, and of low-moderate suitability for common and soprano pipistrelle, Leisler's, Daubenton's, whiskered and Natterer's bat. This area is of low suitability for Nathusius' pipistrelle and lesser horseshoe bat.

For the southern turbines (T01, T02, T03), the bat landscape is of moderate-high for all bats. The landscape is of high suitability for Natterer's bat, and of moderate-high suitability for brown long-eared bat and common pipistrelle. The landscape is of moderate suitability for soprano pipistrelle, Leisler's, Daubenton's and whiskered bat. The southern turbine landscape is of low-moderate suitability for lesser horseshoe bat, and of low suitability for Nathusius' pipistrelle.

6.5.6.1.2 Roost Survey Results

The following Potential Roost Features (PRFs) were noted in trees on site. No trees support high value PRFs. A total of 5 trees were identified as supporting moderate value PRFs, whilst a total of 12 trees were identified as supporting low value PRFs.

Structures occurring within and surrounding the proposed wind farm site were surveyed for the presence of roosting bats. A total of five structures were confirmed to function as bat roosts. These structures are labelled and mapped in **Appendix 6.2**.

Structure 2A* is a derelict house that functions as a day roost and night roost for brown long-eared bat.

Structure 3A* is a stone-house ruin that functions as a multi-species roost. A brown long-eared bat summer maternity roost and night roost was recorded at this structure. The structure also supported whiskered bat, Soprano pipistrelle and Common pipistrelle that used it as a day roost and night roost.

Structure 8A* is a derelict 2-storey house that functions as a probable minor day roost for brown long-eared bat and Common pipistrelle.

Structure 10* is a stone house ruin that is used as a night roost by brown long-eared bat.

Structure 12* is a stone house ruin with sheds and a courtyard. This functions as a whiskered bat summer roost and as an important night roost and probable day roost for brown long-eared bat.

In addition to these five structures three other structures (5, 7B & 11) were identified as being of moderate roost suitability.

6.5.6.1.3 Bat Transect Survey Results

At least three species of bats were recorded during the bat transect surveys. These comprised Common pipistrelle, Soprano pipistrelle and Myotis species. The most commonly recorded species was Soprano pipistrelle, accounting for 83.2% of all activity recorded along transect surveys. Common pipistrelle was the next most frequently recorded species, making up 15.6% of the calls recorded. Myotis species made up the remaining call, amounting to 1.2% of the bat calls recorded.

6.5.6.1.4 Static Survey Results

A total of eight species of bats were recorded during the static detector monitoring. **Table 6.8** below provides a summary of the bat species recorded during the static detector monitoring sessions.

Table 6.8: Bat species recorded during static detector monitoring surveys

Detector	Survey Year	**Monitoring Round**	**Species detected**
DH1	2020	Round 1	Daubenton's bat Whiskered bat Natterer's bat Myotis bat Leisler's bat Nathusius' pipistrelle Common pipistrelle Soprano pipistrelle Pipistrelle bat Brown long-eared bat
		Round 2	Daubenton's bat Whiskered bat Natterer's bat Leisler's bat Nathusius' pipistrelle Common pipistrelle Soprano pipistrelle Brown long-eared bat
		Round 3	Daubenton's bat Whiskered bat Natterer's bat Myotis bat Leisler's bat Nathusius' pipistrelle Common pipistrelle Soprano pipistrelle Brown long-eared bat
	2021	Round 1	Daubenton's bat Whiskered bat *Myotis* bat Leisler's bat Nathusius' pipistrelle Common pipistrelle Soprano pipistrelle Pipistrelle bat Brown long-eared bat
		Round 2	Daubenton's bat Whiskered bat Natterer's bat Leisler's bat Common pipistrelle Soprano pipistrelle Brown long-eared bat

Detector	Survey Year	**Monitoring Round**	**Species detected**
		Round 3	Daubenton's bat Whiskered bat Natterer's bat Leisler's bat Common pipistrelle Soprano pipistrelle Brown long-eared bat
DH2	2020	Round 1	Whiskered bat Myotis bat Leisler's bat Nathusius' pipistrelle Common pipistrelle Soprano pipistrelle
		Round 2	Daubenton's bat Whiskered bat Natterer's bat Leisler's bat Nathusius' pipistrelle Common pipistrelle Soprano pipistrelle Pipistrelle bat Brown long-eared bat
		Round 3	Daubenton's bat Whiskered bat Natterer's bat Myotis bat Leisler's bat Common pipistrelle Soprano pipistrelle Brown long-eared bat
	2021	Round 1	Daubenton's bat Leisler's bat Common pipistrelle Soprano pipistrelle Brown long-eared bat
		Round 2	No data
		Round 3	Daubenton's bat Whiskered bat Natterer's bat *Myotis* bat Leisler's bat Common pipistrelle Soprano pipistrelle

Detector	Survey Year	**Monitoring Round**	**Species detected**
DH3	2020	Round 1	Daubenton's bat Whiskered bat Natterer's bat Myotis bat Leisler's bat Nathusius' pipistrelle Common pipistrelle Soprano pipistrelle Brown long-eared bat
		Round 2	Daubenton's bat Whiskered bat Natterer's bat Myotis bat Leisler's bat Nathusius' pipistrelle Common pipistrelle Soprano pipistrelle Brown long-eared bat
		Round 3	Daubenton's bat Whiskered bat Natterer's bat Whiskered bat Leisler's bat Nathusius' pipistrelle Common pipistrelle Soprano pipistrelle Brown long-eared bat
	2021	Round 1	Daubenton's bat Whiskered bat *Myotis* bat Leisler's bat Nathusius' pipistrelle Common pipistrelle Soprano pipistrelle Brown long-eared bat
		Round 2	Daubenton's bat Whiskered bat Natterer's bat Leisler's bat Common pipistrelle Soprano pipistrelle Brown long-eared bat
		Round 3	Daubenton's bat Whiskered bat Natterer's bat

Detector	Survey Year	**Monitoring Round**	**Species detected**
			Myotis bat Leisler's bat Common pipistrelle Soprano pipistrelle Nathusius pipistrelle Brown long-eared bat
DH4	2020	Round 1	Whiskered bat Leisler's bat Nathusius' pipistrelle Common pipistrelle Soprano pipistrelle Brown long-eared bat
		Round 2	Daubenton's bat Whiskered bat Myotis bat Leisler's bat Nathusius' pipistrelle Common pipistrelle Soprano pipistrelle Brown long-eared bat
		Round 3	Daubenton's bat Leisler's bat Nathusius' pipistrelle Common pipistrelle Soprano pipistrelle Brown long-eared bat
	2021	Round 1	Daubenton's bat Whiskered bat Natterer's bat *Myotis* bat Leisler's bat Nathusius' pipistrelle Common pipistrelle Soprano pipistrelle Brown long-eared bat
		Round 2	Daubenton's bat Whiskered bat Natterer's bat *Myotis* bat Leisler's bat Common pipistrelle Soprano pipistrelle Brown long-eared bat
		Round 3	Daubenton's bat

Detector	Survey Year	**Monitoring Round**	**Species detected**
			Whiskered bat Natterer's bat Leisler's bat Common pipistrelle Soprano pipistrelle Brown long-eared bat
DH5	2020	Round 1	Daubenton's bat Whiskered bat Natterer's bat Myotis bat Leisler's bat Nathusius' pipistrelle Common pipistrelle Soprano pipistrelle Brown long-eared bat
		Round 2	Daubenton's bat Whiskered bat Myotis bat Leisler's bat Nathusius' pipistrelle Common pipistrelle Soprano pipistrelle Brown long-eared bat
		Round 3	Daubenton's bat Whiskered bat Myotis bat Leisler's bat Nathusius' pipistrelle Common pipistrelle Soprano pipistrelle Brown long-eared bat
	2021	Round 1	Daubenton's bat Whiskered bat Natterer's bat *Myotis* bat Leisler's bat Nathusius' pipistrelle Common pipistrelle Soprano pipistrelle Brown long-eared bat
		Round 2	Daubenton's bat Whiskered bat Natterer's bat *Myotis* bat Leisler's bat

Detector	Survey Year	**Monitoring Round**	**Species detected**
			Common pipistrelle Soprano pipistrelle Brown long-eared bat
		Round 3	Daubenton's bat Whiskered bat Natterer's bat *Myotis bat* Leisler's bat Common pipistrelle Soprano pipistrelle Brown long-eared bat
DH6	2020	Round 1	Daubenton's bat Whiskered bat Myotis bat Leisler's bat Nathusius' pipistrelle Common pipistrelle Soprano pipistrelle Brown long-eared bat
		Round 2	Daubenton's bat Whiskered bat Natterer's bat Myotis bat Leisler's bat Nathusius' pipistrelle Common pipistrelle Soprano pipistrelle Brown long-eared bat
		Round 3	Daubenton's bat Whiskered bat Natterer's bat Myotis bat Leisler's bat Nathusius' pipistrelle Common pipistrelle Soprano pipistrelle Brown long-eared bat
	2021	Round 1	Daubenton's bat Whiskered bat *Myotis* bat Leisler's bat Nathusius' pipistrelle Common pipistrelle Soprano pipistrelle Pipistrelle bat

Detector	Survey Year	**Monitoring Round**	**Species detected**
			Brown long-eared bat
		Round 2	Daubenton's bat Whiskered bat Natterer's bat *Myotis* bat Leisler's bat Common pipistrelle Soprano pipistrelle Brown long-eared bat
		Round 3	Daubenton's bat Whiskered bat Natterer's bat *Myotis bat* Leisler's bat Common pipistrelle Soprano pipistrelle Brown long-eared bat
DH7	2020	Round 1	Daubenton's bat Whiskered bat Natterer's bat Myotis bat Leisler's bat Nathusius' pipistrelle Common pipistrelle Soprano pipistrelle Brown long-eared bat
		Round 2	Daubenton's bat Whiskered bat Natterer's bat Myotis bat Leisler's bat Nathusius' pipistrelle Common pipistrelle Soprano pipistrelle Brown long-eared bat
		Round 3	Daubenton's bat Whiskered bat Natterer's bat Myotis bat Leisler's bat Nathusius' pipistrelle Common pipistrelle Soprano pipistrelle
	2021	Round 1	Daubenton's bat

Detector	Survey Year	**Monitoring Round**	**Species detected**
			Whiskered bat Natterer's bat *Myotis* bat Leisler's bat Nathusius' pipistrelle Common pipistrelle Soprano pipistrelle Brown long-eared bat
		Round 2	Whiskered bat Natterer's bat *Myotis* bat Leisler's bat Common pipistrelle Soprano pipistrelle Brown long-eared bat
		Round 3	Daubenton's bat Whiskered bat Natterer's bat *Myotis bat* Leisler's bat Common pipistrelle Soprano pipistrelle Nathusius pipistrelle Brown long-eared bat
DH8	2020	Round 1	Daubenton's bat Whiskered bat Natterer's bat Myotis bat Leisler's bat Nathusius' pipistrelle Common pipistrelle Soprano pipistrelle Brown long-eared bat
		Round 2	Daubenton's bat Whiskered bat Natterer's bat Myotis bat Leisler's bat Nathusius' pipistrelle Common pipistrelle Soprano pipistrelle Brown long-eared bat
		Round 3	Daubenton's bat Whiskered bat Natterer's bat

Detector	Survey Year	**Monitoring Round**	**Species detected**
			Myotis bat Leisler's bat Nathusius' pipistrelle Common pipistrelle Soprano pipistrelle Brown long-eared bat
	2021	Round 1	Daubenton's bat Whiskered bat Natterer's bat *Myotis* bat Leisler's bat Common pipistrelle Soprano pipistrelle Brown long-eared bat
		Round 2	Daubenton's bat Whiskered bat Natterer's bat *Myotis* bat Leisler's bat Common pipistrelle Soprano pipistrelle Brown long-eared bat
		Round 3	Daubenton's bat Whiskered bat Natterer's bat Leisler's bat Common pipistrelle Soprano pipistrelle Nathusius pipistrelle Brown long-eared bat
DH9	2020	Round 1	Daubenton's bat Whiskered bat Natterer's bat Myotis bat Leisler's bat Common pipistrelle Soprano pipistrelle Pipistrelle bat Brown long-eared bat
		Round 2	Daubenton's bat Whiskered bat Natterer's bat Myotis bat Leisler's bat Nathusius' pipistrelle

Detector	Survey Year	**Monitoring Round**	**Species detected**
			Common pipistrelle Soprano pipistrelle Pipistrelle bat Brown long-eared bat
		Round 3	Daubenton's bat Whiskered bat Natterer's bat Myotis bat Leisler's bat Nathusius' pipistrelle Common pipistrelle Soprano pipistrelle Brown long-eared bat
	2021	Round 1	Daubenton's bat Whiskered bat *Myotis* bat Leisler's bat Common pipistrelle Soprano pipistrelle Brown long-eared bat
		Round 2	Daubenton's bat Whiskered bat Natterer's bat *Myotis* bat Leisler's bat Common pipistrelle Soprano pipistrelle Brown long-eared bat
		Round 3	Daubenton's bat Whiskered bat Natterer's bat *Myotis* bat Leisler's bat Common pipistrelle Soprano pipistrelle Nathusius pipistrelle Brown long-eared bat
DH10	2020	Round 1	Daubenton's bat Whiskered bat Natterer's bat Myotis bat Leisler's bat Nathusius' pipistrelle Common pipistrelle Soprano pipistrelle

Detector	Survey Year	**Monitoring Round**	**Species detected**
			Brown long-eared bat
		Round 2	Whiskered bat Natterer's bat Myotis bat Leisler's bat Nathusius' pipistrelle Common pipistrelle Soprano pipistrelle Brown long-eared bat
		Round 3	Daubenton's bat Whiskered bat Leisler's bat Nathusius' pipistrelle Common pipistrelle Soprano pipistrelle Brown long-eared bat
	2021	Round 1	*Myotis* bat Leisler's bat Common pipistrelle Soprano pipistrelle
		Round 2	Daubenton's bat Whiskered bat Natterer's bat *Myotis* bat Leisler's bat Common pipistrelle Soprano pipistrelle Brown long-eared bat
		Round 3	Daubenton's bat Whiskered bat Natterer's bat *Myotis* bat Leisler's bat Common pipistrelle Soprano pipistrelle Nathusius pipistrelle Brown long-eared bat
DH11	2021	Round 1	*Myotis* bat Leisler's bat Common pipistrelle Soprano pipistrelle Brown long-eared
		Round 2	Daubenton's bat Whiskered bat

Detector	Survey Year	**Monitoring Round**	**Species detected**
			Natterer's bat *Myotis* bat Leisler's bat Common pipistrelle Soprano pipistrelle Brown long-eared bat
		Round 3	Daubenton's bat Whiskered bat Natterer's bat *Myotis* bat Leisler's bat Common pipistrelle Soprano pipistrelle Nathusius pipistrelle Brown long-eared bat

6.5.6.2 Terrestrial Mammals – Badger and Otter

The main channel of the Finisk River to the south of the proposed wind farm site is known to support otters and suitable habitat for otters occurs throughout this watercourse. The site-specific conservation objectives for the River Blackwater SAC include the stretch of the Finisk River from Ballynamult downstream to its confluence with the main channel of the River Blackwater as part of the suitable habitat resource for otters for which SAC conservation objectives apply.

The lower sections of the Lisleagh Stream and the Farnane Stream to the east and west of the proposed development site also provide suitable foraging habitat for otters. The upper sections of these streams, near their sources to the east and west of the proposed wind farm site provide limited foraging habitat for otters owing to the spate conditions and variable flow rates in these upper sections.

No evidence indicating the presence of otters, their holts or couches were observed along the stretch of the Farnane Stream to the west and south of the proposed turbine location T9 and north to its source, west of the proposed turbine T11. Similarly no evidence indicating the presence of otters, their holts or couches was recorded along the section of the Lisleagh Stream running west from the Waterford Wetland Site 239, downstream to a confluence with another minor tributary (northeast of the proposed turbine T1).

The Aughkilladoon Stream that rises within the proposed wind farm site to the east of the proposed turbines T1and T2 is a minor stream that is subject to variable flows with much of

the stream drying out during dry periods. It is of low foraging habitat potential for otters and no evidence indicating the presence of otters, their holts or couches were observed along this stream.

No badgers or their setts were observed during field surveys within the proposed wind farm site. All hedgerows occurring within a 50m buffer zone of the proposed wind farm access track were searched for the presence of badger sett entrance and none were recorded.

Evidence of rabbit was recorded in agricultural lands to the south of Broemountain in the vicinity of the proposed turbine T9 and T10 and within the lower lying agricultural lands to the west in the vicinity of turbines T1 to T8. No evidence of other mammal species such as fox, pine marten, Irish stoat, red squirrel, hedgehog and pygmy shrew were recorded during surveys. However these species are likely to occur in the surrounding area.

6.5.6.3 Herpetofauna

Common frog (*Rana temporaria*) was frequently recorded within the proposed Development Site. This species was recorded breeding along the Farnanes Stream along the western boundary of the proposed wind farm site and also along the Lisleagh Stream to the east. The poor flush and wet grassland habitats occurring within the proposed development site provide suitable breeding habitat for common frog. Common lizard or smooth newt were not recorded during field surveys. However, the commonage area in the northwest of the proposed wind farm site provides suitable habitat for both these species and they are likely to occur within, and surrounding the Site.

6.5.6.4 Terrestrial Invertebrates

The commonage area of Broemountain is the only area within the proposed wind farm site where the marsh fritillary larval foodplant, *Succisa pratensis*, occurs. This plant species is restricted to areas of wet grassland habitat to the west of the proposed wind farm site layout. This species rarely occurs within the footprint of the proposed wind farm site and no habitat suitable for supporting this species occurs within the layout. Where Succisa pratensis does occur it is largely as rare to occasional stands within a tall sward of *Molinia caerulea* wet grassland. The sward here is pre-dominantly greater than 25cm in height making this habitat less suitable for marsh fritillary colonies (Fowles, 2005). No incidental observations of marsh fritillary were recorded at the proposed wind farm site during field surveys.

The small heath butterfly was recorded within the commonage area during field surveys. Other species observed include orange tip, small tortoiseshell, common blue, green-veined

white, meadow brown, ringlet and small white. The heath bumblebee *Bombus jonellus* was also recorded in this area of the proposed wind farm site.

6.5.6.5 Fisheries

The three principal watercourses draining the project site are of a similar character and are representative of the Eroding Upland River (FL2) habitats. Each of the watercourses are representative of upland spate rivers characterised by fast water flow and incised banks. Each of the streams are subject to variable flow rates that are dependent on precipitation rates, with spate conditions occurring during periods of higher rainfall and ebb flows resulting during periods of low rainfall or dry conditions. During ebb flows much of the stream bed along these streams can be subject to drying out. The morphology of the Farnanes Stream is representative of high-gradient upland A/B-type zone (Rosgen, 1996) which are characterised by first order stream over high gradients, with steps and pools boulder strewn beds with cobbles and gravels and a straight profile. The Aughkilladoon Stream and the Lisleagh Stream are located in an area of gently sloping ground and are more representative of C-type zone (Rosgen, 1996). Partial shading occur along the Aughkilladoon Stream and the Lisleagh Stream is caused by adjacent hedgerows. Shading is high along the Lisleagh Stream further downstream owing to the stream passing through an area of linear broad-leaved woodland. The Farnane Stream is more open with little shading occurring along the upper section of the stream to the west of the proposed wind farm site. Further downstream as it passes through conifer plantation shading is excessive.

The habitat rating of each of the three watercourses is provided in **Table 6.9**. This rating has been undertaken in line with the guidance outlined in Department of Agriculture's (Northern Ireland) Fisheries Division Advisory Leaflet "*The Evaluation of Habitat for Salmon and Trout*".

Table 6.9: Assessment of Fishery Habitat

Habitat	Parameter	Farnanes	Lisleagh	Aughkilladoon
Spawning	Flow 300 – 600mm^3/s	Flows recorded at 600l/s (significantly in excess of this guideline.	Flows recorded at 1,200l/s (significantly in excess of this guideline.	Flows recorded at 1,200l/s (significantly in excess of this guideline.
	Water Depth 150 – 700mm	Depths variable depending on weather conditions. Subject to low depths, <150mm.	Depths within this range.	Depths variable depending on weather conditions. Subject to low depths, <150mm.
	70% substrate 30 – 80mm diameter	Substrate within this range.	Substrate within this range.	Substrate within this range.
	Gravel depth 50 – 500mm	Gravel depths within this range.	Gravel depths within this range.	Gravel depths within this range.
	Grade	3	2	2
Nursery	50 – 250mm depth	Depths variable depending on weather conditions. Subject to low depths, <150mm.	Depths within this range.	Depths variable depending on weather conditions. Subject to low depths, <150mm.
	0.5 – 8% Gradient	Gradient outside this range.	Gradient within this range.	Gradient within this range.
	Stable cobble/bou-lder substrate >70%	Stable cobble boulder <70%.	Cobble within this range.	Stable cobble boulder <70%.
	Adequate cover provided	Adequate cover available.	Limited cover available.	Adequate cover available.
	Grade	3	2	3

Habitat	Parameter	Farnanes	Lisleagh	Aughkilladoon
Holding	Minimum depth – 1m	Absent	Absent	Absent
	Stable bankside and substrate	Absent	Absent	Absent
	Grade	4	4	4

As outlined in **Table 6.9** above the three primary streams draining the project site support conditions that are overall not representative of optimal spawning or nursery habitat for salmonids. These findings are supported by McGinnity et al. (2003) and Hendry et al. (2003) who note that salmonid watercourse are generally restricted to 2nd order and higher watercourses, whilst 1st order streams are unsuitable for spawning and the early life stage of salmonids. The 1st order nature of these streams along with their propensity for variable flow rates and the drying out of sections of river bed during periods of drier weather conditions are identified as the principal factors reducing the potential to support salmonids.

The Finisk River, downstream of the proposed wind farm site, is representative of a salmonid watercourse and provides suitable spawning, nursery and holding habitat for salmonids. Detailed fish assessments of the Finisk River has been completed by the IFI in 2010 and 2017.

During the 2010 IFI electro-fishing monitoring the Finisk River was surveyed at Modelligo Bridge, downstream of the proposed wind farm site. Riffle and glide habitat were the dominant habitat types present within this section of the watercourse, with cobble and gravel making up the substrate conditions. Macrophyte vegetation present included a number of bryophytes and emergent species as well as filamentous green algae. The fish species recorded during the 2010 monitoring comprised Atlantic salmon, brown trout, eel and lamprey species. The river was classified as a "fast" growth rate river for brown trout. The 2010 fish ecological status of the Finisk River at the survey site was classified as Good.

During the 2017 IFI electro-fishing monitoring the Finisk River was surveyed at four sites: Site 1 to Site 4. Site 1 was located upstream of the proposed wind farm site at Tooraneena, Site 2 was located a short distance downstream of the entrance to the proposed wind farm

site at Mountain Castle Bridge; Site 3 was located at Modelligo Bridge (the same site as that used during the 2010 survey; and Sites 4 and 5 were located further downstream. The species recorded at each of the survey sites are listed on **Table 6.10** below.

Table 6.10: Fish species recorded along the Finisk River during IFI 2017 Monitoring

Site No.	1	2	3	4	5
Species	***Present (Y/N)***	***Present (Y/N)***	***Present (Y/N)***	***Present (Y/N)***	***Present (Y/N)***
Brown trout	Y	Y	Y	Y	Y
European eel	N	N	Y	N	N
Lamprey sp.	N	N	N	N	N
Salmon	Y	Y	Y	Y	Y
Stone loach	N	N	N	N	N
Three-spined stickleback	N	N	N	N	N

Three fish species were recorded at five sites surveyed on the Finisk River in 2017. Brown trout and salmon were the most abundant species captured. Four age classes for brown trout (0+, 1+, 2+ and 3+) and three for salmon (0+, 1+ and 2+) were recorded. Site 3 was surveyed on two previous occasions (during 2010 as described above and also during 2014). Brown trout density was higher in 2017, when compared with 2010 and 2014, however, the opposite was observed for salmon. The IFI assigned one site – Site 4 - a fish ecological status of poor. Two sites (Sites 1 & 3) were assigned moderate; and one - Site 2, which is located a short distance downstream of the proposed wind farm site entrance - was assigned good.

A comparison of the 2010 and 2017 results for Site 3 indicates that the fish ecological status at this site has decreased in the intervening years from Good to Moderate.

6.5.6.6 Invasive Alien Species (IAS)

Two non-native invasive species were identified within or adjacent to the proposed development site. These include *Cherry laural Prunus laurocerasus*, stands of which are located outside the proposed wind farm site layout to the north of the proposed turbine T9 and Japanese Knotweed *Fallopia japonica* which is located along a section of the public road that is located within the proposed development site redline boundary and also at another location along the public road at a haul route widening location.

6.6 ASSESSMENT OF POTENTIAL ENVIRONMENTAL EFFECTS

6.6.1 Identification & Evaluation of Ecological Receptors

Table 6.11 below lists and evaluates the ecological features identified as occurring within the ZoI of the Development and identifies those which are considered to be ecological receptors following the methodology previously described within **Section 6.2**.

Table 6.11: Evaluation of Ecological Features Identified at and surrounding the Development

Ecological Feature	Evaluation	Ecological Receptor?
National and Local Designated Sites*		
Blackwater River SAC & Blackwater River & Estuary pNHA	This is an internationally important site of conservation. It supports a range of freshwater, coastal and woodland Annex 1 habitats and also supports internationally important populations of Atlantic salmon, lamprey species and otters all of which occur downstream of the proposed development site. It also support a other species such as freshwater pearl mussel, white-clawed crayfish and Killarney Fern. None of these latter 3 species occur within vicinity or downstream of the proposed development site.	Yes – International Importance (Rating A). Assessment of this ecological feature is provided in the NIS for the Development.
Habitats		
Dry Heath	The dry heath habitat occurring within the Site comprises vegetation communities that are representative of the Annex 1 habitat European Dry Heath (4030).	Yes - National Importance (Rating B)
Wet heath	The wet heath habitat occurring outside of but adjacent to the northwest boundary of the Site comprises vegetation communities that are representative of the Annex 1 habitat Northern Atlantic Wet heath with Erica tetralix (4010).	Yes - National Importance (Rating B)
Non-calcareous spring	While springs are generally rare throughout Ireland and of conservation importance the spring that occurs within the site supports vegetation indicative of enriched conditions. AS such it is considered to be of local value only.	Yes – Local importance (higher value) (Rating D)
Dense Bracken	This is a species poor habitat that is spreading in areas of dry heath where inappropriate high grazing has resulted in a loss of *Calluna vulgaris* cover.	No – Local importance (lower value) (Rating E)
Dry heath/Acid grassland/dense bracken mosaic	This mosaic habitat within the commonage area of Broemountain occurs where excessive grazing pressure has resulted in disturbance and damage to areas of dry heath.	No – Local importance (lower value) (Rating E)
Rich Flush	The area of rich flush within the Broemountain area to the west of the proposed wind farm site layout is an example of semi-natural habitat that is generally rare in the surrounding area and	Yes – County Importance (Rating C)

Ecological Feature	Evaluation	Ecological Receptor?
	supports a diversity of species. This habitat type is typically of importance of a range of invertebrate species.	
Poor Fen	The example of poor fen at the Waterford Wetland Site No. 173 is representative of a semi-natural habitat that support a range of species typical of poor fen habitat. This wetland area is disturbed as a result of inappropriate cattle grazing. Notwithstanding this it is a rare habitat in the wider surrounding area and has been identified as a site of ecological importance at the County level	Yes - County Importance (Rating C).
Acid grassland	This habitat is associated with the commonage area at Broemountain in the west of the proposed wind farm site. . It has links to the Annex 1 species-rich Nardus *grassland* 6230 but is in unfavourable condition.	Yes – Local importance (higher value) (Rating D)
Wet grassland	The wet grassland habitat occurring within the proposed wind farm site are generally species poor being dominated by stands of Molinia caerulea and Juncus effusus. However they provide cover and habitat for fauna species and are therefore considered to be of local value.	Yes - Local importance (higher value) (Rating D)
Improved agricultural grassland	This is an intensively management habitat that supports low flora diversity and is of low value for fauna.	No - Local importance (lower value) (Rating E)
Broad-leaved woodland	The scrub habitat occurring within the Site provides shelter and foraging habitat for a range of fauna.	Yes – Local importance (higher value) (Rating D)
Mixed broadleaved woodland	The scrub habitat occurring within the Site provides shelter and foraging habitat for a range of fauna.	Yes – Local importance (higher value) (Rating D)
Conifer plantation	Conifer plantation is located within the wind farm site with the proposed turbines T5 and T6 being located within this habitat. This is an artificial and modified habitat of low biodiversity value.	No - Local importance (lower value) (Rating E)
Scrub	The scrub habitat occurring within the Site provides shelter and foraging habitat for a range of fauna.	Yes – Local importance (higher value) (Rating D)
Buildings and artificial surfaces	The examples of this habitat occurring within the Site is characterised by existing public roads, farm access tracks, farm yards and associated structures.	No - Local importance (lower value) (Rating E) Structures that support bat roosts are local importance (higher value) for bats that use structures as day and night roosts and are of county importance (Rating C) for structures that support maternity roosts or important day roosts
Recolonising bare ground	Minor areas of recolonising bare ground occur within the Development site in areas of previously disturbed agricultural lands.	No - Local importance (lower value) (Rating E)

Ecological Feature	Evaluation	Ecological Receptor?
Species		
Otters	While no otter resting places or signs of foraging otters were observed during field surveys along the first order streams draining the proposed wind farm site, the Finisk River downstream is known to support otters and this river and its 10m riparian corridor have been identified as otter habitat as part of the Blackwater River SAC conservation objectives. As such otters are identified as an ecological features of international nature conservation value	Yes - International Importance (Rating A)
Bats	All bat species in Ireland are protected under national and European legislation. Up to seven species of bats were recorded at the proposed wind farm site during bat monitoring surveys.	Yes - local importance (higher value) (Rating D)
Badgers	Whilst not recorded during field surveys, the habitats within the proposed wind farm site provide suitable habitat for this species and, following a precautionary approach, this species is included as an ecological receptor.	Yes - local importance (higher value) (Rating D)
Red squirrel	Whilst not recorded during field surveys, the habitats within the proposed wind farm site provide suitable habitat for this species and, following a precautionary approach, this species is included as an ecological receptor.	Yes - local importance (higher value) (Rating D)
Irish hare	Whilst not recorded during field surveys, the habitats within the proposed wind farm site provide suitable habitat for this species and, following a precautionary approach, this species is included as an ecological receptor.	Yes - local importance (higher value) (Rating D)
Irish stoat	Whilst not recorded during field surveys, the habitats within the proposed wind farm site provide suitable habitat for this species and, following a precautionary approach, this species is included as an ecological receptor.	Yes - local importance (higher value) (Rating D)
Hedgehog	Whilst not recorded during field surveys, the habitats within the proposed wind farm site provide suitable habitat for this species and, following a precautionary approach, this species is included as an ecological receptor.	Yes - local importance (higher value) (Rating D)
Pygmy Shrew	Whilst not recorded during field surveys, the habitats within the proposed wind farm site provide suitable habitat for this species and, following a precautionary approach, this species is included as an ecological receptor.	Yes - local importance (higher value) (Rating D)
Herpetofauna	Common frog were encountered within the commonage area of the proposed wind farm site at Broemountain and breeding	Yes - local importance (higher value) (Rating D)

Ecological Feature	Evaluation	Ecological Receptor?
	common frog were recorded along the Farnanes Stream. The Site also provides suitable habitat for common lizard and smooth newt.	
Invertebrates	Other species of local importance are likely to be supported by the Site.	Yes - local importance (higher value) (Rating D)
Fisheries	The Finisk River is an important salmonid spawning and nursery river and is also known to support populations of lamprey species. These species are listed as Annex 2 qualifying species of the River Blackwater SAC, which includes the Finisk River. As such the fisheries supported by this watercourse are of international value.	Yes - International Importance (Rating A)
Marsh fritillary	The nearest record for this species is approximately 8km to the southwest of the project site. Stands of Succisa pratensis occur in association with wet grassland habitat to the west of the proposed wind farm site within the commonage area at Broemountain. No suitable marsh fritillary habitat has been identified as occurring within the proposed development footprint.	N/A - no suitable habitat present in the proposed development footprint.
Non-native invasive species	*Prunus laurocerasus,*and *Fallopia japonica* is the only identified Schedule IAS that has been identified as occurring within the proposed development site and that requires assessment.	N/A – potential for spread of this non-native invasive species

**Assessment of impacts upon European Sites is provided within the Natura Impact Statement; SPAs are not considered here. SPAs and overlapping pNHAs are considered in Chapter 7 Ornithology*

6.6.2 The 'Do-Nothing' Impact

Land use activities at the Site comprise livestock grazing in the form of sheep and cattle grazing and forestry in the form of conifer plantation. In less improved areas of commonage land to the west of the proposed wind farm site grazing pressure appears to have undermine the favourable status of acid grassland and the overall area of dry heath habitat.

To the east of the site the lands are managed for agricultural livestock farming and conifer plantation. The pasture lands occurring within the proposed wind farm site are intensively managed and subject to high levels of livestock grazing as well as nutrient application. These lands will continue to be used for intensive agricultural purposes in line with current agricultural policies for the use of productive farmlands. The conifer plantation is managed as a commercial forest. This forest will continue to be managed as a commercial forest with harvesting occurring on maturation of the stock followed by replanting. The rotation of harvesting and replanting is likely to continue to occur in these areas of commercial forestry.

6.6.3 Potential Effects of the Construction Phase

The construction phase will involve disturbance to existing vegetation during the construction activities. This will be largely in the form of excavation and removal of habitats to facilitate the construction of the wind farm site infrastructure comprising the site Access Tracks, hardstand areas and turbine foundations and substations. A section of electrical cable will be undergrounded within the proposed Access Track. Vegetation clearance and minor excavations will also be required for temporary infrastructure required for the construction phase of the Development. The temporary construction phase infrastructure comprises the Temporary Construction Compound, blade set-down areas and Turbine Hardstands.

The provision of the electrical cable will result in excavations along the public road corridor between the proposed wind farm site and the substation at Dungarvan.

The haul route from Belview Port to the proposed wind farm site will require temporary widening at three locations to allow a load bearing surface.

6.6.3.1 Direct Effects

Potential sources of direct impacts during the construction phase include:

- Clearance of vegetation, soil and peat substrate and rock for the construction of the Site infrastructure as listed above;
- Creation of temporary infrastructure within the Site as listed above;
- Deposition of spoil material arising from infrastructure works; and
- Access by construction equipment, including access away from the proposed infrastructure location (compaction and other damage).

Estimates of habitat loss are provided within **Tables 6.12** below.

6.6.3.1.1 Potential Direct Effects on Designated Areas During the Construction and Decommissioning Phase

No elements of the Site permanent or temporary infrastructure are located within the boundary of any European Sites, NHAs or pNHAs. There will be no direct effects, in terms of direct habitat loss, damage or disturbance on any designated conservation area as a result of the construction phase of the Development; the provision of the grid connection cable along the public road between the Site and the 110kV substation at Dungarvan; or the provision of three temporary widening areas along the Haul Route.

6.6.3.1.2 Potential Direct Effects to Article 17 Annex 1 habitats

The access track between the proposed turbine T10 and T13 and the proposed turbine T10 to T13 inclusive and associated hardstands are located within the boundary of an area of dry heath habitat that has been mapped as part of the Article 17 national extent of dry heath habitat. Dry heath is the only habitat that is representative of a mapped Article 17 habitat occurring within the or adjacent to the footprint of the proposed wind farm layout. The overall area of Article 17 dry heath habitat occurring at Broemountain (see **Figure 6.7**) measures approximately 100 Ha and the proposed wind farm site layout occurring within this polygon measures approximately 7 Ha.

As noted in **Section 6.4.4** above the certainty rating applied to this area of dry heath is 1 which is indicative of the lowest level of certainty applied to Article 17 mapped areas. Following the detailed habitat and vegetation surveys completed at the proposed wind farm site an accurate area of dry heath habitat, representative of the Annex 1 habitat European Dry Heath has been mapped, as shown on **Figure 6.8 Habitat Map.** All areas of dry heath shown on **Figure 6.8** are located within the Article 17 dry heath polygon and this area of dry heath measures approximately 33 Ha. Given the certainty associated with the area of Annex 1 dry heath mapped on **Figure 6.8**, this area, as opposed to the 100 Ha area is used to quantify the area of Annex 1 dry habitat loss at the local context. However when assessing the impact of Annex 1 dry habitat loss at the national level, the national extent of this habitat is used.

The footprint of the wind farm layout occurring within the habitat measures approximately 3.5 Ha and as such the proposed development will result in the loss of approximately 3.5 Ha of Annex 1 dry habitat at the local level. This represents approximately 10% of the extent of this habitat occurring within the proposed wind farm site. This extent of loss of an example of Annex 1 habitat that forms part of the national resource of dry heath habitat is representative of a significant, permanent negative impact at the local scale.

Given that the area of dry heath to be lost to the proposed development forms part of the favourable reference area (FRA) of dry heath habitat, the loss of 3.5 Ha of this habitat will have the potential to result in impacts at the national/international scale. The Article 17 Reporting for dry heath has not specified a favourable reference area for dry heath habitat. However, it does provide a best single value of the surface area of dry heath habitat in Ireland, which is reported to be 1,230.01km^2. This broadly corresponds to the area of dry heath habitat that has been mapped as part of the Article 17 habitat dataset (area = 1,559.38km^2). For the

purposes of this assessment the best single value of the surface area of this habitat is taken to represent the favourable reference area (FRA) of dry heath in Ireland.

The loss of 3.5 Ha as a result of the proposed development from the FRA of 1,230.01km^2 will represent a loss of approximately 0.003% of the FRA of dry heath at the national scale. The reference area for dry heath is currently assessed by the NPWS to be inadequate, with a declining trend in the reference area, estimated to be C. 0.001% per annum since 1994. Whilst the NPWS considered this to be too small to trigger a deteriorating trend in the overall conservation status of this habitat, the proposed development will have the potential to contribute an additional loss of 0.003% of this habitat at the national level. Given the current inadequate status of the reference area for this habitat, any loss of dry heath habitat as a result of the proposed development will have the potential to result in a significant negative effect, at the national/international scale.

6.6.3.1.3 Potential Direct Effects on Habitats During the Construction and Decommissioning Phase

Direct Effects Arising from the Proposed Wind Farm Site

Loss and disturbance of habitats will be the principal adverse ecological effect of this development. The installation of the wind turbines and associated infrastructure will result in direct and permanent habitat loss under the footprint of the Development.

The temporary construction infrastructure elements listed above will result in direct and temporary habitat loss under the footprint of the Development.

Direct habitat loss during the construction stage of the Development will occur under the footprint of each of the wind farm infrastructure elements listed in the bullet points above.

Table 6.12 which follows, provides an assessment of the significance of habitat loss to habitats occurring within the footprint of the Development. The total loss of habitat, in square meters, is provided in **Table 6.13** and a summary list of the elements of the Development infrastructure that will result in this loss is also provided.

Table 6.12: Assessment of Estimated Habitat Loss at the Site

Habitat	wind farm infrastructure	Area under footprint (m^2)	% of Habitat under footprint of the proposed wind farm	Annex 1 Habitat	Significance of habitat loss
Dry heath	Access track Turbine 10 Turbine 11 Turbine 12 Turbine 13	34,036.39	10	Dry heath 4030	The examples of dry heath occurring under the footprint of the proposed development are representative of Annex 1 blanket bog habitat and have been evaluated as an ecological receptor of international importance. As outlined in Section 6.6.3.1.2 above the loss of dry heath habitat to the footprint of the proposed wind farm site has the potential to result in significant negative effects at the national/international scale.
Rich Flush	NA – no rich flush habitat occurs within the proposed wind farm layout	NA	NA	-	There will be no direct loss of rich flush habitat as a result of the proposed development.
Poor Fen	NA – no poor fen habitat occurs within the proposed wind farm layout	NA	NA	-	There will be no direct loss of poor fen habitat as a result of the proposed development.
Non-calcareous spring	NA – no non-calcareous spring habitat occurs within the proposed wind farm layout	NA	NA	-	There will be no direct loss of non-calcareous spring habitat as a result of the proposed development.
Acid grassland	Access track to T9	48,703.92	11.44	-	The Development will result in the loss of acid grassland occurring along the proposed Access Track and within the footprint of the proposed burrow. The majority of acid grassland to be loss to the footprint will be associated with the proposed burrow pit. This habitat

Habitat	wind farm infrastructure	Area under footprint (m^2)	% of Habitat under footprint of the proposed wind farm	Annex 1 Habitat	Significance of habitat loss
	Access track to T10 Access track to T8 Burrow pit				is evaluated at local importance (higher value). The status of the acid grassland occurring under the footprint of the proposed development and within the overall boundary is considered to be undermined by inappropriate land management such as grazing pressure and scrub/bracken encroachment. Whilst the approximately 11% of the area of this habitat occurring within the proposed development site will be lost to the wind farm footprint, in terms of the overall area of this habitat occurring in the wider surrounding area, particularly in upland areas the west and northwest of the proposed development site, the loss of 4.8 Ha of this already disturbed habitat, will represent at most a moderate negative effect at the local scale.
Wet grassland	Access track to T1/T2 Access track to T4 T10	5,800.45	1.1	-	The Development will result in the loss of wet grassland occurring along the proposed Access Track and within the footprint of the proposed T10 hardstand. This habitat is evaluated at local importance (higher value). The stands of wet grassland occurring at these locations are either species Juncus effusus dominated wet grassland in areas of improved agricultural pasture land (in the case of the access track locations) or species-poor Molinia caerulea dominated wet grassland. The proposed development will result in a small loss of this habitat occurring within the overall Site boundary and given that this habitat is widespread in the wider surrounding area, the loss of wet grassland will represent a slight negative effect at the local scale.
Broad-leaved woodland	NA – no poor broad-leaved woodland occurs within the proposed wind farm layout	NA	NA	-	There will be no direct loss of broad-leaved woodland habitat as a result of the proposed development.
Scrub	Turbine T9 Bat buffer Turbine T6 Bat buffer	5,466.27	0.55	-	The Development will result in a minor loss in the area of scrub habitat occurring along the proposed Access Track to T9 and in the vicinity of T5, T6 and T9 associated with vegetation clearance to establish a protective bat buffer area around these turbines. The extent of scrub occurring within the Site will be 7.8% of the overall scrub habitat occurring within the proposed development boundary. The extent of scrub within the proposed development site is minor given the open

Habitat	wind farm infrastructure	Area under footprint (m^2)	% of Habitat under footprint of the proposed wind farm	Annex 1 Habitat	Significance of habitat loss
	Turbine T5 bat buffer Access track to T9				nature of the commonage and agricultural pasture land that dominate the land cover. Scrub habitat is more widespread in the surrounding area. The loss of this habitat to the wind farm footprint will not undermine the extent and integrity of this habitat occurring in the surrounding locality. As such the Development will not result in a significant effect to the conservation status of this habitat at the local scale.
Hedgerow	Access track	2,307.16m	9	-	Approximately 25.6km of hedgerow habitat have been mapped as occurring within the proposed development site. Of this approximately 1.38km (5.4%) will be lost to the proposed development. Hedgerow habitat will be lost where the proposed access track will intersect existing hedgerow habitat. In addition to this hedgerows occurring within the buffer zone of c 100m surrounding turbines will be removed to minimise interactions between bats and operating turbines. The removal of hedgerow habitat in this buffer zone will result in a further loss of c. 930m of hedgerow habitat. The hedgerow habitats occurring within the proposed development site are of local importance (higher value) and the loss of approximately 2.31km of this habitat will represent a significant negative effect to the extent of hedgerow habitat at the local scale.
Treeline	T4 bat buffer	132.55	6.4	-	One section of treeline, measures approximately 132.5m will be lost as result of the proposed development arising from the implementation of a vegetation clearance buffer for the protection of bat species surrounding the proposed turbine T4. Whilst the loss of this treeline will represent approximately 6.4% of the extent of this habitat occurring within the proposed development site, this habitat is widespread in the surrounding local area and the loss of this small length of treeline will represent a slight negative impact.
Eroding Streams	Access track	NA	NA	-	There will be no loss of freshwater eroding stream habitats to the footprint of the Development.

Direct Effects Arising from the Proposed Haul Route

The Haul Route will result in the provision of three temporary road widenings along its route. The widening at these locations will result in the loss of roadside verge, improved agricultural grassland, hedgerows and the resurfacing of existing made ground. These existing habitats are of low nature conservation value (Rating E) and have not been identified as ecological receptors. The temporary loss of these features will not result in significant negative biodiversity impacts.

Direct Effects Arising from the Proposed Grid Connection Route

The proposed Grid Connection Route will be restricted to the existing public road corridor, which does not support any ecological receptors identified for the Development. The installation of the Grid Connection cable ducting will not require any instream works as the cable cross watercourses using horizontal directional drilling. The launch pits and receptor pits required for the horizontal directional drilling will be positioned within the road corridor and as such will not result in the loss of any semi-natural habitats.

6.6.3.1.4 Potential Direct Effects on Watercourses, Fisheries and Associated Aquatic Fauna during the Construction and Decommissioning Phase

The Development will comprise one new crossing of the Aughkilladoon Stream along the proposed Access Track. The crossings have been designed in accordance with detail shown in shown in **Figure 2.7** which are in line with standard Inland Fisheries Ireland requirements for new watercourse crossings. These crossing comprises a clear span bridge and will not result in any modifications to the watercourse channel at the crossing location. In addition, no instream works will be required during the construction of this watercourse crossings. As such there will be no direct physical impacts to watercourses as a result of the proposed wind farm. Notwithstanding the absence of direct physical impacts, the provision of the new crossing at the wind farm site will pose a risk of the loss of contaminants, such as suspended solids, hydrocarbons or cementitious materials, to this watercourse. The loss of such contaminants to this watercourse are representative of an indirect impact and are considered further in **Section 6.6.3.2.2**.

No new watercourse crossings are required as part of the Grid Connection route or the Haul Route. The potential for works associated with these elements of the proposed development, in the vicinity of watercourses and drains to result in perturbations to water quality, is considered further in **Section 6.6.3.2.2**.

6.6.3.1.5 Potential Direct Effects on Bats During the Construction and Decommissioning Phase

Potential direct effects on bats during the Construction and Decommissioning Phase relate to the direct loss of or disturbance to roost sites. Given that works associated with the proposed wind farm development do not propose to demolish any structures confirms as bat roosts or identified as having moderate potential to support bat roosts, there will be no potential for direct habitat loss to bats and there roost sites.

6.6.3.1.6 Potential Direct Effects on Otter During the Construction and Decommissioning Phase

Potential direct impacts on Otters from construction works are associated with the loss of or damage to holts and couches or the abandonment of these breeding/resting sites as a result of ongoing disturbance. As detailed in **Section 6.5.6.2**, no holts, couches or field signs indicating the presence of an otter breeding/resting site were recorded within the Development Site during field surveys. Given the absence of such features there will be no potential for the construction phase of the Development to result in significant negative effects to otters.

6.6.3.1.7 Potential Direct Effects on Badgers & other Non-volant mammals during the Construction and Decommissioning Phase

Potential direct impacts on badgers and other non-volant mammals from construction works are associated with the loss of or damage to setts and breeding/resting places of other non-volant mammals, the abandonment of these breeding/resting sites as a result of ongoing disturbance and the potential for the loss of foraging habitat for these species. As detailed in **Section 6.5.6.2**, no setts, breeding or resting places of badger or other protected non-volant mammals were recorded within the Development Site during field surveys. Given the absence of such features there will be no potential for the construction phase of the Development to result in significant negative effects to badgers and other non-volant mammals by way of loss of or disturbance to their breeding/resting places.

The construction phase will result in the loss of vegetation ground cover which will cause loss of potential foraging and commuting/shelter habitat for badgers and other protected non-volant mammals. The loss of such potential habitat for non-volant mammals will represent a permanent negative impact of slight significance at the local scale.

6.6.3.1.8 Potential Direct Effects on Herpetofauna During the Construction and Decommissioning Phase

Potential direct impacts to common frog, smooth newt and common lizard during the construction works will be limited to direct mortality during vegetation clearance, excavations and spoil deposition works particularly in wet grassland and heath habitats. As detailed in **Section 6.5.6.3**, common frogs were recorded during surveys within the commonage area of the proposed development site at Broemountain. The population at the proposed development site is considered to be of Local (Higher) Importance (Rating D). The nature of the proposed development site means that they have the potential to occur immediately adjacent to the existing infrastructure.

Potential impacts to herpetofauna can vary depending on the time of year, with destruction of hibernacula (locations being used for winter hibernation) being a particular concern. Hibernacula need to be frost-free, humid and safe from predators and flooding (Baker et al., 2011). Such areas can include bunds and rocky areas, notably when these occur within slightly drier habitats such as dry heath. In light of the above it is considered that, in the absence of mitigation measures, there is potential for significant temporary impacts to herpetofauna at the local level. Mitigation proposals in this respect are provided in **Section 6.7** below.

6.6.3.1.9 Potential Direct Effects on Terrestrial Invertebrates During the Construction and Decommissioning Phase

The loss of habitats to the footprint of the proposed wind farm will result in the loss of terrestrial invertebrate habitat and therefore reduce the abundance and potentially the diversity of this group. The impact of the proposed development to terrestrial invertebrates will be at the local scale and restricted to local populations occurring at the Development Site.

Impacts on terrestrial invertebrates are considered temporary moderate negative where infrastructure is reinstated post construction e.g. proposed site compound, temporary construction areas. Impacts on terrestrial invertebrate habitat are assessed as permanent moderate negative where infrastructure remains post construction.

6.6.3.1.10 Potential Direct Effects on Notable Flora During the Construction and Decommissioning Phase

No notable flora species were identified as occurring within the footprint of the proposed development and as such there will be no potential for the direct loss of such species.

6.6.3.1.11 Potential Direct Effects arising from the spread of Invasive Alien Species (IAS) During the Construction phase

Fraga, *et al.* (2008) have identified a link between wind farms and the spread of IAS in upland habitats. The scheduled invasive alien species *Fallopia japonica* occurs within the proposed development site along the existing public road network that will be used as part of the haul route for the proposed development. In addition, a stand of *Prunus laurocerasus* occurs within the proposed wind farm site, and is associated with the area of scrub habitat to be cleared as part of the vegetation clearance surrounding the proposed turbine T9. As such, the potential exists for direct effects associated with the spread of a scheduled invasive alien species during the construction phase. The spread of these species within the Development site or in the surrounding area is considered to represent a significant effect at the local level and will require mitigation to prevent the spread of this species.

6.6.3.2 Indirect Effects

6.6.3.2.1 Potential Indirect Effects on Designated Areas During the Construction and Decommissioning Phase

The designated conservation areas that have been identified as occurring within the zone of influence of the Development and representative of key biodiversity features are:

- Blackwater River SAC & pNHA;

The potential for indirect impacts to these designated conservation areas have been examined within the Screening Report for Appropriate Assessment and the NIS prepared for the Development.

The Screening Report for Appropriate Assessment for the Development concluded that it cannot be excluded, on the basis of objective information, that the Development, individually or in combination with other plans or projects, will not have a significant effect on the River Blackwater SAC and pNHA.

As such, an Appropriate Assessment is required for the proposed development and an NIS has been prepared to assist the competent authority during the completion of its Appropriate Assessment.

The NIS for the Development has concluded that in light of the best scientific knowledge in the field, the Development, alone or in-combination with other plans or projects will not result in adverse impacts to the integrity of relevant European Sites and associated/overlapping pNHAs provided all mitigation measures set out in the NIS are implemented in full. These

mitigation measures have been evaluated for their effectiveness to remove the potential for adverse effects to European Sites. These measures have been found to represent effective safeguards. These findings have been reached in the absence of reasonable scientific doubt and it is concluded that the Development will not adversely affect the integrity of the relevant European Sites examined.

6.6.3.2.2 Potential Indirect Effects on Watercourses, Fisheries and Associated Aquatic Fauna during the Construction and Decommissioning Phase

Proposed Development Site

The potential impacts that may arise as a result of the Development relate to the discharge of contaminated surface water from the Site during the construction phase. The freshwater habitat receptors that are at risk from such discharges comprise the Finisk River sub-catchment into which the Development drains and downstream to the main channel of the River Blackwater.

Earthworks associated with the construction phase of the Development will necessitate the denuding of surfaces. In the absence of appropriate mitigation measures such activities will have the potential to generate silt-laden runoff from the works area and for this runoff to be discharged via existing preferential surface water flow pathways and drainage channels to the Farnanes, Aghkilladoon and Lisleagh Streams and on downstream to the Finisk River.

Whilst the risk of a peat slide event arising from the proposed development has been found to be negligible (see **EIAR Section 8.4.2.3.4**), the potential for ground instability/slope failure has been identified. In the event of slope failure the potential will exist for the conveyance of significant quantities of sediment to the Farnanes, Aughkilladoon or Lisleagh Stream and on downstream to the Finisk River. Whilst the possibility of a slope failure at the wind farm site has been assessed (see **Appendix 8.1**) to be representative of a low risk, poorly managed construction activities (including traffic movement) can increase the risk. Any slope failure which occurs will be localised due to the topography of the Site. However, given the hydrological pathway to European Sites and the important status of the Finisk River sub-catchment downstream for sensitive aquatic fauna such as Atlantic salmon and otters, any slope failure will have the potential to result in significant long-term damage to freshwater habitats.

The discharge of silt-laden runoff to the Finisk River and further downstream to the main channel of the River Blackwater will have the potential to result in significant negative impacts to invertebrates, plant life and on all life stages of salmonid fish. The negative impacts of silt-laden runoff to fish species such as Atlantic salmon and brown trout include:

- The settlement of silt on spawning redds resulting in the infilling of intra-gravel voids and the smothering of eggs and newly hatched fish.
- Increase in turbidity and water colour resulting in a reduction in light penetration and perturbation to instream salmonid habitats.
- The settlement of silt on river beds can smother and displace macroinvertebrates, reducing the prey resource for fish species.
- Suspended solids can settle in pool and riffle habitats resulting in a reduction in the availability and quality of rearing habitat for fish.
- Silt-laden runoff can result in a reduction in transparency, impairing the ability of fish and otters to find food.
- Suspended solids can abrade or clog salmonid fish gills. Whilst high concentrations of suspended solids are required to clog fish gills, small concentrations can result in abrasion to gills a create the potential for infection.

The clearance of surface vegetation and the exposure of underlying substrate can result in the mobilisation of nutrients stored within soil substrates and the generation of nutrient-laden surface water runoff (Tuukkanen, 2017; Monteverde, 2022). Potential nutrient mobilisation is not just associated with substrates. Inputs of suspended solids can also contribute to nutrient enrichment in receiving waters as a result of the release of nutrient bound to sediments following mobilisation (Sharpley et al., 1992; Ballantine et al. 2006). The degree to which sediment loss contributes to nutrient enrichment is dependent on the type of soil. Soils / subsoils will contribute varying degrees of loading of various compounds and nutrients, including Nitrogen (N) and Phosphorous (P) compounds, which are attributed to nutrient enrichment, or excessive loading of N and P in waters. The release of such sediment in silt-laden surface water runoff from works at the wind farm site will have the potential to contribute to nutrient inputs to receiving waters within the Finisk sub-catchment and their conveyance downstream to the River Blackwater.

The discharge of nutrient laden surface water to the Finisk River and downstream to the River Blackwater will have the potential to result in/contribute to reductions in water quality, increasing primary productivity leading to eutrophication and decreasing oxygen saturation. High oxygen levels in freshwaters are critical for all life stages of sensitive aquatic fauna such as Atlantic salmon. Such changes in watercourse trophic status will have the potential to contribute towards the degradation of habitat conditions with the Finisk sub-catchment and River Blackwater downstream and their potential to support Atlantic salmon, otter and lamprey species.

Plant equipment and vehicles associated with excavation, material transport, and construction activities introduce the risk of hydrocarbon (fuel and oil) spillages and leaks, particularly in relation to regular refuelling which in turn implies the requirement of a fuelling station or will be supplied by fuel tanker scheduled to refuel the plant machinery directly. Similar to suspended solids arising from excavation activities, hydrocarbons accidentally introduced to the environment will likely be intercepted by drainage and surface water networks that drain the proposed wind farm site.

Hydrocarbons are a pollutant risk due to their toxicity to all flora and fauna organisms. Hydrocarbons chemically repel water and sparingly dissolve in water. The majority of hydrocarbons are light non-aqueous phase liquids (L-NAPL's) which means that they are less dense than water and therefore float on the water's surface. Hydrocarbons adsorb ('stick') onto the majority of natural solid objects they encounter, such as vegetation, animals, and earth materials such as soil. They burn most living organic tissue, such as vegetation, due to their volatile chemistry. They are also a nutrient supply for adapted micro-organisms, which can deplete dissolved oxygen at a rapid rate and thus kill off water-based vertebrate such as Atlantic salmon and invertebrate life. Hydrocarbons can bioaccumulate in salmonids (e.g. McCain *et al.* 1990), with Atlantic salmon known to be physically affected by short term exposure leading to loss of condition, and are also known to avoid areas containing hydrocarbons (e.g. Maynard and Weber 1981) leading to the effective loss of habitat or migration routes for the species.

The Development has the potential to result in the accidental spillage or deposition of construction materials such as cementitious materials into soils and in turn impact on surface water runoff, or accidental spillages directly intercepted by drainage or surface water networks associated with the proposed wind farm site.

Depending on the material in question, the introduction of such materials can lead to a local change in hydrochemistry and impact on the aquatic ecology of the receiving waterbody. For example, the introduction of cementitious material (concrete / cement / lean mix etc.) can lead to changes in soil and water pH, and increased concentrations of sulphates and other constituents of concrete. Fresh or wet concrete is a much more significant hazard when compared to old or set concrete which is considered inert in comparison, however it should also be noted that any construction materials or non-natural materials deposited, even if inert, are considered contaminants.

Proposed Haul Route

The proposed widening works at the three locations along the Haul Route are located within the vicinity of watercourses, including the main channel of the Finisk River. As such the construction works associated with the haul route widening areas are predicted to have the potential to result in significant negative impacts, such as those described above, to aquatic habitats and the fauna supported by them.

Proposed Grid Connection Route

During the installation of the Gird Connection Route along the public road sediment runoff to surrounding and receiving waterbodies could result from:

- Excavations associated with construction of a trench along culverts and bridges over watercourses;
- Disturbance of the existing road surface followed by excavation;
- Stockpiling of soils and excavated materials;
- Run-off from the hard road surface.

A greater risk of sediment run-off would be expected during and following periods of heavy and sustained rainfall.

The Finisk River and the Colligan River are the two main watercourses intersected by the proposed grid connection route and both have high potential for salmonid, lamprey and otter populations. However given that the approach to the installation of the grid connection route crossing these rivers will be via horizontal directional drilling no above ground works will be undertaken at or immediately adjacent to these watercourses. The launch pits and receptors pits for the horizontal directional drilling crossing of these two rivers (as well as the Killeagh Stream (EPA name Ballykerin Upper Stream) (which is the other watercourse to be crossed by the route) will be set back from them by a minimum distance of 50m. this set back distance is to allow for the drilling of the cable route at the appropriate depth within bedrock under the watercourse. As part of the horizontal directional drilling works. Existing road and paved surfaces will require to be excavated at the pit locations for all other crossings. These excavations will create the potential for the generation of silt-laden surface runoff to adjacent watercourses. In the event that such runoff is entrained in surface water runoff and conveyed to receiving watercourses it will present a risk of sedimentation and perturbations to water quality, with consequent effects such as those described above.

In addition to the potential generation of surface water runoff from launch pits and receptor pits, fluids will be used during the horizontal directional drilling works, with such fluid being pumped

down the drill bore under pressure. The drilling fluid to be used during horizontal directional drilling for the project will be Clearbore. Clearbore is a polymer-based product that is designed to instantly break down and become chemically destroyed in the presence of small quantities of calcium hypochlorite. The product is not toxic to aquatic organisms and is biodegradable. The drilling fluid will become mixed with material drilled in the borehole to form a drilling mud. As the drilling is completed under pressure any blockages in the pilot-hole during the pilot drill or reaming can result in the inadvertent breakout of drilling mud within the pilot-hole. Such breakouts can occur where an alternative path of less resistance through the overburden is present during a blockage. The breakout of drilling mud can result in contamination in the vicinity of the breakout. The locations where a breakout would present the greatest risk to the River Blackwater SAC is during drilling under the main channel of the Finisk River. Populations of Atlantic salmon as well as otter and lamprey species are known to occur in this watercourse as well as along the Colligan River, at the proposed electrical cable route crossings. The breakout of drilling muds to these rivers crossed by the proposed electrical cable route will have the potential to undermine the status of instream habitats with resultant adverse effects to populations of these species.

6.6.3.2.3 Potential Indirect Effects on Terrestrial Habitats During the Construction Phase

Indirect effects to terrestrial habitats during the construction phase of the wind farm relate to the potential for works to undermine key processes that underpin the status of these habitats. For terrestrial habitats this relates to the potential for works to undermine key hydrological or hydrogeological processes that underpin the status of terrestrial wetland habitats. The only habitats occurring within the project site that are underpinned by hydrological/hydrogeological processes are the two Waterford Wetland Site (Lisleagh and Dyrick Hill Wetlands), the rich flush habitat approximately 100m to the west of the proposed turbine T10, and the non-calcareous spring habitats occurring and to the south of the proposed access track Chainage. 1,840 and the west of the proposed access track Chainage 1,350.

No element of the proposed development occur within the two Waterford Wetland Sites Lisleagh Mountain (Site Code:173) or Dyrick Hill (Site Code: 239). The nearest element of the proposed development to the Dyrick Hill wetland site is along the existing public road adjacent to this site. No works are proposed to this public road as part of the proposed development and as such there will be no potential for indirect impacts to this wetland site.

The Lisleagh Mountain (Site Code: 173) wetland site is located approximately 125m to the north of the nearest proposed turbine T3. This turbine is located down gradient of this wetland site and construction works associated with this turbine will not have the potential to

undermine the hydrological processes that underpin the status of the poor fen habitat occurring at this wetland site.

Non-calcareous springs can be indirectly affected by construction works where such works result in changes to the zone of contribution for the spring. Such changes can arise where bedrock is excavated and groundwater flow pathways feeding the spring are altered or blocked. No excavations will be required for the section of access track at Chainage 1840 as the existing access track will be used. The surface of this existing access track will be upgraded as part of the proposed development. Minor excavations to subsoil level that will not result in changes to bedrock or groundwater flow pathway will be completed for the section of access track (c. Chainage 1350) to the east of the more southerly non-calcareous spring. Given that groundwater conditions and flow paths that feed these springs will not be altered by the proposed development there will be no potential for it to result in significant negative effects to this habitat.

6.6.3.2.4 Potential Indirect Effects on Otter During the Construction Phase

The main pressure affecting this species in Ireland is pollution, particularly from organic pollution resulting in fish kills and accidental deaths as a result of road traffic and fishing gear (NPWS, 2019b). The NPWS also list diffuse and point source pollution of freshwaters as a likely indirect impact to otters through changes in prey abundance. However, the NPWS conclude that these threats are considered to produce local impacts only and are not of significance for the national otter population. Nevertheless, such impacts have the potential to be of local significance in the context of a population supported by an SAC river catchment. As such in the event of pollution, arising from construction activities, to suitable otter foraging habitat downstream of the project, the potential will exist for indirect impacts to the conservation status of otters within the Blackwater River SAC, by way of reductions in the abundance of prey species.

Noise and vibration will be generated during the horizontal directional drilling under watercourses along the proposed electrical cable route.

Horizontal directional drilling will generate noise and vibration during drilling operations. The primary noise sources would consist of the elevated diesel-powered hydraulic drill drive, a diesel driven electricity generator, and electrically driven spoil treatment plant for mechanical separation of solids from working fluid.

Table D.6 in BS5228: Part 2: 2009 +A1:2014 suggests that vibration from such activities falls to below 1mm/s within a distance of approximately 10 to 15 metres. No otter breeding sites are located in the vicinity of the proposed Grid Connection Route crossings and given the low levels of noise and vibration predicted to be generated during the drilling of the 110mm boreholes along with the set-back distances of 50m from the watercourse for the launch pits where the hydraulic driver and generator will be positioned, there will be no potential for significant disturbance to otters during this element of the Development.

Other potential indirect effects on otter during the construction phase are generally considered to be those associated with disturbance and water quality impacts on watercourses, resulting in potential impacts on prey availability. The effects of water quality perturbations to otter habitat have been described in Section 6.6.3.2.2 above and it is considered that, without mitigation, potential indirect impacts on Otter as a result of perturbations to water quality will arise.

6.6.3.2.5 Potential Indirect Effects on Badgers & other Non-volant mammals during the Construction and Decommissioning Phase

Given that no breeding/resting sites for badgers or other non-volant mammals were recorded within or in the vicinity of the proposed development there will be no potential for significant indirect disturbance to badgers and other non-volant mammals during the construction phase.

Other potential negative impacts to badgers during the construction phase of the proposed development include:

- The exposure of badgers to polluting substances such as chemicals, fuels and cement-based products; and
- The entrapment of badgers within excavation areas.

Without the implementation of appropriate construction practices these impacts will have the potential to negatively affect badgers occupying the sett adjacent to the project site. **Section 6.7** below provides measures to ensure that disturbance associated with the sustained presence of humans is avoided.

6.6.3.2.6 Potential Indirect Effects on Bats During the Construction and Decommissioning Phase

Potential indirect effects on bats relate to the loss of habitat that may be used bats for roosting, foraging or commuting.

Given the absence of roost sites for bats occurring at or surrounding the proposed wind farm site there will be no potential for the Construction and Decommissioning Phase to result in the loss of roosting habitat for bat species.

The construction phase will have the potential to result in the loss of or damage to commuting and foraging habitat.

6.6.3.2.7 Potential Indirect Effects on Herpetofauna During the Construction and Decommissioning Phase

Potential indirect effects on common frog, smooth newt and common lizard during the Construction and Decommissioning Phase are generally considered to be those associated with disturbance. However, although these species are easily disturbed when approached, the impact of disturbance is not considered likely to carry over a significant distance. As noted in **Section 6.6.3.1.8** above these species are considered to be sensitive to impacts associated with the direct loss of habitat to the footprint of the Site. The proposed works will be undertaken from the temporary infrastructure provided for the construction phase and from the existing wind farm infrastructure during the decommissioning phase. Suitable habitat for these species will extend into the wider area, ensuring that there is sufficient habitat remaining to support these species in an undisturbed state. Given the limited likely effective disturbance distance for these species and the extensive area of suitable habitat for them in the wider area the potential indirect effects on these species during the construction phase are not considered to be significant.

6.6.3.2.8 Potential Indirect Effects on Terrestrial Invertebrates During the Construction Phase

Potential indirect effects on terrestrial invertebrates during the Construction and Decommissioning Phase will relate to effects associated with disturbance. Whilst terrestrial invertebrates are easily disturbed when approached, the impact of disturbance is not considered likely to carry over a significant distance. As noted in **Section 6.6.3.1.9** above these species are considered to be sensitive to impacts associated with the direct loss of habitat to the footprint of the Site. The proposed works will be undertaken from the temporary infrastructure provided for the construction phase and from the existing wind farm infrastructure during the decommissioning phase. Suitable habitat for terrestrial invertebrates will extend into the wider area, ensuring that there is sufficient habitat remaining to support these species in an undisturbed state. Given the limited likely effective disturbance distance for these species and the extensive area of suitable habitat for them in the wider area the potential indirect effects on terrestrial invertebrates during the construction phase are not considered to be significant.

6.6.3.2.9 Cumulative effects of the Construction and Decommissioning Phase

Past land use practices have resulted in negative impacts to heathland habitats within and adjacent to the Site. Dry heath and acid grassland habitats have been subjected to historical overgrazing which has led to damage and erosion to heath and grassland habitats to the west of the Site. The presence of extensive forestry to the east and north of the Site has also resulted in the conversion of heathland habitats and the loss of areas of heath habitat.

In the absence of future habitat management measures the Development will have the potential to combine with these historical land use activities to result in further loss of heath habitats within the proposed development site. In addition, the risks to receiving waterbodies posed by the Development will also have the potential to combine with existing land use activities such as forestry plantation and intensive agricultural activity to result in cumulative pollution loss to Finisk River sub-catchment and the River Blackwater downstream with associated pressures to water quality and the freshwater ecology supported by this catchment.

It is noted that the provision of habitat enhancement measures such as the implementation of and commitment to appropriate grazing regimes within the Site and the rehabilitation of dry heath habitat will have the potential to reduce the cumulative impact of historical land use activities and habitat loss associated with the proposed development within the Site, with positive impacts for the status of heath and grassland habitat that will be subject to these measures.

In terms of other projects there are no recent significant projects permitted in the vicinity of the Site. Those that do occur within the area surrounding the proposed development relate to small scale projects associated with amendments to residential dwellings and the construction of residential dwellings.

Other specific live or recently approved projects in the vicinity of the Site, that are considered to be minor in scale, are listed below and an examination of potential cumulative effects between these other projects and the Development is provided for each.

Planning Reference No. 22822: planning permission for the erection of overground electronic communications infrastructure. A screening for Appropriate Assessment and EIA for this project was completed by the Planning Authority and it was determined that this project, alone or in-combination with other plans or projects, would not have the potential to result in likely significant effects to European Sites or the environment. Given this determination the Development will not combine with this project to result in cumulative negative effects to the environment and biodiversity receptors.

Planning Reference No. 221047: planning permission for the erection of overground electronic communications infrastructure. A screening for Appropriate Assessment and EIA for this project was completed by the Planning Authority and it was determined that this project, alone or in-combination with other plans or projects, would not have the potential to result in likely significant effects to European Sites or the environment. Given this determination the Development will not combine with this project to result in cumulative negative effects to the environment and biodiversity receptors.

Planning Reference No. 221046: planning permission for a new dwelling. A screening for Appropriate Assessment and EIA for this project was completed by the Planning Authority and it was determined that this project, alone or in-combination with other plans or projects, would not have the potential to result in likely significant effects to European Sites or the environment. Given this determination the Development will not combine with this project to result in cumulative negative effects to the environment and biodiversity receptors.

Planning Reference No. 211167: planning permission for internal modifications to a thatched cottage. A screening for Appropriate Assessment and EIA for this project was completed by the Planning Authority and it was determined that this project, alone or in-combination with other plans or projects, would not have the potential to result in likely significant effects to European Sites or the environment. Given this determination the Development will not combine with this project to result in cumulative negative effects to the environment and biodiversity receptors.

Planning Reference No. 19541: planning permission for a new dwelling. A screening for Appropriate Assessment and EIA for this project was completed by the Planning Authority and it was determined that this project, alone or in-combination with other plans or projects, would not have the potential to result in likely significant effects to European Sites or the environment. Given this determination the Development will not combine with this project to result in cumulative negative effects to the environment and biodiversity receptors.

6.6.4 Potential Effects during the Operational Phase

6.6.4.1 Potential Direct Effects on designated areas during the Operational Phase

The potential effects of the operation phase of the Development to designated sites is set out in the accompanying NIS. The NIS has concluded that given the absence of any element of the Development within the boundary of any European Sites, NHAs or pNHAs it will not have the potential to result in direct effects to designated areas that could in turn result in adverse impacts to the integrity of these sites.

6.6.4.2 Potential Direct Effects on Habitats during the Operation phase

The operation phase of the Development will not cause significant or adverse direct impacts to the quality or functionality of the habitats occurring within the Development area.

6.6.4.3 Potential Direct Effects on Watercourses and Associated Ecology during the Operational Phase

There is limited potential for direct effects on receiving watercourses within or bounding the proposed development during the operational phase as no instream works or loss of natural watercourse features are planned as part of the operational phase. However, in the event that a maintenance need arises for the watercourse crossing within the wind farm site during the operation phase, instream works may be required and such works could result in direct effects to these watercourses. Such a direct effect upon watercourses and downstream ecology during the operational phase are considered to have the potential to be significant at the local scale.

6.6.4.4 Potential Direct Effects on Bats during the Operational Phase

Impacts that may arise during the operation phase relate to collision mortality, barotrauma and other injuries to bats.

As all detector locations had several nights of high activity (>100 passes per species per night) for the high collision risk species, as well as the proximity to confirmed bat roosts, it is considered that all proposed turbine locations have a High Risk Factor for bats, in the absence of mitigation.

6.6.4.5 Potential Direct Effects on Otter during the Operation phase

The operation phase of the proposed Development will not have the potential to result in direct effects to otters. No otter holts or couches were identified within the proposed development site and there will be no potential for operation phase maintenance activities to result in disturbance to otters.

6.6.4.6 Potential Direct Effects on Badgers & other Protected Non-volant mammals during the Operation phase

No effects to badgers or other protected non-volant mammals are predicted during the operation phase of the proposed Wind Farm. As no field signs indicating the presence of such species were noted within the site during field surveys and due to the limited human presence for maintenance works during daylight hours, outside the period of peak badger and other protected non-volant mammals' activity, no significant effects are predicted to affect such species during the operation of the proposed wind farm.

6.6.5 Potential indirect effects during the Operational Phase

The potential for indirect effects to arise during the operation phase and impact receptors that include designated areas, the aquatic environment and associated aquatic fauna and habitats are considered in the following subsections. The operation phase will not have the potential to result in significant indirect impacts to otter.

6.6.5.1 Potential indirect effects on designated areas during the Operational Phase

The designated conservation areas that have been identified as occurring within the zone of influence of the Development and representative of key biodiversity features are:

- River Blackwater SAC & pNHA

The potential for indirect impacts to these designated conservation areas during the operation phase have been examined within the Screening Report for Appropriate Assessment and the NIS prepared for the Development.

The Screening Report for Appropriate Assessment for the Development concluded that it cannot be excluded, on the basis of objective information, that the Development, individually or in combination with other plans or projects, will have a significant effect on the following European Sites:

- River Blackwater SAC & pNHA;

As such, an Appropriate Assessment is required for the Development and an NIS has been prepared to assist the competent authority during the completion of its Appropriate Assessment.

The NIS for the Development has concluded that in light of the best scientific knowledge in the field, the Development, alone or in-combination with other plans or projects will not result in adverse impacts to the integrity of European Sites, and all other relevant European Sites, provided all mitigation measures set out in the NIS are implemented in full. These mitigation measures have been evaluated for their effectiveness to remove the potential for adverse effects to European Sites. These measures have been found to represent effective safeguards. These findings have been reached in the absence of reasonable scientific doubt and it is concluded that the Development will not adversely affect the integrity of the relevant European Sites examined.

6.6.5.2 Potential indirect effects on watercourses and associated downstream ecology during the Operational Phase

There is potential for indirect effects on watercourses during the operational phase of the proposed wind farm due to the operation of permanent site drainage. As with the construction activities sediments and hydrocarbons represent the source of risk to water quality during operation phase maintenance works. These effects are already described for the Construction and Decommissioning Phase and are also a risk in the operational phase of the Development.

Taking this into account, unmitigated, the potential for indirect effects on watercourses resulting from the operational phase is considered to be significant at the local scale. This is due to the potential for wider surface water runoff given the larger areas of hardstanding required to accommodate the proposed wind farm infrastructure.

6.6.5.3 Potential indirect effects on Habitats during the Operational Phase

During the operation of the wind farm, the increased area of hard standing within the Site and surrounding the proposed wind turbine locations will have the potential to lead to changes in the volume and nature of site runoff. The worst-case scenario net increase of surface water runoff associated with the Development is calculated to be c. 5,915 m^3/month (or 1.16 % relative to the area of the Site) during the average wettest month of the year (December).

The use of construction materials with a different mineralogical composition to that of the surrounding substrate can lead to changes in the hydrochemistry of the substrate into which these materials are placed. Heathland, such as dry heath, and non-calcareous spring habitats in particular are sensitive to changes in hydrochemistry and pH levels given the low pH of these habitats. Where materials with different mineralogical composition are used, waters percolating through these materials will acquire a different hydrochemical signature to waters associated with the native substrate of the site. The impact of this percolating water to the surrounding substrate will depend on the difference between the mineralogy of the imported material and native substrate. Imported material that is highly alkaline in nature, such as cement-based products, can leach highly alkaline waters into the native substrate adjacent to these areas. This can result in the alteration of the hydrochemistry of sub-soil waters by elevating pH levels, which in turn can lead to a change in vegetation community. As such in the absence of the use of appropriate materials, such an effect could result in significant effects to the status of dry heath and non-calcareous spring habitats occurring in the immediate vicinity of the Site infrastructure.

Aside from the potential changes to surface water runoff rates and mineralogy the operation of the Development will not result in any additional land take or loss of revegetated habitats and as such there is no potential for any significant effects in this regard. In addition, the operational phase has the potential to result in enhancement of the surrounding areas within the Site and within the Habitat Management Plan area through habitat rehabilitation management (as described in the Biodiversity Management Plan) that will be implemented during the construction phase of the Development and maintained during the operational phase.

6.6.6 Cumulative Effects during the Operational Phase

It is anticipated that, in the absence of mitigation, the key cumulative impacts upon biodiversity during the operation of the Development are largely as a result of existing drainage on the Site which could exacerbate erosion within the vicinity of the proposed infrastructure. As such, the potential for cumulative impacts as a result of the operation of the Development is considered to be significant at the local level, taking into consideration the potential for cumulative effects of other land use operations, such as drainage from neighbouring conifer plantations and public road corridors, in the vicinity of the Site. This is because, cumulatively and before mitigation is introduced at the Site, the installation of wider surface areas of hardstanding and potentially operational drainage as required, in-combination with other land uses such as forestry could result in greater surface water runoff in the region as a whole. This could potentially result in increased washout to receiving watercourses during operation. In the absence of appropriate mitigation, increased surface water runoff can lead to an exacerbation of erosion and/or sediments entering local watercourses, particularly during the first few years of operation. Mitigation proposals in this respect are provided in **Section 6.7**.

6.7 MITIGATION MEASURES

Section 6.6 identified the need for mitigation of the following potentially significant effects:

Table 6.13: Summary of Significant Effects before Mitigation

Potential significant effects during the construction phase on:	Potential significant effects during the operational phase on:
Designated sites (indirect effects)	Designated sites (indirect effects)
Annex 1 habitats: dry heath (direct and indirect effects)	Watercourses and lake habitats (indirect effects)
Watercourses (indirect effects)	Annex 2 species: Otters, Atlantic salmon, Lamprey species (indirect effects)

Potential significant effects during the construction phase on:	Potential significant effects during the operational phase on:
Terrestrial habitats: Acid grassland; wet grassland & hedgerow	Other Aquatic species: fish species (indirect effects)
Annex 2 species: Otters, Atlantic salmon, Lamprey species (indirect effects)	Herpetofauna (indirect effects)
Badgers & Other protected non-volant mammals (indirect effects)	Watercourses & non-calcareous spring (indirect effects)
Other Aquatic species: fish species (indirect effects)	
Herpetofauna (indirect effects)	

Core areas of mitigation required relates to aspects such as minimising the extent of working areas and control of sediment and other pollution, in addition to timing and specific methods to avoid impact on particular species. The incorporation of these requirements into appropriate compliance documents and overseeing of mitigation measures by an Ecological Clerk of Works is also fundamental.

This section sets out the required mitigation, and draws on other sections and reports as necessary. Notably, the mitigation from Chapter 9: Hydrology and Hydrogeology and Chapter 8 Soils and Geology are highly pertinent as these chapters set out the required mitigation to avoid impact on watercourses and water-based erosion and avoid/minimise the risk of a slope failure event during the construction phase of the Development. These mitigation requirements are not repeated in this section but need to be implemented in full to avoid impacts on ecological features and are referred to as appropriate.

6.7.1 Construction Phase Mitigation

6.7.1.1 Mitigation by Avoidance

6.7.1.1.1 Protection of Watercourses

The Development has been designed to ensure that an adequate buffer zone is provided for between this infrastructure and watercourses. In addition, the design has sought to minimise the requirement for new watercourse crossings. This has been achieved by restricting the need for watercourse crossing to a total of one new crossing of the Aughkilladoon Stream within the proposed wind farm site, and three crossings along the proposed grid connection route. The buffer zone implemented between all large-scale infrastructure associated with the wind farm site, such as turbines, hardstand, and access tracks are located at distances of over 50m from any watercourses, except for where the Access Track crosses watercourses the Aghkilladoon Stream. In addition, the best practice construction measures that are described above are designed to avoid impacts on areas that are outside the site including watercourses.

A Surface Water Management Plan has been prepared for the proposed wind farm and this plan ensures the implementation of a suite of measures that will avoid negative impacts to water quality and the hydrological regime of the Finisk River.

6.7.1.1.2 Protection of Designated Areas

The project is not located within any designated areas and as such the potential for direct impacts to these areas will be avoided. As set out in the accompanying Natura Impact Statement the principal risk posed by the proposed development to designated areas in the surrounding area relate to indirect impacts arising from negative impacts to water quality and associated adverse effects to freshwater dependent habitats and species. Mitigation measures are set out in **Section 6.7.1.2.1 and Section 6.7.1.3.2** below that aim to protect water quality in receiving watercourses and thereby avoid the potential for adverse effects to the freshwater dependent qualifying habitats and qualifying species of surrounding designated areas.

6.7.1.1.3 Protection of Important Habitats

The Development will result in the loss of areas of Annex I dry heath habitat. It is essential that the direct loss of dry heath habitat is fully minimised (notably also taking account of the international/national nature conservation value of these habitats) and so mitigation by avoidance is essential to limit such losses within the footprint of the Development, and its zone of influence. Mitigation in this respect is:

- The full extent of the infrastructure footprint will be marked out prior to the commencement of works, with an appropriately robust and visible fencing / marker system. Where this meets Annex I habitats, this will also be the full extent of the works corridor, with no machinery access (access will only be allowed on foot and only for the purposes of silt / pollution control if required), storage or other works allowed outside this area.
- The efficacy and coherence of the marker system (and required remediation) will form an essential part of the Site operations.
- A pre-construction Invasive Species Survey will be conducted during the optimal growing season (May to August immediately prior to works occurring at this site for the Development) and shall include data on all locations, extents and potential construction impacts in relation to scheduled and non-scheduled Alien Invasive Species (IAS). This survey will be completed along with reporting on the best course of action to be implemented to avoid the spread of such IAS on the Site or further afield. The management of IAS identified as occurring within the proposed development site will be undertaken in accordance with best practice management guidelines as set out in

the TII guidelines "The Management of Noxious Weeds and Non-Native Invasive Plant Species on National Roads" (2010).

6.7.1.1.4 Protection of Important Mammal Species

The Ecological Clerk of Works for the construction phase will complete a pre-construction survey of the construction footprint in order to confirm the continued absence of mammal breeding and resting places within the construction footprint and within 50m of the construction footprint or identify the presence of newly established breeding/resting places. Based upon the results of these surveys, the ECoW will establish whether or not there is a need at that stage for the implementation of further mitigation measures and the requirement for protected species licences. An example of where such a need could arise is where a badger sett becomes established along or in the immediate vicinity of a hedgerow that will be intersected by the proposed access track.

6.7.1.1.5 Protection of Bats

Any trees and treelines along approach roads and planned site access tracks will be retained unless felling is unavoidable. Retained trees should be protected from root damage by an exclusion zone of at least 7 metres or equivalent to canopy height. Such protected trees will be fenced off by adequate temporary fencing prior to other works commencing.

No structures will be demolished as part of the construction phase of the proposed development and there will be no disturbance to confirmed bat roost structures occurring within and adjacent to the proposed wind farm site boundary.

6.7.1.1.6 Protection of Herpetofauna

The Ecological Clerk of Works for the construction phase will complete a survey of the construction footprint during spring (late February / March / early April) ahead of the proposed works in order to identify any key amphibian breeding areas. This will allow wildlife barriers to be installed where necessary to minimise impacts upon such features where these are likely to be indirectly affected by the works.

6.7.1.2 Mitigation by Design

6.7.1.2.1 Protection of Watercourses

An Ecological Clerk of Works ("ECoW") will be employed from the commencement to completion of construction works, including Access Tracks, On-site Substation and Control Building, Temporary Construction Compound, Turbine Hardstands and Turbine Foundations and Wind Farm Internal Cabling works at a minimum. Primary roles for the ECoW will include

the setting out and monitoring of the working corridor and review of pollution control measures and working practices during the active construction period as well as ad hoc input into site remediation.

For the construction of culverts, all activities must adhere to IFI, (2016) Guidelines on Protection of Fisheries during Construction Works in and Adjacent to Waters. Section 9 Planning, Design and Construction Issues details on Best Practice guidance for the installation of culverts on watercourses.

All measures outlined in the accompanying SWMP will be fully implemented by the contractor and will be agreed to with the planning authority in advance of construction activities. The objective of the SWMP is to prevent pollution to watercourses and adverse impacts to sensitive fauna. The SWMP has provided sufficient detail so that all activities that could potentially lead to negative impacts on water quality have been identified. The SWMP is based upon a detailed understanding of the hydrology, hydrogeology and geology within and surrounding the proposed wind farm extension.

All watercourses draining the Site will be examined on a repeated scheduled timeframe (i.e. daily/weekly/fortnightly etc.) as deemed appropriate by the Contractor, Planning Authority, NPWS and Inland Fisheries Ireland. A log will be kept of these examinations and a water sampling protocol to monitor key water quality parameters will be established in agreement with the NPWS and Inland Fisheries Ireland. The monitoring protocol will be devised so that sediment release (should it occur) from the Site is detected at an early stage. Sediment release to the above watercourses from the site will be restricted to <25mg/l as per the Salmonid Water Regulations.

Method statements outlining the approach to all surface watercourse crossing will be approved in advance with Inland Fisheries Ireland.

Disturbance to natural drainage features will be avoided during the construction phase of the Development. The design of the Development has allowed for the establishment of a 50m wide watercourse buffer zone during the construction phase.

Uncontaminated surface runoff will be diverted away from construction areas through the installation of interceptor drains up-gradient of construction areas.

Drainage waters originating in construction areas will be collected in a closed system and treated prior to controlled, diffuse release. Drainage waters from construction areas will be managed through a series of treatment stages that include swales, check dams and settlement/attenuation ponds along with other pollution control measures such as silt fences and silt mats.

A three-stage treatment train will be employed to capture, retain and treat discharges during the construction phase. This treatment train is also proposed for discharges from hard surfaces that will be installed as a result of the Development.

Settlement/attenuation ponds will be used to attenuate and treat runoff. A detailed pre-construction peat stability assessment has considered the appropriate location of settlement/attenuation ponds so that these facilities will not increase the risk of slope failure. These will have permanent open water to minimise the risk of sediment washout. Settlement/attenuation pond side slopes will be constructed at shallow grades such as 1 in 3 side slope. Settlement/attenuation ponds will be designed so that outflows are spread diffusely over a wider area so that increases in run-off can be mitigated. Erosion control and detention ponds will be regularly maintained during the construction phase.

Standing water from excavations will not be pumped directly into watercourses. Where dewatering of excavations is required, water will be pumped to the head of a treatment train in order to receive full treatment prior to discharge.

Roadside drains will be shallow with moderate gradients to prevent scouring. In steep areas check dams (possibly in conjunction with settlement ponds and / or cross drains) may be necessary to reduce flow rate.

Oil fuel will be stored within containment areas and emergency response measures for oil spillage on site will be prepared.

Refuelling of plant during construction will be carried out at a designated area, a minimum of 50m from watercourses. Drip trays and spill kits will be available on site. Maintenance of all plant and machinery will be undertaken off-site. Only emergency break-down maintenance will be carried out on site.

Cement will be mixed within containment areas and if Readymix vehicles are used these will be washed in the same area and the water cycled.

All vehicles transporting materials to and from the Site will store materials in a contained load so that the potential for emissions or spillage is reduced during journeys and bridge crossing over watercourses. The measures outlined in the UK's Planning Policy Guidance No. 26: Dealing with Spillages on Highways (a Good Practice Guidance notes proposed of the UK EA/SEPA/EHS) will be adhered to in the event of a spillage or accident during the transportation of materials.

All construction personnel will be trained in pollution incident control response. An emergency response plan has been prepared as part of the CEMP for the proposed development and information outlining response procedures and contingency plans to contain pollution, as set out in the CEMP, will be made available on site.

Access Tracks and turning areas will be confined to areas of shallow peat where possible and will be constructed on a geotextile layer. These areas will also be kept as level as possible to avoid fast run-off. This can be achieved by following contours where possible.

At the proposed spoil storage area, impermeable berms will be put in place surrounding peat spoil receptor cells. The berms will be established in advance of the deposition of peat surplus material. The berms will be designed to account for a bulking factor of 10% of the surplus peat material to be disposed in these areas. In addition, all existing drainage ditch outflows from cutover blanket bog that will be used as receptor cells for surplus peat will be blocked in advance of the deposition of any surplus material within these cells. This will prevent the ongoing loss of water from these cut areas to receiving lakes to the north and south and also prevent the migration of peat spoilt material from the cells to these lakes.

6.7.1.2.2 Prevention of Spread of Invasive Alien Species

The presence of the non-native invasive species *Fallopia japonica* and *Prunus laurocerasus* within the proposed development site provides the potential for the spread of this species by the proposed works. These species is invasive and out-compete native flora to form mono-specific stands. Their presence along watercourses is particularly significant, as contaminated soil or vegetative material washed from an infected area can result in the spread of this species downstream. Appropriate mitigation measures including management and control measures are required at all sites within the proposed works area where this species is encountered for the prevention of spread of these species. The mitigation measures for the control of invasive species will follow the TII guideline document *The Management of Invasive Alien Plan Species on National Roads – Technical Guidance* (TII, 2020). A summary of the physical and chemical control measures for *Fallopia japonica* are as follows:

- Where feasible, preference should be given to treating Japanese knotweed in its original location to limit the risk of further spread of the plant.
- Physical methods of IAPS control include cutting, digging or excavating, hoeing and pulling by hand.
- Where cut, pulled or mown IAPS material arises, its disposal shall not lead to a risk of further spread
- Particular care shall be taken near watercourses as water is an effective conduit for the dispersal of plant fragments and seeds.
- particular care is required in relation to the disposal of Japanese and other knotweed species. Where burial is being used to dispose of these species, a non-persistent herbicide shall be applied to the infestation prior to excavation. The material shall then be excavated and subsequently buried to a minimum depth of 5m. The waste shall be covered with a proprietary root barrier membrane layer and infilled with a minimum 5m depth of uncontaminated soil.
- Any geotextile membranes used for burial must be undamaged, sealed securely, have a manufacturer's guarantee that it will remain intact for at least 50 years, and be UV resistant. Where burial to a depth of 5m is not possible, the infestation shall be treated with a non-persistent herbicide prior to excavation, excavated and then completely encapsulated in a proprietary root barrier membrane cell. The upper surface of the cell shall be buried to a depth of at least 2m with uncontaminated soil.
- Treat with glyphosate. Glyphosate is a broad-spectrum herbicide and, as such, is potentially damaging to non-target plants.
- Great care is, therefore, necessary when applying this herbicide
- effective control of Japanese knotweed may be achieved by biannual (summer and autumn) foliar glyphosate applications or by annual application of glyphosate in autumn (after the flowering period but prior to senescence) using stem injection (at high concentrations) or foliar spray (Jones, et al., 2018).
- The use of herbicides containing the active ingredients aminopyralid and fluroxypyr are not to be used for stands of Fallopia japonica occurring in close proximity to watercourses and wetland habitats.
- The application of herbicides and pesticides shall not be undertaken in the following conditions:
    - Windy weather where there is a risk of spray drift occurring
    - During or preceding rainfall which can result in the chemical being washed off
    - During periods of particularly cold weather which can reduce the plant's ability to uptake the chemical

A summary of the physical and chemical control measures for *Prunus laurocerasus* are as follows:

- Cutting – anytime of the year. This approach can be very labour intensive and does not kill the plant. Regular follow up is required to deal with re-growth.
- Uprooting - anytime of the year. Small plants can be pulled by hand while large stems can be cut and the roots grubbed out by winch or machine.
- Mulch matting - anytime of the year. This approach can be labour intensive and regular follow up is required to deal with re-growth.
- Bud-rubbing – spring to autumn. This approach can be labour intensive and regular follow up is required to deal with re-growth.
- Glyphosate – during the active growth in late spring or summer. Spot treatment of stands of *Prunus laurocerasus* on site.
- Triclopyr - during the active growth in late spring or summer. Spot treatment of stands of *Prunus laurocerasus* on site.

Due to the legislative requirements to control the spread of noxious weeds and non-native invasive plant species, it is important that any activities associated with the planning, construction and operation of wind farm developments comply with the requirements of the Wildlife Acts, 1976-2012. Regulations 49 and 50 of the European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. 477 of 2011) include legislative measures to deal with the dispersal and introduction of Invasive Alien Species (IAS), which are listed in the Third Schedule of the regulations. Regulation 49 deals with the Prohibition on introduction and dispersal of certain species while Regulation 50 relates to Prohibition on dealing in and keeping certain species.

The introduction and/or spread of invasive species such as Himalayan Balsam, Giant Rhubarb or Rhododendron for example, could result in the establishment of invasive alien species and this may have negative effects on the surrounding environs. Appropriate spread prevention measures have been incorporated into the design of the project. The following measures address potential effects associated with the construction phase of the project:

- Good construction site hygiene will be employed to prevent the introduction and spread of problematic invasive alien plant species (e.g. Himalayan Balsam, Japanese Knotweed etc.) by thoroughly washing vehicles prior to leaving any site.
- All plant and equipment employed on the construction site (e.g. excavator, footwear, etc.) will be thoroughly cleaned down using a power washer unit prior to arrival on site to prevent the spread of invasive plant species
- All washing will be undertaken in areas with no potential to result in the spread of invasive species. This process will be detailed in the contractor's method statement.

- Any soil and topsoil required on the site will be sourced from a stock that has been screened for the presence of any invasive species and where it is confirmed that none are present.
- All planting and landscaping associated with the Development shall avoid the use on invasive shrubs such as Rhododendron.

6.7.1.3 Mitigation by Reduction

6.7.1.3.1 Protection of important habitats

A site-specific CEMP will be implemented to ensure that potential adverse impacts to upland watercourses flowing through the site are avoided. Minimum buffer zones will be implemented between areas associated with the construction of Turbine Foundations and streams/eroding gullies, except where stream crossings are required.

Within the Broemountain Commonage Area site operatives, plant and machinery will be restricted to the footprint of the proposed development construction boundary and will not be permitted to encroach upon adjacent lands. This will reduce the potential for damage and disturbance to heath, acid grassland and mosaic habitats.

6.7.1.3.2 Protection of Watercourses

All elements of the SWMP and the mitigation measures outlined in Chapter 9 to reduce the amount of silt-laden water generated within the construction footprint will be implemented. These measures will include the provision of clean water catch drains upslope of construction areas and the minimisation of excavation footprints and the time excavations and surfaces are left exposed and denuded.

6.7.1.4 Offsetting

6.7.1.4.1 Habitat restoration

The northwest section of the proposed wind farm site at Broemountain as well as the Waterford Wetland Sites 173 and 239 that occur within the proposed development site provide significant opportunities for habitat restoration and enhancement. A Habitat Management Plan is provided as **Appendix 6.4** and all measures set out in this plan will be implemented as part of the Development. The restoration of areas of dry heath and unimproved acid grassland and the implementation of measures such as the control of grazing will aim to achieve the restoration and enhancement of an area of approximately 12 ha of dry heath habitat as well as improving conditions within the Waterford Wetland Habitat Lisleagh Mountains (Site Code: 173) through the provision of appropriate grazing management.

New hedgerow planting, consisting of native species and of local Waterford/Irish provenance will be provided within the proposed wind farm site to offset the loss of approximately 1.38km of hedgerow to the footprint of the proposed development. The corridors of proposed new hedgerow planting are outlined in **Appendix 6.4** and amount to approximately 3.65km of new hedgerow. The planting of this hedgerow and their successful establishment during the operation phase of the proposed wind farm site will result in an overall net increase of approximately 1.3km of hedgerow habitat within the proposed wind farm site. This will have the potential to represent a significant positive effect for hedgerow and the fauna that rely upon this habitat.

6.7.2 Operational Phase mitigation

6.7.2.1 Mitigation by Design

6.7.2.1.1 Protection of Watercourses

The following measures are required in order to ensure the ongoing protection of watercourses:

- Re-seeding / re-vegetation of all areas of bare ground or the placement of Geo-jute (or similar) matting will take place as practically possible at the start of the operational phase to prevent run-off.
- Silt traps erected during the construction phase within roadside and artificial drainage will be replaced with stone check dams for the lifetime of the project. These stone check dams will only be placed within artificial drainage systems such as roadside drains and not natural streams or ditches.
- A full review of construction stage temporary drainage will be undertaken by the Developer (in conjunction with the Project Hydrologist/ Site Engineer and the Project Ecologist) following the completion of construction, and drainage removed or appropriately blocked where this will not interfere with infrastructure.
- The Temporary Construction Compound / office must house all chemicals within a secure bunded COSSH store for the operational phase of the project.

6.7.2.1.2 Protection of Bats

Turbines will operate in a manner which restricts the rotation of the blades as far as is practicably possible below the manufacturer's specified cut-in speed (SNH 2021). This is usually achieved by feathering the blades during low wind speeds; the angle of the blades is rotated to present the slimmest profile possible towards the wind, ensuring they do not rotate or 'idle' when not generating power.

Turbine blades spinning in low wind can kill bats, however bats cannot be killed by feathered blades which are not spinning (Horn et al., 2008). The feathering of turbine blades combined with increased cut-in speeds have been shown to reduce bat fatalities by up to 50% (SNH 2021). As such, the feathering of blades to prevent 'idling' during low wind speeds is proposed for all turbines.

6.7.2.2 Mitigation by Reduction

6.7.2.2.1 Protection of Bats

Cut-In Speeds/Curtailment

Increasing the cut-in speed above that set by the manufacturer can reduce the potential for bat/turbine collisions. A study by Arnett et al. (2011) showed a 50% decrease in bat fatality can be achieved by increasing the cut-in speed by 1.5 m/s.

Species with elevated risk of collision (Leisler's bat, soprano and common pipistrelle) in particular would benefit from increasing the cut-in speed of turbines, as dictated on a case-by case basis depending on the activity levels recorded at each turbine.

Cut-in speeds should be increased during the bat activity season (April-October) or where temperatures are optimal for bat activity to 5.5 m/s from 30 minutes prior to sunset and to 30 minutes after sunrise at turbines where surveillance shows high bat activity levels for High and Medium-Risk species and/or if bat carcasses are recorded.

The duration required depends on the level of mitigation required for each individual turbine i.e. a full bat activity season or only spring and autumn (duration will be determined by the first year of surveillance).

Cut-in speeds restrictions will be operated according to specific weather conditions:

- When the air temperature is greater than 7°C (as bat activity does not usually occur below this temperature).
- Generally, bat activity peaks at low wind speeds (<5.5m/s). As such, it has been shown that curtailing the operations of wind turbines at low wind speeds can reduce bat mortality dramatically, particularly during late summer and the early autumn months.

Due to the considerable unnecessary down time resulting from the proposed "blanket curtailment" (above) and the advances in smart curtailment a focused curtailment regime is further proposed from the year two of operation.

This will focus on times and dates, corresponding with periods when the highest level of bat activity occur within the Site. This includes the use of the SCADA (Supervisory Control and Data Acquisitions) operating system (or equivalent) to only pause/feather the blades below a specified wind speed and above a specified temperature within specified time periods.

Post-constructions surveys will be undertaken for the first three years of operation to confirm if blanket curtailment restrictions can be amended in line with post-construction activity levels. The post construction surveys will be used to update the current curtailment regime (blanket curtailment) designed around the values for the key weather parameters and other factors that are known to influence collision risk. This will include all of the following:

- Wind speed in m/s (measured at nacelle height)
- Time after sunset
- Month of the year
- Temperature (ºC)
- Precipitation (mm/hr)

Offsetting

6.7.2.2.2 Restoration of Important Habitats

Restoration of habitats will require ongoing positive management input as well as monitoring of success and necessary remedial measures. This is set out in the Habitat Management Plan in **Appendix 6.4**.

6.7.3 Decommissioning Phase Mitigation

No new impacts on the surface water and groundwater receiving environment are anticipated during the decommissioning phase of the project. The decommissioning phase of the project will result in the removal of Site infrastructure such as wind turbines and the Met Mast etc. No new additional mitigation measures to those proposed for the construction which will also be implemented during decommissioning are required for the decommissioning phase of the Development. The decommissioning phase and associated removal of major infrastructure components is anticipated to result in similar potential risks to surface water and groundwater as those that will be encountered during the construction phase of the Development.

The excavation of greenfield land is not expected to be required during the decommissioning phase. In addition, the movement of plant, vehicles and equipment is not expected to be required during the decommissioning phase since all of the project's hardstand areas will be pre-existing by the time the decommissioning phase is being carried out. As a result, the risk of elevated suspended solids being discharged in surface water run-off to the downstream

receiving environmental is expected to be low. However, the potential risk remains for spills of fuels hazardous chemicals which is a common risk to all developments. The mitigation measures outlined in this chapter will be implemented during the decommissioning phase to reduce the potential for such impacts.

6.8 MONITORING

An ECoW will be appointed prior to the commencement of construction. The ECoW will be an ecologist with experience of baseline ecological surveys, pre-construction surveys and construction phase supervision. The ECoW will be responsible for completing pre-construction surveys and supervising construction works and advising on the implementation of biodiversity enhancement measures that will be commenced during the construction phase.

Pre-construction confirmatory surveys required in advance of the construction phase will include as a minimum:

- Otter surveys along the Finisk River. Surveys to be completed will pay particular attention to identifying the presence/absence of otter holts/couches within 150m of the proposed wind farm infrastructure. In the event that otter holts or couches identified within 150m of the proposed development the status of the breeding/resting place will be confirmed. Where the holt/couch is identified as a breeding site, then, in the absence of a derogation licence, no works will be permitted to proceed within a 150m radius of the breeding place, whilst it is still actively used as a breeding site. In the event that a non-breeding active holt or couch is identified within 50m of the proposed development, then, in the absence of a derogation licence, no works will be permitted to proceed within a 50m radius of the non-breeding but active holt or couch.
- Non-native invasive plant species surveys: An up-to-date confirmatory non-native invasive plant species survey of the Site and adjacent areas will be completed during the growing season immediately prior to the commencement of construction works.
- Confirmatory surveys for the presence of plant species of conservation interest. These surveys shall be completed during the growing season immediately prior to the commencement of the construction phase. The surveys shall be completed to identify the presence of any new stands of rare or threatened species as listed in **Section 6.4.3** above. In the event that new stands of these species are identified as occurring within the footprint of the proposed wind farm, stands of these plants will be required to be translocated to a suitable receptor area either within the proposed development site or an alternative suitable location. Such translocations will only be permitted to proceed upon receipt of a derogation licence.

- The ECoW will ensure that best practice construction methods and mitigation measures detailed in this EIAR and accompanying planning documentation including the CEMP and NIS are implemented in full.
- The ECoW will be responsible for ensuring that the construction phase contractor is aware of key biodiversity receptors. The ECoW will inspect the construction works throughout the construction phase and will pay particular attention to the implementation of all biodiversity related mitigation measures.
- The ECoW will provide monitoring inspection reports during the construction phase and will also provide a close-out report following the completion of the contract construction works.
- Where necessary the ECoW will liaise with relevant authorities such as Waterford County Council, the IFI and the NPWS with respect to construction phase activities that relate to biodiversity.
- As part of the ECoW terms of appointment, the ECoW will be vested with the authority to stop works where activities have been identified on site that are not in accordance with the mitigation measures outlined in this EIAR, the NIS and/or the CEMP prepared for the planning application for the proposed development.

6.8.1 Post-construction phase monitoring

6.8.1.1 Habitats

Post construction phase monitoring will be completed as per the specification for monitoring set out in the Habitat Management Plan in **Appendix 6.4**.

6.8.1.2 Bats

Post construction phase monitoring for bats will be completed as per the specification for monitoring set out in **Appendix 6.2**.

6.9 RESIDUAL EFFECTS

The direct and indirect effects of the proposed development to biodiversity have been set out in Section 6.6 above. There will be an overall loss of approximately 31 Ha of habitat to the footprint of the proposed wind farm. This will include a loss of approximately 3.4 Ha of Annex 1 dry heath habitat. In addition, there will be approximately 1.38km of hedgerow lost to the footprint of the proposed wind farm. The Habitat Management Plan will be implemented to mitigate for the loss of habitat to the footprint of the proposed wind farm. This plan comprises measures for the restoration and enhancement of an area of approximately 12 Ha of degraded dry heath habitat as well as the establishment of approximately 3.65km of new hedgerow habitat with a net increase of c. 1.3km of this habitat. The habitat management

measures that will be implemented for the poor fen and surrounding wet grassland habitat at the Lisleagh Mountain Waterford Wetland site will provide enhancement and ongoing protection for this habitat over the lifetime of the wind farm. These measures will also reduce the impact of wet grassland habitat loss to the footprint of the proposed wind farm. A summary of the measures to be implement as part of the Habitat Management Plan is provided in **Table 6.14** below.

Table 6.14 provides an assessment of the residual impacts of the Development, taking into account the mitigation measures set out in **Section 6.7** and the measures set out in the Habitat Management Plan, as summarised in **Table 6.15** below.

Table 6.14: Summary of Proposed Habitat Management and & Biodiversity Receptors to be targeted

Management Element	Biodiversity Receptor		
	Habitats & Flora	Fauna	Water Quality
Restoration/enhancement and maintenance of c.12Ha of dry heath habitat. The aim of this measures will be to reinstate this area of dry heath and unimproved species rich *Nardus* grassland to favourable conservation condition.	ü	ü	
Grazing Management	ü	ü	ü
New Hedgerow Planting	ü	ü	ü

Table 6.15: Assessment of Residual Effects

Biodiversity Receptor	Impact	Significance	Probability	Mitigation	Residual Impact
European Sites	Potential for the discharge of pollutants such as sediment or hydrocarbons downstream to the River Blackwater SAC and pNHA which could affect qualifying habitat and species.	The significance of impact will depend upon the magnitude of the pollution event (i.e. the levels of pollution released). Any pollution event with the potential to result in short to long-term perturbations to conservation objective targets of qualifying feature of interest will represent a significant effect	Likely	Minimise ground disturbance. Timing of works and implementation of surface water management and control measures. Implementation of all mitigation measures set out in Section 6.7, Chapter 8 & 9 and within the Natura Impact Statement (DEC, 2023). The implementation of mitigation measures will negate the potential for this impact to arise.	No residual adverse effects
NHAs	No impact. No NHAs within the zone of influence of the Development.	N/A	None	None Required	No residual impact
pNHAs	Potential for the discharge of pollutants such as sediment or hydrocarbons downstream to the Blackwater River and Estuary pNHA which could affect qualifying habitat and species.	The significance of impact will depend upon the magnitude of the pollution event (i.e. the levels of pollution released). Any pollution event with the potential to result in short to long-term perturbations to feature of interest will represent a significant effect	Likely	Minimise ground disturbance. Timing of works and implementation of surface water management and control measures. Implementation of all mitigation measures set out in Section 6.7, Chapter 8 & 9 and within the Natura Impact Statement (DEC, 2023). The implementation of mitigation measures will negate the potential for this impact to arise.	No residual adverse effects

Biodiversity Receptor	Impact	Significance	Probability	Mitigation	Residual Impact
Dry heath	Loss of habitat to the footprint of the proposed wind farm.	Permanent loss of EU Annex 1 dry heath habitats (see Table 6.13)	Certain	Mitigation measures for habitats are set out under Section 6.7.1. A Habitat Management Plan has been prepared. This includes for the restoration of approximately 37/16.5 Ha of dry heath and acid grassland within the wind farm site. The extent of dry heath associated with this area will be greater than the c. 3.4 Ha that will be lost to the footprint of the proposed development.	Permanent loss of habitat to the footprint of the proposed wind farm (see Table 6.13). In the context of the proposed mitigation measures and the aims of the HMP this will result in a significant, short to medium term impact on dry heath habitat of international importance at the international scale. The long-term residual impact will be dependent upon achieving the targets set out in the Habitat Management Plan. The successful achievement of the targets set out in this Plan will have the potential to offset the loss of dry heath to the footprint of the proposed wind farm through the provision of a net increase the area of dry heath habitats occurring within the proposed development boundary. The achievement of this aim of the HMP will also have the potential to contribute towards an increase of the favourable reference area of this habitat, with the potential for positive, long-term effects for this habitat at the international scale.

Biodiversity Receptor	Impact	Significance	Probability	Mitigation	Residual Impact
Hedgerows	Potential for loss of c. 1.38km of hedgerow habitat.	Significant at the local scale	Certain	Mitigation measures for habitats are set out under Section 6.7.1. A Habitat Management Plan has been prepared. This includes for the planting of approximately 2.5km of hedgerow within the wind farm site. Ongoing management of hedgerow habitat set out in the Habitat Management Plan	Permanent loss of habitat to the footprint of the proposed wind farm (see Table 6.13). In the context of the proposed mitigation measures and the aims of the HMP this will result in a significant, short to medium term impact on hedgerow habitat of local importance at the local scale. The long-term residual impact will be dependent upon achieving the targets set out in the Habitat Management Plan. The successful achievement of the targets set out in this Plan will have the potential to offset the loss of hedgerow habitat to the footprint of the proposed wind farm through the provision of a net increase the length of hedgerow habitats occurring within the proposed development boundary.
Wet grassland	Potential for loss of c. 0.58 Ha of species-poor wet grassland	Slight at the local scale	Certain	Mitigation measures for habitats are set out under Section 6.7.1. A Habitat Management Plan has been prepared. This includes for the management and enhancement of Lisleagh Mountain Waterford Wetland Site (Site Code: 173) as an area of poor fen and wet grassland habitat.	Permanent loss of habitat to the footprint of the proposed wind farm (see Table 6.13). In the context of the proposed mitigation measures and the aims of the HMP this will result in a slight, short to medium term impact on wet grassland of local importance at the local scale. The long-term residual impact will be dependent upon

Biodiversity Receptor	Impact	Significance	Probability	Mitigation	Residual Impact
				Ongoing management of Lisleagh Mountain Wetland set out in the Habitat Management Plan	achieving the targets set out in the Habitat Management Plan. The successful achievement of the targets set out in this Plan will have the potential to offset the loss of wet grassland habitat to the footprint of the proposed wind farm through the enhancement and management of wet grassland and poor flush habitats at the Lisleagh Mountains Wetland site over the lifetime of the operation phase of the proposed wind farm.
Acid grassland	Loss of habitat to the footprint of the proposed wind farm.	Permanent loss of acid grassland habitat to the footprint of the proposed wind farm site (see Table 6.13)	Certain	Mitigation measures for habitats are set out under Section 6.7.1. A Habitat Management Plan has been prepared. This includes for the restoration of approximately 37/16.5 Ha of dry heath and acid grassland within the wind farm site. The area of acid grassland associated with the is area will be greater than the c. 4.87 Ha that will be lost to the footprint of the proposed development.	Permanent loss of habitat to the footprint of the proposed wind farm (see Table 6.13). In the context of the proposed mitigation measures and the aims of the HMP this will result in a significant, moderate, short to medium term impact on acid grassland habitat of local importance at the local scale. The long-term residual impact will be dependent upon achieving the targets set out in the Habitat Management Plan. The successful achievement of the targets set out in this Plan will have the potential to offset the loss of acid grassland to the footprint of the proposed wind farm through the provision of a net increase the area of

Biodiversity Receptor	Impact	Significance	Probability	Mitigation	Residual Impact
					acid grassland habitats occurring within the proposed development boundary. The achievement of this aim of the HMP will also have the potential to contribute towards an increase on the FRA of this habitat, with the potential for positive, long-term effects for this habitat at the international scale.
Aquatic Habitats	Potential for the discharge of pollutants such as sediment or hydrocarbons downstream to aquatic habitats.	The significance of impact will depend upon the magnitude of the pollution event (i.e. the levels of pollution released). Any pollution event with the potential to result in short to long-term perturbations to the status of receiving aquatic habitats	Likely	Minimise ground disturbance. Timing of works and implementation of surface water management and control measures. Implementation of all mitigation measures set out in Section 6.7, Chapter 8 & 9 and within the Natura Impact Statement (DEC, 2023). The implementation of mitigation measures will negate the potential for this impact to arise.	Imperceptible
Fisheries and Aquatic Fauna	Potential for the discharge of pollutants such as sediment or hydrocarbons downstream to aquatic habitats that support fisheries and aquatic fauna.	The significance of impact will depend upon the magnitude of the pollution event (i.e. the levels of pollution released). Any pollution event with the potential to result in short to long-term perturbations to the status of receiving aquatic habitats to support fisheries and aquatic fauna.	Likely	Minimise ground disturbance. Timing of works and implementation of surface water management and control measures. Implementation of all mitigation measures set out in Section 6.7, Chapter 8 & 9 and within the Natura Impact Statement (DEC, 2023). The implementation of mitigation	Imperceptible

Biodiversity Receptor	Impact	Significance	Probability	Mitigation	Residual Impact
				measures will negate the potential for this impact to arise.	
Otters	Potential for indirect impacts to otters as result of perturbations to aquatic habitats downstream that are relied upon by otter or provide suitable habitat for otters.	The significance of impact will depend upon the magnitude of the pollution event (i.e. the levels of pollution released). Any pollution event with the potential to result in short to long-term perturbations to the status of receiving aquatic habitats to support otters	Likely	Minimise ground disturbance. Timing of works and implementation of surface water management and control measures. Implementation of all mitigation measures set out in Section 6.7, Chapter 8 & 9 and within the Natura Impact Statement (DEC, 2023). The implementation of mitigation measures will negate the potential for this impact to arise.	Imperceptible
Bats	Potential impacts during the operation phase associated with the risk of fatalities posed by operating wind turbines to high risk species that comprise pipistrelle species and Leisler's bat.	Potential for impacts to the local population of Soprano pipistrelle and Common pipistrelle populations.	Possible	Implementation of mitigation measures set out in Section 6.7.3.1.2 and 6.7.3.2.1 and set out in further detail in Appendix 6.2.	The adjudged worst-case scenario is that, during operation, the turbines may possibly cause injury or death to a few individual specimens of Leisler's bat as it is a high-flying species (10m to 70m+). However, the amount of time spent hunting at the upper height limit cannot be assessed accurately due to the maximum distance (60m to 80m) of detection of this species by ultrasound detectors but most activity and time can be expected to occur in the mid-region of the species hunting altitude i.e. 40m.

Biodiversity Receptor	Impact	Significance	Probability	Mitigation	Residual Impact
					The resulting effect of the development on local bat populations, with implemented mitigation measures, is considered to be a Slight to Imperceptible Residual Negative Reversible Effect and in the Local Context with the favourable conservation status (FCS) of bat species being unaffected and all species confirmed or expected on or near the study areas are predicted to persist.
Herpetofauna	Mortality resulting from construction works. Loss of foraging habitat.	Potential for impacts to the local common frog populations.	Likely	Minimise ground disturbance. Timing of works. Habitat management measures as part of the Habitat Management Plan. Implementation of mitigation measures set out in Section 6.7.2.1.6.	Imperceptible
Terrestrial Invertebrates	Loss of habitat.	Potential for impacts to the local terrestrial fauna populations.	Likely	Minimise ground disturbance. Timing of works. Habitat management measures as part of the Habitat Management Plan	Imperceptible