

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 Tullaghmore Wind Farm (**Chapter 2: Project Description**).

A Construction Environmental Management Plan (CEMP) is appended to the EIAR in **Appendix 2.1**. This document 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 16.1**. In addition, a Draft Habitat Management Plan (Draft HMP) is appended to the EIAR in **Appendix 6.5**.

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

Common acronyms used throughout this EIAR can be found in **Appendix 1.4**.

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 2020 - 2022
- **Appendix 6.4:** Fish Population Assessment
- **Appendix 6.5:** 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**

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6.1.2 Scope

Doherty Environmental Consultants (DEC) Ltd. was commissioned by Jennings O'Donovan (JOD), on behalf of Tullaghmore Windfarm Limited to undertake an ecological impact assessment of the Development, which would go on 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 International Legislation

6.1.3.1 EU 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 may have a significant effect on a Natura 2000 site 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*

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) and amendments*

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 EU Directive on the Conservation of Natural Habitats and of Wild Fauna and Flora (Habitats Directive 1992), provides protection to particular species and their habitats across Europe. The Habitats Directive is transposed into Irish law through the EC (Birds and Natural Habitats) Regulations 2011.

Annex IV of the EU Habitats Directive provides protection to a number of named species wherever they occur. These species are protected under Regulations 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 incorporate 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 2030¹. Along with the Heritage Plan, The National Biodiversity Action Plan 2017 - 2021² 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 National Biodiversity Action Plan 2017-2021 (NBAP) emphasises the requirement for

¹ The National Heritage Plan - Available online at: <https://www.chg.gov.ie/heritage/heritageireland2030/> (Accessed August 2019).

² The National Biodiversity Action Plan – Available online at: <https://www.npws.ie/legislation/national-biodiversity-plan> (Accessed August 2019).

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."*

6.1.5 Local Policy

The management and conservation of heritage, including biodiversity, in County Galway is set out in the Galway County Heritage and Biodiversity Plan 2017 - 2022. The Biodiversity and Natural Heritage Plan section of the overall plan set out a range of objectives under themes that include community engagement; education and training; research and information; people, property and works; and stakeholder engagement and pursuing opportunities.

The Galway County Development Plan 2022 – 2028 came into effect on the 20th June 2022. Chapter 10 of the County Development Plan sets out Policies and Objectives for Natural Heritage and Biodiversity. Policy NHB1 seeks to protect and where possible enhance natural heritage sites designated under EU and National Legislation as well as plant and animal species and their habitats that have been identified under EU and National Legislation.

Policy NHB2 and NHB3 set out the requirement for Appropriate Assessment of projects likely to impact European Sites and establish a commitment that no projects that have potential to result in significant impacts to European Sites are permitted on the basis of the County Development Plan.

Policy NHB4 seeks to ensure, where appropriate, the protection and conservation of areas, sites, species and ecological networks of biodiversity value outside of designated sites. Policy NHB5 supports the protection and enhancement of biodiversity and ecological

connectivity in non-designated sites, including hedgerows, streams and wetlands, amongst other features.

Policy WTWF1 seeks to protect and conserve the ecological and biodiversity heritage of wetland habitats including fens, heath, peatlands, springs and watercourses.

Specific policy objectives are set out for peatland habitats. These comprise:

- *P1: Protection of Peatlands – which seeks to ensure that Peatland areas which are designated are conserved for their ecological, climate regulation, education and culture potential.*
- *P2: Best Practice in Peatland Conservation and Management – which provides an objectives for Galway County Council to work in partnership with relevant stakeholders on all suitable peatland sites to demonstrate best practice in sustainable peatland conservation, management and restoration techniques*
- *P3: Framework Plans – which seek to support relevant agencies in advancing rehabilitation works for peatlands and related infrastructure, to provide for the future sustainable and environmentally sensitive use of Peatland sites including for amenity purposes.*

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")³ 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'⁴ (the CIEEM Guidelines"), published by the Chartered Institute of Ecology and Environmental Management ("CIEEM"), are the acknowledged

³ 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 August 2019).

⁴ 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 August 2019).

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.

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 Project will comprise of the following main components:

- Erection of 6 no. 6.8MW wind turbines with an overall ground to blade tip height of 185m. The candidate wind turbine will have a rotor diameter of 162m and a hub height of 104m
- Construction of site access roads, crane hardstand areas and turbine foundations.
- Improvement of existing site entrance with access onto the N59

- Construction of one no. temporary construction compound with associated temporary site offices, parking areas and security fencing
- Installation of 1 no. permanent meteorological mast with a height of 104m
- Construction of new internal site access tracks and upgrade of existing Site track, to include all associated drainage
- Development of a site drainage network
- Construction of one no. permanent 38kV substation
- All associated underground electrical and communications cabling connecting the wind turbines to the wind farm substation
- All works associated with the connection of the wind farm to the national electricity grid, which will be via 38kV underground cable connection approximately 18.65km in length to the existing ESB Screebe 110kV GIS Substation.
- Biodiversity enhancement measures
- Works at 4 no. locations along the proposed turbine delivery haul route from Galway Port.

A 10-year planning permission and 35-year operational life from the date of commissioning of the entire wind farm is being sought.

6.3 ASSESSMENT METHODOLOGY AND SIGNIFICANCE CRITERIA

Terrestrial 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 landowners as well as relevant statutory and non-statutory agencies. In addition to the above the following research was also undertaken:

- A review of baseline ecology information described in the Environmental Impact Assessment Reports/Environmental Impact Statements (EIS) for surrounding wind farm projects. A key document that provides baseline information for the surrounding

area is the EIS for the proposed N59 Maam Cross to Oughterard Road Project (NRA, 2012). Information for detailed ecological investigations for this project within the vicinity of the proposed Development Site was reviewed as part of the desktop assessment.

- 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 SPA.
- A review of the online BCI Batlas;
- A review of the New Atlas of the British and Irish Flora (Preston et al., 2002)
- A review of the New Atlas of Breeding Birds in Britain and Ireland: 2007 – 2011 (Balmer et al, 2012).
- 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 hectads M04, L94, L95 and M05 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 1.3** of this EIAR.

Table 6.1: Biodiversity Consultation Conducted to Inform the Development

Consultee	Response Details
DAU / NPWS	<ul style="list-style-type: none"> • “In general, the EIAR should include sufficient project details so that the full nature and extent of the likely significant effects are clear and assessed fully in relation to, among other things, road design and construction methodology; Site drainage details, including settlement ponds; temporary and permanent storage or disposal areas for peat and other materials or wastes arising; extraction sites/borrow pits; and any modifications to roads, bridges or culverts along the entire length of haul routes” • The Department notes that the location map provided is for an area of peatland. The EIAR should give specific consideration to the mobilisation of silt and changes to the stability of peat. • “The proposed windfarm has the potential for significant changes in patterns of surface water flow and may desiccate the peat allowing pathways to open up resulting in subsurface water losses.” • Detailed consideration should be given to the amount of peat to be excavated, stored, and disposed/recovered. A detailed plan for the safe storage, disposal and rehabilitation of excavated or disturbed peat should form part of the EIAR. • The spreading or recovery of excavated peat on areas of intact bog, wet and revegetated areas of cutover bog or other habitats or vegetation of ecological value is unlikely to be acceptable. Excavated or exposed peat should not pose any threat to surface waters and water quality. Any proposals to combine peat disposal with habitat restoration or rehabilitation measures will require a detailed plan to show the location, nature and area of lands in question, and provide details of how such areas will be reinstated, managed and improved for habitats and/or species, together with proposals for monitoring and reporting. This plan should be prepared by a suitably qualified ecologist in consultation with hydrologists and other experts as appropriate of how such areas will be reinstated, managed and improved for habitats and/or species, together with proposals for monitoring and reporting. This plan should be prepared by a suitably qualified ecologist in consultation with hydrologists and other experts as appropriate. • “A detailed Site drainage map will be required and should show all existing watercourses, drainage ditches, flushes, lakes or ponds; new drainage ditches; all outfall points to watercourses or lakes; and all settlement ponds.” • “The likely impacts of grid connection, particularly for birds, sensitive habitats and on surface waters” • “Flood plains, if present, should be identified in the EIAR and left undeveloped to allow for the protection of these valuable habitats and provide areas for flood water retention (green infrastructure). If applicable, the EIAR should take account of the guidelines for Planning Authorities entitled “The Planning System and Flood Risk Management” published by the Department of the Environment, Heritage and Local Government in November 2009.” • The primary water course on Site is the Owenwee (Corrib) which has ‘Good’ I status and flows into the Lough Corrib Special Area of Conservation (SAC Site Code 004042) and Lough Corrib Special Protection Area (SPA Site Code 004042). There is potential for

Consultee	Response Details
	<p>impact on the conservation objectives of these European Sites, particularly with respect to water-dependent species (I and Qis) and wetland habitat (I). Consequently, management of surface and sub-surface water, water tables and drainage carries an elevated risk with regard to this proposed development.</p> <ul style="list-style-type: none"> Any losses of biodiversity habitat associated with this proposed development (including access roads and cabling etc.) such as woodland, scrub, hedgerows and other habitats should be mitigated for. In addition, Annex 1 habitats which occur outside the Natura 2000 network are important in terms of biodiversity conservation. The presence of any Annex I habitats outside the network should be given due consideration as part of the consideration of biodiversity matters generally for the proposed development. The loss of Annex 1 habitats outside SACs should be avoided wherever possible.
IFI	<p>The IFI response noted multiple potential issues in relation to aquatic biodiversity and habitats, fish spawning and electrofishing etc. The following key points raised by IFI with relevance to this Chapter include the following:</p> <ul style="list-style-type: none"> “Lough Corrib is renowned for its wild brown trout and salmon which ascend the tributaries of the catchment annually to spawn and utilise as nursery habitat. Prime water quality and instream habitat is key to salmonids completing this stage of their lifecycle. This is an extremely environmentally sensitive Site as the headwaters of the Owenwee River dissect the middle of the proposed windfarm and also border the eastern boundary.” “Particular attention should be paid to the hydrology of any Site where excavations including excavations for road construction are being undertaken.” “It is important that natural flow paths are not interrupted or diverted in such a manner as to give rise to erosion or instability of soils caused by an alteration in water movement either above or below ground.” “Attention should be paid to drainage during both the construction phase and the operational phase. This includes waters being pumped from foundations or other excavations. It is particularly important during the construction phase that sufficient retention time in the settlement pond is available to ensure no deleterious matter is discharged to any waters. We strongly recommend that settlement ponds are maintained, where appropriate, during the operational phase to allow for the adequate settlement of suspended solids and sediments and prevent any deleterious matter from discharging into any natural waters. In constructing and designing silt traps particular attention should be paid to rainfall levels and intensity. The silt traps should be designed to minimise the movement of silt especially during intense precipitation events where the trap maybe hydraulically overloaded. It is essential that they are located with good access to facilitate monitoring sampling and maintenance. A license to discharge to waters may be required from the local authority.” “We have serious concerns about the construction of roads as these will tend to provide preferential flow paths for surface waters. Considerable attention to detail must be provided in relation to the interception of surface water flows. Our concerns in relation to deleterious matter have been referred to above, but we also have concerns in relation to the flow patterns and to ensuring that normal flows are maintained both during and after construction. Situations can arise where water transportation is significantly increased in certain watercourses thereby putting additional pressures on watercourses and interfering with the sustained flow of water particularly during dry weather. This should be avoided.” “Furthermore, drainage from disturbed and stockpiled soils will have to be considered in advance. Consideration must be given to runoff/leachate from any stockpiles.” “Details relating to operations during the construction phase to contain pollutants should also be considered. It should be noted that cement leachate, hydrocarbon oils and other toxic poisonous materials will require full containment and should not be permitted to discharge to any waters. Please note that physical pollution of watercourses in terms of dumping of unsuitable gravel material or other construction debris in or stockpiling such materials near watercourses is not acceptable as this will interfere with the aquatic habitat.”

Consultee	Response Details
	<ul style="list-style-type: none"> • “In relation to watercourse crossings please be advised that this IFI will require to be consulted well in advance in relation to all crossings of any watercourse or the use of any temporary diversions. We strongly recommend that these crossings should be kept to a minimum. We will also require that any instream structures or bridge crossings are approved by the Fisheries IFI. In particular in designing crossings the length, slope and width of any instream structure will be important. Clear span bridges are the preferred option for all crossings especially in upland areas.” <p>“The EIS should indicate proposals to monitor the impact on all watercourses within the “development”.”</p> <ul style="list-style-type: none"> • “Variations in the topography that will give rise to point flows (keep flow as diffuse as possible)” • “In particular meticulous care should be paid to avoid interfering with the catchment and altering the direction of flow, perhaps to another catchment.” • “Small streams in upland areas a distance of at least 15 meters should be considered as a bare minimum for a riparian zone. This should be more if the factors above are involved and will require ground truthing and Site-specific survey.” • “We strongly recommend that discussions should take place with the Environmental Section of the relevant County Council with a view to obtaining a licence to discharge trade effluent from the “building Site” to waters. In this regard we consider that drainage waters particularly during the construction phase should be regarded as trade effluent. All effluent should comply with appropriate quality standards.” • “Should works be approved a detailed method statement addressing the issues outlined above, including all mitigations measures, precautions and environmental incident procedures must be forwarded to Inland Fisheries Ireland before works commence.”
IPCC	No response received to date.
An Taisce	<p>There are very significant location sensitivities and constraints in Maam area both in ecology and landscape</p> <p>Requested a Discovery sheet map in a separate word or adobe attachment showing location context.</p> <p>The requested information was circulated but no additional response has been received to date.</p>

6.3.2 Site Investigations Undertaken

6.3.2.1 Habitat Survey

Habitat surveys have been carried out at the proposed Development Site between August 2020 and September 2022. 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 27th & 28th August 2020; 10th November 2020; 17th March 2021; 28th January 2022; 16th March 2022; 29th April 2022; 19th May 2022; and 2nd November 2022.

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 27th & 28th August 2020. 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 ERICA⁵ analysis tool and associated hosting website. Since 2015 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.

IVC plant communities and sub-communities were mapped in the field using ESRI Field Maps. 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 77 no. target notes that were chosen to represent the range of plant communities found within and surrounding the proposed wind farm site and the 18 no. target note at the peat storage and restoration (habitat enhancement) area are mapped in **Figure 6.2a** and **Figure 6.2b**. 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).

⁵ ERICA - Engine for Relevés to Irish Communities Assignment: <https://biodiversityireland.shinyapps.io/vegetation-classification>

The study area covered by the IVC survey is shown in **Figure 6.2a** and focused effort on the area within the wind farm site layout. 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 Active Blanket Bog Assessment

When undertaking vegetation surveys in blanket bog habitats other parameters were also noted for each quadrat/target note and the surrounding area to facilitate the identification of active or inactive blanket bog conditions. These additional parameters are based on the NIEA, Natural Heritage, Development Management Team Advice Note: Active Peatland and PPS 18 and include recording the following information:

- The presence and percentage cover of Sphagnum species
- The nature of the surface and whether it is spongy underfoot
- The presence and percentage cover of Eriophorum species;
- Whether the vegetation recorded is typical of blanket bog habitat
- Whether there was a significant amount of flora species not typical of blanket bog habitats;
- Whether typical blanket bog micro-typology such as hummock-hollow complexes occurred
- Whether the surface was dry, or the hydrology was affected by artificial drainage
- Whether blanket bog habitats in which quadrats are undertaken occur as part of a mosaic of acid grassland and dry heath
- The presence of bare peat and/or algal mats
- The depths of peat at the quadrat.

6.3.2.1.3 Aquatic Surveys

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 Owenwee River, the Tawnaghbeg Stream and the Tullaghmore Stream. 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).

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*".

6.3.2.1.4 Fisheries Survey

Fisheries surveys consisting of a fish habitat survey and electrofishing survey were completed for the Tullaghmore Wind Farm during September 2022. Full details of the methodologies used for the completion of these surveys are described in **Appendix 6.4**. A total of 13 sites were selected for the habitat and electrofishing surveys. The location of these sites are detailed in **Table 6.2** below and are shown on **Figure 6.4**. These sites were located at representative areas and were located both upstream and downstream of proposed wind farm infrastructure.

Table 6.2: Location of Fisheries Habitat & Electrofishing Survey Sites

Site No.	Catchment	Sub-catchment	Watercourse Name	Watercourse Order	Segment Code	EPA Code
1	Corrib	Corrib_SC_10	Unnamed	1 st	30_1229	-
2	Corrib	Joyce's_SC_10	Owenwee [Corrib]	3 rd	30_1096	30O03
3	Corrib	Joyce's_SC_10	Owenwee [Corrib]	3 rd	30_1095	30O03
4	Corrib	Joyce's_SC_10	Tullaghmore	2 nd	30_2970	30T15
5	Corrib	Joyce's_SC_10	Unnamed	1 st	30_1427	-
6	Corrib	Joyce's_SC_10	Tullaghmore	1 st	30_1428	30T15

Site No.	Catchment	Sub-catchment	Watercourse Name	Watercourse Order	Segment Code	EPA Code
7	Corrib	Joyce's_SC_10	Unnamed	2 nd	30_3271	-
8	Corrib	Joyce's_SC_10	Tawnaghbeg 30	1 st	30_3082	30T16
9	Corrib	Joyce's_SC_10	Owenwee [Corrib]	3 rd	30_283	30O03
10	Corrib	Joyce's_SC_10	Owenwee [Corrib]	1 st	30_2420	30O03
11	Corrib	Joyce's_SC_10	Letterkeeghaun 30	2 nd	30_587	30L20
12	Corrib	Joyce's_SC_10	Letterkeeghaun 30	2 nd	30_587	30L20
13	Corrib	Joyce's_SC_10	Letterkeeghaun 30	1 st	30_682	30L20

The electrical fishing survey was completed under authorisation from the Department of Communication, Energy and Natural Resources under Section 14 of the Fisheries Act (1980). The survey had regard to the CFB (2008) guidance and Matson *et al* (2018). A portable electrical fishing unit (Smith Root-LR 24 backpack) was used during the assessments. Fishing was carried out continuously for 10 minutes at each of the sites. Captured fish were collected into a container of river water using dip nets. On completion of the survey fish were then anaesthetised using a solution of 2-phenoxyethanol, identified, and measured to the nearest mm using a measuring board. Subsequent to this the fish were allowed to recover in a container of river water and were then released alive and spread evenly over the sampling area. No mortalities were recorded.

Juvenile lamprey surveys generally followed the methodology for ammocoete surveys given in the manual 'Monitoring the River, Brook and Sea Lamprey, *Lampetra fluviatilis*, *L. planeri* and *Petromyzon marinus* by Harvey & Cowx (2003). Electrical fishing for juvenile lampreys was carried out at three 1m² habitat patches where habitat was available. However, no lamprey habitats were recorded at any of the sites.

6.3.2.1.5 Freshwater Pearl Mussel Assessment

An assessment of habitat conditions for freshwater pearl mussel was completed along the section of the Owenwee River flows along the eastern boundary of the Site and downstream along its stretch to the north of the N59 national road. A freshwater pearl mussel habitat assessment was also completed along the minor first order Tawnaghbeg Stream and the Tullaghmore Stream.

The results of previous freshwater pearl mussel surveys completed along the Owenwee River for the proposed N59 realignment in 2010 and 2011 (Moorkens, 2012) were also

reviewed during the assessment of habitat suitability along this watercourse for freshwater pearl mussel.

6.3.2.1.6 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 2022.

6.3.2.1.7 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) ⁽⁶⁾ and Bang & Dahlstrom (1990) ⁽⁷⁾, 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 two locations along the Owenwee River that forms the eastern boundary to the Site. **Figure 6.5** shows the location of camera traps. The camera trap locations were selected to provide coverage of potential otter habitat along the river. The two cameras were installed between August and November

(6) Neal, E., & Cheeseman, C., (1996). 'Badgers'. Poyser Natural History, London.

(7) Bang, P., & Dahlstrom, P., 'Animal Tracks and Signs'. Oxford University Press, Oxford.

2021 and between September and October 2022. The camera traps were positioned on the trunk of birch trees. The camera was angled so that a view of the river corridor was provided. 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.

6.3.2.1.8 Bats

Bat activity surveys were completed at the proposed wind farm site during the 2020 bat activity season. The 2020 surveys were carried out in accordance with SNH (2019) guidelines. Surveys comprised preliminary roost assessments; manual bat activity surveys consisting of walked and driven transects as well as roost emergence surveys; and static detector surveys. The static detector surveys comprised the installation of 13 static detectors within the townlands of Tullaghboy and Letterkeeghaun. Six of these static detectors are located within or adjacent to the proposed wind farm site. These are static detector no. D1, D2, D5, D6, D10 and D12. Monitoring from these three locations was completed during the spring, summer and autumn seasons of 2020. Static detector recordings from these six detectors were analysed using ECOBAT.

The results of the bat surveys, as well as the desktop study completed for bats as described in Section 6.3.1 above, form the basis for the assessments of the potential impacts on bats. Further detail on the methods used and results are presented in **Appendix 6.2**.

6.3.2.1.9 Herpetofauna

Incidental records of herpetofauna were noted during all field surveys undertaken between 2020 and 2022.

6.3.2.1.10 Other species

Habitats occurring within and adjacent to the proposed wind farm are typical of those that are relied upon by typical peatland invertebrate species such as moth species (e.g. emperor moth *Saturnia pavonia*, fox moth *Macrothylacia rubi* and latticed heath *Chiasmia clathrata*).

The prevalence of the marsh fritillary foodplant devil's-bit scabious *Succisa pratensis* is rare at the Site and as such the Site was not considered suitable for supporting colonies of marsh fritillary and no dedicated marsh fritillary surveys were completed.

6.3.2.1.11 Grid Connection Route Surveys

The grid connection route will be installed within the public road for its entire length between the entrance to the Site at the N59 and the substation at Screebe. The electrical cable will be installed within the formation of the road and existing bridge crossings along its length. A survey of bridges occurring along the route for their potential to support bats was completed during the 2022 bat activity season. This survey involved a day-time inspection of the bridges and a grading of the bridges as per the methodology outlined by Billington and Norman (1998).

6.3.2.1.12 Haul Route Surveys

The haul route will be restricted to the existing public road corridor between Galway Port and the Site. It is proposed to provide temporary road widening for turbine deliveries at four locations along the haul route. A habitat survey of each of these four locations was completed during January 2022. 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 Owenwee 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) than others (e.g. brown long-eared bat).

One bat detector malfunctioned during surveys.

Static detectors were originally deployed as close as possible to the proposed turbine locations. However, the proposed turbine locations were updated in 2021 after the survey period and as such the results of the static bat detector surveys are representative of the Site and surrounding area.

6.3.3 Impact Assessment Methodology

6.3.3.1 *Establishing the Potential Zone of Influence (Zol) 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 (Zol), 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 Zol 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 Zol of the Development in relation to terrestrial habitats is generally limited to the footprint of the 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. Such hydrogeological/hydrological impacts are examined further in Section 6.6 with respect to blanket bog habitats, which is considered to represent the ecological receptor at risk from such effects as a result of water draw down.

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 wetland/terrestrial 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 Zol 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 Zol 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 6.3: Geographic frame of reference used to determine value of ecological resources⁸

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Importance	Criteria
International Importance (Rating A)	<ul style="list-style-type: none"> • '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: <ul style="list-style-type: none"> ○ 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)	<ul style="list-style-type: none"> • 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: <ul style="list-style-type: none"> • Species protected under the Wildlife Acts; and/or,

⁸ 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 October 2022).

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Importance	Criteria
	<ul style="list-style-type: none"> 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)	<ul style="list-style-type: none"> Area of Special Amenity. Area subject to a Tree Preservation Order. Area of High Amenity, or equivalent, designated under the County Development Plan. Resident or regularly occurring populations (assessed to be important at the County level) of the following: <ul style="list-style-type: none"> 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)	<ul style="list-style-type: none"> 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: <ul style="list-style-type: none"> 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)	<ul style="list-style-type: none"> 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 Zol 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 near the townland of Tullaghmore, approximately 9 kilometres west of Oughterard in County Galway. The Site is located across

land which is predominantly Atlantic blanket bog and upland heath and blanket bog (>200m in altitude) situated to the west of the Derroura Forest which is managed by Coillte. To the south of the Site is the N59 Road, Lough Bofin and the Connemara Bog Complex Special Area of Conservation (SAC). North of the Site there are additional areas of blanket bog, forestry, Curraun Lough, the Western Way long-distance walking trail and the Lough Corrib SAC. To the west/south-west of the Site flows the Owenwee River, Loughaunierin and Tawnaghbeg Lough.

The Site contains a number of small streams, all of which are headwaters of the Owenwee and Owenree Rivers, the latter of which ultimately flows into Lough Corrib Upper to the north of the Site. There are no lakes located within the Site boundary where the predominant land use is agricultural grazing land for both sheep and cattle. The land within the Site boundary has also been utilised for peat extraction purposes. There are no dwellings located within the Site boundary which is characteristic of the wider rural setting. The Site is serviced by a pre-existing access road off the N59 road along the southern Site boundary and adjacent to the Owenwee River.

The main Site extends to 161.88 hectares (ha), the majority of which consists of peat and heath habitats used for grazing sheep and is in the ownership of three local landowners. The proposed Peat Storage and Restoration (Habitat Enhancement) Area extends to 29.86ha. Therefore, the total site area is 191.74ha.

The proposed Peat Storage and Restoration (Habitat Enhancement) Area is located to the east of Maam Cross in the townland of Lurgan or Shindilla. This area is comprised of intensively cutover blanket bog. Evidence of industrial scale peat harvesting, such as large-scale machinery and peat loading bays is present at this location. The proposed Peat Storage and Restoration (Habitat Enhancement) Area is in close proximity of two lakes, Loughanillaun to the north and Lough Ardderry to the south. Both lakes have been classed as high-status waterbodies under the Water Framework Directive. Loughanillaun forms part of the Maumturk Mountains SAC and represents an example of oligotrophic lake which is a qualifying habitat of the SAC. The 2019 Water Framework Directive Cycle 2 report for the Joyce's_SC_010 sub-catchment, within which the proposed Peat Storage and Restoration (Habitat Enhancement) Area is located, has noted that Loughanillaun has been identified as failing to meet High Ecological Status objectives due to chlorophyll and phytoplankton. Peat cutting, overgrazing and erosion have been identified as the land use pressures that are likely contributing to the at-risk status of this lake. Channelisation of inputting streams and drains has also been identified as a significant pressure impacting this lake.

Lough Ardderry is split into two sections by the N59 to the south of Maam Cross with a channel under the road linking both sections. The western section of the lake forms part of the Connemara Bog Complex and represents an example of oligotrophic lake which is a qualifying habitat of the SAC. O' Reilly (2002), described Lough Ardderry as a "shallow lough, holding brown trout and in the wet season a relatively small head of sea trout and occasional salmon".

6.4.1.1 Topography

The topography of the proposed wind farm site is variable, and it is broadly surrounded by or is partially overlapping three elevated areas. These include Knockbrack to the east of the Site (299m OD (metres above Ordnance Datum)) near Lough Beg in the Derroura Forest and Cappanaurabaun (273m OD) at the northern extent of the Site. Further north beyond the Site boundary is Curraun Hill at 252m OD. The topography beyond the southern and western extent of the Site is characterised by low lying (c. 40 to 50m OD Malin) surface water features such as the Owenwee River, Owenree River, Lough Bofin, Loughanaduff, Loughaunierin and Tawnaghbeg Lough. The N59 road which traverses the proposed southern Site boundary is also generally low lying.

The proposed wind farm site is generally topographically elevated in the north / north-west and generally topographically low lying in the south and east. The steepest incline across the Site occurs at the north-western extent of the Site near the proposed T4 position. A peat stability risk assessment (PSRA) (contained in **Appendix 8.1**) and a chapter on Lands, Soils and Geology (Chapter 8) have been prepared to address the potential risks associated with the positioning of project infrastructure and potential peat failures. Elevations typically range from between 100m and 200m OD across the majority of the Site with areas of relatively flat ground existing within the central areas of the Site between elevations of 110m – 150m OD. Elevation contours are included within a 3-D hydrological flow map outlined in **Figure 9.6** in **Volume III**. The proposed Peat Storage and Restoration (Habitat Enhancement) Area is located approximately 3.4km to the west of the main site in the townland of Lurgan or Shindilla and is situated on relatively flat low-lying peatland at approximately 43m OD.

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 6.6d**; and the **NIS (DEC Ltd. 2022)**).

Table 6.4: European Sites, NHAs & pNHAs

European Sites	Brief Description	Qualifying Interests (QI's)	Approximate Distance (Km) from Site (at closest point)
Special Area of Conservation (SAC)			
Connemara Bog Complex SAC (Site Code: 2034)	<p>The Connemara Bog Complex is characterized by areas of deep peat surrounded by rocky granite outcrops covered by heath vegetation. However, the main habitat within this site is lowland Atlantic blanket bog, as most of the area is covered by blanket peat greater than 1 m in depth. A mosaic of different communities exists in association with the blanket bog, including hummock/hollow systems, interconnecting bog pools, flushes, transition and quaking mires, freshwater marshes, lakeshore, lake and river systems. The key plant species of lowland blanket bog are Black Bog-rush (<i>Schoenus nigricans</i>), Purple Moor-grass (<i>Molinia caerulea</i>), Crossleaved Heath (<i>Erica tetralix</i>), Deergass (<i>Scirpus cespitosus</i>), Common Cottongrass (<i>Eriophorum angustifolium</i>), Bog Asphodel (<i>Narthecium ossifragum</i>), White Beak-sedge (<i>Rhynchospora alba</i>) and bog moss species (<i>Sphagnum</i> spp.). Rhynchosporion vegetation is found on the blanket bog by lake and pool margins, in wet hollows and in quaking areas. Species such as White Beak-sedge, Common Cottongrass, Bogbean (<i>Menyanthes trifoliata</i>), sundews (<i>Drosera</i> spp.) and bog mosses are common. Areas of wet heath are widespread throughout this site, where blanket peat becomes shallower. There is a limited amount of dry heath, with species such as Western Gorse (<i>Ulex gallii</i>), St. Dabeoc's Heath (<i>Daboecia cantabrica</i>) and Bell Heather (<i>Erica cinerea</i>) recorded.</p> <p>Nine species protected under the Flora (Protection) Order, 2015, occur within this site, one of which the Slender Naiad is listed on Annex II of the E.U. Habitats Directive. There are a number of areas of old oak</p>	Coastal lagoons [1150] Reefs [1170] Oligotrophic waters containing very few minerals of sandy plains (Littorelletalia uniflorae) [3110] Oligotrophic to mesotrophic standing waters with vegetation of the Littorelletea uniflorae and/or Isoeto-Nanojuncetea [3130] Natural dystrophic lakes and ponds [3160] Water courses of plain to montane levels with the Ranunculion fluitantis and Callitriche-Batrachion vegetation [3260] Northern Atlantic wet heaths with Erica tetralix [4010] European dry heaths [4030] Molinia meadows on calcareous, peaty or clayey-silt-laden soils (Molinion caeruleae) [6410] Blanket bogs (* if active bog) [7130] Transition mires and quaking bogs [7140] Depressions on peat substrates of the Rhynchosporion [7150] Alkaline fens [7230] Old sessile oak woods with Ilex and Blechnum in the British Isles [91A0] Euphydryas aurinia (Marsh Fritillary) [1065] Salmo salar (Salmon) [1106] Lutra lutra (Otter) [1355]	Within proposed development site. Crossed by the proposed grid connection route.

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European Sites	Brief Description	Qualifying Interests (QI's)	Approximate Distance (Km) from Site (at closest point)
	<p>woodland, but the woodland at Shannawoneen, north of Spiddal, is the best known.</p> <p>Areas of Molinia meadow at this site contain species such as Purple Moor-grass, Meadow Thistle (<i>Cirsium dissectum</i>), Sharp-flowered Rush (<i>Juncus acutiflorus</i>) and Tormentil (<i>Potentilla erecta</i>). The community occurs on wet acid soils.</p> <p>Four main lagoons occur within this site.</p> <p>The Annex II butterfly species, Marsh Fritillary, is known to occur at this site.</p> <p>Atlantic Salmon, a species listed under Annex II of the E.U. Habitats Directive, occurs in many of the rivers within the site.</p> <p>Otter have been recorded as occurring in the Connemara Bog Complex.</p>	<p>Najas flexilis (Slender Naiad) [1833]</p>	<p>RECEIVED: 26/01/2023</p>
<p>Maumturk Mountains SAC (Site Code: 2008)</p>	<p>Wet heath is widespread within this site on the margins of areas of blanket bog and on the lower slopes of mountains where peat depth is less than 1m. Blanket bog also occurs within this site, some of which is intact and of good quality, with a particularly good example at Caher.</p> <p>Rhynchosporion vegetation is associated with the blanket bog in a few areas of the site. It is characterised by well-developed inter-connecting pool systems with quaking carpets of Sphagnum.</p> <p>Oligotrophic lakes are well represented in this site, occurring mainly in the southeast near Maam Cross.</p>	<p>Oligotrophic waters containing very few minerals of sandy plains (Littorelletalia uniflorae) [3110] Northern Atlantic wet heaths with Erica tetralix [4010] Alpine and Boreal heaths [4060] Blanket bogs (* if active bog) [7130] Depressions on peat substrates of the Rhynchosporion [7150] Siliceous rocky slopes with chasmophytic vegetation [8220] Salmo salar (Salmon) [1106] Najas flexilis (Slender Naiad) [1833]</p>	<p>Within the proposed development site</p>

European Sites	Brief Description	Qualifying Interests (QI's)	Approximate Distance (Km) from Site (at closest point)
	<p>The site is very important for salmon while Arctic Char has been recorded in Derryneen Lough and Lough Shindilla.</p>		
<p>Lough Corrib SAC (Site Code: 0297)</p>	<p>The shallow, lime-rich waters of the southern basin of Lough Corrib support one of the most extensive beds of stoneworts (Charophytes) in Ireland and the Annex 1 habitat Hard oligo-mesotrophic waters with benthic vegetation of Chara spp.</p> <p>This large site contains four discrete raised bog areas and is selected for active raised bog, degraded raised bog, Rhynchosporion and bog woodland. The Rhynchosporion habitat occurs in wet depressions, pool edges and erosion channels. Limestone pavement occurs along much of the shoreline in the lower Corrib basin, and supports a rich and diverse flora. Open areas of orchid-rich calcareous grassland are also found in association with the limestone exposures. A number of the rivers in the site support submerged and floating vegetation of the Ranunculion fluitantis and Callitricho-Batrachio.</p> <p>The rare and Annex II-listed Slender Green Feather-moss (<i>Hamatocaulis vernicosus</i>, formerly known as <i>Drepanocladus vernicosus</i>) is found at the fen at Gortachalla, northeast of Moycullen.</p> <p>Otter have been recorded regularly within this site.</p> <p>Atlantic Salmon (<i>Salmo salar</i>) use the lake and rivers as spawning grounds. Sea lamprey and brook lamprey also use the freshwater habitats of the SAC as spawning and juvenile habitat.</p>	<p>Oligotrophic waters containing very few minerals of sandy plains (Littorelletalia uniflorae) [3110] Oligotrophic to mesotrophic standing waters with vegetation of the Littorelletea uniflorae and/or Isoeto-Nanojuncetea [3130] Hard oligo-mesotrophic waters with benthic vegetation of Chara spp. [3140] Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation [3260] Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (* important orchid sites) [6210] Molinia meadows on calcareous, peaty or clayey-silt-laden soils (Molinion caeruleae) [6410] Active raised bogs [7110] Degraded raised bogs still capable of natural regeneration [7120] Depressions on peat substrates of the Rhynchosporion [7150] Calcareous fens with Cladium mariscus and species of the Caricion davallianae [7210] Petrifying springs with tufa formation (Cratoneurion) [7220] Alkaline fens [7230]</p>	<p>1</p>

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European Sites	Brief Description	Qualifying Interests (QI's)	Approximate Distance (Km) from Site (at closest point)
	<p>A population of Freshwater Pearl Mussel (<i>Margaritifera margaritifera</i>), a species listed on Annex II of the E.U. Habitats Directive, occurs within the site. White-clawed Crayfish (<i>Austropotamobius pallipes</i>), also listed on Annex II, is well distributed throughout Lough Corrib and its in-flowing rivers over limestone. A summer roost of Lesser Horseshoe Bat, another Annex II species, occurs within the site - approximately 100 animals were recorded here in 1999.</p>	<p>Limestone pavements [8240] Old sessile oak woods with Ilex and Blechnum in the British Isles [91A0] Bog woodland [91D0] Margaritifera margaritifera (Freshwater Pearl Mussel) [1029] Austropotamobius pallipes (White-clawed Crayfish) [1092] Petromyzon marinus (Sea Lamprey) [1095] Lampetra planeri (Brook Lamprey) [1096] Salmo salar (Salmon) [1106] Rhinolophus hipposideros (Lesser Horseshoe Bat) [1303] Lutra lutra (Otter) [1355] Najas flexilis (Slender Naiad) [1833] Hamatocaulis vernicosus (Slender Green Feather-moss) [6216]</p>	<p>RECEIVED: 26/01/2023</p>
<p>Kilkieran Bay And Islands SAC (Site Code: 2111)</p>	<p>The marine habitats found within Kilkieran Bay and Greatman's Bay are of very high conservation value. The site is extremely important for the number of lagoons that it includes - it is considered to be one of the best sites in the country for this habitat and provides an excellent example of a particularly unusual type of saline lake lagoon situated on peat. Areas of saltmarsh occur frequently throughout the site - a thin fringe of saltmarsh is found along most stretches of coastline. Machair occurs most extensively on Mweenish Island, Finish Island and Mason Island, which lie in the west of the site. Lowland hay meadows are relatively rare within the site, but some good examples are known. The habitat is most commonly found in small, unimproved fields located behind beaches, which are influenced by blown sand. The submerged aquatic plant Slender</p>	<p>Mudflats and sandflats not covered by seawater at low tide [1140] Coastal lagoons [1150] Large shallow inlets and bays [1160] Reefs [1170] Atlantic salt meadows (<i>Glaucopuccinellietalia maritimae</i>) [1330] Mediterranean salt meadows (<i>Juncetalia maritimi</i>) [1410] Machairs (* in Ireland) [21A0] Oligotrophic to mesotrophic standing waters with vegetation of the <i>Littorelletea uniflorae</i> and/or <i>Isoeto-Nanojuncetea</i> [3130]</p>	<p>8 from the nearest point of the proposed development site. Adjoins the proposed grid connection route along the T340 to Screebe substation. Adjoins the proposed haul route along the R336</p>

European Sites	Brief Description	Qualifying Interests (QI's)	Approximate Distance (Km) from Site (at closest point)
	<p>Naiad (<i>Najas flexilis</i>) occurs in several of the coastal freshwater lakes. Otter, a species also listed on Annex II of the E.U. Habitats Directive, occurs commonly throughout the site. The site is used by Common Seal (maximum count of 116 in the all-Ireland survey of 2003). Grey Seal is a regular visitor and may breed.</p>	<p>Lowland hay meadows (<i>Alopecurus pratensis</i>, <i>Sanguisorba officinalis</i>) [6510] <i>Lutra lutra</i> (Otter) [1355] <i>Phoca vitulina</i> (Harbour Seal) [1365] <i>Najas flexilis</i> (Slender Naiad) [1833]</p>	
<p>Lough Carra/Mask Complex SAC (Site Code: 1774)</p>	<p>Lough Mask, at over 8,000ha, is the sixth largest lake in the country and with a maximum depth of 58m it is one of the deepest. Lough Carra, which is hydrologically linked to Mask, is one of the best examples in Ireland of a hard water marl lake. The limestone pavement within this site represents the northern limit of the limestones of Clare and Galway. Areas of calcareous grassland, often orchid-rich, occur interspersed amongst the limestone. The dry heath is well developed in places and is characterised by Gorse (<i>Ulex europaeus</i>), Bell Heather (<i>Erica cinerea</i>), Heather (<i>Calluna vulgaris</i>) and St. Dabeoc's Heath (<i>Dabeocia cantabrica</i>). A wide range of wetland habitats occur around Lough Carra and along parts of the eastern and southern shores of Lough Mask, including Cladium fen and alkaline fen. The Owenbrin area of the site supports a population of the rare bryophyte <i>Hamatocaulis vernicosus</i>. A large loft in the stable block of Curramore House provides a summer breeding site of the Lesser Horseshoe Bat. The site provides excellent habitat for Otter.</p>	<p>Oligotrophic waters containing very few minerals of sandy plains (<i>Littorelletalia uniflorae</i>) [3110] Oligotrophic to mesotrophic standing waters with vegetation of the <i>Littorelletea uniflorae</i> and/or <i>Isoeto-Nanojuncetea</i> [3130] Hard oligo-mesotrophic waters with benthic vegetation of <i>Chara</i> spp. [3140] European dry heaths [4030] Semi-natural dry grasslands and scrubland facies on calcareous substrates (<i>Festuco-Brometalia</i>) (* important orchid sites) [6210] Calcareous fens with <i>Cladium mariscus</i> and species of the <i>Caricion davallianae</i> [7210] Alkaline fens [7230] Limestone pavements [8240] Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> (<i>Alno-Padion</i>, <i>Alnion incanae</i>, <i>Salicion albae</i>) [91E0] <i>Rhinolophus hipposideros</i> (Lesser Horseshoe Bat) [1303] <i>Lutra lutra</i> (Otter) [1355]</p>	9

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European Sites	Brief Description	Qualifying Interests (QI's)	Approximate Distance (Km) from Site (at closest point)
		Hamatocaulis vernicosus (Slender Green Feather-moss) [6216]	
Ballymaglancy Cave, Cong SAC (Site Code: 0474)	Lesser Horseshoe Bats have been using the cave for many years - 50 hibernating bats were recorded in winter 1993/94. The numbers, however, vary with external temperature; during periods of sustained low temperatures, numbers in the cave may exceed 50 bats; when air temperature rises, numbers may drop to approximately 35 bats. As 50 bats have been recorded hibernating here, this is a site of international importance. Most of the bats hibernate within 20m of the cave entrance. Ballymaglancy is the most suitable hibernation site for bats in the Cong district, as it offers a number of low, dry passageways near the cave entrance.	Caves not open to the public [8310] Rhinolophus hipposideros (Lesser Horseshoe Bat) [1303]	11
The Twelve Bens/Garraun Complex SAC (Site Code: 2031)	This is an extensive site situated in the north-west of Connemara in Co. Galway and dominated by mountainous terrain. Geologically, the site can be divided into two distinct parts. The Twelve Bens are composed of resistant quartzite with schists in the valleys, while the mountains north of Kylemore are composed of gneiss and various types of sandstones and mudstones. The predominant vegetation type at this site is upland blanket bog/heath dominated by Heather (<i>Calluna vulgaris</i>), Deerglass (<i>Scirpus cespitosus</i>), Cross-leaved Heath (<i>Erica cinerea</i>) and the mosses <i>Racomitrium lanuginosum</i> and <i>Sphagnum capillifolium</i> . Another important and widespread habitat is lowland blanket bog dominated by Purple Moor-grass (<i>Molinia caerulea</i>), Black Bog-rush (<i>Schoenus nigricans</i>), Crossleaved Heath and the liverwort <i>Pleurozia purpurea</i> . Rhynchosporion vegetation is well represented around pools, in wet hollows and in quaking and flush areas associated with the lowland blanket bog. A number of rare, Red	Oligotrophic waters containing very few minerals of sandy plains (<i>Littorelletalia uniflorae</i>) [3110] Oligotrophic to mesotrophic standing waters with vegetation of the <i>Littorelletea uniflorae</i> and/or <i>Isoeto-Nanojuncetea</i> [3130] Alpine and Boreal heaths [4060] Blanket bogs (* if active bog) [7130] Depressions on peat substrates of the <i>Rhynchosporion</i> [7150] Siliceous scree of the montane to snow levels (<i>Androsacetalia alpinae</i> and <i>Galeopsietalia ladani</i>) [8110] Calcareous rocky slopes with chasmophytic vegetation [8210] Siliceous rocky slopes with chasmophytic vegetation [8220] Old sessile oak woods with <i>Ilex</i> and <i>Blechnum</i> in the British Isles [91A0]	13

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European Sites	Brief Description	Qualifying Interests (QI's)	Approximate Distance (Km) from Site (at closest point)
	<p>Data Book plant species are found within the site, many of which are associated with rocky scree habitats. The suite of lowland lakes that encircle the mountains represent some of the finest oligotrophic lakes in the country and two rare, Red Data Book plant species, Slender Naiad (<i>Najas flexilis</i>) and Pillwort (<i>Pilularia globulifera</i>), occur. The Owenglin River supports an important population of Salmon, another Annex II species. Arctic Char, Irish Hare, Common Frog, Otter and Freshwater Pearl Mussel and have been recorded from the site.</p>	<p>Margaritifera margaritifera (Freshwater Pearl Mussel) [1029] Salmo salar (Salmon) [1106] Lutra lutra (Otter) [1355] Najas flexilis (Slender Naiad) [1833]</p>	
Special Protection Area (SPA)			
<p>Lough Corrib SPA (Site Code: 4042)</p>	<p>Lough Corrib is the largest lake in the country and is located, for the most part, in County Galway, with a small section in the north extending into County Mayo. The shallow, lime-rich waters of the southern basin of the lake support one of the most extensive beds of Stoneworts (<i>Charophytes</i>) in Ireland. Lough Corrib SPA is an internationally important site which supports in excess of 20,000 wintering waterbirds, including a population of Pochard that is, itself, of international importance. A further six species of wintering waterfowl have populations of national importance. The site also contains a nationally important communal roost site for Hen Harrier. Lough Corrib is the most important site in the country for breeding Common Scoter. Its populations of breeding gulls and terns are also notable, with nationally important numbers of Black-headed Gull, Common Gull, Common Tern and Arctic Tern occurring. It is of note that several species which regularly occur are listed on Annex I of the E.U. Birds Directive, i.e. Whooper Swan, Greenland White-fronted Goose, Hen Harrier, Golden Plover, Common Tern and Arctic Tern.</p>	<p>Gadwall (<i>Anas strepera</i>) [A051] Shoveler (<i>Anas clypeata</i>) [A056] Pochard (<i>Aythya ferina</i>) [A059] Tufted Duck (<i>Aythya fuligula</i>) [A061] Common Scoter (<i>Melanitta nigra</i>) [A065] Hen Harrier (<i>Circus cyaneus</i>) [A082] Coot (<i>Fulica atra</i>) [A125] Golden Plover (<i>Pluvialis apricaria</i>) [A140] Black-headed Gull (<i>Chroicocephalus ridibundus</i>) [A179] Common Gull (<i>Larus canus</i>) [A182] Common Tern (<i>Sterna hirundo</i>) [A193] Arctic Tern (<i>Sterna paradisaea</i>) [A194] Greenland White-fronted Goose (<i>Anser albifrons flavirostris</i>) [A395] Wetland and Waterbirds [A999]</p>	<p>1</p>

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European Sites	Brief Description	Qualifying Interests (QI's)	Approximate Distance (Km) from Site (at closest point)
Connemara Bog Complex SPA (Site Code: 4181)	The Connemara Bog Complex SPA is a large site encompassing much of the south Connemara lowlands of Co. Galway. Connemara Bog Complex SPA is of high ornithological importance, in particular for its nationally important breeding populations of Cormorant, Merlin, Golden Plover and Common Gull. It is of note that three of the regularly occurring species, Greenland White-fronted Goose, Merlin and Golden Plover, are listed on Annex I of the E.U. Birds Directive.	Cormorant (<i>Phalacrocorax carbo</i>) [A017] Merlin (<i>Falco columbarius</i>) [A098] Golden Plover (<i>Pluvialis apricaria</i>) [A140] Common Gull (<i>Larus canus</i>) [A182]	5 from the proposed development site. Adjoins a section of the haul route along the R336
Lough Mask SPA (Site Code: 4062)	Lough Mask, at over 8,000ha, is the sixth largest lake in the country. Lough Mask is one of the most important inland gull breeding sites in the country, with nationally important populations of three gull species. It also has a nationally important colony of Common Tern. The site supports a good diversity of wintering waterfowl, including a nationally important population of Tufted Duck. The site is also regularly utilised by a proportion of the Erriff/Derrycraff population of Greenland White-fronted Goose. The occurrence of three species, Whooper Swan, Greenland White-fronted Goose and Common Tern, is of note as these species are listed on Annex I of the E.U. Birds Directive. Part of Lough Mask SPA is a Wildfowl Sanctuary.	Tufted Duck (<i>Aythya fuligula</i>) [A061] Black-headed Gull (<i>Chroicocephalus ridibundus</i>) [A179] Common Gull (<i>Larus canus</i>) [A182] Lesser Black-backed Gull (<i>Larus fuscus</i>) [A183] Common Tern (<i>Sterna hirundo</i>) [A193] Greenland White-fronted Goose (<i>Anser albifrons flavirostris</i>) [A395] Wetland and Waterbirds [A999]	10
Lough Carra SPA (Site Code: 4051)	Lough Carra is designated for its role in supporting a breeding population of common gull of international importance.	Common Gull (<i>Larus canus</i>) [A182]	24
Natural Heritage Area (NHA) within 15km			
Oughterard District Bog NHA	Oughterard District Bog NHA contains a relatively large area of lowland and upland blanket bog extending from Corkernarusheeny in the north to	Blanket bog Wet heath	7.5

European Sites	Brief Description	Qualifying Interests (QI's)	Approximate Distance (Km) from Site (at closest point)
	Uggool in the south. Much of the site has typical blanket bog vegetation, consisting of Ling Heather (<i>Calluna vulgaris</i>), Cross-leaved Heath (<i>Erica tetralix</i>), cottongrasses (<i>Eriophorum</i> spp.), Carnation Sedge (<i>Carex panicea</i>) and occasional Black Bog-rush (<i>Schoenus nigricans</i>). It contains upland and lowland blanket bog features including pools, flushes and areas of heath.		
Proposed Natural Heritage Area (pNHA) within 15km			
Maumturk Mountains (Site Code: 2008)	A description of this pNHA is not provided in the pNHA Site Synopsis Portfolio prepared by the NPWS ⁹ . The pNHA boundary is contiguous with the Maumturk Mountains SAC and as such the reasons for its selection as a pNHA are considered to be the same as those set out for the Maumturk Mountains SAC above.	See qualifying interests set out for the Maumturk Mountains SAC above.	Within the proposed development site.
Connemara Bog Complex (Site Code: 2034)	A description of this pNHA is not provided in the pNHA Site Synopsis Portfolio prepared by the NPWS.	See qualifying interests set out for the Connemara Bog Complex SAC above.	Within the proposed development site. Crossed by the proposed grid connection route.
Lough Corrib (Site Code: 0297)	A description of this pNHA is not provided in the pNHA Site Synopsis Portfolio prepared by the NPWS.	See qualifying interests set out for the Lough Corrib SAC above.	0.8
Maumtrasna Mountain Complex (Site Code: 0735)	The Maumtrasna Mountain Complex is situated to the north-east of the Maumturk Mountains and to the west of Lough Mask and Lough Corrib. The major habitat within the Maumtrasna Mountain Complex is upland grassland on peaty soil. The dominant plant species in this habitat include Deergrass (<i>Scirpus cespitosus</i>), Mat-grass (<i>Nardus stricta</i>), Purple Moor-grass (<i>Molinia caerulea</i>) with occasional Ling Heather (<i>Calluna vulgaris</i>) and Bell Heather (<i>Erica cinerea</i>). Overgrazing by sheep has greatly reduced the amount of heather cover in these	Upland species rich grassland Irish St. John's Wort Alpine Hair grass Alpine Meadow Rue Mountain Sorrel Arctic Char	3.7

⁹ See <https://www.npws.ie/protected-sites/nha>

European Sites	Brief Description	Qualifying Interests (QI's)	Approximate Distance (Km) from Site (at closest point)
	<p>communities and consequently resulted in a large scale change from upland heath to grassland. The secondary habitat in the site is upland grassland on mineral soil. This is largely confined to a distinct band running parallel to the southern boundary, e.g. at Lugnabrick and Knocknagussy. This vegetation type is generally found in association with sedimentary rocks and includes typical species such as Bent Grass (<i>Agrostis</i> spp.), Fescue Grass (<i>Festuca</i> spp.), Mat-grass and Heath Bedstraw (<i>Galium saxatile</i>). Minor habitats present, include upland heath, lowland blanket bog, scree, exposed rock, lakes, flushes, river valleys and streams.</p> <p>The rare and protected Irish St. John's-wort (<i>Hypericum canadense</i>) is found at one location in the site, in a patch of moorland approximately 1.5km east of Lough Nadirkmore. In areas where cliffs occur at altitude e.g. the Dirkmore and Dirkbeg corries, the cliffs at Lugnabrick and at Benbeg ridge, nationally scarce plant species such as Alpine Hair-grass (<i>Deschampsia cespitosa</i> subsp. <i>alpina</i>), Alpine Meadow Rue (<i>Thalictrum alpinum</i>) and Mountain Sorrel (<i>Oxyria digyna</i>) are present.</p> <p>Arctic Char (<i>Salvelinus alpinus</i>) has been recorded in Lough Nafooney. This species is listed in the Irish Red Data Book as threatened in Ireland.</p>		
Oughterard National School (Site Code: 2082)	This site consists of a two-storey primary school which is used as a nursery site by approximately 300 Leisler's Bat (<i>Nyctalus leisleri</i>). The bats roost in two sites in the roof. This site is probably the largest Leisler's Bat nursery colony in Ireland and possibly in Europe. It was first discovered in 1992 and has increased in size every year since then.	Leisler's bat	9

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European Sites	Brief Description	Qualifying Interests (QI's)	Approximate Distance (Km) from Site (at closest point)
Lough Carra/Lough Mask Complex (Site Code: 1774)	This forms part of the Lough Mask SPA. A description of this pNHA is not provided in the pNHA Site Synopsis Portfolio prepared by the NPWS.	See special conservation interests set out for the Lough Mask SPA above.	9.5
Oilean Na Ngeabhrog (Glencoh Rock) (Site Code: 0315)	This forms part of the Kilkieran Bay and Islands SAC. A description of this pNHA is not provided in the pNHA Site Synopsis Portfolio prepared by the NPWS.	See qualifying interests set out for the Kilkieran Bay and Islands SAC above.	11
Ballymaglancy Cave, Cong (Site Code: 0474)	A description of this pNHA is not provided in the pNHA Site Synopsis Portfolio prepared by the NPWS.	See qualifying interests set out for the Ballymaglancy Cave, Cong SAC above.	11
The Twelve Bens/Garraun Complex SAC (Site Code: 2031)	A description of this pNHA is not provided in the pNHA Site Synopsis Portfolio prepared by the NPWS.	See qualifying interests set out for the Twelve Bens/Garraun Complex SAC above.	13
Kinvarra Saltmarsh (Site Code: 2075)	This forms part of the Kilkieran Bay and Islands SAC. A description of this pNHA is not provided in the pNHA Site Synopsis Portfolio prepared by the NPWS.	See qualifying interests set out for the Kilkieran Bay and Islands SAC above.	14

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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 6.5: Rare, threatened or protected Species Recorded within 2 km of the Application Site (10 km 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	<i>Lutra lutra</i>	Y	-	Y	LC	-	-	3	1	2010	NBDC & NPWS
Badger	<i>Meles meles</i>	-	-	Y	LC	-	-	3	1	2018	NBDC & NPWS
Pine marten	<i>Martes martes</i>	Y	-	Y	LC	-	-	4	1	2021	NBDC
Red Deer	<i>Cervus elaphus</i>	Y	-	Y	LC	-	-	2	1	2015	NBDC
Pygmy Shrew	<i>Sorex minutus</i>	-	-	Y	LC	-	-	3	1	2015	NBDC
Bats (within 10 km)											
Soprano pipistrelle	<i>Pipistrellus pygmaeus</i>	Y	-	Y	LC	-	-	3	1	2014	NBDC

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

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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
Common pipistrelle	<i>Pipistrellus pipistrellus</i>	Y	-	Y	LC	-	-	3	1	2009	NBDC
Natterer's bat	<i>Myotis nattereri</i>	Y	-	Y	LC	-	-	3	1	2014	NBDC
Lei'ler's bat	<i>Nyctalus leisleri</i>	Y	-	Y	LC	-	-	3	1	2009	NBDC
Daubenton's bat	<i>Myotis daubentonii</i>	Y	-	Y	LC	-	-	3	1	2014	NBDC
Lesser horseshoe bats	<i>Rhinolophus hipposideros</i>	Y	-	Y	LC	-	-	3	1	2015	NBDC
Invertebrates											
Dingy skipper	<i>Erynnis tages</i>	-	-	Y	Near threatened	-	-	2	1	2010	NBDC
Grayling	<i>Hipparchia semele</i>	-	-	Y	Near threatened	-	-	2	1	2013	NBDC
Small Heath	<i>Coenonympha pamphilus</i>	-	-	Y	Near threatened	-	-	2	1	2013	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
Moss Carder- bee	<i>Bombus (Thoracombus) muscorum</i>	-	-	-	Near threatened	-	-	2	1	2018	NBDC
Mayfly species	<i>Kageronia fuscogrisea</i>	-	-	-	Near threatened	-	-	2	1	1985	NBDC
Mayfly species	<i>Leptophlebia marginata</i>	-	-	-	Vulnerable	-	-	2	1	1990	NBDC
Amphibian											
Common frog	<i>Rana temporaria</i>	-	-	Y	Vulnerable	-	-	2	1	2018	NBDC
Common lizard	<i>Zootoca vivipara</i>	-	-	Y	Vulnerable	-	-	2	1	2020	NBDC
Smooth Newt	<i>Lissotriton vulgaris</i>	-	-	Y	Vulnerable	-	-	2	1	2018	NBDC
Plants											
Large White- moss	<i>Leucobryum glaucum</i>	Y	-	-	Least Concern	-	-	2	3	1976	NBDC
Rose-moss	<i>Rhodobryum roseum</i>	-	-	-	Near Threatened	-	-	2	3	1973	NBDC

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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
Bog Hair-grass	<i>Deschampsia setacea</i>	-	-	-	Vulnerable	Y	-	3	1	1969; 2006	NBDC & NPWS
Slender Cottongrass	<i>Eriophorum gracile</i>	-	-	-	Vulnerable	Y	-	3	1	1969	NBDC & NPWS
Slender Naiad	<i>Najas flexilis</i>	Y	-	-	Vulnerable	Y	-	4	1	2018	NBDC & NPWS
Bog Orchid	<i>Hammarbya paludosa</i>	-	-	-	Threatened	-	-	4	3	1895	NPWS
Irish Spleenwort	<i>Asplenium onopteris</i>				Threatened	-	-	4	3	1852	NPWS
Brown Beaked Sedge	<i>Rhynchospora fusca</i>	-	-	-		-	-	3	1	2004	NPWS
Heath Cudweed	<i>Gnaphalium sylvaticum</i>	-	-	-	Threatened	-	-	3	3		NPWS
Marsh Clubmoss	<i>Lycopodiella inundata</i>	-	-	-	Threatened	Y	-	3	3	1971	NPWS
String Grimmia	<i>Grimmia funalis</i>	-	-	-		-	-	3	1	2004	NPWS

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
Spring Quilwort	<i>Isoetes echinospora</i>	-	-	-	Threatened	-	-	3	3	1959	NPWS
Pale Dog-violet	<i>Viola lactea</i>	-	-	-	Threatened	Y	-	4	3	1976	NPWS
Wood Bitter-vetch	<i>Vicia orobus</i>	-	-	-	Threatened	Y	-	4	3	1845	NPWS
Invasive Species											
Curly Waterweed	<i>Lagarosiphon major</i>	-	-	-	-	-	-	4	1	2007	NBDC
Rhododendron	<i>Rhododendron ponticum</i>	-	-	-	-	-	-	1	1	2019	NBDC
Zebra Mussel	<i>Dreissena (Dreissena) polymorpha</i>	-	-	-	-	-	-	4	1	2013	NBDC
Two-spined Acaena	<i>Acaena ovalifolia</i>	-	-	-	-	-	-	4	1	2019	NBDC
Jen'ins' Spire Snail	<i>Potamopyrgus antipodarum</i>	-	-	-	-	-	-	3	1	2015	NBDC
Sycamore	<i>Acer pseudoplatanus</i>	-	-	-	-	-	-	1	1	2015	NBDC

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

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The N59 Road project EIS reported records for the two FPO-listed species Bog Hair-grass (*Deschampsia setacea*) and Marsh Clubmoss (*Lycopodiella inundata*) as occurring within the hectad M04, within which the proposed Development Site is located. Bog Hair-grass is also recorded from L94 within which the proposed Peat Storage and Restoration (Habitat Enhancement) Area is located. This is consistent with the NPWS records for its presence within the 2km area of search surrounding the project site. The N59 Road project EIS also reported these species to occur along the Owenwee River.

The presence of Bog Hair-grass is mentioned in the site synopsis for the Connemara Bog Complex. This is a tufted, slender perennial grass with bristle-like leaves of bare peaty pools and wet hollows in acid bogs and on heath. This species is restricted to west Galway.

Marsh Clubmoss has shortly creeping stems and is a short-lived perennial of bare peat in bogs and heath and is associated with wet heath habitats and bogs. In Ireland its recorded distribution is restricted to five hectads, two of which are located in west Galway.

The N59 Road project EIS reported Wood-Bitter Vetch (*Vicia orobus*) and slender cottongrass (*Eriophorum gracile*), both FPO-listed species, as occurring at Maam Cross in the hectad L94, within which the proposed Peat Storage and Restoration (Habitat Enhancement) Area is located.

Slender Cottongrass has three-angled stems throughout and short spikelets and is a species restricted to very wet bogs and swamps. It has been recorded on the shores of small lakes at Maam Cross.

Wood Bitter-vetch is a bushy perennial of meadows, scrub and rocks. A record for this species at Maam Cross dates from 1845.

The above listed species were not identified within the proposed development site during habitat and vegetation surveys.

6.4.3.1 Freshwater pearl mussel

There are no records held by the NBDC or the NPWS for the presence of freshwater pearl mussel within 2km of the proposed Development. The Development site is located within the Joyce'_SC_010 sub-catchment. This sub-catchment is not identified as a freshwater pearl mussel sensitive catchment. Whilst the proposed development site is not located

within a freshwater pearl mussel sensitive catchment, it is located immediately north of the Corrib – Owenriff freshwater pearl mussel sensitive catchment.

The freshwater pearl mussel survey completed for the N59 Maam Cross to Oughterard Road project in 2010 by Moorkens (2012) was reviewed to identify baseline information for this species pertinent to the Development. The nearest record of freshwater pearl mussel to the Site reported from these surveys is located along the Owenriff River in the vicinity of Lough Adrehid, approximately 3km to the southeast of the Site. This record of freshwater pearl mussel is located in a separate surface water sub-catchment to the Site and there is no hydrological pathway linking the Site to the Owenriff River.

The Owenwee River, which represents the principal receiving watercourse draining the Site was surveyed in 2010 as part of the N59 project. No freshwater pearl mussels were found along the 20m to 200m stretch of the river surveyed. The results of the survey along the Owenwee River (at ITM 502318, 745100) upstream and adjacent to the site entrance stated that *"this river flows down a rather steep gradient with some cascades, pools and dark substrate of boulders, cobbles and gravel. Some filamentous algae was present. There were no live mussels or dead shells found within the surveyed stretch"*.

A second 20m to 200m stretch of the Owenwee River was searched from ITM 502220, 745188. This stretch was referred to by Moorkens (2012) as the Owenree River. The results of the survey from this location states that *"this river was shallow and silted at the time of survey. The substrate was a combination of boulders, cobbles and gravel. The river is unlikely to have enough water to support pearl mussels during drought periods. Some filamentous algae was present. There were no live mussels or dead shells found within the surveyed stretch"*. Moorkens (2012) goes on to conclude that the Owenree and Owenwee Rivers do not provide suitable habitat for freshwater pearl mussel.

6.4.3.2 Marsh fritillary

There are no marsh fritillary records held by the NBDC for marsh fritillary within the hectad M04 in which the proposed Development Site is located. There are records for this species within the hectad L94, within which the proposed Peat Storage and Restoration (Habitat Enhancement) Area is located. These records are dated from the period 1960 to 1984. There are no records for this species held by the NPWS within the Site or the surrounding 2km area of search.

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 6.7a & 6.7b** 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 blanket bog polygons are mapped to the north and east of the proposed Development Site and the north of the proposed Peat Storage and Restoration (Habitat Enhancement) Area. These areas of mapped Annex 1 blanket bog habitat have been sourced by the NPWS from the Coillte Biodiversity database and the Conservation Planning Unit Habitats. The NPWS have used a "certainty rating" to rate the accuracy of both the Coillte Biodiversity database and the Conservation Planning Unit Habitats mapping. 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 2 to both the Coillte and the Conservation Planning Unit blanket bog polygons surrounding the Development Site.

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, 2022), with all potential likely significant effects upon European Sites being taken into consideration. As such, this EIAR Chapter focusses on the potential for impacts upon National and Local Designated 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 Maumturk Mountains SAC, Lough Corrib SAC, Connemara Bog Complex SAC, and Lough Corrib SPA.

The Oughterard District Bog NHA is located 7.5km to the southeast of the proposed wind farm and is situated in a separate surface water sub-catchment to the Development. There are no pathways connecting the Development to this NHA.

There is a hydrological pathway between the project site and the Lough Corrib pNHA. This is established via the Owenree River which flows into Lough Tawnaghbeg. The Owenree River also discharges from this lake and flows into the Lough Corrib pNHA.

There is a minor overlap between the Redline Boundary and the Connemara Bog Complex pNHA. This is due to the site boundary including the section of the N59 road to the south of the Site. The pNHA boundary overlaps the N59 to the west of the site entrance. It is considered that this overlap is due to a digital mapping projection error. Given this and the location of this pNHA in a separate surface water sub-catchment to the Development, it is considered that there is no hydrological pathway connecting the Development to this 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 6.6** below.

Table 6.6: 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	The Owenree River flowing along the eastern boundary of the proposed wind farm is representative of an eroding watercourse. This river flows over ground sloping from north to south between a gradient of c. 160m OD Malin towards the northeast of the wind farm site to c. 70m OD Malin at the site entrance. A variety of instream habitats occur along the river including cascades and tumbling sections, pools, riffles and run habitat. The upper sections of the river, adjacent to proposed Development are subject to low water flows and drying out during dry periods. Sections of riverbed were dry and elsewhere

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.
		supported very low levels of water during fisheries surveys completed in September 2022. Overall, the Owenwee River is an important salmonid spawning and nursery area for brown trout, with the lower sections of the river also supporting spawning and nursery habitat for Atlantic salmon.
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 <i>Juncus effusus</i> and <i>Sphagnum cuspidatum</i> .
GS3	Acidic grassland	One area of acid grassland occurs towards the west of the Site. This is located in an area where past land management has converted the habitat from wet 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 <i>Deschampsia flexuosa</i> , <i>Agrostis stolonifera</i> , <i>Agrostis capillaris</i> , <i>Nardus stricta</i> , <i>Anthoxanthum odoratum</i> , <i>Juncus squarrosus</i> , <i>Molinia caerulea</i> and <i>Carex echinata</i> . Some low browsed <i>Calluna vulgaris</i> and <i>Erica tetralix</i> also occur along with <i>Potentilla erecta</i> , <i>Ranunculus flammula</i> , <i>Galium saxatile</i> and <i>Pedicularis sylvatica</i> .
GS4	Wet grassland	One small area of wet grassland occurs along the western boundary of the Site in the vicinity of the proposed meteorological mast location. This habitat is representative of a dense stand of high sward <i>Juncus effusus</i> .
WS1	Scrub	Scrub habitat occurs adjacent to the existing site access road at the proposed site entrance from the N59 road and also along the riparian corridor of the Owenwee River along the eastern boundary of the Site. The scrub habitat is dominated by stands of <i>Ulex europeus</i> , along with downy birch (<i>Betula pubescens</i>), grey willow (<i>Salix cinerea</i>), eared willow (<i>Salix aurita</i>), rowan (<i>Sorbus acuparia</i>), holly (<i>Ilex aquifolium</i>), and blackthorn (<i>Prunus spinosa</i>). Areas of gorse and other tree species are interspersed with stands of dense bracken (<i>Pteridium aquilinum</i>), while bramble (<i>Rubus fruticosus</i> agg.) is also frequent within the herb layer of this habitat.
HH1	Dry heath	Patches of dry heath habitat occur within the Site on outcrops of bedrock that are covered by a thin film of peat substrate. The vegetation occurring on these outcrops comprise <i>Agrostis stolonifera</i> , <i>Agrostis capillaris</i> , <i>Deschampsia flexuosa</i> , <i>Festuca ovina</i> , <i>Erica tetralix</i> , <i>Erica cinerea</i> , <i>Calluna vulgaris</i> , <i>Daboecia cantabrica</i> , <i>Juncus squarrosus</i> , <i>Potentilla erecta</i> , <i>Rhytidadelphus squarrosus</i> , <i>Rhytidadelphus loreus</i> , <i>Hylocomium splendens</i> and <i>Racomitrium lanuginosum</i> .
HH3	Wet heath	Wet heath habitat occurs throughout the Site on areas of thin peat (c. less than 0.5m in depths). This habitat is dominated by stands of <i>Calluna vulgaris</i> and <i>Erica tetralix</i> with <i>Molinia caerulea</i> , <i>Eriophorum vaginatum</i> , <i>Eriophorum angustifolium</i> , <i>Schoenus nigrans</i> and <i>Trichophorum germanicum</i> also occurring abundantly throughout this habitat. Other species that are frequent in this habitat include <i>Narthecium ossifragum</i> , <i>Rhynchospora alba</i> , <i>Drosera rotundifolia</i> , <i>Cladonia species</i> , <i>Nardus stricta</i> , <i>Anthoxanthum odoratum</i> , <i>Hypnum jutlandicum</i> , <i>Pleurozium schreberi</i> , <i>Pleurozia purpurea</i> , <i>Vaccinium myrtillus</i> , <i>Sphagnum capillifolium</i> , <i>Sphagnum subnitens</i> , <i>Sphagnum papillosum</i> and <i>Sphagnum palustre</i> .
PF2	Poor flush	The examples of poor flush occurring within the Site are examples of topogenous flushes occurring in depressions or on flatter ground at the base of slopes and are fed by surrounding surface water flows. They are located on areas of deeper peat and the examples of this habitat occurring to the east of the Site near the Owenwee River are surrounded by small areas of transition mire and quaking bog. The vegetation of the poor flush consists of <i>Vaccinium myrtillus</i> , <i>Molinia caerulea</i> , <i>Schoenus nigrans</i> , <i>Menyanthes trifoliata</i> , <i>Sphagnum cuspidatum</i> , <i>Sphagnum palustre</i> , <i>Sphagnum denticulatum</i> , <i>Carex rostrata</i> , <i>Carex lasiocarpa</i> , <i>Carex nigra</i> , <i>Carex echinata</i> , <i>Rhynchospora alba</i> , <i>Eriophorum angustifolium</i> and <i>Ranunculus flammula</i> . <i>Phragmites australis</i> also occurs in this habitat.
PB3	Lowland blanket bog	The lowland blanket bog habitat occurring within the Site varies between a <i>Molinia caerulea</i> and <i>Calluna vulgaris</i> dominated blanket bog. The blanket bog habitat occurs on flat to gently sloping ground to the south, east and west of the Site. Within the Site it occurs between an elevation of 60m and 150m OD Malin. <i>Molinia caerulea</i> generally dominates the sward with <i>Trichophorum germanicum</i> , <i>Calluna vulgaris</i> and <i>Erica tetralix</i> occurring abundantly. <i>Eriophorum vaginatum</i> , <i>Eriophorum angustifolium</i> and <i>Schoenus nigrans</i> occur throughout. <i>Agrostis ovina</i> , <i>Deschampsia flexuosa</i> , <i>Carex echinata</i> , <i>Carex panicea</i> , <i>Rhynchospora alba</i> , <i>Narthecium ossifragum</i> , <i>Potentilla erecta</i> and <i>Drosera rotundifolia</i> occur constantly. The bryophyte layer is dominated by <i>Sphagnum</i> species with <i>Sphagnum capillifolium</i> , <i>Sphagnum</i>

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.
		<i>papillosum</i> , <i>Sphagnum palustre</i> , <i>Sphagnum denticulatum</i> , <i>Sphagnum subnitens</i> and <i>Sphagnum tenellum</i> occurring. Other frequently occurring bryophytes include <i>Pleurozia purpurea</i> , <i>Pleurozium schreberi</i> , <i>Racomitrium lanuginosum</i> , <i>Aulacomium palustre</i> , <i>Hypnum jutlandicum</i> , <i>Rhytidadelphus loreus</i> and <i>Odontoschisma sphagni</i> .
PB4	Cutover blanket bog	Areas of cutover blanket bog occur to the east of the Site adjacent to the existing access track. The areas of previously cut bog are now recolonised with <i>Calluna vulgaris</i> , <i>Schoenus nigrans</i> , <i>Molinia caerulea</i> , <i>Eriophorum vaginatum</i> and <i>Eriophorum angustifolium</i> dominating the sward.
HH12/GS3	Dry heath/Acid grassland Mosaic	This habitat mosaic occurs on outcrops of bedrock that are more grassy in nature occurring in association with typical dry heath species such as <i>Calluna vulgaris</i> , <i>Erica cinerea</i> , <i>Vaccinium myrtillus</i> and <i>Juncus squarrosus</i> . Other species occurring include <i>Deschampsia flexuosa</i> , <i>Agrostis capillaris</i> , <i>Festuca ovina</i> , <i>Nardus stricta</i> , <i>Potentilla erecta</i> and <i>Carex binervis</i>
HH3/ER1	Wet heath/Exposed Siliceous Rock Mosaic	This mosaic habitat dominates the western side of the Site in areas of elevated and sloping ground on thin peat cover, less than 0.5m in depth. The vegetation occurring in this habitat is similar to that of the wet heath described above. The principal difference distinguishing this area from other areas of wet heath is the prevalence of exposed bedrock at the surface. In this habitat <i>Calluna vulgaris</i> , <i>Vaccinium myrtillus</i> and <i>Trichophorum germanicum</i> along with a range of other grasses are abundant. <i>Sphagnum capillifolium</i> is prevalent throughout along with <i>Cladonia portentosa</i> .
PB5/HH3	Degraded blanket bog/Wet heath Mosaic	An area of degraded blanket bog and wet heath mosaic occurs towards the southwest of the Site on lands that have been subjected to drainage and extensive grazing by sheep and cattle. The peat depth is variable in this area ranging from deep peat in excess of 1m to shallow peat with bedrock outcropping. The deeper areas of peat occur to the south of the proposed access track and substation, while shallow peat occurs at and to the north of these elements of the proposed wind farm. The sward is dominated by <i>Molinia caerulea</i> , <i>Schoenus nigrans</i> , <i>Trichophorum germanicum</i> , <i>Eriophorum vaginatum</i> and <i>Eriophorum angustifolium</i> . <i>Calluna vulgaris</i> and <i>Erica tetralix</i> are frequent but not dominant.
BL3	Buildings and artificial surfaces	The examples of this habitat occurring within the Site is characterised by access track and the N59 national road.

6.5.2.2 Irish Vegetation Classification

Table 6.7 below lists the Irish Vegetation Classification communities identified as occurring within the Site. The Level 3 Guide to Habitats in Ireland habitats to which these vegetation communities correspond are also identified in Table 6.7.

Table 6.7: Upland Survey Communities recorded during this survey

IVC Code(s)	Name of IVC Communities	Corresponding Level 3 Habitat	Brief Description**
			** The brief descriptions below, are based on the IVC Synopsis
BG1C	<i>Schoenus nigrans</i> – <i>Eriophorum angustifolium</i> Bog	Degraded blanket bog/wet heath mosaic	This vegetation community is typically associated with areas of lowland blanket bog that have been subject to drainage, overgrazing, trampling and peat extraction. Plant cover in this community can be low and is primarily dominated by <i>Molinia caerulea</i> , <i>Schoenus nigrans</i> , <i>Narthecium ossifragum</i> , <i>Rhynchospora alba</i> , <i>Eriophorum angustifolium</i> , <i>Calluna vulgaris</i> , <i>Erica tetralix</i> and <i>Drosera rotundifolia</i> . The example of this vegetation community occurring within the Site corresponds most closely to the areas of degraded blanket bog on deeper peat to the south of the proposed Site Access Track and 38kV Substation in the western area of the Site. Here the vegetation cover can be sparse with pioneering <i>Eriophorum vaginatum</i> , <i>Eriophorum</i>

IVC Code(s)	Name of IVC Communities	Corresponding Level 3 Habitat	Brief Description**
			<i>angustifolium</i> , <i>Schoenus nigrans</i> occurring along with <i>Calluna vulgaris</i> , <i>Erica tetralix</i> , <i>Drosera rotundifolia</i> and <i>Narthecium ossifragum</i> .
BG2C	<i>Erica tetralix</i> – <i>Molinia caerulea</i> – <i>Cladonia portentosa</i>	Lowland blanket bog	<p>This community is dominated by a mixture of <i>Calluna vulgaris</i> and <i>Molinia caerulea</i>. <i>Erica tetralix</i> and <i>Trichophorum germanicum</i> are also plentiful constants while <i>Potentilla erecta</i> and <i>Eriophorum angustifolium</i> complete the usual plants of the field layer. Frequent companions to these species are <i>Eriophorum vaginatum</i>, <i>Narthecium ossifragum</i>, <i>Polygala serpyllifolia</i> and <i>Drosera rotundifolia</i>. <i>Sphagnum capillifolium</i> is usually found in the bryophyte layer together with <i>Hypnum jutlandicum</i> and <i>Odontoschisma sphagni</i>. <i>Sphagnum tenellum</i> and <i>Sphagnum subnitens</i> are frequent. Conspicuous white patches of <i>Cladonia portentosa</i> are a common</p> <p>Examples of this community occurring within the Site are located on more sloping areas of lowland blanket bog to the west of the mapped area of lowland blanket bog where it grades into wet heath. In this vegetation community <i>Calluna vulgaris</i> is more abundant and dominant or co-dominant with <i>Molinia caerulea</i>.</p>
BG2D	<i>Erica tetralix</i> – <i>Schoenus nigrans</i> bog	Lowland blanket bog	<p>The bulk of the field layer in this rather diverse community is composed of a mixture of <i>Calluna vulgaris</i>, <i>Molinia caerulea</i>, <i>Eriophorum angustifolium</i> and <i>Schoenus nigricans</i>. Other vascular plant constants are <i>Erica tetralix</i>, <i>Narthecium ossifragum</i>, <i>Drosera rotundifolia</i>, <i>Potentilla erecta</i>, <i>Trichophorum cespitosum/germanicum</i> and <i>Rhynchospora alba</i>. There is good cover of <i>Sphagnum</i> species in the bryophyte layer with <i>Sphagnum capillifolium</i>, <i>Sphagnum tenellum</i> and <i>Sphagnum papillosum</i> all being constants, alongside <i>Racomitrium lanuginosum</i>, <i>Hypnum jutlandicum</i> and <i>Pleurozia purpurea</i>. Lichens are also characteristic of this vegetation with <i>Cladonia uncialis</i> and <i>Cladonia portentosa</i> usually found here.</p> <p>Examples of this community occur within the lowland blanket bog habitat on flatter or the most gently sloping ground towards the east of the lowland blanket bog area. It is dominated by <i>Molinia caerulea</i> with <i>Schoenus nigrans</i>, <i>Eriophorum vaginatum</i>, <i>Eriophorum angustifolium</i> also being frequent to abundant and constant. Other constantly occurring species include <i>Erica tetralix</i>, <i>Narthecium ossifragum</i>, <i>Drosera rotundifolia</i>, <i>Potentilla erecta</i>, <i>Trichophorum germanicum</i>, <i>Rhynchospora alba</i>, <i>Pleurozia purpurea</i>, <i>Hypnum jutlandicum</i>, <i>Cladonia portentosa</i> and a range of <i>Sphagnum</i> species, dominated by <i>Sphagnum capillifolium</i> and <i>Sphagnum papillosum</i>.</p>
BG2E	<i>Calluna vulgaris</i> – <i>Eriophorum</i> spp. bog	Lowland blanket bog and wet heath ecotone	<p>This is quite a heathy bog community with a dwarf shrub layer dominated by <i>Calluna vulgaris</i> alongside which grow some stems of <i>Erica tetralix</i>. Tussocks of <i>Eriophorum vaginatum</i> are a constant feature, as are tufts of <i>Eriophorum angustifolium</i> and <i>Trichophorum germanicum</i>. Frequent companions are <i>Potentilla erecta</i> and <i>Molinia caerulea</i>. Beneath all this, in the bryophyte layer, hummocks of <i>Sphagnum capillifolium</i> are found together with pale green patches of <i>Hypnum jutlandicum</i>. <i>Sphagnum papillosum</i> and threads of <i>Odontoschisma sphagni</i> are frequent.</p>
HE2D	<i>Calluna vulgaris</i> – <i>Molinia caerulea</i> – <i>Erica cinerea</i> heath	Wet heath/exposed siliceous rock mosaic	<p>This community is typically dominated by bushes of <i>Calluna vulgaris</i> but tufts or small tussocks of <i>Molinia caerulea</i> are also plentiful. These are accompanied by <i>Potentilla erecta</i> and both <i>Erica cinerea</i> and <i>Erica tetralix</i>. There are few other vascular plants, with the sedges <i>Eriophorum vaginatum</i>, <i>Eriophorum angustifolium</i> and <i>Trichophorum germanicum</i> being only occasional. The bryophyte layer is largely pleurocarpous in character, with <i>Hylocomium splendens</i>, <i>Rhytidiadelphus loreus</i>, <i>Hypnum jutlandicum</i> and <i>Pleurozium schreberi</i> occurring, but crimson patches of <i>Sphagnum capillifolium</i> are also frequently encountered here. This is a community of the lower to middle slopes of hills and mountains primarily wet heathland where soils are rather poorly drained, acidic and infertile.</p> <p>Examples of this vegetation community occur on the west/southwest facing slopes of the western area of the site in the vicinity of the proposed turbine T4. On these slopes bushy and leggy <i>Calluna vulgaris</i> dominates the sward with <i>Molinia caerulea</i> also abundant while <i>Erica tetralix</i> is constant and <i>Erica cinerea</i> is occasionally occurring. <i>Eriophorum vaginatum</i> and <i>Eriophorum angustifolium</i> are also occasional while the <i>Rhytidiadelphus loreus</i>, <i>Hypnum jutlandicum</i>, <i>Hylocomium splendens</i> and <i>Pleurozium schreberi</i> are constant in the bryophyte layer.</p>

IVC Code(s)	Name of IVC Communities	Corresponding Level 3 Habitat	Brief Description**
** The brief descriptions below, are based on the IVC Synopsis			
HE2E	Calluna vulgaris – Trichophorum germanicum heath	Wet heath	<i>Calluna vulgaris</i> tends to dominate this community, accompanied by a mixture of <i>Erica cinerea</i> , <i>Molinia caerulea</i> and <i>Trichophorum germanicum</i> . <i>Potentilla erecta</i> is a constant species, while <i>Erica tetralix</i> is frequent and occasionally there are patches of <i>Nardus stricta</i> , <i>Carex binervis</i> , <i>Carex panicea</i> and <i>Eriophorum angustifolium</i> . The bryophyte layer is not very extensive, with <i>Hypnum jutlandicum</i> the mainstay, although it is frequently joined by the grey-green mounds of <i>Racomitrium lanuginosum</i> . <i>Cladonia portentosa</i> is also often met with here.
FE2E	Menyanthes trifoliata – Sphagnum recurvum agg. mire	Poor flush	<p>The chief feature of this mire assemblage is an abundant carpet of <i>Sphagnum recurvum</i> agg. There are no other constant species but often through this layer grow some <i>Menyanthes trifoliata</i>, <i>Carex rostrata</i>, <i>Eriophorum angustifolium</i> and <i>Anthoxanthum odoratum</i>. There is a whole suite of occasional graminoids including <i>Holcus lanatus</i>, <i>Juncus effusus</i>, <i>Carex echinata</i>, <i>Agrostis</i> spp., <i>Carex nigra</i> and <i>Molinia caerulea</i>. <i>Sphagnum palustre</i> is the most likely other <i>Sphagnum</i> to be found and often there is some cover of <i>Aulacomnium palustre</i> and <i>Polytrichum commune</i>.</p> <p>The poor flush habitats occurring within the Site and particularly those occurring to the east of the Site near the Owenwee River represent examples of this vegetation community. The bryophyte layer of the flushed habitat is dominated <i>Sphagnum recurvum</i> while <i>Menyanthes trifoliata</i> is abundant in the herb layer along with <i>Molinia caerulea</i>, <i>Schoenus nigrans</i>, <i>Eriophorum angustifolium</i>, <i>Carex rostrata</i> and <i>Carex echinata</i></p>

6.5.2.3 Annex I Habitats

The Annex 1 habitats identified as occurring within the Site are listed in **Table 6.8** below.

Table 6.8: 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).
			<i>EU Annex I habitats marked by an asterisk (*) are deemed to be priority habitats that are in danger of disappearing within the EU territory.</i>
7130	Active Blanket bog	Lowland blanket bog PB3	Blanket bog* (Active)
7130	Blanket bog	Lowland blanket bog/cutover blanket bog PB4	Blanket bog (Inactive)
4010	Wet heath	Wet heath HH3	North Atlantic wet heath with <i>Erica tetralix</i>
4030	Dry heath	Dry heath HH1	European dry heath
7140	Transition Mires	Poor Flush PF2	Transition mires and quaking bogs (associated with quaking areas at the ecotone between lowland

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.
			blanket bog and poor flush to the east of the access track approaching proposed turbine T1 and in the vicinity of the proposed turbine T1)

6.5.3 Habitats occurring at the Peat Storage and Restoration (Habitat Enhancement) Area

The habitats occurring within the Red Line Boundary surrounding the Peat Storage and Restoration (Habitat Enhancement) Area consist of cutover blanket bog (PB4) and degraded blanket bog (PB5).

The cutover blanket bog is represented by areas of existing cut cells created as a result of past and ongoing industrial scale peat harvesting. Peat harvesting has been undertaken in this area over a protracted period of time and this has resulted in a variation in the vegetation communities occurring within the cut cells. Recently cut cells are generally devoid of vegetation with only a sparse cover of pioneering species occurring. However, cells that have been historically cutover have in general become recolonised by typical blanket bog vegetation. Vegetation occurring in re-vegetated cells include a sward of *Schoenus nigrans*, *Molinia caerulea* and *Calluna vulgaris*, *Eriophorum vaginatum*, *Eriophorum angustifolium*, with *Erica tetralix*, *Nartheicum ossifragum*, *Carex echinata*, *Carex nigra*, *Rhynchospora alba*, *Succisa pratensis*, *Potentilla erecta* and *Polygala serpyllifolia*. The bryophyte layer support a range of Sphagnum species including *Sphagnum papillosum*, *Sphagnum palustre* and *Sphagnum capillifolium*. Notwithstanding this recolonisation, water is being lost from these cells and also from the uncut areas immediately adjacent to these areas. Scouring was also noted along drainage channels with silt-laden surface water emissions to the receiving lakes to the north and south of the proposed Peat Storage and Restoration (Habitat Enhancement) Area likely to be ongoing.

Areas of denuded peat surface where the vegetation and surface layer of acrotelm have been removed are also occurring within the areas to be used for spoil storage. These areas are not cut into cells but have been degraded as a result of the vegetation and surface layer

of acrotelm being removed. These examples of degraded blanket bog are generally denuded and support a sparse cover of pioneering vegetation such as *Eriophorum angustifolium*, *Eriophorum vaginatum*, *Schoenus nigrans*, *Nartheicum ossifragum*, *Rhynchospora alba* and *Campylopus atrovirens*.

The non-native invasive species *Rhododendron ponticum* was recorded within the proposed Peat Storage and Restoration (Habitat Enhancement) Area.

The Level 3 Fossitt habitats occurring within the red line boundary of the proposed Peat Storage and Restoration (Habitat Enhancement) Area are shown on **Figure 6.9** and are dominated by lowland blanket bog (PB3), cutover blanket bog (PB4) and degraded blanket bog (PB5).

The proposed Peat Storage and Restoration (Habitat Enhancement) Area is located in close proximity of two lakes, Loughanillaun to the north and Lough Ardderry to the south. Both lakes have been classed as high-status waterbodies under the Water Framework Directive. Loughanillaun forms part of the Maumturk Mountains SAC and presents an example of oligotrophic lake which is a qualifying habitat of the SAC. The 2019 Water Framework Directive Cycle 2 report for the Joyce's_SC_010 sub-catchment has noted that Loughanillaun has been identified as failing to meet High Ecological Status objectives due to chlorophyll and phytoplankton. Peat cutting, overgrazing and erosion have been identified as the land use pressures that are likely contributing to the at-risk status of this lake. Channelisation of inputting streams and drains has also been identified as a significant pressure impacting this lake.

Lough Ardderry is spilt into two sections by the N59 to the south of Maam Cross with a channel under the road linking both sections. The western section of the lake forms part of the Connemara Bog Complex SAC and represents an example of oligotrophic lake which is a qualifying habitat of the SAC. O' Reilly (2002), described Lough Ardderry as a "shallow lough, holding brown trout and in the wet season a relatively small head of sea trout and occasional salmon". This lake was surveyed during September 2010 by Inland Fisheries Ireland (IFI, 2010). A total of five species were recorded during this survey including high numbers of perch (99) and lower numbers of brown trout (20), salmon (2), Arctic Charr (10) and European eel (2).

6.5.4 Habitats occurring at the Four Haul Route Widening Locations

Temporary widening at 4 locations on the haul route from Galway Port to the Site to allow a load bearing surface will be provided as part of the EIA Development. The four widening locations are shown on **Figure 6.10**.

The first temporary widening area is located along the R336 at Ballynahown South. The existing R336 will be widened to the west side of the road. The habitats occurring here comprise a grassy verge along the road edge that gives way to a pasture field representative of improved agricultural grassland. No non-native invasive species were recorded at this location. The boundary of the Connemara Bog Complex SAC is located to the east and on the opposite side of the R336 at this location. No widening works will be completed within the SAC. A habitat map showing the habitats occurring at the haul route location is provided as **Figure 6.11**.

The second temporary widening area is located at Camus Eighter, south of the junction of the R336 and the R340. The existing R336 will be widened to the west side of the road. The habitat occurring at this location is comprised of scrub. The vegetation occurring here include *Salix cinerea*, *Salix aurita*, *Fraxinus excelsior* and *Betula pubescens*. No non-native invasive species were recorded at this location. The boundary of the Connemara Bog Complex SAC is located to the north and south of this location. No widening works will be completed within the SAC. A habitat map showing the habitats occurring at the haul route location is provided as **Figure 6.12**.

The third temporary widening area is located along the R336 in the townland of Knockaphreaghaun to the east of Loughaunfree. The existing R336 will be widened to the east side of the road. The land cover occurring at this location is comprised of an existing area or road verge hardstanding that is representative of buildings and artificial surfaces (BL3). No non-native invasive species were recorded at this location. The boundary of the Connemara Bog Complex SAC is located to the west and on the opposite side of the R336 at this location. No widening works will be completed within the SAC. A habitat map showing the habitats occurring at the haul route location is provided as **Figure 6.13**.

The fourth temporary widening area is located along the R336 in the townland of Knockaphreaghaun approximately 600m to the north of the third temporary widening area. The existing R336 will be widened to the east side of the road. Grassy verge (GS2) habitat borders the R336 to the east within the footprint of the temporary widening area. Moving east this first gives way to wet grassland (GS4) dominated by *Juncus effusus*, which in turn

gives way to wet heath (HH3) habitat dominated by *Calluna vulgaris* and *Erica tetralix*. No non-native invasive species were recorded at this location. The boundary of the Connemara Bog Complex SAC is located to the west and on the opposite side of the R336 at this location. No widening works will be completed within the SAC. A habitat map showing the habitats occurring at the haul route location is provided as **Figure 6.14**.

6.5.5 Habitats occurring along the grid connection route

The entire stretch of the grid connection route from the Site to the existing ESB substation at Screebe will be located within the footprint of existing public road corridors. The electrical cable and associated ducting will be installed in the formation of the N59 road between the proposed development site and Maam Cross; within the formation of the R336 between Maam Cross and R336 and R340 junction; and within the formation of the R340 between this junction and the substation.

Horizontal directional drilling will be used at five 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 road corridor.

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

6.5.6 Results of the Aquatic Habitat Survey

The Site and the majority of the proposed Peat Storage and Restoration (Habitat Enhancement) Area are located within the Corrib catchment. The southern portion of the proposed Peat Storage and Restoration (Habitat Enhancement) Area is located within the Galway Bay North catchment. The proposed haul route and grid connection route are also located within the Galway Bay North catchment. The Development and grid connection to Screebe are located within four WFD sub-catchments. These include the Corrib, Joyce's and Furnace subcatchments with a small section of the Site boundary overlapping into the Ballycuirke Lough Stream sub-catchment. The Ballycuirke Lough Stream sub-catchment is listed as a Margaritifera Sensitive Area (the Corrib – Owenriff catchment) in accordance with Annex II and Annex V of the EU Habitats Directive. The section of the Site boundary that overlaps with this sub-catchment and the freshwater pearl mussel sensitive catchment relates to the Red Line Boundary that includes the section of the existing N59 road to the southeast of the Site entrance. It is noted that there are no works associated with the Development for

this area of the Red Line Boundary. As such no works will be completed within this sub-catchment and the associated freshwater pearl mussel sensitive area.

The Site is drained by the Owenwee River which rises near the north-western portion of the Site to the east of the Derroura Forest. The Owenwee River flows in a south-westward direction before turning north-westward at Shannakinloughra and discharging into Tawnaghbeg Lough which in turn is also drained by the Owenree River. Tawnaghbeg Lough is located approximately 200m to the north-east of the larger Loughaunierin, Tawnaghbeg Lough is located approximately 400m west of the Site. Tawnaghbeg Lough is drained by the Owenree River which continues northwards joining with an unnamed stream which drains the western extent of the Site. Further downstream along the Owenree River is a confluence with the Folore River, which includes Loughanillaun and Maumwee Lough in its catchment. 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 6.9** below. Locations surveyed differed between small order streams to larger order rivers surrounding the Site.

Table 6.9: 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	Owenwee River	Owenwee River	Tawnaghbeg Stream (EPA Name)	Tullaghmore Stream (EPA Name)
River Sub-basin	Owenwee sub-basin	Owenwee sub-basin	Owenwee sub-basin	Owenwee sub-basin
River/Stream Order	1 st Order	2 nd Order	1 st Order	1 st Order
<i>Margaritifera</i> sensitive area	No	No	No	No
EPA code	30L20	30O03	30T16	30T15
EPA Q-Value	Not assigned	Q4 (latest result from 2021 at monitoring station 200m downstream of Tawnaghbeg Lough)	Not assigned	Not assigned
Q-value (N59 Road Project 2010)	None	Q3-4 (from bridge crossing of the Owenwee at local road to Tullaghboy)	Not assigned	Not assigned
Q-Value	Q4-5	Q4	Q4-5	Q4-5
Hydromorph Score (RHAT)				
WFD Class	A	A	A	A
WFD Status	Good	Good	Good	Good
Salmonid Suitability	Yes, suitable nursery, spawning and holding habitat. Important salmonid river.	Yes, suitable nursery, spawning and holding habitat. Important salmonid river.	No. Stream is subject to low flows and drying out	No. Minor stream in incised channel with limited salmonid habitat.
Plate Ref.				

6.5.7 Fauna

6.5.7.1 Bats

6.5.7.1.1 Existing Desktop Information

BCI and NBDC records indicate eight known bat roosts in the wider area surrounding the Site. **Table 6.10** provides information on these roosts and potential connectivity between the sites.

Table 6.10: Recorded Bat Roosts in the c. 10km area surrounding the proposed wind farm site

Scientific Name	Common Name	Date of Last Record	Details	Potential Connectivity with the proposed wind farm site
Rhinolophus hipposideros	Lesser horseshoe bat	13/02/2003	c. 5km 12 bats	Proposed wind farm site sits outside the CSZ for this species. Roost situated far side of L. Corrib.
Rhinolophus hipposideros	Lesser horseshoe bat	Sept. 2001	c. 5.8km N. 1 bat	Proposed wind farm site sits outside the CSZ for this species. Roost situated far side of L. Corrib.
Rhinolophus hipposideros	Lesser horseshoe bat	25/08/1998	c. 6.5km 32 bats emerged	Proposed wind farm site sits outside the CSZ for this species. Roost situated far side of L. Corrib.
Rhinolophus hipposideros	Lesser horseshoe bat	13/06/2006	C 7.5km 66 bats emerged	Proposed wind farm site sits outside the CSZ for this species. Roost situated far side of L. Corrib.
Rhinolophus hipposideros	Lesser horseshoe bat	27/05/2006	c. 7.5km 45 bat emerged; 49 bat emerged	Proposed wind farm site sits outside the CSZ for this species. Roost situated far side of L. Corrib.
Nyctalus leisleri	Leisler's bat	15/07/2010	9.56km 50 bats	(Shiel, 1999) found that the maximum (mean) flight distance recorded for individuals from two Leisler's bat maternity roosts ranged from approximately 4.5 km to 7.5 km throughout the year. At 9.56km the subject sits outside the CSZ for this species.
Nyctalus leisleri	Leisler's bat	28/07/2011	9.1km 64 bats	As above, the subject sits outside the CSZ for this species.
Unknown species	Unknown species	30/05/2009	8.5km east Droppings found in fissure	Lies outside CSZ for any Irish bat.

In addition to the roosts listed in **Table 6.10**, records for the presence of five of the nine known Irish species of bat (Bat Conservation Ireland) have also been recorded (observed) within circa 5km of proposed wind farm site. These are Common Pipistrelle, Soprano Pipistrelle, Leisler's bat, Daubenton's bat, Natterer's bat.

Review of the NPWS Lesser Horseshoe bat database indicates that there are no records of roosts within a 2.5 km buffer (Core Sustainance Zone (CSZ)) of the proposed wind farm site boundary (NPWS 2021).

The Oughterard National School pNHA, which is designated for its role in supporting a nationally important Leisler's bat roost is located over 9km to the east of the Development. This pNHA is located outside of the CSZ for this roost and the Leisler's bats supported by it.

The Cave Database for the Republic of Ireland does not hold any records of caves within a 4 km radius of the proposed wind farm site boundary.

The bat landscape association model (Lundy *et al*, 2011) suggests that the proposed wind farm site boundary is part of a landscape that is of High (Amber) suitability for bat species as a whole (33.6). The landscape suitability is highest for Brown Long-eared bats and Common Pipistrelle, high for Natterer's bats and Leisler's bat and moderate for Soprano Pipistrelle and Daubenton's bat. The site is of low suitability for Lesser horseshoe and lowest for Nathusius's Pipistrelle and Whiskered bat.

The proposed wind farm was assessed in terms of its "habitat risk" for bats, in accordance with the methods outlined in the Nature Scotland guidelines. This assessment has assigned a low habitat risk for the Site. This is based on the small number of potential roost features occurring at the Site; the low-quality foraging habitat that could be used by small numbers of foraging bats; and the isolated setting of the Site and particularly the turbine locations, which are not connected to the wider landscape by linear features.

6.5.7.1.2 Roost Survey Results

No trees with potential to function as bat roosts were identified as occurring within the Site. No buildings or structures suitable for usage by bats as roosts occur within the proposed wind farm site. The closest structures examined included a concrete bridge (53.454268 - 9.4563424), stone bridge (53.447686 -9.471969), ruined dwelling (53.459389 -9.4497867), located within conifers to the east and an unoccupied house (53.457427 -9.4763865)

located to the west. No evidence of roosting bats were found at these structures during surveys and none of these structures function as bat roosts.

6.5.7.1.3 Bat Transect Survey Results

A total of five species of bats were recorded during the bat transect surveys. These comprised Common pipistrelle, Soprano pipistrelle, Leisler's bat, Daubenton's bat and Natterer's bat. The most commonly recorded species was Common pipistrelle and Soprano pipistrelle, with much lower levels of Leisler's bat and Myotis species.

6.5.7.1.4 Static Survey Results

A total of seven species of bats were recorded during the bat transect surveys at the six static detectors relevant to the Site. **Table 6.11** below provides a summary of the results recorded by these detectors.

Table 6.11: Bat Activity Categories for Each Species Recorded at Each Static Detector

Detector	Myotis species	Leisler's bat	Common pipistrelle	Soprano pipistrelle	Nathusius pipistrelle	Brown long-eared bat	Natterer's bat	Pipistrelle 40 kHz	Bat per Hour (all species)
D1	40	22	69	143	0	31	4	13	0.86
D2	87	31	279	351	0	37	21	15	2.19
D5	43	27	82	237	1	21	11	7	1.14
D6	46	31	46	179	0	32	8	3	0.92
D10	100	20	688	332	1	53	17	26	3.85
D12	160	9	84	63	3	29	20	81	1.20

ECOBAT was used to classify the level of bat activity recorded at each of the six static locations of all species recorded. **Table 6.12** below provides a summary of the bat activity category assigned for each species recorded at each of the six static monitoring location.

Table 6.12: Bat Activity Categories for Each Species Recorded at Each Static Detector

Detector	Myotis species	Leisler's bat	Common pipistrelle	Soprano pipistrelle	Nathusius pipistrelle	Brown long-eared bat	Natterer's bat	Pipistrelle 40 kHz
D1	Low	Low	Low	Low	Low	Low	Low	Low
D2	Low	Low	Low to Moderate	Low to Moderate	Low	Low	Low	Low to Moderate
D5	Low	Low	Low	Low to Moderate	Low	Low	Low	Low

Detector	Myotis species	Leisler's bat	Common pipistrelle	Soprano pipistrelle	Nathusius pipistrelle	Brown long-eared bat	Natterer's bat	Pipistrelle 40 kHz
D6	Low	Low	Low	Low	Low	Low	Low	Low
D10	Moderate	Low	Low	Moderate	Low	Low	Low	Moderate
D12	Low to Moderate	Low	Low	Low	Low	Low	Low	Low

Following an analysis of the number of nights recorded bat activity fell into each activity band for each species, the following overall bat activity category was assigned for each of the species recorded:

- Myotis species: Low bat activity category
- Natterer's bat: Low bat activity category
- Leisler's bat: Low bat activity category
- Nathusius pipistrelle: Low bat activity category
- Soprano pipistrelle: Low to Moderate bat activity category
- Common pipistrelle: Low bat activity category
- Brown long-eared bat: Low bat activity category

No instances of high bat activity were recorded at any of the six static detector locations and none of the activity associated with any of the species of bats recorded have been classified within the high bat activity category.

6.5.7.2 Terrestrial Mammals – Badger and Otter

The main channel of the Owenwee River is known to support otters and suitable foraging habitat occurs along the river along the eastern boundary of the Site and downstream along the section of the river to the north of the N59. No otter holts or couches were identified along this river during the manual field surveys of the river. No images of otters moving along the river were captured during the camera trap surveys.

No spraints or other field signs of otters such as footprints, prey remains, jelly etc. were recorded during the field surveys.

No badger setts were recorded within the Site during field surveys and the Site does not offer suitable habitat for badgers. The peat substrate dominating the Site, which is generally saturated does not provide the appropriate conditions required to support badger setts.

6.5.7.3 *Herpetofauna*

Common frog (*Rana temporaria*) was frequently recorded within the proposed Development Site and the proposed Peat Storage and Restoration (Habitat Enhancement) Area during field surveys. The blanket bog and heath habitats dominating the proposed Development Site provide suitable breeding and foraging habitat for common frog. Common lizard or smooth newt were not recorded during field surveys. However, the Site provides suitable habitat for both these species and they are likely to occur within, and surrounding the Site.

6.5.7.4 *Freshwater Pearl Mussel (FPM)*

The Corrib – Owenriff freshwater pearl mussel catchment is located to the south of the Site and is separated from the Site by the catchment boundary which is broadly delineated by the N59 road to the south of the Site. The Ballycurke Lough Stream sub-catchment is the nearest sub-catchment of the Corrib – Owenriff freshwater pearl mussel sensitive catchment to the proposed wind farm. This is located to the south of the N59 national road. Freshwater pearl mussel are known to occur within this sub-catchment, with the nearest record located downstream of the Letterfore River, approximately 3km to the southeast of the Site. Aside from a minor area of the Red Line Boundary for the Site that overlaps the existing N59 road corridor, the Site is not located within the Ballycurke Lough Stream sub-catchment or the freshwater pearl mussel sensitive area. As noted above, no works are to be undertaken within this minor area of the Red Line Boundary that occurs within the Corrib – Owenriff freshwater pearl mussel catchment.

The potential for the Owenwee River to support freshwater pearl mussels was previously assessed as part of the N59 Road project between 2010 and 2012. This assessment concluded that the Owenwee River does not provide suitable habitat for freshwater pearl mussels (Moorkens, 2012).

From the review of aerial imagery for the period 2005 – 2012, 2013 – 2018 and current google satellite imagery it has been found that conditions along the Owenwee River were considered to remain unchanged from those identified by Moorkens (2012) during the assessments completed between 2010 and 2012 and that the river continues to remain unsuitable for freshwater pearl mussels.

6.5.7.5 *Fisheries*

The proposed Tullaghmore Wind Farm is drained by River Owenwee [Corrib] (EPA Code: 30O03). The River Owenwee flows to the east and then west of the proposed wind farm site and is just c. 7.2km in length, also flowing through the Tawnaghbeg Lough on the way.

After this it flows into Lough Corrib to the north. Went (1942) provides an account of the distribution of salmon and trout in the Owenree catchment. According to this author “*about three miles south-east of the mouth of the Bealanabrack River, a small river, the Owenwee, enters Lough Corrib. This small river drains a series of small lakes in the Maam Cross region, namely, Loughaunierin, Tawnaghbeg Lough, Loughanillaun, and Maamwee Lough*”. Went (1942) notes that “*both salmon and trout ascend the Owenwee, the salmon mainly making for the tributary draining Loughanillaun*”. Went (1942) goes on to say that “*formerly salmon did not ascend more than a few hundred yards of this tributary and spawned in the gravelly areas below a fairly serious obstruction to their ascent into the upper waters. In consequence of some slight change in the rocks forming the fall, in recent years salmon have been reported to ascend the river beyond the fall, passing through Loughanillaun into Maamwee Lough*”.

Went then notes that “*on the other portion of the Owenwee River an impassable fall a short distance below Loughaunierin prevents the passage of fish up into that lake*”.

Went (1942) notes that “*Loughaunierin contains a fair stock of brown trout of small size which descend the river to spawn. The shore and bottom of the lake are rocky and there is very little aquatic vegetation*”.

This author then states that “*Tawnaghbeg lough, or, as it was aptly called by an English tourist, Reedy Lake; is situated on the most extensive portion of the Owenwee itself. As its English name implies, a considerable part of its area is covered with reeds and water lilies, and jointed pipe worts are exceedingly plentiful. It contains numerous small dark brown trout throughout the year, but from August onwards big brown trout from Lough Corrib run up on every flood and lie in this lake, where they are taken by anglers. Most of these large trout are not feeding and have stomachs similar to those of adult salmon. These large Corrib trout are thin, in poor condition, and, according to persons who have eaten them, quite tasteless, as might have been expected from their sexual condition, in that the gonads are very well developed*”.

Went (1942) then notably adds that “*In the spawning season the majority of these fish travel into the small streams flowing down from the comparatively high ground on the east side of the lake*”.

O'Reilly (2007) reports that “*Loughanillaun contains Brown Trout and Salmon from Corrib late in the season*”. O'Reilly (2007) also reported that “*Tawnaghbeg lough contains a good stock of trout to 1.5lbs*”. He does not mention salmon being present in this lake and makes no reference to the large lake run Brown Trout that were noted by Went (1942). O'Reilly (2007) also gives an account for Loughaunierin and states that it gets a run of larger trout from Lough Corrib “*after a good flood in August*”. He again makes no reference to salmon using this lake.

A summary of the results of the fisheries surveys completed at the 13 no. survey sites is provided under **Table 6.13** below,

Table 6.13: Description of the aquatic sites assessed for the proposed Tullaghmore Wind Farm

Site No.	Watercourse Name	Description	Fish present	Overall evaluation
1	Unnamed	This is a tiny high gradient 1 st order stream that does not provide any habitat for fish. Substrate consists of rocks and cobble.	None	This stream is too small to support any fish species. However, it flows directly into Lough Corrib SAC.
2	Owenwee [Corrib]	This 3 rd order river is known to hold both resident and migratory Brown Trout, and Salmon. Deep holding areas and a falls/cascade are present near this site.	Brown trout Atlantic salmon	The lower reaches of the Owenwee River is a 'Locally Important, Higher Value' salmonid spawning and nursery area.
3	Owenwee [Corrib]	This section is also a 3 rd order river and it is a spawning and nursey area for Brown Trout. Salmon were not recorded but could be present. This site is overgrown and contains holding and spawning/nursery areas.	Brown trout	
4	Tullaghmore	This small 2 nd order stream has a cobble/gravel substrate and a high gradient. It is very overgrown but is a nursery/spawning habitat for trout.	Brown trout	The Tullaghmore River is a small but locally important spawning stream for Brown Trout.
5	Unnamed	Tiny 1 st order stream with cobble/gravel substrate.	None	Too small and no fish present.
6	Tullaghmore	This section is a 1 st order stream with high gradient and is too small for fish.	None	The Tullaghmore River is a small but locally important spawning stream for Brown Trout. However, it is too small in its upper reaches to hold fish.
7	Unnamed	Small overgrown 2 nd order stream with cobble/gravel substrate.	Brown trout	Tiny stream providing marginal spawning and nursery habitat for Brown Trout.

Site No.	Watercourse Name	Description	Fish present	Overall evaluation
8	Tawnaghbeg 30	Tiny 1 st order high gradient stream.	None	Tiny stream, no fish present.
9	Owenwee [Corrib]	This section is again a 3 rd order river and provides spawning and nurse habitat for Brown Trout.	Brown trout	The upper Owenwee River is a small but locally important spawning stream for Brown Trout. Salmon occur downstream.
10	Owenwee [Corrib]	Tiny 1 st order stream – very small and water levels extremely low at the time of the survey.	Brown trout	
11	Letterkeeghaun 30	Small 2 nd order stream – almost dry at the time of the survey.	None	Tiny stream, no fish present.
12	Letterkeeghaun 30	Small 2 nd order stream – too small for fish at the time of the survey.	None	Tiny stream, no fish present.
13	Letterkeeghaun 30	Tiny 1 st order stream.	None	Tiny stream, no fish present.

6.5.7.6 Invasive Alien Species (IAS)

The only non-native invasive species identified as occurring during field surveys within and/or adjacent to the Site and the proposed Peat Storage and Restoration (Habitat Enhancement) Area was *Rhododendron ponticum*. This species was identified as present along the southern section of the Site and surrounding the proposed spoil storage and restoration area.

6.6 ASSESSMENT OF POTENTIAL ENVIRONMENTAL EFFECTS

6.6.1 Identification & Evaluation of Ecological Receptors

Table 6.14 below lists and evaluates the ecological features identified as occurring within the Zol of the Development and identifies those which are considered to be ecological receptors following the methodology previously described within Section 6.2.

Table 6.14: Evaluation of Ecological Features Identified at and surrounding the Development

Ecological Feature	Evaluation	Ecological Receptor?
National and Local Designated Sites*		

Ecological Feature	Evaluation	Ecological Receptor?
Connemara Bog Complex SAC & pNHA	This is an internationally important site of conservation. It supports a range of peatland, freshwater and woodland Annex 1 habitats and also supports internationally important populations of Atlantic salmon, otter, slender naiad and marsh fritillary. It is also supports populations of freshwater pearl mussel which occur in the freshwater catchments that are located within this SAC.	Yes – International Importance (Rating A). Assessment of this ecological feature is provided in the NIS for the Development.
Maumturk Mountains SAC & pNHA	This is an internationally important site of conservation. It supports a range of bog, heath and freshwater Annex 1 habitats and also supports internationally important populations of Atlantic salmon, and slender naiad. It is also supports populations of freshwater pearl mussel which occur in the freshwater catchments that are located within this SAC.	Yes – International Importance (Rating A). Assessment of this ecological feature is provided in the NIS for the Development.
Lough Corrib SAC & pNHA	This is an internationally important site of conservation. It supports a range of peatland, freshwater and woodland Annex 1 habitats and also supports internationally important populations of freshwater pearl mussel, Atlantic salmon, lamprey species, white-clawed crayfish, otter, lesser horseshoe bats, slender naiad and the Hamatocaulis vernicosus.	Yes – International Importance (Rating A). Assessment of this ecological feature is provided in the NIS for the Development.
Habitats		
Active lowland blanket bog	The lowland blanket bog occurring within the project site is representative of active blanket bog which is representative of the priority habitat Active blanket bog* (7130). As such this habitat is of international importance.	Yes - International Importance (Rating A)
Cutover blanket bog	The examples of degraded/cutover blanket bog occurring within the project site are examples of the Annex 1 habitat blanket bog (7130). However, they are examples of disturbed blanket bog habitat that are not in favourable conservation condition. Nevertheless, they do support a typical suite of blanket bog species and with the implementation of appropriate land management measures have the potential to be restored to blanket bog condition.	Yes - County Importance (Rating C)
Poor Flush & Transition Mires	The examples of poor flush and associated transition mire habitat are representative of micro-habitats occurring within a lowland blanket bog complex. The quaking areas of transition mires surrounding the flush areas are representative of the Annex 1 habitat Transition Mires (7140) and are evaluated as being of County Importance.	Yes - the poor flush habitats are of County Importance (Rating C). Examples of Transition Mires are of National Importance (Rating B)
Wet heath	The wet heath habitat occurring within the Site comprises vegetation communities that are representative of the Annex 1	Yes - National Importance (Rating B)

Ecological Feature	Evaluation	Ecological Receptor?
	habitat Northern Atlantic Wet heath with Erica tetralix (4010).	
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/exposed siliceous rock mosaic	This habitat occurring within the Site has been subject to overgrazing and erosion of thin peat soils as a result of overgrazing. Notwithstanding the past inappropriate land use effects to this habitat mosaic it supports a range of vegetation communities typical of wet heath. As such it is considered to be of county importance.	Yes - County Importance (Rating C)
Scrub	The scrub habitat occurring within the Site provides a vegetation riparian corridor along the Owenwee River and provides shelter and foraging habitat for a range of fauna.	Yes – (local importance (higher value) (Rating D)
Dry heath/acid grassland mosaic	This habitat has been overgrazed by livestock. It represents a preferred location for sheep and cattle to graze within the Site. It is of limited nature conservation value.	Yes - (local importance (higher value) (Rating D)
Wet grassland	The extent of wet grassland within the Site is minor. It is species poor and is not representative of a habitat of nature conservation value.	No - (Local importance (lower value) (Rating E)
Acid grassland	This habitat is associated with drier areas of peatland habitat where the peat substrate has been altered and improved. It has no links to Annex 1 habitats and is not considered to be representative of a habitat of nature conservation value	No - (Local importance (lower value) (Rating E)
Species		
Otters	While no otter resting places or signs of foraging otters were observed during field surveys along the Owenwee River and the other minor watercourse draining the Site, this species is known to forage along the Owenwee River. Otters are also likely to use the lakes adjacent to the proposed spoil storage and restoration (habitat enhancement) area for foraging. Otters are a qualifying species of the adjacent Lough Corrib SAC and Connemara Bog Complex and the otters that forage along the Owenwee River are likely to form part of the population of these SACs. 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	Yes - local importance (higher value) (Rating D)

Ecological Feature	Evaluation	Ecological Receptor?
	at the proposed wind farm site during bat monitoring surveys.	
Badgers	No evidence of badgers was recorded at the Site, the proposed spoil storage and restoration area. The peatland substrates of the Site are not considered to offer suitable habitat for badgers and this species is not identified as a potential ecological receptor.	No
Herpetofauna	Common frog were frequently encountered in both the Site and the proposed spoil storage and restoration area. The Site also provides suitable habitat for common lizard and smooth newt.	Yes - local importance (higher value) (Rating D)
Invertebrates	No suitable marsh fritillary habitat has been identified as occurring within the Site. Other species of local importance are likely to be supported by the Site.	Yes - local importance (higher value) (Rating D)
Fisheries	The Owenwee River is an important salmonid spawning and nursery river. The river eventually drains into Lough Corrib SAC via Lough Tawnaghbeg. Atlantic salmon use at least part of the Owenwee catchment, downstream of Lough Tawnaghbeg.	Yes - local importance (higher value) (Rating D)
Freshwater pearl mussel	No element of the Development is located within a freshwater pearl mussel catchment and the watercourses draining the Site have been identified as being unsuitable for supporting freshwater pearl mussel. Notwithstanding this given the proximity of the Site to a freshwater pearl mussel catchment of international importance this species and its habitat is identified as a feature of international ecological importance that requires assessment.	Yes - International Importance (Rating A)
Non-native invasive species	<i>Rhododendron ponticum</i> 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 Natura 2000 Sites is provided within the NIS

6.6.2 The 'Do-Nothing' Impact

Land use activities at the Site comprise extensive livestock grazing in the form of sheep and cattle grazing. Historically, grazing pressure appears to have been more pronounced to the west of the Site whilst the impacts of grazing in the east of the Site are considered to be negligible with no discernible damage to the peatland habitats occurring in this area. Overall grazing pressure has been reduced in the west of the Site in more recent years. However, there is noticeable erosion evident throughout this area of the Site. Grazing has continued

in the east at extensive levels that are sympathetic to maintaining active blanket bog conditions. Under the do-nothing it is likely that grazing levels will continue in the west of the Site and at current levels the current grazing regime is likely to continue to retard the recovering of wet heath vegetation in area that have been previously subject to inappropriate grazing levels. The east of the Site is expected to continue to be grazed at extensive levels that are in keeping with a regime appropriate for maintaining favourable blanket bog conditions.

Under the do-nothing scenario the proposed Peat Storage and Restoration (Habitat Enhancement) Area will continue to function as a cutover and degraded area of blanket bog. Artificial drainage channels will remain in place and will continue to function as potential conduits for the loss of sediment to Loughanilluan to the north and Lough Arderry to the south. The presence of cut cells, with changes in surface levels occurring throughout this area, as well as the presence of existing artificial drainage is likely to undermine the potential for this area to naturally regenerate as an active blanket bog habitat.

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 peatland habitats to facilitate the construction of the wind farm site infrastructure comprising the site Access Tracks, hardstand areas and turbine foundations, substations, Met Mast foundation. 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.

At the proposed spoil storage and restoration area spoil from the construction phase will be deposited. The deposition of spoil material and the movement of construction machinery will result in disturbance to the existing areas of cutover blanket bog that will be used as spoil storage areas.

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 Screebe.

The haul route from Galway Port to the proposed wind farm site will require temporary widening at four 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 within the proposed spoil storage and restoration (habitat enhancement) area; 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 6.15** below.

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

No element 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 Screebe; or the provision of four temporary widening areas along the Haul Route.

6.6.3.1.2 **Potential Direct Effects to Article 17 Annex 1 habitats**

No element of the Site permanent or temporary infrastructure are located within the boundary of any Annex 1 habitats as mapped by the NPWS for the 2019 Article 17 reporting. There will be no direct effects, in terms of direct habitat loss, damage or disturbance on any mapped area of Article 17 habitat 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 Screebe; or the provision of four temporary widening areas along the Haul Route.

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 6.15 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 6.15** and a summary list of the elements of the Development infrastructure that will result in this loss is also provided.

Table 6.15: Assessment of Estimated Habitat Loss at the Site

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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
Lowland blanket bog	Access track	39,538.78	6.7	Active Blanket Bog* 7130	<p>The examples of lowland blanket bog occurring under the footprint of the proposed development are representative of best examples of an undesignated Annex 1 blanket bog habitat and have been evaluated as an ecological receptor of international importance.</p> <p>The loss of priority blanket bog habitat to the footprint of the Development has the potential to result in significant, negative, permanent and irreversible impacts.</p> <p>Impacts at the national/international scale will have the potential to arise where the loss of examples of this habitat will result in a reduction of the national area of this habitat. The Article 17 Reporting for blanket bog has not specified a favourable reference area for blanket bog habitat. However, it does provide a best single value of the surface area of blanket bog habitat in Ireland, which is reported to be 2,574.51km². This broadly corresponds to the area of blanket bog habitat that has been mapped as part of the Article 17 habitat dataset (area = 2,313.5km²). 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 blanket bog in Ireland¹¹.</p> <p>As noted in Section 6.6.3.1.2 above the blanket bog habitat occurring within the Development does not form part of the national surface area and FRA of this Annex 1 habitat. Therefore, the loss of blanket bog habitat to the footprint of the Development will not have the potential to negatively affect the conservation status of this habitat at the national/international scale. Notwithstanding this the loss of an area of Annex 1 blanket bog habitat will have the potential to undermine the integrity of the blanket bog habitat occurring within the Site and will represent a significant, irreversible and permanent impact at the county scale.</p>
	Turbine 1				
	Turbine 2				
	Turbine 5				
	Turbine 6				
Cutover Blanket bog	Access track	6,384.51	7.4	Blanket bog 7010	<p>The cutover blanket bog habitat has been evaluated at county importance (Rating C). This habitat has been subject to inappropriate turbary in the past and extensive area of cutover blanket bog occur in the wider area surrounding the proposed development site. As such the loss of approximately 7.4% of the extent of this habitat to the footprint of the Development will represent a significant impact to the integrity of this habitat within the Site and at the local scale. This impact will be irreversible and permanent.</p>

¹¹ It is noted that the Article 17 Reporting provides a FRA for a variety of other Annex 1 habitats and that where the FRA is specified it is the same value as the best single value for the habitat

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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
Wet heath	Access track	29,874.80	8.9	North Atlantic Wet Heath 4010	<p>The examples of wet heath occurring under the footprint of the Development are representative of examples of an undesignated Annex 1 wet heath habitat and have been evaluated as an ecological receptor of national importance.</p> <p>The loss of wet heath habitat to the footprint of the Development has the potential to result in significant, negative, permanent and irreversible impacts.</p> <p>Impacts at the national/international scale will have the potential to arise where the loss of examples of this habitat will result in a reduction of the national area of this habitat. The Article 17 Reporting for wet heath has not specified a favourable reference area for wet heath habitat. However, it does provide a best single value of the surface area of wet heath habitat in Ireland, which is reported to be 1,598.51km². This broadly corresponds to the area of wet heath habitat that has been mapped as part of the Article 17 habitat dataset (area = 1,559.38km²). 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 wet heath in Ireland.</p> <p>As noted in Section 6.6.3.1.2 above the wet heath habitat occurring within the Development does not form part of the national surface area and FRA of this Annex 1 habitat. Therefore, the loss of blanket bog habitat to the footprint of the Development will not have the potential to negatively affect the conservation status of this habitat at the national/international scale. Notwithstanding this the loss of an area of Annex 1 wet heath habitat will have the potential to undermine the integrity of this habitat occurring within the Site and will represent a significant, irreversible and permanent impact at the county scale.</p>
	Turbine 2				
	Turbine 3				
	Turbine 5				
Dry heath	Turbine 5	461.65	13.1	European Dry Heath	<p>The Development will result in the loss of a minor area of dry heath habitat at one location under the footprint of the Turbine 5 hardstand. The example of dry heath occurring under the footprint of the Development at this location is representative of an example of undesignated Annex 1 dry heath habitat and has been evaluated as an ecological receptor of national importance.</p> <p>The loss of dry heath habitat to the footprint of the Development has the potential to result in significant, negative, permanent and irreversible impacts.</p> <p>Impacts at the national/international scale will have the potential to arise where the loss of examples of this habitat will result in a reduction of the national area of this habitat. 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 1,230.01km². This broadly corresponds to the area of dry heath habitat that has been mapped as part of the Article 17 habitat dataset (area = 1,559.38km²). For the purposes of this assessment the best single value of the</p>

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
					<p>surface area of this habitat is taken to represent the favourable reference area (FRA) of dry heath in Ireland.</p> <p>As noted in Section 6.6.3.1.2 above the dry heath habitat occurring within the Development does not form part of the national surface area and FRA of this Annex 1 habitat. Therefore, the loss of blanket bog habitat to the footprint of the Development will not have the potential to negatively affect the conservation status of this habitat at the national/international scale. Given the smaller area that will be lost to the Development and the patchy distribution of this habitat within the Site, the loss of this small area to the footprint of the Development will not undermine the integrity of this habitat at the wider county or regional scale. As such the loss of dry heath habitat will represent a significant, irreversible and permanent impact to the extent of this habitat at the local scale.</p>
Wet Heath HH3/Exposed Siliceous Rock ER1 Mosaic	Access track Turbine 2 Turbine 3 Turbine 4 Turbine 5 Turbine 6 Meteorological Mast	56,784.77	12.4	North Atlantic Wet Heath 4010	<p>This mosaic habitat has been evaluated at county importance (Rating C). Similar mosaic habitats of upland wet heath and exposed siliceous rock that have been subject to inappropriate past grazing regimes are widespread in the wider surrounding area. As such the loss of approximately 12% of the extent of this habitat to the footprint of the Development will represent a significant impact to the integrity of this habitat within the Site and at the local scale. This impact will be irreversible and permanent.</p>
Poor Flush	Turbine 1	4,005.50	15.2	See Transition mire below	<p>This poor flush habitat has been evaluated at county importance (Rating C). The loss of approximately c. 15% of the extent of this habitat to the footprint of the Development will represent a significant impact to the integrity of this habitat within the Site and at the local scale. This impact will be irreversible and permanent.</p>
Transition Mire	Turbine 1	<500		Transition Mire 7150	<p>The Development will result in the loss of a minor area of transition mire at one location under the footprint of the Turbine 1 hardstand. The example of transition mire occurring under the footprint of the Development at this location is representative of an example of undesignated Annex 1 transition mire habitat and has been evaluated as an ecological receptor of national importance.</p> <p>The loss of transition mire habitat to the footprint of the Development has the potential to result in significant, negative, permanent and irreversible impacts.</p>

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
					<p>Impacts at the national/international scale will have the potential to arise where the loss of examples of this habitat will result in a reduction of the national area of this habitat. The Article 17 Reporting for transition mire has not specified a favourable reference area for this habitat. However, it does provide a best single value of the surface area of transition mire habitat in Ireland, which is reported to be 77.41km². 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.</p> <p>As noted in Section 6.6.3.1.2 above the transition mire habitat occurring within the Development does not form part of the national surface area and FRA of this Annex 1 habitat. Therefore, the loss of transition mire habitat to the footprint of the Development will not have the potential to negatively affect the conservation status of this habitat at the national/international scale. Whilst it is noted that a small area of this habitat will be lost to the footprint of the Development, this small area is required to be considered in the overall restricted area of this habitat at the national scale as reported for the FRA. This habitat is representative of micro-habitat of expansive blanket bog and raised bog habitats and therefore its extent in terms of area is limited. As such the loss of examples of this habitat within the Site will have the potential to undermine its integrity within the Site and result in significant, irreversible and permanent impacts to this habitat at the wider county scale.</p>
Degraded Lowland Blanket Bog/Wet Heath Mosaic	Access track Substation Meteorological Mast	3,517.53	<ul style="list-style-type: none"> 4.5 		<p>This mosaic habitat has been evaluated at county importance (Rating C). Similar mosaic habitats of upland wet heath and exposed siliceous rock that have been subject to inappropriate past grazing regimes are widespread in the wider surrounding area. As such the loss of approximately 12% of the extent of this habitat to the footprint of the Development will represent a significant impact to the integrity of this habitat within the Site and at the local scale. This impact will be irreversible and permanent.</p>
Scrub	Access track	754.33	<ul style="list-style-type: none"> 11.1 	-	<p>The Development will result in a minor loss in the area of scrub habitat occurring at the site entrance and along the proposed Access Track. The extent of scrub occurring within the Site is minor due to the predominance of peatland habitats. As such the loss of minor areas of scrub habitat will amount to approximately 11% of the area of this habitat occurring within the Site. While the extent of this habitat is limited within the Site it occurs widely in the wider area surrounding the Site and the minor 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.</p>

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
Eroding Stream	Access track	NA	<ul style="list-style-type: none"> NA 	-	There will be no loss of freshwater eroding stream habitats to the footprint of the Development.

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Direct Effects Arising from the Peat Storage and Restoration (Habitat Enhancement) Area

Excess spoil arising from the Development will be transferred to the proposed spoil storage for deposition. Approximately 6.5ha of existing cut-over blanket bog will be used to accommodate the surplus peat spoil material. The spoil material will be deposited into existing cut cells within the proposed Peat Storage and Restoration (Habitat Enhancement) Area. The spoil will be stored to a depth of 1.5m. Given that it is predicted that the majority of the existing cut cells into which spoil will be placed will be less than 1.5m in depth, the existing cells will be filled with peat spoil to the adjoining ground level and then a containment berm will be provided to create a cell. The berms will be constructed as 30m x 30m cells.

Spoil will also be deposited in the proposed Peat Storage and Restoration (Habitat Enhancement) Area on existing area of uncut but denuded and degraded blanket bog. For these areas berms will be provided to create cells that are 45m x 60m in size.

The deposition of spoil material on existing cutover blanket bog will result in the permanent loss of this habitat.

Direct Effects Arising from the Proposed Haul Route

The Haul Route will result in the provision of four temporary road widenings along its route. The widening at three of these locations will result in the loss of grassy verge, improved agricultural grassland 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. The remaining widening area will result in the loss of scrub habitat which has been evaluated to be of local nature conservation value (Rating D). The temporary loss of this habitat to the road widening will represent a moderate negative, temporary and reversible effect at the local level.

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 will be installed within a trench in the formation of all existing bridge and culvert watercourse crossings. As such there will be no potential for direct effects to habitats as a result of the installation of the proposed Grid Connection.

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 four crossings of natural streams/flushes along the proposed Access Track. The existing crossing over the Owenwee River on the main Access Track from the N59 will be upgraded for the increased proposed Access Track widths and to allow heavier vehicles to traverse it. The upgrade will involve the construction of a clear span bridge to the north of the existing bridge location. Further to consultation with Inland Fisheries Ireland (IFI) the crossings have been designed in accordance with detail shown in shown in **Figure 2.6(a) to (d)**. These crossings comprise clear span bridges for each of the four crossings and will not result in any modifications to the watercourse channels at the crossing locations. In addition, no instream works will be required during the construction of these four 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 upgrade of the Owenwee crossing and the two 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 these watercourses. The loss of such contaminants to these watercourses 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. No new watercourse crossings are required for access to the proposed spoil storage and restoration (habitat enhancement) area. 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 no roost sites within the Site there will be no potential for the Construction and Decommissioning Phase to result in direct effects to bats.

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 6.5.7.2, 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 Freshwater pearl mussel During the Construction and Decommissioning Phase

The Development is not located within a freshwater pearl mussel sensitive catchment and the Owenwee River catchment that drains the Site does not support freshwater pearl mussel and has been identified as a watercourse that is unsuitable for freshwater pearl mussel.

The Ballycurke Lough Stream sub-catchment to the south and southwest of the Site is known to support freshwater pearl mussel with the nearest known record occurring approximately 3km to the southeast of the Site.

No element of the Development is located within the Ballycurke Lough Stream sub-catchment and there is no hydrological pathway connecting the Development to this sub-catchment or any other freshwater pearl mussel sensitive catchment. Given the absence of a hydrological pathway connecting the Development to freshwater pearl mussel sensitive catchments there will be no potential for the construction phase of the Development to result in significant negative impacts to this ecological receptor.

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 in heath and bog habitats. As detailed in Section 6.5.7.3, common frogs were frequently recorded during surveys within both the proposed wind farm site and the proposed Peat Storage and Restoration (Habitat Enhancement) Area. 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 parts of the bog. 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 peatland 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

St Dabeoc's heath *Daboecia cantabrica* was recorded in dry heath habitat to the south of the Site. This species, which is not an FPO-listed species, has a restricted distribution in Ireland to West Galway and Mayo and occurs only locally in these areas. The species was recorded approximately 220m to the south of the Site and will not be directly affected by the Development.

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 blanket bog habitat of a mountainous region in Spain. The scheduled invasive alien species *Rhododendron ponticum* occurs within the proposed development site. 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 this species within peatland habitats of 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:

- Connemara Bog Complex SAC & pNHA;
- Maumturk Mountains SAC & pNHA; and
- Lough Corrib SAC.

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 have a significant effect on the following European Sites:

- Connemara Bog Complex SAC;
- Maumturk Mountains SAC; and
- Lough Corrib SAC.

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 effects to 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.

6.6.3.2.2 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 Owenwee River sub-catchment into which the Development drains and downstream to Lough Tawnaghbeg and Lough Corrib; and Loughanillaun and Ardderry Lough which represent the receiving waterbodies surrounding the proposed spoil storage and restoration (habitat enhancement) areas.

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 Owenwee River and its tributaries that drain the Site.

In the event of a peat slide event, the potential will exist for the conveyance of significant quantities of peat materials to the Owenwee River and associated sub-catchment. Whilst the possibility of a peat slide 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 peat slide or slope failure which occurs will be localised due to the generally thin peat and the topography of the Site. However, given the hydrological pathway to European Sites and the important status of the Owenwee River and the Lough Corrib catchment downstream for sensitive aquatic fauna such as Atlantic salmon and otters, any peat slide will have the potential to result in significant long-term damage to freshwater habitats.

The discharge of silt-laden runoff to the Owenwee River and associated catchment and downstream to the Lough Corrib catchment 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 and create the potential for infection.

The clearance of surface peatland vegetation and the exposure of underlying peat substrate can result in the mobilisation of nutrients stored within peat substrates and the generation of nutrient-laden surface water runoff (Tuukkanen, 2017; Monteverde, 2022). Potential nutrient mobilisation is not just associated with peat 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). This degree to which sediment loss contributes to nutrient enrichment is dependent on the type of soil. Peat and other 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 Site will have the potential to contribute to nutrient inputs to receiving waters within the Owenwee catchment and their conveyance downstream to Lough Corrib. The lake habitat at Lough Corrib, at the outfall of the Owenwee river is representative of a Oligotrophic Isoetid Lake Habitat which is characterised by low primary productivity and is highly sensitive to nutrient inputs, increases in primary productivity and ultimately the adverse effects of eutrophication.

The discharge of nutrient laden surface water to the Owenwee River and downstream to the Corrib catchment 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 will have the potential to contribute towards the degradation of habitat conditions with the Owenwee catchment and Lough Corrib 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 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 are known to 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 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 Peat Storage and Restoration (Habitat Enhancement) Area

Sediment loss to the receiving high-status lakes of Loughanilluan and Lough Ardderry have been identified as existing pressures to these lakes (see Section 6.5.3 above). The

deposition of surplus peat material within the proposed spoil storage will present a risk of exacerbating the loss of sediment to the receiving lake waterbodies downstream of this area that comprise Loughanillaun to the north and Ardderry Lough to the south. These lakes support sensitive aquatic species, including salmonids, and Artic Char, the latter having been recorded from Ardderry Lough. The lakes are also examples of the Annex 1 qualifying habitat "potential" oligotrophic lakes of the Maumturk Mountains SAC and the Connemara Bog Complex. The emission of pollutants such as sediment or hydrocarbons (from construction machinery in the event of a spillage or leak) to these lake habitats would represent a significant negative effect of temporary to short-term duration.

Proposed Haul Route

The proposed widening works at the four locations along the Haul Route are not located within the vicinity of any watercourse or lake habitats. Each of the widening areas are buffered by over 50m from such freshwater features and there are no pathways connecting these locations to these freshwater habitats. As such the construction works associated with the haul route widening areas are not predicted to have the potential to result in significant negative impacts to aquatic habitats and the fauna supported by them.

Proposed Grid Connection Route

During the installation of the Grid 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; and
- 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 Grid Connection route and watercourse intersections all occur within streams or rivers that have high potential for salmonid populations, and/or the known distribution of other sensitive species such as lamprey species. In the event of a potential spillage or release of plant fuel, oil or other polluting substances, this could reach important sections of river with adverse impacts for the potential of the river to support resident salmonids as well as other aquatic fauna. The implication of the emission of such materials to receiving waterbodies for aquatic fauna will be similar to those outlined above for the proposed wind farm.

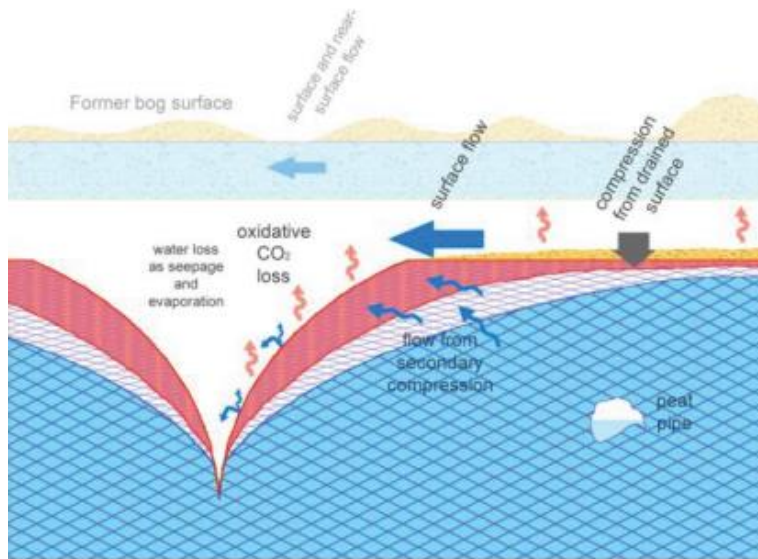
6.6.3.2.3 Potential Indirect Effects on Terrestrial Habitats During the Construction Phase

Peatland habitats are representative of wetland habitats and are sensitive to changes in the hydrological regime that underpin the status of these habitats. Drainage of peatland habitats, by increasing outflow, reduces the water stored in peat. The water table of intact blanket bog is generally at or near the surface. For instance, Murphy (2008) noted that water tables of intact blanket bog are generally within 5cm of the surface, while the water levels of drained bogs were generally more than 30cm below the surface. The drainage of peatlands can result in the lowering of the otherwise high-water table, an increase in the depth of the aerated and non-peat forming layer with an associated increase of peat oxidation. The new hydrological conditions created by drainage can in turn promote vegetational changes (Fraga et al., 2008). Drained peatlands have a lower frequency or abundance of peat forming vegetation such as Sphagnum and Eriophorum species (Shepherd et al., 2013). Numerous studies have investigated the effects of water down from surrounding peat bog as a result of drainage ditches and gullies. A review of such studies was undertaken by Nayak *et al.* (2008) which summarised the extent of drainage around sites of disturbance to be confined to a distance of 1.5m to 50m. Allot *et al.* (2009) showed that the zone of drawdown extends 2m into the peatland from the edges of gullies and that gully depth did not affect the zone of water draw down. It is noted that in the Allot study gully depths were between 1.5 and 3m deep, which is similar to the peat depths recorded at turbine T2, T5 and the On-site Substation and Control Building. Peat depth at turbine T1, T3 and T4 are less than 0.5m. Holden *et al.* (2011) recorded blanket bog water tables at their lowest nearest drains but found that the water table increased rapidly over 2m either side of the drain. The findings of the Holden et al. study are consistent with that of Allot (2009) indicating that bog water table levels recovered within a short distance of the drain.

However, Lindsay (2010, 2014) suggests that the commonly-held view that the effects of drainage are restricted to within narrow band of disturbance adjacent to drainage features does not take into account responses to drainage such as peat consolidation, compression and oxidation/decomposition. The impact of these processes is dependent on the existing condition of the peatland. In areas of intact and active bog, the impact can be significant. Lindsay (2005, 2014) asserts that the effects of drawdown on acrotelmic peat forming vegetation in such intact and active blanket bogs can be up to 200m from the site of disturbance. These more wide-ranging impacts arise as a result of primary consolidation (over the short-term) and secondary compressions and oxidation (over the longer term). These short-term and long-term processes as shown on **Plate 6.1** below. In the event that the Development results in water drawn and drainage of surrounding blanket bog the potential will exist for further impacts to the integrity of this habitat of international

conservation importance within the Site. Such effects will represent a significant negative, permanent, and irreversible effect to this habitat at the county/regional scale.

Plate 6.1: Impacts of Drainage to Bogs (reference Lindsay et al. 2014)



Peatlands in particular are sensitive to changes in hydrochemistry and pH levels given the low pH of these habitats. They are highly sensitive to the emission of alkaline waters and in the absence of suitable construction phase mitigation measures activities such as concrete batching and washout will have the potential to result in the emission of such waters to peatland habitats. Such emissions will have the potential to result in significant negative, medium to long-term effects on bog and heath vegetation communities affected by such emissions.

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 SAC, by way of reductions in the abundance of prey species.

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, there will be no potential for significant disturbance to otters during this element of the Development.

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. As detailed in Section 6.5.6.2, no holts or signs of Otter were recorded at the Site. Given the absence of otter breeding and resting places construction works will not have the potential to result in significant disturbance to otters. However, 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 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 Site there will be no potential for the Construction and Decommissioning Phase to result in the loss of roosting habitat for bat species.

The habitats occurring at the proposed wind farm site are representative of low habitat value for bats. There will be no loss of structured vegetation, such as conifer plantation edge or scrub habitat, as a result of the proposed wind farm. Given that the habitat to be lost to the footprint of the Site is of low foraging value for bat species, this loss will not result in any significant reduction or loss of available foraging habitat for bat species.

6.6.3.2.6 Potential Indirect Effects on Freshwater Pearl Mussel During the Construction and Decommissioning Phase

The Site is not located within a freshwater pearl mussel sensitive catchment and the Owenwee River that drains the Site does not support freshwater pearl mussel and has been identified as a watercourse that is unsuitable for freshwater pearl mussel.

The Ballycurke Lough Stream sub-catchment to the south and southwest of the Site is known to support freshwater pearl mussel with the nearest known record occurring approximately 3km to the southeast of the Site.

No element of the Development is located within the Ballycurke Lough Stream sub-catchment and there is no hydrological pathway connecting the Development to this sub-catchment or any other freshwater pearl mussel sensitive catchment. Given the absence of a hydrological pathway connecting the Development to freshwater pearl mussel sensitive catchments there will be no potential for the construction phase of the Development to result in significant negative impacts to this ecological receptor.

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 peatland habitats within and adjacent to the Site. Blanket bog habitats have been subjected to historical turbarry towards the east of the Site in the vicinity of the proposed Site Access Track while overgrazing has led to damage and erosion to heath and blanket bog 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 drainage of peatland habitats and the loss of areas of blanket bog and heath habitat. The proposed spoil storage area has been subject to intensive industrial scale peat harvesting. All of these land use practices have resulted in the reduction in area of blanket bog and heath habitats and also continue to pose a risk of sediment loss to receiving waterbodies. The Development will have the potential to combine with these historical land use activities to result in further loss of blanket bog and heath habitats in the local area surrounding the Site. In addition, the risks to receiving waterbodies posed by the Development will also have the potential to combine with these existing land use activities to result in cumulative sediment loss to these waterbodies and associated pressures to water quality and the freshwater ecology supported by them.

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 blanket bog habitat within the proposed spoil storage and restoration (habitat enhancement) area, along with the blocking of existing drains in this latter area will have the potential to reduce the impact of historical land use activities within the Site with associated positive impacts for the status of blanket bog and heath 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. The permitted N59 upgrade works between Maam Cross and Bunnakill Road were completed in 2022 and as such there will be no potential for the Development to overlap with the construction phase of this project.

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. 21963: planning permission for the retention of a temporary meteorological mast within the Site. A screening for Appropriate Assessment 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. 201558: planning permission for a general-purpose shed. A screening for Appropriate Assessment 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. 211067: planning permission for a partial change of use of an existing shop to use as an off-licence. This project represents a change of use of an existing retail premise in terms of the products sold from the premises. It does not involve any proposals with potential to result in land use effects and will not have the potential to combine with the Development to result in likely significant effects to biodiversity receptors.

Planning Reference No. 212279: planning permission for a dwelling house. A screening for Appropriate Assessment 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. 221051: planning application for a dwelling house. This project is located within the Ballycurke Lough Stream_SC_010 sub-catchment within which no element of the Development will be located. No drainage waters from the Development will drain to this sub-catchment and as such there will be no potential for the project to combine

with this other live planning application project to result in cumulative negative effects to the freshwater aquatic environment of the Ballycurke Lough Stream_SC_010 sub-catchment. Planning Reference No. 221052: planning application for an agricultural shed to house livestock. This project is located within the Ballycurke Lough Stream_SC_010 sub-catchment within which no element of the Development will be located. No drainage waters from the Development will drain to this sub-catchment and as such there will be no potential for the project to combine with this other live planning application project to result in cumulative negative effects to the freshwater aquatic environment of the Ballycurke Lough Stream_SC_010 sub-catchment.

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 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 four watercourse crossings 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

The operation phase of the Development will not result in the loss of or fragmentation to habitats that could be relied upon by bats for roosting, foraging or commuting. As such

there will be no potential for additional habitat loss, over and above that identified for the Construction Phase.

The operation of the proposed wind farm will have the potential to result in long-term effects for the Common pipistrelle and Soprano pipistrelle populations. The analysis of static monitoring completed at Static Detectors D1 and D5 identified the potential for a medium risk of collision for Soprano pipistrelle and Common pipistrelle, whilst at Detector D4 a medium risk of collision for Soprano pipistrelle was identified. The significance of this impacts is representative of a moderate, long-term effect. This is based on the absence of roost sites in the vicinity of proposed wind farm site, the overall low value foraging habitats occurring at the proposed turbine locations and the overall low bat activity recorded for both species at the proposed wind farm site during monitoring. The potential for a moderate impact to the local populations of these species is also assigned with reference to changes in activity levels of these two species in the vicinity of turbines following their installation (Richardson et al., 2021).

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.

6.6.5 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 other

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:

- Connemara Bog Complex SAC & pNHA;
- Maumturk Mountains SAC & pNHA; and
- Lough Corrib SAC.

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:

- Connemara Bog Complex SAC;
- Maumturk Mountains SAC; and
- Lough Corrib SAC.

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 effects to 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. 1,117m³/month, or a net increase of 0.38% 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. Peatlands 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 blanket bog and heath 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 peatland 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 peat restoration (habitat enhancement) 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 ecology during the operation of the Development are largely as a result of existing drainage on the Site which could exacerbate peatland 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 6.16: Summary of Significant Effects before Mitigation

Potential significant effects during the construction phase on:	Potential significant effects during the operational phase on:
<ul style="list-style-type: none"> Designated sites (indirect effects) 	<ul style="list-style-type: none"> Designated sites (indirect effects)
<ul style="list-style-type: none"> Annex 1 habitats: blanket bog, wet heath, transition mire (direct and indirect effects) 	<ul style="list-style-type: none"> Watercourses and lake habitats (indirect effects)
<ul style="list-style-type: none"> Watercourses and lake habitats (indirect effects) 	<ul style="list-style-type: none"> Annex 2 species: Otters, Atlantic salmon, Artic Char (indirect effects)
<ul style="list-style-type: none"> Annex 2 species: Otters, Atlantic salmon, Artic Char (indirect effects) 	<ul style="list-style-type: none"> Other Aquatic species: fish species (indirect effects)
<ul style="list-style-type: none"> Other Aquatic species: fish species (indirect effects) 	<ul style="list-style-type: none"> Herpetofauna (indirect effects)
<ul style="list-style-type: none"> Herpetofauna (indirect effects) 	<ul style="list-style-type: none"> Watercourses and lake habitats (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 peat slip 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 Embedded Mitigation

The Development is the result of, and incorporates significant embedded mitigation to inform the minimisation of potential impacts during the design phase. This has included an initial design principle of maximising the extent of existing infrastructure and minimising the extent of works impacting on important conservation habitats. This has been achieved by incorporating the existing access track from the N59 into the proposed initial sections of the access track between the N59 and the proposed turbine T1; the positioning wherever possible of the Access Track and Turbine Hardstands and Foundations in areas of shallower peat to avoid impacts to priority lowland blanket bog habitat. Examples of where this has been achieved comprise the section of the Access Track between the substation and the turn to T5; the Access Track spur to the proposed turbine T2; the Access Track spur to T3; and the positioning of turbines T2; T3; T4 and T5 in areas of shallow peat.

In addition, the Development has been designed to avoid siting any proposed wind farm infrastructure or temporary construction phase infrastructure within the Ballycurke Lough Stream_SC_010 sub-catchment and the associated Corrib-Owenriff freshwater pearl mussel sensitive catchment.

6.7.2 Construction Phase Mitigation

6.7.2.1 Mitigation by Avoidance

6.7.2.1.1 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 four crossings within the Site, with

one (the crossing of the Owenwee River) comprising an upgrade to the existing crossing. 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 at the above three referenced locations. 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 Owenwee River.

6.7.2.1.2 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 6.7.2.2.2 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.

6.7.2.1.3 Protection of Important Habitats

The Development will result in the loss of areas of Annex I (and non-Annex I habitats), including 7130* Active Blanket Bog, 7130 Blanket Bog, 4010 Wet Heath and 7150 Transition Mire as. It is essential that the direct loss of any such 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).

6.7.2.1.4 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 an otter holt becomes established in the immediate vicinity of the proposed bridge crossing of the Owenwee River.

6.7.2.1.5 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.

6.7.2.1.6 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.]

6.7.2.2 Mitigation by Design

6.7.2.2.1 Protection of Annex 1 Blanket bog Habitats

In order to minimise the impact of the proposed Access Tracks that will traverse across blanket bog habitat, floated roads will be incorporated into the design of the Access Tracks. A general rule of thumb in the industry is for site tracks across peat greater than 1.5m deep to be floated using layers of geosynthetic materials and following the best construction practices and guidance as highlighted, for example, in the guidance produced by Forestry Civil Engineering (FCS) and Scottish Natural Heritage (SNH) (2010) "*Floating Roads on Peat*". The aim during floating road construction is to load the road slowly, to achieve a slow and steady settlement as the peat changes volume and water is forced out of the peat mass. This permits the peat to gradually compress and consolidate allowing time for it to gain in strength and take up the new load. Sufficient time must be allowed for the loading phases of the floating road and these loading phases must be carefully controlled in order to keep the stresses induced in the peat below the strength of the peat at the time. This prevents rapid peat failure which has been the cause of the creation of unsuccessful 'sinking' roads in the past.

In recent years a vast amount of experience on constructing floating roads has been gained from methods used in Scandinavian countries (e.g. Munro and MacCulloch, 2006) reporting on experience from the Roadex III Project), and from the experience of construction contractors working in difficult peatland habitats in northern Scotland. These methods have previously been brought together in the FCS and SNH (2006) guidance. When properly implemented these methods produce robust engineering and drainage solutions that cause minimal impact on peat hydrology.

Apart from engineering facility across soft terrain, floating roads are used to minimise potential effects on peat hydrology. Excavating and cutting into peat severs hydrological flow routes and cuts off the sources of water required to maintain peat bog vegetation communities. Well designed and constructed floating roads, with frequently spaced cross-drainage, permit diffuse drainage through the structure of the road throughout the life of the wind farm. It is important that vegetation communities on the upslope side of the road, supported by aerobic acrotelmic peat conditions, are not saturated, and lose their character, while vegetation communities on the downslope side of the road are not dried out through lack of water supply. Incorporation of diffuse drainage also prevents turbulent point sources which can cause erosion and damage vegetation communities.

A number of considerations for the Site have contributed to the choice of routing and design of floating road selection. These are:

- minimising length of peat or mire to be crossed;
- gradient – the shallowest gradients have been sought, using detailed LiDAR mapping. However a shallow gradient assists road drainage; and
- design – the construction method, drainage frequency and materials to be used (particularly the type of geogrid).

Since strength of peat in a deposit is seldom directly related to depth, peat depth was not a prime consideration in choice of routing for sections of floating road. Custom-designed floating road solutions will be used at the Development, which address the site-specific needs of each stretch of track. Where a gradient exists, the permanent drainage for floating roads will be designed with sufficient cross drainage to ensure hydrological connectivity from the upslope side to the downslope side. This will be especially important along the section of floated road that will be provided along the section of the access track in the vicinity of poor flush and transition mire habitat to the south of the proposed turbine T1. The construction and loading of stretches of floating road will progress in phases to allow time for settlement and equilibration of underlying peat, which is vital for long term maintenance of peat strength.

The design of the floating road will incorporate within-road cross drains in addition to culverts where the floated road will cross existing ditches or preferential flow paths. Beyond this, the selection of floated track sections will be made in advance of construction works, and following completion of detailed pre-construction design and with approval of ECoW, Geologist, Hydrologist, etc.

6.7.2.2.2 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, 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 (in **Appendix 2.1**) for the 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.

6.7.2.2.3 Prevention of Spread of Invasive Alien Species

The presence of the non-native invasive species *Rhododendron ponticum* within the proposed development site provides the potential for the spread of this species by the proposed works. This species is highly invasive and out-compete native flora to form mono-specific stands. Its 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 follow the NRA *Guidelines on the Management of Noxious Weeds and Non-Native Invasive Plant Species on National Roads* (NRA, 2010). A summary of the physical and chemical control measures for *Rhododendron ponticum* 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 *Rhododendron ponticum* on site.
- Triclopyr - during the active growth in late spring or summer. Spot treatment of stands of *Rhododendron ponticum* 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 (Regulation 50 has not yet been commenced). Invasive species listed under the Third Schedule of the European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. 477 of 2011). 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.

6.7.2.3 Mitigation by Reduction

6.7.2.3.1 Protection of important habitats

A site-specific CEMP will be implemented (to be developed from the CEMP in **Appendix 2.1**) 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.

During the construction phase, will be transferred to the spoil storage areas where it is will be used.

6.7.2.3.2 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.

6.7.2.4 Offsetting

6.7.2.4.1 Habitat restoration

The Site as well as the proposed spoil storage and restoration (habitat enhancement) area provide significant opportunities for habitat restoration and enhancement. A Habitat Management Plan is provided as **Appendix 6.5** and all measures set out in this plan will be implemented as part of the Development. The restoration of areas of cutover blanket bog within the proposed spoil storage area and the implementation of other measures such as the cessation of turbarry activity and the installation of drain blocks within the overall peat restoration (habitat enhancement) area will aim to achieve the restoration of approximately 6.5ha of cutover blanket bog as well as improving the water balance within an area of approximately 30ha of blanket bog habitat occurring within the peat restoration (habitat enhancement) area.

6.7.3 Operational Phase mitigation

6.7.3.1 Mitigation by Design

6.7.3.1.1 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 Geojute (or similar) matting will take place as soon 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.

6.7.3.1.2 Protection of Bats

Bats typically use woodland edge habitats for commuting and feeding purposes. Areas of conifer plantation should be felled in order to discourage bat species from flying close to turbines. Various publications provide guidelines on buffer zones surrounding turbines to reduce the favourability of the site for bat activity. Natural England Bats (England, 2014) recommend 50m buffers from blade tip to tree. (NIEA, 2021) recommends a minimum buffer of 100m between the turbines at the edge of commercial forestry where wind farms are proposed to be key-holed. It is noted that no key holing of conifer plantation will form part of the Development. The buffer zone from the edge of conifer plantation along the eastern boundary of the Site has been calculated (see **Appendix 6.2**) to be 104m. The proposed wind farm has been designed such that all turbines are positioned outside this buffer zone.

6.7.3.2 Mitigation by Reduction

6.7.3.2.1 Protection of Bats

Feathering of Blades

Turbines should 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. 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 from 30% to 90% (NIEA, 2021), (SNH, 2021), (Wellig S.D., 2018), (Rydell J., 2010), (Arnett, 2011) and (Baerwald, 2009).

As such, the feathering of blades to prevent 'idling' during low wind speeds is recommended for all turbines.

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 as per SNH (2021) guidelines (i.e. Leisler's bat, Soprano, Common and Nathusius' 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.

Due to the higher levels of activity identified at locations closest to edge ecology, increased cut-in speeds will be implemented from commencement of operation for turbines T1 and T2 (closest turbine locations to edge ecology). Cut-in speeds will be increased during the bat activity season (April-October) and/or where weather conditions are optimal for bat activity (see below) from 30 minutes prior to sunset and to 30 minutes after sunrise at all turbines. Cut-in speeds restrictions will be operated according to specific weather conditions:

1. When the air temperature is above approximately 10 to 11°C at nacelle height.
2. Generally, bat activity peaks at a wind speed range of 5.0 to 6.5m/s (at nacelle height).

Due to the considerable unnecessary down time resulting from the proposed 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.

6.7.3.3 *Offsetting*

6.7.3.3.1 **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 6.5**.

6.7.4 **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 peat or soil 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 environment 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 Owenwee River. Surveys to be completed will pay particular attention to identifying the presence/absence of otter holts/couches within 50m of the proposed wind farm infrastructure.

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 Galway 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 6.5**.

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 14 Ha to the footprint of the proposed wind farm. This will include a loss of approximately 3.95 Ha of lowland blanket bog; 0.64 Ha of cutover blanket bog; 0.35 Ha of degraded blanket bog and wet heath mosaic; 2.99 Ha of wet heath; 0.05 Ha of dry heath; and 5.68 Ha of wet heath/siliceous rock mosaic. The Habitat Management and Peatland Rehabilitation 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 of approximately 22.5 Ha of degraded and cutover blanket bog in the proposed Peat Storage and Restoration (Habitat Enhancement) Area as well as the ongoing management of a further area of c. 4.5 Ha of lowland blanket bog in this area. The plan also includes for the management of the habitats occurring within the proposed wind farm site. This amounts to approximately 150ha of peatland habitat comprised of lowland blanket bog, cutover and degraded blanket bog and heath habitats. A summary of the measures to be implement as part of the Habitat Management Plan is provided in **Table 6.17** below.

Table 6.18 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 6.16 below.

Table 6.17: Summary of Proposed Habitat Management and Peatland Rehabilitation & Biodiversity Receptors to be targeted

Management Element	Biodiversity Receptor		
	Habitats & Flora	Fauna	Water Quality
Restoration and maintenance of c. 173ha of peatland habitat at the proposed wind farm site and the proposed Peat Storage and Restoration (Habitat Enhancement) Area	✓	✓	
Prevention of Peat Cutting	✓	✓	✓
Blocking of Drainage Ditches	✓	✓	✓
Grazing Management	✓	✓	✓

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Table 6.18: 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 European Sites 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 pNHAs 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	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	No residual adverse effects

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Biodiversity Receptor	Impact	Significance	Probability	Mitigation	Residual Impact
		feature of interest will represent a significant effect		implementation of mitigation measures will negate the potential for this impact to arise.	
Peatland Habitats including blanket bog habitats and heath habitats	Loss of habitat to the footprint of the proposed wind farm.	Permanent loss of EU Annex 1 peatland habitats (see Table 6.15)	Certain	<p>Mitigation measures for habitats are set out under Section 6.7.2.1.3; 6.7.2.2.1 and 6.7.2.3.1.</p> <p>A Habitat Management Plan has been prepared. This includes for the restoration of approximately 22.5ha of cutover blanket bog and degraded blanket bog in the proposed Peat Storage and Restoration (Habitat Enhancement) Area as well as the restoration of approximately 15.5ha of cutover blanket bog and degraded blanket bog within the wind farm site.</p> <p>Ongoing management of lowland blanket bog and heath habitats within the wind farm site, amounting to an additional c. 135ha is also</p>	<p>Permanent loss of habitat to the footprint of the proposed wind farm (see Table 6.15).</p> <p>This will result in a significant, temporary impact on features of local to international importance.</p> <p>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 habitat to the footprint of the proposed wind farm through the provision of a net increase the area of</p>

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Biodiversity Receptor	Impact	Significance	Probability	Mitigation	Residual Impact
				included for as part of the Habitat Management Plan	peatland habitats at favourable conservation condition.
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.	Negligible
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 measures will negate the	Negligible

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Biodiversity Receptor	Impact	Significance	Probability	Mitigation	Residual Impact
				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.	Negligible
Bats	Potential impacts during the operation phase associated with the risk of fatalities posed by operating wind turbines to Common pipistrelle and Soprano pipistrelle.	Potential for moderate long-term impacts to the local 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.	Negligible
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.	Negligible

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Biodiversity Receptor	Impact	Significance	Probability	Mitigation	Residual Impact
				Implementation of mitigation measures set out in Section 6.7.2.1.6.	
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	Negligible

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