

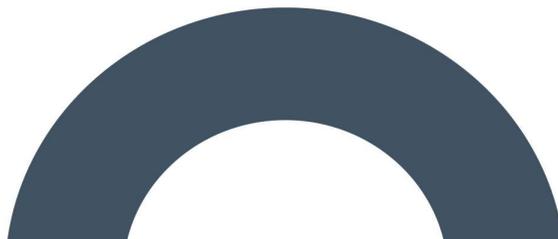
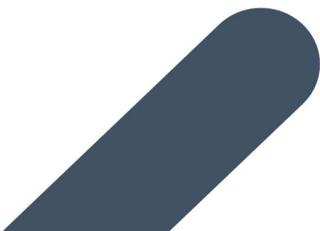
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Environmental Impact Assessment Report (EIAR)

Carrig Renewables Wind Farm

Chapter 6 - Biodiversity

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Prepared By: **MKO
Tuam Road
Galway
Ireland
H91 VW84**



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6. BIODIVERSITY

6.1 Introduction

This chapter assesses the likely significant effects (both alone and cumulatively with other plans and projects) that the proposed Carrig Renewables Wind Farm development (the “Proposed Development”) may have on Biodiversity, Flora and Fauna and sets out the mitigation measures proposed to avoid, reduce, or offset any potential significant effects that are identified. The residual impacts on biodiversity are then assessed. Particular attention has been paid to species and habitats of ecological importance. These include species and habitats with national and international protection under the Wildlife Acts 1976-2022 as amended, EU Habitats Directive 92/43/EEC. Impacts on avian receptors are considered in Chapter 7 of this EIAR. The full description of the Proposed Development is provided in Chapter 4 of this EIAR.

The chapter is structured as follows:

- The Introduction provides a description of the legislation, guidance, and policy context applicable to Biodiversity, Flora and Fauna.
- This is followed by a comprehensive description of the ecological survey and impact assessment methodologies that were followed to inform the robust assessment of likely significant effects on ecological receptors.
- A description of the Baseline Ecological Conditions and Receptor Evaluation is then provided.
- This is followed by an Assessment of Effects which are described with regard to each phase of the development: construction phase, operational phase and decommissioning phase. Potential Cumulative effects in combination with other plans and projects are also fully assessed.
- Proposed mitigation and best practice measures to avoid or reduce the identified effects are described and discussed. This is followed by an assessment of residual effects taking into consideration the effect of the proposed mitigation and best practice measures.
- The conclusion provides a summary statement on the overall significance of predicted effects on Biodiversity, Flora and Fauna.

The following defined terms are utilised in this chapter:

- For the purposes of this EIAR, the development and its component parts which is the subject of a proposed application for planning permission is referred to as the ‘Proposed Development’.
- For the purpose of this EIAR chapter, the term ‘EIAR Site Boundary’/ ‘Site Boundary’/ ‘site’ refers to the site boundary as shown in Figure 6-1.
- The term ‘development footprint’ is used to describe the lands that will be subject to the proposed infrastructure and associated construction works.
- “Key Ecological Receptor” (KER) is defined as a species or habitat occurring within the zone of influence of the development upon which likely significant effects are anticipated.
- “Zones of Influence” (ZOI) for individual ecological receptors refers to the zone within which potential effects are anticipated. ZOIs differ depending on the sensitivities of particular habitats and species and were assigned in accordance with best available guidance and through adoption of a precautionary approach.

Requirements for Ecological Impact Assessment

National Legislation

The Wildlife Act, 1976–2021 as amended, is the principal piece of legislation governing protection of wildlife in Ireland. The Wildlife Act provides strict protection for species of conservation value. The Wildlife Act conserves wildlife (including game) and protects certain wild creatures and flora. These species are therefore considered in this report as ecological receptors.

Natural Heritage Areas (NHAs) and Proposed Natural Heritage Areas (pNHAs) are heritage sites that are designated for the protection of flora, fauna, habitats, and geological sites. Only NHAs are designated under the Wildlife (Amendment) Act 2017. These sites do not form part of the Natura 2000 network of European sites and the AA process, or screening for same, does not apply to NHAs or pNHAs. Proposed Natural Heritage Areas (pNHAs) were published on a non-statutory basis in 1995 but have not since been statutorily proposed or designated¹ However, these sites are considered to be of significance for wildlife and habitats as they may form statutory designated sites in the future (NPWS, 2020).

The Flora (Protection) Order, 2022 (S.I. No. 235 of 2022) lists the species, hybrids and/or subspecies of flora protected under Section 21 of the Wildlife Acts. It provides protection to a wide variety of protected plant species in Ireland including vascular plants, mosses, liverworts, lichens and stoneworts. It is illegal to cut, pick, collect, uproot or damage, injure or destroy species listed or their flowers, fruits, seeds or spores or wilfully damage, alter, destroy or interfere with their habitat (unless under licence).

National Policy

The National Biodiversity Action Plan 2017-2021 (Department of Culture, Heritage and the Gaeltacht, 2017) (the “Plan”) demonstrates Ireland’s continuing commitment to meeting and acting on its obligations to protect Ireland’s biodiversity for the benefit of future generations through a series of targeted strategies and actions. The main objective of the Plan is to bring biodiversity into the mainstream of policy and decision-making. Objective 1 (*Mainstream biodiversity into decision-making across all sectors*) of the Plan identifies the following relevant measures in relation to future developments:

- “Incorporate into legislation the requirement for consideration of impacts on biodiversity to ensure that conservation and sustainable use of biodiversity are taken into account in all relevant plans and programmes and relevant new legislation;
- Public and Private Sector relevant policies will use best practice in SEA, AA and other assessment tools to ensure proper consideration of biodiversity in policies and plans;
- All Public Authorities and private sector bodies move towards no net loss of biodiversity through strategies, planning, mitigation measures, appropriate offsetting and/or investment in Blue-Green infrastructure;
- Strengthen ecological expertise in local authorities and relevant Government Departments and agencies;
- Local Authorities will review and update their Biodiversity and Heritage Action Plans;
- Local Authorities will review and update their Development Plans and policies to include policies and objectives for the protection and restoration of biodiversity;
- Develop Green Infrastructure at local, regional and national levels and promote the use of nature based solutions for the delivery of a coherent and integrated network;

¹ <https://www.npws.ie/protected-sites/nha> (accessed 19 November 2020).

- Continue to produce guidance on the protection of biodiversity in designated areas, marine and the wider countryside for Local Authorities and relevant sectors;
- Integrate Natura 2000 and Biodiversity financial expenditure tracking into Government Programmes internal paying agency management procedures including linkage to the Prioritised Action Framework and this NBAP;
- Develop a Natural Capital Asset Register and national natural capital accounts by 2020, and integrate these accounts into economic policy and decision-making;
- Initiate natural capital accounting through sectoral and small scale pilot studies, including the integration of environmental and economic statistics using the framework of the UN System of Experimental-Ecosystem Accounting (SEEA);
- Establish a national Business and Biodiversity Platform under the CBD's Global Business Partnership;
- Ensure Origin Green produces tangible benefits for biodiversity with increased emphasis on conservation and restoration of biodiversity;
- Implement actions from Ireland's Biodiversity Climate Change Sectoral Adaptation Plan;
- Identify and take measures to minimise the impact of incentives and subsidies on biodiversity loss, and develop positive incentive measures, where necessary, to assist the conservation of biodiversity;
- Establish and implement mechanisms for the payments of ecosystem services including carbon stocks, to generate increased revenue for biodiversity conservation and restoration;
- Develop and implement a National Biodiversity Finance Plan to set out in detail how the actions and targets of this NBAP will be delivered from 2017 and beyond; and
- Monitor the implementation of the Plan”

In addition, the National Biodiversity Data Centre (2021) Pollinator-friendly management of Wind Farms identifies an evidence-based action plan for wind farm operators that can help pollinators by employing changes to existing management strategies.

Such policies have informed the evaluation of ecological features recorded within the study area and the ecological assessment process. Pollinator friendly measures have been incorporated into the Proposed Development and these are detailed within the Biodiversity Mitigation and Enhancement Plan (BMEP) (see Appendix 6.4).

European Legislation

The EU Habitats Directive (92/43/EEC) (together with the Birds Directive (79/409/EEC), as subsequently codified by Council Directive 2009/147/EC on the conservation of wild birds) forms the cornerstone of Europe's nature conservation within the EU. It is built around two pillars: the Natura 2000 network of protected sites and the strict system of species protection. The Habitats Directive protects over 1,000 animal and plant species and over 200 "habitat types" (e.g., special types of forests, meadows, wetlands, etc.), which are of European importance. The Habitats Directive and Birds Directive, which were transposed into Irish law through Part XAB of the Planning and Development Acts 2000-2019 (from a land use planning perspective) recognise the significance of protecting rare and endangered species of flora and fauna, and more importantly, their habitats.

Annex I of the Habitats Directive lists habitat types whose conservation requires the designation of Special Areas of Conservation (SAC). Priority habitats, such as Turloughs, which are in danger of disappearing within the EU territory are also listed in Annex I. Annex II of the Directive lists animal and plant species (e.g. marsh fritillary, Atlantic salmon, and Killarney fern) whose conservation also requires the designation of SAC. Annex IV lists animal and plant species in need of strict protection such as lesser horseshoe bat and otter, and Annex V lists animal and plant species whose taking in the wild and exploitation may be subject to management measures. In Ireland, species listed under Annex V include Irish hare, common frog and pine marten. Species can be listed in more than one Annex, as is the case with otter and lesser horseshoe bat which are listed on both Annex II and Annex IV.

The disturbance of species under Article 12 of the Habitats Directive (and in particular avoidance of deliberate disturbance of Annex IV species, particularly during the period of breeding, rearing, hibernation and migration and avoidance of deterioration or destruction of breeding sites or resting places) has been specifically assessed in this EIAR.

Council Directive 2009/147/EC on the conservation of wild birds (the “**Birds Directive**”) instructs Member States to take measures to maintain populations of all bird species naturally occurring in the wild state in the EU (Article 2). According to Recital 1 of the Birds Directive, Council Directive 79/409/EEC on the conservation of wild birds was substantially amended several times and in the interests of clarity and rationality, the Birds Directive codifies Council Directive 79/409/EEC. Such measures may include the maintenance and/or re-establishment of habitats in order to sustain these bird populations (Article 3). A subset of bird species has been identified in the Directive and are listed in Annex I as requiring special conservation measures in relation to their habitats. These species have been listed on account of inter alia: their risk of extinction; vulnerability to specific changes in their habitat; and/or due to their relatively small population size or restricted distribution. Special Protection Areas (SPAs) are to be identified and classified for these Annex I listed species and for regularly occurring migratory species, paying particular attention to the protection of wetlands (Article 4).

In summary, the species and habitats provided National and International protection under these legislative and policy documents have been considered in this Ecological Impact Assessment. A detailed assessment of the likelihood of the Proposed Development having either a significant effect or an adverse impact on any relevant European Sites (i.e., SACs, cSACs, SPAs or cSPAs) has been carried out in the Appropriate Assessment Screening Report and Natura Impact Statement. A separate assessment has not been carried out in this chapter, to avoid duplication of assessments. However, the relevant conclusions have been cross-referenced and incorporated.

6.3

Relevant Guidance

The assessment methodology follows that described in the National Road Authority (NRA)’s Guidelines for Assessment of Ecological Impacts of National Road Schemes Rev 2 (NRA, 2009) (referred to hereafter as the NRA Ecological Impact Assessment Guidelines), and the survey methodology follows that described in the NRA Guidelines on Ecological Surveying Techniques for Protected Flora and Fauna on National Road Schemes (NRA, 2009). Although these survey methodologies relate to road schemes, these standard guidelines are recognised survey methodologies that ensure good practice regardless of the development type.

In addition, the following guidelines were consulted in the preparation of this document to inform the scope of the assessment as well as the structure and content of this report:

- Guidelines for Ecological Impact Assessment in the UK and Ireland. Terrestrial, Freshwater, and Coastal (CIEEM, 2018, updated 2022).
- SNH (2019) ‘Bats and onshore wind turbines: survey, Assessment and mitigation’
- NatureScot (2021). Bats and onshore wind turbines: survey, assessment, and mitigation. Version: August 2021 (updated with minor revisions).
- Guidelines on the information to be contained in Environmental Impact Statements (EPA, 2022).
- Guidelines for Planning Authorities and An Bord Pleanála on Carrying out Environmental Impact Assessment. Department of the Environment, Community and Local Government DoEHLG (2013).
- Guidelines for assessment of Ecological Impacts of National Road Schemes, (NRA, 2009).
- Environmental Impact Assessment of National Road Schemes – A Practical Guide (NRA, 2009).
- Environmental Assessment and Construction Guidelines (NRA, 2006).

- Draft Advice Notes on Current Practice (in preparation of Environmental Impact Statements) (Environmental Protection Agency (EPA), 2003).
- Advice Notes on Current Practice (in preparation of Environmental Impact Statements) (Environmental Protection Agency (EPA), 2003).
- Guidelines on the information to be contained in Environmental Impact Statements (EPA, 2002).
- European Commission Guidance on the preparation of the Environmental Impact Assessment Report (2017)
- European Commission Guidance document on wind energy developments and EU nature legislation (2020)

This assessment has been carried out in accordance with the Environmental Impact Assessment guidance as outlined in Chapter 1 of the EIAR.

In addition to the above, the following legislation applies with respect to habitats, fauna and water quality in Ireland and has been considered in the preparation of this report:

- The International Convention on Wetlands of International Importance especially Waterfowl Habitat (Concluded at Ramsar, Iran on 2 February 1971)
- S.I. No. 272 of 2009: European Communities Environmental Objectives (Surface Waters) Regulations 2009 and S.I. No. 722 of 2003 European Communities (Water Policy) Regulations 2003 which give further effect to EU Water Framework Directive (2000/60/EC).

The following legislation applies with respect to non-native species:

- Regulation 49 and 50 of European Communities (Birds and Natural Habitats) Regulations 2011 (SI 477 of 2011).

This assessment has been prepared with respect to the various planning policies and strategy guidance documents listed below:

- Tipperary County Development Plan 2022-2028
- Offaly County Development Plan 2021-2027
- National Biodiversity Action Plan 2017-2021
- Draft National Biodiversity Action Plan 2023-2027

6.3.1 Statement of Authority

This report has been prepared by Cora Twomey (BSc.) and Rachel Walsh (BSc. Env). Rachel is an experienced ecologist with over 3 years' professional experience in ecological assessment. Cora has over 1 years' experience in ecological assessment. Field assessments were conducted by MKO ecologists Cathal Bergin (BSc. Wildlife Biology), Cora Twomey (BSc), Brónagh Boylan (BSc), Neansaí O' Donovan (BSc. Wildlife Biology) and Rachel Walsh (BSc. Env).

This report has been reviewed by John Hynes. (BSc., MSc., MCIEEM). John has over 10 years' experience in ecological management and assessment.

6.4 Methodology

Assessing the impacts of any project and associated activities requires an understanding of the ecological baseline conditions prior to and at the time of the project proceeding. Ecological baseline conditions are those existing in the absence of proposed activities (CIEEM, 2018, updated 2022).

The following sections outline the methodologies utilised to establish the baseline ecological condition of the Proposed Development site.

6.4.1 Desk Study

The desk study undertaken for this assessment included a thorough review of available ecological data including the following:

- Review of NPWS Article 17 maps 2019, 2013 and 2007.
- Review of online web-mappers: National Parks and Wildlife Service (NPWS), EPA (Envision), Water Framework Directive (WFD) and Inland Fisheries Ireland (IFI).
- Inland Fisheries Ireland (IFI) Reports, where available.
- Data on potential occurrence of protected bryophytes – as per NPWS online map viewer; Flora Protection Order Map Viewer – Bryophytes².
- Review of relevant Plans, including the National Biodiversity Action Plan 2017-2021, Draft National Biodiversity Action Plan 2023-2027 the All Ireland Pollinator Plan 2021-2025.
- Review of the Bat Conservation Ireland (BCI) Private Database.
- Review of the publicly available National Biodiversity Data Centre (NBDC) web-mapper.
- Records from the NPWS web-mapper and review of specially requested records from the NPWS Rare and Protected Species Database for the hectads in which the Proposed Development is located.
- Review of the EIS/ EIARs prepared for other plans and projects occurring in the wider area. Potential for in-combination effects have been considered in Chapter 2 of this EIAR and Section 6.8 of this Chapter.

6.4.2 Scoping and Consultation

MKO undertook a scoping exercise during preparation of this EIAR, as described in Chapter 2 of this EIAR.

Copies of all scoping responses are included in Appendix 2.1 of this EIAR. The recommendations of the consultees have informed the EIAR preparation process and the contents of this chapter. Table 2.4 in Chapter 2 of this EIAR describes where the comments raised in the scoping responses received have been addressed in this assessment. Table 6-1 provides a list of the organisations consulted with regard to biodiversity during the scoping process, their comments were fully considered in the preparation of this chapter.

² NPWS, 2019, Online map viewer; Flora Protection Order Map Viewer – Bryophytes. Online, Available at: <http://dahg.maps.arcgis.com/apps/webappviewer/index.html?id=71f8df33693f48edbb70369d7fb26b7e>, Accessed: 15/08/2023.

Table 6-1 Organisations consulted with regard to biodiversity

Consultee	Response Yes/No	Response Details	Report Section where Comments are Addressed
An Taisce	No response received to date	Receipt of scoping document confirmed	-
Bat Conservation Ireland	Response received 08/05/2023	Bat Conservation Ireland is a small wildlife charity and do not have the administrative capacity to review documents relating to planning applications. Please ensure that all bat surveying is undertaken according to best practice guidelines pertaining to onshore wind farms and general bat survey guidelines.	All bat surveys have been carried out according to relevant survey guidelines as detailed in the Bat Report (Appendix 6-2)
BirdWatch Ireland	No response received to date	-	-
Department of Housing, Local Government and Heritage (NPWS)	Response received 09/05/2023	<p><i>The Proposed Development site is part of an ecological corridor connecting a range of ecologically valuable sites which currently are separated by only small margins. The development of the site would reduce connectivity and damage future potential to restore habitats and improve ecological connectivity. The European Union's Biodiversity strategy for 2030 proposes that member states take effective restoration measures to restore degraded ecosystems. This Department owns a significant area of adjoining undesignated peatland at Sharragh and has already carried out habitat restoration measures there and intends carrying out further habitat restoration in the future. Some of these measures make the area attractive to wildfowl which could be impacted by the proposal. A development of the type proposed And associated infrastructure would reduce the extent of natural habitat in the area and limit potential to restore wetland habitats there in the future.</i></p> <p><i>While impacts on surface water may be obvious potential impacts on</i></p>	<p>The assessment of impacts to adjacent peatland habitats and designated sites via groundwater pathways and future rewetting potential is assessed in Section 6.7.2.1.2 and 6.7.5.1.</p> <p>The potential for impacting future opportunities for rewetting cutover bog habitats within the site is provided in Section 6.7.3.1.2.</p> <p>The assessment of impacts on wildfowl is provided in Chapter 7 of this EIAR, 'Ornithology'.</p>

Consultee	Response Yes/No	Response Details	Report Section where Comments are Addressed
		<p><i>groundwater are less so and will require detailed examination. This Department is concerned that deep excavations could potentially damage a confining layer leading to loss of groundwater from the adjoining designated raised bog sites.</i></p> <p><i>If the development proceeds it will cause the direct destruction of significant volumes of peat and cause direct release of green-house gas but less directly it is likely to lead to further drainage of adjoining peat and be a barrier to future rewetting of the site that would stop carbon loss to the atmosphere and simultaneously create important habitat. The Department recommends that in addition to standard assessments the ecological assessment also considers whether if the development were to proceed it would limit future potential to rewet the area of peatland and what measures could be taken to prevent this. An assessment should be made of the green-house gases likely to be released by the proposed works and an assessment of the carbon release that could be prevented through rewetting of the site. The potential of the development to limit restoration of adjoining wetland sites through water retention measures should also be assessed.</i></p> <p>The Department also expressed concern for the proximity of the development to wintering populations of wildfowl, in particular Whooper Swan and Greenland White-fronted Goose.</p> <p><i>In summary while the exact proposed site itself is not specifically designated as a formal conservation area, it is very close to and in our view supporting nearby designated conservation areas. The physical and ecological nature of the site also makes it a likely ecological link</i></p>	

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Consultee	Response Yes/No	Response Details	Report Section where Comments are Addressed
		<p><i>between designated sites and it offers significant potential for future ecological connection and restoration in addition to carbon storage. The potential to impact on wildfowl movements in the area is also of concern. For these nature conservation reasons the Department considers this a poor choice of location for such a development.</i></p>	
<p>Inland Fisheries Ireland</p>	<p>Response received 23/09/2022</p>	<p>The main concerns are in relation to the protection of aquatic resource and associated riparian habitat, in particular of the Faddan Beg stream which flows into the Little Brosna River.</p> <ol style="list-style-type: none"> 1. All watercourses that will receive drainage from the construction sites of the turbines or the access roads must be assessed in terms of aquatic biodiversity with particular emphasis on fish, the food of fish, spawning grounds and fish habitat in general. In this regard changes to river morphology should be avoided. 2. We are concerned about soils, their structure and types around all the turbines, turbine pads, associated access roads and site development. In particular we have concerns about the stability of the soils and the impact that works on both the turbines and access roads may have either directly or by vibration on the stability of the soils. IFI are particularly concerned where it is proposed to construct wind turbines on peat soils especially if these peat soils are located on upland areas. Extra caution will be required to prevent deleterious discharges to waters. 3. Of concern to IFI is that the Proposed Development will necessitate the continuation of the current drainage/watercourse management scheme, thereby preventing future restoration of the 	<p>Mitigations with regard to protection of water quality and fisheries habitats during construction and operation of the Proposed Development are provided in Section 6.7.2.1.1 and 6.7.3.1.1.</p>

Consultee	Response Yes/No	Response Details	Report Section where Comments are Addressed
		<p>bog complex. Additionally, IFI are concerned with the proposed peat stripping of the site and the re-use of this material within the development and the potential for significant nutrient loss from this activity. Any proposed mitigation measures should focus not solely on suspended solids but also on dissolved nutrients such as ammonia that are lost from desiccated peat.</p> <p>4. IFI strongly recommends that specialist personnel are employed to assess soil strength and suitability of the ground at each site and along any proposed access road. This is particularly important in relation to peat soils. From our experiences we will have serious difficulties with developments on peat soils where there is excessive slope and/or where the peat depth exceeds one metre. Excessive slopes will be an issue with all wind farm proposals regardless of soil type. The potential for soil movement and landslides should be assessed fully within the EIS.</p> <p>5. 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.</p> <p>6. 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 is available in any settlement pond to ensure no deleterious matter is discharged to</p>	

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Consultee	Response Yes/No	Response Details	Report Section where Comments are Addressed
		<p>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. 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 during intense precipitation events where the trap may become 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.</p> <p>7. We have concerns about the construction of roads as these will tend to provide preferential flow paths for surface waters. Considerable attention must be paid 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 these and interfering with the sustained flow of water particularly during dry weather. This should be avoided.</p> <p>8. Consideration must be given to the disposal of waste materials such that they will not give rise to discharges to waters. In terms of risk, the placing of soils on watercourse-adjacent ground should not be permitted unless the area has been the subject of a risk assessment. This is of particular concern where peat</p>	

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Consultee	Response Yes/No	Response Details	Report Section where Comments are Addressed
		<p>soils are encountered. Furthermore drainage from disturbed and stockpiled soils will have to be considered in advance. It may be necessary to carry out soil stockpiling operations in confined areas only and to ensure vegetation/covering of the soils to prevent wash-out.</p> <p>9. Details in relation to site offices and the services necessary for the site offices should form part of the EIA. In addition, 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 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.</p> <p>10. The use of sedimentary rocks, such as shale, in road construction should be avoided. This type of material has poor tensile strength and is liable to be crushed by heavy vehicles thereby releasing fine sediment materials into the drainage system which are difficult to precipitate and may give rise to water pollution. We recommend that specialist expertise should advise on the type of material required for road construction bearing in mind the pressures that will arise during the construction phase and the necessity to avoid pollution due to fines washing out into the roadside drainage.</p> <p>11. In relation to watercourse crossings for the road or grid connection please be advised that IFI will require to be consulted well in</p>	

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Consultee	Response Yes/No	Response Details	Report Section where Comments are Addressed
		<p>advance in relation to all watercourse crossings 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 IFI. 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> <p>12. Please also note that any instream works or other works which may impact directly on a watercourse should only be carried out during the open season which is from 1st July to 30th of September in each year (so as to avoid impacting on the aquatic habitat during the spawning season.) It would be important that appropriate scheduling of works is allowed for.</p> <p>13. The EIAR should indicate proposals to monitor the impact on watercourses within the site. In the event that environmental damage to the aquatic habitat and associated riparian zone is caused, the EIAR should indicate the steps that may be taken to rectify any damage to the aquatic habitat including liaison with the appropriate authorities.</p> <p>14. In relation to wind farm structures and infrastructure it is important that a sufficient bank side riparian zone is maintained to absorb and attenuate overland flows. In deciding the extent of this riparian zone the following factors would be important:</p> <ul style="list-style-type: none"> ➤ Type of soil and its depth and strength ➤ Stock piling or spreading of spoil on unstable soils especially if the soil is peat with a depth greater than 1meter thick. (Geotec. survey and assessment at 	

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Consultee	Response Yes/No	Response Details	Report Section where Comments are Addressed
		<p>every stage of operation is essential)</p> <ul style="list-style-type: none"> ➤ Degree or extent of the slope. ➤ Variations in the topography that will give rise to point flows (keep flow as diffuse as possible). ➤ Extent and nature of catchment above the area of operation. In particular meticulous care should be paid to avoid interfering with the catchment and altering the direction of flow, perhaps to another catchment. ➤ The importance of the watercourse and downstream waters in fisheries and biodiversity terms. ➤ The extent and proven efficacy of water treatment in relation to the structure. <p>Should works be approved a finalised CEMP must be agreed with Inland Fisheries Ireland before works commence.</p>	
Irish Peatland Conservation Council	No response received to date	-	
Irish Wildlife Trust	No response received to date	-	
Heritage Officer- Offaly County Council	No response received to date	-	
Heritage Officer- Tipperary County Council	No response received to date	-	

Consultee	Response Yes/No	Response Details	Report Section where Comments are Addressed
The Heritage Council	No response received to date	-	

6.4.3 Field Surveys

Comprehensive surveys of the biodiversity of the entire site were undertaken on various dates during 2022 and 2023 as detailed below. The following sections fully describe the ecological surveys that have been undertaken and provide details of the methodologies, dates of survey and guidance followed.

6.4.3.1 Multi-disciplinary Walkover Surveys (as per NRA Guidelines, 2009)

Multidisciplinary walkover surveys were undertaken on the 10th August 2022, 8th September 2022, 10th February 2023, 13th June 2023, 29th June 2023, 12th of July 2023 and 11th August 2023. Excluding the February visit, the habitat surveys of the Site covered the recognised optimum period for vegetation surveys/habitat mapping, i.e. April to September (Smith *et al.*, 2011). A comprehensive walkover of the entire site was completed with incidental records also incorporated from other dedicated species/habitat specific surveys including for otter, bats, aquatic invertebrate surveys and quadrat surveys.

The walkover surveys were also designed to detect the presence, or likely presence, of a range of protected species. The survey included a search for badger setts and areas of suitable habitat, potential features likely to be of significance to bats and additional habitat features for the full range of other protected species that are likely to occur within the vicinity of the Proposed Development (e.g. otter). In addition, an inventory of other species of local biodiversity interest was compiled including invertebrates (butterflies, dragonflies, damselflies, beetles), plants, fungi etc.

The multi-disciplinary walkover surveys comprehensively covered the lands within the EIAR Site Boundary and based on the survey findings, further detailed targeted surveys were carried out for features and locations of ecological significance. These surveys were carried out in accordance with NRA *Guidelines on Ecological Surveying Techniques for Protected Flora and Fauna* on National Road Schemes (NRA, 2009).

During the multidisciplinary surveys, a search for Invasive Alien Species (IAS) listed under the Third Schedule of the European Communities Regulations 2011 (S.I. 477 of 2015) was conducted.

Other targeted survey methodologies undertaken at the site are described in the following subsections.

6.4.3.2 Dedicated Habitat and Vegetation Composition Surveys

All habitats recorded on site and described in this EIAR chapter have been classified in accordance with Fossitt (2000). In addition, peatland habitats outside of the proposed development footprint but within the EIAR Site Boundary are described in detail in this chapter. Full details of all the botanical surveys and results are provided in Appendix 6.1 and an assessment of the potential for the EIAR Site Boundary to support Annex I habitats is also provided in this Appendix.

Botanical surveys of the EIAR Site Boundary were also undertaken throughout multidisciplinary walkover surveys carried out in 2022 and 2023. These surveys provided an understanding of the baseline and informed further survey work following finalisation of the Proposed Development layout.

The habitat assessment surveys described in this report have been undertaken in accordance with the following guidelines and interpretation documents:

- Smith, G.F. & Crowley, W. (2020) The habitats of cutover raised bog. Irish Wildlife Manuals, No. 128. National Parks and Wildlife Service, Department of Housing, Local Government and Heritage, Ireland. Version 2.0. Irish Wildlife Manuals, No. 79. National Parks and Wildlife Service.
- Commission of the European Communities (2013) *Interpretation manual of European Union habitats*. Eur 27. European Commission DG Environment.
- Foss, P.J. & Crushell, P. 2008, *Guidelines for a National Fen Survey of Ireland, Survey Manual*. Report for the National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government, Ireland.
- NPWS (2019) The Status of EU Protected Habitats and Species in Ireland. Habitat Assessments Volume 1. Version 1.1. Unpublished Report, National Parks and Wildlife Services. Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland.
- NPWS (2019). The Status of EU Protected Habitats and Species in Ireland. Volume 2: *Habitat Assessments*. Unpublished NPWS report. Edited by: Deirdre Lynn and Fionnuala O'Neill.
- Martin, J.R., O'Neill, F.H. & Daly, O.H. (2018), *The monitoring and assessment of three EU Habitats Directive Annex I grassland habitats*. Irish Wildlife Manuals, No. 102. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht, Ireland.
- O'Neill, F.H., Martin, J.R., Devaney, F.M. & Perrin, P.M. (2013), *The Irish semi-natural grasslands survey 2007-2012*. Irish Wildlife Manuals, No. 78. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Ireland.
- Perrin, P., Martin, J., Barron, S., O'Neill, F., McNutt, K. & Delaney, A. (2008) National Survey of Native Woodlands 2003-2008. Unpublished report submitted to National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government, Dublin

Plant nomenclature for vascular plants follows 'New Flora of the British Isles' (Stace, 2010), while mosses and liverworts nomenclature follows 'Mosses and Liverworts of Britain and Ireland - a field guide' (British Bryological Society, 2010).

6.4.3.2.1 Vegetation composition assessment

Detailed habitat classification and assessment was undertaken by MKO at targeted locations within the development footprint, with relevés undertaken in 2023 within representative habitats at each turbine base, repository areas, met mast, construction compounds and substation (including battery storage facility). The extent of each habitat on site was mapped using aerial photography, handheld GPS and smartphone technology. A representative photograph was also taken for each of the habitats recorded on site, including all relevés. The location of all quadrats is shown in Figure 6-1.

The survey results were then analysed in accordance the Irish Vegetation Classification (IVC) system. The IVC is a project with aims to classify, describe, and map in detail all aspects of natural and semi-natural vegetation in Ireland within a single, unified framework. The National Vegetation Database (NVD), upon which the IVC is based, holds data for over 30,000 relevés and is the core resource upon which the classification system is based.

A fundamental requirement of the IVC is to "aid in definition and **identification** of EU Habitat Directive (92/43/EEC) Annex I habitats" and to 'inform the planning process, for example through environmental impact assessments'.

The Engine for Relevés to Irish Communities Assignment (ERICA)³ is a web application for assigning vegetation data to communities defined by the Irish Vegetation Classification (IVC). Data can be

³ Perrin, 2019, ERICA – Engine for Relevés to Irish Communities Assignment V5.0 User's Manual, Online, Available at: https://biodiversityireland.shinapps.io/vegetation-classification/w_9cd4889a/manual.pdf, Accessed: 10.11.2020

uploaded, checked for errors, and analysed and the results can then be downloaded. ERICA works with both quantitative vegetation cover data (such as are recorded in relevés and other types of botanical recording plots) and presence/absence data, such as species lists. ERICA covers grasslands, woodland, duneland, heaths, bogs, fens, mires, freshwater, saline waters, rocky habitats, scrub, strandline, saltmarsh and weed communities (Perrin, 2019).

The data collected from the botanical assessments was uploaded to ERICA, analysed and the results data downloaded.

The analysis procedure uses a clustering process to assign classification affinity to vegetation plots based on a degree of membership to each of the communities defined by the IVC. Table 6-2 details the categorizing types of plots utilizing the clustering analysis. This categorizing procedure was utilized to determine if the Relevés within the study area had any affinity to Annex I habitats and whether further assessment was required.

Table 6-2 Categorising types of plots using clustering analysis (after Wisser & de Cáceres, 2013).

Plot Type	Definition
Assigned	The plot has membership ≥ 0.5 for one of the vegetation communities and therefore relates to the core definition of that vegetation community.
Unassigned	The plot has membership ≥ 0.5 for the noise class and is poorly represented by the current classification scheme
Transitional	The plot has membership < 0.5 for all vegetation communities and for the noise class. It falls within the scope of the current classification scheme but does not relate to the core definition of any of the vegetation communities.

Habitats considered to be of ecological significance and in particular having the potential to correspond to those listed in Annex I of the EU Habitats Directive 92/43/EEC were identified and classified as Key Ecological Receptors (KERs).

6.4.3.3 Fauna Surveys

The results of the desk study, scoping replies and incidental records of protected species recorded during multidisciplinary walkover surveys were all used to inform the scope of targeted ecological surveys required. Based on these findings dedicated surveys for bats, otter and badger were undertaken at the times set out below following the methodologies also provided below. Following the completion of ecological walkover surveys, no requirement for further dedicated faunal surveys was identified. During the multidisciplinary walkover surveys, records of invertebrates including butterflies, damselflies, dragonflies, moths, beetles etc. were recorded. As suitable marsh fritillary habitat was identified following initial site visits and based on records in the wider area following the desk study, dedicated marsh fritillary butterfly surveys were deemed necessary.

6.4.3.3.1 Badger Survey

Dedicated badger surveys were conducted on the 10th of August 2022, 10th of February 2023, 13th June 2023, 29th June 2023, and 12th of July 2023. In addition, records of any badger activity within the study area were also recorded during other faunal and habitat surveys of the site. The badger surveys covered the entire development footprint and surrounding boundary hedgerows/treelines. The site was systematically searched for signs of badger, incidental setts, prints, latrines, foraging signs, or sightings. If encountered, setts were classified as per the convention set out in NRA (2009) (i.e., main, annexe, subsidiary, outlier). The badger survey was not constrained by vegetation given the nature of the habitats within the site and the timing of the surveys (NRA 2006a).

The badger survey was conducted adhering to best practice guidance (NRA, 2009) and followed the 'Guidelines for the Treatment of Badger Prior to the Construction of National Roads Schemes' (NRA, 2006a) and following CIEEM best practice competencies for species surveys (CIEEM, 2013⁴).

6.4.3.3.2 Otter Survey

Following a review of the initial site walkover ecological surveys for constraints identification and the results of the multi-disciplinary walkover survey, areas identified as providing potential habitat for otter were subject to specialist targeted survey. The otter survey of watercourses was conducted on the 10th of August 2022, 10th of February 2023, 13th June 2023, 29th June 2023 and 12th of July 2023. Otter surveys of watercourses downstream of the Proposed Development site were also carried out in September 2022 as detailed in the Aquatic Baseline Report in Appendix 6-3.

The otter surveys were conducted as per NRA (2009) guidelines (Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes). This involved a search for all otter signs e.g., spraints, scat, prints, slides, trails, couches and holts. In addition to the width of the rivers/watercourses, a 10m riparian buffer (both banks) was considered to comprise part of the otter habitat (NPWS 2009). The dedicated otter surveys also followed the guidance as set out in NRA (2008) 'Guidelines for the Treatment of Otters Prior to the Construction of National Roads Schemes' and following CIEEM best practice competencies for species surveys (CIEEM, 2013).

6.4.3.3.3 Bats

A detailed bat survey report is provided in Appendix 6-2 of this EIAR. This document provides a detailed description of all survey methodologies as undertaken at the site during the period 2022-2023. Full details of the survey times and dates and the methodologies followed are provided in the Bat Report, included as Appendix 6-2, along with details of all the surveyors.

⁴ CIEEM, 2013, *Technical Guidance Series – Competencies for Species Survey*, Online, Available at: <https://cieem.net/resource/competencies-for-species-survey-css/> Accessed: 20.08.2023

Habitat suitability for bats was assessed according to Collins (2016), which provides a grading protocol for roosting habitats and for commuting and foraging areas. All further bat activity and roost surveys were undertaken in strict accordance with those prescribed in SNH (2019) ‘*Bats and onshore wind turbines: survey, Assessment and mitigation*’. This is in line with standard best practice industry guidelines.

6.4.3.3.4 **Marsh fritillary surveys**

Following the identification of suitable habitat for marsh fritillary within the site during habitat surveys, targeted surveys for the species were undertaken on 8th September 2022. The survey methodology followed that described in the NRA (2009) best practice guidance document. This involved walked surveys to identify suitable areas of marsh fritillary habitat within or adjacent to the development footprint. Where suitable habitat did occur, detailed surveys to locate larval webs were undertaken. In addition, habitat suitability assessments were undertaken within areas of suitable habitat for the species following those developed by the NBDC⁵.

6.4.3.3.5 **Aquatic surveys**

The small streams that flow off the site of the Proposed Development, and downstream watercourses, were subject to biological evaluation and assessment through kick sampling, fish stock assessment (electro-fishing) and white-clawed crayfish surveys between the 9th to 11th September 2022. Full details of the results of these surveys are provided in Appendix 6.3.

The survey included a general habitat assessment and biological water quality assessment at watercourses within or downstream of the ELAR study area boundary. The water quality, as per Q-value (Quality Rating System)⁶, is fully described in Appendix 6.3. Biological water quality was assessed through kick-sampling each of these watercourses. Macro-invertebrate samples were converted to Q-ratings as per Toner et al. (2005). The applied Q ratings followed the EPA water quality classes and Water Framework Directive status categories. All riverine samples were taken with a standard kick sampling hand net (250mm width, 500µm mesh size) from areas of riffle/glide utilising a two-minute sample, as per ISO standards for water quality sampling (ISO 10870:2012). Large cobble was also washed at each site where present. The results of the surveys are provided in Aquatic Baseline Report in Appendix 6.3.

Aquatic plant species protected under Flora (Protection) Order, 2022 (S.I. No. 235 of 2022) were searched for during all aquatic surveys.

6.4.3.3.6 **Invasive species survey**

During the multi-disciplinary walkover surveys, a search for non-native invasive species was undertaken. The survey focused on the identification of invasive species listed under the Third Schedule of the European Communities (Birds and Natural Habitats) Regulations 2011 (As Amended) (S.I. 477 of 2015).

⁵ NBDC, 2020, *Habitat Condition Assessment for Marsh Fritillary*, Online, Available at: <http://www.biodiversityireland.ie/wordpress/wp-content/uploads/Marsh-Fritillary-Habitat-Condition-Form.pdf>, Accessed, 20 August 2023

⁶ Toner, P., Bowman, J., Clabby, K., Lucey, J., McGarrigle, M., Concannon, C., & MacGarthaigh, M. (2005). *Water quality in Ireland*. Environmental Protection Agency, Co. Wexford, Ireland.

6.4.4 Methodology for Assessment of Impacts and Effects

6.4.4.1 Identification of Target Receptors and Key Ecological Receptors

The methodology for assessment followed a precautionary screening approach with regard to the identification of Key Ecological Receptors (KERs). Following a comprehensive desk study, site visits were undertaken on the dates listed in Section 6.4.3.1 and “Target receptors” likely to occur in the zone of influence of the development were identified. The target receptors included habitats and species that were protected under the following legislation:

- Annexes of the EU Habitats Directive
- Qualifying Interests (QI) of Special Areas of Conservation (SAC) within the likely zone of impact.
- Species protected under the Wildlife Acts 1976-2022
- Species protected under the Flora Protection Order 2022

6.4.4.2 Determining Importance of Ecological Receptors

The importance of the ecological features identified within the study area was determined with reference to a defined geographical context. This was undertaken following a methodology that is set out in Chapter 3 of the ‘Guidelines for Assessment of Ecological Impacts of National Roads Schemes’ (NRA, 2009). These guidelines set out the context for the determination of value on a geographic basis with a hierarchy assigned in relation to the importance of any particular receptor. The guidelines provide a basis for determination of whether any particular receptor is of importance on the following scales:

- International
- National
- County
- Local Importance (Higher Value)
- Local Importance (Lower Value)

The Guidelines clearly set out the criteria by which each geographic level of importance can be assigned. Locally Important (lower value) receptors contain habitats and species that are widespread and of low ecological significance and of any importance only in the local area. Internationally Important sites are either designated for conservation as part of the Natura 2000 Network (SAC or SPA) or provide the best examples of habitats or internationally important populations of protected flora and fauna. Specific criteria for assigning each of the other levels of importance are set out in the guidelines and have been followed in this assessment. Where appropriate, the geographic frame of reference set out above was adapted to suit local circumstances. In addition, and where appropriate, the conservation status of habitats and species is considered when determining the significance of ecological receptors.

Any ecological receptors that are determined to be of National or International, County or Local importance (Higher Value) following the criteria set out in NRA (2009) are considered to be Key Ecological Receptors (KERs) for the purposes of ecological impact assessment if there is a pathway for effects thereon. Any receptors that are determined to be of Local Importance (Lower Value) are not considered to be Key Ecological Receptors.

6.4.4.3 Characterisation of Impacts and Effects

The Proposed Development will result in a number of impacts. The ecological effects of these impacts are characterised as per the CIEEM ‘Guidelines for Ecological Impact Assessment in the UK and

Ireland' (2018, updated 2022). These guidelines are the industry standard for the completion of Ecological Impact Assessment in the UK and Ireland. This chapter has also been prepared in accordance with the corresponding EPA guidance (EPA 2022). The headings under which the impacts are characterised follow those listed in the guidance document and are applied where relevant. A summary of the impact characteristics considered in the assessment is provided below:

- Positive or Negative. Assessment of whether the Proposed Development results in a positive or negative effect on the ecological receptor.
- Extent. Description of the spatial area over which the effect has the potential to occur.
- Magnitude Refers to size, amount, intensity, and volume. It should be quantified if possible and expressed in absolute or relative terms e.g., the amount of habitat lost, percentage change to habitat area, percentage decline in a species population.
- Duration is defined in relation to ecological characteristics (such as the lifecycle of a species) as well as human timeframes. For example, five years, which might seem short-term in the human context or that of other long-lived species, would span at least five generations of some invertebrate species.
- Frequency and Timing. This relates to the number of times that an impact occurs and its frequency. A small-scale impact can have a significant effect if it is repeated on numerous occasions over a long period.
- Reversibility. This is a consideration of whether an effect is reversible within a 'reasonable' timescale. What is considered to be a reasonable timescale can vary between receptors and is justified where appropriate in the impact assessment section of this report.

6.4.4.4 Determining the Significance of Effects

The ecological significance of the effects of the Proposed Development are determined following the precautionary principle and in accordance with the methodology set out in Section 5 of CIEEM (2018).

For the purpose of Ecological Impact Assessment (EcIA), 'significant effect' is an effect that either supports or undermines biodiversity conservation objectives for 'important ecological features' or for biodiversity in general. Conservation objectives may be specific (e.g., for a designated site) or broad (e.g. national/local nature conservation policy) or more wide-ranging (enhancement of biodiversity). Effects can be considered significant at a wide range of scales from international to local (CIEEM, 2018).

When determining significance, consideration is given to whether:

- Any processes or key characteristics of key ecological receptors will be removed or changed.
- There will be an effect on the nature, extent, structure and function of important ecological features.
- There is an effect on the average population size and viability of ecologically important species.
- There is an effect on the conservation status of important ecological habitats and species.

The EPA Guidelines on information to be included in Environmental Impact Assessment Reports (EPA, 2022) and the *Guidelines for assessment of Ecological Impacts of National Road Schemes*, (NRA, 2009) were also considered when determining significance and the assessment is in accordance with those guidelines.

The terminology used in the determination of significance follows the suggested language set out in the EPA Guidelines (2022) as shown in Table 6-3 below.

Table 6-3 Criteria for determining significance of effect, based on (EPA, 2022) guidelines

Description of Effect	Definition
Imperceptible effect	An effect capable of measurement but without significant consequences.
Not Significant	An effect which causes noticeable changes in the character of the environment but without significant consequences.
Slight effects	An effect which causes noticeable changes in the character of the environment without affecting its sensitivities.
Moderate effects	An effect that alters the character of the environment in a manner that is consistent with existing and emerging baseline trends.
Significant effects	An effect which, by its character, magnitude, duration or intensity, alters a sensitive aspect of the environment.
Very Significant	An effect which, by its character, magnitude, duration or intensity, significantly alters most of a sensitive aspect of the environment.
Profound effects	An effect which obliterates sensitive characteristics.

As per TII (NRA, 2009) and CIEEM (2018) best practice guidelines, the following key elements should also be examined when determining the significance of effects:

- The likely effects on ‘integrity’ should be used as a measure to determine whether an impact on a site is likely to be significant (NRA, 2009).
- A ‘significant effect’ is an effect that either supports or undermines biodiversity conservation objectives (CIEEM, 2018).

Integrity

In the context of EcIA, ‘integrity’ refers to the coherence of the ecological structure and function, across the entirety of a site, that enables it to sustain all of the ecological resources for which it has been valued (NRA, 2009). Impacts resulting in adverse changes to the nature, extent, structure and function of component habitats and effects on the average population size and viability of component species, would affect the integrity of a site, if it changes the condition of the ecosystem to unfavourable.

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. According to CIEEM (2018) guidelines the definition for conservation status in relation to habitats and species are as follows:

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

As defined in the EU Habitats Directive 92/43/EEC, the conservation 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.

The conservation 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 population on a long-term basis.

According to the NRA/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).

6.4.4.5 Incorporation of Mitigation

Section 6.7 of this EIAR assesses the potential effects of the Proposed Development to ensure that all effects on Key Ecological Receptors (KERs) are adequately addressed. Where effects on Key Ecological Receptors are predicted, mitigation is incorporated into the project design or layout to address such impacts. The implemented mitigation measures avoid or reduce or offset potential significant residual effects, post mitigation.

6.4.4.6 Limitations

The information provided in this assessment accurately and comprehensively describes the baseline ecological environment following surveys on numerous dates during all seasons during 2022 and 2023; it provides an accurate prediction of the likely ecological effects of the Proposed Development alone and together with potential cumulative effects; prescribes best practice and mitigation as necessary; and describes the residual ecological impacts.

The specialist studies, analysis and reporting have been undertaken in accordance with the appropriate guidelines.

The habitats and species on the site were readily identifiable and comprehensive assessments were made during the field visit. No significant limitations in the scope, scale or context of the assessment have been identified.

6.5 Establishing the Ecological Baseline

6.5.1 Desk Study Results

The following sections describe the results of a survey of published material that was consulted as part of the desk study for the purposes of the ecological assessment. It provides a baseline for the ecology of the existing environment. Material reviewed includes the Site Synopses for Designated Sites for their conservation importance compiled by the National Parks and Wildlife Service (NPWS) of the Department of Culture, Heritage and the Gaeltacht, bird and plant distribution atlases and other research publications.

6.5.1.1 Designated Sites

6.5.1.1.1 Identification of the Designated Sites within the Likely Zone of Influence of the Proposed Development

The potential for the Proposed Development to impact on sites that are designated for nature conservation was considered in this Ecological Impact Assessment.

Special Areas of Conservation (SACs) and Special Protection Areas for Birds (SPAs) are designated under the EU Habitats Directive and EU Birds Directive, respectively and are collectively known as 'European Sites'. The potential for significant effects and/or adverse impacts on the integrity of European Sites is fully assessed in the AA Screening Report and Natura Impact Statement that accompanies this application. As per EPA draft Guidance 2017, "a biodiversity section of an EIAR, should not repeat the detailed assessment of potential effects on European sites contained in a Natura Impact Statement" but should "incorporate their key findings as available and appropriate". Section 6.7.5 of this EIAR provides a summary of the key assessment findings with regard to European Designated Sites.

Natural Heritage Areas (NHAs) are designated under Section 18 the Wildlife (Amendment) Act 2000 and their management and protection is provided for by this legislation and planning policy. The potential for effects on these designated sites is fully considered in this Biodiversity Chapter.

Proposed Natural Heritage Areas (pNHAs) were designated on a non-statutory basis in 1995 but have not since been statutorily proposed or designated. However, the potential for effects on these designated sites is fully considered in this Biodiversity Chapter.

The following methodology was used to establish which sites that are designated for nature conservation have the potential to be impacted by the Proposed Development:

- Initially the most up to date GIS spatial datasets for European and Nationally designated sites and water catchments were downloaded from the NPWS website (www.npws.ie) and the EPA website (www.epa.ie) on the 26/07/2023. The datasets were utilised to identify Designated Sites which could feasibly be affected by the Proposed Development.
- All designated sites in the vicinity of the development site were identified.
- A map of all the European Sites within the vicinity of the Proposed Development is provided in Figure 6-2. A map of all Nationally Designated Sites within the vicinity of the Proposed Development is provided in Figure 6-3.
- The table below provides details of all relevant Nationally designated sites as identified in the preceding steps and assesses which are within the likely Zone of Impact.
- All relevant European Designated Sites are fully described and assessed in the Screening for Appropriate Assessment and Natura Impact Statement reports submitted as part of this planning application.
- The designation features of these sites, as per the NPWS website (www.npws.ie), were consulted and reviewed at the time of preparing this report 26/07/2023. Where potential pathways for Significant Effect are identified, the site is included within the Likely Zone of Impact and further assessment is required.

Table 6-4 Designated sites in the Zone of Influence

Designated Site	Distance from EIAR Site Boundary (km)	Likely Zone of Impact Determination
Special Areas of Conservation (SAC)		
Ballyduff/Clonfinane Bog SAC [000641]	110m	<p>There will be no direct effects as the Proposed Development is located entirely outside the designated site.</p> <p>The SAC is located 110 metres to the north of the Proposed Development. The site is designated for peatland habitats. A potential for indirect significant effect was identified via contribution to airborne nitrogen deposition on the SAC as a result of construction activities and vehicular emissions associated with the Proposed Development. In addition, a potential for significant effect via groundwater impacts was identified.</p> <p>A pathway for likely significant effect on this European Site was identified. The site is considered to be within the Likely Zone of Impact and is considered further in this assessment.</p>
Arragh More (Derrybreen) Bog SAC [002207]	450m	<p>There will be no direct effects as the Proposed Development is located entirely outside the designated site.</p> <p>The SAC is located 450 metres to the west of the Proposed Development. The site is designated for peatland habitats. A potential for indirect significant effect was identified via contribution to airborne nitrogen deposition on the SAC as a result of construction activities and vehicular emissions associated with the Proposed Development. In addition, a potential for significant effect via groundwater impacts was identified.</p> <p>A pathway for likely significant effect on this European Site was identified. The site is considered to be within the Likely Zone of Impact and is considered further in this assessment.</p>
Kilcarren-Firville Bog SAC [000647]	1.5km	<p>There will be no direct effects as the Proposed Development is located entirely outside the designated site.</p> <p>The SAC is located 1.5km to the west of the Proposed Development. The site is designated for peatland habitats. Taking a precautionary approach, a potential for indirect significant effect was identified via contribution to airborne nitrogen deposition on the SAC as a result of construction activities and vehicular emissions associated with the Proposed Development. In addition, a potential for significant effect via groundwater impacts was identified.</p>

Designated Site	Distance from EIAR Site Boundary (km)	Likely Zone of Impact Determination
		<p>A pathway for likely significant effect on this European Site was identified. The site is considered to be within the Likely Zone of Impact and is considered further in this assessment.</p>
Ridge Road, SW of Rapemills SAC [000919]	1.7km	<p>There will be no direct effects as the Proposed Development is located entirely outside the designated site.</p> <p>The SAC is located 1.7km to the northeast of the Proposed Development. The site is designated for peat land habitats. Due to the distance between the Proposed Development site and the SAC, and the terrestrial nature of the QI habitat, there is no potential for indirect effects on the SAC.</p> <p>No pathway for likely significant effect on this European Site was identified, when considered in the absence of any mitigation, individually or cumulatively with other plans or projects. The site is not within the Likely Zone of Impact and is not considered further in this assessment.</p>
Sharavogue Bog SAC [000585]	2.5km	<p>There will be no direct effects as the Proposed Development is located entirely outside the designated site.</p> <p>The SAC is located 2.5km to the southeast of the Proposed Development. The site is designated for peat land habitats. Due to the distance between the Proposed Development site and the SAC, and the terrestrial nature of the QI habitats, there is no potential for indirect effects on the SAC.</p> <p>No pathway for likely significant effect on this European Site was identified, when considered in the absence of any mitigation, individually or cumulatively with other plans or projects. The site is not within the Likely Zone of Impact and is not considered further in this assessment.</p>
Liskeenan Fen SAC [001683]	2.6km	<p>There will be no direct effects as the Proposed Development is located entirely outside the designated site.</p> <p>This SAC is located within the 'Borrisokane' WFD groundwater body IE_SH_G_042. The Proposed Development site is located within the 'Birr' WFD groundwater body IE_SH_G_041. Therefore, there is no potential for likely significant effect via groundwater quality deterioration to the SAC.</p> <p>Due to the intervening distance between the Proposed Development site and the SAC, and the nature of the QI habitat, no other potential pathway for likely significant effect was identified.</p>

Designated Site	Distance from EIAR Site Boundary (km)	Likely Zone of Impact Determination
		<p>No pathway for likely significant effect on this European Site was identified, when considered in the absence of any mitigation, individually or cumulatively with other plans or projects. The site is not within the Likely Zone of Impact and is not considered further in this assessment.</p>
All Saints Bog and Esker SAC [000 566]	3.6km	<p>There will be no direct effects as the Proposed Development is located entirely outside the designated site.</p> <p>Due to the intervening distance between the Proposed Development site and the SAC, and the terrestrial nature of the QI habitats listed, no potential pathway for likely significant indirect effect was identified.</p> <p>No pathway for likely significant effect on this European Site was identified, when considered in the absence of any mitigation, individually or cumulatively with other plans or projects. The site is not within the Likely Zone of Impact and is not considered further in this assessment.</p>
Lisduff Fen SAC [002147]	4km	<p>There will be no direct effects as the Proposed Development is located entirely outside the designated site.</p> <p>This SAC is located within the ‘Shinrone’ WFD groundwater body IE_SH_G_205. The Proposed Development site is located within the ‘Birr’ WFD groundwater body IE_SH_G_041. Therefore, there is no potential for likely significant effect via groundwater quality deterioration to the groundwater dependent habitats and wetland-dependant species for which this SAC is designated.</p> <p>No other potential pathway for likely significant effect was identified.</p> <p>No pathway for likely significant effect on this European Site was identified, when considered in the absence of any mitigation, individually or cumulatively with other plans or projects. The site is not within the Likely Zone of Impact and is not considered further in this assessment.</p>
Island Fen SAC [002236]	7.1km	<p>There will be no direct effects as the Proposed Development is located entirely outside the designated site.</p> <p>This SAC is located within the ‘Shinrone’ WFD groundwater body IE_SH_G_205. The Proposed Development site is located within the ‘Birr’ WFD groundwater body IE_SH_G_041. Therefore, there is no potential for likely significant effect via</p>

Designated Site	Distance from EIAR Site Boundary (km)	Likely Zone of Impact Determination
		<p>groundwater quality deterioration to the groundwater dependent habitat, 'Alkaline fen'.</p> <p>Due to the terrestrial nature of habitat 5130, and the intervening distance between the Proposed Development and the SAC, there is no potential for likely significant effect on this QI.</p> <p>No other potential pathway for likely significant effect was identified.</p> <p>No pathway for likely significant effect on this European Site was identified, when considered in the absence of any mitigation, individually or cumulatively with other plans or projects. The site is not within the Likely Zone of Impact and is not considered further in this assessment.</p>
Lough Derg, North-east Shore SAC [002241]	<p>Over-land distance: 7.5km</p> <p>Hydrological distance: approx. 43km</p>	<p>There will be no direct effects as the Proposed Development is located entirely outside the designated site.</p> <p>There is hydrological connectivity between this SAC and the Proposed Development site via the Little Brosna River. Therefore, a potential for likely significant indirect effect on the SAC was identified.</p> <p>A pathway for likely significant effect on this European Site was identified. The site is considered to be within the Likely Zone of Impact and is considered further in this assessment.</p>
River Shannon Callows SAC [000216]	<p>Over-land distance: 7.6km</p> <p>Hydrological distance: approx. 28km</p>	<p>There will be no direct effects as the Proposed Development is located entirely outside the designated site.</p> <p>There is hydrological connectivity between this SAC and the Proposed Development site via the Little Brosna River. Therefore, a potential for likely significant indirect effect on the SAC was identified.</p> <p>A pathway for likely significant effect on this European Site was identified. The site is considered to be within the Likely Zone of Impact and is considered further in this assessment.</p>
Scohoboy (Sopwell) Bog SAC [002206]	7.7km	<p>There will be no direct effects as the Proposed Development is located entirely outside the designated site.</p> <p>Due to the intervening distance between the Proposed Development site and the SAC, and the terrestrial nature of the QI habitat listed, no potential pathway for likely significant indirect effect was identified.</p> <p>No pathway for likely significant effect on this European Site was identified, when considered in</p>

Designated Site	Distance from EIAR Site Boundary (km)	Likely Zone of Impact Determination
		<p>the absence of any mitigation, individually or cumulatively with other plans or projects. The site is not within the Likely Zone of Impact and is not considered further in this assessment.</p>
Redwood Bog SAC [002353]	8.2km	<p>There will be no direct effects as the Proposed Development is located entirely outside the designated site.</p> <p>Due to the intervening distance between the Proposed Development site and the SAC, and the terrestrial nature of the QI habitats listed, no potential pathway for likely significant indirect effect was identified.</p> <p>No pathway for likely significant effect on this European Site was identified, when considered in the absence of any mitigation, individually or cumulatively with other plans or projects. The site is not within the Likely Zone of Impact and is not considered further in this assessment.</p>
Slieve Bloom Mountains SAC [000412]	14.6km	<p>There will be no direct effects as the Proposed Development is located entirely outside the designated site.</p> <p>The SAC is located within a separate hydrological subcatchment and is situated upgradient to the Proposed Development site. There is therefore no potential for likely significant effect via downstream hydrological effects to the SAC.</p> <p>Due to the intervening distance between the SAC and the Proposed Development site, there is no potential for likely significant effect on the terrestrial habitats listed.</p> <p>No pathway for likely significant effect on this European Site was identified, when considered in the absence of any mitigation, individually or cumulatively with other plans or projects. The site is not within the Likely Zone of Impact and is not considered further in this assessment.</p>
Lower River Shannon SAC [002165]	<p>Overland distance: approx. 35km</p> <p>Hydrological distance: Approx 83km downstream</p>	<p>There is hydrological connectivity between this SAC and the Proposed Development site via the Little Brosna River and River Shannon over a hydrological distance of approx. 83km.</p> <p>Surface water connectivity between the Proposed Development site and the SAC exists via the Little Brosna River and River Shannon. However, any potential pollutants would have to travel over 80km via the Little Brosna River and River Shannon and pass through Lough Derg which measures 118km² in surface area. Given the nature of the watercourses on the site, the attenuation effect of the intervening waterbodies as listed, and the distance to the</p>

Designated Site	Distance from EIAR Site Boundary (km)	Likely Zone of Impact Determination
		<p>European Site, in the absence of any mitigation there is no potential for the Proposed Development to result in any significant effect thereon.</p> <p>No pathway for likely significant effect on this European Site was identified, when considered in the absence of any mitigation, individually or cumulatively with other plans or projects. The site is not within the Likely Zone of Impact and is not considered further in this assessment.</p>
Special Protection Area (SPA)		
Dovegrove Callows SPA [004137]	160m from EIAR site boundary including grid connection route. 6.7km from the proposed wind farm site. Hydrological distance: Approx. 300m downstream of the grid connection route	<p>There will be no direct effects as the Proposed Development is located entirely outside the designated site.</p> <p>Hydrological connectivity between the Proposed Development and the SPA was identified via the proposed grid connection route. Therefore, a potential for likely significant indirect effect via deterioration of surface water quality was identified.</p> <p>A pathway for likely significant effect on this European Site was identified. The site is considered to be within the Likely Zone of Impact and is considered further in this assessment.</p>
River Little Brosna Callows SPA [004086]	3km from EIAR site boundary including grid connection route. 6.1km from the proposed wind farm site. Hydrological distance: Approx. 18km	<p>There will be no direct effects as the Proposed Development is located entirely outside the designated site.</p> <p>The potential for significant effects on the SCI species in the form of disturbance, displacement and collision risk cannot be excluded and further assessment is required.</p> <p>While the SPA is located approx. 3km west of the EIAR Site Boundary at its closest point, hydrologically it is approx. 18km downstream of the Proposed Development site, therefore, taking a precautionary approach, there is a potential for deterioration in water quality to the SPA.</p> <p>A pathway for likely significant effect on this European Site was identified. The site is considered to be within the Likely Zone of Impact and is considered further in this assessment.</p>
All Saints Bog SPA [004103]	3.6km	<p>There will be no direct effects as the Proposed Development is located entirely outside the designated site.</p> <p>During bird surveys which were undertaken for the Proposed Development between September 2020 and March 2023, as described in Chapter 7, there were no observations of Greenland white-fronted geese within 500m of the proposed site. The closest</p>

Designated Site	Distance from EIAR Site Boundary (km)	Likely Zone of Impact Determination
		<p>record of Greenland White-fronted Geese observed during the surveys was 7.8km away from the Proposed Development site. There is no connectivity between the SCI species of the SPA and the Proposed Development site. Therefore, the potential for direct and indirect effects on the populations of Greenland White-fronted Goose associated with the SPA can be discounted.</p> <p>No complete impact source-pathway receptor chain was identified between the proposed works and this SPA.</p> <p>No pathway for likely significant effect on this European Site was identified, when considered in the absence of any mitigation, individually or cumulatively with other plans or projects. The site is not within the Likely Zone of Impact and is not considered further in this assessment.</p>
<p>Middle Shannon Callows SPA [004096]</p>	<p>7.6km from EIAR site boundary including grid connection route.</p> <p>9.8km from the proposed wind farm site.</p> <p>Hydrological distance: approx. 28km</p>	<p>There will be no direct effects as the Proposed Development is located entirely outside the designated site.</p> <p>The potential for significant effects on the SCI species in the form of disturbance, displacement and collision risk cannot be excluded and further assessment is required.</p> <p>While the SPA is located approx. 7.6km west of the EIAR Site Boundary at its closest point, hydrologically it is approx. 28km downstream of the Proposed Development site, therefore, taking a precautionary approach, there is a potential for deterioration in water quality to the SPA.</p> <p>A pathway for likely significant effect on this European Site was identified. The site is considered to be within the Likely Zone of Impact and is considered further in this assessment.</p>
<p>Lough Derg (Shannon) SPA [004058]</p>	<p>7.9km from EIAR site boundary including grid connection route and from the proposed wind farm site.</p> <p>Hydrological distance: approx. 43km</p>	<p>There will be no direct effects as the Proposed Development is located entirely outside the designated site.</p> <p>The potential for significant effects on the SCI species in the form of disturbance, displacement and collision risk cannot be excluded and further assessment is required.</p> <p>While the SPA is located approx. 7.9km west of the EIAR Site Boundary at its closest point, hydrologically it is approx. 43km downstream of the Proposed Development site, therefore, taking a precautionary approach, there is a potential for deterioration in water quality to the SPA.</p>

Designated Site	Distance from EIAR Site Boundary (km)	Likely Zone of Impact Determination
		<p>A pathway for likely significant effect on this European Site was identified. The site is considered to be within the Likely Zone of Impact and is considered further in this assessment.</p>
<p>Slieve Bloom Mountains SPA [004160]</p>	<p>12.7km</p>	<p>There will be no direct effects as the Proposed Development is located entirely outside the designated site.</p> <p>The Proposed Development site is located 12.7km from the SPA. The Proposed Development site is outside the core foraging distance of hen harrier (Core range of 2km, with maximum range of 10km) as per Scottish Natural Heritage Guidelines (SNH, 2016). According to the Site-specific Conservation Objectives for this SPA, the core area used by breeding pairs is within 5km of nest sites. Therefore, it is highly unlikely that there is a potential for significant effect to breeding pairs.</p> <p>During the bird surveys which were undertaken for the Proposed Development between September 2020 and March 2023, as described in Chapter 7, Hen Harrier was only recorded within the wind farm site on one occasion over the three winters of bird surveys, comprising a single bird hunting. The Wind Farm Site is therefore not an important foraging habitat for hen harrier and there is no potential for construction works to result in ecologically significant habitat loss for hen harrier. The land lost to the development footprint is small (i.e. 6.02ha/2.5% of the Wind Farm Site) relative to the total area within the Wind Farm Site.</p> <p>No pathway for likely significant effect on this European Site was identified, when considered in the absence of any mitigation, individually or cumulatively with other plans or projects. The site is not within the Likely Zone of Impact and is not considered further in this assessment.</p>
<p>Natural Heritage Areas (NHA)</p>		
<p>Arragh More Bog NHA [000640] <i>Also designated as an SAC</i></p>	<p>The red line boundary borders the boundary of the NHA which is located west of the Proposed Development.</p>	<p>There will be no direct effects as the Proposed Development is located entirely outside the designated site.</p> <p>The red line boundary borders the boundary of the NHA which is located west of the Proposed Development. The site is designated for peatland habitats. A potential for indirect significant effect was identified via contribution to airborne nitrogen deposition on the NHA as a result of construction of the Proposed Development.</p> <p>A pathway for likely significant effect on this NHA was identified. The site is considered to be within</p>

Designated Site	Distance from EIAR Site Boundary (km)	Likely Zone of Impact Determination
		the Likely Zone of Impact and is considered further in this assessment.
Killeen Bog NHA [000648]	786m	<p>There will be no direct effects as the Proposed Development is located entirely outside the designated site.</p> <p>The NHA is located 786m to the northeast of the development site. The site is designated for peat land habitats. The site is designated for peatland habitats. A potential for indirect significant effect was identified via contribution to airborne nitrogen deposition on the NHA as a result of construction of the Proposed Development.</p> <p>A pathway for likely significant effect on this NHA was identified. The site is considered to be within the Likely Zone of Impact and is considered further in this assessment.</p>
River Little Brosna Callows NHA [000564] <i>Also designated as an SPA</i>	3km	<p>There will be no direct effects as the Proposed Development is located entirely outside the designated site.</p> <p>The potential for significant effects on the SCI species in the form of disturbance, displacement and collision risk cannot be excluded and further assessment is required.</p> <p>The NHA is located approx. 18km downstream of the Proposed Development site, therefore there is a potential for deterioration in water quality to the NHA.</p> <p>A pathway for likely significant effect on this NHA was identified. The site is considered to be within the Likely Zone of Impact and is considered further in this assessment.</p>
Lorrha Bog NHA [001684]	4.9km	<p>There will be no direct effects as the Proposed Development is located entirely outside the designated sites.</p> <p>Due to the intervening distance between the Proposed Development site and the NHAs, and the terrestrial nature of the peatland habitats for which they are designated, no potential pathway for likely significant indirect effect was identified.</p> <p>No pathway for likely significant effect on these NHAs was identified. The sites are considered to be outside the Likely Zone of Impact and are not considered further in this assessment.</p>
Cangort Bog NHA [000890]	6.4km	
Scohaboy Bog NHA [000937]	7.7km	
Ballymacegan Bog NHA [000642]	10.4km	
Kilnaborris Bog NHA [000284]	11.7km	
Meeneen Bog NHA [000310]	11.8km	
Capira/Derrew Bog NHA [001240]	14.3km	
Proposed Natural Heritage Areas (pNHA)		

Designated Site	Distance from EIAR Site Boundary (km)	Likely Zone of Impact Determination
Woodville Woods [000927]	This pNHA is located adjacent to the proposed grid connection route. The pNHA is over 7km away from the proposed wind farm site.	<p>There is no potential for direct effects as the Proposed Development is located entirely outside of this designated site.</p> <p>This pNHA is located adjacent to the proposed grid connection route. There is no potential for impact on the terrestrial native woodland habitat for which it is designated. There is no potential for impact on the lake habitat for which it is designated as the watercourse crossings associated with the proposed grid connection route flow away from this pNHA.</p> <p>The pNHA is considered to be outside the Likely Zone of Impact and no further assessment is required.</p>
Ballyduff/Clonfinane Bog [000641] <i>Also designated as an SAC</i>	110m	<p>There will be no direct effects as the Proposed Development is located entirely outside the designated site.</p> <p>The pNHA is located 110 metres to the north of the development site. The site is designated for peatland habitats. A potential for indirect significant effect was identified via contribution to airborne nitrogen deposition on the pNHA as a result of construction of the Proposed Development.</p> <p>A pathway for likely significant effect on this pNHA was identified. The site is considered to be within the Likely Zone of Impact and is considered further in this assessment.</p>
Ross And Glens Eskers [000920]	144m	<p>There is no potential for direct effects as the Proposed Development is located entirely outside of this designated site.</p> <p>This pNHA is located 144m from the proposed grid connection route and over 8km from the proposed wind farm. There is no potential for impact on the terrestrial habitats for which it is designated.</p> <p>The pNHA is considered to be outside the Likely Zone of Impact and no further assessment is required.</p>
Dovegrove Callows [000010] <i>Also designated as an SPA</i>	<p>452m over-land from grid connection route.</p> <p>Approx. 550m hydrologically downstream from grid connection route.</p> <p>Approx. 6.7km from proposed wind farm site</p>	<p>There will be no direct effects as the Proposed Development is located entirely outside the designated site.</p> <p>Hydrological connectivity between the Proposed Development and the pNHA was identified via the proposed grid connection route. Therefore, a potential for likely significant indirect effect via deterioration of surface water quality was identified.</p> <p>A pathway for likely significant effect on this pNHA was identified. The site is considered to be within</p>

Designated Site	Distance from EIAR Site Boundary (km)	Likely Zone of Impact Determination
		the Likely Zone of Impact and is considered further in this assessment.
Birr (Domestic Dwelling No.1, Occupied) [000569]	864m	<p>This pNHA is designated for a roost of Leisler's Bat (<i>Nyctalus leisleri</i>). A potential pathway for impact via habitat loss and collision risk was identified.</p> <p>A pathway for likely significant effect on this pNHA was identified. The site is considered to be within the Likely Zone of Impact and is considered further in this assessment.</p>
Birr (Domestic Dwelling No. 2, Occupied) [000568]	1.1km	<p>This pNHA is designated for a roost of Leisler's Bat (<i>Nyctalus leisleri</i>). A potential pathway for impact via habitat loss and collision risk was identified.</p> <p>A pathway for likely significant effect on this pNHA was identified. The site is considered to be within the Likely Zone of Impact and is considered further in this assessment.</p>
Kilcarren-Firville Bog [000647] <i>Also designated as an SAC</i>	1.5km	<p>There will be no direct effects as the Proposed Development is located entirely outside the designated site.</p> <p>The pNHA is located 1.5km to the west of the development site. The site is designated for peatland habitats. A potential for indirect significant effect was identified via contribution to airborne nitrogen deposition on the pNHA as a result of construction of the Proposed Development. In addition, a potential for significant effect via groundwater impacts was identified.</p> <p>A pathway for likely significant effect on this pNHA was identified. The site is considered to be within the Likely Zone of Impact and is considered further in this assessment.</p>
Ridge Road, SW Of Rapemills [000919] <i>Also designated as an SAC</i>	1.7km	<p>There will be no direct effects as the Proposed Development is located entirely outside the designated site.</p> <p>The pNHA is located 1.7km to the northeast of the development site. The site is designated for peat land habitats. Due to the distance between the Proposed Development site and the pNHA, and the terrestrial nature of the habitat, there is no potential for indirect effects on the pNHA.</p> <p>The pNHA is considered to be outside the Likely Zone of Impact and no further assessment is required.</p>
Sharavogue Bog [000585] <i>Also designated as an SAC</i>	2.5km	<p>There will be no direct effects as the Proposed Development is located entirely outside the designated site.</p>

Designated Site	Distance from EIAR Site Boundary (km)	Likely Zone of Impact Determination
		<p>The pNHA is located 2.5km to the southeast of the development site. The site is designated for peatland habitats. Due to the distance between the Proposed Development site and the pNHA, and the terrestrial nature of the habitat, there is no potential for indirect effects on the pNHA.</p> <p>The pNHA is considered to be outside the Likely Zone of Impact and no further assessment is required.</p>
Bracken's Dwelling, Near Whiteford [002058]	2.5km	<p>This pNHA is designated for a nursery roost of Leisler's Bat (<i>Nyctalus leisleri</i>). A potential pathway for impact via habitat loss and collision risk was identified.</p> <p>A pathway for likely significant effect on this pNHA was identified. The site is considered to be within the Likely Zone of Impact and is considered further in this assessment.</p>
Liskeenan Fen [001683] <i>Also designated as an SAC</i>	2.6km	<p>There will be no direct effects as the Proposed Development is located entirely outside the designated site.</p> <p>This pNHA is located within the 'Borrisokane' WFD groundwater body IE_SH_G_042. The Proposed Development site is located within the 'Birr' WFD groundwater body IE_SH_G_041. Therefore, there is no potential for likely significant effect via groundwater quality deterioration to the pNHA.</p> <p>Due to the intervening distance between the Proposed Development site and the pNHA, and the nature of the habitat, no other potential pathway for likely significant effect was identified.</p> <p>The pNHA is considered to be outside the Likely Zone of Impact and no further assessment is required.</p>
All Saints Bog And Esker [000566] <i>Also designated as an SAC</i>	3.6km	<p>There will be no direct effects as the Proposed Development is located entirely outside the designated site.</p> <p>Due to the intervening distance between the Proposed Development site and the pNHA, and the terrestrial nature of the QI habitats listed, no potential pathway for likely significant indirect effect was identified.</p> <p>The pNHA is considered to be outside the Likely Zone of Impact and no further assessment is required.</p>

Designated Site	Distance from EIAR Site Boundary (km)	Likely Zone of Impact Determination
Fiagh Bog [000932]	4.1km	<p>There will be no direct effects as the Proposed Development is located entirely outside the designated site.</p> <p>This pNHA is located within the 'Borrisokane' WFD groundwater body IE_SH_G_042. The Proposed Development site is located within the 'Birr' WFD groundwater body IE_SH_G_041. Therefore, there is no potential for likely significant effect via groundwater quality deterioration to the pNHA.</p> <p>Due to the intervening distance between the Proposed Development site and the pNHA, and the nature of the habitat, no other potential pathway for likely significant effect was identified.</p> <p>The pNHA is considered to be outside the Likely Zone of Impact and no further assessment is required.</p>
Lough Coura [000909]	4.8km	<p>There is no downstream hydrological connectivity from the Proposed Development site to these pNHAs. The pNHAs are located within a separate groundwater body to the Proposed Development site.</p> <p>These pNHAs are considered to be outside the Likely Zone of Impact and no further assessment is required.</p>
Lough Nahinch (Tipperary) [000936]	5.2km	
Spring Park Wetlands [000941]	7.1km	
Friar's Lough [000933]	7.4km	
River Shannon Callows [000216] <i>Also designated as an SAC</i>	7.6km	<p>There will be no direct effects as the Proposed Development is located entirely outside the designated site.</p> <p>There is hydrological connectivity between this pNHA and the Proposed Development site via the Little Brosna River. Therefore, a potential for likely significant indirect effect on the pNHA was identified.</p> <p>A pathway for likely significant effect on this pNHA was identified. The site is considered to be within the Likely Zone of Impact and is considered further in this assessment.</p>
Lough Derg [000011] <i>Also designated as an SAC</i>	7.6km Hydrological distance: approx. 43km	<p>There will be no direct effects as the Proposed Development is located entirely outside the designated site.</p> <p>There is hydrological connectivity between this pNHA and the Proposed Development site via the Little Brosna River and River Shannon. Therefore, a potential for likely significant indirect effect on the pNHA was identified.</p> <p>A pathway for likely significant effect on this pNHA was identified. The site is considered to be within</p>

Designated Site	Distance from EIAR Site Boundary (km)	Likely Zone of Impact Determination
		the Likely Zone of Impact and is considered further in this assessment.
Redwood Bog [000654] <i>Also designated as an SAC</i>	8.2km	<p>There will be no direct effects as the Proposed Development is located entirely outside the designated site.</p> <p>Due to the intervening distance between the Proposed Development site and the pNHA, and the terrestrial nature of the QI habitats listed, no potential pathway for likely significant indirect effect was identified.</p> <p>The pNHA is considered to be outside the Likely Zone of Impact and no further assessment is required.</p>
Banagher (Domestic Dwelling, Occupied) [000567]	8.3km	<p>This pNHA is designated for a roost of Brown long eared bat. A potential pathway for impact via habitat loss and collision risk was identified.</p> <p>A pathway for likely significant effect on this pNHA was identified. The site is considered to be within the Likely Zone of Impact and is considered further in this assessment.</p>
Cloghanbeg [002059]	8.4km	<p>This pNHA is designated for a nursery roost of Leisler's Bat (<i>Nyctalus leisleri</i>). A potential pathway for impact via habitat loss and collision risk was identified.</p> <p>A pathway for likely significant effect on this pNHA was identified. The site is considered to be within the Likely Zone of Impact and is considered further in this assessment.</p>
Derrykeel Meadows [000897]	9.6km	<p>There will be no direct effects as the Proposed Development is located entirely outside the designated site.</p> <p>Due to the intervening distance between the Proposed Development site and the pNHA, and the terrestrial nature of the habitat, no potential pathway for likely significant indirect effect was identified.</p> <p>The pNHA is considered to be outside the Likely Zone of Impact and no further assessment is required.</p>
Grand Canal [002104]	10.7km	<p>There is no hydrological connectivity between the Proposed Development site and this pNHA.</p> <p>The pNHA is considered to be outside the Likely Zone of Impact and no further assessment is required.</p>

Designated Site	Distance from EIAR Site Boundary (km)	Likely Zone of Impact Determination
Mount St. Joseph Woods [000913]	10.8km	<p>There is no source-pathway-receptor change for impact between the Proposed Development and this terrestrial pNHA.</p> <p>The pNHA is considered to be outside the Likely Zone of Impact and no further assessment is required.</p>
Miltown, Shinrone [002065]	11.5km	<p>This pNHA is designated for a Natterer's Bat roost (<i>Myotis nattereri</i>) of National Importance. A potential pathway for impact via habitat loss and collision risk was identified.</p> <p>A pathway for likely significant effect on this pNHA was identified. The site is considered to be within the Likely Zone of Impact and is considered further in this assessment.</p>
Drumakeenan, Eagle Hill And Perry's Mill [000900]	11.6km	<p>This pNHA is designated for esker and calcareous grassland habitats as well as fen habitat. There is no downstream hydrological connectivity from the Proposed Development site to the pNHA. The pNHA is located within a separate groundwater body to the development site.</p> <p>The pNHA is considered to be outside the Likely Zone of Impact and no further assessment is required.</p>
Kinnitty (Domestic Dwelling, Occupied) [000579]	12.1km	<p>This pNHA is designated for a summer roost of Leisler's Bat (<i>Nyctalus leisleri</i>). A potential pathway for impact via habitat loss and collision risk was identified.</p> <p>A pathway for likely significant effect on this pNHA was identified. The site is considered to be within the Likely Zone of Impact and is considered further in this assessment.</p>
Golden Grove Woods [000903]	12.3km	<p>There is no source-pathway-receptor change for impact between the Proposed Development and this terrestrial pNHA.</p> <p>The pNHA is considered to be outside the Likely Zone of Impact and no further assessment is required.</p>
St. Joseph's, Mountheaton [002063]	12.9km	<p>This pNHA is designated for a roost of Brown Long-eared Bat. A potential pathway for impact via habitat loss and collision risk was identified.</p> <p>A pathway for likely significant effect on this pNHA was identified. The site is considered to be within the Likely Zone of Impact and is considered further in this assessment.</p>

Designated Site	Distance from EIAR Site Boundary (km)	Likely Zone of Impact Determination
Drumakeenan National School [002064]	12.9km	<p>This pNHA is designated for a roost of Brown Long-eared Bat. A potential pathway for impact via habitat loss and collision risk was identified.</p> <p>A pathway for likely significant effect on this pNHA was identified. The site is considered to be within the Likely Zone of Impact and is considered further in this assessment.</p>
Lough Avan [001995]	13.2km	<p>These pNHAs are located within a separate hydrological catchment to the Proposed Development site.</p> <p>These pNHAs are therefore <i>not within</i> the Likely Zone of Impact and further assessment is not required.</p>
Lough Boora [001365]	13.9km	
Slieve Bloom Mountains [000412] <i>Also designated as an SAC</i>	14.6km	<p>There will be no direct effects as the Proposed Development is located entirely outside the designated site.</p> <p>The pNHA is located within a separate hydrological sub catchment and is situated upgradient to the Proposed Development site. There is therefore no potential for likely significant effect via downstream hydrological effects to the pNHA.</p> <p>Due to the intervening distance between the pNHA and the Proposed Development site, there is no potential for likely significant effect on the terrestrial habitats listed.</p> <p>This pNHA is therefore <i>not within</i> the Likely Zone of Impact and further assessment is not required.</p>
Newchapel Turlough [000653]	14.9km	<p>These pNHA is located within a separate groundwater body to the Proposed Development site.</p> <p>The pNHA id therefore <i>not within</i> the Likely Zone of Impact and further assessment is not required.</p>

Potential for effects on European sites is summarised in this report and is fully addressed in the Natura Impact Statement submitted as part of the statutory consent process.

The following Nationally Designated Sites have been identified as being within the Zone of Likely Impact and are assessed further in Section 6.7.5:

- > Arragh More Bog NHA [000640]
- > Killeen Bog NHA [000648]
- > River Little Brosna Callows NHA [000564]
- > Ballyduff/Clonfinane Bog [000641]
- > Kilcarren-Firville Bog [000647]

- > Dovegrove Callows [000010]
- > Birr (Domestic Dwelling No.1, Occupied) [000569]
- > Birr (Domestic Dwelling No. 2, Occupied) [000568]
- > Bracken's Dwelling, Near Whiteford [002058]
- > River Shannon Callows [000216]
- > Lough Derg [000011]
- > Banagher (Domestic Dwelling, Occupied) [000567]
- > Cloghanbeg [002059]
- > Miltown, Shinrone [002065]
- > Kinnitty (Domestic Dwelling, Occupied) [000579]
- > St. Joseph's, Mountheaton [002063]
- > Drumakeenan National School [002064]

6.5.1.2 NPWS Article 17 Reporting

A review of the Irish Reports for Article 17 of the Habitats Directive (92/42/EEC), including the Heath, Bogs and Mires, Irish Semi-Natural Grassland Survey datasets, National Survey of Native Woodlands and Ancient and Long-Established Woodland datasets were conducted prior to undertaking the multi-disciplinary walkover surveys within the EIAR Site Boundary. The closest Ancient Long-established Woodland (Woodville_1618) is located 5.5km away in County Offaly. The nearest Native Woodland according to the 2003-2008 survey is located 3.9km from the proposed site within Offaly. The nearest semi natural grasslands are located 4.7km from the proposed site.

A search of the NPWS Article 17 datasets⁷ (2019) was undertaken to identify Article 17 habitats within or adjacent to the site boundary, as shown in Figure 6-4. Isolated patches of mapped Annex I Active Raised Bog are mapped on peatland areas outside of the EIAR site boundary, to the west and north, approx. 260m to the west at their closest. Old Oak Woodland is mapped 5.5km south of the EIAR boundary. Annex I Bog Woodland is mapped 1.4km north of the EIAR boundary.

6.5.1.3 Vascular plants

A search was made in the New Atlas of the British and Irish Flora (Preston *et al*, 2002) to investigate whether any rare or unusual plant species listed under Annex I of the EU Habitats Directive, The Irish Red Data Book, 1, Vascular Plants (Curtis, 1988) or the Flora (Protection) Order (1999, as amended 2022) had been recorded in the relevant 10km squares in which the study site is situated. Species of conservation concern are given in the table below.

Table 6-5 Species listed designated under the Flora Protection Order or the Irish Red Data Book within Hectad's M90, N00, R99 and S09

Common Name	Scientific Name	Hectad	Status
Prickly Sedge	<i>Carex spicata</i>	M90, N00, R99, S09	NT
Small Spurge	<i>Euphorbia exigua</i>	M90, N00, R99, S09	NT
Autumn Gentian	<i>Gentianella amarella</i>	M90, N00, R99, S09	NT

⁷ Including bog 2012 and 2019 datasets, Online, Available at: <https://www.npws.ie/publications/article-17-reports>

European Gromwell	<i>Lithospermum officinale</i>	M90	NT
Common Mallow	<i>Malva neglecta</i>	M90, N00, R99, S09	NT
Fly Orchid	<i>Ophrys insectifera</i>	M90, N00, R99, S09	NT
Brown Beak-sedge	<i>Rhynchospora fusca</i>	M90, N00, R99, S09	NT
Arctic Bur-reed	<i>Sparganium natans</i>	M90, N00, R99, S09	NT
Field-speedwell	<i>Veronica agrestis</i>	M90, N00, R99, S09	NT
Green-winged Orchid	<i>Orchis morio</i>	N00, R99, S09	VU
Good-King-Henry	<i>Chenopodium bonus-henricus</i>	N00, S09	VU
Narrow-Fruited-Cornsalad	<i>Valerianella dentata</i>	N00, R99, S09	VU
Fragrant Agrimony	<i>Agrimonia procera</i>	N00, S09	VU
Smooth Brome	<i>Bromus racemosus</i>	N00, S09	NT
Slender Thistle	<i>Carduus tenuiflorus</i>	N00, R99, S09	NT
Slender-tufted Sedge	<i>Carex acuta</i>	N00, S09	NT
Basil-thyme	<i>Clinopodium acinos</i>	N00, S09	FPO, NT
Frog orchid	<i>Coeloglossum viride</i>	N00, S09	NT
Field Gentian	<i>Gentianella campestris</i>	N00, S09	NT
Black Henbane	<i>Hyoscyamus niger</i>	N00, R99, S09	NT
Yellow Bird's-nest	<i>Monotropa hypopitys</i>	N00, R99, S09	NT
Common Gromwell	<i>Lithospermum officinale</i>	N00, R99, S09	NT
Dense-flowered Orchid	<i>Neotinea maculata</i>	N00, S09	NT

Autumn Lady's-tresses	<i>Spiranthes spiralis</i>	N00, R99, S09	FPO, NT
Slender Cottongrass	<i>Eriophorum gracile</i>	S09	FPO, NT

6.5.1.4 Bryophytes

A search of the NPWS online database for bryophytes (non-vascular land plants comprising of mosses, hornworts, and liverworts) was also undertaken with no protected bryophytes recorded within or adjacent to the proposal (NPWS, 2020).

6.5.1.5 National Biodiversity Data Centre (NBDC) Records

A search of the National Biodiversity Data Centre (NBDC) records for the relevant hectads, M90, N00, S09, and R99, provided records on a number of fauna species of conservation concern, excluding marine species. These are provided in Table 6-6. NDBC records for protected bird species are presented in Table 6-7.

Table 6-6 NBDC Records for Species of Conservation Interest in hectad's M90, N00, R99 and S09.

Common name	Scientific name	Designation	Hectad
Common Frog	<i>Rana temporaria</i>	HD Annex V, WA	R99, M90, N00, S09
Smooth Newt	<i>Lissotriton vulgaris</i>	WA	R99, N00, S09
Common Lizard	<i>Zootoca vivipara</i>	WA	N00
Daubenton's Bat	<i>Myotis daubentonii</i>	HD Annex IV, WA	R99, N00, S09
Lesser Noctule	<i>Nyctalus leisleri</i>	HD Annex IV, WA	R99, M90, N00, S09
Pipistrelle	<i>Pipistrellus pipistrellus sensu lato</i>	HD Annex IV, WA	R99, M90, N00, S09
Soprano Pipistrelle	<i>Pipistrellus pygmaeus</i>	HD Annex IV, WA	R99, M90, N00, S09
Nathusius's Pipistrelle	<i>Pipistrellus nathusii</i>	HD Annex IV, WA	N00
Whiskered Bat	<i>Myotis mystacinus</i>	HD Annex IV, WA	N00
Natterer's Bat	<i>Myotis nattereri</i>	HD Annex IV, WA	N00, S09
Brown Long-eared Bat	<i>Plecotus auritus</i>)	HD Annex IV, WA	N00, S09

Common name	Scientific name	Designation	Hectad
Pine Marten	<i>Martes martes</i>	HD Annex V, WA	R99, M90, N00, S09
European Otter	<i>Lutra lutra</i>	HD Annex II, IV, WA	R99, M90, N00, S09
Eurasian Badger	<i>Meles meles</i>	WA	R99, M90, N00, S09
Eurasian Pygmy Shrew	<i>Sorex minutus</i>	WA	R99, M90, N00, S09
Eurasian Red Squirrel	<i>Sciurus vulgaris</i>	WA	R99, M90, N00, S09
West European Hedgehog	<i>Erinaceus europaeus</i>	WA	R99, M90, N00, S09
Freshwater White-clawed Crayfish	<i>Austropotamobius pallipes</i>	HD Annex II, V, WA	R99, M90, N00, S09
Marsh Fritillary	<i>Euphydryas aurinia</i>	HD Annex II	R99, N00, S09
Geyer's Whorl Snail	<i>Vertigo geyeri</i>	HD Annex II, WA	R99, N00, S09
Desmoulin's Whorl Snail	<i>Vertigo moulinsiana</i>	HD Annex II, WA	R99, N00
Duck Mussel	<i>Anodonta anatina</i>	NT	N00
Swan Mussel	<i>Anodonta cygnea</i>	VU	N00
Tree Snail	<i>Balea perversa</i>	VU	N00
Whirlpool Ramshorn	<i>Anisus (Disculifer) vortex</i>	VU	N00
European Eel	<i>Anguilla anguilla</i>	OSPAR Convention	S09

Annex II, Annex IV, Annex V – Of EU Habitats Directive, WA - Wildlife Acts – Irish Wildlife Acts (1976, 2017), LC – Least concern, NT – Near threatened, VU – Vulnerable, EN – Endangered.

Table 6-7 NDBC records for protected bird species in hectads M90, N00, R99 and S09

Common name	Scientific name	Designation	Hectad
Barn Owl	<i>Tyto alba</i>	WA, RL	N00, M90, S09, R99
Barn Swallow	<i>Hirundo rustica</i>	WA, AL	N00, M90, S09, R99
Black-headed Gull	<i>Larus ridibundus</i>	WA, RL	N00, M90, S09, R99
Black-tailed Godwit	<i>Limosa limosa</i>	WA, AL	N00, M90, S09
Common Coot	<i>Fulica atra</i>	WA, Annex II, III, AL	N00, M90, S09, R99
Common Grasshopper Warbler	<i>Locustella naevia</i>	WA, AL	N00, M90, S09, R99
Common Greenshank	<i>Tringa nebularia</i>	WA, AL	N00
Common Kestrel	<i>Falco tinnunculus</i>	WA, AL	N00, M90, S09, R99
Common Kingfisher	<i>Alcedo atthis</i>	WA, Annex I, AL	N00, M90, S09
Common Linnet	<i>Carduelis cannabina</i>	WA, AL	N00, M90, S09, R99
Common Pheasant	<i>Phasianus colchicus</i>	WA, Annex II, III, AL	N00, M90, S09, R99
Common Pochard	<i>Aythya ferina</i>	WA, Annex II, III, AL	N00, M90
Common Redshank	<i>Tringa totanus</i>	WA, RL	N00, M90, S09, R99
Common Sandpiper	<i>Actitis hypoleucos</i>	WA, AL	N00
Common Shelduck	<i>Tadorna tadorna</i>	WA, AL	M90
Common Snipe	<i>Gallinago gallinago</i>	WA, Annex II, III, AL	N00, M90, S09, R99
Common Starling	<i>Sturnus vulgaris</i>	WA, AL	N00, M90, S09, R99
Common Swift	<i>Apus apus</i>	WA, AL	N00, M90, S09, R99
Common Wood Pigeon	<i>Columba palumbus</i>	WA, Annex II, RL	N00, M90, S09, R99
Corn Crake	<i>Crex crex</i>	WA, Annex I, RL	N00, M90, S09, R99
Dunlin	<i>Calidris alpina</i>	WA, Annex I, AL	N00, M90

Common name	Scientific name	Designation	Hectad
Eurasian Curlew	<i>Numenius arquata</i>	WA, Annex II, AL	N00, M90, S09
Eurasian Teal	<i>Anas crecca</i>	WA, Annex II, III, AL	N00, M90, S09, R99
Eurasian Wigeon	<i>Anas penelope</i>	WA, Annex II, III, AL	N00, M90, R99
Eurasian Woodcock	<i>Scolopax rusticola</i>	WA, Annex II, III, AL	N00, M90, S09, R99
European Golden Plover	<i>Pluvialis apricaria</i>	WA, Annex II, III, RL	N00, M90, S09, R99
European Nightjar	<i>Caprimulgus europaeus</i>	WA, Annex I, II, III, RL	N00
Gadwall	<i>Anas strepera</i>	WA, Annex I, RL	N00, M90
Garganey	<i>Anas querquedula</i>	WA, Annex II, AL	M90
Great Black-backed Gull	<i>Larus marinus</i>	WA, AL	N00
Great Cormorant	<i>Phalacrocorax carbo</i>	WA, AL	N00, M90, S09
Great Crested Grebe	<i>Podiceps cristatus</i>	WA, AL	M90, R99
Greater Scaup	<i>Aythya marila</i>	WA, Annex II, III, AL	M90
Greater White-fronted Goose	<i>Anser albifrons</i>	WA, Annex I, II, III, AL	N00, M90
Grey Partridge	<i>Perdix perdix</i>	WA, Annex II, III, RL	N00, R99
Greylag Goose	<i>Anser anser</i>	WA, Annex II, III, AL	N00, M90
Hen Harrier	<i>Circus cyaneus</i>	WA, Annex I, AL	N00, M90, S09, R99
Herring Gull	<i>Larus argentatus</i>	WA, RL	N00, M90, R99
House Martin	<i>Delichon urbicum</i>	WA, AL	N00, M90, S09, R99
House Sparrow	<i>Passer domesticus</i>	WA, AL	N00, M90, S09, R99
Lesser Black-backed Gull	<i>Larus fuscus</i>	WA, AL	M90
Little Egret	<i>Egretta garzetta</i>	WA, Annex I	N00, M90, R99
Little Grebe	<i>Tachybaptus ruficollis</i>	WA, AL	N00, M90, S09, R99
Mallard	<i>Anas platyrhynchos</i>	WA, Annex II, Annex III	N00, M90, S09, R99

Common name	Scientific name	Designation	Hectad
Merlin	<i>Falco columbarius</i>	WA, Annex II, III	N00, M90, S09, R99
Mew Gull	<i>Larus canus</i>	WA, AL	N00, M90
Mute Swan	<i>Cygnus olor</i>	WA, AL	N00, M90, S09, R99
Northern Lapwing	<i>Vanellus vanellus</i>	WA, Annex II, RL	N00, M90, S09, R99
Northern Pintail	<i>Anas acuta</i>	WA, Annex II, III, RL	N00, M90
Northern Shoveler	<i>Anas clypeata</i>	WA, Annex II, III, RL	N00, M90, R99
Northern Wheatear	<i>Oenanthe oenanthe</i>	WA, AL	R99
Peregrine Falcon	<i>Falco peregrinus</i>	WA, Annex I	N00, M90, S09
Pink-footed Goose	<i>Anser brachyrhynchus</i>	WA, Annex II	N00, M90
Red Grouse	<i>Lagopus lagopus</i>	WA, Annex II, III, RL	N00, M90, R99
Rock Pigeon	<i>Columba livia</i>	WA, Annex II	N00, M90, S09, R99
Ruff	<i>Philomachus pugnax</i>	WA, Annex I, AL	N00, M90, S09
Sand Martin	<i>Riparia riparia</i>	WA, AL	N00, M90, S09, R99
Short-eared Owl	<i>Asio flammeus</i>	WA, Annex I, AL	N00, M90
Sky Lark	<i>Alauda arvensis</i>	WA, AL	N00, M90, S09, R99
Spotted Crake	<i>Porzana porzana</i>	WA, AL	M90
Spotted Flycatcher	<i>Muscicapa striata</i>	WA, AL	N00, M90, S09, R99
Stock Pigeon	<i>Columba oenas</i>	WA, AL	N00, M90, S09, R99
Tufted Duck	<i>Aythya fuligula</i>	WA, Annex II, III, AL	N00, M90, S09, R99
Water Rail	<i>Rallus aquaticus</i>	WA, AL	N00, M90, S09, R99
Whinchat	<i>Saxicola rubetra</i>	WA, AL	N00, S09
Whooper Swan	<i>Cygnus cygnus</i>	WA, Annex I, AL	N00, M90, S09, R99
Wood Lark	<i>Lullula arborea</i>	WA	N00

Common name	Scientific name	Designation	Hectad
Yellowhammer	<i>Emberiza citrinella</i>	WA, RL	N00, M90, S09, R99

WA = Protected Species: Wildlife Acts, Annex (No.) – Protected Species: EU Bird's Directive, BoCCI – RL = Red Listed, AL = Amber Listed, GL = Green Listed

6.5.1.6 NPWS Data

National Parks and Wildlife Service (NPWS) online records were searched to see if any rare or protected species of flora or fauna have been recorded from hectad's M90 and N00. An information request was also sent to the NPWS requesting records from the Rare and Protected Species Database. Table 6-8 lists rare and protected species records obtained from NPWS, as received on the 29th of July 2022 as well as those recorded available through the online NPWS map viewer.

Table 6-8 National Parks and Wildlife Service Records

Common name	Scientific name	Designation	Hectad
Autumn Gentian	<i>Gentianella amarella</i>	Threatened Species: Near threatened	N00
Autumn Lady's-tresses	<i>Spiranthes spiralis</i>	Threatened Species: Near threatened	N00
Brown Beak-sedge	<i>Rhynchospora fusca</i>	Threatened Species: Near threatened	M90, N00
Reindeer Lichen	<i>Cladonia ciliata var. tenuis</i>	Annex V	N00
Reindeer Lichen (Cream Cup Lichen)	<i>Cladonia portentosa</i>	Annex V	M90, N00
Cladonia tenuis	<i>Cladonia ciliata var. ciliata</i>	Annex V	M90, N00
Fir Clubmoss	<i>Huperzia selago</i>	Annex V, Threatened Species: Near threatened	M90, N00
Green-winged Orchid	<i>Anacamptis morio (Orchis morio)</i>	Threatened Species: Vulnerable	N00
Henbane	<i>Hyoscyamus niger</i>	Threatened Species: Near threatened	N00
Lustrous Bog-moss	<i>Sphagnum subnitens</i>	Annex V, Threatened Species: Near threatened	M90, N00
Magellanic Bog-moss	<i>Sphagnum magellanicum</i>	Annex V	N00
Reindeer Moss	<i>Cladina rangiferina</i>	Annex V	M90
Soft Bog-moss	<i>Sphagnum tenellum</i>	Annex V	M90
Yellow Bird's-nest	<i>Monotropa hypopitys</i>		N00
Common frog	<i>Rana temporaria</i>	HD Annex V, WA	M90, N00
Common lizard	<i>Zootoca vivipara</i>	WA	N00

Common name	Scientific name	Designation	Hectad
Eurasian badger	<i>Meles meles</i>	WA	M90, N00
Eurasian Red Squirrel	<i>Sciurus vulgaris</i>	WA	N00
Eurasian Pygmy Shrew	<i>Sorex minutus</i>	WA	N00
European Otter	<i>Lutra lutra</i>	Annex II, IV, WA	M90, N00
Irish Hare	<i>Lepus timidus subsp. Hibernicus</i>	Annex V, WA	M90, N00
Stoat	<i>Mustela erminea</i>	WA	M90, N00
Irish stoat	<i>Mustela erminea subsp. hibernica</i>	WA	N00
Pine marten	<i>Martes martes</i>	WA, Annex V	M90, N00
Fallow Deer	<i>Dama dama</i>	WA	N00
European hedgehog	<i>Erinaceus europaeus</i>	WA	M90, N00
Barn Owl	<i>Tyto alba</i>	WA, RL	M90
Curlew	<i>Numenius arquata</i>	RL	M90
Desmoulin's Whorl Snail	<i>Vertigo moulinsiana</i>	Annex II, EN	N00
Geyer's Whorl Snail	<i>Vertigo geyeri</i>	Annex II, VU	N00
White-clawed Crayfish	<i>Austropotamobius pallipes</i>	Annex II, V, WA	M90, N00
Brook Lamprey	<i>Lampetra planeri</i>	Annex II, V	N00

FPO = Flora Protection Order; RL = Red List, VU = Vulnerable, WA = Protected Species: Wildlife Acts, Annex (No.) – Protected Species: EU Habitats Directive, BoCCI – RL = Red Listed, AL = Amber Listed, GL = Green Listed

6.5.1.7 Bat Records

A review of the National Bat Database of Ireland maintained by Bat Conservation Ireland, was made on the 28th July 2023, to obtain bat records from within 10km of the Proposed Development site. The search yielded records for eight bat species within 10km. Table 6-6 lists the bat species recorded within the hectads which pertain to the current study area (M90, N00, R99, S09).

Table 6-9 NBDC Bat Records within 10km of Proposed Development

Grid Square	Species	Database	Designation
M90, N00, R99, S09	Lesser Noctule <i>Nyctalus leisleri</i>	National Bat Database of Ireland	HD Annex IV, WA
M90, N00, R99, S09	Soprano Pipistrelle <i>Pipistrellus pygmaeus</i>	National Bat Database of Ireland	HD Annex IV, WA
N00	Nathusius's Pipistrelle <i>Pipistrellus nathusii</i>	National Bat Database of Ireland	HD Annex IV, WA
N00, S09	Brown Long-eared Bat <i>Plecotus auritus</i>	National Bat Database of Ireland	HD Annex IV, WA
N00, R99, S09	Daubenton's Bat <i>Myotis daubentonii</i>	National Bat Database of Ireland	HD Annex IV, WA
N00, S09	Natterer's Bat <i>Myotis nattereri</i>	National Bat Database of Ireland	HD Annex IV, WA
N00	Whiskered Bat <i>Myotis mystacinus</i>	National Bat Database of Ireland	HD Annex IV, WA
M90, N00, R99, S09	Pipistrelle <i>Pipistrellus pipistrellus sensu lato</i>	National Bat Database of Ireland	HD Annex IV, WA

6.5.1.8 Marsh fritillary (*Euphydryas aurinia*)

No records of marsh fritillary have been recorded within the EIAR study area boundary. The closest NBDC records for marsh fritillary were located 5km to the northwest of the EIAR boundary adjacent to the townland of Birr.

6.5.1.9 Inland Fisheries Ireland (IFI) Data

The IFI online database was reviewed for fish species records within the catchments downstream of the EIAR study area boundary. The Carrig Renewables Wind Farm development encompasses numerous small streams and rivers in north Tipperary, including the Little Brosna River, Lorrha Stream, River

Annagh, River Pallas, and the Kilfadda Castle Stream. The closest waterbody with IFI data is the Little Brosna River.

A range of fish species including Atlantic salmon (*Salmo salar*) and brown trout (*Salmo trutta*) were returned. Table 6-10 provides a summary of the available online data⁸.

Table 6-10 Fish data available from IFI National Research Survey Programme

Waterbody Name & Site Code	Species	Species Richness	Draft Fish Ecological Status
Little Brosna River Site code: IE_SH_25L020700	Brown Trout (<i>Salmo trutta</i>), minnow (<i>Phoxinus phoxinus</i>), Atlantic salmon (<i>Salmo salar</i>), roach (<i>Rutilus rutilus</i>), stone loach (<i>Barbatula barbatula</i>), three-spined stickleback (<i>Gasterosteus aculeatus</i>), Lamprey sp. (<i>Lampetra sp.</i>)	7	Good

6.5.1.10 Invasive Species

The NBDC database also contains records of invasive species identified within the relevant hectad's. Records of invasive species for hectad's M90, N00, R99, S09 are provided in Table 6-11.

Table 6-11 Invasive species records from the NBDC Database

Common Name	Scientific Name	Hectad
American Mink	<i>Mustela vison</i>	R99, M90, N00, S09
Bank Vole	<i>Myodes glareolus</i>	R99, M90, N00, S09
Brown Rat	<i>Rattus norvegicus</i>	N00, S09
House Mouse	<i>Mus musculus</i>	S09
Eastern Grey Squirrel	<i>Sciurus carolinensis</i>	R99, N00, S09
European Rabbit	<i>Oryctolagus cuniculus</i>	R99, M90, N00, S09
Fallow Deer	<i>Dama dama</i>	R99, M90, N00, S09
Greater White-toothed Shrew	<i>Crocidura russala</i>	R99, N00, S09
Common Garden Snail	<i>Cornu aspersum</i>	R99, M90, N00, S09
Jenkins' Spire Snail	<i>Potamopyrgus antipodarum</i>	R99, M90, N00, S09
Wrinkled Snail	<i>Candidula intersepta</i>	R99, M90, N00
Budapest Slug	<i>Tandonia budapestensis</i>	N00
Keeled Slug	<i>Tandonia sowerbyi</i>	N00, S09
Spanish Bluebell	<i>Hyacinthoides hispanica</i>	N00
Three-cornered Garlic	<i>Allium triquetrum</i>	N00
Japanese Knotweed	<i>Fallopia japonica</i>	R99, N00, S09
Giant Knotweed	<i>Fallopia sachalinensis</i>	N00
Common Broomrape	<i>Orobancha minor</i>	M90

⁸ IFI National Research Survey Programme, Online, Available at:
<https://ifigis.maps.arcgis.com/apps/webappviewer/index.html?id=9a31fedb077c4fb2991184842b7ef025>

Common Name	Scientific Name	Hectad
Canadian Waterweed	<i>Elodea canadensis</i>	M90, S09
Pampas-grass	<i>Cortaderia selloana</i>	N00
Parrot's-feather	<i>Myriophyllum aquaticum</i>	N00
Giant-rhubarb	<i>Gunnera tinctoria</i>	M90, N00, S09
American Skunk-cabbage	<i>Lysichiton americanus</i>	N00
Pitcherplant	<i>Sarracenia purpurea</i>	N00
Black Currant	<i>Ribes nigrum</i>	N00
Traveller's-joy	<i>Clematis vitalba</i>	N00, S09
Indian Balsam	<i>Impatiens glandulifera</i>	N00
Butterfly-bush	<i>Buddleja davidii</i>	N00
Himalayan Honeysuckle	<i>Leycesteria formosa</i>	N00
Cherry Laurel	<i>Prunus laurocerasus</i>	N00, S09
Evergreen Oak	<i>Quercus ilex</i>	N00, S09
False acacia	<i>Robinia pseudoacacia</i>	N00
Fringed Water-lily	<i>Nymphaoides peltata</i>	N00
Giant Hogweed	<i>Heracleum mantegazzianum</i>	N00
Rhododendron	<i>Rhododendron ponticum</i>	N00, S09
Sycamore	<i>Acer pseudoplatanus</i>	R99, M90, N00, S09
Douglas Fir	<i>Pseudotsuga menziesii</i>	S09

High/Medium/Low Invasive species impact; Regulation number – Ireland/EU; WA - Protected species: Irish Wildlife Acts (1976-2017)

6.5.1.11 Local Hydrology and Hydrogeology

The following description has been summarised from Chapter 9 'Water' of the EIAR and provides a baseline of the local watercourses within and downstream of the site of the proposed project.

Regionally the Proposed Development site is located in the Lower River Shannon surface water catchment within Hydrometric Areas 25A and 25B of the Shannon International River Basin District. A regional hydrology map is shown as Figure 9-1 (in Chapter 9 of this EIAR).

On a more local scale, the Proposed Development site is located entirely within the LittleBrosna_SC_020 sub-catchment (Little Brosna River catchment). The Little Brosna River flows to the east of the wind farm site at a downstream distance of approximately 5.5km. The Little Brosna River flows into the Shannon River approximately 22km downstream of the wind farm site. The grid connection crosses over the Little Brosna River northwest of Birr Town.

The Proposed Development site drains directly into the Little Brosna River via several local river waterbodies as described below...A local hydrology map is shown as Figure 9-2 (in Chapter 9 of this EIAR).

The wind farm site drains to the Little Brosna River via 3 main river waterbodies. The Fadden Beg Stream on the north of the proposed site, the Holy Well Clohaskin Stream and Fadden More Stream on the south of the proposed site.

The northern portion of the wind farm site (including 6 no. of the 7 no. proposed turbine locations) is drained by the Faddan Beg Stream (EPA Code: 25F29) which flows through the northwestern section of the wind farm site.

The Faddan Beg Stream is a first order stream that rises to the west of the wind farm site and then flows along the northern edge of the cutaway raised bog on which many of the proposed turbines are located. The bog is significantly cutaway and has turbary plots that extend into the central portion of the bog. There are several drainage outfalls from the cutaway raised bog that flow northerly towards the Faddan Beg Stream as it passes through the wind farm site. The portion of the wind farm site to the north of the Faddan Beg Stream is largely covered by a coniferous forest which has a network of large land drains that flow to the southeast towards the Faddan Beg Stream.

The Faddan Beg Stream is joined by a second (unnamed) first order stream that emerges from the southwestern portion of the wind farm site and then flows along the south-eastern edge of the cutover raised bog before merging with the Faddan Beg Stream close to the northern boundary. The unnamed stream also drains some agricultural land located to the south of the cutaway raised bog.

The southern portion of the wind farm site drains to the Holy Well Clohaskin Stream (EPA Code: 25F29), which is a second order stream, that intercepts the southern section of the wind farm site. The Holy Well Clohaskin Stream is fed by a smaller first order stream (Fadden More Stream) that flows along the south-eastern boundary of the wind farm site.

Proposed wind farm infrastructure in the southern portion of the wind farm site that drains to the Holy Well Clohaskin Stream include 1 no. turbine (T1) along with the site entrance and main access road. There is an area of commercial bog cutting in the south of the wind farm site that also drains to the Holy Well Clohaskin Stream and Fadden More Stream.

An existing drainage map for the wind farm site is shown within **Figure 9-3, Chapter 9**. The drainage map was created using OSI mapped watercourses, aerial photography, field mapping and analysis of Lidar data. Lidar data allows detailed mapping on the topographic contours of the wind farm site, thereby identifying all the linear drainage features at the site that are greater than 150m in length. Based on this assessment the main drainage pathways at the wind farm site are shown and the connectivity (i.e. pathways and outlet points) of these drains with the downstream EPA mapped streams/rivers can be clearly illustrated.

Surface water flow monitoring of the main streams emerging from the wind farm site was undertaken at 3 no. locations (SW1 – SW3) (**Table 9-6, Chapter 9**) and also downstream of the grid connection route on Little Brosna River (SW4 & SW5).

The flows are typical of small streams (watercourses draining the wind farm site) and larger waterbodies (Little Brosna River).

The wind farm site is underlain by 2 no. Ground Waterbodies (GWBs). The north of the wind farm site including 3 no. turbines are underlain by the Banagher GWB (IE_SH_G_040). Meanwhile, the majority of the wind farm site and all other key Proposed Development infrastructure are underlain by the Birr GWB (IE_SH_G_041). The Banagher GWB is described as poorly productive while the Birr GWB is described as karstic.

6.5.1.12 Water Quality

River Basin Management Plans (RBMPs) have been published for all River Basin Districts in Ireland in accordance with the requirements of the Water Framework Directive. The online EPA Envision map viewer provides access to water quality information at individual waterbody status for all the River Basin Districts in Ireland. The EPA Envision map viewer was consulted, most recently, on 26th July 2023 concerning the water quality status of the rivers which run within and directly adjacent to the

Study Area. The WFD River Waterbody Status 2016 – 2021 for the watercourses which flow through the site have been assessed in Table 6-12.

Table 6-12 Watercourses on site with relevant water quality statuses

Name	Location	Q-Value	Status	Risk (WFD 3 rd cycle)
Little Brosna	Flows in an easterly direction through the southern end of the site boundary where it later downstream flows into the Incherky River approximately 21km downstream, which later flows into Lough Derg.	3-4	Moderate	At Risk
Lorrha Stream	The Lorrha Stream flows westerly along the north-westerly boundary of the wind farm site and flows into Friar's Lough approximately 7.5km further downstream, before it later flows into Lough Derg approximately 7km further downstream from Friars Lough.	3-4	Moderate	At Risk
River Annagh	The Annagh River flows adjacent to the north-easterly boundary of the windfarm site and flows into the Incherky River approximately 7.5km downstream, which later flows into Lough Derg.	3-4	Moderate	Review
River Pallas	The river Pallas flows east adjacent to the northernmost boundary of the wind farm site. The Pallas River later joins the Incherky river approximately 9.2km downstream.	3-4	Moderate	At Risk
Kilfadda Castle Stream	The Kilfadda Castle Stream flows in a western direction to the west of the proposed site. The Kilfadda Castle stream flows into the Carrighorig Stream 5.5km downstream, which approximately 3.9km later flows into Lough Derg. All watercourses surrounding the Proposed Development site eventually flow into Lough Derg and into the Lower River Shannon.	3-4	Moderate	At Risk

Status- WFD River Waterbody Status 2010-2015 Risk – WFD River Waterbodies Risk

6.5.2

Conclusions of the Desk Study

The desktop study has provided information about the existing environment in hectad's M90, N00, S09 and R99, within which the Proposed Development is located. The mammal species recorded within the relevant hectad have widespread range and distributions in Ireland and are likely to be recorded frequently throughout Ireland (Marnell et al, 2009⁹). Bat records within 10km of the Proposed Development site revealed that the wider area has been studied for bats. This suggests that the area offers potential for foraging and commuting bat species.

As part of the desk study, the Article 17 mapped Annex I habitats data set was searched. Isolated patches of Active Raised Bog and Bog Woodland are present outside of the EIAR boundary, approx. 260m away at their closest. A number of watercourses adjacent to the study area, lead to downstream National and EU Designated Sites.

The EU designated sites are further considered in the Natura Impact Statement prepared for the Proposed Development.

⁹Marnell, F., Kingston, N. & Looney, D. (2009) Ireland Red List No. 3: Terrestrial Mammals, National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government, Dublin, Ireland.

The desk study identified that a variety of protected faunal species are known to occur within the study area, including bats, otter, badger, and red squirrel. The mammal species recorded during the desk study informed the survey methodologies undertaken during the site visits. The desk study also provided useful information to inform the ecological surveys undertaken on site as well as the identification of pathways for potential impact on sensitive ecological receptors.

6.6 Description of the Existing Environment

6.6.1 Description of Habitats within EIAR Site Boundary

A total of seventeen habitats were recorded within the Wind Farm Site and the extended Ecological Survey Area (see Habitat Map - Figure 6-5), including;

- > Cutover bog (PB4)
- > Conifer plantation (WD4)
- > Broadleaved woodland (WD1)
- > Bog Woodland (WN7)
- > Recently felled woodland (WS5)
- > Dense Bracken (HD1)
- > Scrub (WS1)
- > Improved Agricultural Grassland (GA1)
- > Dry meadows and grassy verges (GS2)
- > Hedgerow (WL1)
- > Treeline (WL2)
- > Eroding upland rivers (FW1)
- > Drainage ditches (FW4)
- > Buildings and artificial habitats (BL3)
- > Spoil and bare ground (ED2)
- > Recolonising bare ground (ED3)

Areas of GS2, BL3, ED2 and ED3 are small in area and occur as part of a mosaic with other habitat as such, are not visible at the scale shown on the Habitat Map.

Detailed botanical data from relevés recorded in the footprint of proposed infrastructure areas, including turbine bases and hardstands, access roads substation, met mast, construction compounds, and peat and spoil repository areas, are provided in Appendix 6-1 of this EIAR.

6.6.11 Woodland Habitats

6.6.11.1 Conifer plantation (WD4)

Areas within the Site comprise different stages of coniferous plantation forestry including recent clear-fell, second rotation, immature, semi-mature and mature forestry. The species comprises of Sitka spruce (*Picea sitchensis*). Given the nature of such densely planted coniferous plantations, few other woody plant species occur. Turbines T6 and T7 and the associated access road occurs entirely within conifer plantation habitat.

A number of small areas within the site have also been planted with alder (*Alnus glutinosa*), ash (*Fraxinus excelsior*) and silver birch (*Betula pendula*) along the peripheries of the plantation or in small blocks. The forest edges support species including willow (*Salix spp.*), ash (*Fraxinus excelsior*), alder (*Alnus glutinosa*), hawthorn (*Crataegus monogyna*), and silver birch (*Betula pendula*).



Plate 6-1: Example of plantation forestry (WD4) occurring within the north and centre of the site.

6.6.11.2 Broadleaved woodland (WD1)

This habitat is found within the southern and western areas of the Site. This habitat is associated with conifer plantation and occurs onsite adjacent to plantations. The species comprises of Willow (*Salix cinerea*), downy birch (*Betula pubescens*), bracken (*Pteridium aquilinum*) and non-vascular species including common feather-moss (*Kindbergia praelonga*). Occasionally alder (*Alnus glutinosa*), and ash (*Fraxinus excelsior*) occur within broadleaved stands. A commercial ash plantation categorised as WD1 occurs in the footprint of the proposed substation.



Plate 6-2 Example of broadleaved woodland within the Proposed Development site

6.6.1.1.3 **Recently felled woodland (WS5)**

Recently felled woodland is located only in the northwest section of the Site. This habitat is associated with conifer plantation and occurs onsite adjacent to the south of the plantations at the north of the Site. Drainage ditches occur in close proximity to this habitat. Regrowth of sitka spruce, willow and alder occurs in places within this habitat. No site infrastructure is located within this habitat.



Plate 6-3 Recently felled plantation occurring within the northwest of the Site

6.6.1.1.4 Bog woodland (WN7)

This habitat occurs in patches throughout the site but is found in the northeast of the Site mainly. This habitat is associated with cutover bog habitat and occurs onsite adjacent to cutover bog and scrub habitat. This habitat is dominated by downy birch (*Betula pubescens*), willows (*Salix cinerea*) and scots pine (*Pinus sylvestris*) with occasional rowan (*Sorbus aucuparia*). Ground cover is dominated by bracken (*Pteridium aquilinum*), bramble (*Rubus fruticosus agg.*), broad buckler-fern (*Dryopteris dilatata*) and purple moor grass (*Molinia caerulea*). Turbine 2, Turbine 3 and internal site access roads occur within bog woodland habitat.

Bog woodlands within the site conform to the *Rubus fruticosus – Dryopteris dilatata* vegetation type as per Perrin et al. 2008¹⁰. No areas of Annex I Bog Woodland were identified within the Proposed Development site. The ground within bog woodland areas is dry and firm underfoot, with sparse bryophyte species, predominantly limited to *Thuidium tamariscinum*, *Kindbergia praelonga* and *Pseudoscleropodium purum*.

¹⁰ Perrin, P., Martin, J., Barron, S., O'Neill, F., McNutt, K. & Delaney, A. (2008) National Survey of Native Woodlands 2003-2008. Unpublished report submitted to National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government, Dublin.



Plate 6-4 Example of bog woodland found within the Proposed Development site

6.6.1.2 Peatland habitats

Peatlands occurring within the site comprise mainly of **Cutover bog (PB4)**. Historic and recent peat extraction has been undertaken within the majority of peatland within the EIAR study area. Therefore, those peatland habitats within the site have been assessed as **Cutover bog (PB4)**.

6.6.1.2.1 Cutover bog (PB4)

Areas of cutover bog comprised of vegetation that included ling heather (*Calluna vulgaris*), cross leaved heath (*Erica tetralix*), purple moor-grass (*Molinia caerulea*), tormentil (*Potentilla erecta*), bog asphodel (*Narthecium ossifragum*), saplings of downy birch (*Betula pubescens*) and willow (*Salix sp.*). Vast areas of cutover bog in the site are dominated by bare peat with revegetation taking place in the cutover bog in the middle of the site. Peat is still actively being extracted from the Site. Turbine 5, turbine 1, part of the turbine 3 footprint and adjacent construction compound, and peat and spoil repository areas occur on this habitat. These cutover habitats have been classified as *Calluna vulgaris*-bare peat cutover bog (BP1), *Eriophorum angustifolium*-bare peat cutover bog (BP2) and *Molinia caerulea* cutover bog (LS3) as per Smith et. al (2020)¹¹. According to Smith et al. 2020, an area of cutover bog must have *Sphagnum* cover of more than 40%, in addition to other criteria, to qualify as Active Raised Bog. As this is the threshold used for the High *Sphagnum* habitat group, it follows that an area of cutover should fall into the HS1, HS2 or HS3 habitat types to qualify as active raised bog. As such, the cutover habitats within the Proposed Development do not qualify as Annex I habitat due to their degraded state and paucity of *Sphagnum* species.

¹¹ Smith, G.F. & Crowley, W. (2020) *The habitats of cutover raised bog. Irish Wildlife Manuals, No. 128. National Parks and Wildlife Service, Department of Housing, Local Government and Heritage, Ireland.*



Plate 6-5 Example of revegetating Cutover bog (PB4) located within the centre of the site



Plate 6-6 Example of cutover bog with active peat extraction and dominated by bare peat

6.6.1.3 Grassland Habitats

6.6.1.3.1 Improved agricultural grasslands (GA1)

Grasslands within the south of the site are classified as Improved agricultural grasslands (GA1) and are species poor. This habitat is predominantly comprised of vegetation that includes perennial rye grass (*Lolium perenne*), ragwort (*Jacobaea vulgaris*) and fat-hen (*Chenopodium album*). Site infrastructure located within this habitat includes Turbine T4 and internal site access tracks.



Plate 6-7 Example of typical sward of Improved agricultural grassland within the study site.

6.6.1.3.2 Dry meadows and grassy verges (GS2)

Small areas of Dry meadows and grassy verges (GS2) were recorded between blocks of plantation forestry or along site tracks and riverbanks. These areas tended to be dominated by the following plant species, yorkshire fog (*Holcus lanatus*), milkwort vetch (*Polygala serpyllifolia*), bindweed (*Convolvulus arvensis*), cleavers (*Galium aparine*), sheep sorrel (*Rumex acetosella*), wild angelica (*Angelica sylvestris*), nettles (*Urtica dioica*), rough hawkbit (*Leontodon hispidus*), autumn hawkbit (*Scorzoneroides autumnalis*), silverweed (*Potentilla anserina*), white and red clover (*Trifolium repens*, *pratense*) and creeping buttercup (*Ranunculus repens*).



Plate 6-8 Example of Dry meadows and grassy verges within the Site

6.6.1.4 Aquatic habitats

6.6.1.4.1 Eroding/upland river (FW1)

A number of watercourses were identified within the site and correspond to eroding/ upland rivers (FW1). Watercourses were mainly comprised of small streams - Faddan Beg flowing through the north of the site, and Holy Well Clohaskin flowing through the south of the site.

The Faddan Beg flows through the north of the site and is half a metre in width, with pebbles and silt substrate and is 20cm in depth. Where it occurs within the study area boundary it is categorised as an eroding/upland river (FW1). There are mature willow and birch trees in places along the bank. The eastern section of the river within the Study Area is more vegetated than the west. Grassy verge habitat is present to the north of the river, composed of gorse (*Ulex europeaus*), bramble (*Rubus fruticosus agg.*), common reed (*Phragmites australis*), creeping bent grass (*Agrostis stolonifera*), yorkshire fog (*Holcus lanatus*), wild angelica (*Angelica sylvestris*), oat grass (*Arrhenatherum elatius*) and bindweed (*Convolvulus sepium* and *Convolvulus arvensis*). Scrub, Dense bracken and Bog woodland habitats are present to the south of the river, comprising willow (*Salix spp.*), birch (*Betula sp.*), bracken, wild angelica, creeping bent grass and meadow sweet (*Filipendula ulmaria*). Instream vegetation within the Faddan Beg River onsite consists of foals watercress (*Apium nodiflorum*), common reed (*Phragmites australis*) and amphibious bistort (*Persicaria amphibia*), great hairy willowherb (*Epilobium hirsutum*) and bulrush (*Typha latifolia*).

The Holy Well Clohaskin river flows through the south of the site. Where it occurs within the study area boundary it is categorised as an eroding/upland river (FW1). The river has a slow to moderate flow. It is approx. 2 meters wide and 30cm deep, with a cobble, pebble and gravel substrate. Bankside vegetation consists of treelines of alder, ash, elder, hawthorn, ivy, holly, dog rose (*Rosa canina*) and sycamore. Instream vegetation includes fool's watercress, watermint (*Mentha aquatica*) and great willow herb (*Epilobium hirsutum*).

These watercourses that drain the Proposed Development site and grid connection route form part of the Little Brosna River. For further detail on these river habitats and their fisheries value please see Aquatic Baseline Report, Appendix 6-3.



Plate 6-9 The Fadden Beg within the north of the study area, a tributary of the Little Brosna River.



Plate 6-10 The Holy Well Clohaskin river to the south of the site.

6.6.1.4.2 Drainage Ditches (FW4)

There are numerous drainage ditches throughout the study area, associated with conifer plantations and cutover bog.

Drainage ditches associated with cutover bog areas have very little to no instream vegetation and is biodiversity poor. Species include *Phragmites australis*, gorse (*Ulex europaeus*), and ling heather (*Calluna vulgaris*).



Plate 6-11 Example of typical drainage ditch found within cutover bog habitat within the Site

Drainage ditches found near conifer plantations consist of gorse (*Ulex europaeus*), fools water-cress (*Apium nodiflorum*), water forget-me-not (*Myosotis scorpioides*), yorkshire fog (*Holcus lanatus*), sweet vernal grass (*Anthoxanthum odoratum*), creeping thistle (*Cirsium arvense*), stinging nettles (*Urtica dioica*), common bent grass (*Agrostis capillaris*), bramble (*Rubus fruticosus agg.*), soft rush (*Juncus effusus*), foxglove (*Digitalis purpurea*), bulrush (*Typha latifolia*) and tormentil (*Potentilla erecta*).



Plate 6-12 Drainage ditch associated with conifer plantation at the north of the Site.



Plate 6-13 Drainage ditch habitat found in association with recently felled plantation habitat.

6.6.15 Other Habitats

6.6.1.5.1 Dense Bracken (HD1)

Small areas of dense bracken were noted along edges of cutover bog and formed small pockets within scrub and bog woodland areas. Species predominantly comprised of bracken fern (*Pteridium aquilinum*), bramble (*Rubus fruticosus agg.*), and common nettle (*Urtica dioica*).



Plate 6-14 Example of bracken (HD1) found onsite

6.6.1.5.2 Scrub (WS1)

Small areas of scrub were noted along edges of cutover bog, bog woodland, and in proximity of drainage ditches. Species predominantly comprised of gorse (*Ulex europaeus*), willow (*Salix cspp.*), birch (*Betula spp.*), bramble (*Rubus fruticosus agg.*), bilberry (*Vaccinium myrtillus*), bracken (*Pteridium aquilinum*) and nettle (*Urtica dioica*). Turbine T3, a peat repository area, and a construction compound are located within Scrub habitat.



Plate 6-15 Example of Scrub (WS1) habitat within the Site

6.6.1.5.3 Hedgerows (WL1)

Hedgerow habitats border the grasslands to the south and east of the Study Area. The species found in this habitat are predominantly hawthorn (*Crataegus monogyna*), dog rose (*Rosa canina*), hazel (*Corylus avellana*), and the understory comprises bramble (*Rubus fruticosus agg.*), nettle (*Urtica dioica*), ivy (*Hedera hibernica*), yorkshire fog (*Holcus lanatus*) and cock's-foot (*Dactylis glomerata*).

6.6.1.5.4 Treelines (WL2)

This habitat is present predominantly in the south and east of the site delineating agricultural fields. The species within this habitat consist of hawthorn (*Crataegus monogyna*), silver birch (*Betula pendula*), ash (*Fraxinus excelsior*), elder (*Sambucus nigra*), with understories composed of bramble (*Rubus fruticosus agg.*), nettle (*Urtica dioica*), ivy (*Hedera hibernica*), yorkshire fog (*Holcus lanatus*) and cock's-foot (*Dactylis glomerata*).



Plate 6-16 Treeline and Hedgerow field boundaries

6.6.1.5.5 Buildings and artificial surfaces (BL3)

Buildings and artificial habitats within the Study Area mainly consist of agricultural sheds and farmyards and a single dwelling house within the boundary. Existing roadways within the Site are categorised within this habitat.

Species associated with this habitat predominantly comprised of bracken (*Pteridium aquilinum*), bramble (*Rubus fruticosus agg.*), yorkshire fog (*Holcus lanatus*), common nettle (*Urtica dioica*), ivy (*Hedera hibernica*).



Plate 6-17 Example farm shed categorised under the Buildings and artificial surfaces within the Site Boundary

6.6.1.5.6 **Recolonising bare ground (ED3) and Spoil and bare ground (ED2)**

A number of areas where ground disturbance has been undertaken in the recent past have begun to recolonise. Unbound forestry tracks through the East of the site were categorised as Spoil and bare ground (ED2). These areas are small in area and occur as part of a mosaic with other habitat as such, have not been mapped in detail.



Plate 6-18 Example of unbound forestry tracks showing Spoil and bare ground within the Study Area.

6.6.1.6 **Habitats within the turbine hardstand footprint**

Turbine 1 and turbine 5 are located on cutover bog (PB4) habitats as described in Section 6.6.1.2. Turbine 3 is located within a mosaic of cutover bog (PB4), bog woodland (WN7) and scrub (WS1). Turbine 2 is located within bog woodland (WN7) as described in Section 6.6.1.1.4. Turbine 4 is located on improved agricultural grassland (GA1) as described in Section 6.6.1.3.1. Turbines 6 and 7 are located in conifer forestry (WD4) as described in Section 6.6.1.1.1. Details of the relevés undertaken within the footprint of the turbine bases are provided in Appendix 6-1.

6.6.1.7 **Habitat within the Substation footprint**

The habitat is classified as a broadleaved woodland (WD1) comprised of a commercial plantation of mostly ash, hawthorn, spindle and hazel with ivy cover. The habitat is separated from the road classified as Buildings and artificial surfaces (BL3) by a low stone wall classified as Stone walls and other stonework (BL1). Ivy and bryophyte cover are present along the stone wall along with other calciphyle vegetation including a variety of Fern species.



Plate 6-19 Broadleaved woodland (WD1) within substation footprint.

6.6.1.8 Habitats within the Peat and Spoil Repository Areas

Peat repository and spoil repository locations have been identified within the Proposed Development boundary and are illustrated in Figure 6-6. These repository areas are located towards the middle of the site by Turbine's T1, T3 and T5, as well as near the construction compounds. The repository areas are located adjacent to existing roads in some cases and other near proposed new access tracks. The peat repository areas are located in cutover bog (PB4), Scrub (WS1), Bog woodland (WN7), Dense bracken (HD1), dry meadows and grassy verges (GS2) and Mixed broadleaved woodland (WD1). See descriptions and photos of these habitats in the preceding Sections. Relevés within the footprints of these areas are provided in Appendix 6-1.

6.6.1.9 Habitats within Construction Compounds

The two proposed construction compounds will be located on cutover bog (PB4) and associated scrub (WS1) habitat, which are described in the preceding Sections. Relevés within the footprints of these areas are provided in Appendix 6-1.

6.6.1.10 Habitats at the Proposed Met Mast

The proposed met mast is to be located adjacent to an existing track on an area of bare peat and spoil/rubble (ED2) and scrub (WS1) dominated by common gorse, willow, nettle, rosebay willowherb (*Chamaenerion angustifolium*) and bramble. Relevé data for the proposed met mast location is shown in Appendix 6-1.



Plate 6-20 Habitat within the footprint of the proposed met mast

6.6.1.11 Internal Road Water-crossing Structures

The southern access road will require a water crossing structure as it crosses the Holy Well Clohaskin river within the south of the site. The habitats found at this location include eroding/upland river (FW1) as described in Section 6.6.1.4.1 above. Two treelines of Alder, Ash, elder, hawthorn, ivy, holly, dog rose (*Rosa canina*) and sycamore are found along the river. The road will also cross an existing road and associated hedgerow (WL1) (Plate 6-22).

The access road to proposed Turbines 6 and 7 will require a water crossing structure over the Faddan Beg Stream (FW1). Bankside vegetation at this location consists of peripheral woodland vegetation and dense bracken and scrub. The stream is adjacent to grassy verge (GS2) habitat at the periphery of conifer plantation (WD4) to the north.

All proposed water-crossing structures will be clear span, bottomless culverts. The locations of the proposed water-crossing structures are shown on Figure 6-6.



Plate 6-21 the Holy Well Clohaskin river within the footprint of southern access road water crossing.



Plate 6-22 Existing road and hedgerow (WL1).

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6.6.1.12 Habitats along the Grid Connection Route

Habitats present along the grid connection route include the following:

- Improved agricultural grassland (GA1)
- Buildings and artificial surfaces (BL3)
- Arable crops (BC1)
- Treelines (WL2)
- Hedgerows (WL1)
- Wet grassland (GS4)
- Amenity grassland (GA2)
- Parkland and scattered trees (WD5)
- Conifer plantation (WD4)
- Dry meadows and grassy verges (GS2)

The proposed substation site is located within an area of broadleaved woodland (WD1) adjacent to an existing access road to the east of the site.

The underground cabling works will consist of the installation of ducts in an excavated trench to accommodate power cables, and a fibre communications cables to allow communications between the proposed 38kV onsite substation and the existing 110kV Dallow substation.

The underground electrical cabling will be laid beneath the surface of the Proposed Development site and the public road. This underground cable connection will originate at the proposed onsite substation and will run southeast along the local public road before meeting the N52 National primary road in the townland of Carrig, see Plate 6-15. The route continues for 2.6km along the N52 before turning northeast onto the L-9520 for the entirety of that local road (approx. 420m). The GCR will merge onto the L-1071 and travel northwards for approx. 1.26km where it will re-join the N52 at the old railway bridge. The habitats adjoining the existing roads, which have been assessed as Buildings and artificial surfaces (BL3), include Parkland and scattered trees (WD5), Improved agricultural grasslands (GA1), Amenity grasslands (GA2), Conifer Plantation (WD4), Treelines and Hedgerows (WL1 & WL2), with few wet grasslands (GS4) and Arable crop (BC1). A number of flowing watercourses which are all tributaries of the Little Brosna River pass beneath the existing road along which the underground cable connection route will be located.

The grid connection cabling route will cross the Little Brosna River in four places, at existing road bridges and continue west along the local road before joining the N52 in the townland of Carrig where the first water crossing occurs along the Little Brosna (LittleBrosna_040). The connection route then follows Northwest through Riverstown along the Regional Road R489, from here the route follows North along L5045 Killeen local road and adjoining to the Croghan Rd L1077, where the second water crossing occurs (LittleBrosna_050). The route follows the R439 North through the townlands of Cappaneale and turns west at Golf Links Lane where the third and fourth water crossings occur (LittleBrosna_060) along an unnamed local access road in Claondallow before reaching the Dallow 110kv Substation.

The construction methodology for the 6 watercourse/culvert crossings has been designed to eliminate the requirement for in-stream works on these locations requiring a crossing to be constructed to traverse the watercourse with the cabling ducts.

Standard Formation Crossing over Culvert – Option A

Where adequate cover exists above a culvert, the standard trench arrangement will be used where the cable ducts pass over a culvert without any contact with the existing culvert or water course.

Where no crossing currently exists, the cable will pass over the watercourse bridged by a bottomless box culvert or pre-cast concrete slab in a standard trefoil arrangement. Where required existing culvert crossings will be extended using appropriately sized corripipes.

Standard Formation Crossing under Culvert – Option B

Where the culvert consists of a socketed concrete or sealed plastic pipe and sufficient depth is not available over the crossing, a trench will be excavated beneath the culvert and cable ducts will be installed in the standard formation 300mm below the existing pipe.

Shallow Formation Crossing over Culvert – Option C

Where cable ducts are to be installed over an existing culvert and sufficient cover cannot be achieved, the ducts will be laid in a much shallower trench, the depth of which will be determined by the cover available at the culvert crossing location. The ducts within the shallow formation trench will be encased in 6mm thick steel galvanized plates and backfilled with 35N concrete.

Where sufficient deck cover is not available to fully accommodate the required ducts, it may be necessary to locally raise the footpath level if present, or to locally raise the pavement level. Should the footpath or pavement level be increased, the parapet wall levels will also increase to facilitate the raise in pavement level if required. Any addition of a new pavement will be tied back into the existing road pavement at grade.

Directional Drilling – Option D

In the event that none of the above methods are appropriate, directional drilling (DD) will be utilised.



Plate 6-15 Local public road in the townland of Faddan More along which the proposed cable route will be located.



Plate 6-23 Section of the grid route connection that passes through Riverstown (BL3)



Plate 6-24 Scattered trees and parkland (WD5) example along the route, which is an abundant habitat along the route

6.6.1.12.1 Watercourse crossings

The 6th water crossing identified during the walkover survey have been assigned a reference number and are as follows. Locations of water crossings are shown on Figure 6-1. The watercourses are listed in the table below starting with the water crossing that is closest to the wind farm site and moving away along the grid connection route. Four of the 6 crossings are EPA-mapped rivers. A farm underpass crossing is also required, but there is no watercourse associated with this.

Table 6-13 Watercourse crossings

Crossing ID	ITM	Culvert type	Crossing option	Channel Works	EPA watercourse reference
WC 1	601783 701291	Stone Arch	D	None. No instream works required.	Little Brosna _040
WC2	604771 703816	Concrete drain	A	None. No instream works required.	Unmapped drain
WC3	605315 705685	Triple Stone Arch	D	None. No instream works required.	Transitional between Little Brosna _060 and Little Borsna _050
WC4	605856 706297	Stone Arch Bridge	A	None. No instream works required.	Unnamed drain
WC5	605543 707711	Stone Arch Bridge	D	None. No instream works required.	Little Brosna _060
WC6	605350 707969	PVC pipe	A	None. No instream works required.	Little Brosna _060
Farm underpass	604770 705745	Concrete bridge	C	N/A – no watercourse present	N/A

Water crossing 1

The westernmost water crossing consists of a single stone arch (BL3) (Plate 6-25) beneath the existing road, on the Little Brosna River, a depositing/lowland river (FW2). Surrounding habitats include Buildings and artificial surfaces (BL3), Improved agricultural grasslands (GA1), Treelines (WL2) and stone walls and other stonework (BL1).



Plate 6-25 Water crossing 1 on the Little Brosna River

Water crossing 2

The second water crossing consists of a concrete pipe (BL3) within a drain (FW4) in Riverstown.



Plate 6-26 WC2 - Concrete pipe in drain, Riverstown.

Water crossing 3

Crossing 3 consist of a triple stone arch (BL3) with plaster underneath (Plate 6-27) over the Little Brosna River along a section categorised as lowland/depositing river (FW2). Improved agricultural grasslands (GA1), Treelines (WL2) and mixed broadleaf woodland (WD1) surround this water crossing.



Plate 6-27 Triple stone arch with plaster underneath over crossing 2.

Water crossing 4

WC4 consists of a stone arch (BL3) over a drainage ditch (FW4).



Plate 6-28 Stone arch at WC4

Water crossing 5

The fifth water crossing consists of an arch (BL3) with a stone wall (Plate 6-29 and Plate 6-30) over the Little Brosna River (FW2). This water crossing is adjacent to conifer plantation (WD4), mixed broadleaved woodland (WD4) and wet grassland (GS4).



Plate 6-29 Pipe under crossing 3.

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Plate 6-30 Stone wall at water crossing 3

Water crossing 6

The sixth water crossing consists of a double culvert (BL3) (Plate 6-31) over the Little Brosna River (FW2). Wet grassland (GS4), Drainage ditches (FW4) and Improved agricultural grassland (GA1) occur in close proximity to this watercourse.



Plate 6-31 Double piped culvert at water crossing 4.

Farm underpass crossing

The farm underpass crossing consists of a concrete and masonry bridge. There is no watercourse associated with this crossing.



Plate 6-32 Farm underpass crossing.

6.6.1.13 Habitats along the turbine delivery route

Accommodation works will be required at various locations on the national and regional road network between the port of arrival in Shannon Foynes and the Proposed Development site. These will be limited to temporary measures including temporary local road widening, overruns of roundabout island and temporary relocation of some signs and street furniture. These areas requiring temporary works have been assessed from an ecological perspective with habitat details provided below:

Location 1 – Townparks, Co. Offaly

It is proposed to install temporary roadway ground mats along a section of grass verge in Birr, Co. Offaly. The ground mats will provide a temporary access roadway over the grass verge and remove the requirement of stoning out the area. The section of the turbine delivery route will require the temporary removal of road signage, shop signage and other roadside infrastructure. Upon completion of the turbine delivery phase, the ground mats will be removed, and all signage and roadside infrastructure will be reinstated.

This area consists of two areas of amenity grassland (GA2) in the town of Birr adjacent to a roundabout and Tesco supermarket. The southern section is adjacent to the skate park and is dominated by perennial rye grass with silver weed, white cover, broad leaved plantain (*Plantago major*) and dandelion. One ornamental semi-mature pedunculate oak tree is present.

The northern grassland area consists of amenity grassland (GA2) with one ornamental beech tree and 3 ornamental lime trees (*Tilia cordata*). The area is adjacent to a treeline of lime with Buddleja (*Buddleja davidii*).



Plate 6-33 Amenity grassland within turbine delivery route accommodation area



Plate 6-34 Amenity grassland within turbine delivery route accommodation area

Location 2– Ballyloughnane, Co. Tipperary

In the townland of Ballyloughnane, Co. Tipperary, it is proposed to construct a short section of temporary roadway through agricultural land on the northern side of a sharp bend on the N52 National Secondary Road. Upon the completion of the turbine component delivery phase, this area will be reinstated to its current condition and the boundary between the public road and the agricultural land will be reinstated.

This area consists of an Improved agricultural field (GA1) bound by a concrete stone wall (BL3). The field is dominated by perennial rye grass, white clover, silverweed (*Potentilla anserina*) and Yorkshire fog, with occasional common daisy and mouse-ear chickweed (*Cerastium fontanum*). Two mature ash trees (*Fraxinus excelsior*) with ivy cover are present east and west along the wall. A hawthorn hedgerow is present along the eastern section of the wall. Both trees will be felled for the works.



Plate 6-35 Agricultural grassland and ash tree within turbine delivery route accommodation area



Plate 6-36 Ash tree in footprint of accommodation works

Location 3 -Clohaskin, Co. Tipperary

Temporary junction widening works will be required on both the northern and southern side of the N52/L5040 junction in order to facilitate the delivery of turbine components and other abnormal loads. Upon the completion of the turbine component delivery phase, this area will be reinstated to its current condition. This area consists of a grassy verge area (GS2) at the junction between the L5040 and N52. The area consists of abundant cocks foot, false oat grass, Yorkshire fog, and quaking grass, with frequent knapweed (*Centaurea nigra*), *Rhytiadelphus squarrosus*, ox-eye daisy (*Leucanthemum vulgare*), common daisy (*Bellis perennis*), creeping buttercup (*Ranunculus repens*), yarrow (*Achillea millefolium*), mouse-ear hawkweed (*Pilosella officinarum*), birds foot trefoil (*Lotus corniculatus*) and occasional glaucous sedge (*Carex flacca*), wild carrot (*Daucus carota*) and red clover (*Trifolium pratense*).



Plate 6-37 Grassy verge habitat within turbine delivery route accommodation area

6.6.1.14 Protected Flora

No botanical species listed under the Flora (protection) Order (S.I. No. 235 of 2022), listed in the EU Habitats Directive (92/43/EEC), or listed in the Irish Red Data Books were recorded on the site. All species recorded are common in the Irish landscape. No rare and protected plant species recorded in the desk study, including those obtained from NPWS data request (see Section 6.5.1.6), were recorded within the study area.

6.6.1.15 Invasive species

During field surveys, a search for Invasive Alien Species (IAS) listed under the Third Schedule of the European Communities Regulations 2011 (S.I. 477 of 2015) was conducted. No Third Schedule invasive species were recorded within the EIAR site boundary, along the grid connection route or within turbine delivery works areas/accommodation works areas.

6.6.2 Fauna in the Existing Environment

The following subsections provide a breakdown of the species recorded during the site visits and assessments. A map showing locations of evidence of fauna observed is in Figure 6-7.

6.6.2.1 Badger

A badger sett, consisting of 4 entrances, was located adjacent to an existing road proposed to be upgraded within the EIAR site boundary. This has been classified as a main sett due to its size and level of activity (as per Smal, (1995)¹². Trail camera footage from 29th June 2023 to 12th July 2023 showed evidence of badger activity in the vicinity of the sett. The location of the badger sett is provided in Confidential Appendix 6-5¹³. Sightings of badger were also observed in the north of the site as shown on Figure 6-7.

6.6.2.2 Otter

No signs of otter activity were found along the watercourses within the development site boundary. Signs of otter were recorded downstream of the development site during the surveys of the watercourses that drain the EIAR study area boundary. As described in the Aquatic Baseline Report, otter signs, in the form of spraints and prints, were recorded at sites on the Holy Well Clohaskin River (A7) and Little Brosna River (A8 and A9), see Aquatic Baseline Report, Appendix 6.3, these locations are also shown on Figure 6-7.

No breeding (holt) or couch (resting) places were identified within or downstream of the EIAR study boundary.

No otter signs were recorded along the watercourses within the site or in close proximity to any of the main windfarm infrastructure i.e., turbines, hardstands, site access roads etc. Watercourses were assessed as providing suitable commuting and foraging habitat for the species and otter may occur within the EIAR site boundary, at least on occasion. Following assessment, the fisheries potential of the watercourses within the site boundary is poor and therefore otter are more likely to utilise the lower reaches of the watercourses, downstream of the Proposed Development site.

6.6.2.3 Marsh Fritillary

Marsh fritillary surveys were undertaken on 8th September 2022 within suitable areas of the site containing Devil's Bit Scabious (*Succisa pratensis*), as mapped on Figure 6-7. No larval webs of Marsh Fritillary were found within any of these areas.

¹² Smal, C. (1995) *The Badger and Habitat Survey of Ireland. Unpublished Report to the Department of Agriculture and the National Parks & Wildlife Service.*

¹³ Following standard best practice, the location of breeding or resting places of protected species should be provided as a confidential appendix for review by the competent authority and not made available to the public in order to avoid potential for persecution.

6.6.2.4 Bats

Bat walkover surveys which were carried out throughout 2022 in accordance with Scottish Natural Heritage Guidance (SNH 2019), and subsequently published NatureScot (2021) guidance, form the core dataset for the assessment of effects on bats at the Proposed Development site. Bat surveys included roost survey, manual transect surveys and ground-level static surveys.

6.6.2.4.1 Roost surveys

Structures

Following the search for roosts in 2022, seven structures and their associated outbuildings containing potential suitable bat roost features were identified. Three are within the EIAR site boundary, including a hay shed, a derelict stone building and a small farm shed. Four structures are located outside the site boundary.

The structures were subject to interior (where accessible) and exterior inspections to search for evidence of bats. Details of the inspection surveys are presented in Section 4.3.3 of the Bat Report (Appendix 6.2). A summary table of the results is provided below. All identified structures will be retained and avoided as part of the Proposed Development.

Table 6-14 Potential Roost Feature (PRF) Inspection Survey Results

Structure	PRF Suitability	Survey Results
Hay Shed	<i>Low</i>	Half open with large amounts of light penetration. No evidence of bats.
Derelict Stone Building	<i>Low</i>	No evidence of bats.
Small farm shed	<i>Negligible</i>	No evidence of bats.
Partially Constructed Block House	<i>Low</i>	No bats were observed emerging.
Corrugated Roof Derelict Cottage	<i>Low</i>	Separate attic space, open to floor level and outside in sections, house is in bad condition. No evidence of bats.
Stone Shed (near the cottage)	<i>Low</i>	Front of structure open with large amounts of light penetration. Some ivy cover present. No evidence of bats.
Old House with sheds	<i>Low</i>	Too bright, no separate attic. No evidence of bats.

Trees

Trees present on site are dominated by commercial coniferous species which provide largely suboptimal suitability for roosting potential due to the lack of potential roost features (PRFs) available. Small sections of the site are comprised of a mixture of mature and immature birch, willow, ash, oak, sycamore and rowan species. Overall, the majority of trees were assessed as not providing suitable habitat for roosting bats due to their size and lack of PRFs and were thus assessed as having *Negligible* – *Low* roosting potential.

6.6.2.4.2 Manual transects

Manual transects were undertaken in Spring, Summer and Autumn 2022. Bat activity was recorded in all seasons. A total of 479 bat passes were recorded. In general, soprano pipistrelle (n=301) was recorded most frequently, followed the common pipistrelle (n=165). Leisler's Bat (n=9) and *Myotis sp.* (n=4) were less frequent.

Species composition and activity levels varied between surveys. Transect survey results were calculated as bat passes per km surveyed (to account for differences in survey effort). Bat activity was concentrated along treelines, and hedgerows, and linear (road/track) habitats.

An emergence survey was carried out on the derelict stone building on the 28th June 2022. Overall, bat activity in the area was low around the building during the emergence survey. Two common pipistrelles were noted commuting beyond the structure with no bats observed emerging. A small number of bats were observed repeatedly foraging along linear features near bog woodland.

An emergence survey was carried out on the Partially Constructed Block House on the 21st May 2022. Overall, bat activity in the area was low around the house during the emergence survey. No bats were observed emerging from the house during emergence survey. One Leisler's bat was seen commuting over the building. A small number of bats were observed repeatedly foraging along linear features near bog woodland. Further details on the manual transect survey results are contained in the Bat Report.

6.6.2.4.3 Ground-level Static Surveys

SNH Guidance (2019) requires static detector surveys at turbine bases and the results of those surveys are provided below. The location of all static detectors is provided in Table 3-4 of the Bat report Appendix 6.2 of this EIAR.

Leisler's bat Median Bat Activity was recorded as Low in Summer and Autumn. Moderate and High Max activity was recorded at all the detector locations in Spring and Summer. Activity peaked at D04 in Spring. In Autumn Moderate Max activity level was recorded at D01 and D03.

Overall, Common pipistrelle Max Bat Activity was generally High in Spring and Summer. High Max Bat activity was recorded at D01, D04, D05, and D07 in Spring, at D01, D02, D04, D05, D06 and D07 in Summer, and at D05 and D07 in Autumn. Activity peaked in Spring at D07.

Soprano pipistrelle Median Bat Activity was generally Low. In Spring and Summer Median Bat Activity was High for D02. High Max Bat Activity was recorded at D02, D03, D05, and D07 in Spring, at D02, and D07 in Summer, and at D05 in Autumn. Activity peaked in Spring D02 and Autumn D05. Moderate Max Bat Activity was recorded in Spring at D04, Summer at D03, D04 and D06, and Autumn D02 and D03.

Myotis spp. recorded relatively low activity in comparison to other species, on a site-specific level. High Max Activity was recorded in Spring D04 and Summer at D04 and D05. A Moderate activity level was recorded at D03 in Autumn. High peak activity levels were also recorded in Spring and Autumn, with the highest activity recorded at D04 in Spring for these species Overall, *Myotis spp.* recorded Low activity across all seasons.

Nathusius' pipistrelle Median Bat activity was recorded as Low for all three seasons. In Summer, D06 and D07 recorded Moderate and High Max bat activity levels. Low Max Bat Activity levels were recorded for all other seasons.

Brown long-eared bat activity was generally Low throughout the site. High Max Activity levels for this species were recorded at D05 Spring.

Detailed results for each species can be found in the Bat Report, provided in Appendix 6.2.

All bat species in Ireland are protected under the Bonn Convention (1992), Bern Convention (1982) and the EU Habitats Directive (92/43/EEC). Additionally, in Ireland bat species are afforded further protection under the Birds and Natural Habitats Regulations (2011) and the Wildlife Acts 1976-2022. No bat roosts were identified within the footprint of the Proposed Development. Bats as an Ecological Receptor have been assigned **Local Importance (Higher value)** on the basis that the habitats within the study area are utilized by a regularly occurring bat population of Local Importance.

No bat roosts and no evidence of use by bats were identified within the Proposed Development site during the surveys. No roosting site of National Importance (i.e. site greater than 100 individuals) was recorded within the site. However, a number of structures and trees with limited potential to host roosting bats occur within the wider area. Structures within the site will be avoided and retained and will not be affected by the Proposed Development at construction or operational phase.

6.6.2.4.4 Grid Connection Route Water Crossing Structures

On the 13th of June 2023 the structures of the existing water crossings along the proposed grid connection route were inspected for signs of bat roosts and were assessed for bat roost potential. The watercourse-crossings were visually assessed for potential use as bat roosting habitat using a protocol set out in BCT *Bat Surveys for Professional Ecologists: Good Practice Guidelines* (3rd edn.) (Collins, 2016). Table 4.1 of the 2016 BCT Guidelines identifies a grading protocol for assessing structures, trees and commuting/foraging habitat for bats. The protocol is divided into four Suitability Categories: *High, Moderate, Low and Negligible*. No signs of bat roosts were found at any of the structures. The findings are summarized in the table below.

Table 6-15 Bat Roost Suitability of watercourse crossings

Crossing ID	ITM	Culvert type	Crossing Option	Photo	Bat Roost Potential
WC1	601783 701291	Stone Arch	D		No evidence of bats found. Some crevices present. <i>Low</i> bat roost potential.
WC2	604771 703816	Concrete drain	A		No evidence of bats found. Structure not suitable for roosting bats. <i>Negligible</i> bat roost potential.
WC3	605315 705685	Triple Stone Arch	D		No evidence of bats found. Some ivy present. <i>Low</i> bat roost potential.

WC4	605856 706297	Stone Arch Bridge	A		No evidence of bats found. Some ivy present. <i>Low</i> bat roost potential.
WC5	605543 707711	Stone Arch	D		No evidence of bats found. Some crevices and ivy cover on stone wall. <i>Low</i> bat roost potential.
WC6	605350 707969	Double piped culvet	A		No evidence of bats found. Structure not suitable for roosting bats. <i>Negligible</i> bat roost potential.
Farm underpass crossing	604770 705745	Concrete bridge and masonry wall over farm track	C		No evidence of bats found. Some vegetation and crevices present. <i>Low</i> bat roost potential.

The rivers in the vicinity of the proposed route provide *Moderate suitability* for commuting and foraging bats. The treelines and hedgerows identified along the proposed route also provide *Moderate* suitability for commuting and foraging bats.

6.6.2.4.5 Turbine Delivery Route Accommodation Work Area

Two mature ash trees with ivy cover were identified within TDR accommodation area 2 (as described in Section 6.6.1.12). While no evidence of roosting bats was found, these trees have been assessed as having *Low* bat roost suitability due to the potential for bats to use the trees opportunistically.



Plate 6-38 Ash tree within footprint of accommodation area



Plate 6-39 Ash tree within footprint of accommodation area

6.6.2.5 Reptiles and Amphibians

Adult Common frog (*Rana temporaria*) was recorded within the EIAR site boundary in cutover bog/bog woodland habitat within the northeast of the site.

Three individual smooth newt (*Lissotriton vulgaris*) were recorded along the roadway during wet weather at night, within the southeast of the site along the access road to proposed Turbine 1. The proposed site track upgrade at this location is located away from suitable habitat for newt at this location. These records are shown on Figure 6-7.

Common lizard (*Zootoca vivipara*), while not recorded during the site visits, is likely to occur within the study area.

6.6.2.6 Fisheries and Aquatic Fauna

The small streams that flow off the site of the Proposed Development, and downstream watercourses, were subject to biological evaluation and assessment through kick sampling, fish stock assessment (electro-fishing) and white-clawed crayfish surveys between the 9th to 11th September 2022. Full details of the results of these surveys are provided in Appendix 6.3.

The survey included a general habitat assessment and biological water quality assessment at watercourses within or downstream of the EIAR study area boundary. The water quality, as per Q-value (Quality Rating System)¹⁴, is fully described in Appendix 6.3. All sampled sites failed to meet the target good status ($\geq Q4$) requirements of the Water Framework Directive. The biological water quality of the survey area was generally poor, with the majority of watercourses significantly impacted via eutrophication, siltation and or historical modifications (hydromorphology).

The aquatic baseline report summarises the results as follows:

*With the exception of the Little Brosna River, the surveyed watercourses in the vicinity of the proposed Carrig Renewables Wind Farm were typically small, modified channels which suffered from considerable hydromorphological and siltation pressures. Some also suffered from very low summer flows at the time of survey (September 2022). Historical drainage pressures (straightening & deepening), eutrophication and siltation have significantly reduced the quality and heterogeneity of aquatic habitats in the vicinity of the proposed project. The majority of survey sites (9 no.) were of at least **local importance (higher value)** given the presence of aquatic species or habitats of high conservation value or their location within designated national and European sites.*

Salmonids were relatively widespread within the LittleBrosna_SC_020 river sub-catchment, with European eel and Lampetra sp. showing a much more restricted distribution in the wider survey area. Atlantic salmon were recorded from the Little Brosna River only (a tributary of the River Shannon). Other fish species recorded were minnow, gudgeon, stone loach, three-spined stickleback, ten-spined stickleback, pike and non-native, invasive roach (the latter in the Little Brosna River only but also likely present in Friar's Lough). White-clawed crayfish were recorded from the Lorrha Stream upstream of Lorrha village. With the exception of duck mussel at Friar's Lough (listed as vulnerable by Byrne et al., 2009) and white-clawed crayfish, no rare or protected macro-invertebrates were recorded. A low number of otter signs were recorded in vicinity of the project (no holts or couches) during the Friday 9th to Sunday 11th September 2022 survey period. No rare or protected macrophytes or aquatic bryophytes were recorded and no examples of Annex I aquatic habitats were present. Biological water quality was less than satisfactory (<Q4) at all sampled sites. Broadly speaking, the highest value watercourses within vicinity of the project in terms of aquatic ecology were the Lorrha Stream and

¹⁴ Toner, P., Bowman, J., Clabby, K., Lucey, J., McGarrigle, M., Concannon, C., & MacGarthaigh, M. (2005). Water quality in Ireland. Environmental Protection Agency, Co. Wexford, Ireland.

Friar's Lough (east of the project) and, to a lesser extent, the Holy Well Clohaskin River (draining east of the site boundary).

6.6.2.7 Other species

The scats of fox (*Vulpes vulpes*) and feeding remains were recorded in a number of areas within the site. Fallow deer (*Dama dama*), sika deer (*Cervus nippon*) and hedgehogs (*Erinaceus europaeus*) were also recorded within the study area boundary. There is potential for Red Squirrel (*Sciurus vulgaris*) within broadleaved and conifer wooded areas of the site.

No significant areas of suitable habitat for other taxa including invertebrates or amphibians, species listed in Annex II or IV of the EU Habitats Directive, or other species of conservation concern was identified within the boundaries of the Proposed Development site.

Incidental records of invertebrates were recorded during the walkover surveys of the site. In addition to the aquatic invertebrates identified during kick samples of the watercourses on site, the following include the species commonly recorded within the study area:

- > Small Blue (*Cupido minimus*)
- > Dingy Skipper (*Erynnis tages*)
- > Silver-washed Fritillary (*Argynnis paphia*)
- > Comma butterfly (*Polygonia c-album*)

6.6.3 Importance of Ecological Receptors

Table 6-12 lists all identified receptors and assigns them an ecological importance in accordance with the Guidelines for Assessment of Ecological Impacts of National Road Schemes (NRA, 2009). This table also provides the rationale for this determination and identifies the habitats that are Key Ecological Receptors. These ecological receptors are considered in Section 6.7 of this report and mitigation/ measures will be incorporated into the Proposed Development where required, to avoid potential significant impacts on the features.

Table 6-16 Ecological Receptors identified during the assessment

Ecological feature or species	Reason for inclusion as a KER	KER
Designated sites	<p>Nationally Designated Sites</p> <p>The following Nationally designated sites have been assessed as being within the Likely Zone of Impact:</p> <ul style="list-style-type: none"> > Arragh More Bog NHA [000640] > Killeen Bog NHA [000648] > River Little Brosna Callows NHA [000564] > Ballyduff/Clonfinane Bog [000641] > Kilcarren-Firville Bog [000647] > Dovegrove Callows [000010] > Birr (Domestic Dwelling No.1, Occupied) [000569] > Birr (Domestic Dwelling No. 2, Occupied) [000568] > Bracken's Dwelling, Near Whiteford [002058] > River Shannon Callows [000216] > Lough Derg [000011] > Banagher (Domestic Dwelling, Occupied) [000567] > Cloghanbeg [002059] > Miltown, Shinrone [002065] > Kinnitty (Domestic Dwelling, Occupied) [000579] > St. Joseph's, Mountheaton [002063] > Drumakeenan National School [002064] 	Yes

Ecological feature or species	Reason for inclusion as a KER	KER
	<p>These sites are assigned at least National importance and are assigned International Importance where they also hold a European designation. These sites are included as KERs as there is potential for indirect effects on them</p> <p>European Designated Sites</p> <p>The following Special Areas of Conservation are identified in the AA Screening as being within the Likely Zone of Impact and are assessed fully in the NIS that accompanies this application:</p> <ul style="list-style-type: none"> > Ballyduff/Clonfinane Bog SAC [000641] > Arragh More (Derrybreen) Bog SAC [002207] > Kilcarren-Firville Bog SAC [000647] > Lough Derg, North-east Shore SAC [002241] > River Shannon Callows SAC [000216] > Dovegrove Callows SPA [004137] > River Little Brosna Callows SPA [004086] > Middle Shannon Callows SPA [004096] > Lough Derg (Shannon) SPA [004058] <p>These sites are assigned International importance and included as a KER as there is potential for indirect effects on them.</p> <p>Note: SPAs within the Likely Zone of Impact are considered in Chapter 7, Ornithology and in the NIS.</p>	<p>Yes</p>
<p>Aquatic habitats and related species</p>	<p>Eroding/upland rivers (FW1)</p> <p>A number of natural watercourses are located within the site boundary. These watercourses include:</p> <ul style="list-style-type: none"> • Faddan Beg Stream, Faddan More • Holy Well Clohaskin River, Faddan More <p>These Rivers and Streams have been assigned Local importance (Higher Value) as they connect to downstream waterbodies, including the Little Brosna River, in the local area. They also provide a conduit to downstream SACs/SPAs of international importance.</p> <p>Drainage ditches (FW4)</p> <p>Drainage ditches are found throughout the site along field boundaries and particularly throughout cutover bog areas. They are highly modified and species poor where they occur, but do provide some connectivity with natural watercourses within the site. As such they are assessed as being local importance (lower value) and are considered further as a KER due to potential for conductivity with higher value watercourses.</p>	<p>Yes</p> <p>Yes</p>

Ecological feature or species	Reason for inclusion as a KER	KER
	<p>Aquatic and Fisheries Species</p> <p>The aquatic species that are associated with the rivers that are located within and surrounding the site are assigned Local Importance (Higher Value) in that they have a high biodiversity value in the local context. The downstream watercourses and fauna within them have been assigned as of Local Importance (Higher Value) due to the known populations of salmon, trout and lamprey species along with otter. There is potential for indirect effect on these features as a result of impacts on water quality. These species include salmonid, trout, lamprey species, European eel, White-clawed Crayfish, aquatic invertebrates and other aquatic species. Fish and other aquatic species are therefore included as a KER for further assessment.</p>	Yes
Conifer plantation (WD4) and Recently felled woodland (WS5)	Some of the proposed windfarm infrastructure is located within Conifer Plantation (WD4). This is a highly modified habitat with a low biodiversity value. This is classified as Local Importance (Lower Value). For these reasons, this habitat has not been identified as a KER.	No
Cutover raised bog (PB4)	The peatland habitats within and surrounding the development footprint are degraded and do not support active peat formation as the habitats are extensively drained. The cutover peatland habitats are subject to recent and continued turbary activity and are dominated by bare peat and low <i>Sphagnum</i> communities. They do not correspond to Annex I peatland habitats. These areas have been classified as Local Importance (Higher Value) as they provide high biodiversity value in a local context.	Yes
Spoil and bare ground (ED2) Recolonising bare ground (ED3)	These habitats are common and widespread in the wider area. The habitat has been assessed as of Local Importance (lower value) as it is largely associated with artificial site access tracks and is of low biodiversity value. For this reason, it has not been identified for further assessment and is not a KER.	No
Improved Agricultural grassland (GA1)	Improved agricultural grassland (GA1) has been assessed as of local importance (lower value) as it is generally of low biodiversity value primarily due to intensive management. As such, the habitat has been assessed as of Local Importance (lower value). The loss of this habitat is not considered significant. It is therefore not considered further in this assessment.	No
Dry meadows and grassy verges (GS2)	This habitat is found along the verges of existing roads and tracks within the proposed wind farm boundary, along the grid connection route and turbine delivery route. This habitat is dominated by common grass species and occurs in isolated, fragmented areas. It is of some low biodiversity value and is assessed as being of local importance (lower value). The loss of this habitat is not considered significant at any geographic scale.	No
Dense Bracken (HD1)	This habitat is a very species poor habitat of low biodiversity level. The small-scale loss of this habitat is not considered significant at any geographic scale.	No
Bog Woodland (WN7)	This habitat is found within the site on cutover bog. This habitat was found to not conform to the Annex I habitat type, as described in Section 6.6.1.1, due to the cutover, highly drained and dry nature of the bog. However, the habitat holds some biodiversity value and is assessed as being of local	Yes

Ecological feature or species	Reason for inclusion as a KER	KER
	importance (higher value). The potential for loss of this habitat is considered further.	
Broadleaved woodland (WD1)	This habitat occurs within the site predominantly as broadleaved plantations. This habitat is considered to be of local importance (higher value) and is considered a KER for further assessment.	Yes
Scrub (WS1)	This habitat is of some local importance to local wildlife (NRA, 2009). However, the habitat is common and widespread in the wider area. Where it occurs on the site it is dominated by few species such as common gorse and bracken. As such, the habitat has been assessed as of Local Importance (lower value). There will be no significant loss of this habitat at any geographic scale as a result of the Proposed Development. It is therefore not considered further in this assessment.	No
Hedgerow (WL1)	Approximately 267 linear meters of hedgerow is proposed to be cleared to accommodate construction of infrastructure. This habitat has been assessed as being of Local Importance (Higher Value) due to the commuting and foraging landscape features that hedgerows provide for local species such as bats.	Yes
Treeline (WL2) Individual trees	Approximately 116 linear meters of treeline is proposed to be cleared to accommodate construction of infrastructure. This habitat has been assessed as being of Local Importance (Higher Value) due to the commuting and foraging landscape features that hedgerows provide for local species such as bats. Two Ash trees in the footprint of the turbine delivery accommodation works are also included here.	Yes
Badger	Badger as an ecological receptor has been assigned Local Importance (Higher value). A potential for direct impacts on badger was identified due to the presence of an active badger sett adjacent to proposed track upgrade works close to T6/T7. It is therefore included as a KER for further assessment.	Yes
Otter	Otter spraints were recorded on the Little Brosna River on stretches downstream of the Proposed Development site. There were no otter records within the site i.e. in close proximity to significant infrastructure such as turbine bases, access roads, etc. Otter has been assessed as of Local Importance (Higher value). No evidence of a more ecologically important population was recorded during any of the site surveys undertaken. The Proposed Development has the potential to result in indirect effects on the receptor (as a result of deterioration in habitat associated with indirect water pollution or disturbance during construction/ decommissioning) and it is therefore included as a KER and requires further assessment.	Yes
Red squirrel	<p>Although evidence of red squirrel was recorded within the study area, no evidence of populations of squirrel being significant at more than a local level was recorded. Based on the low number of squirrel records for the site, squirrel has been assessed as of Local Importance (Higher value).</p> <p>The Proposed Development footprint has the potential to result in direct and indirect effects on this receptor. However, given the extent of suitable habitat in the area for the species, the small footprint of the proposed infrastructure and the fact that the Proposed Development will not result in any fragmentation of red squirrel habitat, red squirrel has not been included as a KER.</p>	No

Ecological feature or species	Reason for inclusion as a KER	KER
Bats	<p>The habitats within and surrounding the Proposed Development site are likely to be utilised by a bat population of Local Importance (higher value). All bat species in Ireland are protected under both national legislation – (Wildlife Act, 1976, as amended) and European legislation – (Habitats Directive (92/43/EEC). Bats are likely to forage and commute within the vicinity of the Proposed Development. No bat roosts were identified within the development footprint. The Proposed Development has the potential to result in direct and indirect effects on the receptor. Therefore, bats are included as a KER for further assessment.</p>	Yes
Reptiles and Amphibians	<p>The Proposed Development will not result in a significant loss of suitable habitat for reptiles and amphibians as suitable alternative habitat exists for amphibians within the wider site. Frog and Smooth Newt were recorded within the site. No evidence of populations of amphibians being significant at more than a local level was recorded, therefore, amphibians have been assessed as of Local Importance (higher value). A potential for significant impact via direct mortality during construction was identified.</p>	Yes
Additional protected fauna (e.g. Irish hare, pine marten, fox etc).	<p>The recorded evidence suggests that the study area is not utilised by populations of higher than local significance and no potential for significant effects have been identified at the population level. Due to the small footprint and nature of the Proposed Development, they are unlikely to be significantly affected by the Proposed Development. For this reason, other faunal species are not considered further in this ELAR. Significant effects are not anticipated.</p>	No

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6.7 Ecological Impact Assessment

6.7.1 Do-Nothing Effect

If the Proposed Development were not to proceed, the majority of the lands within the site would continue to be managed according to current practices, including areas of commercial forestry and agricultural land and actively cut turbary peatlands. Forestry would continue to involve the harvesting of timber as it matures, followed by the coniferous forestry replanting. The cutover bog would continue to be actively cut as per the existing turbary activities in place. The other habitats identified within the EIAR study area, including bog woodland and broadleaved woodland, would likely remain in a similar condition. In some drier areas of the peatland habitat, scrub is likely to develop and in time, this may undergo succession to additional small areas of woodland. The general biodiversity on the site, as described in this chapter, would likely remain similar to its current state as activity levels and land use would not change significantly.

6.7.2 Likely Effects During Construction Phase

6.7.2.1 Effects on Habitats During Construction

Table 6-17 below provides details of the extent of the recorded habitats on the site, the extent of the habitat that will be lost to facilitate the Proposed Development (including bat buffers) and the percentage of the total area of that habitat in the EIAR study area that it represents.

Table 6-17 Extent of habitat lost to the Proposed Development and the percentage of the total area of that habitat on site

Habitat	Total Area (Ha) /Length (Km) within the ELAR study boundary	Area (ha)/length (km) to be lost to development footprint	% of total to be lost	KER (Yes/No)
Conifer plantation (WD4)	57ha	9.67ha	17	No
Improved agricultural grassland (GA1)	75ha	4.5ha	6	No
Cutover bog (PB4)	48ha	9.9ha	20 ¹⁵	Yes
Broadleaved woodland (WD1)	13ha	1.9ha	14	Yes
Bog woodland (WN7)	26ha	5.8ha	22	Yes
Scrub (WS1)	3ha	0.8ha	26	No
Bog woodland/scrub mosaic (WN7/WS1)	1ha	1ha	100	Yes
Clearfell (WS5)	7.8ha	0	0	No
Eroding rivers (FW1)	Not known	0	0	Yes
Hedgerow (WL1)	4456 linear metres	267 linear metres	6	Yes
Treeline (WL2)	2906 linear metres	116 linear metres	4	Yes

The Proposed Development will result in the loss of areas of habitat that are of Local Importance (Lower Value) and are not identified as KERs. This mainly involves the loss of coniferous plantation forestry (WD4) and improved agricultural grassland (GA1) which has been assessed as of low ecological value. Other habitats assessed as of local importance (lower value) include; Scrub (WS1), grassy verges (GS2), Recolonising bare ground (ED3) and Spoil and bare ground (ED2). Any direct or indirect impacts on these habitats are not significant.

The effects on habitats that are identified as KERs are described in the below tables.

6.7.2.1.1 Assessment of Potential Effects on Rivers and Streams and Sensitive Aquatic Faunal Species

Table 6-18 Potential for impact on rivers, streams and Sensitive Aquatic Species

Description of Effect	<p>This section assesses the potential for likely significant effects on aquatic receptors including aquatic habitats (i.e. watercourses), salmonids, lamprey, coarse fish, European eel, aquatic invertebrates, molluscs and other aquatic species identified during the desk study and field surveys and which are likely to occur downstream of the Proposed Development.</p> <p>The footprint of the Proposed Development has been specifically designed to avoid significant impacts on watercourses. This was initially achieved by way of a constraints mapping exercise. The key mitigation measure during the construction phase is the avoidance of sensitive aquatic areas where possible, by application of suitable buffer</p>
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¹⁵ of ELAR study boundary. 9.9ha equates to approx. 5% of the entire local bog complex (187ha approx.)

	<p>zones (i.e. 50m to main watercourses). All of the key development components within the wind farm site are located significantly away from the delineated 50m watercourse buffer zones with the exception of 2 no. new watercourse crossing locations within the wind farm site. The location of new watercourse crossings has been specifically chosen to facilitate the use of precast concrete bottomless box culverts, see the site layout drawings in Appendix 4.1 of this EIAR, thereby ensuring that no instream works are necessary in these locations and minimising potential for impact on the receiving environment. The locations of the water crossing structures are shown on Figure 6-6.</p> <p>However, the proposed turbine delivery route and grid connection route also cross a number of watercourses. As no instream works are proposed to natural watercourses, there will be no direct effects on these habitats or the species that are associated with them. There will be no loss of fisheries habitat or potential for the Proposed Development to result in any barriers to the movement of aquatic species. There will be no significant direct effects on sensitive aquatic habitats or the species that are associated with them.</p> <p>There is potential for the construction activity to result in the run-off of silt, nutrients and other pollutants such as hydrocarbons and cementitious material into these watercourses. This represents a potential indirect effect on the identified aquatic receptors in the form of habitat degradation through water pollution.</p> <p>These potential effects on water quality are fully described and assessed in Chapter 9 'Water' of this EIAR and are described here in relation specifically to ecology.</p>
<p>Characterisation of unmitigated effect</p>	<p>In the absence of mitigation, the indirect effect of water pollution on aquatic receptors during construction has the potential be an indirect, negative, significant, temporary, likely effect on surface water quality in downstream surface water receptors on watercourses which act as a conduit to downstream habitats.</p>
<p>Mitigation</p>	<p>A detailed Surface Water Management Plan for the Proposed Development is provided as Appendix 4.4 of this EIAR. This plan provides details of how surface water quality will be protected during the construction of the Proposed Development. In addition to this, specific mitigation is provided in relation to water quality in Chapter 9: 'Hydrology and Hydrogeology' of this EIAR. This provides specific mitigation for the proposed works including mitigation by avoidance, mitigation by design, mitigation against release of suspended solids, hydrocarbons, cementitious materials, dewatering works controls, prevention of contamination from wastewater disposal, and clear-felling mitigations. In addition, Section 9.5.2.9 of the EIAR also describes the mitigation in relation to morphological changes to surface watercourses & drainage patterns for the Proposed Development.</p> <p>In relation to new watercourse crossings, Inland Fisheries Ireland (IFI) will be consulted a minimum of four weeks in advance of the installation of pre-cast concrete bottomless box culverts. The Inland Fisheries Ireland (2016): <i>Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters</i>, and the Scottish Natural Heritage (SNH) <i>Good Practice During Wind Farm Construction</i> (SNH, 2019, 4th Edition) will also be adhered to. This will minimise the risk of entrainment of suspended sediment in surface water runoff, and transport via this pathway to surface watercourses (any deviation from this will be done in discussion with the IFI).</p> <p>There are a total of 6 no. watercourse crossings along the grid connection and all the crossings are existing bridges and culverts along the public road. No in-stream works are required at any of these crossings, however due to the proximity of the streams to the construction work at the crossing locations, there is a potential for surface water quality impacts during trench excavation work. Mitigation measures are outlined in relation to these works in Section 9.5.2 of Chapter 9.</p> <p>The upgrade of existing access tracks and construction of new tracks will involve some works within 50m of watercourses and new watercourse crossings. However, no instream works are proposed to natural watercourses, and a suite of measures are in</p>

	place to avoid any adverse effects on watercourses. These measures are described in full in Chapter 9 ‘Water’ of the EIAR.
Residual Effect following Mitigation	Following the implementation of the mitigation measures as described above, there will be no significant residual effect on aquatic habitats or species as a result of the Proposed Development. The Proposed Development will not cause any waterbodies to deteriorate, irrespective of their current condition, and will not in any way prevent any waterbodies from meeting the biological and chemical characteristics for good ecological status.

6.7.2.1.2 Assessment of Potential Effects on Cutover bog (PB4)

Table 6-19 Loss of peatlands and associated habitats

Description of Effect	<p>The construction of the proposed windfarm and associated infrastructure will result in the direct loss of approximately 9.9 hectares of Cutover bog (PB4) as a result of the proposed Turbine no.1, Turbine no.5, Turbine no.3, sections of the new site access track between T3 and T2, peat and spoil repository areas and the construction compound adjacent to T3. The remaining area of peatland habitats within the EIAR study area boundary have been avoided in the design of the project.</p> <p>There is the potential to result in indirect effects on the habitat immediately adjoining the footprint through drainage and to impede potential future restoration efforts of the bog. There is also potential for impact via air quality impacts associated with increased airborne nitrogen deposition associated with the construction works. Such indirect impacts are further considered in the below paragraphs.</p> <p>The potential for impact on peatland habitats on adjacent NHA and pNHA sites is assessed in Section 6.7.5.1.</p>
Characterisation of unmitigated effect	<p>As described in Section 6.6.1.2 and demonstrated by relevé data in Appendix 6-1, the cutover bog habitats within the site do not correspond to Annex I habitat and fit into the bare peat and low <i>Sphagnum</i> groups as per Smith et al. (2020). The bog habitats within the site are subject to ongoing turbary activity and are actively drained and dry underfoot. As such these cutover bog communities are assessed as being of Local Importance (Higher value). While 9.9ha of cutover bog habitat constitutes 20% of the area of cutover bog habitat within the EIAR study boundary, this area comprises approx. 5% of the entire local bog complex.</p> <p>The potential for drainage or alteration of hydrochemistry of adjacent cutover bog habitats within the site was also identified. However, as described in Chapter 9, Section 9.5.2.4, the effects are likely to be localised due to the relatively shallow excavation depths and the local hydrogeological regime with low to moderate permeability peat and glacial tills overlying the limestone bedrock. Effects on groundwater levels will only be for a temporary basis during the construction work. Water level impacts will be temporary and are unlikely to be significant beyond 50m from any excavation. The potential for impacts on groundwater flows and hydrochemistry of adjacent habitats is assessed further below.</p>
Assessment of Significance prior to mitigation	<p>As described above, the loss of 9.9ha of cutover bog habitats comprises approx. 5% of the area of the wider, local bog complex. The loss of Cutover Bog (PB4) habitats to the above-described infrastructure areas has therefore been assessed as a permanent moderate negative effect on a receptor of Local Importance (higher value) in the absence of mitigation.</p> <p>The potential for groundwater and hydrochemistry impacts on adjacent cutover bog habitats thus potentially impacting the potential for future restoration works is assessed as a permanent significant effect on a receptor of Local Importance (higher value).</p>

Mitigation

Where direct impacts on peatland habitat will occur (Turbine no.1 (Turbine no.5, sections of the new site access track between T3 and T2, peat and spoil repository areas and the construction compound adjacent to T3), mitigation measures as described below will be implemented to minimise the works area within the construction corridor. This will avoid any loss of peatland habitat outside the Proposed Development footprint. As described in Section 4.9.3.1 of the EIAR, floating roads over peat are proposed for areas where the peat stability assessment indicates that this construction method is suitable. Floating roads minimise impact on the peat, particularly peat hydrology, as there is no excavation required and no subsequent peat arisings are generated. Where the underlying peat has insufficient bearing capacity or due to topographic restrictions, an excavated type access road may be more suitable. The construction types as they are proposed are shown in the Peat Management Plan in Appendix 4-2, this document is included in Chapter 4 of this EIAR.

Where excavation is required, such as at turbine T1, T5 and T3 hardstands, all turves and sub-peat arising from the initial construction phase will be used to provide a layer of peatland vegetation on top of proposed peat repository areas in the site. This is described in the accompanying Biodiversity Management and Enhancement Plan (BMEP), provided in Appendix 6.4 of the EIAR.

Mitigations to prevent alteration to groundwater flows and hydrochemistry:

The following mitigations, as detailed in Section 9.5.2.8, Chapter 9, will prevent groundwater and hydrochemistry impacts on bog habitats adjacent to infrastructure within the site:

Proposed mitigation measures relative to piling works will comprise:

- Where driven piles are used, they will have a cross section without re-entrant angles;
- Strict QA/QC procedures for piling works will be followed;
- Piles will be kept vertical during piling works;
- Good workmanship will be employed during all piling works; and,
- Use of bentonite seal to prevent upward/downward movement of surface water/groundwater.

Scenario 1: Creating a Pathway for Downward Flow

To ensure downward flow of peat water and/or pollutants from the piling works does not occur, a bentonite seal will be used in a starter pit for each driven pile, and the mitigation measures outlined above will be implemented. The concrete added to the bored pile will seal the pile annulus. As a result, the potential for either piling work option to create pathways for downward flow of peat water or pollutants that could affect groundwater quality in the underlying aquifer is imperceptible.

Scenario 2: Creating a Pathway for Upward Flow

No upwelling of groundwater to the peat surface water recorded in any of the site investigation locations recorded across the proposed site.

Notwithstanding this, to ensure upward flow of underlying groundwater via potential pathways created by piling works does not occur, a bentonite seal will be used in a starter pit for each driven pile, and the mitigation measures outlined above will be implemented. The concrete added to the bored pile will seal the pile annulus. As a result, the potential for piling works to create pathways for upward flow of alkaline groundwater to the bog surface is imperceptible.

Scenario 3: Blocking Regional Groundwater Flow

For example, if a piling array of 50 no. 300mm piles is applied at each turbine base (as piling Option 1), this combined area of piling footprint amounts to ~24.7m², or 3.53m² per turbine base. Each turbine base is 500m – 800m apart. The area of the piles driven into the ground is distributed over a very large area, and that area only amounts to <0.02% of the development footprint, or <0.0005% of the proposed site area. Also, none of the proposed piles would penetrate any great distance into the underlying bedrock aquifer, as they will find sufficient resistance, either in the over lying glacial tills/mineral subsoils or upon reaching the top of bedrock. At such wide separation distance, the ability of clusters of piles, with a plan area of ~3.53m² per turbine, to alter or affect regional groundwater flow is imperceptible.

Mitigation Measures for protection of groundwater quality:

The proposed mitigation measures designed for the protection of groundwater quality within the peat bog will be implemented at all construction work areas.

- > Mitigation measures for sediment control are detailed in Section 9.5 of Chapter 9.
- > Mitigation measures for the control of hydrocarbons during construction works are detailed in Section 9.5 of Chapter 9.
- > Mitigation measures for the control of cement-based products during construction works are detailed in Section 9.5 of Chapter 9.

Air Quality Impacts

Air quality impacts could occur as a result of dust production and wind blow during construction and excavation activities, as well as transport of materials and exhaust emissions associated with vehicles and plant. This has the potential to be a temporary, short-term, irreversible Moderate effect on a receptor of Local Importance (higher value).

Exhaust emissions:

Proposed Development Infrastructure:

The construction of turbines, the anemometry mast, substation, site roads and other onsite infrastructure will require the operation of construction vehicles and plant on site and the transport of workers to and from the site. Exhaust emissions associated with vehicles and plant such as NO₂, Benzene and PM₁₀ will arise as a result of construction activities. This potential effect will not be significant and will be restricted to the duration of the construction phase and localised to works areas.

The construction of the proposed substation, widening works along the local road and the grid connection cabling route to the Dallow 110kV substation will require the use of construction machinery, thereby giving rise to exhaust emissions.

Transport to and from site:

The transport of turbine components, construction materials, waste and workers to and from the site will also give rise to exhaust emissions associated with the transport vehicles.

Mitigation:

- > All construction vehicles and plant used onsite during the construction phase will be maintained in good operational order. If a vehicle requires

repairs this work will be carried out, thereby minimising any emissions that arise.

- Turbine components will be transported to the site on specified routes only, unless otherwise agreed with the Planning Authority.
- All machinery will be switched off when not in use.
- Users of the site will be required to ensure that all plant and vehicles are suitably maintained to ensure that emissions of engine generated pollutants is kept to a minimum.

Dust emissions:

Dust emissions arise when particulate matter becomes airborne making it available to be carried downwind from the source. Dust emissions can lead to elevated PM₁₀ and PM_{2.5} concentrations and may also cause dust soiling. The amount of dust generated and emitted from a working site and the potential impact on the surrounding areas varies according to:

- a) The type and quantity of material and working methods
- b) Distance between site activities and sensitive receptors
- c) Climate/local meteorology and topography

Turbines and Other Infrastructure:

The construction of turbine foundations and hardstands, substation, anemometry mast, site roads, other onsite infrastructure will give rise to dust emissions during the construction phase. The excavation of the grid connection cabling route trench will give rise to localised dust emissions. However, due to the nature of construction along the proposed grid connection, which is termed a “rolling” construction site, meaning that these works will not be concentrated in any one area of the route for any considerable length of time. Therefore, these effects are considered to be temporary and a slight negative impact. The transport construction materials to and waste from the wind farm site will give rise to some localised dust emissions during periods of dry weather. Mitigation measures to prevent adverse effects to nearby SACs as a result of airborne nitrogen deposition are provided below.

- A wheel wash facility will be installed on the Proposed Development site and will be used by vehicles before leaving site.
- In periods of extended dry weather, dust suppression may be necessary along haul roads, site roads, grid route, road widening sections, substation, and construction compounds to ensure dust does not cause a nuisance. If necessary, such as during periods of dry weather, de-silted water will be taken from stilling ponds in the site’s drainage system and will be pumped into a bowser or water spreader to dampen down haul roads, turbine bases, and site compounds to prevent the generation of dust where required. Water bowser movements will be carefully monitored by the Ecological Clerk of Works to avoid increased runoff.
- Areas of excavation will be kept to a minimum and stockpiling of excavated material will be minimised by coordinating excavation and placement of material in peat placement areas.
- Turbines components and construction materials will be transported to the site on specified haul routes only, as agreed with the local authority.

	<ul style="list-style-type: none"> ➤ The agreed haul route roads adjacent to the site will be regularly inspected for cleanliness and cleaned as instructed by the construction Site Supervisor/Site Manager. ➤ The transport of construction materials may have the potential to generate dust in dry weather conditions. Roads will be watered down to suppress dust particles in the air as instructed by the Site Supervisor/Manager <p>Community Benefit Fund</p> <p>As described in Chapter 4, as part of the Proposed Development, the following commitments will be made with regard to contributions to peatland restoration works:</p> <ul style="list-style-type: none"> ➤ Commitment to providing a portion of the community benefit fund to biodiversity enhancement/nature positive projects within 10km of the Proposed Development. ➤ Commitment to offering compensation to turbary rights holders for the remaining peat who cease peat extraction on their plots. This initiative aims to prevent further degradation of the peatland habitat within the site and to promote the natural regeneration of peatland areas.
Residual Effect following Mitigation	<p>With the above mitigations in place, there will be no potential for residual significant impact on peatland habitats adjacent to the development footprint as a result of drainage or air quality impacts. However, it is considered that there is potential for residual moderate impact through loss of peatland habitat at the local scale. Significant effects are not anticipated at the County level.</p>

6.7.2.1.3 Assessment of Potential Effects on Bog Woodland (WN7) and Broadleaved Woodland (WD1)

Table 6-20 Loss of woodland habitats

Description of Effect	<p>The construction of the proposed windfarm and associated infrastructure will result in the direct loss of approximately 5.8ha of bog woodland (WN7) as a result of the proposed Turbine no.2 and associated bat buffer as per NatureScot guidelines, and 1ha of bog woodland/scrub mosaic (WN7/WS1) within the footprint of Turbine 3.</p> <p>The construction of the proposed substation and the use of spoil repository area C, and bat buffer for Turbine 4 will result in the loss of approx. 1.9ha of broadleaved woodland (WD1).</p>
Characterisation of unmitigated effect	<p>The loss of bog woodland (WN7) and broadleaved woodland (WD1) will result in a permanent and irreversible impact on a habitat of Local importance (higher value). The magnitude of this impact is judged to be Moderate in the absence of mitigation as the habitats affected consist of a small area of bog woodland on degraded bog and a small area of ash plantation.</p>
Assessment of Significance prior to mitigation	<p>The loss of the above-described woodland habitats has been assessed as a permanent moderate negative effect on a receptor of Local importance (higher value), in the absence of mitigation. No areas of Annex I bog woodland were identified within the site.</p>
Mitigation	<p>The construction of the proposed substation, spoil repository area C and bat buffer for Turbine 4 will result in loss of 1.9ha of broadleaved woodland (WD1). In order to offset this loss, it is proposed to carry out an Arboricultural Assessment of trees within the ash plantation adjacent to the proposed substation. Any trees in poor condition will be replaced with a variety of suitable native species. This will increase the diversity and</p>

	<p>longevity of this woodland. This is described in the accompanying Biodiversity Management and Enhancement Plan (BMEP), provided in Appendix 6.4 of the ELAR.</p> <p>The replanting measures will be monitored by a suitably qualified ecologist appointed by the wind farm operator over the lifetime of the Proposed Development as part of the BMEP to confirm their effectiveness and to allow for alteration in approaches where necessary.</p>
Residual Effect following Mitigation	<p>The loss of 5.8ha of bog woodland, 1ha of bog woodland/scrub mosaic and 1.9ha of broadleaved woodland is considered to result in a Moderate negative impact on a receptor of local importance (higher value). Significant effects are not anticipated at the County level.</p>

6.7.2.1.4 Assessment of Potential Effects on Hedgerows and Treelines

Table 6-21 Hedgerow and Treeline impact assessment

Description of Effect	<p>The new access road from the south of the site and bat buffers around turbines will result in the loss of 383m of linear habitat. The areas where this will occur are shown in Figure 1-1 of the BMEP (Appendix 6.4). There will also be loss of two mature ash trees as part of the turbine delivery route accommodation works.</p>
Characterisation of unmitigated effect	<p>The permanent loss of approximately 383 linear metres of hedgerow and treeline would constitute a permanent negative effect on the linear habitat within the site, albeit a minimal one within the context of the surrounding landscape given that the hedgerow is species poor and habitats of this nature is widespread and common in the wider area.</p>
Assessment of Significance prior to mitigation	<p>The permanent loss of small sections of hedgerow and treeline is not considered to be a significant effect at any greater than the local geographical scale, as this habitat is widespread and common within the local farmlands. Removal of the hedgerows/treelines would not cause any significant fragmentation of habitat connectivity within the landscape.</p>
Mitigation	<p>In order to compensate for the loss of linear vegetation, approximately 674 linear metres of new replacement hedgerow planting will be carried out along sections of proposed new and upgraded roads. This will result in a net gain in this habitat within the site. Tree/shrub species planted in these locations will be of a similar composition to those occurring on site, will be native and of local provenance. Further details with regard to species, planting location, and management is contained within the BMEP.</p>
Residual Effect following Mitigation	<p>Following implementation of mitigation, no potential for significant effect exists at any geographic scale. The planting of additional hedgerow will serve to enhance the hedgerow habitat within the site due to increased species diversity compared to that to be lost, will benefit wildlife and due to the increase of 291 linear metres over that to be lost, will result in a net gain in this habitat within the site.</p>

6.7.2.2 Effects on Protected Fauna During Construction

The Proposed Development has the potential to result in habitat loss and disturbance impacts on faunal species that were recorded on the site but were not included as KERs, see Table 6-16. Given the extensive area of habitat that will remain undisturbed throughout the site and the avoidance of the most significant areas of faunal habitat (peatlands, scrub and watercourses), no significant effects on non-KER faunal biodiversity are anticipated as a result of the Proposed Development. Therefore, these species were excluded from further assessment. The following species are assessed below:

- > Otter
- > Badger
- > Bats
- > Amphibians

No instream works are required for any of the proposed new water-crossing structures within the site or for the cabling along the grid connection route. The potential for significant effects on aquatic species is restricted to indirect effects on their habitat resulting from water pollution. This has been assessed in Section 6.7.2.1.1 above and is not repeated below.

6.7.2.2.1 Assessment of Potential Effects on Otter

Table 6-22 Assessment of Potential Impacts on Otter

Description of Effect	<p>As described above in relation to aquatic habitats and species, the Proposed Development has been deliberately designed so that all major infrastructure, i.e., turbine bases and hardstands, avoid significant watercourses. No instream works are required for any of the water crossing works along the grid connection route. No otter holts were found within the development site boundary or along water courses in the vicinity of the proposed grid connection route.</p> <p>Two watercourse crossings are required along the wind farm access roads using clear span, bottomless box culverts. The locations of these crossings are shown on the layout drawings included in Appendix 4-1 of this EIAR. The construction of new watercourse crossings has the potential for indirect effects in the form of disturbance to otter. Similarly, the construction/ installation of the proposed grid connection route, for which Horizontal Directional Drilling (HDD) is proposed for some of the existing structures, may also have the potential for disturbance/displacement due to noise where works to bridges are to take place.</p> <p>Potential for effects on Otter has been considered regarding NPWS Threat Response Plan (TRP) which identifies four significant threats facing Otter in an Irish context: Habitat destruction, Water pollution, Disturbance (Recreational sources) and Accidental death/persecution</p>
Characterisation of unmitigated effect	<p>No otter holts are present within the EIAR study boundary or in the vicinity of water crossings associated with the grid connection route. Evidence of otter in the form of spraint was identified along the Little River Brosna downstream of the Proposed Development site, but not in the vicinity of proposed grid connection route crossings. There is potential for the construction activity to result in the run-off of silt, nutrients and other pollutants such as hydrocarbons and cementitious material into land drains and minor watercourses. This represents a potential indirect effect on Otter in the form of habitat degradation through water pollution.</p> <p>Given that the majority of the site is at present in active afforestation and cutover bog, and all major proposed infrastructure is located over 50 metres from any significant watercourse, any potential disturbance to otter will be a short-term, slight negative effect associated with the installation of the proposed watercourse crossings.</p> <p>In relation to disturbance, Otter are predominantly crepuscular in nature and it is anticipated that construction activity will mostly be confined to daytime hours, thus minimizing potential disturbance related impacts to the species. Channin P (2003) provides a literary review with regard to anthropogenic disturbance and refers to several reports which have found that disturbance is not detrimental to Otters (Jefferies (1987), (Durbin 1993). (Green & Green 1997). The report also describes successful breeding in towns, under ferry terminals and under the jetties of one of Europe’s largest oil and gas terminals at Sullom Voe in North Scotland. Irish Wildlife Manual No 76 (National Otter Survey of Ireland 2010/2012) notes that the occurrence of Otter was unaffected by perceived levels of disturbance at the survey sites. It also notes that there is little published evidence demonstrating any consistent relationship between Otter occurrence and human disturbance (Mason & Macdonald 1986, Delibes et al. 1991; Bailey & Rochford, 2006).</p>

<p>Assessment of Significance prior to mitigation</p>	<p>Significant effects regarding habitat destruction, barrier effect, disturbance and mortality are not anticipated.</p> <p>In the absence of mitigation, the indirect effect of water pollution on otter during construction has the potential to be a short-term reversible impact. The magnitude of any such impact is likely to be at worst moderate, given that the majority of new infrastructure such as turbine bases, substation and construction compounds are located over 50metres from any significant watercourse.</p>
<p>Mitigation</p>	<p>A detailed drainage maintenance plan for the Proposed Development is provided in Section 4 of this EIAR. This plan provides full details of how water quality will be protected during the construction of the Proposed Development. In addition to this, specific mitigation is provided in relation to water quality in Chapter 9: ‘Hydrology and Hydrogeology’ of this EIAR. These mitigation measures will ensure that there will be no potential indirect effects on otter as a result of a deterioration in water quality.</p> <p>Prior to the commencement of construction works associated with the installation of watercourse crossings, the following measures will be undertaken for the avoidance of disturbance/displacement and direct mortality and to ensure that no otter holts/breeding sites have been established since the original surveys undertaken (TII, 2007):</p> <ul style="list-style-type: none"> ➤ From a precautionary basis, a pre-commencement otter survey will be undertaken in accordance with standard best practice guidance prior to the commencement of site works to ensure that current activity levels are confirmed prior to commencement of works. In the unlikely event that an otter holt is identified within or immediately adjacent to the Proposed Development footprint, consultation will be undertaken with the National Parks and Wildlife Service and a derogation licence applied for. ➤ All conditions of a derogation licence will be implemented in full. ➤ No works will be undertaken within 150m of any holts at which breeding females or cubs are present. ➤ No wheeled or tracked vehicles (of any kind) will be used within 20m of active, but non-breeding, otter holts. Light work, such as digging by hand or scrub clearance will not take place within 15m of such holts, except under licence (TII, 2006¹⁶). ➤ All of the above works will be undertaken or supervised by an appropriately qualified ecologist.
<p>Residual Effect following Mitigation</p>	<p>Following the implementation of the mitigation proposed above, there will be no significant residual effect on otter as a result of the Proposed Development at any geographic scale.</p>

¹⁶ NRA, 2006. *Guidelines for the Treatment of Otters prior to the Construction of National Road Schemes*. Dublin: Transport Infrastructure Ireland. Available at: www.tii.ie/tii-library/environment/construction-guidelines/Guidelines-for-the-Treatment-of-Otters-prior-to-the-Construction-of-National-Road-Schemes.pdf

6.7.2.2.2 Assessment of Potential Effects on Badger

Table 6-23 Assessment of Potential Impacts on Badger

<p>Description of Effect</p>	<p>During the ecological surveys undertaken of the Proposed Development site, one badger sett was found in close proximity to the proposed wind farm infrastructure near the proposed access road to be upgraded to Turbines 6 and 7. Taking a precautionary approach a potential for significant effect to badger was identified due to direct mortality and sett loss due to the upgrades of the access road.</p>
<p>Characterisation of unmitigated effect</p>	<p>In the absence of mitigation, the upgrade of the access road in close proximity to a sett, while it may not cause direct destruction of the sett, has potential to cause tunnel collapse as well as disturbance of badgers within the sett. The risk of tunnel collapse also carries a risk of mortality to badgers.</p> <p>The risk of tunnel collapse also carries a risk of loss of sett habitat for the local population of badgers.</p>
<p>Assessment of Significance prior to mitigation</p>	<p>In the absence of mitigation, the potential for direct mortality of badgers as a result of potential tunnel collapse due to the construction of the access road is assessed as being a significant effect on the local badger population. The potential for loss of sett habitat as a result of construction work is assessed as a permanent, irreversible, significant effect on the local badger population.</p>
<p>Mitigation</p>	<p>In order to offset the potential loss/destruction of the badger sett as a result of the road upgrade works, an artificial sett will be constructed at least 6 months in advance of the road upgrade works. The sett will be constructed in the proposed area shown in Figure 6-8. This area is at least 50m away from proposed infrastructure in an area which will be free of disturbance and is in close proximity to the existing sett. The artificial sett will be monitored during the 6 month period to ensure badgers are familiarised with the sett. Details on the location and construction of the artificial sett are contained within the BMEP (Appendix 6.4).</p> <p>Prior to the commencement of construction works associated with the upgrades to the access road, the following measures will be undertaken for the avoidance of disturbance and/or direct mortality to badger and to ensure no additional setts have been established since the original surveys undertaken. The following measures are in line with <i>Guidelines For The Treatment Of Badgers Prior To The Construction Of National Road Schemes</i> (TII 2009).</p> <ul style="list-style-type: none"> ➤ From a precautionary basis, a pre-commencement badger survey will be undertaken in accordance with standard best practice guidance prior to the commencement of site works to ensure that no additional setts in close proximity to proposed infrastructure have been built. In the event that a badger sett is identified within or immediately adjacent to the Proposed Development footprint, mitigations as per the above referenced TII document will be implemented for the new sett. <p>An exclusion of the existing sett will be carried out to ensure no badgers are present within the sett during road upgrade works. The exclusion will be carried out in line with TII guidelines as follows:</p> <ul style="list-style-type: none"> ➤ Local NPWS staff will be informed in advance of the exclusion works. ➤ The exclusion will not take place during badger breeding season (December to June inclusive) ➤ One way exclusion gates will be installed on each sett entrance. ➤ The one-way gates will be left in place for a period of 21 days and works will proceed immediately after once exclusion of badgers has been confirmed by an Ecologist. ➤ An Ecologist will monitor the gates every 3 to 5 days during the 21-day period to ensure badgers do not succeed in re-entering the sett. ➤ If badgers succeed in re-entering during the 21-day period, the exclusion process and 21-day period must start again.

	<ul style="list-style-type: none"> > All of the above works will be undertaken or supervised by an appropriately qualified ecologist.
Residual Effect following Mitigation	Following the implementation of the mitigation proposed above, there will be no significant residual effect on badger as a result of the Proposed Development at any geographic scale.

6.7.2.2.3 Assessment of Potential Effects on Bats

Table 6-24 Assessment of Potential Impacts on Bats

Description of Effect	<p>As per NatureScot Guidance, wind farms present four potential risks to bats:</p> <ul style="list-style-type: none"> > Collision mortality, barotrauma and other injuries; (Operational Phase Impact) > Loss or damage to commuting and foraging habitat; > Loss of, or damage to, roosts; > and Displacement of individuals or populations. <p>For each of these four risks, the detailed knowledge of bat distribution and activity within the Site has been utilised to predict the potential effects of the Proposed Development on bats (operational phase impacts relating to collision mortality, barotrauma and other injuries are assessed in Section 6.7.3).</p> <p>Bat surveys undertaken in 2022, in accordance with NatureScot 2021 guidance, form the core dataset for the assessment of effects on bats.</p>
Characterisation of unmitigated effect	<p>Loss or damage to commuting and foraging habitat</p> <p>In absence of appropriate design, the loss or degradation of commuting/foraging habitat has potential to reduce feeding opportunities and/or displace bat populations. However, the development is partly located within existing conifer plantation forestry and cutover bog and linear landscape features such as hedgerows and treelines have been largely avoided. A total of 383m of hedgerow and treeline habitat will be lost for new access roads and turbine bat buffers. Any areas of hedgerow or treeline loss will be replaced within the site with species indigenous to the area. Approximately 674 linear metres of hedgerow planting is proposed, which will result in a net gain in linear habitat features within the site. Hedgerow removal will result in a short term effect, with connectivity re-established within approximately 2-5 years. No permanent loss of, or damage to, commuting or foraging habitats is anticipated as a result of the turbine delivery or cable routes and there will be no net loss of linear landscape features for commuting and foraging bats.</p> <p>The Proposed Development, including the creation of new road infrastructure with associated new linear habitat features and felling of forestry will provide a positive change with the creation of additional available areas of linear landscape features that may be utilised by bats for commuting or foraging.</p> <p>Given the extensive area of habitat that will remain undisturbed throughout the site and the avoidance of the most significant areas of faunal habitat (i.e. natural woodlands and watercourses), no significant effects with regard to loss of commuting and foraging habitat are anticipated. The opening up of conifer forestry plantations to facilitate turbine construction will result in a net gain in linear landscape features available for foraging and commuting bats. This is a positive impact at the local level.</p>

Loss of, or damage to, roosts

Wind Farm Site:

The Proposed Development site is located within cutover bog, commercial conifer forestry, and broadleaf woodland with agricultural and wet grassland. Seven structures and their associated outbuildings were identified within the wider area as providing potential suitable habitat to host roosting bats, as discussed in Appendix 6.2. However, no bat roosts or evidence of bat use were identified during the surveys undertaken in 2022. All structures identified will be avoided and retained as part of the Proposed Development, thus no loss or damage of potential roosts is anticipated.

Trees present within the site consist primarily of mature conifers and immature deciduous trees and as such, do not provide significant potential habitat for roosting bats. A small number of trees identified as *Low* potential during the roost surveys as having potential to host roosting bats were located within the site boundary. Further details on felling buffers are outlined in Section 6.1.3 of the Bat Report. No evidence of bat use was identified during daytime inspection of the trees. However, on a precautionary basis, as a number of trees presented *Low* roosting potential, a pre-commencement survey will be carried out prior to felling. Further details are outlined under Mitigations below.

Grid Connection Route:

The underground cabling will connect from the proposed onsite 38kV substation within the site of the Proposed Development via a 38kV underground electrical cable connection to the existing 110kV Dallow substation in near Birr, Co. Offaly. The route will primarily follow the existing road network measuring approximately 13.7km in length.

There will be no requirement to fell trees/forestry as part of the underground cable route. Therefore, there will be no loss of tree roosting habitat associated with these works.

Bridges and culvert crossings along the underground electrical cabling route were assessed as having *Negligible* or *Low* value for roosting bats (see Section 6.6.2.3.1). Directional Drilling is proposed for 3no. water crossings (WC1, WC3 and WC5). The structures will not be altered, in any regard. Consequently, no loss of potential roosting habitat is anticipated.

Water crossings WC2 and WC6 consist of a culvert and a PVC pipe, respectively, with *Negligible* roosting potential. Water crossing WC4 and the farm underpass, which presented *Low* roosting potential, will require standard formation crossing which includes works within the road network. Proposed works will be confined to the road surface. No bats were observed, and no evidence of bat use was identified within the structures.

No potential for significant effect with regard to the loss of, or damage to, roosting habitat as a result of the proposed grid route, is anticipated.

Turbine Delivery Route:

Two mature ash trees (Location 2, see Section 6.6.2.3.2) with *Low* roosting potential are proposed to be removed as part of the proposed TDR.

No evidence of bat use was identified during daytime inspection of the trees. However, on a precautionary basis, as the trees presented *Low* roosting potential, a pre-commencement survey will be carried out prior to felling. Further details are outlined below.

	<p>Displacement of individuals or populations</p> <p>The Proposed Development is predominantly located within a pastureland, commercial forestry plantation and cutover bog. There will be no significant loss of linear landscape features for commuting and foraging bats, and there will be no anticipated loss of roosting sites. The Proposed Development has been designed to largely retain and enhance the linear and woodland features around the site and improve connectivity for foraging and commuting bats. The habitats on the site will remain suitable for bats and no significant displacement of individuals or populations is anticipated.</p>
<p>Assessment of Significance prior to mitigation</p>	<p>There is no potential for the construction of the Proposed Development to result in Significant effects on the local bat population at any geographic scale as no roosts were recorded close to the infrastructure. Habitat loss and temporary disturbance as a result of works along the turbine delivery route likely to result in slight effects on the local population. The bat survey report, which is included in Appendix 6.2 provides further detail and analysis with regard to the effects on bat species.</p>
<p>Mitigation</p>	<p>Loss or damage to commuting and foraging habitat</p> <p>It is proposed to replace ash trees lost as a result of the substation, which are currently in poor condition, with native trees of various ages in order to enhance the age structure and longevity of this woodland. It is also proposed to offset the proposed loss of hedgerow and trees through the creation of new hedgerows and treelines along proposed new internal access roads. A total of approximately 674m of linear hedgerow and treeline habitat will be planted. Overall, the proposed replanting will result in a net gain of approximately 291m in the linear landscape features within the Proposed Development site. Planting will be of semi-mature species indigenous to the local area, to ensure connectivity is re-established post-construction.</p> <p>It is proposed to replace any woodland loss with healthy specimens (excluding ash) in order to enhance the age structure, diversity and longevity of woodland areas. The species to be used for the replanting will comprise native species, indigenous to the local area including hawthorn (<i>Crataegus monogyna</i>), blackthorn (<i>Prunus spinosa</i>), Hazel (<i>Corylus avellana</i>), elder (<i>Sambucus nigra</i>), goat willow (<i>Salix caprea</i>), spindle (<i>Euonymus europaeus</i>), dog rose (<i>Rosa canina</i>).</p> <p>A Biodiversity Management and Enhancement Plan (BMEP) has been developed to mitigate the loss of bat foraging/commuting habitat associated with the Proposed Development and is presented in Appendix 6.4. The replanting design outlined in the BMEP will ensure habitat connectivity is maintained and enhanced around the Proposed Development site. While no significant effects are anticipated as a result of the loss of habitats, linear features and woodland areas will be fully re-instated or enhanced by replanting of the hedgerows, treelines and woodland habitats.</p> <p>Given the proposed replanting plan, the extensive area of habitat that will remain undisturbed throughout the site and the avoidance of the most significant areas of faunal habitat (i.e. natural woodlands and watercourses), including the proposed retention and enhancement of these habitats, no significant effects with regard to loss of commuting and foraging habitat are anticipated.</p> <p>Loss of or Damage to Roosts</p> <p>Two mature ash trees with <i>Low</i> roosting potential are proposed to be removed as part of the proposed TDR.</p>

	<p>Where the potential for indirect effects (i.e. disturbance) on bats potentially roosting within trees has been identified, the following mitigating procedures are proposed:</p> <ul style="list-style-type: none"> ➤ An inspection survey will be carried out prior to the commencement of the works to ensure no bats are roosting within the trees. ➤ If the inspection survey cannot provide sufficient data to exclude the presence of a roost (i.e. due to lack of access), an activity survey will also be conducted prior to commencement. ➤ Where evidence of bats is identified during the above pre-commencement surveys, a Derogation Licence will be required from NPWS for the continuation of the works. ➤ The works will be carried out outside the maternity (May-August) and hibernation (November-March) seasons to avoid the potential for disturbance on bats during sensitive periods of their lifecycle. <p>The requirement for a pre-commencement survey does not represent a lacuna in the survey assessment but is fully in line with industry best practice. The function of this survey will be to assess any changes in baseline environment since the time of undertaking the inspection in June 2023.</p>
<p>Residual Effect following Mitigation</p>	<p>There is no potential for the construction of the Proposed Development to result in Significant effects on the local bat population at any geographic scale. There will be no significant effect on the conservation status of any bat species as defined in ‘<i>The Status of Protected Habitats and Species in Ireland</i>’ (NPWS, 2019)</p>

6.7.2.2.4 Assessment of Potential Impact on Amphibians

Table 6-25 Assessment of Potential Impacts on Amphibians

<p>Description of Effect</p>	<p>Due to the presence of suitable alternative habitat for Common Frog and Smooth Newt within the wider site, no significant impacts via habitat loss are predicted. However, due to the presence of suitable habitat for amphibians within the footprint of Turbine 2 and associated access roads, a potential for direct impact via mortality during construction works was identified.</p>
<p>Characterisation of unmitigated effect</p>	<p>In the absence of mitigation, there is potential for direct mortality to Common Frog and Smooth Newt in the vicinity of Turbine 2.</p>
<p>Assessment of Significance prior to mitigation</p>	<p>Significant effects as a result of habitat loss are not predicted due to the presence of suitable habitat for amphibians in the wider area.</p> <p>Due to the presence of suitable habitat within the footprint of Turbine 2 (in the form of ponds), and records of Common Frog and Smooth Newt found within this area of the site during the surveys undertaken, there is potential for significant effect to amphibians at a local level via direct mortality as a result of construction works.</p>
<p>Mitigation</p>	<p>A detailed drainage maintenance plan for the Proposed Development is provided in Section 4 of this EIAR. This plan provides full details of how water quality will be protected during the construction of the Proposed Development. In addition to this, specific mitigation is provided in relation to water quality in Chapter 9: ‘Hydrology and Hydrogeology’ of this EIAR. These mitigation measures will ensure that there will be no potential indirect effects on amphibians as a result of a deterioration in water quality.</p>

	<p>Prior to the commencement of construction works associated with Turbine 2, the following measures will be undertaken for the avoidance of direct mortality to amphibians:</p> <ul style="list-style-type: none"> > A pre-commencement Common Frog and Smooth Newt survey will be undertaken in accordance with standard best practice guidance prior to the commencement of works for Turbine 2. Any amphibians found will be translocated to suitable habitat within the development site, outside of construction areas, under licence from the National Parks and Wildlife Service. > All conditions of a derogation licence will be implemented in full. > All of the above works will be undertaken or supervised by an appropriately qualified ecologist.
<p>Residual Effect following Mitigation</p>	<p>Following the implementation of the mitigation proposed above, there will be no significant residual effect on amphibians as a result of the Proposed Development at any geographic scale.</p>

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6.7.3 Likely Significant Effects During Operational Phase

6.7.3.1 Effects on Habitats during Operation

The operation of the Proposed 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. These habitats are not considered to be a KER in the context of the operation of the Proposed Development. However, the Proposed Development has the potential to result in enhancement of the surrounding areas through habitat rehabilitation management (as described in the Biodiversity Management and Enhancement Plan) that will be implemented during the construction phase of the Proposed Development and maintained during the operational phase. Details of the management that will be undertaken are provided in the Biodiversity Management and Enhancement Plan in Appendix 6.4.

There is no potential for significant negative effects on terrestrial fauna such as otter that was identified as a KER during the construction phase of the development.

Potential for effects on rivers, streams and sensitive aquatic species remains a KER during operation and is assessed in detail in the following subsection, as are impacts on fauna.

6.7.3.1.1 Effects on Rivers and Streams and Sensitive Aquatic Faunal Species.

Table 6-26 Assessment of Potential Impacts on Rivers, Streams and Sensitive Aquatic Faunal Species

<p>Description of Effect</p>	<p>This section assesses the potential for likely significant effects on aquatic receptors including aquatic habitats (i.e., watercourses), salmonids, lamprey, coarse fish, white-clawed crayfish, European eel, aquatic invertebrates, molluscs and other aquatic species.</p> <p>The increase in the amount of hard standing associated with the proposed infrastructure has the potential to result in faster water runoff from the site to the surrounding watercourses. This may have the indirect effect of causing erosion, which could lead to deterioration of surface water and supporting habitat quality. Additionally, there is the potential for the faster run off of any pollutants that may be associated with vehicular usage on the site.</p> <p>The predicted impacts on water quality are fully described in Chapter 9: ‘Hydrology and Hydrogeology’ of this EIAR and are described here in relation specifically to biodiversity.</p>
<p>Characterisation of unmitigated effect</p>	<p>Impact on water quality during the operational phase of the Proposed Development has been assessed as a Negative, slight, indirect, long term, likely effect on all downstream surface water bodies. The magnitude of this impact is slight because all major infrastructure will be located over 50 metres from any significant watercourse (those mapped by the EPA¹⁷ and downloaded to GIS) and the footprint of the Proposed Development will be minimal when compared to the overall size of the site.</p>
<p>Assessment of Significance prior to mitigation</p>	<p>Significant effects on water quality are not anticipated at any geographic scale during the operation of the Proposed Development.</p>
<p>Mitigation</p>	<p>Whilst no significant effects on water quality are anticipated, potential for effects on water quality associated with the operational phase drainage of the site has been fully mitigated through appropriate design and mitigation as fully described in Section 4.7 ‘Site drainage’, and Section 9.5.3 of the EIAR. In Section 9.5.3 of Chapter 9 ‘Water’, the</p>

¹⁷ EPA, 2020, Online Map viewer. Available at: <https://gis.epa.ie/EPAMaps/>

	<p>assessment concludes that with the implementation of mitigation, <i>‘No significant effects on downstream flood risk will occur during the operational phase of the Proposed Development’</i> during the operational phase. The detailed mitigation measures are not repeated here to reduce repetition throughout the document, but are described in Section 9.5.3.1, Chapter 9; the measures used to mitigate the risk of release of hydrocarbons and other pollutants and for sediment control during the construction phase will also be employed as required during the operational phase. Drainage management measures employed during the construction phase will ensure that runoff from the operational development will be effectively mitigated.</p>
<p>Residual Effect following Mitigation</p>	<p>Proven and effective measures to attenuate runoff and mitigate the risk of flooding will be employed. The residual effect will be a neutral, indirect, long term, likely effect on down gradient streams/rivers.</p>

6.7.3.1.2 Impacts on future restoration potential of cutover bog habitats

The potential for the Proposed Development to impact the potential for rewetting or restoration of cutover bog habitats within the study area bog complex has been considered. As described in Section 6.7.2.1.2, and in Chapter 9, the potential for impacts on groundwater flows and hydrochemistry outside of 50m of the development footprint, with implementation of the prescribed mitigation, is highly unlikely. Therefore, there will be no potential for impact on rewetting opportunities for adjacent cutover bog habitats in the future. Please see below a summary of two case studies of rewetting cutover/cutaway bog projects carried out in tandem with and adjacent to operational wind farms. These project sites consisted of similar cutover raised bog habitats as the Proposed Development site. As stated in previous sections, the footprint of the Proposed Development will result in a loss of approx. 5% of the cutover bog habitats within the local bog complex.

Mountlucas Wind Farm (28 Turbines) was developed on cutover peatlands and completed construction in 2014. Rewetting measures as part of rehabilitation were incorporated into the site following construction and the site is now heavily vegetated to the extent that the former peat extraction activity is no longer evident.

Cloncreen Wind Farm (21 turbines) was commissioned in 2022. The peat source at Cloncreen has been largely exhausted over the years of industrial peat extraction. Since commissioning of the wind farm, rehabilitation works have been completed on the land area at Cloncreen that is not occupied by the permanent footprint of the wind farm infrastructure.

The experience across a range of windfarm sites demonstrates that peatland rehabilitation and wind farm development can co-exist successfully.

6.7.3.2 Effects on Fauna during Operation

The operation of the Proposed Development will not result in any additional habitat loss or deterioration, nor will it result in a significant increase in anthropogenic activity due to its location and scale.

The implementation of the Biodiversity Management and Enhancement Plan (BMEP) will ensure that any cutover bog, broadleaved woodland, treeline, hedgerow, and badger sett habitat that is lost to facilitate the proposed infrastructure will be replaced within the site. The BMEP will incorporate measures to create a wetland area within the northeast of the site and will result in the establishment of habitats of higher value for local faunal species during the operational period. This re-wetted area will provide a greater biodiversity benefit than the existing areas of drained, dry cutover bog being lost for the proposed infrastructure. As such the operation of the Proposed Development will not result in a significant impact at any geographic scale. Such measures will have positive effects on the non-volant terrestrial fauna at the site of the Proposed Development, including Common Frog and Smooth Newt which were both recorded within the site, as well as for birds and invertebrates. There is no potential for significant negative effects on non-volant terrestrial fauna including otter that was identified as a KER during the construction phase of the development.

It should be noted that no significant habitat for salmonids, lamprey, European eel, aquatic invertebrates or other aquatic species was recorded within the footprint of the Proposed Development and all major infrastructure such as turbine bases are located over 50 metres from the watercourses and wetlands within the site. The potential for significant effects on the above aquatic species is restricted to indirect effects on their habitat resulting from water pollution. This has been assessed in Section 6.7.2.1.1 and is not repeated below.

Potential for significant effects on bat species resulting from the operation of the Proposed Development were identified and therefore, these are identified as KERs during the operational phase.

6.7.3.2.1 Assessment of Potential Effects on Bats during operation

Table 6-27 Assessment of Potential Impacts on Bats

<p>Description of Effect</p>	<p>There is no potential for loss or fragmentation of foraging or roosting habitat for bat species during the operational phase of the Proposed Development as there will be no additional loss of any habitats following construction.</p> <p>The bat survey report that is provided in Appendix 6.2 found bat species composition and abundance to be typical of the geographic location and nature of the site, and that the site is utilised by a regularly occurring bat population of Local Importance.</p> <p>The operational phase of the Proposed Development poses a potential risk to bats in the form of collision mortality, barotrauma and other injuries cause by bats coming into contact or close proximity to operational turbines. Any increase in artificial lighting at night associated with the Proposed Development would have the potential to result in displacement effects on bats.</p> <p>No potential effects relating to bats have been identified along the Grid Connection Underground Cabling Route during the Operational Phase of the Proposed Development.</p>
<p>Characterisation of unmitigated effect</p>	<p>Collision Risk</p> <p>The following high-risk species were recorded during the dedicated surveys:</p> <ul style="list-style-type: none"> > Leisler’s bat, > Common pipistrelle > Soprano pipistrelle

	<p>> Nathusius' pipistrelle</p> <p>The Overall Risk Assessment for high collision risk species is provided in the sections below. Overall Risk was determined, in accordance with Table 3b of NatureScot 2021 guidance, by a cross-tabulation of the site risk level (i.e. Medium) bat activity outputs for each species. The assessment was carried out for both median and maximum activity categories in order to provide insight into typical bat activity (i.e. median values) and activity peaks (i.e. maximum values). NatureScot recommends that the most appropriate activity level (i.e., median or maximum) be utilised to determine the overall risk assessment for a species.</p> <p>There is Medium collision risk level assigned to the local population of Leisler's Bat in Spring, and a Low collision risk level assigned to the local population in Summer and Autumn.</p> <p>There is Low collision risk level assigned to the local population of Common pipistrelle in Spring and Autumn, and a Medium collision risk level assigned to the local population in Summer.</p> <p>There is Medium collision risk level assigned to the local population of Soprano pipistrelle in Spring and Summer, and a Low collision risk level assigned to the local population in Summer and Autumn.</p> <p>Based on site visit and survey data, including walked transects, it is determined that the Typical Activity (i.e., Median) is reflective of the nature of the site, which is predominantly a mixture of cutover bog, and mature commercial coniferous forestry with Low levels of bat activity recorded during the walked transects undertaken. Thus, there is Low collision risk level assigned to the local population of Nathusius' pipistrelle for all three seasons.</p> <p>As per NatureScot guidance there is no requirement to complete an Overall Risk Assessment for low-risk species. During the extensive suite of surveys undertaken that following low risk species were recorded:</p> <ul style="list-style-type: none"> > <i>Myotis sp.</i> > Brown long-eared bat <p>Overall activity levels were low for the above species, therefore no significant collision related effects are anticipated.</p>
<p>Assessment of Significance prior to mitigation</p>	<p>Death may occur through collision with turbine blades or as a result of barotrauma. Fatalities may negatively affect local bat populations. Significant effects are not anticipated at the county or national scale.</p> <p>To date, no studies have conclusively linked pre-construction activity surveys to post-construction fatality rates (Hein et al. 2013). However, there is a strong positive correlation between post-construction activity and fatality at wind farms (Kunz et al. 2007, Baerwald and Barclay 2009, Amorim et al. 2012, Korner-Nievergelt et al. 2013).</p> <p>The magnitude of this effect, in respect of local bat populations, in the absence of mitigation is Moderate at the local scale.</p>
<p>Mitigation</p>	<p>Buffering</p> <p>In accordance with NIEA Guidance¹⁸, and in order to reduce the value of the habitat for bat species in the areas surrounding the turbines, a buffer of at least 50m between the tip of the blade and any trees or other tall vegetation that could provide high quality</p>

¹⁸ Northern Ireland Environment Agency Natural Environment Division (NED) published Guidance on Bat Surveys, Assessment and Mitigation for Onshore Wind Turbine Developments in Northern Ireland (NIEA, 2021).

foraging habitat for bat species will be implemented. Details of this mitigation and how it is calculated is provided in Section 6.1.3 of the 'Bat Report' (Appendix 6.2).

Lighting Restrictions

Where lighting is required, directional lighting will be used to prevent overspill on to woodland/forestry edges. Exterior lighting, during construction and post construction, shall be designed to minimize light spillage, thus reducing the effect on areas outside the Proposed Development, and consequently on bats i.e., Lighting will be directed away from mature trees/treelines around the periphery of the site boundary to minimize disturbance to bats. Directional accessories can be used to direct light away from these features, e.g., through the use of light shields. The luminaries will be of the type that prevent upward spillage of light and minimize horizontal spillage away from the intended lands. Any proposed lighting around the site shall be designed in accordance with the Institute of Lighting Professionals Guidance Note 08/18 Bats and artificial lighting in the UK.

In addition, the applicant commits to the use of lights during construction, operation and decommissioning (such that they are necessary) in line with the following guidance that is provided in the Dark Sky Ireland Lighting Recommendations:

- > Every light needs to be justifiable,
- > Limit the use of light to when it is needed,
- > Direct the light to where it is needed,
- > Reduce the light intensity to the minimum needed,
- > Use light spectra adapted to the environment,
- > When using white light, use sources with a “warm” colour temperature (less than 3000K).

With regard to the potential for lighting to increase collision risk, it is noted that there will be some illumination of the turbines in the form of aviation lighting, and whilst this lighting is unlikely to result in any significant increase in collision risk, a comprehensive and site-specific mitigation and monitoring programme, described in section 6.2 of the Bat Report in Appendix 6.2, is proposed for a period of at least 3 years post construction. No significant effects of lighting on bats are anticipated; however, if in the course of this monitoring, any potential for significant effects on bats is identified, specific measures will be implemented to avoid any such impacts.

Blade Feathering

NIEA Guidelines also recommend that, in addition to buffers applied to habitat features, all wind turbines are subject to 'feathering' of turbine blades when wind speeds are below the cut-in speed of the proposed turbine. This means that the turbine blades are pitched at 90 degrees or parallel to the wind to reduce their rotation speed to below two revolutions per minute while idling. This measure has been shown to significantly reduce bat fatalities (by up to 50%) in some studies (NIEA, 2021).

In accordance with NIEA Guidelines, blade feathering will be implemented as a standard across all proposed turbines when wind speeds are below the cut-in speed of the turbine.

Post construction monitoring

It is noted in the NatureScot (2021) guidelines that bat activity on windfarm sites is highly liable to change following construction of a wind farm, due to the changes in habitat that occur to facilitate construction. Therefore, continued monitoring of operational wind farms for up to three years' post construction is recommended in NIEA and NatureScot (both 2021) guidelines and will be undertaken at this site, to verify the predicted post construction effects on the local bat populations.

Full details of the proposed operational bat monitoring programme for the Proposed Development are provided in Section 6.2 of the Bat Report (Appendix 6.2) and include

	<p>measurement of bat activity using static detectors at turbine bases, walked survey transects and corpse searching to record any bat fatalities resulting from collision. Monitoring of weather parameters known to influence collision risk including wind speed, temperature and precipitation will be undertaken in parallel with this. At a minimum, monitoring will be conducted for 3 years post construction. The monitoring will also include carcass searches to monitor and record bat fatalities, which shall be conducted at each turbine in accordance with NatureScot Guidance.</p> <p>The results of post construction monitoring shall be utilised to assess changes in bat activity patterns post construction and to monitor the implementation of the mitigation strategy. At the end of each year, the efficacy of the mitigation programme will be reviewed, and any identified efficiencies incorporated into the programme. This approach allows for an evidence-based review of the potential for bat fatalities at the site, post construction, to ensure that the necessary measures, based on a new baseline post-construction, are implemented for the protection of bat species locally.</p>
<p>Residual Effect following Mitigation</p>	<p>Taking into consideration the sensitive design of the project and the proposed best practice and adaptive mitigation measures, there is no potential for significant effects on bat populations as a result of the Proposed Development.</p>

6.7.4

Likely Significant Effects During Decommissioning phase

Decommissioning is fully described within the Decommissioning Plan (Appendix 4.5) and Chapter 4 of this EIAR. There will be no additional habitat loss associated with the decommissioning of the Proposed Development and therefore there will be no significant effects in this regard.

The wind turbines proposed as part of the Proposed Development are expected to have a lifespan of approximately 30 years. Following the end of their useful life, the equipment may be replaced with a new technology, subject to planning permission being obtained, or the Proposed Development may be decommissioned fully.

Upon decommissioning of the Proposed Development site, the wind turbines will be disassembled in reverse order to how they were erected. The turbines will be disassembled with a similar model of crane that was used for their erection. The turbine will likely be removed from Site using the same transport methodology adopted for delivery to Site initially. The turbine materials will be transferred to a suitable recycling or recovery facility.

The underground electrical cabling connecting the turbines to the on-site substation will be removed from the cable ducts. The cabling will be pulled from the cable ducts using a mechanical winch which will extract the cable and re-roll it on to a cable drum. This will be undertaken at the original cable jointing pits which will be excavated using a mechanical excavator and will be fully re-instated once the cables are removed. The cable ducting will be left in-situ as it is considered the most environmentally prudent option, avoiding unnecessary excavation and soil disturbance. The cable materials will be transferred to a suitable recycling or recovery facility.

All above ground turbine components would be separated and removed off-site for recycling. Turbine foundations would remain in place underground and would be covered with earth and reseeded as appropriate. Leaving the turbine foundations in-situ is considered a more environmentally prudent option, as to remove that volume of reinforced concrete from the ground could result in unnecessary environment emissions such as noise, dust and/or vibration.

Site roadways could be in use for purposes other than the operation of the Proposed Development by the time the decommissioning of the Proposed Development site is to be considered, and therefore it may be more appropriate to leave the Site roads in situ for future use. It is envisaged that the roads will

provide a useful means of extracting the commercial forestry crop which exists on the Site, and as agricultural roads.

The grid connection underground electrical cabling route and onsite substation will remain in place as it will be under the ownership and control of the ESB and Eirgrid.

A Decommissioning Plan has been prepared (Appendix 4-5) the detail of which will be agreed with the local authority prior to any decommissioning. The Decommissioning Plan will be updated prior to the end of the operational period in line with decommissioning methodologies that may exist at the time and will be agreed with the competent authority at that time. The potential for effects during the decommissioning phase of the Proposed Development has been fully assessed in the EIAR.

The impacts on biodiversity will also be similar in nature to those experienced during construction but on a far lesser scale and magnitude. There will be no additional or ancillary impacts associated with the decommissioning phase. The existing site roads will be used during decommissioning. The redundant underground cables will be pulled from their trenches without the requirement for significant excavation.

The same mitigation to prevent significant impacts on water quality and associated aquatic fauna and other terrestrial fauna during construction will be applicable to the decommissioning phase. The Decommissioning Plan provides details of the methodologies that will be adopted, throughout decommissioning, the environmental controls that will be implemented, the Emergency Response Procedure to be adopted, methods for reviewing compliance and an indicative programme of decommissioning works. The CEMP for the Proposed Development also provides details of the mitigation and best practice that will be employed to avoid any potential for significant residual effects on biodiversity during decommissioning of the Proposed Development. In addition, the measures incorporated into the construction phase, in Section 6.7.2.1 of this EIAR chapter, including specific mitigation provided in relation to water quality in Chapter 9: 'Water', will be implemented during decommissioning. It can be concluded that following the implementation of preventative mitigation, there is no potential for the decommissioning of the Proposed Development to result in significant effects on biodiversity.

6.7.5 Effects on Designated Sites

None of the elements of the Proposed Development are located within the boundaries of any Nationally or European designated sites. There will be no direct effects on any designated site as a result of the construction, operation and decommissioning of the wind farm project including the turbine delivery route, substation and grid connection.

6.7.5.1 Impacts on Nationally Designated Sites

As identified in Table 6-4, the following Nationally Designated Sites were identified as being within the Zone of Likely Impact:

- > Arragh More Bog NHA [000640]
- > Killeen Bog NHA [000648]
- > River Little Brosna Callows NHA [000564]
- > Ballyduff/Clonfinane Bog [000641]
- > Kilcarren-Firville Bog [000647]
- > Dovegrove Callows [000010]
- > Birr (Domestic Dwelling No.1, Occupied) [000569]
- > Birr (Domestic Dwelling No. 2, Occupied) [000568]
- > Bracken's Dwelling, Near Whiteford [002058]
- > River Shannon Callows [000216]
- > Lough Derg [000011]

- > Banagher (Domestic Dwelling, Occupied) [000567]
- > Cloghanbeg [002059]
- > Miltown, Shinrone [002065]
- > Kinnitty (Domestic Dwelling, Occupied) [000579]
- > St. Joseph's, Mountheaton [002063]
- > Drumakeenan National School [002064]

The following NHA/pNHAs are also designated as SAC/SPA and are fully considered under their European designation within the NIS:

- > Arragh More Bog NHA [000640]
- > River Little Brosna Callows NHA [000564]
- > Ballyduff/Clonfinane Bog [000641]
- > Dovegrove Callows [000010]
- > River Shannon Callows [000216]
- > Lough Derg [000011]

6.7.5.1.1 Hydrological (surface water) Impacts

Potential hydrological connectivity has been identified from the Proposed Development site to River Little Brosna Callows NHA, Dovegrove Callows pNHA, River Shannon Callows pNHA and Lough Derg pNHA. No potential for residual adverse impacts on water quality have been identified following implementation of mitigation measures in relation to potential effects on rivers/streams and sensitive aquatic faunal species, as described above in Section 6.7.2 and therefore no significant effects on these NHAs/pNHAs are anticipated.

No hydrological connectivity has been identified to any other NHAs/pNHAs; given the distance from the Proposed Development site and relatively low impact of the works, and therefore, no impacts are anticipated.

6.7.5.1.2 Collision Risk and Habitat Loss

A potential for impact on bat populations associated with the following pNHA bat roosts due to habitat loss or collision risk was identified on a precautionary basis:

- > Birr (Domestic Dwelling No.1, Occupied) [000569]
- > Birr (Domestic Dwelling No. 2, Occupied) [000568]
- > Bracken's Dwelling, Near Whiteford [002058]
- > Banagher (Domestic Dwelling, Occupied) [000567]
- > Cloghanbeg [002059]
- > Miltown, Shinrone [002065]
- > Kinnitty (Domestic Dwelling, Occupied) [000579]
- > St. Joseph's, Mountheaton [002063]
- > Drumakeenan National School [002064]

However, the mitigations prescribed for local bat populations, as listed in Section 6.7.2.3.3 and Section 6.7.3.2.1, which will mitigate potential risks via habitat loss and collision, are such that there is no potential for residual impact on these pNHA roosts.

The potential for collision risk or habitat loss to bird populations associated with the following designated sites has been fully considered and mitigated in Chapter 7 'Ornithology':

- > River Little Brosna Callows NHA [000564]
- > River Shannon Callows [000216]
- > Lough Derg [000011]

6.7.5.1.3 Air Quality Impacts

The potential for air quality-related impacts to peatland habitats via increased nitrogen deposition as a result of construction works was identified on the following pNHAs:

- Arragh More Bog NHA [000640]
- Killeen Bog NHA [000648]
- Ballyduff/Clonfinane Bog [000641]
- Kilcaren-Firville Bog [000647]

Such air quality impacts could occur as a result of dust production and wind blow during construction and excavation activities, as well as transport of materials and vehicle and plant emissions. This has the potential to be a temporary, short-term, irreversible Moderate effect on a receptor of International Importance, given the Sites' European designations.

Exhaust Emissions

Proposed Development Infrastructure:

The construction of turbines, the anemometry mast, substation, site roads and other onsite infrastructure will require the operation of construction vehicles and plant on site and the transport of workers to and from the site. Exhaust emissions associated with vehicles and plant such as NO₂, Benzene and PM₁₀ will arise as a result of construction activities. This potential effect will not be significant and will be restricted to the duration of the construction phase and localised to works areas.

The construction of the proposed substation, widening works along the local road and the grid connection cabling route to the Dallow 110kV substation will require the use of construction machinery, thereby giving rise to exhaust emissions.

Transport to and from site:

The transport of turbine components, construction materials, waste, and workers to and from the site will also give rise to exhaust emissions associated with the transport vehicles.

Mitigation:

- All construction vehicles and plant used onsite during the construction phase will be maintained in good operational order. If a vehicle requires repairs this work will be carried out, thereby minimising any emissions that arise.
- Turbine components will be transported to the site on specified routes only, unless otherwise agreed with the Planning Authority.
- All machinery will be switched off when not in use.
- Users of the site will be required to ensure that all plant and vehicles are suitably maintained to ensure that emissions of engine generated pollutants is kept to a minimum.

Dust Emissions

Dust emissions arise when particulate matter becomes airborne making it available to be carried downwind from the source. Dust emissions can lead to elevated PM₁₀ and PM_{2.5} concentrations and may also cause dust soiling. The amount of dust generated and emitted from a working site and the potential impact on the surrounding areas varies according to:

- d) The type and quantity of material and working methods
- e) Distance between site activities and sensitive receptors
- f) Climate/local meteorology and topography

Turbines and Other Infrastructure:

The construction of turbine foundations and hardstands, substation, anemometry mast, site roads, other onsite infrastructure will give rise to dust emissions during the construction phase. The excavation of the grid connection cabling route trench will give rise to localised dust emissions. However, due to the nature of construction along the proposed grid connection, which is termed a “rolling” construction site, meaning that these works will not be concentrated in any one area of the route for any considerable length of time. Therefore, these effects are considered to be temporary and a slight negative impact. The transport construction materials to and waste from the wind farm site will give rise to some localised dust emissions during periods of dry weather. Mitigation measures to prevent adverse effects to nearby SACs as a result of airborne nitrogen deposition are provided below.

- A wheel wash facility will be installed on the Proposed Development site and will be used by vehicles before leaving site.
- In periods of extended dry weather, dust suppression may be necessary along haul roads, site roads, grid route, road widening sections, substation, and construction compounds to ensure dust does not cause a nuisance. If necessary, such as during periods of dry weather, de-silted water will be taken from stilling ponds in the site’s drainage system and will be pumped into a bowser or water spreader to dampen down haul roads, turbine bases, and site compounds to prevent the generation of dust where required. Water bowser movements will be carefully monitored by the Ecological Clerk of Works to avoid increased runoff.
- Areas of excavation will be kept to a minimum and stockpiling of excavated material will be minimised by coordinating excavation and placement of material in peat placement areas.
- Turbines components and construction materials will be transported to the site on specified haul routes only, as agreed with the local authority.
- The agreed haul route roads adjacent to the site will be regularly inspected for cleanliness and cleaned as instructed by the construction Site Supervisor/Site Manager.
 The transport of construction materials may have the potential to generate dust in dry weather conditions. Roads will be watered down to suppress dust particles in the air as instructed by the Site Supervisor/Manager

Residual effect:

Once the listed measures are put in place, there will be no residual impacts to designated sites via air quality impacts.

6.7.5.14 **Groundwater level Impacts**

As assessed in Chapter 9 ‘Water,’ dewatering of deeper excavations (i.e., turbine bases) as well as turbine base piling have the potential to impact on local groundwater levels and flows. The potential for impacts on local groundwater levels, thus resulting in draw-down of groundwater from the following adjacent NHA and pNHA bog sites was identified:

- Arragh More Bog NHA [000640]
- Killeen Bog NHA [000648]
- Ballyduff/Clonfinane Bog pNHA [000641]
- Kilcarren-Firville Bog pNHA [000647]

However, as described in Chapter 9, Section 9.5.2.4, and in Section 6.7.2.1.2 of this chapter, the effects are likely to be localised due to the relatively shallow excavation depths and the local hydrogeological regime with low to moderate permeability peat and glacial tills overlying the limestone bedrock. Effects on groundwater levels will only be for a temporary basis during the construction work. Water level impacts will be temporary and are unlikely to be significant beyond 50m from any excavation.

Regarding works along the grid route, no groundwater level effects will occur. This is due to the shallow nature of the excavation trench (i.e., ~1.2m), the location of the trench in the existing road carriageway and the unsaturated nature of the soil/subsoil to be excavated.

However, taking a precautionary approach, the identified pathway for impact is via alteration of local groundwater levels thus affecting groundwater flow paths in the Banagher and Birr Groundwater bodies, and potentially causing a draw-down of groundwater from adjacent designated peatland sites. This is considered to be a direct, negative, slight, temporary, unlikely effect on local groundwater levels within the wind farm site.

Main streams and rivers are at least 100 – 300m away from any turbine bases, and at these distances potential effects will be imperceptible. The proposed underground cable trench is designed to be shallow and will only be approximately 1.2m in depth. At this depth, it will only potentially interact with shallow perched water within the peat profile. No interaction with deeper regional groundwater will occur. Therefore, no effects on the local groundwater table or flows will occur from this element of the development. The construction of the proposed electrical substation, the temporary construction compounds and roads will be relatively shallow and will only have the potential to interact with the shallow perched water table within the peat bog. No interaction with the deeper regional groundwater regime will occur. Therefore, no effects on the local groundwater table or flows will occur.

The potential effect of piling works on groundwater is assessed below.

Due to the possibility of deep peat and glacial tills at some of the proposed turbine's locations, a range of foundation scenarios are proposed, including:

- > Gravity foundations;
- > Piled foundation with a configuration of up to 50 no. 300mm square concrete driven piles. These piles could extend to a depth of between 5 to ~18metres below ground level; and,

The following potential scenarios arise in respect of proposed piling works:

- > Creation of preferential pathways, through a low permeability subsurface layer (an aquitard such as lacustrine clay), to allow downward flow into the underlying aquifer;
- > Creation of preferential pathways, through a low permeability subsurface layer (an aquitard such as lacustrine clay), to allow upward migration alkaline groundwater to the acidic bog surface, thus potentially altering local hydrochemistry and therefore vegetation at the bog surface; and,
- > Creation of a blockage to regional groundwater flow within the underlying aquifer due to placement of pile clusters.

Pathways: Groundwater flowpaths (upward and/or downward pathways, and regional groundwater flows).

Receptors: Groundwater quality in the underlying Banagher and Birr groundwater bodies and groundwater hydrochemistry at the surface and within the peat bog.

Pre-Mitigation Potential Effects: Negative, moderate, direct, short term, likely effect on groundwater quality/hydrochemistry.

Proposed Mitigation Measures:

The proposed mitigation measures designed for the protection of downstream surface water quality and groundwater quality within the peat bog will be implemented at all construction work areas.

- Mitigation measures for sediment control are detailed in Section 9.5 of Chapter 9.
- Mitigation measures for the control of hydrocarbons during construction works are detailed in Section 9.5 of Chapter 9.
- Mitigation measures for the control of cement-based products during construction works are detailed in Section 9.5 of Chapter 9.

Proposed mitigation measures relative to piling works will comprise:

- Where driven piles are used, they will have a cross section without re-entrant angles;
- Strict QA/QC procedures for piling works will be followed;
- Piles will be kept vertical during piling works;
- Good workmanship will be employed during all piling works; and,
- Where required use bentonite seal to prevent upward/downward movement of surface water/groundwater.

Impact Assessment:

The ground conditions at the proposed site can be typically categorised into the following deposits (based on data presented in Chapter 8, 'Geology and Soils'):

- **Peat** – Typically described as spongy, dark brown, pseudo fibrous peat. Peat thicknesses from ranged from 0.6 – 3.7m at turbine locations;
- **Lacustrine Clay** – Located at turbine T5 only (2m);
- **Glacial Tills** – Mainly CLAYs and SILTs (glacial tills derived from limestone). The thickness of the layer is variable across the proposed site ranging between 0 and >2.4m in the trial pits;
- **Limestone Bedrock** – Limestone bedrock was encountered in only 2 no. trial pits at depths of 1.8 and 2.8m.
- **Groundwater** – Groundwater ingress was recorded in 5 of the 15 no. trial pits completed at the wind farm site. The depth of groundwater ingress ranges between 0.9 and 3.6mbgl.

Proposed piles will penetrate through peat deposits, lacustrine clay deposits (where they occur), and then into underlying glacial tills or bedrock. Where present the clay layer is likely to act as an aquitard/low permeability layer, through which only very small amounts of water can flow.

Peat water is perched above the regional groundwater table. Peat water occurs in the bog basins, while regional groundwater flow will occur in the underlying bedrock aquifer. Glacial tills that occur between the base of the peat/lacustrine clays may be permeable in local zones, but in general will have a moderate to low permeability. Therefore, the two main groundwater systems are the upper acidic peat water, and the lower regional bedrock groundwater water. As the underlying bedrock is mainly limestone, the groundwater occurring within this aquifer will be alkaline.

For the driven piles the clay and also the glacial tills are likely to 'self-seal' around the piles, meaning that a long-term pathway between the upper peat/bog water and the lower bedrock aquifer will not be sustained.

Research indicates that provided the aquitard layer is of a reasonable thickness and the piles driven through have a cross section without re-entrant angles, the likelihood of creating preferential flow paths

for downward migration of leachate (i.e., peat water) is very low. This hypothesis is consistent with the results obtained by Hayman et al (1993) and Boutwell et al (2000) (referenced in Chapter 9).

For bored piles, as the temporary steel casing is removed, a steel reinforcement cage is added to the pile column and then concrete is added to the toe of the pile using a tremie pipe. Vermiculite is used to create a plug between the concrete and the displaced water, therefore the concrete seals the entire pile column and pushes the vermiculite plug to the surface as concrete is added. The temporary steel casing is removed carefully as the concreting works are being completed. This concreting process is similar to that used when grouting a water supply production well (IGI (2007), and EPA (2013)). This means that a long term pathway between the upper peat/bog water and the lower bedrock aquifer will not be sustained.

Scenario 1: Creating a Pathway for Downward Flow

To ensure downward flow of peat water and/or pollutants from the piling works does not occur, a bentonite seal will be used in a starter pit for each driven pile, and the mitigation measures outlined above will be implemented. The concrete added to the bored pile will seal the pile annulus. As a result, the potential for either piling work option to create pathways for downward flow of peat water or pollutants that could affect groundwater quality in the underlying aquifer is imperceptible.

Scenario 2: Creating a Pathway for Upward Flow

No upwelling of groundwater to the peat surface water recorded in any of the site investigation locations recorded across the proposed site.

Notwithstanding this, to ensure upward flow of underlying groundwater via potential pathways created by piling works does not occur, a bentonite seal will be used in a starter pit for each driven pile, and the mitigation measures outlined above will be implemented. The concrete added to the bored pile will seal the pile annulus. As a result, the potential for piling works to create pathways for upward flow of alkaline groundwater to the bog surface is imperceptible.

Scenario 3: Blocking Regional Groundwater Flow

For example, if a piling array of 50 no. 300mm piles is applied at each turbine base (as piling Option 1), this combined area of piling footprint amounts to $\sim 24.7\text{m}^2$, or 3.53m^2 per turbine base. Each turbine base is 500m – 800m apart. The area of the piles driven into the ground is distributed over a very large area, and that area only amounts to $<0.02\%$ of the development footprint, or $<0.0005\%$ of the proposed site area. Also, none of the proposed piles would penetrate any great distance into the underlying bedrock aquifer, as they will find sufficient resistance, either in the over lying glacial tills/mineral subsoils or upon reaching the top of bedrock. At such wide separation distance, the ability of clusters of piles, with a plan area of $\sim 3.53\text{m}^2$ per turbine, to alter or affect regional groundwater flow is imperceptible.

Post-Mitigation Residual Effects: The proposed piling works potentially pose a threat to groundwater quality in the underlying regional groundwater system, and also could potentially create a pathway for upward migration of alkaline groundwater to the peat surface. These potential effects will not arise at the proposed site due to a combination of the prevailing ground conditions, groundwater conditions, and proposed mitigation measures that will ensure the potential pathways for interaction of shallow (acidic peat water) and deeper (alkaline) groundwater are prevented from occurring. In addition, due to the small footprint of proposed pile clusters, and the significant spacing between turbine bases where pile clusters are proposed, the potential for such pile clusters to block regional groundwater flow is imperceptible at that scale. The proposed piled foundations therefore have no potential to change the WFD status or impact the WFD objectives of the underlying Banagher and Birr Groundwater bodies. The residual effect will be a negative, imperceptible, indirect, short term, unlikely effect on groundwater flow, and ground quality/peat water hydrochemistry.

Significance of Effects: For the reasons given above, no significant effects on regional groundwater and the Banagher and Birr groundwater bodies will occur, and no significant effects on peat water hydrochemistry will occur from proposed piling works.

As shown above and detailed in Chapter 9, due to the existing groundwater table and sublayer conditions within the Proposed Development footprint, there is no potential for impacts on regional groundwater flows. Once the above prescribed piling methodology and mitigations are in place, there is no potential for significant impact on local groundwater flows and hydrochemistry, therefore there will be no impact on the adjacent peatland habitats. It has been shown there is no potential for impact via groundwater flow path alteration of adjacent NHA and pNHA peatland sites.

No potential for significant impacts on any other Nationally designated sites have been identified.

6.7.5.2 Impacts on European Sites

In relation to European sites, an Appropriate Assessment Screening Report and Natura Impact Statement (NIS) have been prepared to provide the competent authorities with the information necessary to complete an Appropriate Assessment for the Proposed Development in compliance with Article 6(3) of the Habitats Directive.

As per the aforementioned EPA Guidance (2022), “a biodiversity section of an ELAR, should not repeat the detailed assessment of potential effects on European sites contained in a Natura Impact Statement” but should “incorporate their key findings as available and appropriate”. This section provides a summary of the key assessment findings with regard to Special Areas of Conservation (SACs) and Special Protection Areas (SPAs).

The Screening for Appropriate Assessment concluded as follows:

‘it cannot be excluded beyond reasonable scientific doubt, in view of best scientific knowledge, on the basis of objective information and in light of the conservation objectives of the relevant European sites, that the Proposed Development, individually or in combination with other plans and projects, would be likely to have a significant effect on the following sites:

- Ballyduff/Clonfinane Bog SAC [000641]
- Arragh More (Derrybreen) Bog SAC [002207]
- Kilcarren-Firville Bog SAC [000647]
- Lough Derg, North-east Shore SAC [002241]
- River Shannon Callows SAC [000216]
- Dovegrove Callows SPA [004137]
- River Little Brosna Callows SPA [004086]
- Middle Shannon Callows SPA [004096]
- Lough Derg (Shannon) SPA [004058]

As a result, an Appropriate Assessment is required, and a Natura Impact Statement has been prepared in respect of the Proposed Development in order to assess whether the Proposed Development will adversely impact the integrity of these European Sites’.

The findings presented in the NIS are that,

‘Where the potential for any adverse effect on any European Site has been identified, the pathway by which any such effect may occur has been robustly blocked through the use of avoidance, appropriate design and mitigation measures as set out within this report and its appendices. The measures ensure that the construction and operation of the Proposed Development does not adversely affect the integrity of European sites.

Therefore, it can be objectively concluded that the Proposed Development, individually or in combination with other plans or projects, will not adversely affect the integrity of any European Site.

6.8 Cumulative Impacts

The Proposed Development was considered in combination with other plans, existing and approved projects and planning applications pending a decision, in the surrounding area that could result in cumulative impacts on the Key Ecological Receptors (KERs) identified in Section 6.6.3 of this report, including European Sites and Nationally designated sites. This included a review of online Planning Registers and served to identify past, present and future plans and projects, their activities and their predicted environmental effects. The projects considered are listed in Chapter 2: Background of the Proposed Development. The full list of projects has been considered and relevant ones from this list are discussed in this section.

6.8.1 Assessment of Plans

The following development plans have been reviewed and taken into consideration as part of this assessment:

- > Tipperary County Development Plan 2022 – 2028
- > Offaly County Development Plan 2021 - 2027
- > National Biodiversity Action Plan 2017-2021
- > Draft 4th National Biodiversity Action Plan 2023-2027
- > Eastern and Midlands Regional Assembly: Regional Spatial & Economic Strategy 2019-2031 (RSES)

The review focused on policies and objectives that relate to nationally designated sites for nature conservation, biodiversity and protected species. Policies and objectives relating to the conservation of peatlands and sustainable land use were also reviewed, particularly where the policies relate to the preservation of surface water quality. An overview of the search results with regard to plans is provided in Table 6-28.

Potential for cumulative impacts on European sites are considered within the Natura Impact Statement that accompanies this application.

Table 6-28 Assessment of Plans

Plans	Key Policies and Objectives directly related to European Sites and Biodiversity in the Zone of Influence	Assessment of Potential Impact on European Sites
<p>Tipperary County Development Plan 2022 – 2028</p>	<p>SO-1: To support the just transition to a climate resilient, biodiversity-rich, environmentally-sustainable and climate-neutral economy.</p> <p>Policies</p> <p>11 - 1 In assessing proposals for new development to balance the need for new development with the protection and enhancement of the natural environment and human health. In line with the provisions of Article 6(3) and Article 6 (4) of the Habitats Directive, no plans, programmes, etc. or projects giving rise to significant cumulative, direct, indirect or secondary impacts on European sites arising from their size or scale, land take, proximity, resource requirements, emissions (disposal to land, water or air), transportation requirements, duration of construction, operation, decommissioning or from any other effects shall be permitted on the basis of this Plan (either individually or in combination with other plans, programmes, etc. or projects⁵⁹).</p> <p>11 - 2 Ensure the protection, integrity and conservation of European Sites and Annex I and II species listed in EU Directives. Where it is determined that a development may individually, or cumulatively, impact on the integrity of European sites, the Council will require planning applications to be accompanied by a NIS in accordance with the Habitats Directive and transposing Regulations, ‘Appropriate Assessment of Plans and Projects, Guidelines for Planning Authorities’, (DEHLG 2009) or any amendment thereof and relevant Environmental Protection Agency (EPA) and European Commission guidance documents. 11 - 3 Ensure the conservation and protection of existing, and proposed NHAs, and to ensure that Proposed Developments within or in close proximity to an existing or proposed NHA would not have a significant adverse impact on the status of the site as described</p> <p>11 - 4 (a) Conserve, protect and enhance areas of local biodiversity value, habitats, ecosystems and ecological corridors, in both urban and rural areas, including rivers, lakes, streams and ponds, peatland and other wetland habitats, woodlands, hedgerows, tree lines, veteran trees, natural and semi-natural grasslands in accordance with the objectives of the National Biodiversity Plan (DCHG 2017) and any review thereof. (b) Safeguard, enhance and protect water bodies (rivers/canals/lakes) and river</p>	<p>The Development plan was comprehensively reviewed, with particular reference to Policies and Objectives that relate to the biodiversity, protected species and designated sites.</p> <p>The Proposed Development is located outside of any Nationally designated sites. All identified pathways for impact to designated sites have been assessed and mitigated where necessary as detailed in Section 6.7.5.</p> <p>No potential for negative cumulative impacts when considered in conjunction with the current proposal were identified.</p> <p>No developments or projects identified within the Development Plan were found to occur in the wider area surrounding the Proposed Development.</p>

Plans	Key Policies and Objectives directly related to European Sites and Biodiversity in the Zone of Influence	Assessment of Potential Impact on European Sites
	<p>walks and to provide links, where possible, to wider green infrastructure networks as an essential part of the design process. (c) Require an ‘Ecosystems Services’ approach for new development to incorporate nature-based solutions to SUDS, in so far as practical, as part of water management systems, public realm design and landscaping, in line with best practice. (d) Where trees or hedgerows are of particular local value, the Council may seek their retention, or where retention is not feasible, their replacement and will seek a proactive focus on new tree-planting as part of new development</p> <p>11 - 5 Ensure that new developments proposed in or near ‘Ground Water Protection Schemes’ and ‘Zones of Contribution’ which contribute to public water supplies, do not result in a significant negative impact on the integrity, function and management of these important assets. 11 - 6 Ensure the integration of river corridors with green infrastructure in settlements in line with the ‘Planning for Watercourses in the Urban Environment’ (Inland Fisheries Ireland, 2020). 11 - 7 a) Ensure the protection of water quality in accordance with the EU WFD, and support the objectives and facilitate the implementation of the associated Programme of Measures of the River Basin Management Plan 2018-2021 and any successor. This includes contributing towards the protection of Blue-Dot catchments and drinking water resources. Also, have cognisance of the EU’s Common Implementation Strategy Guidance Document No. 20 and 36 which provide guidance on exemptions to the environmental objectives of the WFD. b) Support an integrated and collaborative approach to catchment management in accordance with the River Basin Management Plan 2018-2021 and any successor. c) Require an undisturbed edge or buffer zone to be maintained, where appropriate, between new developments and riparian zones of water bodies to maintain the natural function of existing ecosystems associated with water courses and their riparian zones, and to enable sustainable public access</p> <p>11 - 8 Provide for the sustainable development of fisheries, in compliance with the Habitats and Birds Directives, and other ecological protection objectives. New infrastructure should be positioned at already modified locations where feasible; and sedimentation and siltation issues should be considered, with floating infrastructure used where feasible. Fishery related developments may necessitate the preparation of a Visitor/Habitat Management Plan that includes requirements in relation to: sustainable fishing practices that would not affect the ecological site integrity; and invasive species</p>	

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Plans	Key Policies and Objectives directly related to European Sites and Biodiversity in the Zone of Influence	Assessment of Potential Impact on European Sites
	<p>11 - 13 Seek to control the spread of invasive plant and animal species, including consideration of potential pathways for invasive species spread, i.e., watercourses.</p> <p>11 - 15 Support the diversification of peatlands, whilst ensuring the protection of their ecological, archaeological, cultural and educational significance in line with the National Peatlands Strategy (DAHG 2015). The Council may request landowners to prepare a 'Peatland Master Plan', especially for areas of industrial cut-over peatland, and will work with all stakeholders involved in the process in this regard. Any Masterplan should identify any significant tourism, amenity and recreation potential of these lands</p> <p>11 - D (a) Support the objectives of the All-Ireland Pollinator Plan 2021- 2025 by incorporating pollinator friendly native trees and plants within grass verges along public roads and existing and future greenways, new hedgerows, public parks and public open spaces in towns and villages, including part of mixed use and residential developments. (b) Prepare a 'Pollinator Action Plan' for Tipperary over the lifetime of the Plan, having consideration to the All-Ireland Pollinator Plan, 2021 - 2025.</p> <p>11 - G Apply best practice in sustainable environmental standards in the design and development of collaborative and/or public sector development in Tipperary, including: (a) Ensure that biodiversity issues are considered at the earliest possible stages of plan making; (b) Ensure that plans and strategies comply with nature conservation legislation and policy as required (fulfil SEA and AA requirements); and (c) Carry out ecological impact assessment of plans and strategies as appropriate.</p>	
<p>Offaly County Development Plan 2021 - 2027</p>	<p>Designated and Non-designated Sites</p> <p>BLP-01: It is Council policy to protect, conserve, and seek to enhance the county's biodiversity and ecological connectivity.</p> <p>BLP-02: It is Council policy to conserve and protect habitats and species listed in the Annexes of the EU Habitats Directive (92/43/EEC) (as amended) and the Birds Directive (2009/147/EC), the Wildlife Acts 1976 (as amended) and the Flora Protection Orders.</p>	<p>The Development plan was comprehensively reviewed, with particular reference to Policies and Objectives that relate to the biodiversity, protected species and designated sites. No potential for negative cumulative impacts when</p>

Plans	Key Policies and Objectives directly related to European Sites and Biodiversity in the Zone of Influence	Assessment of Potential Impact on European Sites
	<p>BLP-03: It is Council policy to support and co-operate with statutory authorities and others in support of measures taken to manage proposed or designated sites in order to achieve their conservation objectives.</p> <p>BLP-05: It is Council policy to ensure that development does not have a significant adverse impact, incapable of satisfactory avoidance or mitigation, on plant, animal or bird species protected by law.</p> <p>BLP-06: It is Council policy to consult with the National Parks and Wildlife Service, and take account of any licensing requirements, when undertaking, approving or authorising development which is likely to affect plant, animal or bird species protected by law.</p> <p>BLP-07: It is Council policy to support the implementation of the National Biodiversity Action Plan 2017- 2021 and the Offaly Heritage Plan Key Actions 2017-2021 and future editions in partnership with relevant stakeholders subject to available resources.</p> <p>BLP-08: It is Council policy to work with all state agencies to promote the development of all aspects of park management in the Slieve Bloom Mountains.</p>	<p>considered in combination with the Proposed Development were identified.</p>
<p>Draft 4th National Biodiversity Action Plan 2023-2027</p>	<p>Objective 2 - Meet Urgent Conservation and Restoration Needs</p> <p>Outcome 2A: The protection of existing designated areas and species is strengthened and conservation and restoration within the existing protected area network are enhanced 29</p> <p>Outcome 2B: Biodiversity and ecosystem services in the wider countryside are conserved 32 18 27 Navigation</p> <p>Outcome 2C: All freshwater bodies are of at least ‘Good Ecological Status’ as defined under the EU Water Framework Directive 36</p> <p>Outcome 2D: Genetic diversity of wild and domesticated species is safeguarded 39 Outcome 2E: A National Restoration Plan is in place to meet EU Biodiversity Strategy 2030 nature restoration targets 41</p>	<p>There will be no adverse effects on designated sites or biodiversity as a result of the Proposed Development.</p> <p>The Proposed Development will not impact on connectivity within the wider area and will maintain watercourses within and adjacent to the development site in good condition.</p> <p>No Invasive species were present within the Site, and the Proposed Development will not contribute to the spread of invasive species.</p>

Plans	Key Policies and Objectives directly related to European Sites and Biodiversity in the Zone of Influence	Assessment of Potential Impact on European Sites
	<p>Outcome 2F: Biodiversity and ecosystem services in the marine environment are conserved and restored 42</p> <p>Outcome 2G: Invasive alien species (IAS) are controlled and managed on an all-island basis to reduce the harmful impact they have on biodiversity and measures are undertaken to tackle the introduction and spread of new IAS to the environment</p>	
<p>National Biodiversity Action Plan 2017-2021</p>	<p>Objective 1 Mainstream biodiversity into decision-making across all sectors</p> <p>Developments in the area of Green Infrastructure are being initiated at the local and regional level. Green Infrastructure is a strategically planned network of natural and semi natural areas with other environmental features designed and managed to deliver a wide range of ecosystem services such as water purification, air quality, space for recreation and climate mitigation and adaptation.</p> <p>Objective 4 - Conserve and restore biodiversity and ecosystem services in the wider countryside</p> <p>Target 6.2 - Sufficiency, coherence, connectivity, and resilience of the protected areas network substantially enhanced by 2020.</p>	<p>The Development plan was comprehensively reviewed, with particular reference to Policies and Objectives that relate to the biodiversity, protected species and designated sites. The Proposed Development has been designed in order to avoid any potential fragmentation of habitats or commuting corridors.</p> <p>No potential for negative cumulative impacts when considered in conjunction with the current proposal were identified.</p>

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Plans	Key Policies and Objectives directly related to European Sites and Biodiversity in the Zone of Influence	Assessment of Potential Impact on European Sites
<p>Eastern and Midlands Regional Assembly: Regional Spatial & Economic Strategy 2019-2031 (RSES)</p>	<p>RPO 7.16: Support the implementation of the Habitats Directives in achieving an improvement in the conservation status of protected species and habitats in the Region and to ensure alignment between the core objectives of the EU Birds and Habitats Directives and local authority development plans.</p> <p>RPO 7.17: Facilitate cross boundary co-ordination between local authorities and the relevant agencies in the Region to provide clear governance arrangements and coordination mechanisms to support the development of ecological networks and enhanced connectivity between protected sites whilst also addressing the need for management of alien invasive species and the conservation of native species.</p> <p>RPO 7.18: Work with local authorities and state agencies to promote the development of all aspects of park management in the Wicklow National Park and the Slieve Bloom Mountains.</p> <p>RPO 7.19: Support the consideration of designating a National Park for the peatlands area in the Midlands.</p> <p>RPO 7.20: Promote the development of improved visitor experiences, nature conservation and sustainable development activities within the Dublin Bay Biosphere in cooperation with the Dublin Bay UNESCO Biosphere Partnership.</p>	<p>There will be no adverse effects on biodiversity as a result of the Proposed Development, and no cumulative impacts in this regard.</p> <p>The Proposed Development has been designed to avoid any effects on water quality and/or designated sites outside the site.</p> <p>The Proposed Development has been subject to a full environmental assessment i.e. EIA and AA.</p>

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6.8.2 Assessment of Projects

As described in Section 2.8 of Chapter 2 of the EIAR, relevant projects have been assessed in combination with the Proposed Development and include planning applications in the vicinity of the site including other wind energy applications within the appropriate zone of sensitivity. Appendix 2.3 to Chapter 2 of this EIAR provides the full list of projects identified; these have not been repeated here to reduce the duplication of information within this EIAR. However, they have been fully considered in the assessment with further detail provided below. In addition, Section 6.8.3 concludes on their potential for impact on biodiversity. The table below provides the cumulative study areas for individual EIAR topics that are also relevant in relation to ecological receptors i.e., hydrological connectivity is important for assessing potential for effects on designated sites. Potential for cumulative effects in relation to birds is assessed separately within Chapter 7 of this EIAR.

Table 6-29: Cumulative Study Areas in relation to ecological receptors (birds are assessed separately within Chapter 7 of this EIAR)

Individual Topic	Maximum Extent	Justification
Biodiversity	<p>1km from Wind Farm Site Boundary.</p> <p>200m from Grid Connection underground electrical cabling route.</p> <p>Consideration for the Biodiversity cumulative extent is also given to the Birds and Water Cumulative geographical boundaries.</p>	<p>Using the precautionary approach and given the nature and scale of the Proposed Development, the geographical boundary for terrestrial ecological aspects, i.e., habitats, is 1km for cumulative assessment for the Wind Farm Site and 200m from Grid Connection underground electrical cabling route.</p>
Water	<p>Wind Farm Site:</p> <p>Little Brosna River catchment for proposed, permitted or existing wind-farm developments</p> <p>River Sub Basins for all smaller proposed, permitted or existing plans or projects (i.e. private and commercial type developments).</p> <p>Grid Connection:</p> <p>Within a 200m buffer zone of the proposed underground electrical cabling connection route.</p>	<p>Regional surface water catchments are used for cumulative impact assessment with regard large infrastructural developments such as wind farms, energy and public transport developments. The potential for cumulative effects for these developments likely exists on a regional catchment scale (i.e., significant works likely existing in several sub-basins). Therefore, other wind-farm developments are considered within Little Brosna River catchment for cumulative effects.</p> <p>River Sub Basins are used for smaller developments (i.e., private & commercial type developments). These developments are not likely to present a significant cumulative impact risk on a regional catchment scale as any effects would likely be imperceptible as a result of the setback distances and localised nature of the associated works. Given the nature and scale of the proposed works and the lack</p>

		<p>of hydrological cumulative impact potential beyond the river sub basin scale, the Water cumulative study area is defined by river sub basins in which the Wind Farm Site is located.</p> <p>Due to the narrow nature of the underground electrical cabling route trench (~0.6m wide), a 200m buffer zone is an appropriate scale when considering potential cumulative effects on the water environment.</p>
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Other smaller developments within the wider study area have been considered within the identified zone of sensitivity for biodiversity i.e., 1km radius of the Site, as described in Section 2.8 of this EIAR, have been considered within this cumulative impact assessment. A list of projects considered in the cumulative assessment is contained within Appendix 2.3 of this EIAR; In order to avoid repetition within the EIAR, these have not been repeated below.

6.8.2.1 Other Wind Farm Projects

For the purposes of this cumulative assessment wind farms within 25km of the Proposed Development site (in addition to a 1-kilometre radius of the Proposed Development area) have been considered in further detail below. Wind farms occurring at greater distances were considered, however, given the nature of the KERs identified within the EIAR survey area (potential for cumulative effects on birds are considered within Chapter 7 of this EIAR) and that no significant residual effects were identified, further detailed analysis is not provided below.

There are 8 no. wind farm developments operational, consented or proposed, that have been identified due to either an application, a request for pre-application consultation having been lodged or permitted, or proposed wind farm projects identified in the Public Domain within the cumulative study area:

- Pl ref: 5123496 Carrig (operational) – 3 Turbines
- Pl ref: 5123495 Skehanagh (operational) – 5 turbines
- Pl ref: 1544 Meenwuan (operational) – 4 turbines
- ABP-306706-20 Derrinlough (permitted. Pre-construction) – 21 turbines
- 5124325 Ballinlough-Ikerrin (operational) – 3 turbines
- 11510203 Monaincha (operational) – 15 turbines
- EX15011 Leabeg (operational) – 2 turbines
- 14188 Cloghan (operational) – 9 turbines

Further details of these projects are provided within Appendix 2.3 to Section 2 of this EIAR.

6.8.2.1.1 Carrig Wind Farm

The potential for the Proposed Development to result in significant cumulative effects when assessed alongside the Carrig Wind Farm (3 turbines) which is located c. 3.6km south of the proposed turbines within the Wind Farm Site was considered. A search was made on the Tipperary County Council planning document viewer, however, no specific information regarding potential residual effects on ecological receptors was available for this wind farm. However, the following factors limit the potential for significant cumulative effects to result: the nature of the habitats on that site (as reviewed on publicly available aerial photography, namely agricultural grasslands) and the lack of significant residual impacts on biodiversity associated with the Proposed Development when considered on its own.

No potential additive impacts have been identified which would result in the potential for significant cumulative effects with the Proposed Development. Taking into consideration also the fact that no significant residual effects on biodiversity have been identified for the Proposed Development (post mitigation) significant cumulative effects on key ecological receptors are not anticipated.

6.8.2.1.2 Skehanagh

The potential for the Proposed Development to result in significant cumulative effects when assessed alongside the Carrig Wind Farm (5 turbines) which is located c. 3.6km southeast of the proposed turbines within the Wind Farm Site was considered. A search was made on the Tipperary County Council planning document viewer, however, no specific information regarding potential residual effects on ecological receptors was available for this wind farm. However, the following factors limit the potential for significant cumulative effects to result: the nature of the habitats on that site (as reviewed on publicly available aerial photography, namely agricultural grasslands) and the lack of significant residual impacts on biodiversity associated with the Proposed Development when considered on its own.

No potential additive impacts have been identified which would result in the potential for significant cumulative effects with the Proposed Development. Taking into consideration also the fact that no significant residual effects on biodiversity have been identified for the Proposed Development (post mitigation) significant cumulative effects on key ecological receptors are not anticipated.

6.8.2.1.3 Meenwuan

The potential for the Proposed Development to result in significant cumulative effects when assessed alongside the Meenwuan Wind Farm was considered. A search was made on the Offaly County Council planning document viewer and the Ecology Chapter of the EIAR¹⁹ was consulted.

No potential additive impacts have been identified which would result in the potential for significant cumulative effects with the Proposed Development. Taking into consideration also the fact that no significant residual effects on biodiversity have been identified for the Proposed Development (post mitigation) significant cumulative effects on key ecological receptors are not anticipated.

6.8.2.1.4 Derrinlough Wind Farm

The potential for the Proposed Development to result in significant cumulative effects when assessed alongside the Derrinlough Wind Farm project, which is located 12.5km northeast of the proposed turbines within the Wind Farm Site was considered. The planning file was reviewed on the ABP case viewer and the EIAR²⁰ for the project consulted. The Biodiversity Chapter to the EIAR concluded that there will be no residual impacts on biodiversity as a result of the development. Based on the information available in the Derrinlough Wind Farm EIAR, significant cumulative impacts in combination with the Proposed Development are not anticipated.

No potential additive impacts have been identified which would result in the potential for significant cumulative effects with the Proposed Development. Taking into consideration also the fact that no significant residual effects on biodiversity have been identified for the Proposed Development (post mitigation) significant cumulative effects on key ecological receptors are not anticipated.

6.8.2.1.5 Ballinlough-Ikerrin

The potential for the Proposed Development to result in significant cumulative effects when assessed alongside the Ballinlough-Ikerrin Wind Farm project (3 turbines), which is located 24km south of the

¹⁹ Fehily Timoney 2015

²⁰ MKO (2020), Environmental Impact Assessment, Derrinlough Wind Farm, County Westmeath.

proposed turbines within the Wind Farm Site was considered. A search was made on the Tipperary County Council planning document viewer, however, no specific information regarding potential residual effects on ecological receptors was available for this wind farm. However, the following factors limit the potential for significant cumulative effects to result: the nature of the habitats on that site (as reviewed on publicly available aerial photography, namely agricultural grasslands) and the lack of significant residual impacts on biodiversity associated with the Proposed Development when considered on its own.

No potential additive impacts have been identified which would result in the potential for significant cumulative effects with the Proposed Development. Taking into consideration also the fact that no significant residual effects on biodiversity have been identified for the Proposed Development (post mitigation) significant cumulative effects on key ecological receptors are not anticipated.

6.8.2.1.6 **Monaincha**

The potential for the Proposed Development to result in significant cumulative effects when assessed alongside the Monaincha Wind Farm project (15 turbines), which is located 22km southeast of the proposed turbines within the Wind Farm Site was considered. A search was made on the Tipperary County Council planning document viewer, however, no specific information regarding potential residual effects on ecological receptors was available for this wind farm. However, the following factors limit the potential for significant cumulative effects to result: the separation in hydrological catchment and distance, and the lack of significant residual impacts on biodiversity associated with the Proposed Development when considered on its own.

No potential additive impacts have been identified which would result in the potential for significant cumulative effects with the Proposed Development. Taking into consideration also the fact that no significant residual effects on biodiversity have been identified for the Proposed Development (post mitigation) significant cumulative effects on key ecological receptors are not anticipated.

6.8.2.1.7 **Leabeg Wind Farm**

The potential for the Proposed Development to result in significant cumulative effects when assessed alongside the Leabeg Wind Farm project which is located c. 25km northeast of the proposed turbines within the Wind Farm Site was considered. No specific information regarding potential residual effects on ecological receptors was available for this wind farm on the Offaly County Council website. However, the following factors limit the potential for significant cumulative effects to result: the nature of the habitats on that site (as reviewed on publicly available aerial photography, agricultural grassland), the small size of the development (2 turbines), the separation in hydrological catchment and distance and the lack of significant residual impacts on biodiversity associated with the Proposed Development when considered on its own.

No potential additive impacts have been identified which would result in the potential for significant cumulative effects with the Proposed Development. Taking into consideration also the fact that no significant residual effects on European Sites have been identified for the Proposed Development (post mitigation) significant cumulative effects on key ecological receptors are not anticipated.

6.8.2.1.8 **Cloghan Wind Farm**

The potential for the Proposed Development to result in significant cumulative effects when assessed alongside the Cloghan Wind Farm project, which is located 17km to the northeast of the proposed turbines within the Wind Farm Site, was considered. The planning file was reviewed on the Offaly County Council planning viewer and the EcIA²¹ for the project consulted. The EcIA did not conclude any significant impacts on biodiversity. Based on the information available in the Cloghan Wind Farm

²¹ *Ecofact Environmental Consultants (2014), Ecological Impact Assessment, Cloghan Wind Farm.*

EcIA, significant cumulative impacts in combination with the Proposed Development are not anticipated.

No potential additive impacts have been identified which would result in the potential for significant cumulative effects with the Proposed Development. Taking into consideration also the fact that no significant residual effects on European Sites have been identified for the Proposed Development (post mitigation) significant cumulative effects on key ecological receptors are not anticipated.

6.8.2.2 Non-Renewable Energy Developments

Appendix 2.3 of this EIAR lists non-renewable energy development existing and approved projects as well as planning applications pending a decision within approximately 1km of the proposed locations of turbines within the Proposed Development in relation to Biodiversity (and within river sub basins in relation to Water, see Section 9.5.7, Chapter 9 of this EIAR). Here a 1km distance from the proposed Wind Farm development has been considered for operational and construction purposes as an appropriate buffer to identify potential sensitive receptors and cumulative projects in the non-renewable energy category that should be considered in the context of the Proposed Development. This distance was considered to be proportional to the likely zone of influence of the developments listed below, which are relatively small-scale. Smaller projects within river sub basins have been considered specifically in relation to potential for cumulative effects on designated sites.

A review of all projects (existing and permitted) within 200 meters of the Grid Connection route has also been completed. Given the narrow nature of the underground electrical cabling route trench (~0.6m wide), the 200 meter distance from the Grid Connection route reflects a generous and conservative range in terms of identifying permissions which may have the potential for cumulative effects having regard to the nature of the Grid Connection works (i.e. construction and operation of underground cabling) in relation to Biodiversity and Water. Appendix 2.3, Chapter 2 of this EIAR lists those existing and approved projects as well as planning applications pending a decision identified within 200 meters of the Grid Connection works.

A total of 29 planning applications have been identified within 1km of the Wind Farm Site and within the sub-basin zone, and within 200m of the underground electrical cabling connection route. More than 75% of these applications are for new dwellings or renovations of existing dwellings, as well as for the erection of farm buildings. Three applications are residential developments of 16, 18 and 40 units. The other non-dwelling/farm related planning applications the installation of approximately 8 kilometres of underground electricity line with a capacity of up to 38kv from the permitted (wind farm) substation (19555). A project listed on the Pollutant Release & Transfer Register (PRTR) located adjacent to the Proposed Development site includes Sharragh pig farm (P0437-02).

Two EIA projects were identified on the EIA portal. These include the adjacent Sharragh pig farm and the construction of 3 pig houses and 1 pig loading bay (EIA portal ID 2018068) The other related to Gurteen Agricultural College and the construction of a reinforced concrete underground storage tank, concrete access road, pumped irrigation system and all associated facilities and site works. The tank will be used for the storage of waste products from agriculture, horticulture, aquaculture, forestry, hunting and fishing (EIA portal ID 2017007).

The planning applications have been reviewed based on their type, scale and proximity to the proposed Wind Farm Site. Based on the scale of the works, their proximity to the Proposed Development and the temporal period of likely works, no cumulative effects will occur as a result of the Proposed Development.

6.8.2.3 Existing Habitats and Land Uses

The potential for the Proposed Development to result in a cumulative loss or deterioration of habitats, or impact on the KER species identified, was considered in relation to the existing land uses in the area.

The Proposed Development is located primarily on cutover bog (PB4), conifer forestry (WD4) and improved agricultural grassland (GA1) habitats. The loss of hedgerow, treeline and broadleaved woodland will be mitigated through habitat enhancement and replanting proposed as part of this development. Adjacent peatland habitats to the Proposed Development site are designated as NHAs and SACs with active restoration works ongoing on the peatland habitats within. As shown in Section 6.7.5, there will be no impacts on the condition of peatlands within the designated sites. As shown in Section 6.7.2.1.2, there will be no significant impact on the potential for restoring adjacent areas of cutover bog within the development site in the future and the Applicant is committed to offering compensation to turbary rights holders within the development site to prevent further degradation. However, as there is a potential for a moderate negative impact at the local level due to the loss of cutover bog (PB4) and woodland habitats for the Proposed Development, a potential for cumulative impact with regard to turbary activities on adjacent habitats exists.

6.8.3 Assessment of Cumulative Effects

The Proposed Development has been considered cumulatively with other plans and projects as described in Sections 6.8.1 and 6.8.2. Particular focus has been placed on those plans and projects that are in closest proximity to the Proposed Development and those that could be potentially affected via downstream surface water.

Following the detailed surveys undertaken and impact assessment provided in Section 6.7, it is concluded that there will be no significant residual disturbance, deterioration of water quality, faunal habitat loss associated with the Proposed Development and therefore it cannot contribute to any cumulative effect when considered in combination with other plans and projects. The other wind farms in the area were considered (among other projects) but the Proposed Development has been deliberately designed to minimise the effects on biodiversity through the siting of the Proposed Development on habitats of low ecological value. Following bespoke mitigation there will be no significant residual impacts on ecological receptors associated with the Proposed Development and therefore no potential for individual or cumulative negative effects on biodiversity are likely to occur.

No significant residual effects as a result of the Proposed Development in relation to disturbance, displacement or mortality of faunal species has been identified. Therefore, there is no potential for the Proposed Development to contribute to any cumulative effect in this regard.

However, it has been concluded that there is a potential for a residual moderate negative impact as a result of the loss of cutover bog (PB4) and woodland habitats. As such, there is a potential for cumulative impact at the local scale when considered in-combination with adjacent land uses. Significant effects not anticipated at the County scale.



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