6. BIODIVERSITY

6.1 Introduction

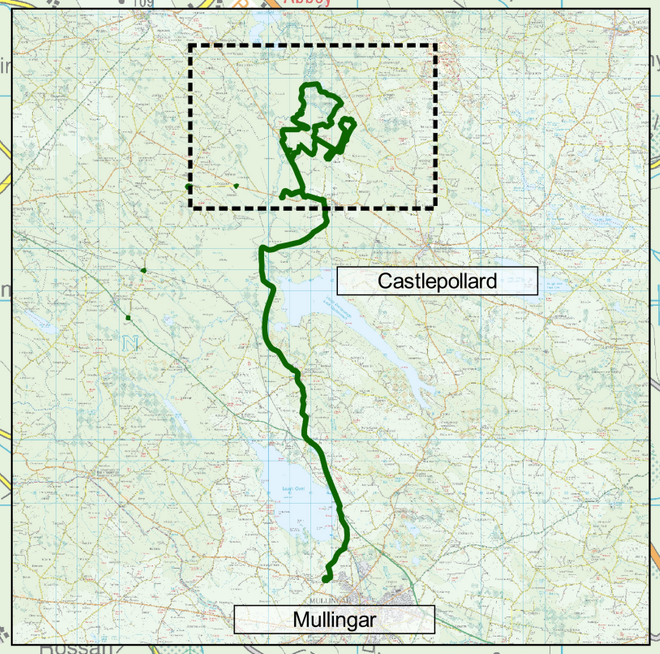
This chapter assesses the likely significant effects (both alone and cumulatively with other projects) that the Proposed Development may have on Biodiversity, Flora and Fauna and sets out the mitigation measures proposed to avoid, reduce or offset any potential significant effects that are identified. 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 1976-2019 and EU Habitats Directive 92/43/EEC. The full description of the Proposed Development is provided in Chapter 4 of this EIAR. Impacts on avian receptors are considered in Chapter Seven 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 projects are fully assessed.
- Proposed mitigation and best practice measures to avoid, reduce or offset 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 defines terms utilised in this chapter:

- For the purposes of this EIAR, the entire project is referred to as 'the Proposed Development'.
- For the purpose of this EIAR, the term 'EIAR Site Boundary' refers to the entire area of the windfarm, the grid connection route, the link road and works along the turbine delivery route as shown in Figure 6-1.
- "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.



Map Legend

EIAR Site Boundary

Drawing Title: Site Location

Project Title: Coole Wind Farm, Co. Westmeath

Drawn By	Checked By
HW	LK
Project No.	Drawing No.
200445	Figure 3-1
Scale	Date
1:30000	2021.01.27

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6.2 Requirements for Ecological Impact Assessment

National Legislation

The Wildlife Act, 1976–2018, 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 designated[1] 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, 2015 (S.I. No. 356 of 2015) 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. Under Flora Protection Order.

It 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 a 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 23 January 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"

Such policies have informed the evaluation of ecological features recorded within the study area and the ecological assessment process.

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 Scoping/Review of Relevant Guidance and Sources of Consultation

The assessment methodology is based primarily upon the National Road Authority (NRA or TII)'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 is based on 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 provide the scope, structure and content of the assessment:

- Guidelines for Ecological Impact Assessment in the UK and Ireland. Terrestrial, Freshwater and Coastal (CIEEM, 2018).

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).
- Planning and Development Acts 2000 – 2019.

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:

- Westmeath County Development Plan 2014 – 2020.
- Draft Westmeath County Development Plan 2021 -2027
- Natura Impact Report on the Westmeath County Development Plan, Westmeath County Council, (2014).

6.3.1 Statement of Authority

This report has been prepared by John Hynes (BSc., MSc., MCIEEM) and Laoise Kelly (BSc., MCIEEM) and reviewed by Pat Roberts (B.Sc. Environmental Science, MCIEEM). Pat has over 14 years' experience in ecological management and assessment. John Hynes has over 10 years' professional ecological consultancy experience Laoise Kelly has over 6 years' professional ecological consultancy experience and both are full members of the Chartered Institute of Ecology and Environmental Management. The baseline ecological surveys were undertaken by John Hynes B.Sc. (Env.) M.Sc MCIEEM, Pat Roberts B. Sc. Env, MCIEEM, Pamela Boyle (PhD), Dr. Una Nealon (PhD), Laoise Kelly B.Sc. (Env.), MCIEEM and Susan Doyle B.Sc. (Env.) M.Sc (Eco). All surveyors have relevant academic qualifications and are competent experts in undertaking habitat and ecological assessments to this level.

6.4 Methodology

The following sections describe the methodologies followed to establish the baseline ecological condition of the Proposed Development site and surrounding area. 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).

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 existing information obtained during the application made as part of the permitted Coole Wind Farm in 2017.
- Review of online web-mappers: National Parks and Wildlife Service (NPWS), EPA (Envision), Water Framework Directive (WFD) and Inland Fisheries Ireland (IFI).
- Data on potential occurrence of protected bryophytes – as per NPWS online map viewer; Flora Protection Order Map Viewer – Bryophytes[2].
- Review of the publicly available National Biodiversity Data Centre (NBDC) web-mapper
- Inland Fisheries Ireland (IFI) Reports, where available.
- Records from the NPWS Rare and Protected Species Database for the hectads in which the Proposed Development is located.

[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: 26/06/2019.*

6.4.2 Scoping and Consultation

MKO undertook a scoping exercise during preparation of this EIAR, as described in Chapter 2, Section 2.6 of this EIAR.

Copies of all scoping responses are included in Appendix 2-2 of this EIAR. The recommendations of the consultees have informed the EIAR preparation process and the contents of this chapter. Table 2-3 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, and notes where scoping responses were received.

Table 6-1 Organisations consulted with regard to biodiversity

Consultee	Response
An Taisce	No response received to date
Bat Conservation Ireland	No response received to date
BirdWatch Ireland	No response received to date
Department of Agriculture, Food and the Marine	Response Received on 5th November 2020
Department of Communications, Climate Action & Environment	No response received to date
Forest Service	No response received to date
Irish Wildlife Trust	No response received to date
Geological Survey of Ireland	Response received on 2nd October 2020
Inland Fisheries Ireland	No response received to date
Irish Peatland Conservation Council	No response received to date
Irish Wildlife Trust	No response received to date
Waterways Ireland	No response received to date

6.4.3 Field Surveys

A comprehensive survey of the biodiversity of the entire site was undertaken by MKO on various dates throughout 2016, 2017, 2019 and 2020. 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)

As part of the original Coole Wind Farm application that was granted in 2019, multidisciplinary walkover surveys associated with the windfarm site were undertaken by MKO in March, April, July, August and September 2016. The survey timing falls within the recognised optimum period for

vegetation surveys/habitat mapping, i.e. April to September (Smith et al., 2011). Additional visits were also conducted outside the optimum survey period in March and October 2016 and in March 2017.

Surveys of the wind farm site including the proposed new turbine locations, 14 and 15, and the proposed grid connection route were carried out on the 21st of November and 16th of December 2019 and the 31st of July and 23rd October 2020 which covered the optimal survey period. Bat surveys for the wind farm site were carried out by Woodrow Sustainable Solutions over the spring, summer and autumn period in 2020. A visual inspection of the proposed grid connection route for its potential to support bats was carried out in November and December 2019. A bat detector survey in the form of a driven transect of the proposed grid connection route was carried out by MKO on 15th September 2020. These surveys provided up to date baseline data for the wind farm site as well as for the footprint of the new works proposed.

The walkover surveys were 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 in the vicinity of the Proposed Development (e.g. otter etc.).

The multi-disciplinary walkover surveys comprehensively covered the entire study area 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

The extent of each habitat on site was mapped on site using aerial photography, hand held GPS and smartphone technology. A representative photograph was also taken for each of the habitats recorded on site. All habitats recorded on site and described in this EIAR chapter have been classified in accordance with Fossitt (2000) Annex I habitats that occurred outside the development footprint were also noted.

6.4.3.3 Turbine Base and Infrastructure Locations

The locations of turbine bases, hard standing areas, the substation, the site compound, internal roads, link road, turbine delivery route, borrow pit and grid connection route were visited during the multidisciplinary walkover surveys. A list of species recorded onsite is presented in Appendix 6-1 of this EIAR.

Botanical surveys for all turbines, road infrastructure, substation and all other infrastructure were undertaken. These surveys provided an understanding of the baseline and informed further survey work following finalisation of the proposed infrastructure layout. The habitat assessment surveys described in this report have been undertaken with reference to the following guidelines and interpretation documents:

- Perrin, P.M, Martin, J.R., Barron, J.R., Roche & O'Hanrahan, B. (2014) *Guidelines for a national survey and conservation assessment of upland vegetation and habitats in Ireland.* Version 2.0. Irish Wildlife Manuals, No. 79. National Parks and Wildlife Service.

- Cross, J. & Lynn, D. (2013) *Results of a monitoring survey of bog woodland.* Irish Wildlife Manuals, No. 69. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland.
- Fernandez, F., Connolly K., Crowley W., Denyer J., Duff K. & Smith G. (2014) Raised Bog Monitoring and Assessment Survey 2013. Irish Wildlife Manuals, No. 81. National Parks and Wildlife Service, Department of Arts, Heritage and Gaeltacht, Dublin, Ireland.
- Commission of the European Communities (2007) 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 (2013) The Status of EU Protected Habitats and Species in Ireland. Habitat Assessments Volume 2. 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

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).

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).

6.4.3.4 Terrestrial Fauna Surveys

The results of the desk study, scoping replies, incidental records of protected species during ecological survey work and multidisciplinary walkover surveys were used to inform the scope of targeted ecological surveys required. Dedicated surveys for bats, otter and badger were undertaken at the times set out below with the methodologies followed also provided below. Following the completion of ecological walkover surveys, no requirement for further dedicated faunal surveys was identified.

As a part of a previous project a number of terrestrial faunal surveys were carried out over the years 2012-2013 and aided in informing the scope of further surveys undertaken as part of the current application. More information in relation to this is provided in Section 3.3.1 of Chapter 3 of the EIAR. Faunal records identified during these surveys were taken into account as part of this assessment.

6.4.3.4.1 *Badger Survey*

Following a review of the previously completed ecological surveys carried out in 2012 and 2013, areas identified as providing potential habitat for Badger and previously identified activity locations were subject to specialist targeted survey. The best time for undertaking Badger surveys is between November and April, when vegetation cover is reduced, the Badger survey conducted in September 2016 was not constrained by vegetation (NRA 2006a). Dedicated Badger surveys were conducted in March, April and September 2016. Further surveys were carried out in 2019 and 2020.

The Badger survey was conducted in order to determine the presence or absence of Badger signs within and outside (areas of identified suitable habitat) the development footprint and study area. This involved a search for all potential Badger signs as per NRA (2009) (latrines, badger paths and setts). Setts were classified as per the convention set out in NRA (2009) (i.e. Main, Annexe, Subsidiary, Outlier).

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 CIEEM best practice competencies for species surveys (CIEEM, 2013[3]).

6.4.3.4.2 *Otter Survey*

Following a review of the previously completed ecological surveys carried out in 2012 and 2013and 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 in March, April and September 2016. Further surveys were carried out in 2019 and 2020.

The Otter survey was 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. Threat Response Plan: Otter (2009-2011).

The dedicated otter survey 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).

6.4.3.5 Bat Surveys

Bat Surveys for the permitted Coole Wind Farm site were designed in accordance with Bat Conservation Ireland's *"Wind Turbine/Wind Farm Development: Bat Survey Guidelines"*. All available data was used in the assessment of potential effects of the development on bats. Bat surveys were undertaken by Aardwolf Wildlife Surveys within the site and the surrounding area in summer, autumn and winter 2013. Additional bat surveys, focusing on the Proposed Development site, were undertaken by MKO in spring, summer and autumn 2016. The assessment of potential effects of the Proposed Development on bats was informed by:

- A desktop study included a review of published and unpublished information, including previous survey reports and data.
- An assessment of habitats and landscape within the site and the surrounding area. Results from the desktop review and walkover surveys were used to assess habitats for their suitability to support foraging and commuting bats, and roosting bats, according to Collins (2016). Suitability categories, divided into *High*, *Moderate, Low* and *Negligible*.
- A search for new roosts within structures and trees within 200m of the developable area. Potential roosts were searched for potential access points, roosting locations and any evidence of bats, including live and dead specimens, droppings, feeding remains, urine splashes, fur oil staining and noises.
- Manual transects comprising walked transects at dusk and at dawn recording bats in real time. Surveys were undertaken in June, August, September and October 2013 and in April, July, August and October 2016.

[3] *CIEEM, 2013, Technical Guidance Series – Competencies for Species Survey, Online, Available at: https://cieem.net/resource/competencies-for-species-survey-css/ Accessed: 20.06.2019*

As of 2019 the appropriate methodological approach for assessing bat population on proposed wind farm sites is "Bats and Onshore Wind Turbines: Survey, Assessment and Mitigation (SNH et al., 2019)". This updated approach required a new method of surveying which was undertaken by Woodrow Sustainable Solutions and a full report is provided in Appendix 6-2. In compliance with SNH et al. (2019), static bat recording equipment was deployed three times at selected locations representative of the proposed turbine layout for the Proposed Development. The three deployments each lasting a minimum of 10 nights covered the spring, summer and autumn active season for bats and were undertaken in conjunction with continuous monitoring of climatic conditions on the site to ensure recording windows were inline within compliant weather parameters. An assessment of potential bat roost features adjacent to the Proposed Development was completed, along with roost emergence surveys and bat activity transects.

In addition, a bat survey of the proposed grid connection route was also undertaken in the form of a visual inspection on the 21st of November and 16th of December 2019. A driven transect was also carried out on 15th September 2020 in accordance with BCT (2007) guidelines. All bridge crossings were assessed for their potential to support bat roosts. Trees along the proposed grid connection route were visually assessed for their potential to support roosting bats with suitability categories, divided into *High*, *Moderate, Low* and *Negligible* (Collins, 2016). The driven transect was carried out 30 minutes before sunset to 2 hours after sunset on 15th September 2020. The transect was driven along a predefined route following the proposed grid connection route at a steady speed of 20-25 kph, continually recording bat sounds with a detector mounted out of the window on the hedgerow/treeline side of the vehicle. The transect was driven with dipped headlights, with one ecologist driving, and another ecologist recording bat activity. The surveyors were equipped with an active full spectrum bat detector, the Batlogger M bat detector (Elekon AG, Lucerne, Switzerland), and all bat activity was recorded for subsequent analysis to confirm species identifications.

The full bat report prepared by Woodrow Sustainable Solutions carried out in 2020 in relation to the wind farm site is provided in Appendix 6-2. Results in relation to the grid connection route survey are provided in Section 6.5.2.5.1 of this chapter.

A submission from the DAU for the now permitted Coole Wind Farm was issued on the 12th December 2017. As part of the response to this submission, surveys at height were undertaken by MKO in autumn 2017 and spring, summer and autumn 2018. One Song Meter SM3BAT detector (Wildlife Acoustics, Maynard, MA, USA) was installed at the meteorological mast (IG Ref: E240666 N 274363) in September 2017. The detector was equipped with two microphones; one at ground level and one at height (approx. 75 m above ground level). The detector was set to record for at least 10 consecutive nights per month between September and October 2017 inclusive. Monitoring was resumed in April 2018, when detectors were set for at least 5 consecutive nights per month between April and October 2018. All recordings were later analysed using bat call analysis software, Kaleidoscope Converter and Viewer, v.5.1.3 (Wildlife Acoustics, Maynard, MA, USA). Bat species were identified using established call parameters, to identify individual species or genera. A bat pass was defined as a recording of an individual species/species group's echolocation containing at least two echolocation pulses and of maximum 15s duration. A Further Information request for this data was not issued and these results were not reported. For reference, this report has been provided as Appendix 6-3.

6.4.3.5.1 Aquatic surveys

Ecofact Environmental Consultants were commissioned to undertake aquatic surveys of watercourses within and in proximity to the Coole site. The Aquatic Survey Report provides an overview of the habitats and plants, fish, aquatic macroinvertebrates and biological and chemical water quality at each of the 8 sampling locations. A description of site location, physical characteristics, habitats, vegetation community, macroinvertebrate community, biological water quality, chemical water quality and species specific

survey results are detailed on a site by site basis. Surveys were undertaken in June 2016. The relevant extracts from the Aquatic Survey Report are provided as Appendix 6-4 of this EIAR.

Of the eight sampling locations, seven (Sites 1, 2, 3, 5, 6, 7 & 8) are pertinent to the Proposed Development. Sampling location 4 was located on the Mayne river and has no hydrological connectivity with the Proposed Development. Sample locations 1-3 are located on the River Inny downstream of the Proposed Development.

The above surveys provide a baseline assessment with regard to 13 out of the proposed 15 turbines. Additional surveys were undertaken to provide a similar baseline assessment in respect of watercourse crossings associated with the proposed grid connection route and T14 and T15 turbines. These assessments were undertaken by MKO in 2019 and 2020. This comprised a visual assessment of the character of the watercourse, associated vegetation and connectivity with other watercourses and/or sites of interest downstream.

6.4.3.5.2 *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).

6.4.3.5.3 *Survey limitations*

Seasonal factors that affect distribution patterns and habits of species were taken into account when conducting the surveys. The potential of the site to support certain populations (in particular those of conservation importance that may not have been recorded during the field survey due to their seasonal absence or nocturnal/cryptic habits) was assessed.

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, initial site visits (main ecological surveys of the site undertaken in March, April, July, August, September and October 2016, March 2017, 21st of November and 16th of December 2019 and the 31st of July and 23rd October 2020) and stakeholder consultation; "Target receptors" likely to occur in the zone of influence of the Proposed 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 1976-2019
- Species protected under the Flora Protection Order 2015

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 ecological effects of the impacts that may occur as a result of the Proposed Development are characterised as per the CIEEM 'Guidelines for Ecological Impact Assessment in the UK and Ireland' (2018). 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 2017). 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 draft Guidelines on information to be included in Environmental Impact Assessment Reports (EPA, 2017) 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 Draft EPA Guidelines (2017) as shown in Table 6-2.

Table 6-2 Criteria for determining significance of effect, based on (EPA, 2017) guidelines

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

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 6.5 of this EIAR assesses the potential effects of the Proposed Development to ensure that all effects on sensitive ecological receptors are adequately addressed. Where significant effects on sensitive ecological receptors are predicted, mitigation is incorporated into the project design or layout to address such impacts. The implemented mitigation measures avoid, 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 and over 4 years; provides an accurate prediction of the likely ecological effects of the Proposed Development; 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

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 of the ecology known to occur in the existing environment. Material reviewed includes the Site Synopses for designated sites within the zone of influence, as 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 6.6.2 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 EcIA.

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 EcIA.

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 03/03/2020. The datasets

were utilised to identify Designated Sites which could feasibly be affected by the Proposed Development.

- All designated sites within a distance of 15km surrounding the development site were identified. In addition, the potential for connectivity with European or Nationally designated sites at distances of greater than 15km from the Proposed Development was also considered in this initial assessment.
- A map of all the European Sites within 15km is provided in Figure 6-2 with all Nationally designated sites shown in Figure 6-3.
- 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 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 Table 6-3 03/03/2020.

Where potential pathways for Significant Effect are identified, the site is included within the Likely Zone of Impact and further assessment is required.

Map Legend

- EIAR Site Boundary
- 15km Buffer from Site
- Special Area of Conservation (SAC)
- Special Protection Area (SPA)
- WFD Catchments
- EPA Mapped Watercourses

Erne
Upper Shannon
Upper Shannon
Upper Shannon
Lower Shannon
Boyne
Newry, Fane, Glyde and Dee

Clooneen Bog SAC
Ballykenny-Fisherstown Bog SPA
Lough Forbes Complex SAC
Brown Bog SAC
Ardagullion Bog SAC
Mount Jessop Bog SAC
Fortwilliam Turlough SAC
Lough Ree SAC
Lough Ree SAC
Carn Park Bog SAC
Crosswood Bog SAC
River Shannon Callows SAC
Middle Shannon Callows SPA
Ballymore Fen SAC
Split Hills And Long Hill Esker SAC
Garriskil Bog SAC
Garriskil Bog SPA
Glen Lough SPA
Glen Lough SPA
Lough Iron SPA
Lough Derravaragh SPA
Scragh Bog SAC
Lough Owel SAC
Lough Owel SPA
Wooddown Bog SAC
Lough Ennell SPA
Lough Ennell SAC
Lough Sheelin SPA
Lough Sheelin SPA
Lough Sheelin SPA
Lough Kinale and Derragh Lough SPA
Moneybeg And Clareisland Bogs SAC
Moneybeg And Clareisland Bogs SAC
Lough Kinale and Derragh Lough SPA
Derragh Bog SAC
White Lough, Ben Loughs And Lough Doo SAC
White Lough, Ben Loughs And Lough Doo SAC
Lough Bane And Lough Glass SAC
Lough Bane And Lough Glass SAC
Lough Lene SAC
River Boyne And River Blackwater SAC
River Boyne And River Blackwater SAC
River Boyne and River Blackwater SPA
River Boyne and River Blackwater SPA
Killyconny Bog (Cloghbally) SAC
River Boyne And River Blackwater SAC
Girley (Drewstown) Bog SAC
Mount Hevey Bog SAC

Drawing Title: 15km Buffer to EU Designated Sites
Project Title: Coole Wind Farm, Co. Westmeath
Drawn By: HW
Checked By: LK
Project No.: 200445
Drawing No.: Figure 6-2
Scale: 1:200000
Date: 2021.01.27

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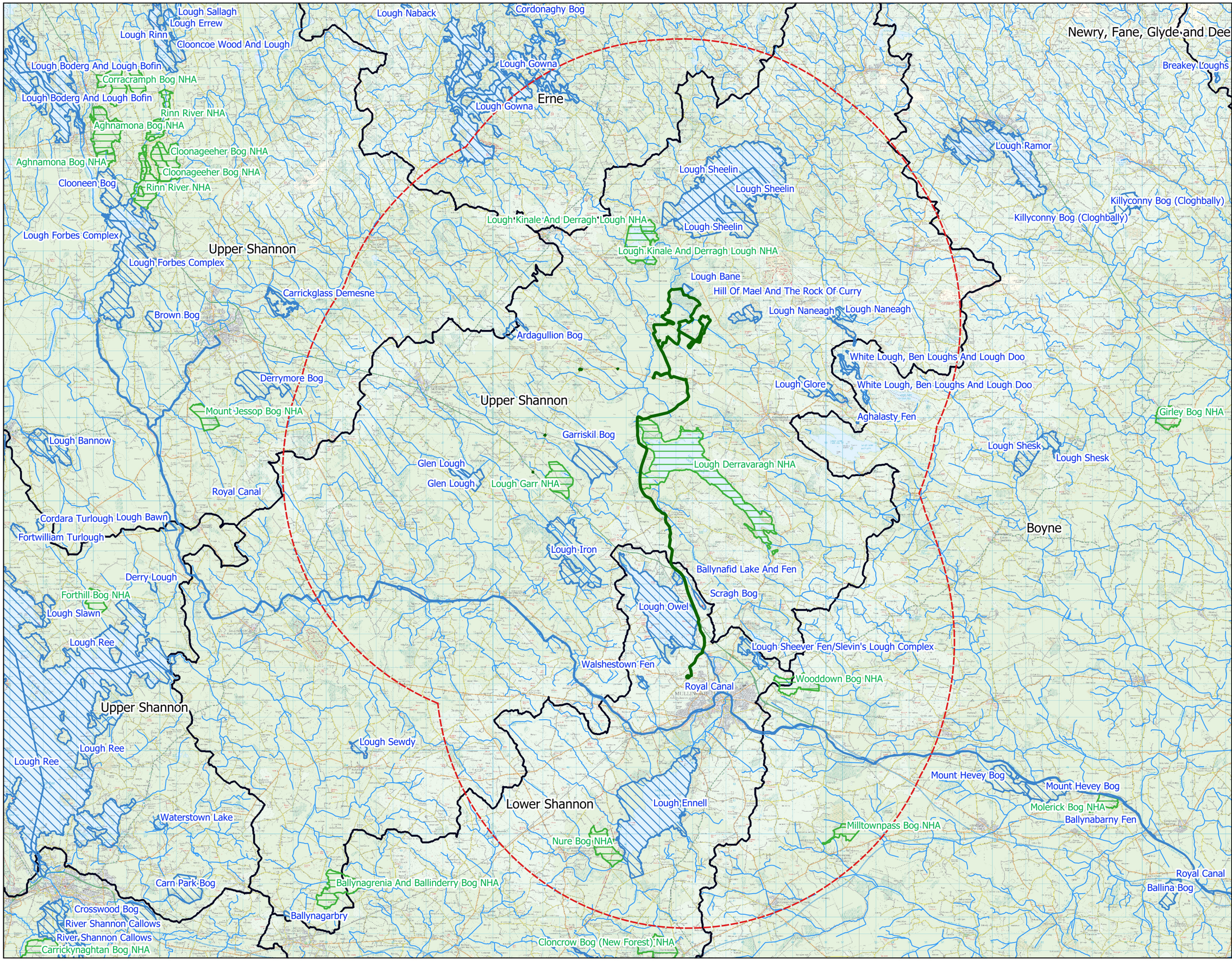

Map Legend

- EIAR Site Boundary
- 15km Buffer from Site
- Natural Heritage Area (NHA)
- Provisional Natural Heritage Area (pNHA)
- WFD Catchments
- EPA Mapped Watercourses

Drawing Title: 15km Buffer to Nationally Designated Sites	
Project Title: Coole Wind Farm, Co. Westmeath	
Drawn By: HW	Checked By: LK
Project No.: 200445	Drawing No.: Figure 6-3
Scale: 1:200000	Date: 2021.01.27

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Table 6-3 Identification of European and Nationally designated sites within the Likely Zone of Impact

Designated Site	Distance from Proposed Development (km)	Likely Zone of Impact Determination
Special Areas of Conservation		
Lough Owel SAC (000688)	Grid connection route is located within the existing N4 corridor along the boundary of the European Site 12.5km from the wind farm site	Potential for impacts on: › Lough Owel SAC (000688) › Lough Ennell SAC (000685) are identified in the AASR and are assessed in full in the Natura Impact Statement.
Lough Ennell SAC (000685)	4.2km the grid connection route 24km from the wind farm site	
Garriskil Bog SAC (000679)	0.06km east of the grid connection route 4.5km from wind farm site	Given the nature and scale of the proposed works, the location of the designated site and the nature of the QI habitats, these SACs are not identified as occurring within the Likely Zone of Impact.
Scragh Bog SAC (000692)	0.3km east of the grid connection route 14.4km from wind farm site	
Derragh Bog SAC (002201)	2.4km north of the wind farm site. 4.9km from the grid connection route.	No complete impact source-pathway receptor chain was identified between the proposed works and these SACs. These SACs are identified as not occurring within the Likely Zone of Impact.
Moneybeg and Clareisland Bogs SAC	3.1km from wind farm site 6.1km from the grid connection route	
Ardagullion Bog SAC (002341)	3.7km from the proposed junction works in Boherquill 7.4km from the wind farm site	
Wooddown Bog SAC (002205)	5.8km from the grid connection route 20.7km south east of the wind farm site	
Lough Lene SAC (002121)	7.5km from the grid connection route 8.5km from the wind farm site	
White Lough, Ben Loughs and Lough Doo SAC (001810)	8.0km from the wind farm site	

Designated Site	Distance from Proposed Development (km)	Likely Zone of Impact Determination
	9.2km from the grid connection route	
Lough Bane and Lough Glass SAC (002120)	10.7km from the wind farm site 11.4km from the grid connection route	
River Boyne and River Blackwater SAC (002299)	12.7km from the grid connection route 14.4km from the wind farm site boundary	
Special Protection Areas		
Lough Owel SPA (004047)	Grid connection route is located within the existing N4 corridor along the boundary of the European Site. 12.5km from the wind farm site	Potential for impacts on: › Lough Owel SPA (004047) › Lough Ennell SPA (004044) › Lough Derravarragh SPA (004043) › Lough Iron SPA (004046) are identified in the AASR and are assessed in full in the Natura Impact Statement.
Lough Ennell SPA (004044)	4.5km from the grid connection route 24.3km from the wind farm site	
Lough Derravarragh SPA (004043)	0.07km from the grid connection route 4.8km from the wind farm site	
Lough Iron SPA (004046)	3km from the proposed junction works in Joanstown and 4.3km from the proposed grid connection route 11.4km from the wind farm site	
Garriskil Bog SPA (004102)	1.4km from the grid connection route 7.2km from the wind farm site	No complete impact source-pathway receptor chain was identified between the proposed works and these SPAs These SPAs are not identified as occurring within the Likely Zone of Impact.
Lough Kinale and Derragh Lough SPA (004061)	1.8km from the wind farm site 4.4km from the grid connection route	
Glen Lough SPA (004045)	3.3km from the proposed junction works in Joanstown. and 9.7km from the proposed grid connection route.	

Designated Site	Distance from Proposed Development (km)	Likely Zone of Impact Determination
	13.5 from the wind farm site	
Lough Sheelin SPA (004065)	3.9km from wind farm site 7.8km from the grid connection route	
Natural Heritage Areas		
Lough Derravaragh NHA	Grid connection route is located within the existing road corridor along the boundary of the NHA 4.3km from the wind farm site	The proposed grid connection occurs adjacent to the NHA. In addition, there is hydrological connectivity between the NHA and the main windfarm site. There is potential for effects in relation to surface water emissions. Impacts on this designated site will be considered under the SPA designation The NHA is **within the Likely Zone of Impact.**
Lough Garr NHA	0.7km from the grid connection route 9.2km southwest of the wind farm site	The designated sites is located upstream in the surface water catchment. No potential pathways for impacts were identified.
Lough Kinale and Derragh Lough NHA	1.7km northwest of the wind farm site 5km from the grid connection route	The NHA occurs upstream of the Proposed Development. No pathways by which the Proposed Development could affect this NHA were identified.
Wooddown Lough NHA	4.5km from the grid connection route 20.3km south of the wind farm site	No pathways by which the Proposed Development could affect this NHA were identified during the assessment
Nure Bog NHA	10.2km from the grid connection 28.9km south of the wind farm site	No pathways by which the Proposed Development could affect this NHA were identified during the assessment
Milltownpass Bog NHA	12.6km from the grid connection route 29.9km southwest of the nearest turbine	No pathways by which the Proposed Development could affect this NHA were identified during the assessment
Proposed Natural Heritage Area (pNHA)		
Lough Bane (001721)	Located adjacent to the north of the wind farm site, 10m from the nearest road infrastructure and 50m from the nearest turbine	This pNHA is located up-gradient of the Proposed Development. There will be no direct effects and there is no potential for indirect effects in relation

Designated Site	Distance from Proposed Development (km)	Likely Zone of Impact Determination
		to this site with regard to emissions given the lack of hydrological connectivity.
Royal Canal (002103)	The grid connection route traverses the pNHA in an existing road bridge. The pNHA is located 17.7km south of the nearest turbine	There is potential for effects in relation to surface water emissions. As a result, the pNHA is considered to be **within the Likely Zone of Impact.**
Ballynafid Lake and Fen (000673)	Within the national N4 road along the boundary of the pNHA and 13.2km south of the nearest turbine	There is potential for effects in relation to surface water emissions. As a result, the pNHA is considered to be **within the Likely Zone of Impact.**
Lough Owel (000688)	Located adjacent to the south of the grid connection route and 12.5km south of the nearest turbine	The proposed grid connection occurs adjacent to the pNHA. There is potential for effects in relation to surface water emissions. Impacts on this designated site will be considered under the European designation within the NIS. As a result, the pNHA is considered to be **within the Likely Zone of Impact.**
Scragh Bog (000692)	0.3km from the grid connection route and 14.4km of the nearest turbine	No potential for impact on this pNHA has been identified and it is not within the Zone of likely Impact.
Hill of Mael and the Rock of Curry (000681)	1.1km east of the nearest turbine and 4.4km from the grid connection route	No potential for impact on this pNHA has been identified and it is not within the Zone of likely Impact.
Garriskil Bog (000679)	1.4km from the grid connection route and 7.2km south-west of the nearest turbine	No potential for impact on this pNHA has been identified and it is not within the Zone of likely Impact.
Lough Sheever Fen/ Slevin's Lough complex	2km from the grid connection route and 17.6km south of the nearest turbine	No potential for impact on this pNHA has been identified and it is not within the Zone of likely Impact.
Walshestown Fen (001731)	2.3km from the grid connection route and 19.7km south of the nearest turbine	No potential for impact on this pNHA has been identified and it is not within the Zone of likely Impact.
Glen Lough (001687)	2.9km from the grid connection route and 13km south-west of the nearest turbine	No potential for impact on this pNHA has been identified and it is not within the Zone of likely Impact.
Lough Iron (000687)	3.0km from the proposed junction works in Joanstown, 4.5km from the grid connection route and 11.5km south-west of the nearest turbine	There is hydrological connectivity between the Proposed Development and the pNHA. As this site is also designated as a SPA for a variety of bird species, impacts on this designated site are fully considered under the European designation within the NIS. As a result, the pNHA is considered to be **within the Likely Zone of Impact.**

Designated Site	Distance from Proposed Development (km)	Likely Zone of Impact Determination
Lough Sheelin (000987)	3.1km from the grid connection route and 3.1km north of the nearest turbine	There is no potential for indirect effects with regard to surface water pollution as the Proposed Development site is located downstream of the pNHA with no identifiable pathway for impact.
Ardaguillon Bog (002069)	3.7km from the proposed junction works in Boherquill and 7.6km west of the nearest turbine	No potential for impact on this pNHA has been identified and it is not within the Zone of likely Impact.
Lough Ennell (000685)	4.2km from the grid connection route and 24km south of the nearest turbine	The pNHA is located downstream of the Proposed Development. Taking a precautionary approach, there is potential for effects in relation to surface water emissions. As a result, the pNHA is considered to be **within the Likely Zone of Impact.**
Lough Glore (000686)	6.3km from the grid connection route and 6.6km east of the nearest turbine	There is no potential for indirect effects with regard to surface water pollution as the Proposed Development site is located downstream of the pNHA with no identifiable pathway for impact.
Lough Naneagh (001814)	7km east of the nearest turbines and 10km east of the grid connection route	No potential for impact on this pNHA has been identified and it is not within the Zone of likely Impact.

Due to their proximity, one NHA and five pNHAs are considered to be within the Likely Zone of Impact of the Proposed Development and have been included as a KER, namely:

- Lough Derravarragh NHA
- Ballynafid Lake and Fen pNHA
- Royal Canal pNHA
- Lough Owel pNHA
- Lough Iron pNHA
- Lough Ennell pNHA

Potential for impacts on these nationally designated sites are assessed in Section 6.5.2.6.

6.5.1.2 NPWS Article 17 Reporting

A review of the NPWS Habitat Directive - Article 17 datasets, Irish Semi-Natural Grassland Survey datasets, and National Survey of Native Woodland datasets along with Long Established Woodland dataset was conducted prior to undertaking the multi-disciplinary walkover surveys. Datasets were also consulted in November 2020 to determine if there had been any amendments.

Datasets were downloaded and overlain on the Proposed Development study area. A polygon for the Irish Semi-Natural Grassland Survey also occurs adjacent to the proposed grid connection near the River Inny in Shrubbywood and has been categorized as Annex I *Lowland Hay Meadow* [6510]. Two locations of overlapping habitats Transition Mire [7140], Cladium Fen [7210] and Alkaline Fen [7230] occur in proximity to the proposed grid connection route namely; west of Lough Derravarragh adjacent to the existing road and in association with Ballynafid Lake and Fen pNHA adjacent to the existing road. A

third dataset for Transitions Mires [7140] occurs in association with Scragh Bog SAC. The proposed grid connection works will be confined to the existing road corridor and conifer plantation with no works taking place in any of these adjacent habitats. No Article 17 datasets were located within the remainder of the Proposed Development site 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 2015) had been recorded in the relevant 10km squares in which the study site is situated (N36, N37, N45, N46, N47). Each hectad contains 100 whole one kilometre squares containing terrestrial habitats. Species of conservation concern are given in Table 6-4.

Table 6-4 Species listed designated under the Flora Protection Order or the Irish Red Data Book within Hectads N36, N37, N45, N46, N47

Common Name	Scientific Name	Hectad	Status
Darnel	*Lolium temulentum*	N45	EN
Good-king-Henry	*Chenopodium bonus-henricus*	N36, N47	VU
Meadow barley	*Hordeum secalinum*	N45	FPO, VU
Green-winged orchid	*Orchis morio*	N45, N46, N47	VU
Fragrant agrimony	*Agrimonia procera*	N47	NT
Erect brome	*Bromopsis erecta*	N45	NT
Bald brome	*Bromus racemosus*	N37, N45, N46	NT
Moonwort	*Brotrychium lunaria*	N46	NT
Sheep thistle	*Carduus tenuiflorus*	N45	NT
Slender tufted-sedge	*Carex acuta*	N36, N45	NT
Fibrous tussock-sedge	*Carex appropinquata*	N36, N45, N46	NT
Prickly sedge	*Carex spicata*	N37, N45	NT
Chamomile	*Chamaemelum nobile*	N45	NT
Corn marigold	*Chrysanthemum segetum*	N45	NT
Frog orchid	*Coeloglossum viride*	N45	NT
Slender cottongrass	*Eriophorum gracile*	N45	FPO, NT
Dwarf spurge	*Euphorbia exigua*	N37	NT

Autumn gentian	*Gentianella amarella*	N45, N46	NT
Field gentian	*Gentianella campestris*	N47	NT
Tubular water-dropwort	*Oenanthe fistulosa*	N45	NT
Lesser wintergreen	*Pyrola minor*	N45	NT
Round-leaved wintergreen	*Pyrola rotundifolia subsp. rotundifolia*	N36, N45, N46	NT
Least bur-reed	*Sparganium natans*	N36, N45	NT
Marsh fern	*Thelypteris palustris*	N36, N45	NT
Green field-speedwell	*Veronica agrestis*	N36, N45, N47	NT

6.5.1.4 Bryophytes

A search of the NPWS online data map for bryophytes (NPWS, 2018) was also undertaken with the protected *Hamatocaulis vernicosus* found in Scragh Bog located 300m east of the proposed grid connection route.

6.5.1.5 National Biodiversity Data Centre (NBDC) Records

A search of the National Biodiversity Data Centre (NBDC) website was conducted prior to the commencement of site surveys. This helped to inform the survey effort and provide a baseline of likely species composition in the area. Records of protected fauna recorded from hectads N36, N37, N45, N46 and N47 are provided in Table 6-5.

Table 6-5 NBDC records for species of conservation interest in hectads N36, N37, N45, N46 and N47

Common name	Scientific name	Designation	Hectad
Large white-moss	*Leucobryum glaucum*	HD Annex IV	N36, N37, N46
Marsh fritillary	*Euphydryas aurinia*	HD Annex II	N36, N37, N45, N46
Common frog	*Rana temporaria*	HD Annex V, WA	N36, N37, N45, N46
Leisler's bat	*Nyctalus leisleri*	HD Annex IV, WA	N36, N45
Daubenton's bat	*Myotis daubentonii*	HD Annex IV, WA	N36, N37, N45
Common pipistrelle	*Pipistrellus pipistrellus s.l.*	HD Annex IV, WA	N36, N46
Soprano pipistrelle	*Pipistrellus pygmaeus*	HD Annex IV, WA	N36, N45, N46, N47
Brown long-eared bat	*Plecotus auritus*	HD Annex IV, WA	N46, N47
Otter	*Lutra lutra*	HD Annex II, IV, WA	N36, N37, N45, N46, N47

Pine marten	*Martes martes*	HD Annex V, WA	N36, N37, N45, N46, N47
Freshwater white-clawed crayfish	*Austropotamobius pallipes*	HD Annex II, WA	N36, N45, N46, N47
Varnished hook-moss	*Hamatocaulus vernicosus*	HD Annex II	N45
Desmoulin's whorl snail	*Vertigo moulinsiana*	HD Annex II, WA	N45
Fir clubmoss	*Huperzia selago*	Annex V	N45

HD = EU Habitats Directive; WA = Wildlife Acts (Ireland).

6.5.1.6 Bat Records

Woodrow Sustainable Solutions Ltd. carried out bat surveys for the site and the report is provided in full in Appendix 6-2. The following paragraphs have been taken from the Bat Survey and Impact Assessment Report provided in Appendix 6-2. For the desk-based study, Table 6-6 below lists the bat data received from Bat Conservation Ireland (BCI) for the area extending 10 km out from the wind farm site and shows that five species have been recorded in the environs, including:

- Common pipistrelle *Pipistrellus pipistrellus*
- Soprano pipistrelle *Pipistrellus pygmaeus*
- Leisler's bat *Nyctalus leisleri*
- Brown long-eared bat *Plecotus auritus*
- Daubenton's bat *Myotis daubentonii*

The only Natura 2000 sites designated for bats in Ireland are for lesser horseshoe bats (*Rhinolophus hipposideros*). The area of interest in Co. Westmeath is outside the range for this species; and with the closest Special Areas of Conservation (SACs) being in Co. Mayo, there are no designated sites within the 15km Zone of Influence of the Proposed Development.

A review of the roost records received from BCI (n = 3 records) found that none were located within the wind farm site and all were beyond the Zone of Influence (300m) of the proposed turbine locations. The 2013 bat surveys did not identify bat roosts within the study area (wind farm site plus 200m search buffer) and several roosts were identified in the wider area surrounding wind farm site (Aardwolf, 2013) including:

- *Soprano pipistrelle* maternity roost with 81 bats c. 3.4km from Wind Farm Site
- *Soprano pipistrelle* day roost c.2.2km from Wind Farm Site
- *Brown long-eared bat* night roost c. 3.1 km from Wind Farm Site
- A mating/lekking site of *Leisler's* bat c. 0.8 km from Wind Farm Site
- Seven potential bat roosts where bat presence was not confirmed

In 2013, no hibernacula were recorded in the study area or in the local area (Aardwolf, 2013).

Table 6-6 BCI Roost Data within 10 km of the Site (Table 3 of Bat Survey and Impact Report)

BCI roost data within 10km of the proposed Coole Application Site			
Roost Data - Roost Surveys			
Name	**Grid reference**	**Species observed**	
Finnea, Co. Westmeath	Confidential; Not provided here – available on request	Unidentified bat – building roost	
Turbotstown, Coole, Co.		Plecotus auritus – building roost	
Westmeath		Pipistrellus pygmaeus	
Roost Data - Transect Surveys			
Name	**Grid reference**	**Species**	
Ballycorkey Bridge Transect	Confidential; Not provided here – available on request	*Myotis daubentonii; Nyctalus leisleri; Pipistrellus pipistrellus* (45kHz); *Pipistrellus pygmaeus; Pipistrellus spp.* (45kHz/55kHz); Unidentified bat	
Ballycorkey Bridge Transect; Spot 2		*Myotis daubentonii*; Unidentified bat	
Ballycorkey Bridge Transect; Spot 1		*Myotis daubentonii*; Unidentified bat	
Ballycorkey Bridge Transect; Spot 3		*Myotis daubentonii*; Unidentified bat	
Ballycorkey Bridge Transect; Spot 4		*Myotis daubentonii*; Unidentified bat	
Ballycorkey Bridge Transect; Spot 5		*Myotis daubentonii*; Unidentified bat	
Ballycorkey Bridge Transect; Spot 6		*Myotis daubentonii*; Unidentified bat	
Ballycorkey Bridge Transect; Spot 7		*Myotis daubentonii*; Unidentified bat	
Coolnagon Bridge Transect		*Myotis daubentonii*; *Pipistrellus spp.* (45kHz/55kHz); Unidentified bat	
Float Bridge Coole Transect		*Myotis daubentonii*; Unidentified bat	
Ad-hoc Observations			
Survey	**Grid reference**	**Species**	**Date**

BATLAS 2010 River Inny, Finnea Bridge, Co. Westmeath	Confidential; Not provided here – available on request	*Myotis daubentonii; Nyctalus leisleri; Pipistrellus pygmaeus*	17/09/2009
BATLAS 2010 Mullaghmeen Forest, Co. Westmeath		*Pipistrellus pipistrellus* (45kHz); *Pipistrellus pygmaeus*	17/09/2009
BATLAS 2010 Church grounds, Togher, Co. Westmeath		*Pipistrellus pipistrellus* (45kHz)	17/09/2009
BATLAS 2010 Bracklagh Lough, Co. Westmeath		*Myotis daubentonii; Pipistrellus pygmaeus*	17/09/2009
EIS Surveys		*Pipistrellus pipistrellus* (45kHz); *Pipistrellus pygmaeus; Plecotus auritus*	17/07/2006

6.5.1.7 Mammal Survey Results

Ecological surveys previously completed at the Proposed Development site in 2012 and 2013 were reviewed to aid in informing survey scope for this application. Species of ecological significance recorded during the mammal surveys included Badger and Otter (See Table 6-7 below). In addition, evidence of Red fox and the non-native invasive species American Mink was also recorded.

Table 6-7 Mammal Survey Records

Date	Species	Mammal notes	Grid Ref
25/02/2013	Badger	Badger dropping & tracks	E241637 N275962
25/02/2013		Badger dropping & tracks	E241009 N275737
02/10/2012	Badger	Tracks by L. Bane	None available
05/12/2012	Otter	On lake x2	None available

6.5.1.8 NPWS

An information request was also sent to the NPWS scientific data unit requesting records from the Rare and Protected Species Database on the 29th October 2020. A response was received on the 2nd November 2020. These records are provided in Table 6-8 below.

6.5.1.9 Table 6-8 NPWS Records for Rare and Protected Species Freshwater Pearl Mussel (*Margaritifera margaritifera*)

The NPWS *Margaritifera* Sensitive Area map (Version 8, 2017) was consulted during the desk study. There is no surface water connectivity between the Proposed Development site and any *Margaritifera* catchment. The Proposed Development site boundary is located 21km southwest of the Erne-Annalee-Larah *Margaritifera* Sensitive Area and 21km northwest of the Barrow *Margaritifera* Sensitive Area, with no connectivity to either.

6.5.1.10 Marsh Fritillary (*Euphydryas aurinia*)

Marsh Fritillary is protected under Annex II of the EU Habitats Directive and listed as '*Vulnerable*' on the IUCN Red List of Irish butterflies. Marsh fritillary were recorded from four of the hectads (N36, N37, N45, N46) according to the NBDC database.

6.5.1.11 Inland Fisheries Ireland Data

A search of the Inland Fisheries Ireland (IFI) online database was carried out to determine the species richness of the rivers and lakes downstream of the Proposed Development site. The results are presented in Table 6-9. Species of conservation interest are found in several of these lakes and rivers: European eel (*Anguilla Anguilla*), is classified as 'critically endangered' in '*Ireland Red List No. 5: Amphibians, Reptiles & Freshwater Fish'* (King *et al.,* 2011). Lamprey (*Lampetra* sp.) are classified as 'near threatened' in '*Ireland Red List No. 5: Amphibians, Reptiles & Freshwater Fish'* (King *et al.,* 2011) and all three species of Irelands lamprey are protected under Annex II of the EU habitats directive, with River Lamprey classified under Annex II and Annex V. European eel (*Anguilla anguilla*) is recorded from Lough Derravaragh, Lough Ennell and Lough Owel and lamprey is recorded from parts of the rivers Inny and Brosna.

Brown trout (*Salmo trutta*) was recorded from all rivers and lakes signifying their importance for salmonid species.

Table 6-9 IFI Sampling for Water Framework Directive

Location	Species	Status	Assessment Year
Lough Derravaragh	Bream; brown trout; European eel; perch; pike; roach; roach x bream hybrid; tench	Poor	2017
Lough Ennell	Brown trout; European eel; perch; pike; roach; roach x bream hybrid; rudd; tench; three-spined stickleback	Moderate	2017
Lough Owel	Brown trout; brown trout (stocked); European eel; perch; pike; roach; roach x rudd hybrid; rudd; tench; three-spined stickleback, rainbow trout	Good	2014
Inny River – Br. 1km S of Oldcastle_A	Brown trout; three-spined stickleback	Good	2014
Inny River – Br. d/s of dam in Dairy farm (Tully)_A	Brown trout; lamprey sp.; three-spined stickleback	Good	2011
Inny River – Shrule Br._A	Brown trout; gudgeon; minnow; perch; pike; roach; salmon; stone loach	Moderate	2014
River Brosna – 0.5km NW of Pollagh_A	Brown trout; gudgeon; lamprey sp.; minnow; perch; pike; roach; stone loach; three-spined stickleback	Moderate	2014

6.5.1.12 Invasive Species

The NBDC database also contains records of invasive species identified within the relevant hectad. Records of 'high impact' invasive species for hectads N36, N37, N45, N46 and N47 are provided in Table 6-10.

Table 6-10 NBDC records for invasive species (hectads N36, N37, N45, N46 and N47)

Common Name	Scientific Name	Hectad
New Zealand flatworm	*Arthurdendyus triangulatus*	N46
Canada goose	*Branta canadensis*	N36
Fallow deer	*Dama dama*	N36, N45, N46
Zebra mussel	*Dreissena polymorpha*	N36, N45
American Mink	*Mustela vison*	N36, N37, N46, N47
Ruddy duck	*Oxyura jamaicensis*	N46
Eastern grey squirrel	*Sciurus carolinensis*	N36, N37, N46, N47

Brown rat	*Rattus norvegicus*	N45
Canadian waterweed	*Elodea canadensis*	N36, N37, N45, N47
Japanese knotweed	*Fallopia japonica*	N36, N37, N45, N46, N47
Giant knotweed	*Fallopia sachalinensis*	N47
Rhododendron	*Rhododendron ponticum*	N36, N37, N45, N46

Regulations 49 and 50 of the European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. 477 of 2011) include legislative measures to deal with the introduction, dispersal, dealing in and keeping of non-native species. Japanese knotweed (F*allopian japonica*) and Rhododendron (*Rhododendron ponticum*) are two species subject to restrictions under Regulations 49 and 50 and are included in the Third Schedule of the European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. No. 477 of 2011).

6.5.1.13 Baseline Hydrology

Regionally, the Proposed Development site is located in the Lower and Upper Shannon surface water catchments (IEGBNISH) within Hydrometric Area 26 of the Upper Shannon. A regional hydrology map is shown in Figure 9-1, Chapter 9 of this EIAR.

On a more local scale, the proposed wind farm site and part of the proposed grid connection route are located within the Inny [Shannon]_SC_020 sub-catchment and the remainder of the grid connection route is located in the Inny[Shannon]_SC_030 and Brosna_SC_10 sub-catchments.

The Inny flows from Lough Sheelin in a south-westerly direction along the western edge of the proposed windfarm site and then slightly to the west of the grid connection route until crossing it and discharging to Lough Derravaragh to the south and east of the grid connection route. After crossing the grid connection route again where it flows out of Lough Derravaragh, the Inny flows into Lough Iron and then continues west through Ballymahon and finally into Lough Ree on the River Shannon. A small tributary of the Inny, the River Glore, flows in a south-easterly direction through the wind farm site.

To the south east of the proposed grid connection route, the River Gaine flows from Lough Drin in a north-westerly direction before discharging to Lough Derravaragh where it joins the Inny.

The grid connection route crosses the Royal Canal to the southern extent of the route. The Royal Canal/Lough Owel Feeder flows from Lough Owel then merges with the River Brosna to the east where it flows south through Mullingar into Lough Ennell and then flows south-westerly through Kilbeggan, Clara and Ferbane until it drains into the lower Shannon at Shannon Harbour. A local hydrology map is shown as Figure 9-2 and 9-3, Chapter 9 of this EIAR.

6.5.1.13.1 Water Quality

The Biotic Index of Water Quality (BIWQ) was developed in Ireland by the Environmental Protection Agency (EPA). Q-values are assigned using a combination of habitat characteristics and structure of the macro-invertebrate community within the waterbody. Individual macro-invertebrate families are classified according to their sensitivity to organic pollution and the Q-value is assessed based primarily on their relative abundance within a sample.

Table 6-11 illustrates the respective Q-value status results from monitoring stations located along rivers which flow through the site or along rivers which are fed directly by watercourses which flow through or around the site.

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 and individual waterbody status for all the River Basin Districts in Ireland. The EPA Envision map viewer was consulted on 29th October 2020 regarding the water quality status of the rivers which run within and directly adjacent to the Study Area. The WFD River Waterbody Status 2013 – 2018 for the watercourses which flow through the site have been assessed in Table 6-12.

Table 6-11 Water quality monitoring stations and associated Q values

Watercourse Name	Sampling station	Location	Q-Value & Water Quality Status	Sampling Year
Brosna	1.1km d/s L Owel (u/s fish farm)	E242885, N255773	3-4 (Moderate)	1993
	Bridge SW of Culleen Beg on R394 (u/s Mgr STW)	E244152, N255383	3 (Poor)	2017
	Mullingar-Canal Crossing	E244164, N253380	3 (Poor)	1993
	Mullingar: Industrial Estate Bridge	E243787, N252380	3 (Poor)	2017
	Butler's Bridge	E241982, N250177	3 (Poor)	2017
Gaine	Downstream of TPEFF3200D0510SW001	E240072, N264478	3 (Poor)	2019
	Bridge in Multyfarnham (u/s STW)	E240452, N264097	3 (Poor)	2019
	Bridge 1km NE of Ballynagall	E244615, N259213	3 (Poor)	2017
Glore	Bridge at Rockbrook	E244347, N274184	4 (Good)	2017
Inny	Finea Bridge	E240225, N281429	3 (Poor)	2017

	2km d/s Lough Kinale	E240632, N279966	4 (Good)	1987
	Camagh Bridge	E239176, N275613	3-4 (Moderate)	2017
	Float Bride	E239240, N272478	4-5 (High)	1987
	Bridge near Shrubbywood	E238727, N270036	4 (Good)	2017
	Clonave Bridge d/s L Derravaragh	E239039, N 266581	3-4 (Moderate)	2005
	Ballinalack Bridge	E234799, N264703	4 (Good)	2017

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

Name	Location	Status	Risk
Brosna	Flows in a southerly direction to the west and then to the east of the proposed grid connection route	Poor	Partly unassigned, partly at risk
Gaine	Flows in a north-westerly direction to the east of the access road	Poor	At risk
Inny	Adjacent to the proposed windfarm site	Moderate	At risk
Inny	West of the grid connection route	Good	Not at risk
Inny	East of the grid connection route, before entering Lough Derravarragh and West of the grid connection routeafter leaving Lough Derravarragh	Good	At risk

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

6.5.1.14 Conclusions of the Desktop Study

The desktop study has provided information about the existing environment in the Hectads pertaining to the site; N36, N37, N45, N46 and N47. The site is situated within the Upper and Lower Shannon surface water catchment within Hydrometric Area 25 of the Shannon River Basin District. On a more local scale, the majority of the site is located in the Brosna_SC_10 sub-catchment. Surface water drained/pumped from the site is routed via large settlement ponds prior to discharge to off-site drainage channels which flow into the local rivers (i.e. Little River and Silver river). The desktop study has provided information about the existing environment in Hectads N36, N37, N45, N46 and N47, within which the Proposed Development site is located.

A number of watercourses that drain the study area, lead to the following downstream EU Designated Sites, and are further considered in the Natura Impact Statement prepared for the Proposed Development:

- Lough Owel SAC (000688)
- Lough Ennell SAC (000685)
- Lough Owel SPA (004047)
- Lough Ennell SPA (004044)
- Lough Derravaragh SPA (004043)
- Lough Iron SPA (004046)

Six Nationally designated sites occur within the Likely Zone of Impact as listed below. These have been included as KERs and are assessed in Section 6.6.2 of this chapter:

- Lough Derravarragh NHA
- Ballynafid Lake and Fen pNHA
- Royal Canal pNHA
- Lough Owel pNHA
- Lough Iron pNHA
- Lough Ennell pNHA

The desk study identified that a variety of protected faunal species are known to occur within the study area, including bats, smooth newt, otter, freshwater white-clawed crayfish, brook lamprey, Atlantic salmon, badger and red squirrel. A review of bat roost records for the area did not identify any roosts within or immediately adjacent to the Proposed Development. 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.

6.5.2 Ecological Walkover Survey Results

6.5.2.1 Description of Habitats and Flora within the Ecological Survey Area

6.5.2.1.1 *Description of Habitats within the Wind Farm Site*

Habitats present within the study area were classified according to the guidelines set out in '*A Guide to Habitats in Ireland*' (Fossitt, 2000), as described above in Section 6.4.3.1. Habitat maps (Figure 6-4 and 6-5) have been created to show the location and relative cover of the habitats recorded. Figure 6-4a and 6-5a show the habitats, with the Proposed Development footprint superimposed.

Map Legend

- EIAR Site Boundary
- Buildings and artificial surfaces(BL3)
- Dystrophic lakes (FL1)
- Improved agricultural grassland (GA1)
- Dry meadows and grassy verges (GS2)
- Wet grassland (GS4)
- Wet grassland/Scrub (GS4/WS1)
- Raised bog (PB1)
- Cutover bog (PB4)
- Poor fen and flush (PF2)
- Mixed broadleaved/conifer woodland (WD2)
- Conifer plantation (WD4)
- Bog woodland (WN7)
- Scrub (WS1)
- Improved agricultural grass--land/Wet Grassland mosaic (GA1/GS4)
- Bog Woodland/Scrub mosaic
- Spoil and Bare Ground (ED2)
- Depositing/ Lowland Rivers (FW2)
- Drainage Ditches (FW4)
- Hedgerows (WL1)
- Treelines (WL2)

N

Drawing Title

Habitat Map

Project Title	
Coole Wind Farm, Co. Westmeath	
Drawn By: HW	Checked By: LK
Project No.: 200445	Drawing No.: Figure 6-4
Scale: 1:15000	Date: 2021.01.27

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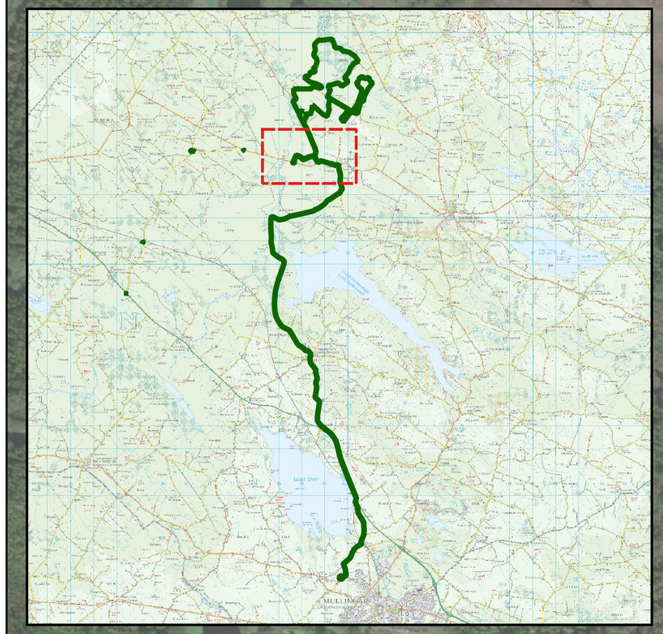

Map Legend

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- Bog Woodland/Scrub mosaic
- Spoil and Bare Ground (ED2)
- Depositing/ Lowland Rivers (FW2)
- Drainage Ditches (FW4)
- Hedgerows (WL1)
- Treelines (WL2)

Drawing Title
Habitat Map - Link Road

Project Title
Coole Wind Farm, Co. Westmeath

Drawn By	Checked By
HW	LK
Project No.	Drawing No.
200445	Figure 6-5
Scale	Date
1:4500	2021.01.27

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Layout Legend

- Proposed Turbine Layout
- Proposed Hardstand
- Proposed Borrow Pit
- Construction Compound
- Internal Roads (new)
- Internal Roads (Upgrades to existing)
- Proposed Junction Works
- External Roads (Upgrades to Existing)
- Proposed Onsite Substation
- Proposed Grid Connection Route
- Proposed Upgrade Works to Existing Mullingar Substation
- Turbine Delivery Route
- Temporary Hardcore Surfacing Areas

Map Legend

- EIAR Site Boundary
- Buildings and artificial surfaces(BL3)
- Dystrophic lakes (FL1)
- Improved agricultural grassland (GA1)
- Dry meadows and grassy verges (GS2)
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- Scrub (WS1)
- Improved agricultural grass--land/Wet Grassland mosaic (GA1/GS4)
- Bog Woodland/Scrub mosaic (WN7/WS1)
- Spoil and Bare Ground (ED2)
- Depositing/ Lowland Rivers (FW2)
- Drainage Ditches (FW4)
- Hedgerows (WL1)
- Treelines (WL2)

N

Drawing Title: Habitat Map - Development Overlain

Project Title: Coole Wind Farm, Co. Westmeath

Drawn By	Checked By
HW	LK
Project No.	**Drawing No.**
200445	Figure 6-4a
Scale	**Date**
1:15000	2021.01.27

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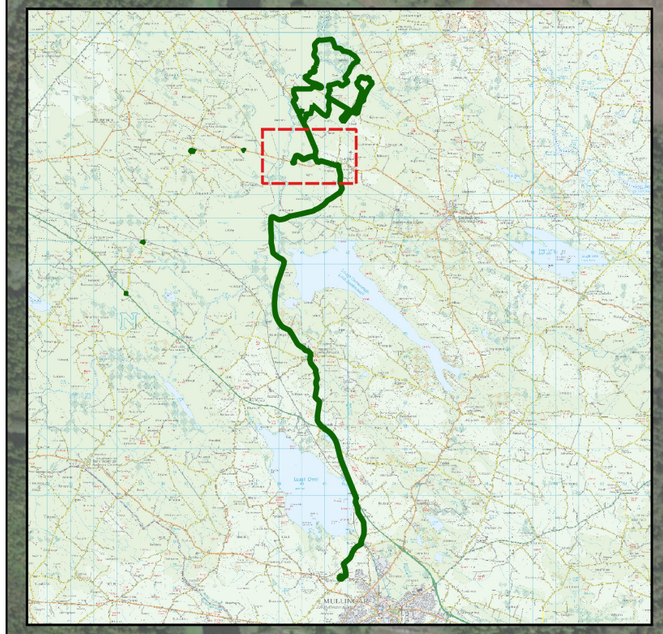

Layout Legend

- Proposed Turbine Layout
- Proposed Hardstand
- Proposed Borrow Pit
- Construction Compound
- Internal Roads (new)
- Internal Roads (Upgrades to existing)
- External Roads (Upgrades to Existing)
- Proposed Onsite Substation
- Proposed Grid Connection Route
- Proposed Upgrade Works to Existing Mullingar Substation
- Turbine Delivery Route
- Temporary Hardcore Surfacing Areas

Map Legend

- EIAR Site Boundary
- Buildings and artificial surfaces(BL3)
- Dystrophic lakes (FL1)
- Improved agricultural grassland (GA1)
- Dry meadows and grassy verges (GS2)
- Wet grassland (GS4)
- Wet grassland/Scrub (GS4/WS1)
- Raised bog (PB1)
- Cutover bog (PB4)
- Poor fen and flush (PF2)
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- Conifer plantation (WD4)
- Bog woodland (WN7)
- Scrub (WS1)
- Improved agricultural grass--land/Wet Grassland mosaic (GA1/GS4)
- Bog Woodland/Scrub mosaic
- Spoil and Bare Ground (ED2)
- Depositing/ Lowland Rivers (FW2)
- Drainage Ditches (FW4)
- Hedgerows (WL1)
- Treelines (WL2)

N

Drawing Title
Habitat Map - Link Road with development overlain

Project Title
Coole Wind Farm, Co. Westmeath

Drawn By	Checked By
HW	LK
Project No.	Drawing No.
200445	Figure 6-5a
Scale	Date
1:4500	2021.01.27

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The habitats recorded in the study area are listed in Table 6-13.

Table 6-13 Habitats within and adjacent to the wind farm site at Coole, Co. Westmeath

Name	Habitat Code	Area	% of Study Area
Cutover Bog	(PB4)	305.02	60.6
Conifer Plantation	(WD4)	105.5	21.0
Mixed Broadleaved/Conifer Woodland	(WD2)	8.03	1.6
Improved Agricultural Grassland	(GA1)	28.77	5.71
Raised Bog	(PB1)	5.79	1.15
Wet Grassland/Scrub	(GS4/WS1)	9.93	1.97
Bog Woodland/Scrub	(WN7)/(WS1)	4.22	0.83
Bog Woodland	(WN7)	3.97	0.79
Scrub	(WS1)	1.93	0.38
Buildings and Artificial Surfaces	(BL3)	1.17	0.23
Dystrophic Lake	(FL1)	0.47	0.09
Poor Fen	(PF2)	0.18	0.04
Dry Meadows and Grassy Verges	(GS2)	3.13	0.62
Name	**Habitat Code**	**Linear Length of Habitat (km)**	**% of Study Area**
Depositing/Lowland River	(FW2)	3.46km	0.20
Drainage Ditch	(FW4)	4.39km	0.26
Treeline	(WL2)	5.34km	0.32
Hedgerow	(WL1)	1.83km	0.11
Spoil and Bare Ground	(ED2)	1.87km	0.11

The Coole study area is dominated by Cutover Raised Bog (PB4) (see Plates 6.1 & 6.2 below). Much of Coole bog comprises milled peat and is divided up by drains, spaced approximately 15m apart, which separate long parallel peat production fields. The lands to the east of the site comprise agricultural land. The edge of the main wind farm site is bordered by Conifer Plantation to the east and south while the lands surrounding T15 are predominantly agricultural in nature. The River Inny borders the west of the site and the River Glore, a tributary of the Inny, runs in an east to west direction through the study area.

Almost all the cutover bog within the study area has been used for peat production and the existing drainage network is maintained. Cutover bog areas are relatively dry with no vegetation cover, other than occasional plants recorded on the sloping banks of drains. For ease of description, the main wind farm study area can be divided up into two distinct sections: North of the Glore River and South of the

Glore River (including the section to the south of the local road which connects the R396 with the R394). In addition, the proposed borrow pit, grid connection and turbine delivery routes are also described in the sections below.

North of the Glore River

This area is dominated by milled cutover bog. Conifer plantation is the dominant habitat to the north east and south. To the north east, the cutover bog is fringed by Non-Annex I Bog woodland (Plate 6.3). The bog woodland is quite open and the ground cover is dominated by Bramble (*Rubus fruticosus* agg.), Ivy (*Hedera helix*), Purple Moor-grass (*Molinia caerulea*) and Bracken (*Pteridium aquilinum*). Other species present include Broad Buckler Fern (*Dryopteris dilatata*), Heather (*Calluna vulgaris*), Honeysuckle (*Lonicera periclymenum*) with occasional Hawthorn (*Crataegus monogyna*) and Gorse (*Ulex europaeus*). There are some narrow sections of Degraded raised bog (PB1), dominated by Ling Heather, along the margins. These areas are partially drained. (Plate 6.4).

To the north, outside the site boundary is an area that has been stripped entirely of peat. This area is at a significantly lower gradient compared to the remaining cutover bog within the site boundary. To the west, the cutover bog is bordered by an intact area of remnant raised bog habitat which surrounds a small dystrophic lake (Plate 6.5). The dominant vegetation recorded from the remnant bog section comprised Ling (*Calluna vulgaris*) and Common Cottongrass (*Eriophorum vaginatum*). Bryophytes were abundant throughout with *Sphagnum cuspidatum*, *Sphagnum papillosum*, *Sphagnum magellanicum* and *Sphagnum capillifolium* recorded. The lichen *Cladonia portentosa* was common. The dystrophic lake was fringed by a floating mat of poor fen vegetation dominated by Bottle Sedge (*Carex rostrata*). Bog bean (*Menyanthes trifoliata*) was also recorded.

Continuing west, an area of Non Annex I bog woodland was recorded along with a fringe of wet grassland and scrub along the banks of the River Inny. Fringes of Reed and large sedge swamp (FS1), dominated by Common reed (*Phragmites australis*) were recorded immediately adjacent to the River Inny (Plate 6.6).

The Glore River is a tributary of the Inny and was classified as a Lowland depositing river (FW2). The Glore River marks the southern boundary of the northern section of the main windfarm site. The watercourse was surrounded by a narrow strip of Mixed Broadleaved/conifer Woodland (WD2). Species recorded included Poplar (*Populus* sp.), Scots Pine (*Pinus sylvestris*), Spruce (*Picea stichenis*) and Grey Willow (*Salix cinerea*).

A number of small silt ponds, associated with the existing onsite drainage network, occur and were classified as Other artificial lakes and ponds (FL8). The on-site drainage features (FW4) drain into the silt ponds (Plate 6.7). Vegetation recorded from the ponds included Pondweed (*Potamogeton natans*), Reedmace (*Typha latifolia*) and Water Horsetail *(Equisetum sp.)*.

The banks of the Glore River were heavily vegetated (Plate 6.8). Species recorded included Reed Canary Grass (*Phalaris arundinacea*), Floating sweet grass (*Glyceria fluitans*), Hogweed (*Heracleum sphondylium*), Angelica (*Angelica sylvestris*), Great Willowherb (*Epilobium hirsutum*), Nettle (*Urtica dioica*), Creeping Thistle (*Cirsium arvense*), Brambles (*Rubus fruticosus* agg.), Meadowsweet (*Filipendula ulmaria*), Bindweed (*Calystegia sepium*). *Sparganium emersum* and Pondweed (*Potamogeton* sp.) were the only instream vegetation recorded. Small stands of Bracken (*Pteridium aquilinum*) were also recorded.

The proposed T15 is located to the east of the site within agricultural grassland categorized as Improved Agricultural Grassland (GA1)/Wet Grassland (GS4). The proposed access road to T15 will follow the local road from the centre of the main wind farm site in an easterly direction before travelling north across a number of agricultural fields comprising Improved Agricultural Grassland (GA1), Dry Meadows and Grassy Verges (GS2) and a species rich Wet Grassland (GS4) located immediately north of the Glore River. The grassland habitats supported species including Meadowsweet (*Filipendula ulmaria*), Conglomerate Rush (*Juncus conglomeratus*), Meadow Buttercup

(*Ranunculus acris),* Sheep Sorrell (*Rumex acetosa*), Yorkshire Fog (*Holcus lanatus*), Sweet Vernal grass (*Anthoxanthum odoratum*), Broadleaved Dock (Rumex obtusifolius), Silverweed (*Potentilla anserina*), Cock's-foot (Dactylus glomerata), Dandelion (*Taraxcum officinale agg.*) Nettle (*Urtica dioica*), Broadleaved Plantain (*Plantago lanceolata*) and Clover (*Trifolium spp.*) and did not correspond to any grassland habitat listed under Annex I of the EU Habitats Directive. The access road will cross the River Glore via a clear span bridge to access the turbine location. The fields along the proposed access road are demarcated by Treeline (WL2) (Plate 6-9) and Hedgerow (WL1) (Plate 6-10) supporting species such as Ash (*Fraxinus excelsior*), Sycamore (*Acer pseudoplatanus),* Willow *(Salix spp.)* and Hawthorn (*Crataegus monogyna*). Some treeline and hedegrow will require removal to facilitate the new access road. These habitats have been assessed for their potential to support bats as provided in the bat report in Appendix 6-2. Though the bat report identified some of this treeline/hedgerow as having *Moderate* potential to support roosting bats, no bat roosts were recorded along the proposed new T15 access road during the surveys carried out. Species within the field at the proposed Turbine 15 location included Yorkshire Fog (*Holcus lanatus*), Pernnial Rye-grass (*Lolium perenne*), Sweet Vernal Grass (*Anthoxanthum odoratum*), Conglomerate Rush (*Juncus conglomerataus*), Red Fescue (*Festuca rubra*), Tormentil (*Potentilla erecta*), Sheep Sorrell (*Rumex acetosa*) and Cock's-foot (*Dactylus glomerata*) (Plate 6-11).

South of the Glore River

This area is dominated by cutover bog. Conifer plantation, dominated by Lodgepole Pine and (*Pinus contorta*) and Spruce (*Picea stichensis*) is the dominant habitat to the north and east. Exiting forestry access tracks were classified as Spoil and bare ground (ED2).

The River Inny forms the western boundary of the site. The watercourse is fringed by a narrow strip of Wet grassland (GS4). Toward the south western corner of the site is an area which is relatively dry and dominated by a mosaic of degraded/cutover bog and grassland dominated by Yorkshire Fog, Creeping Bent and occasional Soft Rush.

Continuing south, and crossing the existing local road, the study area continues to be dominated by Cutover bog. The proposed new access road to Turbine 14 leaves the local road and travels south traversing Conifer Plantation (WD4) supporting species of Lodgepole Pine and (*Pinus contorta*) and Spruce (*Picea stichensis*) adjacent to this Cutover Bog (PB4) habitat. Turbine 14 will be located within this conifer plantation approximately 700m south of the local road as shown in Plate 6-12.

Plate 6-1 Milled peat field (North of Site)

Plate 6-2 Milled peat field and typical drain (South of Glore River)

Plate 6-3 Bog Woodland WN7 Non Annex I (North western site boundary)

Plate 6-4 Fringe of remnant Raised bog between Cutover Peat and Bog Woodland (North of Site)

Plate 6-5 Dystrophic Lake, fringing poor fen and remnant degraded raised bog.

Plate 6-6 River Inny, fringing reed swamp and adjacent wet grassland and willow scrub.

Plate 6-7 Silt Pond

Plate 6-8 Glore River Corridor

Plate 6-9 Example of Treeline (WL2) along the field boundaries on the proposed access road to Turbine 15

Plate 6-10 Young Hawthorn Hedgerow (WL1) along proposed access road to Turbine 15

Plate 6-11 Proposed location of T15 looking south categorised as a mosaic of Improved Agricultural Grassland (GA1)/Wet Grassland (GS4)

Plate 6-12 Proposed location of T14 within Conifer Plantation (WD4)

6.5.2.1.2 Proposed Borrow Pit

The proposed borrow pit is located approximately 700 metres east of the nearest proposed turbine location (T14). The proposed borrow pit is linked to the main area of the proposed wind farm site via the L5755 local road.

The habitats present at the borrow pit location included Improved agricultural grassland (GA1) surrounded by Hedgerow (WL1) and Treelines (WL2). The grassland is utilised for agricultural purposes. Species recorded form the sward included Perennial Ryegrass (*Lolium perenne*), Cocksfoot (*Dactylis glomerata*), Meadow Foxtail (*Alopecurus pratensis*), Meadow Grasses (*Poa* spp.), Creeping Thistle (*Cirsium arvense*), Chickweed (*Cerastium fontanum*), Soft Rush (*Juncus effuses*) and Nettle (*Urtica dioica*). Species recorded from the hedgerows included Hawthorn, Bramble, Dog Rose (*Rosa canina*). Treelines were dominated by Ash (*Fraxinus excelsior*) and Beech (*Fagus sylvatica*).

6.5.2.1.3 Habitats on the Grid Connection Route

The proposed grid connection route will be located within the carriageway/verge of existing public roads. There is no requirement to use habitats located outside the road carriageway except at the Northern and Southern ends where the connection points leave the public road for termination. All roads within/adjacent to the proposed cable route were classified as Building and Artificial Surfaces (BL3). Much of the cable route was bordered by a verge supporting Dry Meadows and Grassy Verges (GS2). Also present along the road, outside the working area, were Hedgerows (WL1), Treelines (WL2), Earth Banks (BL2), Stone Walls (BL1), Scrub (WS1), Spoil and Bare Ground (ED2), Flower Beds and Borders (BC4) and Buildings and Artificial Surfaces (BL3). Species within the dry meadows and grassy verge habitat were surveyed in July 2020 (i.e. the optimal growing season) and assessed for their potential to support Annex I habitat 'lowland hay meadows'. Species recorded within the grass verge habitat included False Oat-grass (*Arrhenatherum elatius*), Nettle (*Urtica dioica*), Bindweed (*Calstegia sepium*), Common Couch-grass (*Elymus repens*), Red Fescue (*Festuca rubra*), Silverweed (*Potentilla anserina*), Wild Carrot (*Daucus carota*), Smooth Sow Thistle (*Sonchus oleraceus*), Meadow Vetchling (*Lathyrus pratensis*), Tufted Vetch (*Viccia cracca*), Knapweed (*Centaurea nigra*) and Ribwort Plantain (*Plantago lanceolata*). No Annex I habitats were recorded within the road carriageway.

Habitats recorded beyond the road boundary included Improved Agricultural Grassland (GA1), Wet Grassland (GS4), Cutover Bog (PB4), Wet Heath (HH3) and Conifer Plantation (WD4). Less frequently recorded habitats included Mixed Woodland (WD2), Broadleaved Woodland (WD1), Amenity Grassland (GA2) and Reed and Large Sedge Swamps (FS1).

Peat Areas

Following consultation and correspondence with Westmeath County Council in relation to the proposed underground grid connection route, a peat stability assessment of sections of public roads underlain by peat of the grid connection route was carried out by Applied Ground Engineering Consultants (AGEC)[4],in April 2017. This geotechnical assessment report was previously submitted as part of the now permitted Coole Wind Farm application, as detailed in Section 2.5.1 in Chapter 2 of the EIAR. The purpose of this assessment was to establish the ground conditions in three priority sections of road (as identified by Westmeath County Council at the time) with respect to construction of the underground cables and the potential effects on the structural integrity of the roads. While additional more detailed investigations have since been carried out into peat depths along the route, resulting in a more refined and robust construction methodology, the report findings in terms of ground conditions is still very useful, and are presented as Appendix 4-4 of this EIAR. The sections of road assessed by AGEC measure approximately 8 kilometres in total and are shown in Figure 4-15. Following this, IONIC Consulting Engineers design of the cable and substation works required have

[4] *AGEC Ltd were rebranded and became Fehily Timoney (FT) in 2019.*

incorporated any available historical data and reports described above, in addition to carrying out their own site investigations and are presented in Appendix 4-3 of the EIAR.

To further investigate the grid connection route, a geophysical investigation was conducted by APEX Geophysics Ltd. in October 2019 to determine the presence/thickness of peat along the grid connection route. This has been provided as Appendix 4-5 of this EIAR, As detailed in Section 2.6.3 in Chapter 2 of the EIAR, the intended approach, i.e. confirming that the grid connection could be laid without affecting the integrity of the road, was set out in correspondence issued to the Planning Authority in September 2017 as detailed in Section 2.6.3 of the EIAR. Following that, further details relating to construction methodology and design were discussed at the two pre-planning meetings that took place on the 15th of August 2019, and the 4th of February 2020. The approaches discussed in these meetings were considered satisfactory by the Planning Authority at that time.

Where the existing road is located on peat, specific engineering designs have been carried out in order to accommodate the cable within the road corridor in these areas. Three such areas where this is required were identified by geotechnical assessment carried out by AGEC and measure approximately 8km in total as described in Appendix 4-4- of Chapter 4 of the EIAR. In addition, a geophysical investigation was produced by APEX in October 2019 to determine the presence/thickness of peat along the route. This has been provided as Appendix 4-5 of this EIAR and has informed the proposed construction methodologies. There are six options for cable laying in peat areas as detailed in Chapter 4 of the EIAR. These options include;

- Trench Type A (Through Floating Road Trench in Road with >2.5m to base of peat)
- Trench Type B (Through Floating Road Trench in Verge with >2.5m to base of peat)
- Trench Type C (Through Raised Floating Road Trench in Verge with <2.5m to base of peat)
- Trench Type D (Through Floating Road Trench in Verge with <2.5m to base of peat)
- Trench Type E1 (Through Floating Grid Route Track with >2.5m to base of peat)
- Trench Type E2 (Through Solid Grid Route Track with <2.5m to base of peat)

The exact location of the cable within the public road corridor will be subject to ESB/Eirgrid specifications and in agreement with Westmeath County Council prior to construction.

6.5.2.1.4 *Habitats on the Turbine Delivery Route*

There are a number of locations along the proposed turbine delivery route which require minor alterations to facilitate the proposed works. The locations of these are provided in Figure 14-8 to14-33 in Chapter 14 of the EIAR.

Location 1 - N4 Junction with L1927 (Joanstown Townland)
Small areas of Amenity grassland (GA1) and Dry Meadows and Grassy Verges (GS2) (combined total approximately 0.03 ha) on road verge will be surfaced over to allow turbine delivery vehicles to make right-hand turn.

Location 2 – Railway Line Level Crossing on the L1927

Small area of Dry Meadows and Grassy Verges (GS2) and approximately 80m of hedgerow will be temporarily removed to facilitate abnormally sized turbine vehicles to negotiate the rail crossing.

Location 3- L1927 and L5828 Local Roads Junction (Boherquill Townland)
Road widening works are proposed to allow transport vehicles to make right-hand turn. This will result in the loss of road side Dry Meadows and Grassy Verges (GS2), Improved agricultural grassland and a heavily trimmed Hawthorn (*Crataegus monogyna*) dominated Hedgerow (WL1). The total area to be surfaced is approximately 0.31 ha.

Location 4 – Gentle right turn from L5828 onto R395
Road widening works are proposed to facilitate abnormally sized vehicles. This will result in the loss of a minor area of road side Dry Meadows and Grassy Verges (GS2) habitat.

Location 5 and 6 - Site access junctions A and B that provide access/egress onto proposed link road (linking R395 and R396)
The habitat to either side of the junction with the proposed link road as accessed from the R395 comprises an area of Dry Meadows and Grassy Verges (GS2) and Cutover Bog (PB4). The proposed area for surfacing measures approximately 0.34 hectares. There will be no impacts to the south of the R395 as there is oversail only at this junction. There will also be minor impacts to the west of the R396 at access junction B. Approximately 20m of treeline and 14m of hedgerow will require removal at Junction B access/egress from the R396.

Location 7 - Site access junction C that provides access to the site from the R396
It is proposed to widen the turn into the proposed wind farm site to the east of the R396 to facilitate the delivery of turbines. This will result in the loss of approximately 0.21 hectares of trees and scrub associated with the edge of conifer plantation to facilitate hardcore surfacing measures.

Location 8 - Site access junction D which crosses the L5755
The swept path analysis undertaken for this location shows that the abnormally sized turbine vehicles will be able to negotiate this crossing with minor impacts on sections of hedge (over-sail) and grass verges.

Location 9 – Site access junction E which provides access to Turbine T14 located south of L5755
It is proposed to widen the turn into the proposed turbine T14 to the south of the L5755 to facilitate the delivery of the turbine. This will result in the loss of approximately 0.21 hectares of Recolonising Bare Ground (ED3) and Scrub (WS1) dominated by Gorse (*Ulex europaeus*), Bracken (*Pteridium aquilinium*), Willow (Salix spp.) and Bramble (*Rubus fruticosus agg.*).

Location 10 – Site access junction F, which is the access junction off the L5755 to / from the proposed borrow pit
The analyses indicates that temporary visibility splays will be required at this junction in order to accommodate the construction vehicles. The borrow pit access location off the public road is to be gated post construction.

Location 11 - Site access junction G which provides access to turbine number 15 situated to the north of the L5755
It is proposed to widen the turn into the proposed turbine T15 to the north of the L5755 to facilitate the delivery of the turbine. There are a number of mature Ash (*Fraxinus excelsior*) and Sycamore (*Acer pseudoplatanus*) trees that will require removal to facilitate the proposed works. These trees did not show any obvious signs of cracks or crevices but had occasional broken limbs and all supported dense ivy. As a result, these were assessed as having *Low-Moderate* potential to support roosting bats. The proposed area for hardcore surfacing measures approximately 0.41 hectares and will result in the loss of Improved Agricultural Grassland (GA1).

6.5.2.2 Botanical Species Present

Species listed in Annex II of the EU Habitats Directive or additional flora listed in the Flora (Protection) Order (2015) or red list of vascular plants (Jackson *et. al* 2016) were not recorded.

6.5.2.3 Invasive Alien 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 species were recorded within the wind farm site.

Bohemian Knotweed (*Fallopia bohemica*), Japanese Knotweed (*Fallopia japonica*) and Rhododendron (*Rhododendron ponticum*) were recorded along the proposed grid connection route as shown in Figure 6-6. The observations were of isolated patches on the roadside verge (See Table 5.15 below).

Map Legend

- Bohemian Knotweed
- Himalayan Knotweed
- Japanese Knotweed
- Rhododendron
- EIAR Site Boundary

Drawing Title: Invasive Species

Project Title: Coole Wind Farm, Co. Westmeath

Drawn By	Checked By
LK	PR
Project No.	Drawing No.
200445	Figure 6-6
Scale	Date
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Table 6-14 Third Schedule Invasive Species

Common Name	Scientific Name	Grid Ref:	Notes
Bohemian Knotweed	*Fallopia bohemica*	240923; 270540	Recorded on the immediate roadside verge, measuring approx. 20m x 15m
Rhododendron	*Rhododendron ponticum*	239010 267335	Recorded on the immediate roadside verge
Japanese Knotweed	*Fallopia japonica*	240469 263629	Recorded on the immediate roadside verge measuring approx. 7m x 3m
Japanese Knotweed	*Fallopia japonica*	242144 255351	Recorded on the immediate roadside verge measuring approx. 16m x 3m
Himalayan Knotweed	*Persicaria wallicchii*	242601 256010	Along waters edge at bridge crossing of Lough Owel Feeder

6.5.2.4 Significance of Habitats

Ecological evaluation follows a methodology that is set out in Chapter 3 of the '*Guidelines for Assessment of Ecological Impacts of National Roads Schemes'* (NRA, 2009). The habitats within and adjacent to the development site were evaluated in accordance with the criteria developed by the NRA (2009b), which classifies sites in terms of their ecological importance, *i.e.* '*international importance'*, '*national importance'*, '*county importance'*, '*local importance (higher value)*' or '*local importance (lower value)*'. Figure 6-7 displays the ecological significance of the habitats identified within the EIAR Site Boundary.

Degraded raised bog (non-Annex I) is present in scattered locations surrounding the EIAR study area boundary. The largest extent of this habitat occurs to the north west of the development site. The degraded peatland does not conform to any of the Annex I raised bog habitat classifications. Areas of the habitat are dried out and drained on all sides. Such areas are not capable of natural regeneration to active raised bog habitat. It is noted that the, structure, function and viability of the habitat make it susceptible to peat extraction and scrub/woodland encroachment. The remnant degraded Raised Bog is assigned ***Local Importance (Higher Value)*** on the basis of containing semi-natural habitat types with high biodiversity in a local context. This habitat has been identified as a KER.

The dystrophic lake recorded surrounded by the remnant raised bog corresponds to the Annex I habitat Natural dystrophic Lakes and ponds [3160]. This habitat and fringing vegetation has been assigned ***National Importance*** based on the presence of a viable habitat area.

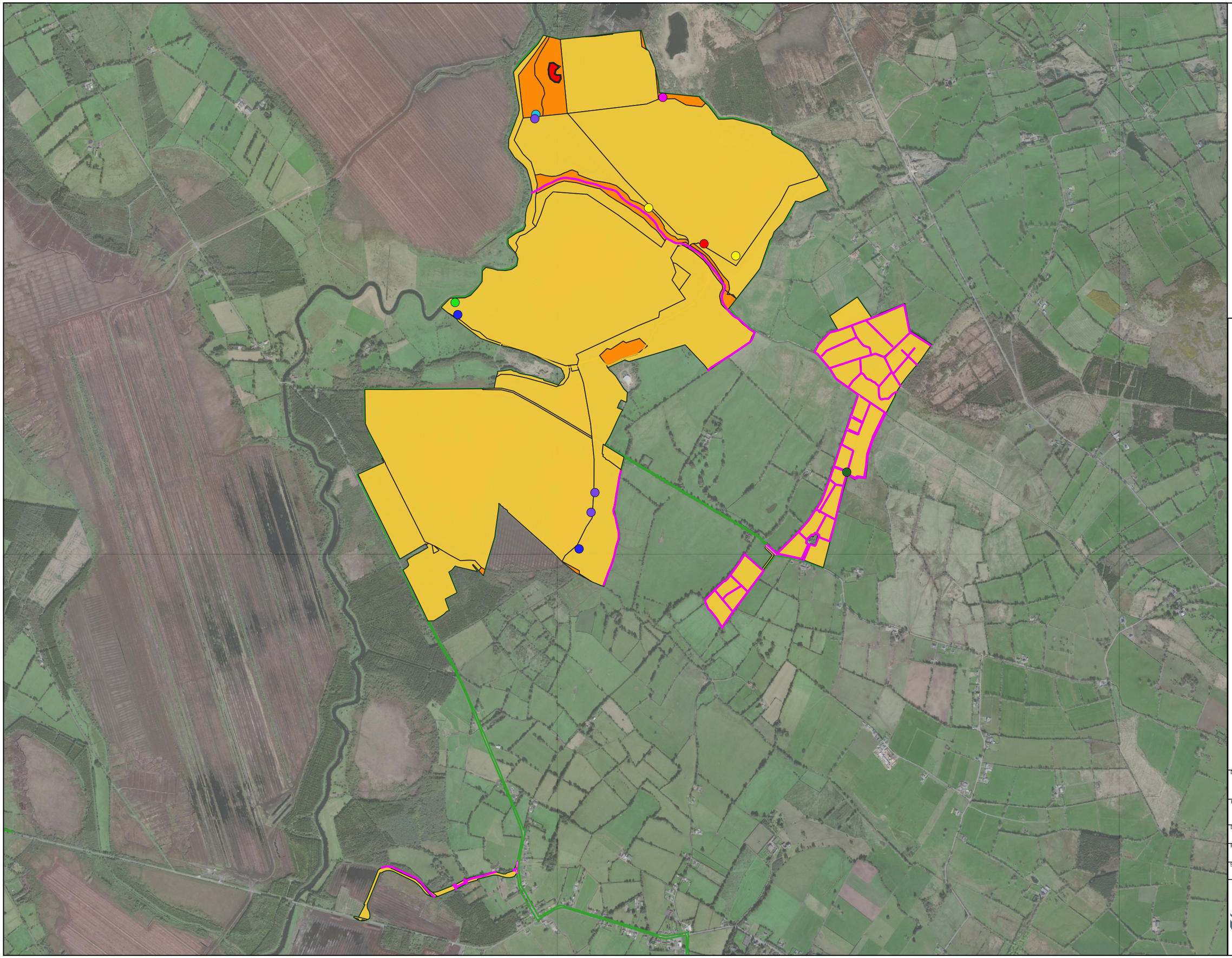
Bog Woodland (WN7) is present in numerous locations along the fringes of the study area boundary. Woodland stands were examined to investigate their potential to conform to the Annex I habitat 'Bog Woodland'. The woodland stands are dry underfoot with dominant Birch (*Betula pubescens*) with some Grey Willow (*Salix cinerea*). The understorey is generally dominated by Bramble (*Rubus fruticosus agg.*) and Ferns (*Dryopteris sp.*) in many areas with Bracken (*Pteridium aquilinum*) in clearings. The woodland stands are relatively dry with many drainage ditches throughout. *Sphagnum* mosses were extremely rare. When considered according to the National Survey of Native Woodlands (Perrin, 2008), this woodland type corresponded closely with the *Rubus fruiticosus - Dryopteris dilatata* variant of the *Betula pubescens – Molinia caerulea* woodland group. This habitat has no affinity with the Annex I Priority Habitat 'Bog Woodland'. The Bog woodland stands, none of which conform to Annex I status, are classified as being of ***Local Importance (higher value)*** on the basis of supporting

semi-natural habitat types with high biodiversity and high degree of naturalness in a local context. This habitat been identified as a KER.

The River Glore, a tributary of the River Inny, runs in an east to west direction through the study area. The Glore River debouches into the River Inny on the western study area boundary. The Glore River flows along a habitat corridor dominated by Mixed broadleaved/conifer woodland. The watercourses including the woodland along the River Glore Corridor are assigned ***Local Importance (higher value)*** on the basis of supporting semi-natural habitat types with high biodiversity and high degree of naturalness in a local context. The watercourses also have potential as a habitat for a number of species that are listed on Annex II of the EU Habitats Directive (e.g. Otter, White-clawed Crayfish etc.). This habitat corridor has been identified as a KER.

Although there are habitats of ecological significance within the study area, the development footprint is dominated by habitats of low ecological significance and are assigned *Local importance (lower value)*, as per the NRA 2009. The pastoral habitats recorded at the proposed location of Turbine 15 and at the proposed borrow pit location were assigned *Local importance (lower value)*.

Habitats encountered at the location of junction modifications on the proposed transport route and along the proposed grid connection route were of low ecological significance. The habitats encountered are common at the local, county and national level and are assigned *Local importance (lower value)*, as per the NRA 2009.



Map Legend

MKO Surveys 2016 and 2020

- Badger prints
- Badger snuffle hoels and print
- Fox dropping
- Freal goats - three grazing
- Irish Hare specimen observed
- Otter prints
- Otter spraint
- Red Fox prints
- Greenwire Surveys (2013) Badger droppings and tracks
- Local Importance (higher value)
- Local Importance (lower value)
- National Importance
- Local Importance (higher value)
- EIAR Site Boundary

N

Drawing Title: Mammal Surveys and Habitat Significance

Project Title: Coole Wind Farm, Co. Westmeath

Drawn By	Checked By
L Kelly	P Roberts
Project No.	Drawing No.
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6.5.2.5 Fauna

6.5.2.5.1 *Bats*

Wind Farm Site

The following paragraphs provide a summary of the survey results as taken from the Bat Impact Assessment Report prepared by Woodrow Sustainable Solutions that is provided in Appendix 6-2.

In addition, the Bat Survey at Height Report prepared by MKO (2018) is provided in Appendix 6-3. The "at height" surveys completed by MKO in 2017/2018 indicated that activity levels were greater at ground level. The Bat Impact Assessment Report provided in Appendix 6-2 is conservative and reflective of the site conditions.

Habitat Availability and Roost Suitability

Habitat types throughout the turbine envelope are dominated by open, cut-over bog which has been industrially exploited for 'peat moss' and blocks of commercial forestry plantations, which are fringed by the remnants of raised bog and some bog woodland. The majority of the turbines will be sited within the exposed cut-over bog including T1, T2, T3, T4, T6, T7, T8, T9, T10, T11, T12 and T13, with T5 and T14 located within conifer plantations. The proposed location for T15 is within pastural grassland including some species rich wet grassland along the River Glore. The river dissects the Wind Farm Site and provides a linear feature with strong connectivity to the surrounding landscape via plantations and the River Inny.

Although the turbines are predominately located within open situations in exposed peat, the interface between the cut-over bog and forestry provides potential foraging and commuting features for bats. Turbines located closer to the forestry edge are predicted to experience higher levels of bat activity, especially when turbines are also located adjacent to the River Glore, where the insect biomass associated with forested sections of the river is anticipated to be preferentially exploited by foraging bats.

Overall, there were very few PRF with moderate or high potential identified during preliminary habitat suitability assessments of the 300m Zone of Influence (ZoI) around the proposed turbine locations. This concurs with the findings of previous surveys of the site conducted in 2013 and 2016 (MKO,2017). It was also considered that there are no features suitable of supporting a hibernacula within the ZoI of the proposed turbines.

Some areas earmarked for wind farm access tracks and the borrow pit supported a number of more mature trees with potential suitable ivy cover, rot holes and knots. Aside from the beech woodland on the access track between T9 and T5, these PRFs were not surveyed and pre-construction roost checks will be required prior to modification or removal of any potential roost features. The beech wood was surveyed in September 2020 and no roosting activity was identified. Other emergence surveys were conducted along the River Glore and all returned nil results.

Summary of static deployment data

1. Bat activity was recorded within the survey area for a minimum of six species, including common pipistrelle, soprano pipistrelle, Leisler's bat, Myotis species, brown long-eared bat and Nathusius' pipistrelle.
2. As shown below in Table 6-15 (Table 12 in the Bat Impact Assessment Report, Appendix 6-2), over the three seasons combined the static detectors (successfully deployed at 12 to 13 locations) recorded a total 31,065 bat passes overc.4,873hours, which equates to6.4bats passes per hour for the survey area as a whole and across all the seasonal deployments. Based on Kepel et al. (2011) this would be considered representative of medium levels of bat activity

across the site. This result was strongly influenced by high overall activity during the spring deployment (11.5bp/h), with relatively lower levels of overall activity recorded in summer (2.6bp/h) and autumn (2.5bp/h).

3. As highlighted by Table 6 of the Bat Impact Assessment Report in Appendix 6-2, applying SNH et al. (2019) classifications levels of bat activity within the survey area for all the deployment locations and across all three seasons was categorized as:
    - Moderate for common pipistrelle, soprano pipistrelle, Leisler's bat.
    - •Moderate/ low for Myotis species, brown long-eared bat and Nathusius' pipistrelle
4. While overall activity levels are moderate to moderate/ low, the high values for max percentiles in Table 6 of the Bat Impact Assessment Report are indicative that high or moderate/ high levels of activity were exhibited on some nights as shown in Table 7 of the Bat Impact Assessment Report in Appendix 6-2 for all the species recorded except for Nathusius' pipistrelle. Myotis species and brown long-eared bat only registered moderate/ high activity for 20 nights and 1 night, respectively.
5. For the spring deployments a minimum of six species were recorded. As shown in Table 6-15 the highest levels of bat activity, both in terms of bat passes and distribution of records, being recorded for common pipistrelle (6.1 bp/h), followed by Leisler's bat (3,1 bp/h) and soprano pipistrelle (1.8 bp/h). The number of bat passes recorded during the spring deployment was over double the number recorded during subsequent deployments, and if the number of bat passes per hour is examined, then activity during May was significantly higher than later in the active season.
6. For the summer deployments a minimum of six species were recorded. As shown in Table 6-15 the highest levels of bat activity in terms of bat passes per hour were recorded for soprano Pipistrelle (1.8 bp/h),followed by Leisler's bats (1.5 bp/h) and common pipistrelles (1.3 bp/h).
7. For the autumn deployments a minimum of six species were recorded. As shown in Table 6-15 there were similar levels of bat activity recorded for common pipistrelles (1.0 bp/h) and soprano Pipistrelle (1.0 bp/h). During this deployment Leisler's bat activity (0.2 bp/h) saw a significant drop compared to previous deployments and was on a par with Myotis species (0.2 bp/h).

Table 6-15 Table 12 of Bat Impact Assessment Report

Deployment	Leisler's bat	Soprano pipistrelle	Common pipistrelle	Nathusius' pipistrelle	Myotis species	Brown long-eared bat	Total
Spring: May-2002 (n = 1,593 hrs)	5,029 3.1 bp/h	2,886 1.8 bp/h	9,704 6.1 bp/h	58 0.03 bp/h	599 0.4 bp/h	68 0.04 bp/h	18,344 11.5 bp/h
Summer: Jul/Aug-2020 (n = 1,597 hrs)	2,382 1.5 bp/h	2,937 1.8 bp/h	2,068 1.3 bp/h	9 0.01 bp/h	425 0.3 bp/h	65 0.04 bp/h	7,886 2.6 bp/h
Autumn: Sep-2020	374 0.2 bp/h	1,922 1.0 bp/h	1,939 1.0 bp/h	76 0.04 bp/h	443	93	4,847

(n = 1,902 hrs)					0.2 bp/h	0.05 bp/h	2.5 bp/h
Total n = 4,873 hrs	7,785	7,745	13,711	143	1,467	226	31,077 6.4 bp/h

The following proposed infrastructure was assessed by MKO during surveys carried out between 2016-2020.

Turbine Delivery Route
All junction works locations along the proposed turbine delivery route have been assessed for their potential to support roosting bats. Where hedgerow, trees and/or treeline exists this has been assessed in accordance with Table 4.1 of the BCT guidelines. Each of the junction works locations have been assessed as described below.

Location 1 - N4 Junction with L1927 (Joanstown Townland)
This area comprises small areas of Amenity grassland (GA1) and Dry Meadows and Grassy Verges (GS2) with no potential to support roosting bats.

Location 2 – Railway Line Level Crossing on the L1927
This area comprises a small area of Dry Meadows and Grassy Verges (GS2) and 80m of hedgerow will be temporarily removed to facilitate abnormally sized turbine vehicles to negotiate the rail crossing. The hedgerow was assessed as having *Negligible* potential to support roosting bats.

Location 3- L1927 and L5828 Local Roads Junction (Boherquill Townland)
This area comprises Dry Meadows and Grassy Verges (GS2), Improved agricultural grassland and a heavily trimmed Hawthorn (*Crataegus monogyna*) dominated Hedgerow (WL1) with *Negligible* potential. One semi-mature Ash tree will also require removal. The tree had no suitable features likely to be utilised as bat roosts and was assigned having *Negligible* potential to support roosting bats.

Location 4 – Gentle right turn from L5828 onto R395
The area comprises Dry Meadows and Grassy Verges (GS2) habitat and has no potential to support bats.

Location 5 and 6 - Site access junctions A and B that provide access/egress onto proposed link road (linking R395 and R396)
The habitat to either side of the junction with the proposed link road as accessed from the R395 comprises an area of Dry Meadows and Grassy Verges (GS2) and Cutover Bog (PB4). There will be no impacts to the south of the R395 as there is only oversail at this junction. There will also be minor impacts to the west of the R396 at access junction B. Approximately 20m of treeline and 14m of hedgerow will require removal at Junction B access/egress from the R396. The hedgerow at this location is heavily trimmed and was assessed as *Negligible*. The trees comprised Hawthorn and semi-mature Ash trees with no major cracks or crevices and were assessed as having *Negligible* to *Low* potential to support roosting bats.

Location 7 - Site access junction C that provides access to the site from the R396
It is proposed to widen the turn into the proposed wind farm site to the east of the R396 to facilitate the delivery of turbines. This will result in the loss of trees and scrub associated with the edge of conifer plantation. These trees had no potential to support bats.

Location 8 - Site access junction D which crosses the L5755

The swept path analysis undertaken for this location shows that the abnormally sized turbine vehicles will be able to negotiate this crossing with minor impacts on sections of hedge (over-sail) and grass verges which has no potential to support bats.

Location 9 – Site access junction E which provides access to Turbine T14 located south of L5755
It is proposed to widen the turn into the proposed turbine T14 to the south of the L5755 to facilitate the delivery of the turbine. This will result in the loss of Recolonising Bare Ground (ED3) and Scrub (WS1) dominated by Gorse (*Ulex europaeus*), Bracken (*Pteridium aquilinium*), Willow (Salix spp.) and Bramble (*Rubus fruticosus agg.*) which has no potential to support bats.

Location 10 – Site access junction F, which is the access junction off the L5755 to / from the proposed borrow pit, and
The analyses indicates that temporary visibility splays will be required at this junction in order to accommodate the construction vehicles. The borrow pit access location off the public road is to be gated post construction.

Location 11 - Site access junction G which provides access to turbine number 15 situated to the north of the L5755.
It is proposed to widen the turn into the proposed turbine T15 to the north of the L5755 to facilitate the delivery of the turbine. There are a number of mature Ash (*Fraxinus excelsior*) and Sycamore (*Acer pseudoplatanus*) trees that will require removal to facilitate the proposed works. These trees did not show any obvious signs of cracks or crevices but had occasional broken limbs and all supported dense ivy. As a result, these were assessed as having *Low-Moderate* potential to support roosting bats. The proposed area for hardcore surfacing will also result in the loss of Improved Agricultural Grassland (GA1).

Proposed Link Road West of Coole Village
The link road is described from east proceeding west. The proposed route diverges from the R396 to the R395 (Building and Artificial Surfaces (BL3)), bordered by Drainage Ditches (FW4), Meadows and Grassy Verges (GS2), Treelines (WL2) and Earth Banks (BL2). Adjacent habitats include agricultural buildings (BL3) and Improved Agricultural Grassland (GA1). The trees to be removed, mostly semi-mature Ash, Lodge pole Pine and Sitka Spruce were assessed as having *Negligible – Moderate* potential to support roosting bats.

Grid Connection Route
The entire length of the proposed grid connection route was surveyed for potential bat roost features on 15th September 2020. Structures were assessed in accordance with Table 4.1 of Collins (2016). The bridges along the proposed route were assessed for their suitability to support bats. The stone bridge that crosses the Lough Owel Feeder did not provide cracks or crevices and its potential to support roosting bats was assessed as *Negligible*. The concrete bridge that crosses the River Inny also did not provide cracks or crevices and was assessed as *Negligible*. The stone bridge that crosses the River Inny at Clonava/Shrubbywod had some cracks and crevices and was assessed as having *Low* potential to support bats. The remaining water crossings comprised small culverts or open drains which were not suitable for bats. Any roosting habitat within any bridges located along the proposed grid connection route will be undisturbed. The cable will either be installed within the road surface, strapped to the side of the bridge in appropriate conduit or else directional drilling will be used.

Trees along the proposed grid connection route were also assessed. The trees comprised predominantly Birch (*Betula spp.*) or conifer species and did not provide suitable bat roost features and were assessed as *Negligible*.

A driven transect was carried out to ascertain bat activity along the proposed grid connection route. This transect methodology was designed to cover a large linear area approximately 25.6 km and was carried out from 30 minutes before sunset to 2 hours after sunset. The following species were recorded; Soprano pipistrelle (n=75) was recorded most frequently, followed by Common pipistrelle (n=49). Instances of Leisler's bat (n=9), Brown long-eared bat (n=3) and Nathusius' pipistrelle (n=2) were less frequent (see

Figure 6-8). Overall activity levels along the route were assessed as Low. No high potential roost features were identified along the proposed peat embankment works areas identified by AGEC. A number of potential mature trees occur within private properties along the proposed route, however, these will not be impacted by the proposed grid connection works.

Methodology (BCT 2007): The transect was driven along a predefined route following the proposed grid connection route at a steady speed of 20-25 kph, continually recording bat sounds with a detector mounted out of the window on the hedgerow/treeline side of the vehicle. The transect was driven with dipped headlights, with one ecologist driving, and another ecologist recording bat activity. The surveyors were equipped with an active full spectrum bat detector, the Batlogger M bat detector (Elekon AG, Lucerne, Switzerland), and all bat activity was recorded for subsequent analysis to confirm species identifications. Weather conditions were suitable for bat surveys with calm wind conditions, temperatures of 16-19˚C and low cloud cover. Low levels of fog were also recorded after sunset.

All works will be restricted to the road corridor and there will be no impact on any structures with potential to support roosting bats. Records of the bat species identified along the grid connection route are provided in Figure 6-8.

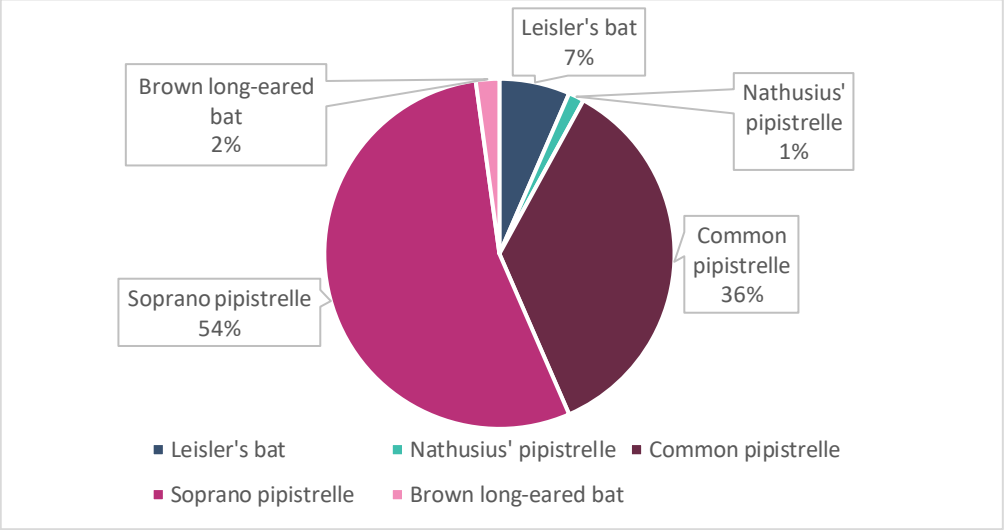

Figure 6-8 Bat species composition recorded along grid connection route September 2020

6.5.2.5.2 Non-volant Mammals

Evidence of mammalian species recorded between 2016 and 2020 site surveys undertaken by MKO are shown in Table 6-16 and in Figure 6-6.

Table 6-16 Evidence of Fauna

Species	Grid Ref:	Notes	Year
Otter (*Lutra lutra*)	E241,465 N277,329	Prints recorded on bare peat	2016
Otter (*Lutra lutra*)	E240,691 N277199	Spraint recorded on log adjacent to drain discharging to River Inny	2020
Badger (*Meles meles*)	E241,713 N276,448	Snuffle holes and prints recorded	2016
Badger (*Meles meles*)	E242,571 N275,072	Prints recorded in field	2020
Red Fox (*Vulpes vulpes*)	E241,904 N276,375	Prints recorded on bare peat	2016
Red Fox (*Vulpes vulpes*)	E241,054 N274949	Dropping on bare peat	2020
Red Fox (*Vulpes vulpes*)	E240,691 N277199	Dropping recorded near drain discharging to River Inny	2020
Irish Hare (*Lepus timidus hibernicus*)	E240,229 N276,021	One specimen observed	2016
Irish Hare (*Lepus timidus hibernicus*)	E240,958 N274,610	One specimen observed	2020
Feral goat	E240,213 N276094	Three feral goats observed grazing	2016

No Otter breeding or resting sites were recorded. However, prints were observed in bare peat in close proximity to the Glore River (2016).

During the 2017 assessment of the proposed cable route Otter spraint was recoded from adjacent watercourses at three location: Grid Refs: E238864 N266724, E239728 N264719 E242599 N256019. Records of spraint were also recorded at the first of these locations, namely the River Inny, during surveys carried out in 2020: Grid Refs: E238,871 N266,732 and E238,871 N266,713.

No Badger setts were recorded within the development footprint or study area during the site visits. Evidence of Badger in the form of snuffle holes and prints were recorded at two locations, one from the north west and the other from the east of the site.

A single Irish Hare and three feral goats were observed during the site visits in 2016. An Irish Hare was also recorded during surveys carried out in 2020.

Evidence of additional non-volant Mammals was not recorded during the site surveys. However it is likely that species such as Pine marten, Irish Stoat, Red squirrel, Pygmy shrew etc. occur within the study area at least on occasion.

6.5.2.5.3 Reptiles and Amphibians

Common Frog (*Rana temporaria*) was recorded in wet areas within the site (including in drains and pools and in bog habitats). The species is likely to breed within the study area. Common Lizard (*Zootoca vivipara*) and Smooth Newt (*Lissotriton vulgaris*), while not recorded during the site visits, are likely to occur within the study area. All species are most likely to be associated with the fringes of the site given that the milled peat areas offer no refugia.

It is considered that the Proposed Development will not result in a significant loss of suitable habitat for reptiles and amphibians. It is considered that suitable habitat is extremely widespread in the study area and beyond. No likely significant effects on these species are anticipated and therefore further survey/ assessment was not necessary.

6.5.2.5.4 Aquatic Fauna

Aquatic Ecological Surveys 2016

In 2016, Ecofact Environmental Consultants were commissioned to undertake aquatic surveys of watercourses within and in proximity to the Coole site. The relevant extracts from the Aquatic Survey Report are provided as Appendix 6-4 of this EIAR..

Of the eight sampling locations, seven (Sites 1, 2, 3, 5, 6, 7 & 8) are pertinent to the Proposed Development: Sampling location 4 was located on the Mayne river and has no hydrological connectivity with the Proposed Development. Sampling locations 1-3 are located on the River Inny downstream of the Proposed Development.

The Annex II species Atlantic Salmon was absent from all watercourses surveyed. No evidence of White-clawed Crayfish was recorded although it is noted that the species was recorded in a survey undertaken by Ecofact in 2013. Suitable substrate for Lamprey ammocoetes was recorded at each watercourse however the species was only recorded from survey areas 04, 06 and 07.

The tables below (6-17-6-20), extracted from the Ecofact Report, provide a summary of the Aquatic survey results.

Table 6-17 Results of the physical habitat appraisals of the aquatic ecology and fisheries survey

Site	Watercourse Name	Wetted width (m)	Mean Depth (cm)	Max Depth (cm)	Instream vegetation (%)	Bank Height (m)	Bank slope (°)	Bank Cover (%)	Canopy Cover (%)	Riffle (%)	Glide (%)	Pool (%)	Flow Velocity (m/s)	Rock (%)	Cobble (%)	Gravel (%)	Fine (%)	Shade (%)
1-3	Inny	28	1	2.5	40	1	75	95	0	0	20	80	0.2	0	0	20	80	10
4	Mayne	1.5	20	25	10	0.7	90	100	70	0	100	0	0.01	0	0	0	100	90
5	Glore	3	20	60	50	3	45	80	10	40	30	30	0.4	0	10	70	20	10
6	Glore	2.5	20	25	90	0.5	80	100	0	10	90	0	0.05	0	0	20	80	0
7	Glore	2.5	35	50	40	0.9	55	100	5	30	40	30	0.1	20	30	25	25	0
8	Monktown	1.5	10	30	15	1	80	80	45	25	25	50	0.2	0	0	0	100	45

Table 6-18 Results of the River Corridor Survey appraisals

Site	River	Tributary	Segment code	EPA code	Order	Wetted width (m)	Drained (Y/N)	Gradient (Low/Med/High)	Siltation (Heavy/Moderate/Normal/Free)	Filamentous algae (Y/N)	Eroding banks (Y/N)	Braided channel (Y/N)
1-3	Inny	-	07_1712	07M03	4	28	Y	L	H	Y	N	N
4	Inny	Mayne	26_2450	26M92	1	1.5	Y	L	H	Y	N	N
5	Inny	Glore	26_2976	26G02	3	3	Y	L	M	Y	Y	N
6	Inny	Glore	26_13411	26G02	3	2.5	Y	M	M	Y	Y	N
7	Inny	Glore	26_3579	26G02	3	2.5	Y	M	N	Y	Y	N
8	Inny	Glore, Monktown	26_2975	26M78	2	1.5	Y	L	H	Y	N	N

Table 6-19 Results of the aquatic ecological appraisals (P=present, L=likely, A=absent)

Site	Watercourse Name	Salmonid nursery (Y/N)	Salmonid fishery (Y/N)	Coarse nursery (Y/N)	Coarse fishery (Y/N)	Salmon (P/A)	Trout (P/A/L)	Coarse fish (P/A)	Eel (P/A/L)	Juvenile lamprey habitat (P/A)	Lamprey (P/A)	Crayfish (P/A)	FPM (P/A)	Floating river vegetation (Y/N)
1-3	Inny	A	A	Y	Y	A	A	A	A	P	A	A	A	A
4	Mayne	A	A	N	A	A	L	L	P	P	P	A	A	A
5	Glore	A	A	Y	A	A	P	A	P	P	L	A	A	A
6	Glore	Y	A	Y	A	A	P	P	P	P	P	A	A	Y
7	Glore	Y	A	Y	A	A	P	P	P	P	P	A	A	A
8	Monktown	A	A	A	A	A	L	L	A	A	A	A	A	A

Table 6-20 Biological water quality and WFD status at survey sites (High/Good/Moderate/Poor/Bad)

Site	Watercourse Name	Q-value	Biological Status (Macroinvertebrates)	Morphological Status	Fish Status
1-3	Inny	Q4/Q3-4	G/M	P	P/B
4	Mayne	Q3	P	P	B
5	Glore	Q3-4	M	P	P/B
6	Glore	Q3-4	M	M	P/B
7	Glore	Q3-4	M	M/P	P
8	Monktown	Q3	P	P/B	B

Significance of Fauna

The Ecological evaluation within this section follows a methodology that is set out in Chapter 3 of the *'Guidelines for Assessment of Ecological Impacts of National Roads Schemes'* (NRA, 2009).

Badger

Badger occur throughout the island of Ireland and are afforded protection under the Wildlife Acts, 1976-2012. Evidence of badger was only recorded along the fringes of the study area (See Figure 6-7)

No active setts were recorded within the development footprint or within the maximum 150m derogation limit outside the footprint area. Badger as an Ecological Receptor has been assigned *Local Importance (Higher value)* on the basis that the habitats along the study area boundary are likely to be utilised by a regularly occurring badger population of Local Importance. This species is classified as a KER.

Otter

Otter is listed under Annex II and Annex IV of the EU Habitats Directive and is also protected under the Irish Wildlife Acts 1976-2012. The species is evaluated as being Near Threatened in the most recent Red Data list for mammals (Kingston, 2012). Otter signs, in the form of prints, were observed at one location within the study area boundary (Figure 6-7).

No Otter breeding sites or holts were observed. The watercourses in the study area offer potential foraging and commuting habitat for the species. While no Otter holts were identified in the study area it is likely that there are breeding holts located in the wider area. Whilst not providing optimum habitat for Otter it is considered likely that the smaller land drains located within the study area may be utilised, on occasion, as commuting corridors between larger watercourses. Otter as an Ecological Receptor has been assigned ***Local Importance (higher value)*** on the basis of being a resident population of species protected under the Wildlife Acts and Annex II and IV of the EU Habitats Directive. This species is classified as a KER.

Irish Hare

Irish Hare was recorded on one occasion within the study area. Taking a precautionary approach Irish Hare as an Ecological Receptor has been assigned ***Local Importance (higher value)*** on the assumed presence of a resident population of species protected under the Wildlife Acts and Annex V of the EU Habitats Directive. Irish Hare is a native species (endemic sub-species), widely distributed and not considered threatened.

The bare peat habitat within the study area does not provide suitable feeding habitat for the species. There is an abundance of suitable habitat for this species along the fringes and surrounding the study area. Significant effects are not anticipated and further assessment was not deemed necessary. This species is not classified as a KER.

Bats

The full bat survey report is provided in Appendix 6-2. The following paragraphs provide a summary of the survey results.

Bats are protected by law in the Republic of Ireland under the Wildlife Act 1976 and subsequent amendments (2000 and 2010). Under the Wildlife Act, it is an offence to intentionally disturb, injure or kill a bat or disturb its resting place. Under this legislation it is unlawful to destroy, alter or disturb known bat roosts without an appropriate derogation licence, as issued by the National Parks and Wildlife Service (NPWS). All bat species fall under Annex IV of the EU Habitats Directive (1992), whereby member states have a burden of responsibility to protect bats and their resting places wherever they occur. The EU Habitats Directive has been transposed into Irish law with the European Communities (Birds and Natural Habitats) Regulations 2011. Among Ireland's obligations under the Habitats Directive, is the obligation to 'maintain favourable conservation status' of Annex-listed species. Ireland has ratified two international conventions, which afford protection to bats amongst other fauna. These are known as the 'Bern' and 'Bonn' Conventions. The Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention 1982) exists to conserve all species and their habitats, including bats. The Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention 1979, enacted 1983) was instigated to protect migrant species across all European boundaries, which covers certain species of bat.

The following bat species were identified during the dedicated bat surveys undertaken at the Coole site: Leisler's bat, Nathusius Pipistrelle, Soprano Pipistrelle, Common Pipistrelle, Myotis species, Brown long-eared bat Natterer's bats and Daubenton's bat. The study area is not utilised by large populations of bats. Overall the level of bat activity at the Coole Bog site was low, with the majority of the bat activity occurring towards the vegetated fringes of the site. Bat activity decreased in the open cutover bog land habitat at the site. This altered habitat is by far the dominant habitat type at the study area. Within the Coole bog site, there is little potential for roosting bats and no bat roosts were identified .

There will be no net loss of bat foraging/roosting habitat associated with the proposed wind farm development including the grid connection and proposed transport route as treeline and hedgerow removed will be replaced as part of the Proposed Development.

Bats as an Ecological Receptor have been assigned ***Local Importance (higher value)*** on the basis of resident and/or locally occurring populations of Annex IV species under the EU Habitats Directive and protected under the Wildlife Acts, 1976-2012.

6.5.2.6 Identification of Key Ecological Receptors

Table 6-21 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. The significance attributed to each of the habitats on site is provided in Figure 6-7.

Table 6-21 Key Ecological Receptors identified during the assessment

Ecological feature or species	Reason for inclusion as a KER	KER
Designated sites	**Nationally Designated Sites** The following Nationally designated sites are located either adjacent to or hydrologically downstream of the proposed grid connection and have been identified as being within the likely Zone of Impact: › Lough Derravarragh NHA › Ballynafid Lake and Fen pNHA › Royal Canal pNHA › Lough Owel pNHA › Lough Iron pNHA › Lough Ennell pNHA These sites are assigned **National** importance and included as a KER as there is potential for indirect effects on them via water pollution.	Yes
	European Designated Sites The following SACs 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: › Lough Owel SAC (000688) › Lough Ennell SAC (000685) › Lough Owel SPA (004047) › Lough Ennell SPA (004044) › Lough Derravaragh SPA (004043) › Lough Iron SPA (004046) These sites are assigned **International** importance and included as a KER as there is potential for indirect effects on them via water pollution. **Note: SPAs within the Likely Zone of Impact are considered in Chapter 7, Ornithology and in the NIS.**	Yes

Ecological feature or species	Reason for inclusion as a KER	KER
Degraded Raised Bog (non-Annex I)	Degraded raised bog (non-Annex I) is present in scattered locations surrounding the study area boundary. The degraded peatland does not conform to any of the Annex I raised bog habitat classifications. Areas of the habitat are dried out and drained on all sides. Such areas are not capable of natural regeneration. It is noted that the, structure, function and viability of the habitat make it susceptible to peat extraction and scrub/woodland encroachment. The remnant degraded Raised Bog is **assigned *Local Importance (Higher Value)*** on the basis of containing semi-natural habitat types with high biodiversity in a local context.	Yes
Dystrophic Lake	The dystrophic lake recorded surrounded by the remnant raised bog corresponds to the Annex I habitat Natural dystrophic Lakes and ponds [3160]. This habitat and fringing vegetation has been assigned ***National Importance*** based on the presence of a viable habitat area.	Yes
Bog Woodland	Bog Woodland (WN7) is present in numerous locations along the fringes of study area boundary. Woodland stands were examined to investigate their potential to conform to the Annex I habitat 'Bog Woodland'. When considered according to the National Survey of Native Woodlands (Perrin, 2008), this woodland type corresponded closely with the *Rubus fruiticosus - Dryopteris dilatata* variant of the *Betula pubescens – Molinia caerulea* woodland group. This habitat has no affinity with the Annex I Priority Habitat 'Bog Woodland'. The Bog woodland stands, none of which conform to Annex I status, are classified as being of ***Local Importance (higher value)*** on the basis of supporting semi-natural habitat types with high biodiversity and high degree of naturalness in a local context.	Yes
River Glore Corridor and River Inny	The watercourses including the woodland along the River Glore Corridor are assigned ***Local Importance (higher value)*** on the basis of supporting semi-natural habitat types with high biodiversity and high degree of naturalness in a local context. The watercourses also have potential to support a number of species that are listed on Annex II of the EU Habitats Directive (e.g. Otter, White-clawed Crayfish etc.).	Yes
Additional Habitats within the study area including borrow pit, Turbine delivery route and grid connection route	The conifer plantation and pastoral habitats associated with the proposed turbine locations, 5, 14 and 15, and the habitats along the turbine delivery route, grid connection route and link road were of low ecological significance and common in the wider landscape. For this reason these were assigned ***Local Importance (lower value).***	No
Otter	Taking precautionary approach the receptor importance has been assigned based on a locally occurring population of a species protected under the Habitat Directive and Wildlife Acts (recorded in borders of study area only). This species has been assigned ***Local Importance (higher value).***	Yes

Ecological feature or species	Reason for inclusion as a KER	KER
Badger	Taking precautionary approach the receptor importance has been assigned based on a locally occurring population of a species protected under the Wildlife Acts (recorded in borders of study area only). This species has been assigned ***Local Importance (higher value).***	Yes
Irish Hare	Native species (endemic sub-species), widely distributed and not considered threatened. The habitats within the development footprint are suboptimal for the species. There is an abundance of suitable habitat for this species surrounding the study area. Significant effects are not anticipated and the species has been assigned *Local Importance (lower value).*	No
Bats	Resident and/or locally occurring populations of Annex IV species (Activity concentrated around fringes of study area)	Yes
Additional protected fauna	Populations of greater than local significance were not recorded	No

6.6 Ecological Impact Assessment

6.6.1 Do-Nothing Effect

An alternative land-use option to developing the Proposed Development would be to leave the site as it is under its current planning permission. As detailed in Section 2.5.1 in Chapter 2 of this EIAR, a wind energy project comprising of 13 turbines and all associated infrastructure has current planning permission on the Proposed Development site. The permitted wind energy project was designed to co-exist and operate independently of land use practices of commercial peat harvesting and forestry to minimise impacts. Whilst there would be a change of land use within the footprint of the Proposed Development, to facilitate the wind turbines and infrastructure, this was found to be an acceptable part of the permitted development. The section of the Proposed Development site that does not form part of the currently permitted wind energy development site has a current-land use practice of low-intensity pastoral agriculture and commercial forestry. An alternative land-use option to developing a renewable energy project at this section of the Proposed Development site would be to leave the site as it is, with no changes made to the current land-use practices of low intensity pastoral agriculture. The landscape and visual effects of this are considered to be neutral.

A second potential Do-Nothing scenario exists for this project i.e. assuming that the permitted development is not constructed. In this scenario the existing baseline environment will evolve in one of two potential ways, either the peat extraction ceases and a rehabilitation plan is developed or the peat extraction continues and then a rehabilitation plan is developed.

6.6.2 Effects on Designated Sites

6.6.2.1.1 *Effects on Nationally Designated Sites*

The proposed grid connection traverses the Royal Canal pNHA to the southern section of the route. Works will be restricted to the existing road at this location and will not directly impact the Royal Canal pNHA. Although the proposed grid connection occurs adjacent to the boundary of a number of designated sites, works will be carried out within the existing road corridor at these locations. As a result, there will be no direct effects on any nationally designated site as a result of the construction,

operation and decommissioning of the Proposed Development. However, taking a precautionary approach, there is potential for indirect effects on these sites via water pollution and they have been included as KERs.

Six nationally designated sites were identified as being within the zone of influence as listed below:

- Lough Derravarragh NHA
- Ballynafid Lake and Fen pNHA
- Royal Canal pNHA
- Lough Owel pNHA
- Lough Iron pNHA
- Lough Ennell pNHA

The boundaries of four of these nationally designated sites, namely; Lough Derravaragh NHA, Lough Owel pNHA, Lough Ennell pNHA and Lough Iron pNHA also share a boundary with a respectively named European designated site, namely Lough Derravaragh SPA, Lough Owel SAC/SPA, Lough Ennell SAC/SPA and Lough Iron SPA. As a result, any mitigation measures implemented for the protection of these European sites will also apply to the concurrently designated national site.

Of the six nationally designated sites listed above, two of these occur as designated sites in their own right and have been assessed further below:

- Ballynafid Lake and Fen pNHA. The proposed grid connection occurs within the national N4 road along the boundary of the pNHA. It is a site that contains peatland and fen habitats and the potential for hydrological connection was considered as a pathway for effect. As described in Chapter 9 of this EIAR, the extents of the pNHA boundary extend out past the N4 road, however this is considered a GIS oversight, as the road and surrounding made ground does not constitute the habitat described under the NHA description.
- Royal Canal pNHA is traversed by the proposed grid connection route where it crosses the Lough Owel feeder via the existing road bridge. Potential for impacts in relation to surface water run-off are assessed in full in the Hydrology Chapter and the CEMP.

Following the implementation of mitigation, there is no potential for significant effects on these Nationally Designated Sites. All best practice measures will be adhered to throughout the Proposed Development phases as described in the Hydrology Chapter and the CEMP.

6.6.2.1.2 *Effects on European Designated Sites*

With regard to European Sites, a Screening assessment was carried out to provide An Bord Pleanala with the information necessary to complete a Screening for Appropriate Assessment for the Proposed Development in compliance with Article 6(3) of the Habitats Directive. As part of this assessment, the potential for the Proposed Development to have an effect on any European sites in the ZOI was considered. 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 have a significant effect on the following European Sites:*
>
> - *Lough Owel SAC (000688)*
> - *Lough Ennell SAC (000685)*
> - *Lough Owel SPA (004047)*
> - *Lough Ennell SPA (004044)*
> - *Lough Derravaragh SPA (004043)*
> - *Lough Iron SPA (004046)"*

As a result, an Appropriate Assessment of the Proposed Development is required and a Natura Impact Statement (NIS) has been prepared.

The NIS concludes the following:

> *"Following an examination, evaluation and analysis, in light of best scientific knowledge and the conservation objectives of the site, and, on the basis of objective information, having taken into account the relevant mitigation measures, it can be concluded that the Proposed Development will not have an adverse impact on any European Sites, either alone or in combination with other plans or projects."*

Due to close proximity and/or potential hydrological pathways with the Proposed Development the following European sites have been included as KERs:

- *Lough Owel SAC (000688)*
- *Lough Ennell SAC (000685)*
- *Lough Owel SPA (004047)*
- *Lough Ennell SPA (004044)*
- *Lough Derravaragh SPA (004043)*
- *Lough Iron SPA (004046)"*

6.6.3 Likely Significant Effects During Construction Phase

6.6.3.1 Effects on Habitats During Construction

Table 6-22 below provides details of the extent of the recorded habitats within the study area site boundary, the extent of the habitat that will be lost to facilitate the Proposed Development and the percentage of the total area of that habitat on the site that it represents.

Table 6-22 Extent of habitat lost to the Proposed Development and the percentage of the total area of that habitat on site

Habitat	Total Area on the Site	Area to be Lost	% of Total
Cutover Bog (PB4)	305.02	12.34	4.04
Conifer Plantation (WD4)	105.5	15.97	15.13
Mixed Broadleaved/Conifer Woodland (WD2)	8.03	0.35	4.36
Improved Agricultural Grassland (GA1)	28.77	7.53	26.1
Raised Bog (PB1)	5.79	0	0
Wet Grassland/Scrub (GS4/WS1)	9.93	0	0
Bog Woodland/Scrub (WN7/WS1)	4.22	0	0
Bog Woodland (non- Annex) (WN7)	3.97	0.32	8.06

Scrub (WS1)	1.93	0.59	0.57
Buildings and Artificial Surfaces (BL3)	1.17	0.55	47.0
Dystrophic Lake (FL1)	0.47	0	0
Poor Fen (PF2)	0.18	0.18	0
Dry Meadows and Grassy Verges (GS2)	3.13	0.17	5.43
	Total Length (km)	Length to be Lost	% of Total
Depositing/Lowland River (FW2)	3.46km	0	0
Drainage Ditch (FW4)	4.39	0.86	19.58
Treeline (WL2)	5.59	0.96	17.17
Hedgerow (WL1)	1.83	0.22	12.02
Spoil and Bare Ground (ED2)	1.87	0.78	41.7

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 bare peat and conifer plantation that are both of very low ecological value. 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.

6.6.3.1.1 Assessment of Potential Effects on River Glore Corridor, River Inny and Sensitive Aquatic Receptors

Table 6-23 Potential for impact on River Glore Corridor,River Inny and Sensitive Aquatic Receptors

Description of Effect	Felling associated with internal roads will result in the direct loss of approximately 0.35 hectares of mixed broadleaved/conifer woodland (WD2). Some of this habitat will be lost along the River Glore corridor. There will be 3 no. watercourse crossings within the wind farm site. The first crossing comprises the replacement of an existing timber bridge with a 5m clear span bridge which will form part of the internal site road network, connecting Turbines T5-T12 to Turbines T1-T4. A second crossing will be required to provide access to Turbine T1 located to the north of an OPW drain and will comprise a 3m clear-span bridge. The third crossing will comprise a new 5m clear-span bridge to provide access to T15. There will be no in-stream works required as part of the Proposed Development. Additional control measures will be undertaken at the proposed watercourse and drain crossing locations. There is no potential for the Proposed Development to result in any barrier to the movement of aquatic species. There will be no instream works associated with the construction of the proposed grid connection route. 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 could result from the installation of the 3 no. proposed watercourse crossings, removal of scrub and woodland, culverting of drainage ditches, large-scale movement of peat or the use of concrete and other construction materials. The Proposed Development will cross numerous small drainage ditches, which are not themselves ecologically sensitive but do provide connectivity to the larger watercourses that surround the site. This represents a potential indirect effect on the identified aquatic receptors in the form of habitat degradation through water pollution. These effects on water quality are fully described in Chapter 9 of this EIAR and are described here in relation specifically to ecology. **Note: Whilst this impact assessment is in the habitats section, it also assesses the impact on the Proposed Development on aquatic species including salmonids, lamprey, coarse fish, white-clawed crayfish, European eel, aquatic invertebrates and other aquatic species. The Proposed Development will have no direct impact on the aquatic habitat of these species and there is no potential for disturbance. The only pathway for effect to occur is as a result of water pollution and this is discussed in this section in relation to habitats and species.**
Characterisation of unmitigated effect	There is no potential for direct loss or fragmentation of aquatic habitat. Given that the site predominantly comprises milled peat and the bridge crossings will not involve instream works, any potential pollution event would be a short-term, slight negative effect. In the absence of mitigation, the indirect effect of water pollution 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 there will be no instream works associated with the bridge crossings.
Assessment of Significance prior to mitigation	In the absence of mitigation and following the precautionary principle, there is potential for the Proposed Development to result in significant indirect effects on the identified aquatic habitats and species at a local geographic scale in the form of pollution during the construction phase of the Proposed Development.
Mitigation	A detailed drainage maintenance plan for the Proposed Development is provided in Section 4.6.10 of this EIAR. This plan provides 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. In addition, the Construction Environmental Management Plan (CEMP) that is provided as Appendix 4-8 provides the details of exactly how the measures will be implemented during construction.
Residual Effect following Mitigation	Following the implementation of mitigation, there will be no significant residual effect on aquatic habitats or species as a result of the Proposed Development.
Potential for Cumulative Effect	The Proposed Development will not result in any significant effect on aquatic habitats or species of biodiversity value. It therefore cannot contribute to any cumulative effect in this regard.

6.6.3.1.2 Assessment of Potential Effects on Remnant Degraded Raised Bog (PB1)

Table 6-24 Indirect Effect on Remnant Degraded Raised Bog

Description of Effect	The Proposed Development has been designed to avoid any direct habitat loss. Given the extent of existing drainage and the separation (10m) from the sensitive habitat, significant indirect drainage related impacts during construction are not anticipated.
Characterisation of unmitigated effect	Indirect habitat degradation is assessed as a *Long-term Negative Impact*.
Assessment of Significance prior to mitigation	The remnant raised bog habitat is currently degraded, therefore any indirect drainage related impacts during construction will not result in significant effect on this already degraded habitat.
Mitigation	The Proposed Development has been deliberately designed to avoid loss of remnant raised bog habitat. A drainage maintenance plan for the Proposed Development is provided in Section 4.6.10 of this EIAR and associated figures in Appendix 4-9.
Residual Effect following Mitigation	Following the implementation of mitigation and the arising effect of the mitigation measures, there will be no significant residual effect on remnant raised bog habitat as a result of the Proposed Development.
Potential for Cumulative Effect	The Proposed Development will not result in any significant negative effect on the remnant raised bog habitat within the site. It therefore cannot contribute to any cumulative effect in this regard.

6.6.3.1.3 Assessment of Potential Effects on Dystrophic Lake (FL1)

Table 6-25 Potential for impact on Dystrophic Lakes (FL1)

Description of Effect	The Proposed Development has been designed to avoid any direct habitat loss. The dystrophic lake is located hydraulically up gradient of the proposed construction area therefore no potential pathway for emissions to impact the lacustrine habitat exist. Given the extent of existing drainage and the separation (100m) from the sensitive habitats, indirect effects during construction are not anticipated.
Characterisation of unmitigated effect	*No effect* was identified with regard to direct habitat loss or degradation.
Assessment of Significance prior to mitigation	No effect was identified with regard to direct habitat loss. There will be no significant effect on this habitat as it is located hydraulically upgradient of the proposed works and no potential pathway for emissions to impact the lacustrine habitat exist. Given the extent of existing drainage and the separation (100m) from the sensitive habitats, indirect effects during construction are not anticipated.
Mitigation	No mitigation required.
Residual Effect following Mitigation	There will be no significant residual effect on dystrophic lakes as a result of the Proposed Development.

Potential for Cumulative Effect	The Proposed Development will not result in any significant effect on aquatic habitats or species of biodiversity value. It therefore cannot contribute to any cumulative effect in this regard.

6.6.3.1.4 *Assessment of Potential Effects on Bog Woodland*

Table 6-26 Indirect Effect on Bog Woodland

Description of Effect	Felling associated with internal roads will result in the direct loss of approximately 0.32 hectares of bog woodland. This woodland block is located on the edge of the cutover peat area and conifer plantation. It is already subject to extensive drainage and is not classified as Annex I habitat. Indirect effects during construction are not anticipated.
Characterisation of unmitigated effect	The minor loss of this non-Annex bog woodland is assessed as a *Short Term Slight Negative Impact.*
Assessment of Significance prior to mitigation	There will be no significant effect as a result of this minor loss of habitat that occurs in association with cutover bog and conifer plantation and is already subject to extensive drainage.
Mitigation	The Proposed Development has been deliberately designed to minimise loss of bog woodland. Vegetation removal will be conducted in line with the provisions of the Wildlife Act. Tree line that is lost as part of the Proposed Development will be replaced along the proposed access road to T15.
Residual Effect following Mitigation	Following the mitigation measures above, there will be no significant residual effect on bog woodland habitat as a result of the Proposed Development.
Potential for Cumulative Effect	The Proposed Development will not result in any significant negative effect on bog woodland habitat within the site. It therefore cannot contribute to any cumulative effect in this regard.

6.6.3.2 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. Given the extensive area of habitat that will remain undisturbed throughout the site and the avoidance of the most significant areas of faunal habitat (wetlands, natural woodlands and watercourses), no significant effects on non-KER faunal biodiversity is anticipated as a result of the Proposed Development.

It should be noted that no significant habitat for salmonids, lamprey, coarse fish, white-clawed crayfish, European eel, aquatic invertebrates or other aquatic species was recorded within the footprint of the Proposed Development. The bridge crossings of the river Glore will be clear span and will not include any instream works. 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 6.6.3.1.1 above and is not repeated below.

6.6.3.2.1 Assessment of Potential Effects on Otter

Table 6-27 Assessment of Potential Impacts on Otter

Description of Effect	Direct impacts on Otter are not anticipated. There will be two crossings of the Glore River, and one drain crossing which will comprise clear span bridges with no requirement for instream works. There will be no loss of resting or breeding places associated with the development. Potential indirect effects may include deterioration of habitat resulting from surface water pollution. Significant displacement is not anticipated given the low levels of activity recorded. Potential effects may include habitat fragmentation and disturbance.
Characterisation of unmitigated effect	There is no potential for direct loss or fragmentation of significant otter habitat. Given that the site predominantly comprises milled peat and the bridge crossings will not involve instream works, any potential disturbance to otter will be a short-term, slight negative effect. In the absence of mitigation, the indirect effect of water pollution on otter during construction has the potential be a short-term reversible impact. The magnitude of any such impact is likely to be at worst moderate, given that there will be no instream works associated with the bridge crossings.
Assessment of Significance prior to mitigation	There is no potential for the construction phase of the Proposed Development to result in significant disturbance, displacement or habitat fragmentation for otter. In the absence of mitigation and following the precautionary principle, there is potential for the Proposed Development to result in significant indirect effects on otter at a local geographic scale in the form of habitat deterioration resulting from pollution.
Mitigation	A pre-commencement otter survey will be carried out prior to construction. This will identify if any otter have taken up residence within or adjacent to the proposed works since the last survey. A detailed drainage maintenance plan for the Proposed Development is provided in Section 4.6.10 of this EIAR. This plan provides 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. In addition, the Construction Environmental Management Plan (CEMP) that is provided as Appendix 4-8 provides the details of exactly how the measures will be implemented during construction.
Residual Effect following Mitigation	Following the implementation of mitigation, there will be no significant residual effect on otter as a result of the Proposed Development.
Potential for Cumulative Effect	The Proposed Development will not result in any significant effect on otter. It therefore cannot contribute to any cumulative effect in this regard.

6.6.3.2.2 Assessment of Potential Effects on Badger

Table 6-28 Assessment of Potential Impacts on Badger

Description of Effect	Direct or indirect impacts on Badger are not anticipated. There will be no loss of resting or breeding places associated with the development. Much of the development footprint is dominated by bare peat and conifer plantation which does not provide suitable foraging habitat for the species. Although suitable badger habitat was recorded in agricultural fields close to Turbine 15 and signs of badger activity were recorded within the agricultural lands in proximity to T15 no badger setts were recorded. Potential effects may include habitat fragmentation and disturbance. Significant displacement is not anticipated given the low levels of activity recorded. The activity was associated with the periphery of the study area boundary and not the development footprint.
Characterisation of unmitigated effect	Given that badger activity was associated with the periphery of the study area boundary and not the development footprint, the temporary disturbance to foraging badger constitutes a Temporary Slight Negative Effect. The Proposed Development will not result in any fragmentation of badger habitat, as there will be no barriers to movement throughout the site as a result of the proposed works
Assessment of Significance prior to mitigation	There is no potential for significant loss of badger habitat as a result of the Proposed Development. There is no potential for significant disturbance to badger as a result of the Proposed Development as badger activity was associated with the periphery of the study area boundary and not the development footprint. There is no potential for significant effects on badger at any geographic scale.
Mitigation	A pre-commencement badger survey will be carried out prior to construction. This will identify if any badgers have taken up residence within or adjacent to the proposed works since the last survey.
Residual Effect following Mitigation	Following the implementation of mitigation, there will be no significant residual effect on badger as a result of the Proposed Development.
Potential for Cumulative Effect	There will be no significant residual effect on badger at any geographic scale, it can therefore be concluded that there is no potential for the Proposed Development to contribute to a cumulative effect in this regard.

6.6.3.2.3 Assessment of Potential Effects on Bats

Table 6-29 Assessment of Potential Impacts on Bats

Description of Effect	Whilst the study area was utilised by foraging and commuting bats, the Proposed Development will not result in any significant reduction or loss of the available habitat on the site given the nature of the habitats within the site i.e. predominantly milled peat. No bat roosts were identified in close proximity to the construction footprint of the Proposed Development and there is no potential for significant bat roosts to be disturbed by increased human presence and increased noise during construction. The potential for bats to be killed during removal of trees or structures was considered in this assessment. No bat roosts were identified within the Proposed Development however a number of trees supporting potential bat roost features occur at the borrow pit, along the proposed access road leading to T15, along the public road between T14 and T15, the Beech woodland along the access track between T5 and T9 and the mature poplar treeline along the River Glore. No bat roosts were recorded along the proposed grid connection route or at the locations proposed for junction works. Location 11 of the proposed junction works supports a number of mature trees which have potential bat roost features in the form of dense ivy and occasional broken limbs.
Characterisation of unmitigated effect	The potential for direct impacts on bats roosting in trees located on access tracks between the turbines and for the excavation of the borrow pit was considered *Significant* at the *Local* scale. During the construction phase the potential for secondary impacts on foraging/ commuting bats due to removal of vegetation was considered *Significant* at the *Local* scale
Assessment of Significance prior to mitigation	In the absence of mitigation there is potential for the construction of the Proposed Development to result in Significant effects on the local bat population at a *Local* scale. No bat roosts were recorded during the bat surveys carried out. However, a number of trees with potential roost features were identified during the surveys. The bat survey report, which is included in Appendix 6-2 provides further detail and analysis with regard to the effects on bat species.
Mitigation	› Pre-construction roost surveys will be required to identify and protect any bats potentially occupying roosts in vegetation earmarked for removal. For any trees found to be occupied by roosting bats prior to construction, an exclusion zone will be implemented to prevent disturbance during times of occupancy. Table 20 of the Bat Survey and Impact Assessment Report provided in Appendix 6-2 provides optimal time periods for works at different roost types, and therefore by extension restrictive periods for construction works, during which the exclusion zone for construction work would be applicable. The extent of the exclusion zone can be up to 30m for any notably disruptive works such as pile-driving; however, the mitigation measure should be proportional to the disturbance levels emanating from the construction activity. Pre-construction surveys will inform the application to undertake appropriate mitigation actions as required to ensure the conservation of bats, if found to be utilising roosts within the construction corridor. › The loss of approximately 960m of treeline and 220m of hedgerow will be replaced as part of the Proposed Development. This will take place along the access road to T15. › Treeline lost along the proposed link road will be replaced 'like for like'. › Where treeline is lost in the woodland habitat between T5 and T9 the remaining woodland will be retained. › The buffer created around T5 will be maintained throughout the operation of the wind farm in order to maintain a homogenous habitat around the turbine throughout its lifespan.

Residual Effect following Mitigation	With the implementation of the above mitigation, 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.
Potential for Cumulative Effect	There is no significant effect on bats associated with the Proposed Development. It therefore cannot contribute to any cumulative effect in this regard.

6.6.3.3 Pre-Construction General Best Practice

Mammal Surveys

Prior to any works being carried out, a pre-construction Badger and Otter survey will be undertaken by a qualified ecologist to ensure that Badger and Otter have not taken up residence within or close to the proposed works area.

It is not anticipated that any setts or holts will require to be excluded as part of project based on the findings of the mammal surveys undertaken. However, should any sett or holt be encountered during the pre-construction surveys, it will be subject to exclusion procedures as outlined in the TII/NRA guidelines (2005 and 2006).

The requirement for a preconstruction survey comes from NRA (2005b) Guidelines for the Treatment of Badgers prior to the Construction of National Road Schemes and NRA (2006b) Guidelines for the Treatment of Otters prior to the Construction of National Road Schemes. The function of the preconstruction survey is to access any changes to the baseline conditions of the site that may have occurred between the planning consent and construction stage. This measure does not represent a lacuna in the assessment and is in accordance with industry best practice.

Invasive Species

Third Schedule invasive species Bohemian Knotweed, Japanese Knotweed, Himalayan Knotweed and Rhododendron were recorded along the proposed grid connection route (see Table 6-14). The following mitigation will be adhered to in relation to these species:

- All earthworks machinery will be thoroughly pressure-washed prior to arrival on site and prior to their further use elsewhere.
- Care will be taken not to disturb or cause the movement of invasive species fragments, either intentionally or accidentally.
- Stands of Knotweed will be clearly demarcated by temporary fencing and tracking within them will be strictly avoided. A minimum buffer of seven metres will be applied to avoid disturbance of lateral Knotweed rhizomes.
- Where works occur within 7m of a Knotweed stand these will be carried out under the supervision of a suitably qualified ecologist.
- Where a Knotweed stand is encountered along the road the grid connection will be laid on the opposite side of the road to avoid excavation of potential Knotweed root material insofar as possible.
- Should removal of Knotweed off site be required this will be done so under the supervision of an ecologist in line with NPWS licencing.
- The machinery must be thoroughly cleaned down under supervision of an ecologist prior to moving away from the Knotweed contaminated area.
- All contractors and staff will be briefed about the presence, identification and significance of Knotweed before commencement of works.

- Good construction site hygiene will be employed to prevent the spread of these species with vehicles thoroughly cleaned down prior to leaving any site with the potential to have supported invasive species. All plant and equipment employed on the construction site (e.g. excavator, footwear, etc.) will be thoroughly cleaned down on site to prevent the spread of invasive plant species such as Knotweed and Rhododendron. All clean down must be undertaken in areas with no potential to result in the spread of invasive species.
- When working at locations in proximity to natural watercourses, a suitable barrier will be erected between the watercourse and the stand of invasive species. This will assist in preventing the spread of any invasive species into the watercourse during their removal.
- Any soils or subsoils contaminated with invasive species will sent for disposal to an appropriately licenced facility.

The treatment and control of invasive alien species will follow guidelines issued by the National Roads Authority - *The Management of Noxious Weeds and Non-native Invasive Plant Species on National Roads* (NRA 2010) and Irish Water (2016) *Information and Guidance Document on Japanese Knotweed*.

6.6.4 Likely Significant Effects During Operational Phase

6.6.4.1 Effects on Habitats during Operation

The operation of the Proposed Development will not result in any additional land take or loss of 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.

Potential for effects on rivers, streams, open waterbodies and sensitive aquatic species remains a KER during operation and is assessed in detail in the following subsections.

6.6.4.1.1 *Effects on River Glore Corridor, River Inny and Aquatic Receptors during Operation*

Table 6-30 Assessment of Potential Impacts on River Glore Corridor, River Inny and Aquatic Receptors during Operation

Description of Effect	Direct effects are not anticipated. Potential indirect effects may include deterioration of habitat quality due to run off of silt and other pollutants to surface waters. The increased amount of hard standing associated with the windfarm infrastructure has the potential to result in faster run off of water 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. These 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. **Note: Whilst this impact assessment is in the habitats section, it also assesses the impact on the Proposed Development on aquatic species including salmonids, lamprey, coarse fish, white-clawed crayfish, European eel, aquatic invertebrates and other aquatic species. The Proposed Development will have no direct impact on the aquatic habitat of these species and there is no potential for disturbance. The only pathway for effect to occur is as a result of water pollution and this is discussed in this section in relation to habitats and species.**
Characterisation of unmitigated effect	Impact on water quality during the operational phase of the Proposed Development has been assessed as a permanent negative effect in the absence of mitigation. The magnitude of this impact is slight because the footprint of the Proposed Development will be minimal when compared to the overall size of the site.

Assessment of Significance prior to mitigation	Significant effects on water quality are not anticipated at any geographic scale during the operation of the Proposed Development.
Mitigation	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 9.4.2 of Chapter 9: Hydrology and Hydrogeology and Section 5 of Appendix 4-8, CEMP.
Residual Effect following Mitigation	Following the implementation of the mitigation measures outlined above, no potential for significant effect has been identified at any geographic scale as a result of the Proposed Development.
Potential for Cumulative Effect	There will be no significant residual effect at any geographic scale, it can therefore be concluded that there is no potential for the Proposed Development to contribute to a cumulative effect in this regard

6.6.4.2 Effects on Fauna during Operation

The operation of the Proposed Development will not result in any additional habitat loss or deterioration.

There is no potential for significant negative effects on non-volant terrestrial fauna including badger and otter that were identified as KERs during the construction phase of the development.

It should be noted that no significant habitat for salmonids, lamprey, coarse fish, white-clawed crayfish, 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 6.6.3.1.1 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 taxa were identified as KERs during the operational phase.

6.6.4.2.1 Assessment of Potential Effects on Bats during Operation

Table 6-31 Assessment of Potential Impacts on Bats during Operation

Description of Effect	There is no potential for loss or fragmentation of foraging or roosting habitat for bat species during the operational phase of the proposed windfarm as there will be no additional loss of any habitats following construction. 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 predominantly characteristic of bare peat, conifer plantation and agricultural habitat found within the site.
Characterisation of unmitigated effect	The potential for impact on bat species during the operation of the proposed windfarm in the absence of mitigation is assessed as a *Long-term Moderate Reversible Impact*.
Assessment of Significance prior to mitigation	During the operational phase the potential for direct impacts on foraging/ commuting bats - collision or barotrauma to Leisler's bats, common and soprano pipistrelle bats is considered *Significant* at the Local scale and for Nathusius' pipistrelles is considered *Significant* at the *County* to *Regional* scale.
Mitigation	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 foraging habitat for bat species will be implemented. Details of this mitigation and how it is calculated is provided in Appendix 6-2. In addition to this, ongoing monitoring of bat activity will be undertaken for at least three years' post construction of the wind farm. This will provide data and information on the actual recorded impact of the wind turbines on the local bat populations. Details of the proposed monitoring programme are provided in Appendix 6-2 and include measurement of bat activity, weather conditions and any correlation between the two. The monitoring will also include corpse searching in the areas surrounding the turbines to gather data on any actual collisions. If, following monitoring, there are significant effects recorded, a range of measures are proposed to ensure that any such effects are fully mitigated. These measures include blade feathering, curtailment of turbines during certain conditions and increase of buffers surrounding the turbines. Any combination of the above measures may be employed following actual monitoring of the impact of the operating turbines on bats.
Residual Effect following Mitigation	Following the implementation of the monitoring and mitigation described above, there is no potential for significant residual effects on bat species.
Potential for Cumulative Effect	There is no significant residual effect on bats associated with the Proposed Development. It therefore cannot contribute to any cumulative effect in this regard.

6.6.5 Likely Significant Effects During Decommissioning phase

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. In addition, the removal of the infrastructure will involve similar operations to those involved in construction but without the large-scale earth moving or excavations as the turbine bases and roads etc. will be left in place. These works would therefore be of a smaller scale but would have similar impacts on ecology to those experienced during construction. There would be no additional or ancillary impacts associated with the decommissioning phase.

The same mitigation to prevent significant impacts on water quality and associated aquatic fauna and terrestrial fauna during construction will be applicable to the decommissioning phase. Any measures to minimise or avoid disturbance will also be applicable. The CEMP, Appendix 4-8, for the Proposed Development and the Decommissioning Plan, Appendix 4-11, provides the 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.

6.7 Cumulative impact

The Proposed Development was considered in combination with other plans and projects in the area that could result in cumulative impacts on European Sites, Nationally designated sites and protected species. This included a review of online Planning Registers and served to identify past 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.

6.7.1 Assessment of Plans

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

- Westmeath County Development Plan 2014-2020
- Westmeath Biodiversity Action Plan 2014 -2020
- Draft Westmeath County Development Plan 2021 – 2027

The review focused on policies and objectives that relate to 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 6-32 and Table 6-33.

Table 6-32 Review of land use and spatial plans 2014-2020

Westmeath County Development Plan 2014 - 2020	
Key Policies/Issues/Objectives Directly Related to European Sites In The Zone of Influence	**Assessment of Potential Impact on Designated Sites**
NATURA 2000 SITES: POLICIES & OBJECTIVE P-NAT1 To protect and conserve wild bird species and their habitats, especially rare or vulnerable species and regularly occurring migratory species.	The Development plan was comprehensively reviewed, with particular reference to Policies and Objectives that relate to the Natura 2000 network and other natural heritage interests. No potential for cumulative impacts when considered in conjunction with the current proposal were identified. There will be no impact on any designated sites as a result of deterioration in water quality. Best practice preventative measures will be implemented to avoid effects on water quality, as outlined in section 3.3 of this report, the hydrology chapter (Appendix 4) and in the CEMP (Appendix 3). There will be no adverse effects on sensitive aquatic receptors listed as QIs/SCIs of European Sites, as a result of deterioration in water quality.
P-NAT2 To protect and conserve Special Areas of Conservation, candidate Special Areas of Conservation, Special Protection Areas and candidate Special Protection Areas, designated by the National Parks and Wildlife Service of the Department of the Arts Heritage and the Gaeltacht under the EU Birds and Habitats Directives respectively.	
P-NAT3 To protect plant, animal, species and habitats which have been identified by the Habitats Directive, Birds Directive, Wildlife Act (1976) and (Amendment Act) 2000, and the Flora Protection Order S.I No. 94 of 1999.	
P-NAT4 To assess any plan or project in accordance with Article 6 of the Habitats Directive, and assess whether the Plan or project is likely to have a significant effect on the site either individually or cumulatively upon the integrity, conservation objectives and qualifying interest of any Natura 2000 site.	
P-NAT5 To require environmental assessment such as EIA (Environmental Impact Assessment) and/or ecological appraisal for development not directly connected with or necessary to the management of a European site, or a proposed European Site and which are likely to have significant effects on the European site either individually or cumulatively.	

Westmeath County Development Plan 2014 - 2020	
Key Policies/Issues/Objectives Directly Related to European Sites In The Zone of Influence	**Assessment of Potential Impact on Designated Sites**
P-NAT6 To consult with the Prescribed Bodies when assessing development proposals affecting sites of biodiversity value, with particular emphasis on the Natura 2000 network of sites.	
P-NAT7 To ensure that the Local Authority in fulfilling its responsibility in the supply of services and infrastructure, zoning of lands and undertaking and authorising development, addresses the potential effects on biodiversity and the needs of priority habitats and species within or adjoining sites as identified in the NPWS Report 'The status of EU Protected Habitats and Species in Ireland' NPWS 2008.	
P-NAT8 To identify and provide appropriate buffer zones between designated ecological sites and local biodiversity features and areas zoned for development.	
P-NAT9 To prepare Strategic Habitat Management Plans for Natura Sites in consultation with the National Parks and Wildlife Service and relevant stakeholders.	
O-NAT1 To promote the maintenance and as appropriate, achievement of favourable conservation status of habitats and species and to improve the ecological coherence of the Natura 2000 network, by maintaining and where appropriate, developing features in the landscape which are of major importance for wild fauna and flora.	

Westmeath County Development Plan 2014 - 2020	
Key Policies/Issues/Objectives Directly Related to European Sites In The Zone of Influence	**Assessment of Potential Impact on Designated Sites**
Rural Enterprise Policies P-RE8 To encourage and support the agencies and stakeholders involved in the management of the Industrial Peatlands to develop a Holistic Plan that meets the environmental, economic and social needs of these areas.	
Natural Heritage Policies P-NH8 To provide for an intrinsic network of enhanced natural resources of clean water, biodiversity, nature conservation areas, landscape, peatlands, wetlands, parks, open spaces and agricultural land.	
Peatland Policies and Objectives P-PTL1 To protect the county's designated peatland areas and landscapes, including any historical walkways through bogs and to conserve their ecological, archaeological, cultural, and educational heritage.	
P-PTL2 To ensure that peatland areas which are designated for protection under international and national legislation for their habitats, are conserved and managed appropriately to conserve their ecological, archaeological, cultural and educational significance.	

Westmeath County Development Plan 2014 - 2020	
Key Policies/Issues/Objectives Directly Related to European Sites In The Zone of Influence	**Assessment of Potential Impact on Designated Sites**
P-PTL3 To require the preparation of Hydrological Reports for significant developments within and in close proximity to peatlands, and to take account of same in the assessment of impacts on the integrity of peatland ecosystems.	
P-PTL4 To plan and prepare for the future sustainable and environmentally sensitive use of large industrial bog sites when peat harvesting finishes and to encourage a balanced approach to the redevelopment of cutaway bogs, including habitat creation, in conjunction with adjacent Local Authorities. This plan will have regard to both National and Regional frameworks with regard to the future use of peatlands, including cutaway bogs.	
P-PTL5 To exercise control of peat extraction, both individually and cumulatively, which would have significant impacts on the environment.	
O-PTL1 To continue to identify and map peatland sites of high local ecological value and protect them for their biodiversity.	
O-PTL2 To investigate the planning status of peat extraction in North Westmeath and to take appropriate enforcement action where appropriate.	

Westmeath County Development Plan 2014 - 2020	
Key Policies/Issues/Objectives Directly Related to European Sites In The Zone of Influence	**Assessment of Potential Impact on Designated Sites**
O-PTL3 To work with other bodies such as the NPWS and Coillte to support the conservation of peatlands.	
O-PTL4 To consider designating peatlands at Coolnagun, Corlanna, Lower Coole, Mayne, Ballinealoe and Clonsura as archaeological heritage areas, where it is considered an ancient trackway or road may have been constructed.	
O-PTL5 To work in partnership with relevant stakeholders on suitable peatland site(s) to demonstrate best practice in sustainable peatland conservation, management and restoration techniques and to promote their heritage and educational value subject to Ecological Impact Assessment and Appropriate Assessment, as appropriate.	
O-PTL6 To support the preparation of a Sustainable Holistic Management Plan for the future use of the Industrial Peatlands in the county, which recognises the role of peatlands in carbon sequestration. Landscape Management Policies P-LLM7. To explore with the relevant agencies the future potential of cut away peatlands, including opportunities for habitat creation or amenity and recreation areas such as community woodlands or parklands.	
General Energy Policies P-EN5 To support the sustainable development of the infrastructure required to assist the Midland Region in the delivery of renewable energy, particularly in the context of the need to make a transition from peat to renewable energy.	

Westmeath County Development Plan 2014 - 2020	
Key Policies/Issues/Objectives Directly Related to European Sites In The Zone of Influence	**Assessment of Potential Impact on Designated Sites**
Wind Energy Policies and Objectives P-WIN2 To strictly direct large-scale energy production projects, in the form of Wind Farms, onto cutover cutaway peatlands in the county, subject to environmental, landscape, habitats and wildlife protection requirements being addressed. In the context of this policy, industrial scale/large-scale energy production projects are defined as follows: Projects that meet or exceed any of the following criteria: - Height: over 100m to blade tip, or - Scale: More than five turbines - Output: Having a total output of greater than 5MW	
O-WIN1 To prepare and implement a Management Plan for the Industrial Peatlands in the county, in consultation with stakeholders and adjacent Local Authorities, during the lifetime of the plan. Said plan shall focus on recreational opportunities, renewable energy, hydrological and ecological considerations and shall be subject to environmental assessment and the requirements of Article 6 of the Habitats Directive.	
Westmeath Biodiversity Action Plan 2014-2020	
Actions for Biodiversity Actions for Biodiversity are divided under the following headings : › Protection and Development of the Ecological Network › Monitoring and Research › Raising Awareness **Protection and Development of the Ecological Network** › Promoting habitats connectivity through:	The Biodiversity Plan was comprehensively reviewed, with particular reference to Actions that relate to the Natura 2000 network. No potential for cumulative impacts when considered in conjunction with the current proposal were identified.

Westmeath County Development Plan 2014 - 2020	
Key Policies/Issues/Objectives Directly Related to European Sites In The Zone of Influence	**Assessment of Potential Impact on Designated Sites**
▪ Raising awareness, ▪ Incorporating planning and legislation, ▪ Education, Protection, ▪ Establishing new connections. › Preparing management plans for conservation worthy habitats. **Monitoring and Research** › Identifying Local Biodiversity Sites. › Assessing gaps in knowledge on Westmeath biodiversity. › Seeking to fill these gaps by both professional and volunteer bodies (applies also to Raising Awareness). › Facilitating free public access to information on Westmeath biodiversity (applies also to Raising Awareness). **Raising Awareness** › Promoting and/or delivering biodiversity education among Members of the Public and Local authorities employees. › Facilitating and promoting free public access to nature enjoyment. › Raising pride of local biodiversity. › Bringing together communities in protecting, enhancing and enjoying nature (applies also to Protection and Development of the Ecological Network).	

Table 6-33 Assessment of Plans

Draft Westmeath County Development Plan 2021 - 2027	
Key Policies/Issues/Objectives Directly Related to European Sites In The Zone of Influence	**Assessment of Potential Impact on Designated Sites**
CPO 12.4: It is Council policy to protect and conserve Special Areas of Conservation, candidate Special Areas of Conservation, Special Protection Areas and candidate Special Protection Areas, designated under the EU Birds and Habitats Directives respectively.	The Development plan was comprehensively reviewed, with particular reference to Policies and Objectives that relate to the Natura 2000 network and other natural heritage interests. No potential for cumulative impacts when considered in conjunction with the current proposal were identified. There will be no impact on any designated sites as a result of deterioration in water quality. Best practice preventative measures will be implemented to avoid effects on water quality, as outlined in Chapter 9: Hydrology and Hydrogeology and Section 4 of the CEMP. There will be no adverse effects on sensitive aquatic receptors listed as QIs/SCIs of European Sites, as a result of deterioration in water quality.
CPO 12.5: It is Council policy to Ensure that 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 projects).	
CPO 12.6: It is Council policy to ensure that any plan or project that could have a significant adverse impact (either by themselves or in combination with other plans and projects) upon the conservation objectives of any Natura 2000 Site or would result in the deterioration of any habitat or any species reliant on that habitat will not be permitted.	
CPO 12.7: It is Council policy to assess any plan or project in accordance with Article 6 of the Habitats Directive to determine whether the plan or project is likely to have a significant effect on the site either individually or cumulatively upon the integrity, conservation objectives and qualifying interest of any Natura 2000 Site.	
CPO 12.8: It is Council policy to require an ecological appraisal for development not directly connected with or necessary to the management of Natura Sites, or a proposed Natura Site and which are likely to have significant effects on that site either individually or cumulatively.	
CPO 12.9: It is Council policy to identify and provide appropriate buffer zones between Designated Sites and local biodiversity features and areas zoned for development	
CPO 12.10: It is Council policy prepare Strategic Habitat Management Plans for Natura 2000 Sites in Council ownership in consultation with the National Parks and Wildlife Service and relevant stakeholders.	

Draft Westmeath County Development Plan 2021 - 2027	
Key Policies/Issues/Objectives Directly Related to European Sites In The Zone of Influence	**Assessment of Potential Impact on Designated Sites**
CPO 12.11: It is Council policy promote the maintenance and as appropriate, achievement of favourable conservation status of habitats and species and to improve the ecological coherence of the Natura 2000 network, by maintaining and where appropriate, developing features in the landscape which are of major importance for wild fauna and flora.	
CPO 12.12: It is Council policy to require that new development proposals affecting designated sites have regard to the sensitivities identified in the SEA Environmental Report prepared in respect of this plan.	
CPO 12.13 It is Council policy to protect, manage and enhance the natural heritage, biodiversity, landscape and environment of County Westmeath, in recognition of its importance as both a non-renewable resource and a natural asset.	Any treeline and/or hedgerow removed as part of the Proposed Development will be replaced as part of the design of the project. Additional treeline will also be planted along the access road to T15. Where removal of woodland is required to widen roads within the site between T5 and T9 these works will be kept to a minimum and the woodland will be retained as part of the operation of the windfarm.
CPO 12.23 It is Council policy to protect and where possible enhance biodiversity and ecological connectivity, including woodlands, trees, hedgerows, semi-natural grasslands, rivers, streams, natural springs, wetlands, geological and geo-morphological systems, other landscape features, natural lighting conditions, and associated wildlife where these form part of the ecological network and/or may be considered as ecological corridors or stepping stones in the context of Article 10 of the Habitats Directive. Appropriate mitigation and/or compensation to conserve biodiversity, landscape character and green infrastructure networks will be required where habitats are at risk or lost as part of a development.	
CPO 12.24 It is Council policy to recognise that nature conservation is not just confined to designated sites and acknowledge the need to protect non-designated habitats and landscapes and to conserve the biological diversity.	
CPO 12.25 Prevent the spread of invasive species within the plan area, including requiring landowners and developers to adhere to best practice guidance in relation to the control of invasive species.	Invasive species listed on the Third Schedule of the European Communities Birds and Habitats Regulations 2011 (S.I. 477/2011) have been identified along the proposed grid connection route. Site specific mitigation in relation to these species has been described within this NIS to prevent the spread of invasive species during the proposed works.
CPO 12.26 Ensure that proposals for development do not lead to the spread or introduction of invasive species. If developments are proposed on sites where invasive species are or were previously present, the applicant will be required to submit a control and management program for the particular invasive species as part of the planning process and to comply with the provisions of the European Communities Birds and Habitats Regulations 2011 (S.I. 477/2011).	

Draft Westmeath County Development Plan 2021 - 2027	
Key Policies/Issues/Objectives Directly Related to European Sites In The Zone of Influence	**Assessment of Potential Impact on Designated Sites**
CPO 12.27 Support, as appropriate, the National Parks and Wildlife Service's efforts to seek to control and manage the spread of non-native invasive species on land and water. Where the presence of non-native invasive species is identified at the site of any Proposed Development or where the proposed activity has an elevated risk of resulting in the presence of these species, details of how these species will be managed and controlled will be required.	

6.7.2 Assessment of Projects

As described in Section 2.5 of the EIAR, relevant projects have been assessed in-combination with the proposed wind farm development and include planning applications in the vicinity of the site and other wind energy applications within the wider area. The projects considered in relation to the potential for cumulative impacts and for which all relevant data was reviewed include those listed below.

Peat Extraction

Commercial peat harvesting at the Proposed Development site, as described in Section 2.6.2 in Chapter 2.

Forestry

Some areas within the site are planted with commercial forestry.

Road Scheme

Proposed upgrade to a 52km section of the N4 between Mullingar and Longford (Roosky). A second Public Consultation on the Route Corridor Options is currently underway.

Other Wind Turbines

There is only one turbine permitted within a 20-kilometre radius of the Proposed Development site, located near Ballyjamesduff, Co. Cavan, as detailed in Section 2.7.4 in Chapter 2. This turbine is located approximately 16.4 kilometres from the nearest proposed turbine location at Coole. An application for a single turbine approximately 16km North East of the proposed development site and 370m South West of the existing Ballyjamesduff turbine has been appealed to An Bord Pleanála (Pl Ref 19/447 / ABP-309478-21) and is due to be decided by 23rd June 2021.

Other Developments

The review of the Westmeath County Council planning register documented relevant general development planning applications in the vicinity of the proposed wind farm site and the grid connection route, most of which relate to the provision and/or alteration of one-off rural housing and agriculture-related structures, as described in Section 2.7.3 in Chapter 2. These applications have also been taken account in describing the baseline environment and in the relevant assessments.

Furthermore, the cumulative impact assessments carried out in each of the subsequent chapters of this EIAR consider all potential significant cumulative effects arising from all land uses in the vicinity of the Proposed Development. These include ongoing agricultural practices, and drainage/maintenance works/programmes. Overall the Proposed Development has been designed to mitigate impacts on the environment and particularly water, and a suite of mitigation measures is set out within the EIAR. The mitigation measures set out in this EIAR have been developed to ensure that significant cumulative affects do not arise during construction, operational or decommissioning phases of the Proposed Development. Additional detail in relation to the potential significant cumulative effects arising and, where appropriate, the specific suite of relevant mitigation measures proposed are set out within each of the relevant chapters of this EIAR.

6.7.3 Assessment of Cumulative Effects

The residual construction, operational and decommissioning impacts of the Proposed Development are considered cumulatively with other plans and projects as described above. 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.

The Proposed Development will result in a loss of approximately 32.38 ha of cutover peatland and colonising woodland/scrub, equivalent to 1.95% of these habitats recorded within the study area. This is a very small percentage of the overall quantum of habitats within the site of the Proposed Development, equating to 3.4%. This does not represent a significant loss of peatland or woodland. As such, there is no potential for the Proposed Development to contribute to any significant cumulative habitat loss when considered in combination with any other plans and projects.

The potential for the Proposed Development to contribute to a cumulative effect on water quality in the Shannon catchment was considered in this chapter and also in Chapter 9 of this EIAR. The Proposed Development includes a range of measures that are in place to prevent any water pollution or hydrological effects outside the development footprint. The implementation of these measures ensures that there is no potential for significant cumulative effects on any downstream receptors, whether the Proposed Development is considered on its own or in combination with other plans or projects.

No significant 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.

The Proposed Development will not result in any significant residual effects on biodiversity and will not contribute to any cumulative effect when considered in combination with other plans and projects.

In the review of the projects that was undertaken, no connection that could potentially result in additional or cumulative impacts was identified. Neither was any potential for different (new) impacts resulting from the combination of the various projects and plans in association with the Proposed Development.