6. BIODIVERSITY

6.1 Introduction

This chapter assesses the likely significant effects (both alone and cumulatively with other projects) that the Proposed Project 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 1976-2021, EU Habitats Directive 92/43/EEC. Impacts on avian receptors are considered in Chapter 7 of this EIAR. The full description of the Proposed Project is provided in Chapter 4 of this EIAR.

The chapter is structured as follows:

- The Introduction provides a description of the legislation, guidance and policy context applicable to Biodiversity, Flora and Fauna.
- This is followed by a comprehensive description of the ecological survey and impact assessment methodologies that were followed to inform the robust assessment of likely significant effects on ecological receptors.
- A description of the Baseline Ecological Conditions and Receptor Evaluation is then provided.
- This is followed by an Assessment of Effects which are described with regard to each phase of the Proposed Project: 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.

For the purposes of this EIAR:

- The ‘Proposed Wind Farm’ refers to the 8 no. turbines and supporting infrastructure which is the subject of this Section 37E application.
- The ‘Proposed Grid Connection’ refers to the 110kV substation and supporting infrastructure which will be the subject of a separate Section 182A application.
- The ‘Proposed Project’ comprises the Proposed Wind Farm and the Proposed Grid Connection, all of which are located within the EIAR Study Boundary (the ‘Site’) and assessed together within this EIAR.

In addition:

- ‘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.

6.1.1 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 2022 S.I. No. 235 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 is illegal to cut, pick, collect, uproot or damage, injure or destroy species listed or their flowers, fruits, seeds or spores or wilfully damage, alter, destroy or interfere with their habitat (unless under licence).

National Policy

The National Biodiversity Action Plan 2017-2021 (Department of Culture, Heritage and the Gaeltacht, 2017) (the "**Plan**") (The 4th National Biodiversity Action Plan is still in draft form at time of writing) 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 EIAR Site Boundary and the ecological assessment process.

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

Such policies have informed the evaluation of ecological features recorded within the Site and the ecological assessment process. Pollinator friendly measures have been incorporated into the Proposed Project and these are detailed within the Biodiversity Mitigation and Enhancement Plan (BMEP) (see Appendix 6-4).

European Legislation

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

6.1.2 Review of Relevant Guidance and Sources of Consultation

The assessment methodology is based primarily upon the National Road Authority (NRA) *'s Guidelines for Assessment of Ecological Impacts of National Road Schemes Rev 2* (NRA, 2009) (referred to hereafter as the NRA Ecological Impact Assessment Guidelines), and the survey methodology 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, updated 2022).

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).
- Wildlife Acts 1976 to 2023

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:

- Galway County Development Plan 2022-2028
- Ireland's 4th National Biodiversity Action Plan 2023-2027
- Northern and Western Regional Assembly Regional Spatial and Economic Strategy 2020-2032

6.1.3 Statement of Authority

This EIAR chapter has been prepared by Rachel Walsh (B.Sc. Env). Rachel has over 3 years' experience in ecological consultancy and has worked on Appropriate Assessments and Ecological Impact Assessments for a range of project types, including renewable energy infrastructure, water services infrastructure and transport infrastructure. This report has been reviewed by John Hynes (B.Sc., M.Sc., MCIEEM). John has 10 years' experience in ecological management and assessment.

The baseline ecological surveys were undertaken by Rachel Walsh (BSc. Env), Cillian Burke (BSc. Env) and Brónagh Boylan (BSc. Env) of MKO.

Comprehensive bat surveys of the Site were carried out by Keith Costello (BSc.), Ryan Connors (BSc., MSc.) & Timothy O'Ceallaigh (BSc). All staff have relevant academic qualifications to complete the surveys and assessments that they were required to do. Bat survey scope development and project management was overseen by Aoife Joyce (BSc., MSc.) and John Hynes (BSc., MSc., MCIEEM). Bat survey data analysis was undertaken, and results were compiled by Laura Gránicz. Impact assessment, the design of mitigation and final reporting was completed by Ryan Connors (BSc., MSc.), and Laura Gránicz (BSc., MSc.) under the supervision of Aoife Joyce and John Hynes. Aoife has over 4 years' experience in ecological assessments and has completed CIEEM and BCI courses in Bat Impacts and Mitigation, Bat Tree Roost Identification and Endoscope training, Bat ID, Biometrics, Trapping and Handling training, and Kaleidoscope Pro Analysis.

6.2 Methodology

The following sections describe the methodologies followed to establish the baseline ecological condition of the 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, updated 2022).

6.2.1 Desk Study

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

- Review of NPWS Article 17 maps 2019, 2013 and 2007.
- Review of online web-mappers: National Parks and Wildlife Service (NPWS), EPA (Envision), Water Framework Directive (WFD) and Inland Fisheries Ireland (IFI).
- Inland Fisheries Ireland (IFI) Reports, where available.
- Data on potential occurrence of protected bryophytes – as per NPWS online map viewer; Flora Protection Order Map Viewer – Bryophytes2.
- Review of relevant Plans, including the 4th National Biodiversity Action Plan 2023-2027, County Biodiversity Plan and the All-Ireland Pollinator Plan 2021-2025.
- Review of the Bat Conservation Ireland (BCI) Private Database.
- Review of the publicly available National Biodiversity Data Centre (NBDC) web-mapper.
- Records from the NPWS web-mapper and review of specially requested records from the NPWS Rare and Protected Species Database for the hectads in which the Proposed Project is located.
- Potential for in-combination effects have been considered in Chapter 2 of this EIAR and Section 6.8 of this Chapter. This was informed by a review of the EIS/EIARs prepared for other plans and projects occurring in the wider area.

6.2.2 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 2-1 of this EIAR. The recommendations of the consultees have informed the EIAR preparation process and the contents of this chapter. Table 2-12 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	
Department of Agriculture, Food and the Marine (DAFM)	29.06.2023	Response from the felling division: *"If the Proposed Development will involve the felling or removal of any trees, the developer must obtain a felling licence from this department before*

[2] *NPWS, 2019, Online map viewer; Flora Protection Order Map Viewer – Bryophytes. Online, Available at: http://dahg.maps.arcgis.com/apps/webappviewer/index.html?id=71f8df33693f48edbb70369d7fb26b7e, Accessed: 15/04/2021.*

		trees are felled or removed. A Felling licence application form can be obtained from Felling Section, Department of Agriculture, Food and the Marine, Johnstown Castle Estate, Co. Wexford. *A felling licence granted by the Minister provides authority under the Forestry Act 2014 to fell or otherwise remove a tree or trees and/or to thin a forest for silvicultural reasons."*
An Taisce	25/05/2023	Acknowledgement of request
Bat Conservation Ireland	-	No response received to date
Birdwatch Ireland	-	No response received to date
Department of Communications, Climate Action and the Environment	25.05.2023	Acknowledgement of receipt
Department of Culture, Heritage and the Gaeltacht	30.06.2023	Acknowledgement of receipt
Development Applications Unit Department of Housing, Local Government and Heritage	30.06.2023	Response from the DAU *"The Department is not in a position to make specific comments on this particular referral at this time. No inference should be drawn from this that the Department is satisfied or otherwise with the proposed activity. The Department may submit observations/recommendations at a later stage in the process."*
Forest Service	-	No response received to date
Galway County Council	26.05.2023	Acknowledgement of receipt
Inland Fisheries Ireland	-	No response received to date
Irish Peatland Conservation Council	-	No response received to date
Irish Red Grouse Association	-	No response received to date
Irish Raptor Study Group	-	No response received to date
Irish Wildlife Trust (IWT)	25.05.2023	Response from the IWT *"Thank you for contacting us. We do not have the staff capacity to respond to this consultation at the moment but we will endeavour to respond if possible."*

6.2.3 Field Surveys

A comprehensive survey of the biodiversity of the Proposed Project site was undertaken on various dates between 2021 and 2023. The following sections fully describe the ecological surveys that have been undertaken and provide details of the methodologies, dates of survey and guidance followed.

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

Multidisciplinary walkover surveys were undertaken within the Proposed Project site on the following dates:

- 17th of August 2023
- 20th of September 2022
- 11th of July 2022
- 4th of July 2022
- 30th of July 2021

All of the survey timings fall within the recognised optimum period for vegetation surveys/habitat mapping, i.e. April to September (Smith *et al.*, 2011). A comprehensive walkover of the entire Proposed Project site was completed with incidental records also incorporated from other dedicated species/habitat specific surveys including bats, marsh fritillary and quadrat surveys.

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

6.2.3.2 Dedicated Habitat and Vegetation Composition Surveys

All habitats recorded on site and described in this EIAR chapter have been classified in accordance with Fossitt (2000). In addition, peatland habitats outside of the proposed infrastructure footprint but within the study area are described in detail in this chapter. Full details of all the botanical surveys and results are provided in Appendix 6-1 and an assessment of the potential for the Site to support Annex I habitats is also provided in this Appendix.

Detailed botanical surveys/relevé assessments of the Proposed Project were also undertaken throughout multidisciplinary walkover surveys carried out from 2021 to 2023. These surveys provided an understanding of the baseline and informed further survey work following finalisation of the site layout.

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

- Commission of the European Communities (2013) *Interpretation manual of European Union habitats*. Eur 27. European Commission DG Environment.
- NPWS (2019). *The Status of EU Protected Habitats and Species in Ireland*. Volume 2: *Habitat Assessments*. Unpublished NPWS report. Edited by: Deirdre Lynn and Fionnuala O'Neill
- Martin, J.R., O'Neill, F.H. & Daly, O.H. (2018), *The monitoring and assessment of three EU Habitats Directive Annex I grassland habitats*. Irish Wildlife Manuals, No. 102. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht, Ireland.
- O'Neill, F.H., Martin, J.R., Devaney, F.M. & Perrin, P.M. (2013), *The Irish semi-natural grasslands survey 2007-2012*. Irish Wildlife Manuals, No. 78. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Ireland.
- Wilson, S. & Fernández, F. (2013) *National survey of limestone pavement and associated habitats in Ireland.* Irish Wildlife Manuals, No. 73. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Ireland.

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).

6.2.3.2.1 Vegetation composition assessment

Detailed habitat classification and assessment was undertaken by MKO at targeted locations within the Proposed Wind Farm site, with relevés undertaken on the 17th August 2023, 6th of July 2022, 11th of July 2022 and 20th of September 2022, within representative habitats at each turbine base and associated Proposed Project infrastructure including the proposed onsite 110kV substation, see Appendix 6-1 for all relevé data. 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, including all relevés. The location of all quadrats is shown in Figure 1-1 of Appendix 6-1.

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

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

The Engine for Relevés to Irish Communities Assignment (ERICA)[3] is a web application for assigning vegetation data to communities defined by the Irish Vegetation Classification (IVC). Data can be uploaded, checked for errors and analysed and the results can then be downloaded. ERICA works with both quantitative vegetation cover data (such as are recorded in relevés and other types of botanical recording plots) and presence/absence data, such as species lists. ERICA covers grasslands, woodland, duneland, heaths, bogs, fens, mires, freshwater, saline waters, rocky habitats, scrub, strandline, saltmarsh and weed communities (Perrin, 2019).

[3] *Perrin, 2019, ERICA – Engine for Relevés to Irish Communities Assignment V5.0 User's Manual, Online, Available at: https://biodiversityireland.shinyapps.io/vegetation-classification/_w_9cd4889a/manual.pdf, Accessed: 10.10.2020*

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

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

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

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

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

6.2.3.3 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 and badger were undertaken at the times set out below with the methodologies followed also provided below. Dedicated surveys for otter within the Proposed Wind Farm site were not carried out due to the absence of surface watercourses, however, surveys for otter were carried out along the Proposed Grid Connection underground cabling route and at watercourses in the vicinity of the Proposed Wind Farm site, as summarised in Section 6.5.3.3.2 and the Aquatic Baseline Report (Appendix 6-3). Although there are no watercourses within the Proposed Wind Farm site, the Proposed Grid Connection underground cabling route does cross a number of watercourses. These were identified as providing potential habitat for otter and were subject to specialist targeted surveys on the 17th of August 2023 and July 2022. Following the completion of ecological walkover surveys, no requirement for further dedicated faunal surveys was identified. During the multidisciplinary walkover surveys, records of invertebrates including butterflies, damselflies, dragonflies, moths, beetles etc. were recorded. Given the known occurrence of the marsh fritillary butterfly in the area, this species was also focused on during the Site visits with dedicated surveys undertaken on 20th September 2022 and 17th of August 2023 within the Proposed Wind Farm site.

6.2.3.3.1 *Badger Survey*

Areas identified as providing potential habitat for badger were subject to specialist targeted survey. Dedicated badger surveys were conducted on the 17th of August 2023, 20th of September 2022, 11th of July 2022, 4th of July 2022 and 30th of July 2021. The badger surveys covered the entire development footprint and surrounding suitable habitats within the EIAR Site Boundary. The badger survey was not constrained by vegetation given the nature of the habitats within the Site (open grasslands with hedgerow and treeline habitat).

The badger surveys were 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). If

encountered, setts would be 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[4]).

6.2.3.3.2 Otter Survey

Although there are no watercourses within the Proposed Wind Farm site, in close proximity to the proposed infrastructure, the Proposed Grid Connection underground cabling route does cross a number of water courses. These were identified as providing potential habitat for otter and were subject to specialist targeted survey on the 17th of August 2023. In addition, dedicated otter surveys were undertaken along other watercourses in the vicinity of the Site during dedicated aquatic surveys undertaken in July 2022 (Aquatic Baseline Report, Appendix 6-3).

The otter surveys were conducted as per TII (2009) guidelines (Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes). This involved a search for all otter signs e.g. spraints, scat, prints, slides, trails, couches and holts. In addition to the width of the rivers/watercourses, a 10m riparian buffer (both banks) was considered to comprise part of the otter habitat (NPWS 2009). The dedicated otter 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[5]).

6.2.3.3.3 Marsh Fritillary Surveys

Following the identification of suitable habitat for marsh fritillary within the Proposed Wind Farm site during habitat surveys, as well as the results of the desk study, targeted surveys for the species were undertaken for larval webs on the 20th of September 2022 and the 17th of August 2023. The survey methodology followed that described in the NRA (2009) best practice guidance document. This involved walked surveys to identify suitable areas of marsh fritillary habitat within or adjacent to the development footprint (Zone of Influence (ZOI)). This was achieved by walking transects through areas of potentially suitable habitat within the Proposed Wind Farm site. Where suitable habitat did occur, detailed surveys to locate larval webs were undertaken. Areas of suitable habitat were also mapped as part of the survey effort and informed the layout of the Proposed Wind Farm. In addition, habitat suitability assessments were undertaken within areas of suitable habitat for the species following those developed by the NBDC[6]. This involved an assessment of the vegetation characteristics at a requisite number of stops within the area of suitable habitat. Records of vegetation height, abundance of devil's bit scabious, presence of structured vegetation, low invading scrub and stock grazing were noted within the relevant recording sheets.

6.2.3.3.4 Bat Surveys

Detailed description of the survey methodologies undertaken at the Site during the survey period May to October 2023 are provided within the full Bat Report included as Appendix 6-2 of this EIAR,

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[4] *CIEEM, 2013, Technical Guidance Series – Competencies for Species Survey, Online, Available at: https://cieem.net/resource/competencies-for-species-survey-css/ Accessed: 20.03.2021*

[5] *CIEEM, 2013, Technical Guidance Series – Competencies for Species Survey, Online, Available at: https://cieem.net/resource/competencies-for-species-survey-css/ Accessed: 20.03.2021*

[6] *NBDC, 2019, Habitat Condition Assessment for Marsh Fritillary, Online, Available at: http://www.biodiversityireland.ie/wordpress/wp-content/uploads/Marsh-Fritillary-Habitat-Condition-Form.pdf, Accessed, 20 March 2020*

together with full details of the survey times and the surveyors who carried out the bat survey and assessment work.

Survey design and effort in 2023 was created in accordance with the best practice guidelines available, '*Bat Surveys: Good Practice Guidelines'* prepared by the Bat Conservation Trust (Hundt, 2012). Surveys undertaken were undertaken in strict accordance with those prescribed in NatureScot (2021) '*Bats and Onshore Wind Turbines: Survey, Assessment and Mitigation*'. This is in line with standard best practice industry guidelines.

6.2.3.4 Aquatic surveys

Dedicated aquatic baseline surveys were undertaken in the vicinity of the Proposed Project between 12th of July 2022 and 14th of July 2022. Whilst no surface watercourses drain the Proposed Wind Farm site; a small number of watercourses are crossed by the Proposed Grid Connection underground cabling route. A total of 15 no. sites (14. no riverine & 1 no. pond) were selected for detailed aquatic assessment. Aquatic survey sites were present on the Glennafosha River (EPA code: 30G69) and unnamed inline pond, Clare River (3C01) and unnamed tributary, Killeenlaun River (20K46), Cregg River (30C03), Ballinduff River (30B05) and an unnamed tributary and the Kilroe Stream (30K23). Survey effort focused on both instream and riparian habitats at each aquatic sampling location. Surveys at each of these sites included a fisheries assessment (electro-fishing and/or fisheries habitat appraisal), white-clawed crayfish survey (*Austropotamobius pallipes*), otter survey (within 150m of the survey site), macrophyte and aquatic bryophyte survey and (where suitable) biological water quality sampling (Q-sampling). Suitability for freshwater pearl mussel (*Margaritifera margaritifera)* was assessed at each survey site with environmental DNA (eDNA) sampling undertaken for the species at 3 no. strategically chosen riverine locations within the vicinity of the Proposed Project. These water samples were also analysed for white-clawed crayfish and crayfish plague (*Aphanomyces astaci*). This holistic approach informed the overall aquatic ecological evaluation of each site in context of the Proposed Project and ensured that any habitats and species of high conservation value would be detected.

Full details of the methodology followed for the aquatic surveys as well as details of the locations of survey sites is provided in the Aquatic Baseline Report, Appendix 6-3.

6.2.3.5 Invasive species survey

During the multi-disciplinary walkover surveys, a search for non-native invasive species was undertaken within the Site. 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).

6.2.3.6 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.

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 limitations in respect of the surveys undertaken have been identified.

6.2.4 Methodology for Assessment of Impacts and Effects

6.2.4.1 Identification of Target Receptors and Key Ecological Receptors

The methodology for assessment followed a precautionary screening approach with regard to the identification of KERs. Following a comprehensive desk study, initial site visits and stakeholder consultation; "Target receptors" likely to occur in the Zone of Influence (ZOI) of the development were identified. The target receptors included habitats and species that were protected under the following legislation:

- Annexes of the EU Habitats Directive.
- Qualifying Interests (QI) of Special Areas of Conservation (SAC) within the likely zone of impact.
- Species protected under the Wildlife Acts 1976-2021.
- Flora (Protection) Order 2022 S.I. No. 235.

6.2.4.2 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 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 KERs.

6.2.4.3 Characterisation of Impacts and Effects

The Proposed Project will result in a number of impacts. The ecological effects of these impacts are characterised as per the CIEEM '*Guidelines for Ecological Impact Assessment in the UK and Ireland*' (2018, updated 2022). These guidelines are the industry standard for the completion of Ecological

Impact Assessment in the UK and Ireland. This chapter has also been prepared in accordance with the corresponding EPA Guidelines (EPA 2022) as detailed in Chapter 1. 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 Project 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.

6.2.4.4 Determining the Significance of Effects

The ecological significance of the effects of the Proposed Project are determined following the precautionary principle and in accordance with the methodology set out in Section 5 of CIEEM (2018, updated 2022).

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, updated 2022).

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's *Guidelines on information to be included in Environmental Impact Assessment Reports* (EPA, 2022) and the *Guidelines for assessment of Ecological Impacts of National Road Schemes*, (NRA, 2009) were also considered when determining significance and the assessment is in accordance with those guidelines. The terminology used in the determination of significance follows the suggested language set out in the EPA Guidelines (2022) as shown in Table 6-3.

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

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, updated 2022) 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, updated 2022).

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, updated 2022) 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).

6.2.4.5 Incorporation of Mitigation

Section 6.8 of this EIAR assesses the potential effects of the Proposed Project 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 effects. The implemented mitigation measures avoid or reduce or offset potential significant residual effects, post mitigation.

6.3 Establishing the Ecological Baseline

6.3.1 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 ZOI, as compiled by the National Parks and Wildlife Service (NPWS), plant distribution atlases and other research publications.

6.3.1.1 Designated Sites

6.3.1.1.1 *Identification of the Designated Sites within the Likely Zone of Influence (ZOI) of the Proposed Project*

The potential for the Proposed Project 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 Guidance 2022, *"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 Biodiversity Chapter.

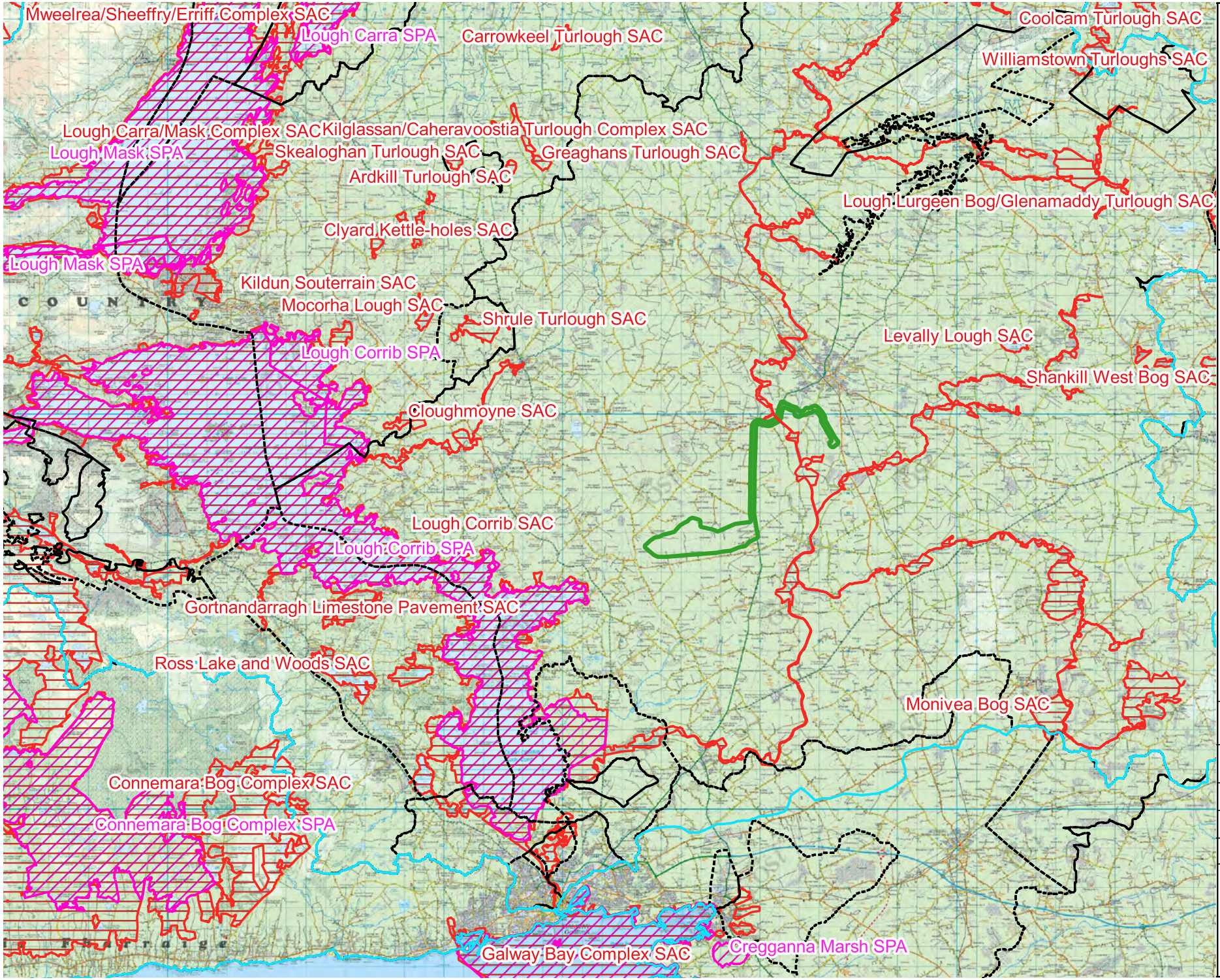
Proposed Natural Heritage Areas (pNHAs) were designated on a non-statutory basis in 1995 but have not since been statutorily proposed or designated. However, the potential for effects on these designated sites is fully considered in this Biodiversity Chapter.

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

- 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 18/01/2024. The datasets were utilised to identify Designated Sites which could feasibly be affected by the Proposed Project.
- All designated sites within the vicinity of the Proposed Project site were identified. In addition, the potential for connectivity with European or Nationally designated sites at greater distances from the Proposed Project was also considered in this initial assessment.
- A map of all the European Sites within the vicinity of the Proposed Project is provided in Figure 6-1 with all Nationally Designated Sites shown in Figure 6-2. These figures also display Water Framework Directive hydrological catchments and groundwater bodies.
- Table 6-4 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 this report 18/01/2024.
- 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

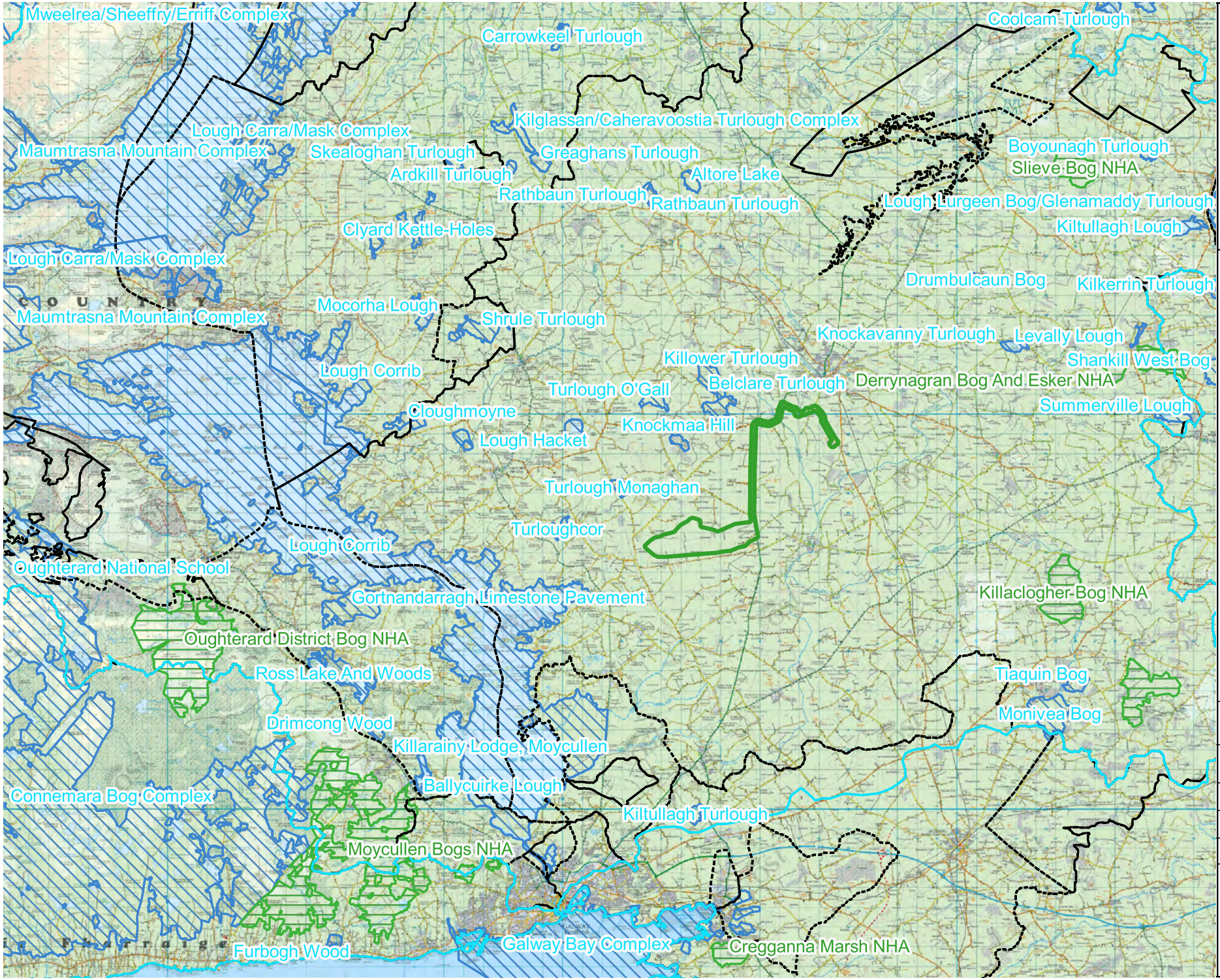
- EIAR Site Boundary
- SAC
- SPA
- WFD Catchments
- WFD Groundwater Bodies

Drawing Title

European Sites

Project Title: Laurclavagh Renewable energy Development	
Drawn By: RW	Checked By: JH
Project No.: 210627	Drawing No.: Figure 6-1
Scale: 1:250,000	Date: 2024-03-06

MKO
Planning and Environmental Consultants
Tuam Road, Galway
Ireland, H91 VW84
+353 (0) 91 735611
email:info@mkoireland.ie
Website: ww.mkoireland.ie



Map Legend

- EIAR Site Boundary
- NHA
- pNHA
- WFD Catchments
- WFD Groundwater Bodies

Drawing Title
Nationally Designated Sites

Project Title
Laurclavagh Renewable Energy Development

Drawn By	Checked By
RW	JH
Project No.	Drawing No.
210627	Figure 6-2
Scale	Date
1:250,000	2024-03-06

MKO
Planning and Environmental Consultants
Tuam Road, Galway
Ireland, H91 VW84
+353 (0) 91 735611
email:info@mkoireland.ie
Website: ww.mkoireland.ie

Table 6-4: Identification of European and Nationally designated sites within the Likely Zone of Impact

Designated Site	Distance from Proposed Project (km)	Likely Zone of Impact Determination
Special Area of Conservation		
Lough Corrib SAC [000297]	The Proposed Grid Connection underground cabling route crosses over the Clare River which is located within this SAC. The Proposed Wind Farm site is located approx. 2.1km west of the SAC boundary.	There will be no direct effects as the Proposed Wind Farm infrastructure is located completely outside of the designated site. There are no instream works required as part of the Proposed Grid Connection works, therefore there is no potential for direct effects associated with the existing crossing over the Clare River. A potential for indirect effect to the SAC was identified as a result of the Proposed Wind Farm via groundwater pathways given that the Proposed Wind Farm is located within a karst area. Additionally, a potential for indirect effect via surface water pathways as a result of the Proposed Grid Connection underground cabling works was identified. Taking a precautionary approach, a potential for indirect effect as a result of disturbance of QI fauna was also identified. **The SAC is considered to be within the Likely Zone of Impact and further assessment is required.**
Levally Lough SAC [000295]	9.6km northeast of the Site	There is no potential for direct effects as the Proposed Project is located completely outside of the designated site. There is no downstream surface water connectivity from the Site to this SAC. The water level data collected during the hydrological surveys undertaken, (outlined in Section 9.3.7.3.2 of Chapter 9 of this EIAR), indicates that groundwater within the Site flows from east to west. As this SAC is situated 9.6km to the northeast, groundwater from the Site will not travel in the direction of this SAC. This conceptual model of groundwater flow is supplemented by tracer studies conducted on a spring located between Turlough Monaghan and the Proposed Project, which proves that groundwater flow direction is in a southwest direction, as discussed in Section 6.3.1.3. Therefore, there is no pathway for effect on this designated site. **No pathway for significant effects on the designated site has been identified.**
Cloughmoyne SAC [000479]	12.7km northwest of the Site	There is no potential for direct effects as the Proposed Project is located completely outside of the designated site.

Designated Site	Distance from Proposed Project (km)	Likely Zone of Impact Determination
		This SAC is located 12.7km northwest of the Site. The groundwater level data collected during the hydrological surveys undertaken, (outlined in Section 9.3.7.3.2 of Chapter 9 of this EIAR), indicates that groundwater within the Site flows from east to west and generally in a southerly direction. As this SAC is situated 12.7km northwest of the Site, groundwater from the Site will not travel in the direction of this SAC. This conceptual model of groundwater flow is supplemented by tracer studies conducted on a spring located between Turlough Monaghan and the Proposed Project, which proves that groundwater flow direction is in a southwest direction, as discussed in Section 6.3.1.3. Furthermore, this SAC is partially within a separate groundwater body. **No pathway for significant effects on the designated site has been identified.**
Shrule Turlough SAC	12.9km	There is no potential for direct effects as the Proposed Project is located completely outside of the designated site. This SAC is located within a separate groundwater body to the Site, therefore, there is no potential for indirect effect. **No pathway for significant effects on the designated site has been identified**
Gortnandarragh Limestone Pavement SAC	13.5km	There is no potential for direct effects as the Proposed Project is located completely outside of the designated site. There is no pathway for effect on the terrestrial habitat for which this SAC is designated. **No pathway for significant effects on the designated site has been identified**
Galway Bay Complex SAC [000268]	Approx. 17km over land to the south of the Site	There is no potential for direct effects as the Proposed Project is located completely outside of the designated site. The only hydrological pathway to this SAC would be via groundwater percolation to Lough Corrib SAC, and subsequent downstream surface water flows of approx. 15km to the marine waters of the SAC. Given the number of groundwater bodies and surface waters required to pass through before reaching the SAC, the minimum intervening hydrological distance, and the relative insensitivity of the marine based QI habitats to localised sedimentation events, there is no potential for likely significant effect on the SAC.

Designated Site	Distance from Proposed Project (km)	Likely Zone of Impact Determination
		The groundwater dependent QI habitats associated with this SAC are located within a separate groundwater body to the Proposed Project. **No pathway for significant effects on the designated site has been identified**
Special Protection Areas (SPA)		
Lough Corrib SPA [004042]	The Proposed Wind Farm site is 3.6km east of the SPA boundary. The SPA is located approx. 32km downstream of the Proposed Grid Connection underground cabling route via the Clare River.	A potential for likely significant direct effect was identified as result of collision risk to SCI bird species associated with the Proposed Wind Farm. A further potential for likely significant indirect effect via water quality deterioration, resulting in a significant effect on SCI supporting habitat, was also identified, given that the Proposed Wind Farm is located within the same groundwater body as the SPA, and the Proposed Grid Connection underground cabling route has surface water connectivity with the SPA. **On a precautionary basis, the SPA is considered to be within the Likely Zone of Impact and further assessment is required.**
Inner Galway Bay SPA [004031]	Over 17km over land to the south of the Site	There is no potential for direct effects as the Proposed Project is located completely outside of the designated site. The only hydrological pathway to this SPA would be via groundwater percolation to Lough Corrib, and subsequent downstream surface water flows of approx. 15km to the marine waters of the SPA. Given the number of groundwater bodies and surface waters required to pass through before reaching the SPA, the minimum intervening hydrological distance, and the relative insensitivity of the marine based habitats to localised point-source sedimentation events, there is no potential for likely significant effect on the SCI supporting marine habitats of the SPA. Given the distance between the Proposed Project and Inner Galway Bay SPA (17km) it has been determined that Common Gull observed on site during the survey period (see Chapter 7) are associated with Lough Corrib. Due to the large separation distance between the Proposed Project and the SPA, no potential for indirect effect on any other species has been identified. **No pathway for significant effects on the designated site has been identified**

Designated Site	Distance from Proposed Project (km)	Likely Zone of Impact Determination
Lough Mask SPA [004062]	26km overland	There is no potential for direct effects as the Proposed Project is located completely outside of the designated site. There is no downstream hydrological connectivity from the Proposed Project site to the SPA. Therefore, there is no potential for hydrological impacts on SCI supporting wetland habitats. Lesser black-backed gull are an SCI species for Lough Mask SPA, however, given the large separation distance between the Proposed Project and Lough Mask and that there are breeding birds at Lough Corrib[7], it is more likely that the birds observed at the Proposed Project site (see Chapter 7) are associated with Lough Corrib. Due to the large separation distance between the Proposed Project and the SPA, no potential for indirect effect on any other species has been identified. **No pathway for significant effects on the designated site has been identified**
Natural Heritage Area (NHA)		
Killaclogher Bog NHA [001280]	12.5km	There is no potential for direct effects as the Proposed Project is located completely outside of the designated site. There is no pathway for effect on the terrestrial habitat for which this NHA is designated. **No pathway for significant effects on the designated site has been identified**
Derrynagran Bog And Esker NHA [001255]	13.6km	There is no potential for direct effects as the Proposed Project is located completely outside of the designated site. There is no pathway for effect on the terrestrial habitat for which this NHA is designated. **No pathway for significant effects on the designated site has been identified**
Proposed Natural Heritage Areas (pNHA)		
Belclare Turlough [000234]	1.3km	There is no potential for direct effects as the Proposed Project is located completely outside of the designated site.

[7] *https://www.npws.ie/sites/default/files/protected-sites/synopsis/SY004042.pdf*

Designated Site	Distance from Proposed Project (km)	Likely Zone of Impact Determination
		The groundwater level data collected during the hydrological surveys undertaken, (outlined in Section 9.3.7.3.2 of Chapter 9 of this EIAR), indicates that groundwater within the Site flows from east to west. As this pNHA is situated to the north of the Site, groundwater from the Proposed Project site will not travel in the direction of this pNHA. This conceptual model of groundwater flow is supplemented by tracer studies conducted on a spring located between Turlough Monaghan and the Site, which proves that groundwater flow direction is in a southwest direction, as discussed in Section 6.3.1.3. **No pathway for significant effects on the designated site has been identified.**
Killower Turlough [000282]	2km	There is no potential for direct effects as the Proposed Project is located completely outside of the designated site. The groundwater level data collected during the hydrological surveys undertaken, (outlined in Section 9.3.7.3.2 of Chapter 9 of this EIAR), indicates that groundwater within the Site flows from east to west. As this pNHA is situated to the north of the Site, groundwater from the Site will not travel in the direction of this pNHA. This conceptual model of groundwater flow is supplemented by tracer studies conducted on a spring located between Turlough Monaghan and the Proposed Project, which proves that groundwater flow direction is in a southwest direction, as discussed in Section 6.3.1.3. **No pathway for significant effects on the designated site has been identified.**
Turlough Monaghan [001322]	2.6km	There is no potential for direct effects as the Proposed Project is located completely outside of the designated site. The groundwater level data collected during the hydrological surveys undertaken, (outlined in Section 9.3.7.3.2 of Chapter 9 of this EIAR), indicates that groundwater within the Siteflows from east to west. As this pNHA is situated to the northwest of the Site, groundwater from the Site will not travel in the direction of this pNHA. This conceptual model of groundwater flow is supplemented by tracer studies conducted on a spring located between Turlough Monaghan and the Proposed Project, which proves that groundwater flow direction is in a southwest direction, as discussed in Section 6.3.1.3.

Designated Site	Distance from Proposed Project (km)	Likely Zone of Impact Determination
		No pathway for significant effects on the designated site has been identified.
Knockmaa Hill [001288]	3.1km	There is no potential for direct effects as the Proposed Project is located completely outside of the designated site. There is no pathway for effect on the terrestrial habitat for which this site is designated. **No pathway for significant effects on the designated site has been identified**
Lough Corrib [000297] *This site is also an SAC*	The Proposed Wind Farm site is 3.6km east of the pNHA boundary. The pNHA is located approx. 32km downstream of the Proposed Grid Connection underground cabling route via the Clare River.	There is no potential for direct effects as the Proposed Project is located completely outside of the pNHA. A potential for likely significant indirect effect via water quality deterioration was identified, given that the Proposed Wind Farm is located within the same groundwater body as the pNHA, and the Proposed Grid Connection route has surface water connectivity with the pNHA. **On a precautionary basis, the pNHA is considered to be within the Likely Zone of Impact and further assessment is required.**
Turloughcor [001788]	4km	There is no potential for direct effects as the Proposed Project is located completely outside of the designated site. The groundwater level data collected during the hydrological surveys undertaken, (outlined in Section 9.3.7.3.2 of Chapter 9 of this EIAR), indicates that groundwater within the Siteflows from east to west. As this pNHA is situated to the northwest of the Proposed Project site, groundwater from the Site will not travel in the direction of this pNHA. This conceptual model of groundwater flow is supplemented by tracer studies conducted on a spring located between Turlough Monaghan and the Proposed Project, which proves that groundwater flow direction is in a southwest direction, as discussed in Section 6.3.1.3. **No pathway for significant effects on the designated site has been identified.**
Turlough O'Gall [000331]	4.3km	There is no potential for direct effects as the Proposed Project is located completely outside of the designated site. The groundwater level data collected during the hydrological surveys undertaken, (outlined in Section 9.3.7.3.2 of Chapter 9 of this EIAR),

Designated Site	Distance from Proposed Project (km)	Likely Zone of Impact Determination
		indicates that groundwater within the Siteflows from east to west. As this pNHA is situated to the north of the Site, groundwater from the Site will not travel in the direction of this pNHA. This conceptual model of groundwater flow is supplemented by tracer studies conducted on a spring located between Turlough Monaghan and the Proposed Project, which proves that groundwater flow direction is in a southwest direction, as discussed in Section 6.3.1.3. **No pathway for significant effects on the designated site has been identified.**
Castle Hackett Souterrain [002038]	4.5km	There is no potential for direct effects as the Proposed Project is located completely outside of the designated site. The Proposed Project is located outside of the 2.5km foraging range (NPWS 2018) for the Lesser Horseshoe Bat roost for which the Site is designated, therefore there is no potential for likely significant effect. **No pathway for significant effects on the designated site has been identified**
Knockavanny Turlough [000289]	5.6km	There is no potential for direct effects as the Proposed Project is located completely outside of the designated site. The groundwater level data collected during the hydrological surveys undertaken, (outlined in Section 9.3.7.3.2 of Chapter 9 of this EIAR), indicates that groundwater within the Siteflows from east to west. As this pNHA is situated to the northeast of the Proposed Project site, groundwater from the Site will not travel in the direction of this pNHA. This conceptual model of groundwater flow is supplemented by tracer studies conducted on a spring located between Turlough Monaghan and the Proposed Project, which proves that groundwater flow direction is in a southwest direction, as discussed in Section 6.3.1.3. **No pathway for significant effects on the designated site has been identified.**
Lough Hackett [001294]	6.2km	There is no potential for direct effects as the Proposed Project is located completely outside of the designated site. The groundwater level data collected during the hydrological surveys undertaken, (outlined in Section 9.3.7.3.2 of Chapter 9 of this EIAR), indicates that groundwater within the Siteflows from east to west. As this pNHA is situated to the

Designated Site	Distance from Proposed Project (km)	Likely Zone of Impact Determination
		northwest of the Proposed Project site, groundwater from the Site will not travel in the direction of this pNHA. This conceptual model of groundwater flow is supplemented by tracer studies conducted on a spring located between Turlough Monaghan and the Proposed Project, which proves that groundwater flow direction is in a southwest direction, as discussed in Section 6.3.1.3. **No pathway for significant effects on the designated site has been identified.**
Levally Lough [000295] *This site is also an SAC*	9.6km	There is no potential for direct effects as the Proposed Project is located completely outside of the designated site. There is no downstream surface water connectivity from the Site to this pNHA. The groundwater level data collected during the hydrological surveys undertaken, (outlined in Section 9.3.7.3.2 of Chapter 9 of this EIAR), indicates that groundwater within the Siteflows from east to west. As this pNHA is situated to the northeast of the Proposed Project site, groundwater from the Site will not travel in the direction of this pNHA. This conceptual model of groundwater flow is supplemented by tracer studies conducted on a spring located between Turlough Monaghan and the Proposed Project, which proves that groundwater flow direction is in a southwest direction, as discussed in Section 6.3.1.3. **No pathway for significant effects on the designated site has been identified.**
Drumbulcaun Bog [000263]	9.8km	There is no potential for direct effects as the Proposed Project is located completely outside of the designated site. The groundwater level data collected during the hydrological surveys undertaken, (outlined in Section 9.3.7.3.2 of Chapter 9 of this EIAR), indicates that groundwater within the Siteflows from east to west. As this pNHA is situated to the northeast of the Proposed Project site, groundwater from the Site will not travel in the direction of this pNHA. This conceptual model of groundwater flow is supplemented by tracer studies conducted on a spring located between Turlough Monaghan and the Proposed Project, which proves that groundwater flow direction is in a southwest direction, as discussed in Section 6.3.1.3.

Designated Site	Distance from Proposed Project (km)	Likely Zone of Impact Determination
		No pathway for significant effects on the designated site has been identified.
Rostaff Turlough [000385]	10km	There is no potential for direct effects as the Proposed Project is located completely outside of the designated site. The groundwater level data collected during the hydrological surveys undertaken, (outlined in Section 9.3.7.3.2 of Chapter 9 of this EIAR), indicates that groundwater within the Siteflows from east to west. As this pNHA is situated to the northwest of the Proposed Project site, groundwater from the Site will not travel in the direction of this pNHA. This conceptual model of groundwater flow is supplemented by tracer studies conducted on a spring located between Turlough Monaghan and the Proposed Project, which proves that groundwater flow direction is in a southwest direction, as discussed in Section 6.3.1.3. **No pathway for significant effects on the designated site has been identified.**
Altore Lake [000224]	11.4km	There is no potential for direct effects as the Proposed Project is located completely outside of the designated site. The groundwater level data collected during the hydrological surveys undertaken, (outlined in Section 9.3.7.3.2 of Chapter 9 of this EIAR), indicates that groundwater within the Siteflows from east to west. As this pNHA is situated to the north of the Proposed Project site, groundwater from the Site will not travel in the direction of this pNHA. This conceptual model of groundwater flow is supplemented by tracer studies conducted on a spring located between Turlough Monaghan and the Proposed Project, which proves that groundwater flow direction is in a southwest direction, as discussed in Section 6.3.1.3. **No pathway for significant effects on the designated site has been identified.**
Rathbaun Turlough [000215]	11.7km	There is no potential for direct effects as the Proposed Project is located completely outside of the designated site. The groundwater level data collected during the hydrological surveys undertaken, (outlined in Section 9.3.7.3.2 of Chapter 9 of this EIAR), indicates that groundwater within the Siteflows from east to west. As this pNHA is situated to the north of the Proposed Project site, groundwater from the Site will not travel in the direction of this

Designated Site	Distance from Proposed Project (km)	Likely Zone of Impact Determination
		pNHA. This conceptual model of groundwater flow is supplemented by tracer studies conducted on a spring located between Turlough Monaghan and the Proposed Project, which proves that groundwater flow direction is in a southwest direction, as discussed in Section 6.3.1.3. **No pathway for significant effects on the designated site has been identified.**
Kiltullagh Turlough [000287]	12.6km	There is no potential for direct effects as the Proposed Project is located completely outside of the designated site. This pNHA is located within a separate groundwater body to the Proposed Project, therefore there is no potential for impacts via groundwater pathways or any other pathway. **No pathway for significant effects on the designated site has been identified.**
Cloughmoyne [000479] *This site is also an SAC*	12.7km	There is no potential for direct effects as the Proposed Project is located completely outside of the designated site. The groundwater level data collected during the hydrological surveys undertaken, (outlined in Section 9.3.7.3.2 of Chapter 9 of this EIAR), indicates that groundwater within the Siteflows from east to west. As this pNHA is situated to the northwest of the Proposed Project site, groundwater from the Site will not travel in the direction of this pNHA. This conceptual model of groundwater flow is supplemented by tracer studies conducted on a spring located between Turlough Monaghan and the Proposed Project, which proves that groundwater flow direction is in a southwest direction, as discussed in Section 6.3.1.3. **No pathway for significant effects on the designated site has been identified.**
Shrule Turlough [000525] *This site is also an SAC*	12.9km	There is no potential for direct effects as the Proposed Project is located completely outside of the designated site. This site is located within a separate groundwater body to the Proposed Project, therefore, there is no potential for indirect effect. **No pathway for significant effects on the designated site has been identified**
Gortnandarragh Limestone Pavement [001271]	13.5km	There is no potential for direct effects as the Proposed Project is located completely outside of the designated site.

Designated Site	Distance from Proposed Project (km)	Likely Zone of Impact Determination
This site is also an SAC		There is no pathway for effect on the terrestrial habitat for which this site is designated. **No pathway for significant effects on the designated site has been identified**

The following designated sites are identified as being within the Likely Zone of Impact and are assessed further in the accompanying NIS:

- Lough Corrib SAC [000297]
- Lough Corrib SPA [004042]

The following pNHA has been identified as being within the Likely Zone of Impact of the Proposed Project:

- Lough Corrib pNHA [000297]

6.3.1.2 NPWS Article 17 Reporting

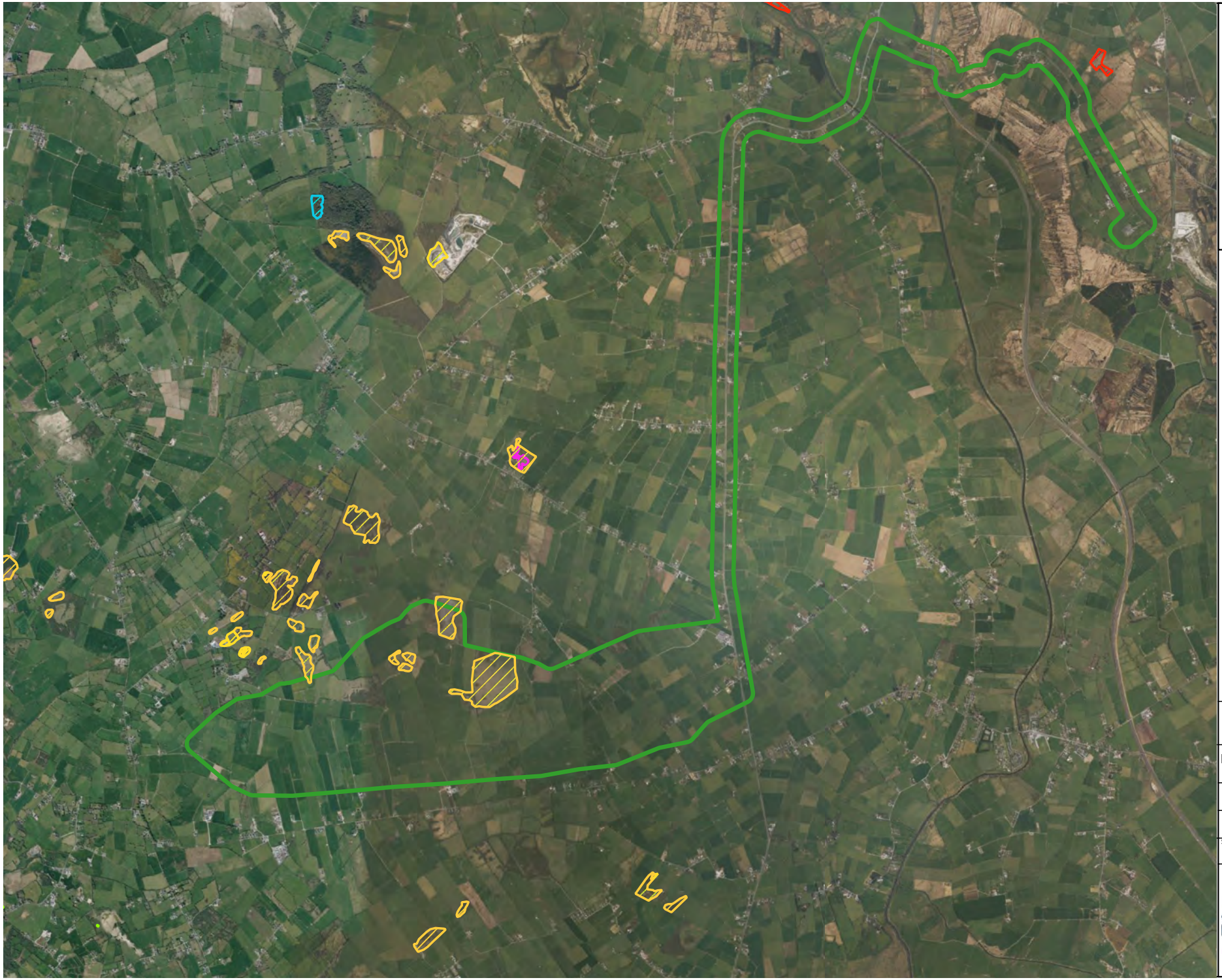
A review of the Irish Reports for Article 17 of the Habitats Directive (92/42/EEC), including the Heath, Bogs and Mires, Irish Semi-Natural Grassland Survey datasets, National Survey of Native Woodlands and Ancient and Long-Established Woodland datasets was carried out as part of this assessment.

The desk study involved a search of information pertinent to the study area. Initially the NPWS designated site datasets were consulted. Areas of Habitats Directive Annex I habitat 'Limestone Pavement* [8240]' are located within the EIAR Site Boundary and surrounding areas. These areas are shown on Figure 6-3.

Areas of 'Semi-natural dry grasslands and scrubland facies on Calcareous substrates (Festuco-Brometalia) (* important orchid sites) [6210]' are present 1.9km north of the EIAR Site Boundary.

Areas of 'Old oak woodlands' are mapped approx. 4.3km north of the EIAR Site Boundary.

Areas of 'Dry heath' are mapped 200m from the EIAR Site Boundary along the extent of the Proposed Grid Connection underground cabling route.



Map Legend

- EIAR Site Boundary
- Dry Heath
- Limestone Pavement
- Old Oak Woodlands
- Orchid Rich Calcareous Grassland

N

Drawing Title

Article 17 Habitats

Project Title: Laurclavagh Renewable Energy Development	
Drawn By: RW	Checked By: JH
Project No.: 210627	Drawing No.: Figure 6-3
Scale: 1:50,000	Date: 2024-03-06

MKO
Planning and Environmental Consultants
Tuam Road, Galway
Ireland, H91 VW84
+353 (0) 91 735611
email:info@mkoireland.ie
Website: ww.mkoireland.ie

6.3.1.3 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 II of the EU Habitats Directive, The Irish Red Data Book – 1 Vascular Plants (Curtis, 1988) or the Flora (Protection) Order 2022 S.I. No. 235 had been recorded in the relevant 10km square in which the study site is situated (M34). Each hectad contains 100 whole one kilometre squares containing terrestrial habitats. Species of conservation concern are given in Table 6-5. No species listed in Annex II of the Habitats Directive are shown in the atlas for square M34.

Table 6-5: Species listed designated under the Flora Protection Order or the Irish Red Data Book within Hectad M34

Common Name	Scientific Name	Status
Moonwort	*Botrychium lunaria*	NT
Greater Knapweed	*Centaurea scabiosa*	NT
Frog Orchid	*Coeloglossum viride*	NT
Dwarf Spurge	*Euphorbia exigua*	NT
Spring Gentian	*Gentiana verna*	NT
Field Gentian	*Gentianella campestris*	NT
Common Gromwell	*Lithospermum officinale*	NT
Fly Orchid	*Ophrys insectifera*	NT
Green-Winged Orchid	*Orchis morio*	VU
Autumn Lady's-Tresses	*Spiranthes spiralis*	NT
Wood Bitter-Vetch	*Vicia orobus*	FPO; VU

FPO= Floral Protection Order; Red List of Vascular Plants = Near Threatened (NT), Vulnerable (VU)

6.3.1.4 Bryophytes

A search of the NPWS online database for bryophytes (non-vascular land plants comprising of mosses, hornworts and liverworts) was also undertaken with no protected bryophytes recorded within or adjacent to the Site (NPWS, 2021).

6.3.1.5 National Biodiversity Data Centre (NBDC) Records

A search of the National Biodiversity Data Centre (NBDC) website was conducted in advance of undertaking field surveys between 2021 and 2023 and an updated search was carried out on the 21/11/2023. This helped to inform survey effort and provide a baseline of likely species composition in the area. Records of protected fauna recorded from hectad M34 are provided in Table 6-6.

NBDC and Bird Atlas records for birds are provided in Chapter 7 Ornithology and are not repeated here.

Table 6-6: NBDC records for protected species and species of conservation interest (excl. birds) in hectad M34

Common Name (Scientific Name)	Date of Last Record	Designation
Reptiles and Anphibians		
Common Frog (*Rana temporaria)*	15.08.2020	HD Annex V; WA
Smooth Newt *(Lissotriton vulgaris)*	15.02.2013	WA
Terrestrial Mammal		
Sika Deer *(Cervus nippon)*	31.12.2009	WA
Fallow Deer (*Dama dama)*	31.12.2008	WA
Hedgehog (*Erinaceus europaeus)*	02.05.2021	WA
Otter (*Lutra lutra)*	23.06.2011	HD Annex II, IV; WA
Pine Marten (*Martes martes)*	29.05.2021	HD Annex V; WA
Badger (*Meles meles)*	18.10.2018	WA
Red Squirrel (*Sciurus vulgaris)*	31.12.2001	WA
Pygmy Shrew (*Sorex minutus)*	15.07.2011	WA
Irish Hare (*Lepus timidus subsp. hibernicus*)	24.01.2023	WA
Irish Stoat (*Mustela erminea subsp. hibernica*)	06.09.2015	WA

HD Annex I, Annex II, Annex IV, Annex V = EU Habitats Directive; WA = Wildlife Acts (Ireland)

6.3.1.5.1 *Invasive Species*

The NBDC database also contains records of invasive species identified within the relevant hectads. 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. Canadian Waterweed is the only record of invasive species subject to restrictions under Regulations 49 and 50 and included in the Third Schedule of the European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. No. 477 of 2011) present in hectad M34.

Table 6-7: NBDC records for invasive species (hectad M34)

Common Name	Scientific Name	Hectad
Cherry Laurel	*Prunus laurocerasus*	M34
Sycamore	*Acer pseudoplatanus*	M34
Common Garden Snail	*Cornu aspersum*	M34
Jenkins' Spire Snail	*Potamopyrgus antipodram*	M34
Bank Vole	*Myodes glareolus*	M34
European Rabbit	*Oryctolagus cuniculus*	M34
Canadian Waterweed	*Elodea canadensis*	M34

6.3.1.6 Bat Records

Bat Conservation Ireland

A data request was sent to Bat Conservation Ireland for records of bat activity and roosts within a 10km radius of an approximate central point in the Site (IG Ref: M 37083 43525; last search 24/11/2023). Available bat records were provided by BCI on 24th November 2023. The search included roosts, transects and ad-hoc observations. A number of ad-hoc observations (n=44) have been recorded. At least eight of Ireland's nine resident bat species were recorded within 10km of the Site. The results of the database search are provided in Table 6-8.

Table 6-8 National Bat Database of Ireland Records within 10km

Northern Section of Proposed Site (IG Ref: E 263983 N 259683)				
Record	**Species**	**Grid Reference**	**Date**	**Location**
Roost	Unidentified bat	M436521	N/A	Clare Tuam, Tuam, County Galway
	Myotis natterreri	M436521	N/A	Clare Tuam, Tuam, County Galway
	Myotis natterreri, Myotis daubentonii, Rhinolophus hipposideros	M4002949590	N/A	Clare Tuam Bridge, N17, Claretuam, Tuam, Galway
	Myotis daubentonii, Myotis natterreri	M4260043400	N/A	Corrofin Bridge, Corrofin, Co. Galway
	Myotis natterreri, Plecotus auritus, Rhinolophus hipposideros	M3537	N/A	Cregg, Corrandulla, Co. Galway
	Unidentified bat	M354378	N/A	Corandulla,Co. Galway
	Myotis natterreri	M3141	N/A	Headford, Co. Galway
	Plecotus auritus	M3048	N/A	Headford, County Galway
	Rhinolophus hipposideros	M329476	N/A	Carrowcohlaun Fort, Belclare, Co. Galway
	Rhinolophus hipposideros	M337487	N/A	Castlehackett, Belclare, Co. Galway
	Rhinolophus hipposideros	M3247	N/A	Co. Galway
Transect	*Unidentified bat, Myotis daubentonii*	M3174135178	N/A	Addergoole Bridge Transect

Northern Section of Proposed Site (IG Ref: E 263983 N 259683)				
	Unidentified bat	M3174135178	N/A	Addergoole Bridge Transect spot 1
	Myotis daubentonii, Unidentified bat	M3230434984	N/A	Addergoole Bridge Transect spot 10
	Unidentified bat	M3171535125	N/A	Addergoole Bridge Transect spot 2
	Myotis daubentonii, Unidentified bat	M3178234968	N/A	Addergoole Bridge Transect spot 4
	Myotis daubentonii, Unidentified bat	M3187934998	N/A	Addergoole Bridge Transect spot 5
	Unidentified bat, Myotis daubentonii	M3196534991	N/A	Addergoole Bridge Transect spot 6
	Unidentified bat, Myotis daubentonii	M3204434937	N/A	Addergoole Bridge Transect spot 7
	Unidentified bat, Myotis daubentonii	M3212634944	N/A	Addergoole Bridge Transect spot 8
	Unidentified bat, Myotis daubentonii	M3219934986	N/A	Addergoole Bridge Transect spot 9
	Pipistrellus pygmaeus, Nyctalus leisleri, Pipistrellus pipistrellus, Unidentified bat	M430517	N/A	M24 (14) 2003-
	Pipistrellus pipistrellus , Pipistrellus spp. , Nyctalus leisleri, Pipistrellus pygmaeus	M388534	N/A	M24 (15) 2003-
	Pipistrellus spp., Nyctalus leisleri, Pipistrellus pygmaeus, Pipistrellus pipistrellus	M386492	N/A	M24 (16) 2003-2008
	Pipistrellus pipistrellus , Pipistrellus spp. , Pipistrellus pygmaeus	M355473	N/A	M24 (17) 2003-2008
	Pipistrellus pipistrellus, Pipistrellus spp. , Pipistrellus pygmaeus	M333453	N/A	M24 (18) 2003-2008
	Pipistrellus pygmaeus, Pipistrellus pipistrellus , Pipistrellus spp.	M304453	N/A	M24 (19) 2003-2008
	Pipistrellus pygmaeus, Pipistrellus spp. , Pipistrellus pipistrellus	M296476	N/A	M24 (20) 2003-2008
	Myotis daubentonii, Unidentified bat	M2799452633	N/A	Shrule Village Transect
Ad-hoc	*Pipistrellus pipistrellus , Pipistrellus pygmaeus, Nyctalus leisleri*	M325506	26/08/2009	BATLAS 2010
	Pipistrellus pipistrellus , Pipistrellus pygmaeus	M2802252649	04/08/2009	BATLAS 2010
	Pipistrellus pygmaeus, Nyctalus leisleri	M2802252649	14/10/2009	BATLAS 2010
	Pipistrellus pygmaeus, Pipistrellus spp. , Nyctalus leisleri, Myotis daubentonii, Plecotus auritus	M4181536435	25/06/2009	BATLAS 2010
	Pipistrellus pygmaeus, Nyctalus leisleri, Plecotus auritus	M3570037600	27/09/2009	BATLAS 2010
	Pipistrellus pipistrellus , Pipistrellus pygmaeus	M3535037800	27/09/2009	BATLAS 2010
	Pipistrellus pipistrellus , Pipistrellus pygmaeus	M317413	22/05/2009	BATLAS 2010
	Myotis spp., Pipistrellus spp. , Pipistrellus pygmaeus	M365426	22/05/2009	BATLAS 2010

Northern Section of Proposed Site (IG Ref: E 263983 N 259683)				
	Pipistrellus pipistrellus , Pipistrellus pygmaeus	M328479	22/05/2009	BATLAS 2010
	Pipistrellus pygmaeus	M417529	24/05/2009	BATLAS 2010
	Pipistrellus pipistrellus , Nyctalus leisleri	M4424034589	22/05/2018	BATLAS 2020
	Pipistrellus pipistrellus	M4467635566	22/05/2018	BATLAS 2020
	Pipistrellus pygmaeus, Nyctalus leisleri	M3074636087	27/08/2018	BATLAS 2020
	Pipistrellus pipistrellus , Pipistrellus pygmaeus, Nyctalus leisleri, Myotis daubentonii	M4179536439	20/05/2018	BATLAS 2020
	Pipistrellus pygmaeus	M3322237358	27/08/2018	BATLAS 2020
	Pipistrellus pygmaeus	M2904637575	27/08/2018	BATLAS 2020
	Pipistrellus pipistrellus , Pipistrellus pygmaeus, Nyctalus leisleri, Myotis daubentonii	M3533337857	29/08/2018	BATLAS 2020
	Pipistrellus pipistrellus , Pipistrellus pygmaeus	M2802838392	27/08/2018	BATLAS 2020
	Pipistrellus spp.	M3660040700	17/08/2018	BATLAS 2020
	Pipistrellus pygmaeus, Nyctalus leisleri, Myotis spp.	M2960041200	30/08/2018	BATLAS 2020
	Pipistrellus pygmaeus, Myotis daubentonii	M3170041300	16/08/2018	BATLAS 2020
	Pipistrellus pipistrellus	M3380042300	16/08/2018	BATLAS 2020
	Pipistrellus pipistrellus , Nyctalus leisleri	M2720046900	10/05/2017	BATLAS 2020
	Pipistrellus pygmaeus, Unidentified bat	M3050047300	16/08/2018	BATLAS 2020
	Pipistrellus pipistrellus , Nyctalus leisleri	M3690047300	16/08/2018	BATLAS 2020
	Pipistrellus pygmaeus, Myotis mystacinus	M3560049400	10/08/2018	BATLAS 2020
	Pipistrellus pygmaeus, Nyctalus leisleri, Myotis daubentonii	M3090049500	10/08/2018	BATLAS 2020
	Pipistrellus pipistrellus	M3250050600	08/08/2018	BATLAS 2020
	Pipistrellus pygmaeus, Nyctalus leisleri	M2810052600	29/08/2018	BATLAS 2020
	Pipistrellus pygmaeus, Nyctalus leisleri	M3710052900	28/08/2018	BATLAS 2020
	Pipistrellus pipistrellus , Pipistrellus pygmaeus, Nyctalus leisleri	M3810053470	28/08/2018	BATLAS 2020
	Pipistrellus pygmaeus, Nyctalus leisleri	M3702550315	10/09/2009	Consultancy Surveys
	Pipistrellus pipistrellus , Pipistrellus pygmaeus	M3702550315	07/08/2010	Consultancy Surveys
	Pipistrellus pipistrellus , Pipistrellus pygmaeus, Nyctalus leisleri	M4184036480	26/08/2019	Consultancy Surveys
	Myotis daubentonii	M4400046000	11/05/2002	Consultancy Surveys
	Myotis daubentonii	M4500041000	11/05/2002	Consultancy Surveys
	Pipistrellus pipistrellus , Pipistrellus pygmaeus, Nyctalus leisleri, Myotis daubentonii	M4200052000	16/06/2005	Consultancy Surveys
	Pipistrellus pygmaeus	M4260043400	16/10/2005	Consultancy Surveys
	Pipistrellus spp. , Myotis daubentonii	M353379	24/09/2019	National Biodiversity Data Centre Bat Records

Northern Section of Proposed Site (IG Ref: E 263983 N 259683)				
	Nyctalus leisleri	M362482	14/07/2022	National Biodiversity Data Centre Bat Records
	Pipistrellus spp.	M310418	27/02/2021	National Biodiversity Data Centre Bat Records
	Pipistrellus spp.	M310418	12/05/2021	National Biodiversity Data Centre Bat Records
	Pipistrellus spp.	M294412	30/06/2022	National Biodiversity Data Centre Bat Records
	Pipistrellus pygmaeus, Myotis daubentonii	M4380052300	23/04/2005	Consultancy Surveys

National Biodiversity Data Centre

The National Bat Database of Ireland was searched for records of bat activity and roosts within a 10km radius of the Site (last search 06/11/2023). Hectads M34 and M44 lie within 10km of the Site. Seven of Ireland's nine resident bat species were recorded within 10km of the Site The results of the database search is provided in Table 6-9.

Table 6-9 NBDC Bat Records within 10km of the Site

Hectad	Species	Database	Designation
M34, M44	Brown Long-eared Bat (*Plecotus auritus*)	National Bat Database of Ireland	HD Annex IV, WA
M34, M44	Lesser Horseshoe Bat (*Rhinolophus hipposideros*)	National Lesser Horseshoe Bat Database	HD Annex II & IV, WA
M34, M44	Lesser Noctule (*Nyctalus leisleri*)	National Bat Database of Ireland	HD Annex IV, WA
M34, M44	Natterer's Bat *(Myotis nattereri)*	National Bat Database of Ireland	HD Annex IV, WA
M34, M44	Common Pipistrelle (*Pipistrellus pipistrellus sensu lato*)	National Bat Database of Ireland	HD Annex IV, WA
M34	Soprano Pipistrelle (*Pipistrellus pygmaeus*)	National Bat Database of Ireland	HD Annex IV, WA
M44	Daubenton's Bat *(Myotis daubentonii)*	National Bat Database of Ireland	HD Annex IV, WA

6.3.1.1 NPWS Protected Species Records

National Parks and Wildlife Service (NPWS) online records were searched to see if any rare or protected species of flora or fauna have been recorded from hectads M34. An information request was also sent to the NPWS scientific data unit requesting records from the Rare and Protected Species Database. A response was received on the 15th September 2021. The table below lists rare and protected species records obtained from NPWS.

Table 6-10: NPWS records for rare and protected species

Common name (Scientific Name)	Designation
Mammals	
Sika Deer (*Cervus nippon*)	WA
Fallow Deer (*Dama dama)*	WA
Hedgehog (*Erinaceus europaeus)*	WA
Otter (*Lutra lutra)*	HD Annex II, IV; WA
Pine Marten (*Martes martes)*	HD Annex V; WA
Badger (*Meles meles)*	WA
Lesser Horseshoe Bat (*Rhinolophus hipposideros)*	HD Annex II, IV; WA
Irish Hare (*Lepus timidus subsp. Hibernicus*)	WA
Reptiles and Amphibians	
Common Frog (*Rana temporaria*)	HD Annex V: WA
Common Lizard (*Zootoca vivipara*)	WA
Inverterbates	
White Clawed Crayfish *(Austropotamobius pallipes)*	HD Annex II, V; WA
Birds	
Common Sandpiper (*Actitis hypoleucos*)	BoCCI AL
Coot (*Fulica atra*)	HD Annex II, Annex III, BoCCI AL
Cormorant (*Phalacrocorax carbo*)	BoCCI AL
Curlew (*Numenius arquata*)	BoCCI – Red List
Golden Plover (*Pluvialis apricaria*)	BoCCI – Red List
Grey Wagtail (*Motacilla cinerea*)	BoCCI – Red List
Herring Gull (*Larus argentatus*)	BoCCI RL
House Martin (*Delichon urbica*)	BoCCI AL
Kingfisher (*Alcedo atthis*)	BD Annex I, BoCCI – Amber List
Lapwing (*Vanellus vanellus*)	BoCC – Red List
Linnet (*Carduelis cannabina*)	BoCCI – Amber List

Common name (Scientific Name)	Designation
Mallard (*Anas platyrhynchos*)	HD Annex II, III, BoCCI
Meadow Pipit (*Anthus pratensis*)	BoCC – Red List
Mute Swan (*Cygnus olor*)	BoCCI – Amber List
Redshank (*Tringa tetanus*)	BoCCI Red List
Sand Martin (*Riparia riparia*)	BoCCI – Amber List
Snipe (*Gallinago gallinago*)	BoCC – Red List
Swallow (*Hirundo rustica*)	BoCCI – Amber List
Swift (*Apus apus*)	BoCC – Red List
Teal (*Anas crecca*)	BoCCI – Amber List
Wheatear (*Oenanthe 6-40uthoriz*)	BoCCI – Amber List
Wigeon (*Anas Penelope*)	BoCCI – Amber List
Willow Warbler (*Phylloscopus trochilus*)	BoCCI – Red List
Vascular Plants	
Dwarf Spurge *(Euphorbia exigua)*	RL (Near Threatened)
Spring Gentian *(Gentiana verna)*	RL (Near Threatened)
Dense Flowered Orchid *(Neotinea maculate)*	RL (Near Threatened)
Fly Orchid *(Ophrys insectifera)*	RL (Near Threatened)
Green Winged Orchid *(Orchis morio)*	RL (Vulnerable)
Shrubby Cinquefoil *(Potentilla 6-40uthorize)*	RL (Vulnerable)
Small White Orchid *(Pseudorchis albida)*	FPO; RL (Vulnerable)
Shepherd's Needle *(Scandix pecten-veneris)*	RL (Regionally Extinct)
Bryophytes	
Cladonia ciliata	HD Annex V
Cladonia portentosa	HD Annex V
Clint Crisp-moss (*Tortella densa*)	

HD = EU Habitats Directive; WA = Wildlife Act (Ireland); BD = Birds Directive; BoCC = Birds of Conservation Concern; FPO = Flora Protection Order; RL = Red List

6.3.1.1.1 Marsh Fritillary

The NPWS point dataset for Marsh Fritillary (*Euphydryas aurinia)* was reviewed on GIS to ascertain whether records for the species are present in the vicinity of the EIAR site boundary. A record for Marsh Fritillary is present approximately 5.3km east of the EIAR site boundary.

6.3.1.2 Inland Fisheries Ireland Data

The IFI online database was reviewed for fish species records within the catchments downstream of the EIAR study area boundary and Lough Corrib. A search of the Inland Fisheries Ireland (IFI) online database was carried out to determine the species richness of the adjacent watercourses. The results are presented in the table below. Further detail with regard to fisheries desk study data is available in the Aquatic Baseline Report (Appendix 6-3).

Table 6-11: Inland Fisheries Ireland Data

Station Name	Species	Draft Fish Ecological Status	Assessment Year
Lough Corrib (Upper)	Bream; Brown Trout; European Eel; Perch; Pike; Roach; Roach x Bream hybrid; Salmon; 3-Spined Stickleback	Poor	2018
Lough Corrib (Lower)	Brown Trout; European Eel; Perch; Pike; Roach; Roach x Bream hybrid; Salmon; Stone Loach; 3-Spined Stickleback	Poor	2018

6.3.1.3 Regional and Local Hydrology

6.3.1.3.1 *Proposed Wind Farm*

The following summary of the local hydrology and hydrogeology in the vicinity of the Proposed Project is provided below, as extracted from Chapter 9 of this EIAR.

Regional hydrology:

With respect to regional hydrology, the Proposed Wind Farm site is located primarily within the Corrib catchment, within Hydrometric Area 30 (Corrib) of the Irish River Basin District. On a more local scale, the Proposed Wind Farm site is contained within the Clare(Galway)_SC_060 subcatchment. The River Clare is situated ~4.0km east of the Proposed Wind Farm site and flows south, while Lough Corrib is located ~4.3km to the west/southwest.

The closest watercourse to the Proposed Wind Farm site is the Ballinduff stream (also referred to as Bunnatubber spring by the EPA) situated 2.6km west of the Proposed Wind Farm site. The upper reaches of the stream are situated near 2 no. mapped turloughs and a spring mapped in the townland of Kilcoona, as well as a further spring in the townland of Bunatober

The Glennafosha stream is mapped ~3.7km northwest of the Proposed Wind Farm site, which flows west before discharging to the River Clare. The Cregg stream is mapped ~4.7km south of the Wind Farm site and flows west to Lough Corrib. The source of the Cregg stream is also located near a mapped spring, which has been traced back to Ballyglunin cave, located 10.7km northeast of the spring...

The regional area spanning east-west between Cahermorris and Ballycreg North and north-south between the townlands of Castlehacket and Lackanroe is distinctively void of mapped river/stream channels. The surface hydrological network does increase towards the margins of this regional area, with channels emerging 1-2km west of the River Clare and east of Lough Corrib.

Local hydrology:

There is a distinct lack of local drainage (field drains, ditches, first-order streams etc) within the Proposed Wind Farm site and surrounding area. The topography broadly slopes southwest across the site, although local variations do exist. Any surface water runoff from the Proposed Wind Farm site is expected to flow in this direction, however it will infiltrate to ground within a short distance, as evidenced by the lack of drainage channels. No field drains or surface watercourses were observed following numerous site walkover surveys. The agricultural fields are primarily improved grassland, which are well drained.

6.3.1.3.2 Proposed Grid Connection

The Proposed Grid Connection underground cabling route is located within the Clare(Galway)_050 and Clare(Galway)_060 river waterbodies, within the Clare[Galway]_SC_060, Clare[Galway]_SC_040 and Clare[Galway]_SC_020 subcatchments... The Proposed Grid Connection underground cabling route runs north along the N83 and crosses a tributary of the River Clare (Glennafosha stream) at Claretuam bridge, and crosses the River Clare approximately 0.9km east of this point at Cloonmore bridge. There are 4 no. watercourse crossings along the Proposed Grid Connection underground cabling route.

Drainage along the Proposed Grid Connection underground cabling route is broadly localised to drainage ditches along the road carriageway of the N83 road. The River Clare (Galway)_050 channel (tributary of main River Clare) meets the N83 National Road approximately 3.1km southwest of Tuam, and subsequently runs approximately parallel to the N83 road, varying between 0.25 – 1.25km east of the road carriageway. Drainage from the road carriageway will primarily drain in the direction of the tributary of the River Clare, however under typical moderate rainfall conditions, the surface water will likely infiltrate through the soil/subsoil before reaching the river as shallow baseflow.

6.3.1.4 Hydrogeology

The Proposed Project is situated within the Clare-Corrib GWB (Groundwater Body), which extends over an area of ~1,422 km^2, stretching from Moylough and Menlough in the east, to the southern shore of Lough Corrib in the west and extending as far north as Ballyhaunis. The Clare-Corrib groundwater Body is classified as a Regionally Important Aquifer (karstified conduit)...

A description of the Clare-Corrib GWB is provided in the Initial Characterisation Summary sheet for the groundwater body. The details within this text have been summarised below, with the addition of context with respect to the Proposed Project.

The topography of the Clare-Corrib Groundwater Body is characterised by small hills and low ridges, with elevation ranging from 10-160mOD. The topography slopes gently westward towards Lough Corrib (at ~8-10mOD).

The bedrock geology comprises Dinantian Pure Bedded Limestone, with areas of Pure Unbedded Limestones near Headford. Karstification is widespread in the GWB with recorded Karst features such as enclosed depressions and swallow holes mapped by the GSI. The frequency of mapped karst features is greater in the eastern section of the GWB, east of the River Clare.

Well yields are variable across the GWB ranging from excellent (>400 m^3/day) to moderate (40-100 m^3/day). The groundwater table has a high annual variation, indicating that the storage is low, with storativity ranging between 0.01-0.02 (Daly, 1985). Overall, groundwater flow directions are to the southwest, with all groundwater discharging to Lough Corrib...

The GWB report[8] states the following:

"...The area is drained by the River Clare and its tributaries, however the present day drainage network has been changed significantly by arterial drainage that took place early in the nineteenth century. According to Coxon and Drew (1983), much of the current stream network is a storm runoff system that is inactive during summer months. Thus, prior to drainage, streams sank underground via the turloughs present in the GWB."

Tracer Studies

Tracer studies have been completed at several springs in the area in order to better understand groundwater flow directions in the underlying bedrock. The tracer studies were undertaken by introducing a dye to the water in the turlough and observing any dye discharge from known local springs. Tracer studies have identified/established groundwater connections between the following:

- *Kilcoona Spring and Lough Hackett (~4.6km north to south flow);*
- *Bunatober spring and borehole to northeast (~4.25km northeast to southwest flow);*
- *Mills pond spring and borehole to northeast (~4.4km northeast to southwest flow);*
- *Mills pond spring and River Clare (~10.7km northeast to southwest flow); and,*
- *Aucloggeen Spring and Ballyglunnin Cave (~10.7km northeast to southwest flow).*

The karst features and tracer study lines are depicted in Figure 9-7 of Chapter 9 of this EIAR which is also provided as Plate 6-1 below. The data proves that groundwater flows within the Proposed Project site are in a south/southwest direction.

Turloughs

There are a number of turloughs mapped outside the EIAR Site Boundary. The closest mapped turlough is located 2 km north of the Proposed Wind Farm site and 2.2km from the nearest proposed turbine. A list of turloughs mapped by the GSI within 5km of the Proposed Wind Farm site is given below.

- Turlough in townland of Fearagha – 2km north of Proposed Wind Farm site;
- Turlough Monaghan – 3.5km north of Proposed Wind Farm site; and,
- 6 no. small turloughs situated in the townland of Balrobuckbeg, near the Balrobuckbeg GWS – 2km west of Proposed Wind Farm Site.

The turloughs are generally small scale and distal to the Proposed Project. None of the above-listed turloughs are designated as SAC's or SPA's, while Turlough Monaghan is designated as a proposed NHA. The water level data collected, (outlined in Section 9.3.7.3.2 of Chapter 9 of this EIAR), *indicates groundwater flows from east to west. As Turlough Monaghan is situated 3.5km north of the Site, groundwater from the proposed site will not travel in the direction of this turlough. This conceptual model of groundwater flow is supplemented by tracer studies conducted on a spring located between Turlough Monaghan and the Proposed Wind Farm site, which proves that groundwater flow direction is in a southwest direction.*

The location of the turloughs mapped by the GSI are included in Figure 9-7, Chapter 9 of this EIAR, denoted with the "T" symbol, and the figure is also provided below.

[8] *Clare-Corrib Groundwater Body Initial Characterisation Report, GSI., 2004*

Springs

Karst features are mapped by the GSI and available through the GSI online viewer. There are several karst features mapped near the Proposed Wind Farm site as shown in Plate 6-1 above. The closest mapped karst feature is a spring, situated between T7 and T8. There are also 3 no. depressions and a cave mapped ~0.8km south of the southwestern corner of the Proposed Wind Farm site.

The spring between proposed turbines 7 and 8 was investigated during the walkover surveys of the Proposed Wind Farm site by Hydro Environmental Services Ltd (as documented in Chapter 9 of this EIAR). Given the difference in groundwater levels between this perched aquifer (at ~40mOD) and the bedrock aquifer (14-29mOD), the available data suggests that there is no hydraulic connection between the spring and the underlying bedrock aquifer. The mapped spring is not a karst spring with water from the underlying limestone aquifer emerging at this point, but rather a shallow well intercepting water in the perched gravel aquifer.

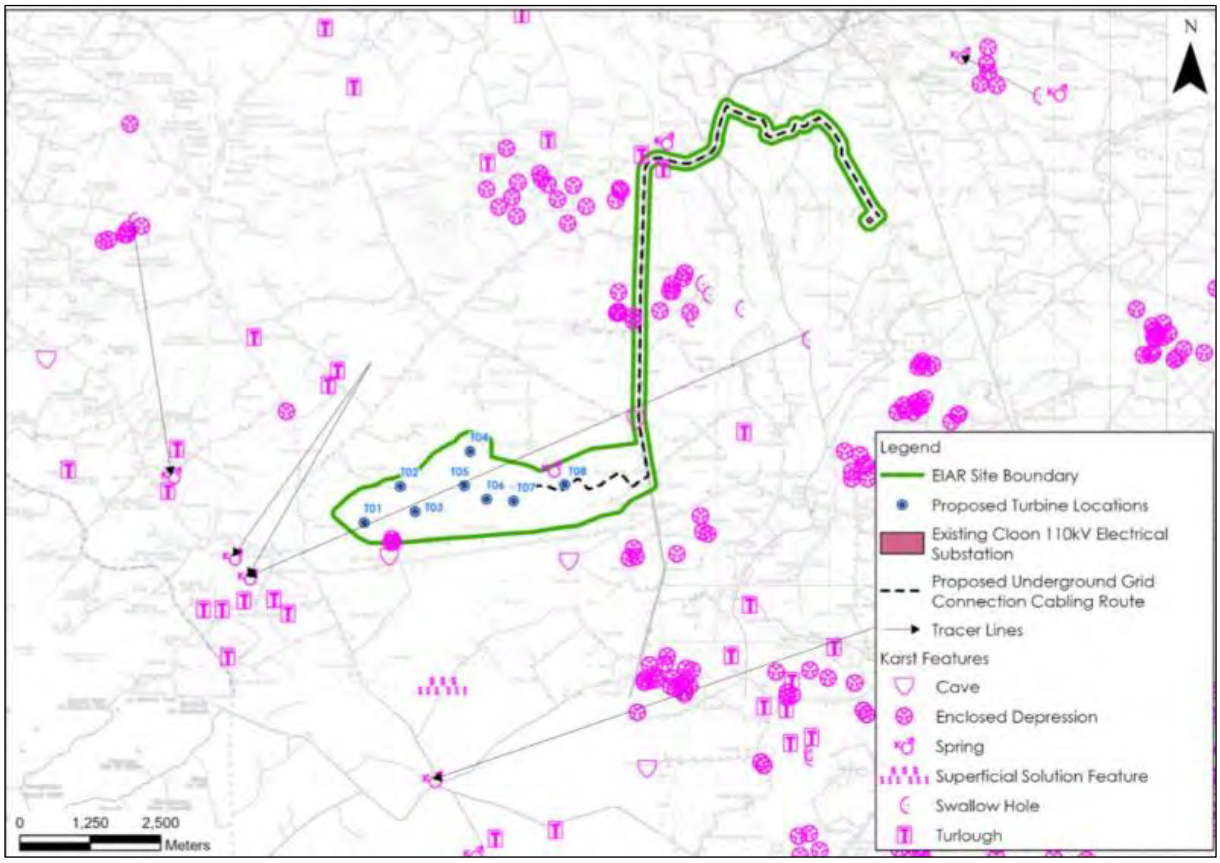


Plate 6-1 GSI-mapped karst features in the vicinity of the Proposed Project site. Source: Hydro-Environmental Services

6.3.1.5 Baseline Water Quality

The below desk study data on the baseline water quality of surface water bodies and groundwater in the vicinity of the Proposed Project is extracted from Chapter 9 of this EIAR and provided again here in the context of biodiversity.

The Proposed Project is located in the Clare Corrib Groundwater body. The Clare Corrib GWB (GWB: IE_WE_G_0020) is assigned 'Good Status' under the 2016-2021 WFD cycle, which is defined based on the quantitative status and chemical status of the GWB. This GWB is considered "Not at Risk" under the 3rd cycle risk rating.

The Proposed Project site is located in the WFD river sub basins of the Ballinduff Stream_010, which has a 2016-2021 WFD Status of "Good" and is deemed to be "Not at risk" of missing out on the 2027

WFD objectives, and the Clare (Galway_060), which has a 2016-2021 Status of "Poor" and is deemed to be "At risk" of not meeting the WFDs 2027 objectives.

The Clare (Galway)_070 has a WFD 2016-2021 Status of "Good" and is deemed to be "Not at risk" of missing out on the WFDs 2027 objectives. The Clare (Galway)_080 has a WFD 2016-2021 Status of "Moderate" and is deemed to be "At risk" of missing out on the WFDs 2027 objectives. The Clare (Galway)_090 has a WFD 2016-2021 Status of "Moderate" and is deemed to be "At risk" of missing out on the WFDs 2027 objectives. The Clare (Galway)_100 has a WFD 2016-2021 Status of "Moderate" and is deemed to be "Under Review". The Corrib Lower lake body has a WFD 2016-2021 Status of "Good" and is deemed to be "Not at risk" of missing the WFDs 2027 objectives.

Table 6-12 Summary of surface water body status. Extracted from Chapter 9 of this EIAR.

SWB	Overall Status (2013-2018)	Overall Status (2016-2021)	Risk 3rd Cycle	Pressures
Ballinduff Stream_010	Good	Good	Not at risk	-
Clare (Galway)_060	Moderate	Poor	At risk	Hydromorphology
Clare (Galway)_070	Good	Good	Not at risk	-
Clare (Galway)_080	Moderate	Moderate	At risk	Hydromorphology
Clare (Galway)_090	Moderate	Moderate	At risk	Hydromorphology
Clare (Galway)_100	Moderate	Moderate	Under review	-
Corrib Lower	Good	Good	Not at risk	-

6.3.1.6 Conclusions of the Desktop Study

The desktop study has provided information about the existing environment in Hectad M34, within which the Proposed Project site is located. No watercourses are present within the Proposed Wind Farm site; however, the Proposed Wind Farm site is within a limestone karst region, with a number of karst features present locally, including a number of undesignated turloughs. There is potential for groundwater connectivity with these features as well as with a number of European and nationally designated sites, and there is surface water connectivity with Lough Corrib SAC via the Proposed Grid Connection underground cabling route.

The desk study identified that a variety of protected faunal species are known to occur within the wider study area, including bats, marsh fritillary, otter and badger. The mammal species recorded during the desk study informed the survey methodologies undertaken during the Site visits. The mammal species recorded within the relevant hectad have widespread range and distributions in Ireland and are likely to be recorded frequently throughout Ireland (Marnell et al, 2009[9]). The Proposed Project is not located within a freshwater pearl mussel 'sensitive area'.

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

The desk study revealed that Annex I Article 17 habitats are present within the Proposed Project site, namely, Limestone pavement, and that there is potential for other associated Annex I calcareous habitats to occur within the Proposed Project site. In addition, the desk study revealed a number of Red Listed and FPO plant species within the hectad that are typically associated with calcareous habitats.

The desk study 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.

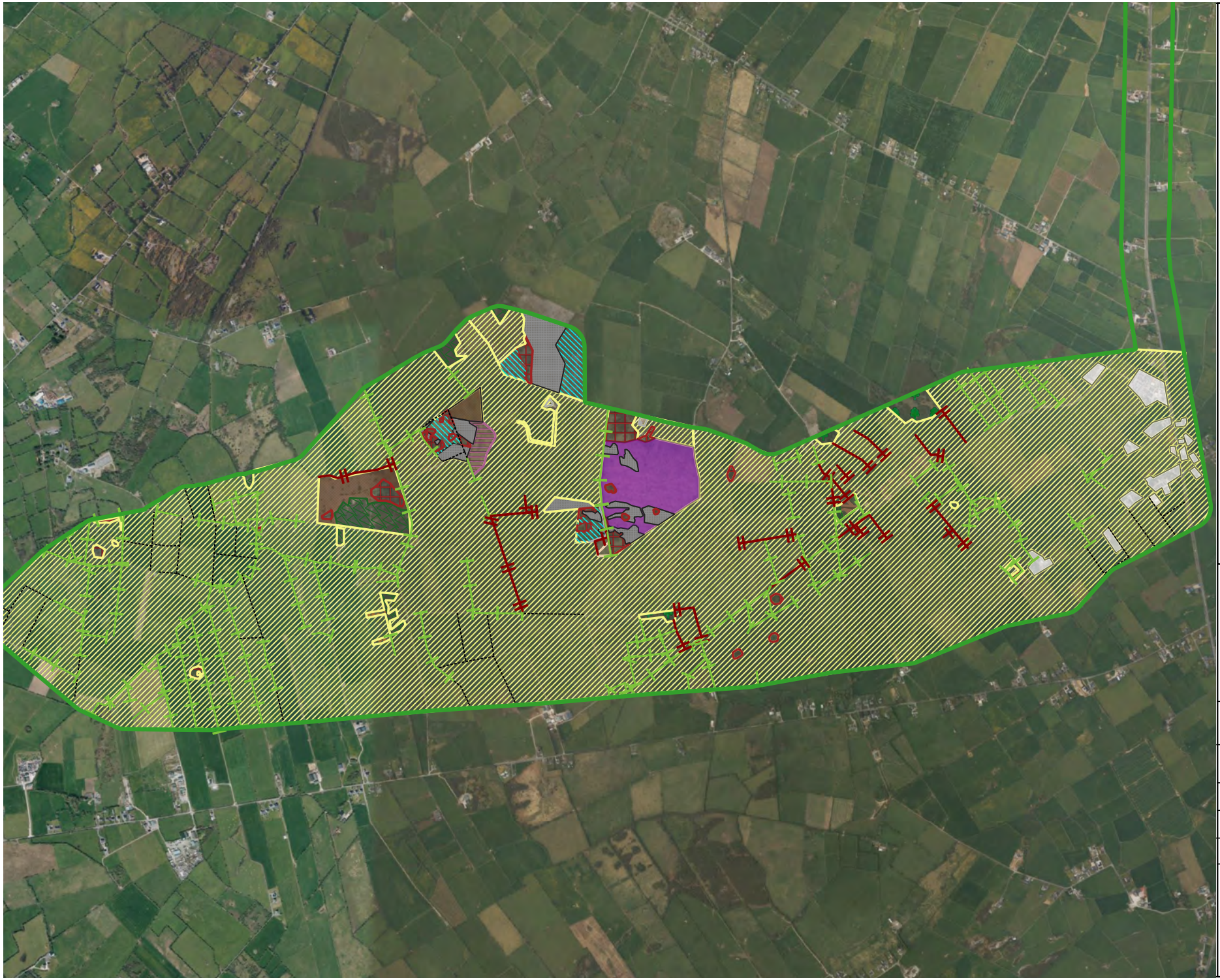
6.4 Baseline Ecological Survey Results

6.4.1 Description of Habitats and Flora within the Ecological Survey Area

A total of fifteen habitats were recorded within the Proposed Project site, including;

- Improved agricultural grassland (GA1)
- Dry calcareous and neutral grassland (GS1)
- Dry meadows and grassy verges (GS2)
- Exposed calcareous rock (Limestone pavement) (ER2)
- Dry calcareous heath (HH2)
- Immature woodland (WS2)
- Oak-ash-hazel woodland (WN2)
- Hedgerows (WL1)
- Treelines (WL2)
- Scrub (WS1)
- Dense bracken (HD1)
- Horticultural land
- Stone walls (BL1)
- Spoil and bare ground (ED2)
- Buildings and Artificial Surfaces (BL3)

Grassland and heath habitats have been categorised to plant communities following the Irish Vegetation Classification (IVC). Detailed botanical data from relevés recorded in grassland and calcareous habitats are provided in Appendix 6-1 of this EIAR. A habitat map of the Site is provided in Figure 6-4. A map showing the development footprint overlaying the Habitat Map is shown in Figure 6-5.

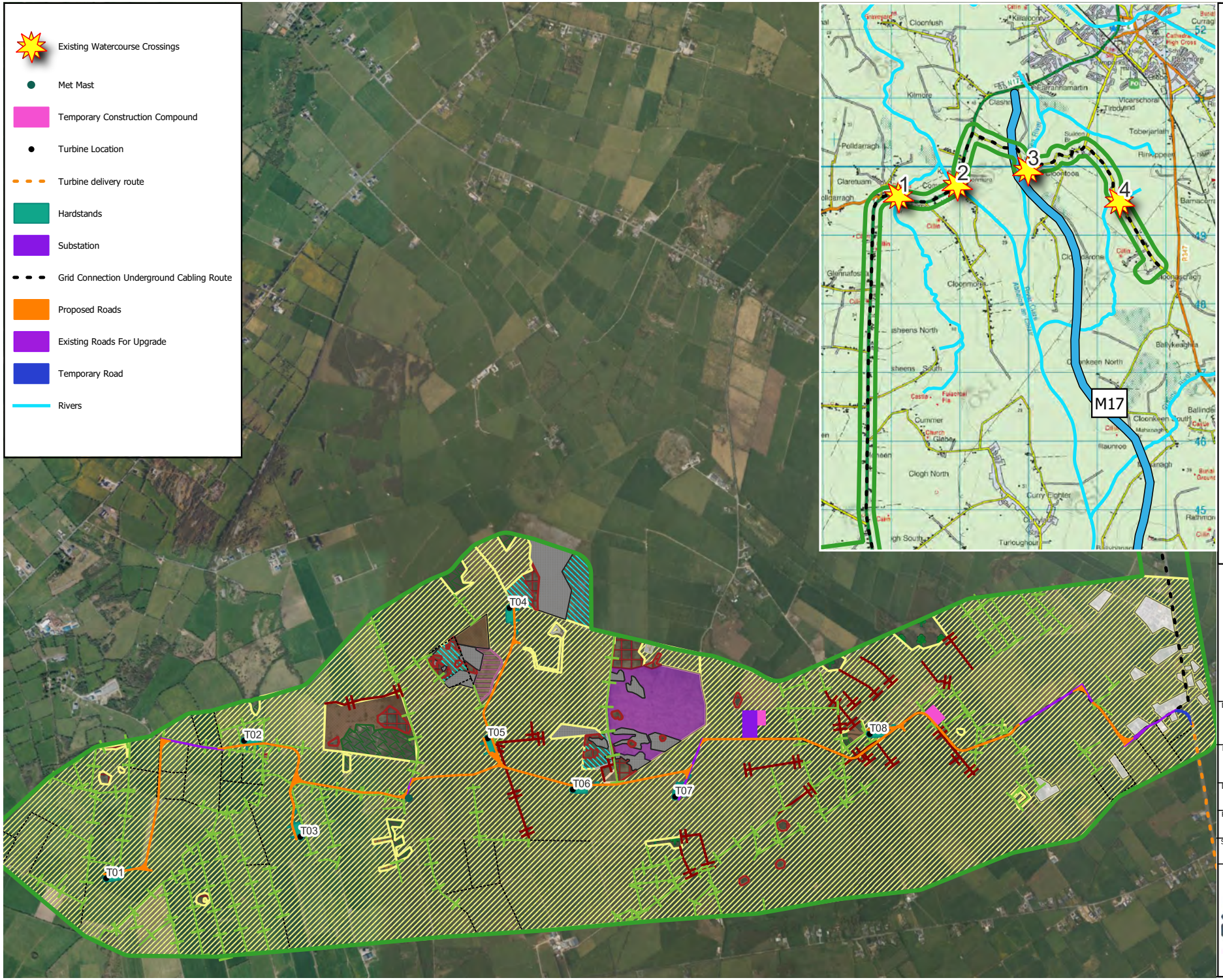


Drawing Title
Habitat Map of Proposed Wind Farm

Project Title
Laurclavagh Renewable Energy Development

Drawn By	Checked By
RW	JH
Project No.	Drawing No.
210627	Figure 6-4
Scale	Date
1:23,000	2024-03-06

MKO
Planning and Environmental Consultants
Tuam Road, Galway
Ireland, H91 VW84
+353 (0) 91 735611
email:info@mkoireland.ie
Website: ww.mkoireland.ie



Map Legend

- EIAR Site Boundary
- Hedgerows (WL1)
- Treelines (WL2)
- Stonework (BL1)
- Earth banks (BL2)
- Artificial surfaces (BL3)
- Exposed calcareous rock (ER2)
- Improved agricultural grassland (GA1)
- Dry calcareous and neutral grassland (GS1)
- Dry meadows and grassy verges (GS2)
- Dense bracken (HD1)
- Dry calcareous heath (HH2)
- Oak-ash-hazel woodland (WN2)
- Scrub (WS1)
- Immature woodland (WS2)
- Mosaic of limestone pavement, heath and grassland

Drawing Title
Habitat Map of Proposed Wind Farm and Overlay

Project Title
Laurclavagh Renewable Energy Development

Drawn By	Checked By
RW	JH
Project No.	Drawing No.
210627	Figure 6-5
Scale	Date
1:23,000	2024-03-11

MKO
Planning and Environmental Consultants
Tuam Road, Galway
Ireland, H91 VW84
+353 (0) 91 735611
email:info@mkoireland.ie
Website: ww.mkoireland.ie

6.4.1.1 Grassland habitats

Grasslands make up a significant proportion of the habitats within the EIAR study area. The EIAR study area comprises large areas of improved agricultural grassland (GA1) with small areas of dry calcareous and neutral grassland (GS1) in associated with areas of limestone pavement, and small less intensively managed fields of dry meadows and grassy verges (GS2). Detailed botanical quadrat data was recorded on site in the form of relevés taken at specific locations within the Site, see Appendix 6-1. The botanical data from all relevés was uploaded to the National Biodiversity Data Centre (NBDC) online habitat classification system ERICA[10].

6.4.1.1.1 *Improved agricultural grassland (GA1)*

The areas of improved agricultural grassland (GA1) have primarily been intensively managed for sheep and cattle grazing, and many of the fields surveyed have been reseeded with perennial ryegrass (*Lolium perenne*). Turbines T1- T8, the temporary construction compound, substation, met mast and all internal site access tracks are located within this habitat. The NBDC online habitat classification system ERICA classified the areas of improved agricultural grassland as conforming to the Perennial rye grass-white clover community (GL3B), and Yorkshire-fog – Perennial Rye-grass community (GL2C). These are fairly species-poor grassland communities with relatively little recognised conservation value.

Plate 6-2 Improved agricultural grassland (GA1) within the Site, occurring within the footprint of Turbine 5

[10] *Engine for Relevés to Irish Communities Assignment*

6.4.1.1.2 Dry calcareous and neutral grassland (GS1)

Areas of Dry calcareous and neutral grassland (GS1) comprise of a mix of both semi-natural and semi-improved grasslands.

Some areas mapped as Dry calcareous and neutral grassland (GS1) have been subject to intensive cattle grazing and improvement, see Plate 6-3. These areas comprise a moderate proportion of perennial rye grass (*Lolium perenne)* and other agricultural species including creeping buttercup (*Ranunculus repens),* white clover (*Trifolium repens),* creeping thistle (*Cirsium arvense)*, ragwort (*Senecio jacobaea)* and dandelion (*Taraxacum officinale agg.).* Species typical of calcareous grasslands found in these areas include lady's bedstraw (*Galium verum),* cats ear (*Hypochaeris radicata),* harebell (*Campanula rotundifolia),* tormentil (*Potentilla erecta),* mouse ear hawkweed (*Pilosella officinarum),* Burnet saxifrage (*Pimpinella saxifraga*), birds foot trefoil (*Lotus corniculatus*), ox eye daisy (*Leucanthemum vulgare),* knapweed (*Centaurea nigra)* and *Scleropodium purum.* The NBDC online habitat classification system ERICA classified these areas as crested dogs tail – red clover community (GL3D), and red fescue – ribwort plantain community (GL3C), with some relevés being transitional in composition. Community GL3C has a 19.2% affinity with Annex I 6210 Orchid-rich calcareous grassland* (Perrin, 2016a). Community GL3D has a 20.7% affinity with Annex I 6210 Orchid-rich calcareous grassland* (Perrin, 2016a). These areas hold some conservation value given their relative species richness. No proposed site infrastructure is located within dry calcareous or neutral grassland habitat.

Other areas of calcareous grassland (GS1) occur in close association with limestone pavement and are described in Section 6.4.1.2.3 below.

Plate 6-3 Semi improved calcareous/neutral grassland to the west of the Site

6.4.1.1.3 Dry meadows and grassy verges (GS2)

Some less intensively managed fields with a higher sward are categorised as dry meadows and grassy verges (GS2), see Plate 6-4. An area of GS2 habitat with a high sward (30 to 50cm) occurs adjacent to hazel scrub/limestone pavement habitat (see Section 6.4.1.2.1) within the west of the Site. This grassland area is relatively species rich with species including ox eye daisy (*Leucanthemum vulgare),* knapweed (*Centaurea nigra),* red clover (*Trifolium pratense),* silverweed (*Potentilla anserina),* quaking grass (*Briza media),* harebells (*Campanula rotundifolia),* eyebright (*Euphrasia officinale agg.),* lady's bedstraw (*Galium verum),* tormentil (*Potentilla erecta),* smooth hawks beard *(Crepis capillaris*), sweet vernal grass (*Anthoxanthum odoratum),* cocks foot (*Dactylis glomerata),* bents (*Agrostis spp.),* with some scrubbier areas of hawthorn (*Crataegus monogyna)* and blackthorn (*Prunus spinosa).* No infrastructure is proposed in these areas.

Plate 6-4 Dry meadows and grassy verges (GS2)

6.4.1.2 Exposed Calcareous Rock (Limestone Pavement) (ER2) and Associated Habitats

Areas of bare limestone pavement are present within central (Plate 6-5) and northern areas of the Site. These occur primarily as bare areas of shattered limestone rock (ER2) and correspond to the Annex I habitat 'Limestone pavement [8240]'. These areas have been mapped under Article 17 mapping as discussed in Section 6.3.1.2. Some of these areas have been mapped on the Habitat Map as occurring as a mosaic with calcareous grassland (GS1) and calcareous heath communities (HH2), as described below. These areas in places are encroached with bracken (*Pteridium aquilinum),* bramble (*Rubus fruticosus agg.)* and common gorse (*Ulex europaeus).* No infrastructure is proposed in any limestone pavement areas or associated habitats.

Plate 6-5 Exposed calcareous rock (ER2) within the centre of the Proposed Wind Farm site

6.4.1.2.1 *Oak-ash-hazel woodland (WN2)*

Some areas of limestone pavement within the Site occur with oak-ash-hazel woodland (WN2) and have been mapped as such where they occur. This habitat corresponds to the *Corylus avellana – Ctenidium molluscum* Vegetation Type 2A Low Woodland as per Irish Wildlife Manual 73. These areas comprise a low woodland canopy dominated by hazel (*Corylus avellana)* with some blackthorn (*Prunus spinosa),* bramble and hawthorn (*Crataegus monogyna)* at times. An area mapped under Article 17 mapping in the northwest of the Site is included here, as well as a larger area within the mid-west of the Site adjacent to GS2 habitat. These areas are completely avoided by the footprint of the Proposed Project.

Plate 6-6 Article 17-mapped oak-ash-hazel woodland on limestone pavement within the northwest of the Proposed Wind Farm site

Plate 6-7 Oak-ash hazel woodland on limestone in the centre to west of the Proposed Wind Farm site

6.4.1.2.2 Dry calcareous heath (HH2)

Areas of Article 17 mapped limestone pavement occur in close association with Calcareous heath habitat (HH2). Heath areas conform to vegetation type 7A *Calluna vulgaris – Potentilla erecta* heath and include the species ling (*Calluna vulgaris),* blue moor grass (*Sesleria caerulea),* bell heather (*Erica cinerea),* mountain avens (*Dryas octopetala),* spring gentian (*Gentiana verna),* tormentil (*Potentilla erecta),* birds foot trefoil (*Lotus corniculatus),* harebells (*Campanula rotundifolia),* pignut (*Conopodium majus),* carline thistle (*Carlina vulgare),* eyebright (*Euphrasia officinale agg.),* lady's bedstraw (*Galium verum),* heath bedstraw (*Galium saxatile),* devils bit scabious (*Succisa pratensis),* kidney vetch (*Anthyllis vulneraria*), red clover (*Trifolium pratense),* yellow wort (*Blackstonia perfoliata),* quaking grass (*Briza media),* wall rue (*Asplenium ruta-muraria),* wild thyme (*Thymus polytrichous),* creeping willow (*Salix repens),* fairy flax (*Linum catharticum),* mouse ear hawkweed (*Pilosella officinarum),* burnet rose (*Rosa spinosissima),* glaucous sedge (*Carex flacca),* the bryophytes *Scleropodium purum, Tortella tortuosa, Ctenidium molluscum,* and the orchids; heath spotted orchid (*Dactylorhiza maculata)* and fragrant orchid (*Gymnadenia conoposea).* These areas are completely avoided by the footprint of the Proposed Project.

Plate 6-8 Dry calcareous heath (HH2) within the Proposed Wind Farm site

6.4.1.2.3 Calcareous grassland (GS1)

Limestone pavement also occurs in association with calcareous grassland (GS1) areas comprising quaking grass (*Briza media),* sweet vernal grass (*Anthoxanthum odoratum),* ox eye daisy, yarrow (*Achillea millefolium),* wild thyme (*Thymus polytrichous),* eyebright (*Euphrasia officinale agg.),* wild carrot (*Daucus carota),* yellow rattle (*Rhinanthus minor),* harebells (*Campanula rotundifolia),* devils bit scabious (*Succisa pratensis),* kidney vetch (*Anthyllis vulneraria*), common milkwort (*Polygala vulgaris),* carline thistle (*Carlina vulgaris),* knapweed (*Centaurea nigra),* cats ear (*Pilosella officinarum), Neckera crispa* and common spotted orchid (*Dactylorhiza fuchsii).* These areas were categorised by ERICA as the community GL3A – *Briza media – Thymus polytrichus* which has a 92% affinity with the Annex I

habitat '6210 Orchid-rich calcareous grassland*'. These areas are completely avoided by the footprint of the Proposed Project.

Plate 6-9 Calcareous grassland (GS1) occurring in association with limestone pavement within the Proposed Wind Farm site, with some bracken encroachment present.

6.4.1.3 Hedgerows (WL1), Treelines (WL2) and Stone walls (BL1)

Agricultural fields within the Proposed Wind Farm site are typically bordered by stone walls (BL1) which are often bare or else associated with hedgerow (WL1) and treeline (WL2) habitat, which is dominated by hawthorn (*Crataegus monogyna* – both hedgerow height and taller mature specimens), blackthorn (*Prunus spinosa),* hazel (*Corylus avellana),* bramble (*Rubus fruticosus agg.)* and ash (*Fraxinus excelsior).* These habitats are present within the footprint of some proposed wind farm roads and within the vicinity of proposed turbines T1, T2, T3, T5 and T8.

Plate 6-10 Hawthorn treeline (WL2) along stone wall (BL1) within the Proposed Wind Farm site

6.4.1.4 Other Habitats

6.4.1.4.1 *Immature woodland (WS2) and Scrub (WS1)*

A small area of hawthorn-dominated immature woodland occurs within the Site, close to proposed turbine 8. Other small areas of hazel-dominated immature woodland (WS2) and bramble scrub (WS1) are also present within the Site. These areas are completely avoided by the footprint of the Proposed Wind Farm.

Plate 6-11 Hawthorn dominated immature woodland within the Proposed Wind Farm site

Plate 6-12 Hazel dominated immature woodland within the Site

6.4.1.4.2 Dense Bracken (HD1)

Some small areas of the Site are heavily encroached with bracken (*Pteridium aquilinum)*. Some areas of Annex I limestone pavement and associated habitats are being encroached by bracken also. These areas are completely avoided by the footprint of the Proposed Wind Farm site.

Plate 6-13 Dense bracken within the Proposed Wind Farm site

Plate 6-14 Limestone pavement/calcareous grassland areas encroached with bracken

6.4.1.4.3 Horticultural land

During the habitat surveys undertaken between 2021 and 2023, it was noted that on occasion some fields within the east of the Site were used for growing vegetables including brassicas, but which were reseeded with perennial grass in subsequent years.

Plate 6-15 Horticultural field within the Proposed Wind Farm site (2022)

6.4.1.4.4 Spoil and bare ground (ED2), Recolonising bare ground (ED3), Buildings and artificial surfaces (BL1)

Unbound farm tracks within the Site are categorised as spoil and bare ground (ED2), with areas becoming recolonised by ruderal plants categorised as recolonising bare ground (ED3). These areas are small and are not mapped in detail. Private dwellings and agricultural buildings are also present within the Site and are categorised as buildings and artificial surfaces (BL3).

6.4.1.5 Habitats along the Proposed Grid Connection Underground Cabling Route

It is proposed to construct an onsite 110 kV substation within the Proposed Wind Farm site and to connect from here via a 110 kV underground electrical cable connection to the existing 110 kV Cloon substation near Tuam, Co Galway. The underground electrical cabling route is approximately 14.3km in length and is located primarily within the public road corridor, with a short section of underground cabling (approximately 2.1km) within the internal road network within the Proposed Wind Farm site.

The underground cable route will be located entirely within the existing road, starting within the L61461 as it leaves the Proposed Wind Farm site (Plate 6-16) and continuing east along a smaller local road (Plate 6-17). Habitats found in the wider areas adjacent to the road include stone walls (BL1), dry meadows and grassy verges (GS2), agricultural grasslands (GA1), wet grasslands (GS4) and peatlands further east along the route. Hedgerows (WL1) and treelines (WL2) also border the road. There are four water crossings along the route which are described further below. The locations of water-crossings are shown on Figure 6-5.

Water Crossing 1 (Plate 6-18) consists of a culverted high stone bridge (BL1) over the Glennafosha River, a depositing/lowland river (FW2). The river is highly modified and straightened, had an imperceptible flow and was highly vegetated with grasses, evidently an ephemeral river. The surrounding areas consist of agricultural fields.

Water Crossing 2 (Plate 6-19) consists of a stone arch bridge over the Clare River, a depositing/lowland river (FW2) with a moderate flow at this location. As summarised in the Aquatic Baseline Report, Appendix 6-3, this river has been extensively straightened and deepened historically and has deep V-shaped banks. The river is 8-10m wide and 0.4m to 1.8m deep. The below description of the river habitat in the vicinity of this water crossing is extracted from the Aquatic Baseline Report:

The substrata were dominated by large boulder, cobble and localised patches of coarse gravel. The Site supported frequent water crowfoot (Ranunculus sp.), curled pondweed (Potamogeton crispus) and perfoliate pondweed (Potamogeton perfoliatus) in riffle areas upstream of the bridge. Boulders supported abundant Rhynchostegium riparoides with occasional Fontinalis antipyretica and Brachythecium rivulare. Despite hydromorphological impacts, given the presence of several key indicator species (EC, 2013), the aquatic vegetation community was representative of the Annex I habitat 'Water courses of plain to montane levels, with submerged or floating vegetation of the Ranunculion fluitantis and Callitricho-Batrachion (low water level during summer) or aquatic mosses [3260]'. The steep banks supported scattered bramble (Rubus fruticosus agg.) scrub with frequent hawthorn and dry meadow habitat (GS2). The Site was bordered by semi-improved pasture (GA1).

Water Crossing 3 (**Error! Reference source not found.**) over the Killeelaun River consists of a single stone arch structure over a small lowland/depositing river (FW2). The following description of this river in the vicinity of the water crossing is extracted from the Aquatic Baseline Report:

The small lowland depositing river (FW2) had been extensively straightened and deepened historically with resulting poor hydromorphology and a steep trapezoidal channel (banks to 5m in height). The river averaged a homogenous 3m wide and 0.4m deep and suffered from low summer flows at the time of survey. The profile comprised slow-flowing glide with no riffle or pool areas. The substrata were dominated by cobble and gravel but these were exposed to very heavy siltation. The Site was heavily vegetated with frequent fool's watercress (Apium nodiflorum), common duckweed (Lemna minor), ivy-leaved duckweed (Lemna trisulca), lesser water parsnip (Berula erecta) and branched bur-reed (Sparganium erectum). Blue water speedwell (Veronica anagallis-aquatica), water forget-me-not and water plantain (Alisma plantago-aquatica) were occasional. Small pondweed (Potamogeton berchtoldii) and broad-leaved pondweed (Potamogeton natans) were also occasional in addition to spiked water-milfoil (Myriophyllum spicatum) and water starwort (Callitriche sp.). Given the presence of several key indicator species (EC, 2013), the aquatic vegetation community was representative of the Annex I

habitat 'Water courses of plain to montane levels, with submerged or floating vegetation of the Ranunculion fluitantis and Callitricho-Batrachion (low water level during summer) or aquatic mosses [3260]'. Filamentous algae covered 30% surface area of the channel bed, indicating significant enrichment. The steep banks supported intermittent hedgerows of hawthorn and bramble and dry meadow habitat (GS2). The Site was bordered by semi-improved pasture (GA1).

Water Crossing 4 (Plate 6-21) consists of a pipe culvert along a tributary of the Clare River. This river is categorised as a lowland/depositing stream (FW2). The following is extracted from the Aquatic Baseline Report:

The diminutive lowland depositing stream (FW2) had been extensively straightened and deepened historically with resulting poor hydromorphology and U-shaped channel with 2m-high banks. The stream flowed under the local road via a pipe culvert and averaged 0.5m wide and 0.05m deep. The stream suffered from low summer flows at the time of survey. The profile comprised shallow riffle and glide. The substrata were dominated by small boulder, cobble and coarse gravel. Despite low flows, siltation was low overall. The Site was heavily vegetated with abundant fool's watercress with occasional watercress (Nasturtium officinale), ivy-leaved duckweed, brooklime and water starwort (Callitriche sp.). The moss Rhynchostegium riparoides was common on boulders with the liverwort Pellia endiviifolia present locally. Filamentous algae was present (5%), indicating enrichment. The riparian areas were dominated by mature grey willow (Salix cinerea) and ash with dense bramble in the understories. The Site was bordered by semi-improved pasture (GA1) and wet grassland (GS4).

Plate 6-16 The Proposed Grid Connection underground cabling route as it leaves the Proposed Wind Farm site along the N83

Plate 6-17 Smaller road along the Proposed Grid Connection underground cabling route as it travels eastwards towards the substation

Plate 6-18 Water crossing 1 along the Glennafosha River

Plate 6-19 Water Crossing 2 over the Clare River

Plate 6-20 Water Crossing 3 over the Killeelaun River

Plate 6-21 Water Crossing 4 over Clare River tributary.

6.4.1.6 Protected Habitats

In summary, as described in the preceding sections, the following Annex I habitats are present within the EIAR Site Boundary but are located completely outside of the footprint of the Proposed Project:

- Limestone pavements [8240]
- Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) [6210]
- European dry heaths [4030]

The following aquatic Annex I habitat was recorded within the Clare River and Killeelaun River in the vicinity of existing water crossings within the Site:

- Water courses of plain to montane levels, with submerged or floating vegetation of the Ranunculion fluitantis and Callitricho-Batrachion (low water level during summer) or aquatic mosses [3260]

6.4.1.7 Protected Flora

Spring gentian (*Gentiana verna),* which is classed as Near Threatened in the Red Data List of Vascular Plants 2016, was recorded within the Site on areas of dry calcareous heath (HH2) and limestone pavement (ER2). These areas are completely avoided by the footprint of the Proposed Project.

No other species listed in the Irish Red Data Books, nor any species listed under the Flora (protection) Order (S.I. No. 235 of 2022) or the EU Habitats Directive (92/43/EEC), were recorded on the Site.

6.4.1.8 Invasive species

During field surveys, a search for Invasive Alien Species (IAS) listed under the Third Schedule of the European Communities Regulations 2011 (S.I. 477 of 2015) was conducted. No invasive species listed under the Third Schedule of the European Communities Regulations 2011 were recorded within the EIAR Site Boundary.

The invasive macrophyte Nuttall's waterweed (*Elodea nuttallii*) was recorded at site B3 on the lower reaches of the Cregg River (Addergoole Bridge). The invasive pathogen crayfish plague (*Aphanomyces astaci*) was detected via eDNA analysis in the Clare River at Lackagh Bridge (site A7) and the Ballinduff Stream at site C5 (see Aquatic Baseline Report, Appendix 6-3). There are no instream works proposed as part of the Proposed Project, therefore, there is no risk of spread of invasive plant material or crayfish plague.

6.4.2 Fauna in the Existing Environment

Faunal walkover surveys were undertaken on the 17th of August 2023, 20th of September 2022, 11th of July 2022, 4th of July 2022 and 30th of July 2021. The walkover survey was designed to detect the presence, or likely presence, of a range of protected species, including birds, bats, otter and badger. Potential suitable habitats were investigated for signs of animal presence. The following subsections provide a breakdown of the species recorded within the Proposed Project site during the site visits and assessments. Evidence of fauna found within the Site is depicted in Figure 6-6.

It is noted in Chapter 7, Section 7.5.4, that based on the results of the above walkover surveys when considering bird species, the existing habitats (i.e., existing roads) do not have the potential to support bird species of conservation interest in the area. On a precautionary basis, it is assumed that some temporary disturbance may occur during works. However, given the extent of suitable habitat in the wider area, significant disturbance effects are not predicted.

6.4.2.1 Badger

Four badger setts were recorded within the Proposed Wind Farm site, one main sett comprising 12 entrances, and three outlier setts compromising one to three entrances. Evidence of activity was seen at the setts in the form of freshly dug soil. Evidence of badger activity was found throughout the Site in the form of fresh scats, snuffle holes, trails and latrines. The locations of the badger setts are provided in Confidential Appendix 6-5[11].

The larger, main sett is located over 200m away from any proposed infrastructure. One of the setts is located in close proximity to a proposed site access road. Therefore, the proposed site access road was altered during the iterative design process to avoid any potential for unnecessary destruction/disturbance to the sett. As a result, all proposed infrastructure is located over 50m from any identified badger sett within the Site.

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

Plate 6-22 Recently used badger sett within the Proposed Wind Farm site.

6.4.2.2 Otter

No otter signs were recorded within the Proposed Wind Farm site. This is due to the absence of watercourses in relation to these features within the Proposed Wind Farm site. Watercourses do occur however at a number of locations along the Proposed Grid Connection underground cabling route. As a result, these watercourses were assessed for signs of otter on the 17th of August 2023 July 2022 (the latter surveys are documented in the Aquatic Baseline Report, Appendix 6-3). Evidence of otter activity was found in the form of two regular spraint sites (containing fish remains only) along the Clare River in the vicinity of the Proposed Grid Connection underground cabling route. Two spraint sites were also found upstream of Water Crossing 3 along the Proposed Grid Connection underground cabling route.

A total of 7 no. otter signs were recorded across 15 no. survey sites during the course of aquatic surveys undertaken in July 2022. All were spraint sites. These are shown on Figure 6-6.

No breeding (holts) or resting (couch) areas were identified in the vicinity of the survey sites in July 2022 nor in the vicinity of the Proposed Grid Connection underground cabling route in August 2023.

6.4.2.3 Bats

Bat surveys undertaken in 2023, in accordance with NatureScot guidance (NatureScot 2023), form the core dataset for the assessment of effects on bats. Bat surveys included roost surveys, manual transect surveys and ground-level static surveys. Full details of results are provided in the Bat Report in Appendix 6-2 and are summarised here.

6.4.2.3.1 *Roost surveys*

Following a search for roosts in 2023, no structures containing potential suitable bat roost features were identified within 200m plus the rotor radius (81.5m) of the proposed turbines.

The assessment of the Proposed Project footprint also included an examination of potential tree roost features. The Site is dominated by agricultural fields, typically bordered by stone walls which are often

bare or else associated with hedgerow and treeline habitat, dominated by hawthorn (*Crataegus monogyna* – both hedgerow height and taller mature specimens), blackthorn (*Prunus spinosa),* hazel (*Corylus avellana),* bramble (*Rubus fruticosus agg.)* and ash (*Fraxinus excelsior).* Due to their size and lack of PRFs, the majority of trees within the Site do not provide significant suitable potential for roosting bats. Bridges and culverts located along the Proposed Grid Connection underground cabling route were also inspected for the potential presence of bat roosts and results of this are provided in Section 6.4.2.3.4 below.

However, during the assessment, five ash trees located to the north of T08, were identified as having potential suitability for roosting bats (IG Ref: M 38343 43894). These trees are situated approximately 100 meters from the nearest turbine location and fall outside the bat buffer for vegetation clearance as per NatureScot, 2021. The ash trees were subject to a ground level inspection using an endoscope where accessible. These trees will be retained and avoided as part of the Proposed Project.

A broken branch was observed in one of the ash trees (IG Red: M 38346 43897) identified as a PRF. On further inspection, no evidence of bats or bat use was identified. The other trees were covered in dense ivy and no other PRFs were identified; however, they may present some potential for roosting bats. The trees are located in an area with limited connectivity to the wider landscape and as such were assessed as having *Low* roosting potential. The trees may be used opportunistically by individual bats.

6.4.2.3.2 Manual Transects 2023

Manual transects were undertaken in Spring, Summer and Autumn of 2023. Bat activity was recorded on all surveys. A total of 253 bat passes were recorded. In general, Leisler's bat (n=155) was recorded most frequently, followed by common pipistrelle (n=51) and soprano pipistrelle (n=46). *Myotis spp.* was rare (n= 1). Transect survey results were calculated as bat passes per km surveyed (to account for differences in survey effort). Bat activity was concentrated along hedgerows, stone walls and linear (road/track) habitats.

Figures 4-1 – 4-3, Section 4.3.3 '*Manual Transects*' of the standalone 'Bat Report', provided in Appendix 6.2, present the spatial distribution of bat activity across the surveys.

6.4.2.3.3 *Ground-level Static Surveys 2023*

A summary of the results of ground level surveys conducted at the Proposed Project site are provided below. The location of all static detectors is provided in Table 3-3 of the Bat report Appendix 6-2 of this EIAR.

In total, 63,831 bat passes were recorded in 2023. In general, Common pipistrelle (n= 24,003) occurred most frequently, followed by Leisler's bat (n= 23,618) and Soprano pipistrelle (n=14,970). Instances of Brown long-eared bat (n=897), *Myotis spp.* (n=270), Nathusius' pipistrelle (n=58) and Lesser horseshoe bat (n=15) were significantly less.

Bat activity was calculated as total bat passes per hour (bpph) per season to account for any bias in survey effort, resulting from varying night lengths between seasons. Plate 4-8 and Table 4-8 of the Bat Report (Appendix 6-2) presents these results for each species.

In general, Leisler's bat activity was recorded most frequently in spring, Common pipistrelle in summer and Soprano pipistrelle in autumn. There was no clearly predominant species in any of the seasons surveyed. *Myotis spp.* and brown long-eared bat were relatively rare throughout each season. Nathusius' pipistrelle was detected in low numbers in each season. Lesser horseshoe bat was detected in each season.

Assessment of bat activity levels-Adapted site-specific ranges

Low, Medium, and High Activity levels were assigned to Median and maximum pass rates (bpph) identified during Spring, Summer and Autumn at the detectors deployed across the 8 no. proposed turbine locations, as adapted from Mathews *et al.* (2016). Table 4-9 in Appendix 6-2 shows the results of the Site-level assessment. Where no Median Activity at a detector is reported, no data was recorded for that species throughout the deployment.

Leisler's bat Median Bat Activity was recorded as Low in Spring at all detectors. In Summer Moderate Median Activity was recorded at D05 and D08 with High Median Activity occurring at D07. The Median Activity was Moderate at D05 in the Autumn. Max Activity peaked at D05 in Summer 2023.

Common pipistrelle Median Activity was recorded as Low in Spring at all detectors Moderate Median Activity was observed at D03 in Summer with High Activity at D08. Median Activity was Low for all detectors in Autumn. Max Bat Activity was observed at D03 in Summer.

Soprano pipistrelle Median Bat Activity was generally Low, being Moderate only at D04 in Summer. Max Bat Activity was recorded at D03 in Summer.

Myotis spp. recorded Low Median Activity at all detectors in in all seasons of 2023. The Max Bat Activity occurred at D05 during the Summer Redeployment.

Nathusius' pipistrelle and Lesser horseshoe bat recorded relatively Low Median Activity in comparison to other species. High Max Activity Nathusius' pipistrelle occurred at D02 and D07 in the Spring while it was also high at D08 in the Autumn. Lesser horseshoe bat Max Activity was Moderate at D01 in Autumn.

Brown long-eared Median Bat Activity was Moderate at D05 and high at D02 in Spring. D05 (R) also recorded High Activity during the Summer. Max Bat Activity was recorded at D02 (R) during the Summer redeployment.

D02, D05 and D08 were located in close proximity to favourable linear features such as gappy treelines, hedgerows and stone walls which provide more suitable habitat for foraging and commuting bats and are likely conducive to the higher activity levels recorded. Detectors in open habitats, far from similar features, such as D01 and D06, recorded less activity overall.

6.4.2.3.4 *Proposed Grid Connection Underground Cabling Route Crossing Structures*

On the 17th of August 2023, the structures of the existing 4 no. water crossings along the Proposed Grid Connection underground cabling route were inspected for signs of bat roosts and these as well as the motorway crossing were assessed for bat roost potential. The crossing structures were visually assessed for potential use as bat roosting habitat using a protocol set out in the Bat Conservation Trust guidance document, *Bat Surveys for Professional Ecologists: Good Practice Guidelines (3rd Edition)* Collins (2016) (the most recent guidelines available at the time). Table 4.1 of the 2016 BCT Guidelines identifies a grading protocol for assessing structures, trees and commuting/foraging habitat for bats. The protocol is divided into four Suitability Categories: *High, Moderate, Low,* and *Negligible*. No signs of bat roosts were found at any of the structures. The findings are summarized in the table below.

Table 6-13 Bat Roost Suitability of Crossings along the Proposed Grid Connection Underground Cabling Route

Crossing ID	ITM	Culvert type	Photo	Bat Roost Potential
WC1	540063 749583	Two concrete pipes and stone wall		No evidence of bats found. Some crevices present within wall. *Low* bat roost potential.
WC2	540920 749751	Concrete bridge over the Clare River		No evidence of bats found. *Low* suitability attributed on a precautionary basis due to potential for crevices and gaps in joints.
WC3	541950 749970	Single stone arch		No evidence of bats found. Some crevices present within stonework. *Low* bat roost potential.
WC4	543287 749508	Pipe culvert		No evidence of bats found. The inlet of the culvert consists of a stone structure and is heavily vegetated. *Negligible* suitability.

MC1	541711 750265	Motorway crossing		Access limited due to its presence on active motorway. *Low* suitability assigned on a precautionary basis.

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

6.4.2.4 Reptiles and Amphibians

Common frog (*Rana temporaria*) and smooth newt (*Lissotriton vulgaris*) were not recorded within the Proposed Wind Farm site. There is no significant suitable habitat for these species within the Proposed Wind Farm site due to the absence of surface water, although there may be suitable habitat along water courses found along the Proposed Grid Connection underground cabling route. Although no Common lizard (*Zootoca vivipara*) was found within the Proposed Project site, suitable habitat in the form of scrub and stone walls exists for this species. The Proposed Project 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.

6.4.2.5 Fisheries and Aquatic Fauna

Full details of results of aquatic surveys undertaken in July 2022 are provided in the Aquatic Baseline Report (Appendix 6-3) and are summarised in this section.

The following aquatic ecology summary is extracted from the Aquatic Baseline Report:

The watercourses in the vicinity of the proposed Laurclavagh wind farm were typically lowland channels which had been extensively straightened and or deepened historically as part of arterial drainage and land reclamation works, resulting in poor hydromorphology and reduced habitat heterogeneity. Whilst some good instream recovery had occurred locally (e.g. Clare River), siltation and hydromorphological pressures were evident throughout the survey area. The highest value watercourses within vicinity of the project in terms of aquatic ecology were those with higher flow volumes and better instream recovery from arterial drainage, namely the Clare River and, to a lesser degree, the Cregg River and Ballinduff Stream.

The following paragraphs summarise the fish species that were found during the electrofishing surveys:

Atlantic salmon were present at 3 no. sites in total, namely, all survey sites on the Clare River... Brown trout were also recorded at these sites, in addition to site C5 on the Ballinduff Stream. Salmonids were present in low numbers, with site A3 on the Clare River supporting the best quality salmonid habitat (very good quality) and the highest relative density of both Atlantic salmon and brown trout...Elsewhere, the quality of salmonid was typically poor due to significant hydromorphological pressures resulting from arterial drainage (i.e. extensive straightening & deepening).

No lamprey ammocoetes (Lampetra sp.) were recorded during targeted electro-fishing. This was considered to reflect the paucity of suitable nursery (soft sediment) habitat within the vicinity of the

proposed project, in addition to the presence of sub-optimal or absence of spawning habitat, primarily due to arterial drainage pressures...

European eel were only recorded in low densities at a total of 4 no. sites on the Clare River (A3), Cregg River (B1 & B2) and Ballinduff Stream (C5)...The paucity of eel recorded during the electro-fishing surveys was considered to reflect a combination sub-optimal habitat resulting from historical modifications in addition to low summer flows at numerous survey sites...

The following paragraphs summarise the results of kick-sampling and Q-Value evaluation carried out:

The mayfly Kageronia (Heptagenia) fuscogrisea was recorded from site was recorded from site B3 on the lower reaches of the Cregg River...The species is primarily found in well-vegetated reaches of alkaline rivers and is listed as near threatened in Ireland due to population declines (Kelly-Quinn & Regan, 2012).

No other rare or protected macro-invertebrate species (according to national red lists) were recorded in the biological water quality samples taken from 10 no. wetted riverine sites or 1 no. sweep sample from pond site A1 in July 2022...

Site A7 on the Clare River (Lackagh Bridge) achieved ***Q4 (good status)*** *water quality and thus met the target good status (≥Q4) requirements of the European Union Environmental Objectives (Surface Waters) (Amendment) Regulations 2019 and the Water Framework Directive (2000/60/EC)...The remaining 9 no. wetted riverine sites achieved* ***Q3-4 (moderate status)*** *(sites A6 & B3) or* ***Q2-3 or Q3 (poor status)*** *(sites A3, A4, A5, B1, B2, C4 & C5).*

With the exception of site A7 on the Clare River, the biological water quality in the vicinity of the proposed project was unsatisfactory and was not meeting good status targets. Hydromorphology (channelisation, resulting from arterial drainage) is the primary threat to water quality within the survey area (EPA, 2019) and this was observed during the Site surveys. Furthermore, low summer flows typical of the wider karstic survey area also influenced biological water quality in July 2022.

No live, white-clawed crayfish (*Austropotamobius pallipes*) were recorded via hand-searching and sweep netting of instream refugia during the surveys undertaken in July 2022. However, crayfish remains were identified in otter spraint recorded at site on the Clare River (see Figure 6-6). Furthermore, white-clawed crayfish eDNA was detected at site A7 on the Clare River and C5 on the Ballinduff Stream. Crayfish plague (*Aphanomyces astaci*) was detected at site A7 on the Clare River and site B3 on the Cregg River.

Composite water samples collected from the from the Clare River (site A7), Cregg River (B3) and Ballinduff Stream (C5) returned a negative result for freshwater pearl mussel (*Margaritifera margaritifera)* eDNA, i.e. freshwater pearl mussel eDNA not present or was present below the limit of detection in a series of 12 qPCR replicates (0 positive replicates out of 12, respectively). These results were considered as evidence of the species' absence at and or upstream of the sampling locations and support the absence of records for the species within the wider survey area.

6.4.2.6 Marsh Fritillary

Despite dedicated marsh fritillary larval web surveys on the 20th of September 2022 and 17th of August 2023, no evidence of this species was recorded. An NPWS record for the species is located 5km east of the Proposed Project site. Suitable habitat for the species exists on areas adjacent to mapped limestone pavement area in the north of the Site. There will be no loss of suitable habitat for the species as a result of the Proposed Project.

6.4.2.7 Other species

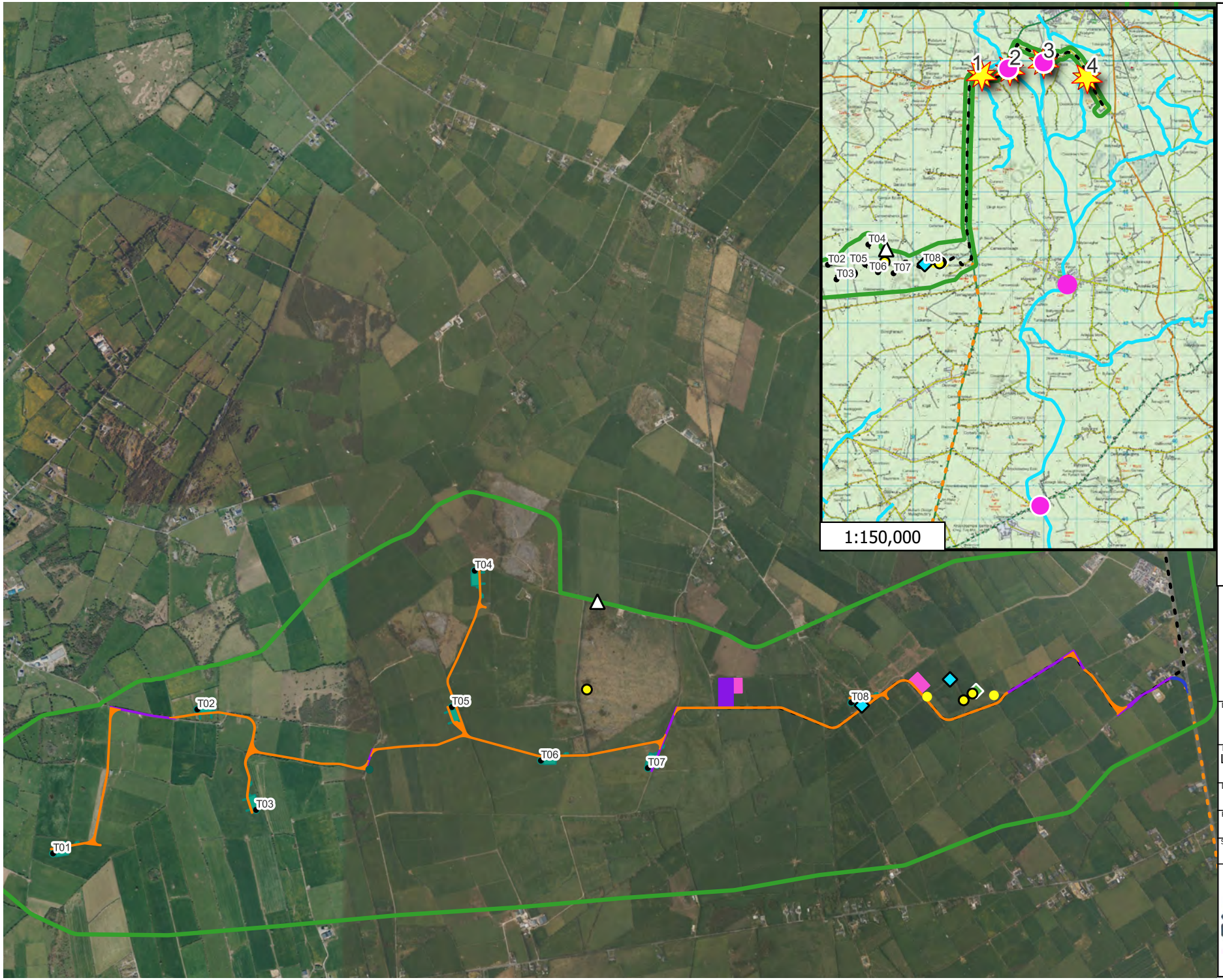
Irish hare (*Lepus timidus ssp. hibernicus*) and Irish stoat (*Mustela erminea hibernica*) were observed on occasion within the EIAR Site Boundary. The scats of fox (*Vulpes vulpes*) were also recorded in a number of areas within the Site. No evidence of other taxa, including invertebrates or amphibians, species listed in Annex II or IV of the EU Habitats Directive, or other species of conservation concern were identified within the boundaries of the Proposed Project site.

The semi-natural grasslands on the Site are likely to provide supporting habitat for a wide variety pollinator species. Incidental records of invertebrates were recorded during the walkover surveys of the Site. The following list includes the species commonly recorded within the EIAR Site Boundary:

- Brimstone (Gonepteryx rhamni)
- Meadow brown (Maniola jurtina)
- Common blue (Polyommatus icarus)
- Peacock butterfly (Inachis io)
- Silver washed Fritillary (Argynnis paphia)
- Orange tip butterfly (Anthocharis cardamines)
- Red admiral (Vanessa atalanta)
- Speckled wood butterfly (Pararge aegeria)
- Green veined white (Pieris napi)
- Small tortoiseshell butterfly (Aglais urticae)
- Painted lady (Vanessa cardui))
- Buff-tailed bumblebee (Bombus terrestris)
- Common carder bumblebee (Bombus pascuorum)
- Six spot burnet (Zygaena filipendulae)

Plate 6-23 Brimstone butterfly recorded within the Site

Plate 6-24 Six spot burnet moths found within the Site



Existing Watercourse Crossings
Met Mast
Temporary Construction Compound
Turbine Location
Hardstands
Substation
Grid Connection Underground Cabling Route
EIAR Site Boundary
Proposed Roads
Temporary Road
Existing Roads For Upgrade
Rivers
Badger scat
Irish stoat
Latrine
Otter spraint
Snuffle holes

N

Drawing Title
Fauna Signs

Project Title
Laurclavagh Renewable Energy Development

Drawn By	Checked By
RW	JH
Project No.	Drawing No.
210627	Figure 6-6
Scale	Date
1:22,000	2024-03-11

MKO
Planning and Environmental Consultants
Tuam Road, Galway
Ireland, H91 VW84
+353 (0) 91 735611
email:info@mkoireland.ie
Website: ww.mkoireland.ie

6.4.3 Identification of Key Ecological Receptors

Table 6-14 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 6.5 of this report and mitigation/ measures will be incorporated into the Proposed Project where required, to avoid potential significant impacts on the features.

Table 6-14 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 site is located downstream of the Proposed Project (via surface water, downstream of the Proposed Grid Connection underground cabling route). A pathway for impact via groundwater quality deterioration as a result of the Proposed Project was also identified: › Lough Corrib [000297] This designated site has been assessed as of **International Importance** due to its also having a European designation.	Yes
	European Designated Sites The following Special Areas of Conservation are identified in the AA Screening as being within the Likely Zone of Impact and are assessed fully in the NIS that accompanies this application: › Lough Corrib SAC [000297] › Lough Corrib SPA [004042] 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, Birds and in the NIS.**	Yes
Local groundwater aquifers and nearby karst features including turloughs	The Proposed Project site is located within the Clare-Corrib groundwater body. Due to the karstic nature of the Site, a potential for impact on local groundwater aquifers in the vicinity of the Proposed Project site as a result of construction works was identified, as well as on a number of nearby karst features, including turloughs, as discussed in Section 6.3.1.3.2. Although several of these identified turloughs are undesignated, turloughs are a priority habitat listed under Annex I of the Habitats Directive and as such are assigned **County Importance.** The potential for impacts on turloughs that have a national or European designation are assessed in Section 6.5.5.	Yes
Nearby surface watercourses with associated fisheries and aquatic fauna.	There are no watercourses occurring within the Proposed Wind Farm site. The only surface watercourses occurring within the EIAR Site Boundary are those occurring along the Proposed Grid Connection underground cabling route i.e. the Clare River and tributaries. The Clare River is of **International Importance** due to its designation under	Yes

	Lough Corrib SAC and the presence of the Annex I habitat 'Water courses of plain to montane levels, with submerged or floating vegetation of the Ranunculion fluitantis and Callitricho-Batrachion (low water level during summer) or aquatic mosses [3260]' at this location of the Proposed Grid Connection underground cabling route water crossing. In the absence of appropriate mitigation and design, taking a precautionary approach; potential for indirect effect on these watercourses during construction of the Proposed Grid Connection underground cabling route has been identified. Depositing/lowland rivers (FW2) and associated aquatic habitats and related species have therefore been identified as a KER for further assessment. The aquatic species that are associated with the watercourses occurring along the Proposed Grid Connection underground cabling route and downstream have been assigned **Local Importance (Higher Value)** as they have a high biodiversity value in the local context. A number of species designated as QIs of Lough Corrib SAC are also assigned **International Importance**, including white-clawed crayfish, Atlantic salmon and lamprey species**.** There is a potential for indirect effect on these features as well as European eel, aquatic invertebrates and other aquatic species as a result of construction of the Proposed Project. Fish and other aquatic species are therefore included as a KER for further assessment along with the river habitats described above.	
Limestone pavement and associated habitats and protected flora: Exposed calcareous rock (ER2) Calcareous heath (HH2) Dry calcareous and neutral grassland (GS1) Spring gentian (*Gentiana verna)*	Article 17 mapped areas within the Proposed Wind Farm site, mapped as 'Limestone pavement [8240]', as well as the associated habitats calcareous heath (HH2) and calcareous grassland (GS1), which correspond to Annex I habitats 'European Dry Heaths [4030]' and 'Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) [6210]' respectively, are of **International Importance** due to their inclusion as part of Article 17 reporting to the European Union. A number of records of spring gentian (*Gentiana verna)* were found on the Site associated with these habitats. This species is listed as Near Threatened on the Irish Red Data list and is of **Local Importance (Higher value).** The Proposed Project footprint is located completely outside of these habitats, therefore there is no potential for direct impacts on these habitats and associated flora. However, a potential for impact as a result of dust deposition or vehicular access during construction of the Proposed Wind Farm site was identified and these habitats are included as KERs for further assessment.	Yes
Oak-ash-hazel woodland (WN2)	This habitat is a semi-natural woodland type of high value for local biodiversity and is of **Local importance (Higher value)**. Where this woodland type occurs on limestone pavement within the Proposed Wind Farm site, it is assigned **County Importance** due to its being a community type of the Annex I habitat 'limestone pavements [8240]'. The footprint of the Proposed Wind Farm is located completely outside of these habitats, therefore there is no potential for direct impact. However, a potential for impact as a result of vehicular access during construction of the Proposed Wind Farm was identified and this habitat is included as a KER for further assessment.	Yes

Treelines (WL2) and Hedgerows (WL1) Stone walls (BL1)	Hedgerows and treelines have been assessed as being of **Local importance (higher value)** as they provide connectivity to the wider landscape and provide supporting habitat for a wide variety of faunal species. In order to facilitate construction of the Proposed Wind Farm and maintain a separation in distance between the turbine blades and hedgerow features (likely to be used by commuting and foraging bat species locally), there will be some loss of hedgerow/treeline habitat within the Proposed Wind Farm site. For this reason, these habitats have been identified for further assessment as a KER. Stone walls, often occurring in association with hedgerows within the Site have been assessed as of local importance (higher value) as they provide connectivity to the wider landscape and provide supporting habitat for a wide variety of faunal species. In order to facilitate some of the Proposed Wind Farm footprint there will be some loss of hedgerow habitat with associated stone wall within the Proposed Wind Farm site. For this reason, stone walls have been identified for further assessment as a KER in combination with hedgerows.	Yes
Immature woodland (WS2) and Scrub (WS1)	Areas of immature woodland (WS2) and scrub (WS1) are located completely outside of the Proposed Project footprint and are therefore not considered further as KERs.	No
Dry meadows and grassy verges (GS2)	Areas of Dry meadows and grassy verges (GS2) are located completely outside of the Proposed Project footprint and are therefore not considered further as KERs.	No
Improved agricultural grassland (GA1)	Most of the Proposed Wind Farm infrastructure is located within Improved agricultural grassland (GA1). This is a highly modified habitat with a low biodiversity value. This is classified as Local Importance (Lower Value). For these reasons, this habitat has not been identified as a KER.	No
Spoil and bare ground (ED2), & Buildings and artificial surfaces (BL3)	These habitats are common and widespread in the wider area. The habitats have been assessed as of Local Importance (lower value) as they are largely associated with artificial site access tracks and are of low biodiversity value. Similarly, the existing road in which the Proposed Grid Connection underground cabling route is located, which is categorised under buildings and artificial surfaces (BL3) is not of ecological significance. For this reason, they have not been identified for further assessment and are not a KER.	No
Badger	Badger as an ecological receptor has been assigned Local Importance (Higher value) on the basis that the habitats within the Proposed Wind Farm site are utilised by a locally occurring badger population of Local Importance. The Proposed Wind Farm layout has been altered to avoid potential for direct impacts on the species as a result of the development infrastructure. Given that the species is known to inhabit the area, potential for direct and indirect impacts on badger therefore considered further in this assessment and the species has been included as a KER for further assessment.	Yes
Otter	While there is no suitable habitat for otter within the Proposed Wind Farm site, a number of records of otter activity were found in the vicinity of the existing water crossings of the Proposed Grid	Yes

	Connection underground cabling route, including along the Clare River. As otter are a QI of Lough Corrib SAC, this population is assigned **International Importance.** The Proposed Grid Connection underground cabling route has the potential to result in indirect effects on the receptor (as a result of deterioration in water quality i.e. supporting habitat, or disturbance/displacement during construction of the Proposed Grid Connection underground cabling route only) and it is therefore included as a KER and requires further assessment following a precautionary approach.	
Bats	The habitats within and surrounding the Proposed Project site are likely to be utilised by a bat population of Local Importance (higher value). All bat species in Ireland are protected under both national legislation – (Wildlife Act, 1976, as amended) and European legislation – (Habitats Directive (92/43/EEC). Bats are likely to forage and commute within the vicinity of the Proposed Project. No roosting bats were identified during the surveys and no roosting site of National Importance (i.e. site greater than 100 individuals) was recorded within the Site. It is suspected that some PRFs within the Site may provide potential roosting habitat for small numbers of roosting bats. However, none of these PRF's reside within the bat felling buffers. The Site was not found to host a roosting site of ecological significance. The Proposed Project has the potential to result in direct and indirect effects on the receptor. Therefore, bats are included as a KER for further assessment.	Yes
Reptiles and Amphibians	It is considered that the Proposed Project will not result in a significant loss of suitable habitat for reptiles and amphibians. No evidence of populations of amphibians/reptiles being significant at more than a local level was recorded. No likely significant effects on these species are anticipated and therefore further survey/ assessment was not deemed necessary. Based on the lack of amphibian or reptile records for the Site, these species have been assessed as of Local Importance (higher value).	No
Marsh fritillary	Due to the absence of the species occurring within the Site and the small area of suitable supporting habitat occurring within the Proposed Wind Farm site but completely outside of the development footprint, no potential for significant effect on the populations known to occur to the east of the Proposed Project site, or a possible metapopulation that may occur within the Site, have been identified. The species is therefore not considered as a KER for further assessment.	No
Invasive species	No invasive species were recorded within the footprint of the Proposed Project. Nuttall's waterweed and crayfish plague were recorded during the aquatic surveys, however, there are no instream works as part of the Proposed Project. Invasive species are therefore not included as a KER.	No
Additional fauna (e.g. Irish hare, Fox, Irish Stoat, etc).	The recorded evidence suggests that the Proposed Project site is not utilised by populations of higher than local significance and no potential for significantly effects have been identified at the population level. Due to the small footprint and nature of the Proposed Project, they are unlikely to be significantly affected by the Proposed Project. For this reason, other faunal species are not considered further in this EIAR. Significant effects are not anticipated.	No

6.5 Ecological Impact Assessment

6.5.1 Do-Nothing Effect

If the Proposed Project were not to proceed, the existing use of small-scale agriculture would continue. The opportunity to harness the wind energy resource of County Galway would be lost, as would the opportunity to contribute to meeting Government and EU targets for the production and consumption of electricity from renewable resources and the reduction of greenhouse gas emissions. The opportunity to generate local employment and investment would also be lost.

If the Proposed Project were not to proceed, the opportunity to revert an area of improved agricultural grassland to species rich grasslands would be lost (please see Appendix 6-4, Biodiversity Management and Enhancement Plan, for details).

6.5.2 Likely Significant Effects During Construction Phase

Within this section, the assessment of effects will consider the Proposed Project i.e. both the Proposed Wind Farm and the Proposed Grid Connection as a whole, where possible. Where the Proposed Wind Farm and the Proposed Grid Connection are required to be considered separately, this is identified within the assessment.

6.5.2.1 Effects on Habitats During Construction

6.5.2.1.1 *Habitats within the Proposed Project Footprint*

Table 6-15 below provides details of the extent of the habitats that will be lost to facilitate the footprint of the Proposed Project. Areas of spoil and bare ground (ED2) are present along existing farm tracks within the footprint but were not carried forward as Key Ecological Receptors as discussed in Table 6-14 above and were not mapped in detail and this habitat is therefore not listed below. A map showing the development footprint overlaying the habitat map is provided in Figure 6-5.

Table 6-15 Habitats occurring within the Proposed Project Footprint.

Habitat	Area to be lost to development footprint (hectares/meters)	KER?
Improved agricultural grassland (GA1)	23.3ha	No
Treelines (WL2) and Hedgerows (WL1) and associated stone walls (BL1)	1800 meters	Yes

The Proposed Project will result in the loss of approx. 23.3ha of Improved agricultural grassland (GA1) which has been assessed as being of Local importance (lower value). The loss of this species poor habitat is not considered significant at any geographic scale.

The Proposed Grid Connection underground cabling route will not result in the permanent loss of any habitat. The works will be restricted to the existing road categorised as Buildings and Artificial Surfaces (BL3). This is not significant at any geographic scale.

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

6.5.2.1.2 Assessment of Potential Effects on Treeline (WL2) and Hedgerow (WL1)

Table 6-14 Assessment of Potential Effects on Treeline (WL2) and Hedgerow (WL1)

Description of Effect	The footprint of the Proposed Project, including internal roads, turbines and associated bat buffer vegetation clearance areas (as per NatureScot 2021 guidance) will result in the loss of approx. 1800 meters of hedgerow and treeline and associated stone wall within the Site. The areas where this will occur are shown in Figure 1-1 of the BMEP (Appendix 6-4).
Characterisation of unmitigated effect	The permanent loss of approximately 1800 linear metres of hedgerow and treeline would constitute a permanent negative effect on the linear habitat within the Site, albeit a minimal one within the context of the surrounding landscape given that the hedgerow is species poor and habitats of this nature are widespread and common in the wider area.
Assessment of Significance prior to mitigation	The permanent loss of hedgerow and treeline is not considered to be a significant effect at any greater than the local geographical scale, as this habitat is widespread and common within the local farmlands. Removal of the hedgerows/treelines at this scale would not cause any significant fragmentation of habitat connectivity within the landscape. The loss of 1800 meters of treeline and hedgerow is considered a permanent, negative, moderate effect.
Mitigation	Approximately 3600m linear metres of new hedgerow planting will be carried out along selected boundaries of fields within the Site. The replanting areas will be selected from the potential replanting areas presented in Figure 2-1 of the BMEP (Appendix 6-4), in consultation with the landowners who are supportive of the proposal. This will result in a 100% net gain in this habitat within the Site. Species planted in these locations will be of a similar composition to those occurring on site, namely, hawthorn and hazel, and will be of local provenance. Further details with regard to species, planting location, and management is contained within the BMEP. In addition, in order to ensure that existing hedgerows to be retained are not impacted by the construction works, such as existing hedgerows along proposed new roads, the following measures will be in place: › A minimum set back of 2 meters will be maintained between existing trees and permanent and temporary construction areas. › Trimming and maintenance of the hedgerows will be carried out to remove any weak overhanging limbs. › This area will be roped off from the works area. › There will be no access to the exclusion zone around the trees and no storage of materials within these zones.
Residual Effect following Mitigation	Following implementation of mitigation, no potential for significant effect exists at any geographic scale. The planting of additional hedgerow will result in a net gain of this habitat within the Site.

6.5.2.1.3 Assessment of Potential Effects on Limestone Pavements and Associated Habitats and Oak-Ash-Hazel Woodland (WN2)

As described in Table 6-14, Article 17 mapped areas within the Proposed Wind Farm site, mapped as 'Limestone pavement [8240]', as well as the associated habitats calcareous heath (HH2) and calcareous grassland (GS1), which correspond to Annex I habitats 'European Dry Heaths [4030]' and 'Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) [6210]' respectively, are of **International Importance** due to their inclusion as part of Article 17 reporting to the European Union. A number of records of spring gentian (*Gentiana verna)* were found on the Site associated with these habitats. This species is listed as Near Threatened on the Irish Red Data list and is of **Local Importance (Higher value).** The Proposed Project footprint is located completely outside of these habitats, therefore there is no potential for direct impacts on these habitats and associated flora.

However, a potential for impact as a result of dust deposition or vehicular access during construction of the Proposed Wind Farm site was identified and these habitats are included as KERs for further assessment which is provided below.

Oak -ash-hazel woodland (WN2) is a semi-natural woodland type of high value for local biodiversity and is of **Local importance (Higher value)**. Where this woodland type occurs on limestone pavement within the Proposed Wind Farm site, it is assigned **County Importance** due to its being a community type of the Annex I habitat 'limestone pavements [8240]'.

The footprint of the Proposed Wind Farm is located completely outside of these habitats, therefore there is no potential for direct impact. However, a potential for impact as a result of vehicular access during construction of the Proposed Wind Farm was identified and this habitat is included as a KER for further assessment.

Table 6-17 Assessment of Potential Effects on Limestone pavements and Associated Habitats

Description of Effect	All areas of limestone pavement (ER2) and associated habitats (calcareous heath HH2 and calcareous grasslands GS1) as well as oak-ash-hazel woodland (WN2) are located completely outside of the development footprint. Therefore, there is no potential for direct losses of this habitat. However, the potential for impacts exists as a result of dust deposition from nearby construction works and from inadvertent access to habitat areas by machinery and/or personnel.
Characterisation of unmitigated effect	There is potential for degradation of these habitats as a result of the above described impacts. Such degradation could occur as a result of dust deposition from construction works which could smother plant species associated with these habitats. There is a potential for introduction of invasive vector material to these areas from imported construction materials. There is also potential for degradation as a result of access by machinery or personnel to these habitat areas or storage of construction materials within these areas.
Assessment of Significance prior to mitigation	The degradation of Annex I limestone pavement and associated Annex I habitats, European dry heaths and calcareous grasslands, has been assessed as a permanent significant negative effect on a small area of a receptor of International importance, in the absence of mitigation.
Mitigation	The Proposed Project has been deliberately designed to avoid loss of limestone pavements and associated habitats as identified during the constraints identification stage of the project, by siting all proposed infrastructure within Improved agricultural grassland (GA1). The areas of Annex I habitat within the study area have been avoided in the design of the development.

	However, due to the proximity of construction areas to Annex I habitat areas, the following mitigation measures will be in place: › Prior to any site clearance/enabling works, the required works area, will be marked out using post and rope by the project engineer and project ecologist, › Annex I habitat areas will be marked out and will be securely fenced or roped off from potential access by machinery or construction personnel with clear signage erected, › In addition, areas of oak-ash-hazel woodland located in close proximity to works areas will be roped off, › There will be no access by construction personnel or machinery to areas of limestone pavement, calcareous dry heath or calcareous grassland, › There will be no temporary storage of materials within areas of limestone pavement, calcareous dry heath or calcareous grassland, › Any materials imported to the Site will be certified to be free of invasive species, › Any transport of materials with potential to give rise to dust will be transported to the Site in a tarpaulin-covered vehicle, and › Hardstanding areas/site roads with the potential to give rise to dust will be regularly watered during dry and/or windy conditions. The Proposed Project provides for the additional creation of calcareous grassland habitat through the provision of a Biodiversity Management and Enhancement Plan. This Plan has been developed to convert areas of improved or semi-improved agricultural grassland to vegetation communities similar to those occurring within adjacent areas of Annex I grassland habitat. The Plan has been agreed to by the subject landowners who will implement the necessary actions in consultation with the project ecologist. The management actions are fully described in a site-specific Biodiversity Management and Enhancement Plan (BMEP), provided in Appendix 6-4 of the EIAR. The BMEP aims to ensure that there will be a net gain in species rich semi-natural dry grassland habitat associated with the Proposed Project and will link up existing species rich areas of the Site.
Residual Effect following Mitigation	Following the implementation of mitigations, there will be no significant residual effect on Annex I habitats at any geographic scale. The proposed BMEP will result in a net gain in species rich calcareous grassland habitat within the Site.

6.5.2.1.4 Assessment of Potential Effects on Groundwater and Nearby Karst Features

Table 6-15 Assessment of Potential Effects on Groundwater and Nearby Karst Features

Description of Effect	This section assesses the potential for likely significant effects on groundwater aquifers and nearby undesignated karst features including turloughs, as discussed in Section 6.3.1.3.2. Due to the nature of the Site, there is potential for contamination of groundwater and alteration of groundwater flow paths during construction of the Proposed Project. The effects on groundwater quality are fully described in Chapter 9 'Water' of this EIAR and are described here in relation specifically to ecology and groundwater-dependent habitats.
Characterisation of unmitigated effect	Groundwater levels may be affected by any change in recharge within a groundwater catchment. A reduction in recharge, which would be accompanied by an increase in surface water drainage, would clearly reduce the volume of water infiltrating to the bedrock aquifers and therefore lead to a reduction in groundwater levels. The drainage management design of the Proposed Wind Farm site has been optimised to ensure the volume of rainfall infiltrating through the subsoils to the groundwater aquifer will not change. Temporary dewatering of turbine bases during construction has the potential to impact on local groundwater levels. The local groundwater levels which have been monitored over a 24-month period and a full understanding of local prevailing hydrogeological conditions has been gained (see Chapter 9). Groundwater levels across the Proposed Wind Farm site are well defined through monitoring of numerous groundwater wells and site investigation boreholes and are described in Chapter 9. Taking a precautionary approach, as outlined in Section 9.4.2.8, Chapter 9, potential impacts on nearby undesignated turloughs include: › Alteration of groundwater volumes through alterations of recharge patterns; › Alteration of groundwater flowpaths which feed the turloughs through excavation / emplacement works; › Alteration of groundwater quality due to cementitious material/hydrocarbons etc; No groundwater level impacts are anticipated from the construction of the Proposed Grid Connection underground cabling trench due to the shallow nature of the excavation (i.e. ~1.3m), the excavation of the trench within the road carriageway and the unsaturated nature of the subsoil/bedrock to be excavated.
Assessment of Significance prior to mitigation	There is potential for an indirect, slight, short term, unlikely impact on groundwater levels and local groundwater well supplies near the Site. Taking a precautionary approach, this has the potential to impact a receptor of County Importance (i.e nearby undesignated turloughs). The potential for impacts on European and Nationally designated turloughs as a result of groundwater pathways is assessed in Section 6.5.5.
Mitigation	A detailed drainage maintenance plan for the Proposed Project is provided in Section 4.6 of this EIAR. This plan provides details of how water quality will

	be protected during the construction of the Proposed Project. In addition to this, specific mitigation is provided in relation to groundwater quality and flow rates in Chapter 9: 'Water' of this EIAR, see Section 9.4. These mitigations relate to earthworks, groundwater flows and levels due to alteration of recharge, potential effects on groundwater levels during excavations, potential release of hydrocarbons during construction and storage, contamination from wastewater disposal, and release of cement-based products. Specifically, mitigations are also provided in Section 9.4.2.8 with regard to nearby undesignated turloughs which include: › Site drainage management will be put in place in order to prevent any surface water runoff from leaving the Site and ensuring that all surface waters infiltrate to ground following short flowpaths (10's of metres) and, › Mitigation measures relating to hydrocarbons, cementitious materials and wastewater disposal (as described in Sections 9.4.2.5, 9.4.2.6 and 9.4.2.7 of Chapter 9) will provide adequate protection to groundwater and surface water quality and ensure that groundwater quality will not be impacted, thus protecting the groundwater quality of any hydraulically downgradient turloughs.
Residual Effect following Mitigation	Following the implementation of mitigation, there will be no significant residual effect on local groundwater aquifers and nearby karst features, including turloughs, as a result of the Proposed Project.

6.5.2.1.5 *Assessment of Potential Effects on Surface Watercourses and Sensitive Aquatic Faunal Species*

Table 6-16 Potential for impact on Watercourses and Sensitive Aquatic Species

Description of Effect	This section assesses the potential for likely significant effects on surface watercourses and associated aquatic habitats, including the Annex I habitat 'Water courses of plain to montane levels, with submerged or floating vegetation of the Ranunculion fluitantis and Callitricho-Batrachion (low water level during summer) or aquatic mosses [3260]' which is present within two watercourses (the Clare River and Killeelaun River) that cross under the existing road within the Site along the Proposed Grid Connection underground cabling route. The potential for impacts on associated aquatic fauna is also assessed including white-clawed crayfish, European eel, salmonids, coarse fish, aquatic invertebrates, molluscs and other aquatic species identified during the desk study and dedicated aquatic surveys and likely to occur downstream of the Site. There are no watercourses located within or adjacent to the footprint of the Proposed Wind Farm, 4 no. natural watercourses flow under the road with existing water crossings along the Proposed Grid Connection underground cabling route. No new water crossing structures are required and no instream works are required. Therefore, there is no potential for the Proposed Project to result in any barrier to the movement of aquatic species. A general description of the various construction methods employed at watercourse crossings along the Proposed Grid Connection underground cabling route are described in Chapter 4 of the EIAR. The measures minimise potential for impact on the receiving environment as instream works are completely avoided. There is potential for the activities associated with the installation of the Proposed Grid Connection underground cabling route to result in the runoff

	of silt and other pollutants such as hydrocarbons and cementitious material in the absence of mitigation. The potential for groundwater quality deterioration to impact downstream surface water receptors was also considered and is assessed in Section 6.5.2.1.3 above. These effects on water quality are fully described in Chapter 9 'Water' of this EIAR and are described here in relation specifically to ecology.
Characterisation of unmitigated effect	Construction phase activities will require earthworks resulting in the removal of vegetation cover and excavation of mineral subsoil (where present), and bedrock in certain areas. Potential sources of sediment laden water include: › Drainage and seepage water resulting from infrastructure excavations; › Stockpiled excavated material providing a point source of exposed sediment; › Construction of the Grid Connection underground cabling trench including small amounts of peat soils, resulting in entrainment of sediment from the excavations during construction; and, › Erosion of sediment from emplaced site drainage channels included in the site drainage plan (although these are limited in scale and channel length). These activities can result in the generation of suspended solids in drainage water, and as there are no drainage outlets (other than recharge to ground) across the Wind Farm site, there is a risk that sediment laden recharge water can enter the underlying aquifer. To reiterate, there are no recorded surface water features within the Proposed Wind Farm site. Surface water runoff that will occur at Proposed Wind Farm infrastructure locations will be recharged locally into subsoils. This recharge water will occur close to source and can migrate vertically to groundwater below the Site. The potential impacts on groundwater quality are assessed separately above in Section 6.5.2.1.5. Along the Proposed Grid Connection underground cabling route, there are 4 no. surface water crossing points. The 2 no. primary crossings exist along existing bridges over the River Clare and a smaller tributary of the River Clare, while there are a further 2 no. crossings further east at small streams along a local road. The proposed Grid Connection underground cabling will be emplaced along the road carriageway, therefore no instream works will occur.
Assessment of Significance prior to mitigation	In the absence of mitigation and following the precautionary principle, there is potential for the Proposed Grid Connection underground cabling works 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. There is potential for an indirect, negative, significant, temporary, unlikely impact to surface waters along the cabling route. This would result in impacts on a receptor of **International Importance** (i.e. the Clare River as part of Lough Corrib SAC).

	There is potential for an indirect, negative, slight, temporary, highly unlikely impact within the Proposed Wind Farm on surface waters. As noted above, no direct surface water pathways exist between the Proposed Wind Farm site and downgradient watercourses, and all potential pathways are via groundwater recharge and groundwater flow.
Mitigation	A drainage design for the Proposed Project is provided in Section 4.5 of this EIAR. This plan provides details of how water quality will be protected during the construction of the Proposed Project, in particular the Proposed Grid Connection. In addition to this, specific mitigation is provided in relation to protection of surface water quality is provided in Chapter 9: 'Water' of this EIAR, see Section 9.4. These mitigations relate to earthworks, potential release of hydrocarbons during construction and storage, contamination from wastewater disposal, and release of cement-based products.
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 Project.

6.5.2.2 Effects on Fauna During Construction

The Proposed Project has the potential to result in habitat loss and disturbance impacts on faunal species that were recorded on the Site but were not included as KERs, see Table 6-14. Given the extensive area of habitat that will remain undisturbed throughout the Site and in the wider area and the avoidance of the most significant areas of faunal habitat (semi-natural dry grassland, limestone pavements, woodlands), no significant effects on non-KER faunal biodiversity are anticipated as a result of the Proposed Project. Therefore, these species were excluded from further assessment.

The potential for significant effects on aquatic species is restricted to indirect effects on their habitat resulting from water pollution. This has been assessed in Section 6.5.2.1.4 above and is not repeated below.

The following species have been brought forward for further assessment, as identified in Table 6-14:

- Bats
- Badger
- Otter

6.5.2.2.1 *Assessment of Potential Effects on Bats*

Table 6-16 Assessment of Potential Impacts on Bats During the Construction Phase

Description of Effect	As per NatureScot Guidance, wind farms present four potential risks to bats: - Collision mortality, barotrauma and other injuries; (Operational Phase Impact) - Loss or damage to commuting and foraging habitat; - Loss of, or damage to, roosts; - and Displacement of individuals or populations. For each of these four risks, the detailed knowledge of bat distribution and activity within the study area has been utilised to predict the potential effects of the Proposed Project on bats. Bat surveys undertaken in 2023, in accordance with NatureScot Guidance (2023), form the core dataset for the assessment of effects on bats.
Characterisation of unmitigated effect	**Loss or damage to commuting and foraging habitat** In absence of appropriate design, the loss or degradation of commuting/foraging habitat has potential to reduce feeding opportunities and/or displace bat populations. However, the Proposed Wind Farm site is predominantly located on agricultural grassland. This environment provides relatively poor-quality commuting and foraging habitat for bats. While certain elements, such as immature treelines, hedgerows, and stone walls exist on the Site, and have the potential to serve as commuting and foraging grounds for bats, their distribution is sporadic, and they are often isolated from the broader landscape. Therefore, no loss of significant commuting/foraging habitat are anticipated. Approximately 1800m of linear vegetation removal will be required as part of the Proposed Project. This includes vegetation removal in accordance with the proposed bat buffers detailed in Section 6.1.3 of the Bat Report (Appendix 6-2).

	Works such as road widening are sometimes required along proposed turbine transport routes to accommodate the large vehicles used to transport turbine components to wind farm sites. However, the accommodation works for the Proposed Project are limited to temporary measures including temporary relocation of some signs and street furniture (See Chapter 4, Section 4.2.2 and Chapter 15 - Traffic). These works are not expected to negatively impact commuting and foraging habitat for bats. There will be no loss of commuting or foraging habitat associated with the Proposed Grid Connection Route which is restricted to the existing road. **Loss of, or damage to, roosts** The Proposed Project is predominantly located within areas of improved agricultural grassland with stone walls, hedgerows and treelines delineating field boundaries. Habitats within the Site are largely unsuitable for roosting bats. There will be some requirement to remove trees to facilitate the proposed bat felling buffers. Trees within the bat buffers all presented *Negligible* suitability for roosting bats. A small number of ash trees (5 no.), identified during the roost surveys as having potential to host roosting bats, were located outside the bat buffers and Proposed Project infrastructure footprint. No evidence of bat use was identified during daytime inspection of the trees. However, the trees are being retained and avoided as part of the Proposed Project. The Proposed Grid Connection underground cabling route to the existing Cloon 110kV electrical substation, predominately follows existing roads. A total of 4 no. existing watercourse crossings and 1 no. Motorway crossing will be traversed along the proposed cabling route. During the roost inspection surveys undertaken of these structures, no bat roosts were found. Negligible to low bat roost suitability was identified in the structures. The methodology for the crossing of these structures would avoid any impacts on potential roosting sites within these structures. The TDR accommodation works are limited to temporary measures including temporary relocation of some signs and street furniture. Therefore, no loss of roosting habitat associated with the TDR is anticipated. **Displacement of individuals or populations** The Proposed Project is predominantly located within agricultural grassland with treelines/hedgerows and stone walls delineating field boundaries. There will be no net loss of linear landscape features for commuting and foraging bats and there will be no loss of any roosting site of ecological significance.
Assessment of Significance prior to mitigation	**Loss or damage to commuting and foraging habitat** Given the extensive area of habitat that will remain undisturbed throughout the Site and surrounding area and the avoidance of the most significant areas of faunal habitat (i.e. natural woodlands and mature treelines), no significant effects with regard to loss of commuting and foraging habitat are anticipated at any geographic scale.

	Loss of, or damage to, roosts No potential for significant effect regarding the loss or disturbance of roosting habitat within the Proposed Wind Farm site or Proposed Grid Connection underground cabling route is anticipated. **Displacement of individuals or populations** The habitats on the Site will remain suitable for bats and no significant displacement of individuals or populations is anticipated.
Mitigation	Whilst no significant effects on bat species have been identified, the following potential positive effects are noted. A replanting plan has been developed to mitigate the loss of bat foraging/commuting habitat associated with the Proposed Project. The ~~replanting~~ proposed planting design will ensure habitat connectivity is maintained and enhanced around the Site. 3600m of linear hedgerow planting is proposed along select field boundaries within the Site, which will result in a net gain in linear habitat features within the Site. Linear vegetation removal will result in a short-term effect, with connectivity re-established within approximately 2-5 years. No permanent loss of, or damage to, commuting or foraging habitats is anticipated as a result of the Proposed Project. The proposed replanting is shown and discussed in Appendix 6-4, BMEP. In addition, the following construction best practice measures will be employed to minimise general noise and disturbance potential: • Plant machinery will be turned off when not in use and all plant and equipment for use will comply with the Construction Plant and Equipment Permissible Noise Levels Regulations (S.I. No. 632 of 2001). • The proposed lighting around the Site shall be designed in accordance with the Institute of Lighting Professionals Guidance Note 08/23 Bats and artificial lighting in the UK (ILP, 2023). In addition, the applicant commits to the use of lights during construction, operation and decommissioning (such that they are necessary) in line with the following guidance that is provided in the Dark Sky Ireland Lighting Recommendations: › Every light needs to be justifiable, › Limit the use of light to when it is needed, › Direct the light to where it is needed, › Reduce the light intensity to the minimum needed, › Use light spectra adapted to the environment, › When using white light, use sources with a “warm” colour temperature (less than 3000K)
Residual Effect following Mitigation	There is no potential for the construction of the Proposed Project to result in Significant effects on the local bat population at any geographic scale.

6.5.2.2.2 Assessment of Potential Impacts on Badger

Table 6-17 Assessment of Potential Impacts on Badger

Description of Effect	**Habitat Loss/Fragmentation** Given the presence of a number of badger setts within the Proposed Wind Farm site, the proposed site layout was changed during iterative design stages in order to avoid impacts on sett locations. Therefore, there will be no loss of badger sett habitat. Given the nature of the Proposed Wind Farm, there will be some minimal loss of suitable badger foraging habitat i.e., agricultural grassland (GA1), associated with the footprint of the Proposed Wind Farm infrastructure. However, this habitat loss will not be significant in the context of the widespread alternative foraging habitat available with the Site and the wider area surrounding the Site.
	Disturbance The proposed site layout has been designed such that all Proposed Wind Farm infrastructure is located over 50m from all identified badger setts. This is in line with NRA guidance**Error! Bookmark not defined.** for avoidance of disturbance of badger during construction works. However, there is a potential for new badger setts to be created during the interim between baseline ecological surveying and commencement of construction, therefore a potential for impact via disturbance of badger exists.
Characterisation of unmitigated effect	**Habitat Loss/Fragmentation** The loss of improved agricultural grassland is not considered to be significant given the small scale of the habitat loss and the extensive area of available habitat locally.
	Disturbance Noise and earth movement during construction works have the potential to disturb badgers occupying setts in close proximity to Proposed Wind Farm infrastructure during construction. Badger tunnel systems can extend some distance from sett entrances (over 20m in some cases[12]) and therefore any excavation by heavy machinery in close proximity to sett entrances risks causing damage to setts and/or direct harm to badgers in the absence of mitigation. In the event that a new badger sett is established within or near the footprint of the Proposed Wind Farm during the interim between baseline ecological surveys and commencement of construction, there is potential for disturbance to badger using the setts as a result of noise during construction works.
Assessment of Significance prior to mitigation	**Habitat Loss/Fragmentation** No significant overall loss or fragmentation of badger foraging habitat is anticipated at any geographic scale.
	Disturbance

[12] *National Roads Authority (2006) Guidelines for the treatment of badgers prior to the construction of National Road Schemes.*

	Any potential for physical damage or significant disturbance of occupied setts has been identified as significant at the local geographic scale in the absence of mitigation.
Mitigation	**Habitat Loss/Fragmentation** No specific mitigation is required for the avoidance of habitat loss.
	Disturbance/Displacement Due to time that can elapse between the original surveys, any future planning consent and construction, a pre-construction badger survey will be carried out in order to assess activity levels at setts and to identify any additional sett entrances that may have been established in the intervening period. All setts within 50m of the Proposed Wind Farm infrastructure will subsequently be monitored for a minimum period of 2 weeks using remote cameras in order to ascertain use by badgers and levels of activity. All badger survey work will be undertaken in line with current best practice guidance[Error! Bookmark not defined.]. Taking a precautionary approach, the following measures will be undertaken for the avoidance of disturbance/displacement and will be implemented during the construction phase of the Proposed Wind Farm: › Exclusion zone fencing and appropriate signage will be put in place between working areas and badger sett exclusion zones to ensure that there will be no encroachment of the badger sett exclusion zones by construction activities. All of the above works will be undertaken or supervised by an appropriately qualified ecologist in advance of construction.
Residual Effect following Mitigation	**Habitat Loss/Fragmentation** No significant fragmentation to or loss of badger foraging habitat is anticipated at any geographic scale.
	Disturbance Following the incorporation of the mitigation measures described above, no significant negative effects to badgers is anticipated at any geographic scale.

6.5.2.2.3 *Assessment of Potential Effects on Otter*

Table 6-20 Assessment of Potential Impacts on otter

Description of Effect	The Proposed Project has been designed to minimise impacts on the receiving environment and maximises the use of existing infrastructure such as existing public roads for crossing watercourses. The Proposed Wind Farm footprint is dominated by grassland habitats and there are no watercourses occurring in close proximity to the Proposed Wind Farm infrastructure. The only requirement for watercourse crossings is the installation of the Proposed Grid Connection underground cabling route within the existing public road network.

	Potential for effects on otter has been considered with regard to NPWS '*Threat Response Plan*'[13] (TRP) which identifies four significant threats facing otter in an Irish context: habitat destruction, water pollution, disturbance (recreational sources) and accidental death/persecution.
Characterisation of unmitigated effect	A number of otter spraints were recorded during the dedicated aquatic surveys along watercourses associated with the Proposed Grid Connection underground cabling route, including in the vicinity of the existing water crossing over the Clare River. Locations of recorded otter spraint are shown in Figure 6-6. Given the layout of the Proposed Wind Farm and Proposed Grid Connection, no significant habitat destruction, no loss of breeding or resting places and no direct mortality related impacts on this species are anticipated. Only minor underground cabling installation works are proposed within the public road. Therefore, there is no potential for the Proposed Project to result in any barrier to the movement of otter. Taking a precautionary approach, it is assumed that otter may occur within and near the Site on occasion, particularly the lower reaches of the main watercourses downstream of the Proposed Grid Connection underground cabling route. There is potential for the construction activity to result in the run-off of silt and other pollutants such as hydrocarbons and cementitious material into watercourses downstream of the Proposed Grid Connection route. This represents a potential indirect effect on otter in the form of habitat degradation through water pollution. In relation to disturbance, otter are predominantly crepuscular in nature and it is anticipated that construction activity associated with the Proposed Grid Connection underground cabling route will be confined to daytime hours, thus minimizing potential disturbance related impacts to the species. Channin P (2003) provides a literary review with regard to anthropogenic disturbance and refers to several reports which have found that disturbance is not detrimental to otters (Jefferies (1987), (Durbin 1993). (Green & Green 1997). Irish Wildlife Manual No 76 (National Otter Survey of Ireland 2010/2012) notes that the occurrence of otter was unaffected by perceived levels of disturbance at the survey sites. It also notes that there is little published evidence demonstrating any consistent relationship between otter occurrence and human disturbance (Mason & Macdonald 1986, Delibes et al. 1991; Bailey &Rochford, 2006).
Assessment of Significance prior to mitigation	Significant effects regarding habitat destruction, barrier effect, disturbance and mortality are not anticipated. 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 effect is likely to be an indirect, slight, short-term, unlikely impact given that all grid connection works will be located within or adjacent to the existing main road infrastructure.
Mitigation	Chapter 4 of this EIAR describes the installation options for the Proposed Grid Connection underground cabling route. The Proposed Wind Farm will not require the crossing of any existing streams or watercourses. However, a total of 4 no. existing watercourse crossings will be traversed along the N83 National Road and the L6141 to cater for the Proposed Grid Connection underground cabling

[13] *NPWS (2009) Threat Response Plan: Otter (2009-2011). National Parks & Wildlife Service, Department of the Environment, Heritage & Local Government, Dublin.*

	towards the existing Cloon 110 kV substation. Instream works are not required at any watercourse crossing along the Proposed Grid Connection underground cabling route. Watercourses will not be directly impacted upon since no instream works or bridge/culvert alterations are proposed. Specific mitigation is provided in relation to water quality in Chapter 9: "Water" of this EIAR and is summarised in Sections 6.5.2.1.3 and 6.5.2.1.4 above.
Residual Effect following Mitigation	Following the implementation of mitigation, any effects on otter will be negligible and will not result in any significant effect.

6.5.3 Likely Significant Effects During Operational Phase

Within this section, the assessment of effects will consider the Proposed Project i.e. both the Proposed Wind Farm and the Proposed Grid Connection as a whole, where possible. Where the Proposed Wind Farm and the Proposed Grid Connection are required to be considered separately, this is identified within the assessment.

6.5.3.1 Effects on Habitats during Operation

The operation of the Proposed Project will not result in any additional land take or loss of habitats and as such there is no potential for any significant effects in this regard. Existing habitats on the Site are not considered to be a KER in the context of the operation of the Proposed Project.

The implementation of the Biodiversity Management and Enhancement Plan will ensure that any treeline or hedgerow habitats lost to facilitate the proposed infrastructure will be replaced within the Site. The Biodiversity Management and Enhancement Plan included as Appendix 6-4, also includes for the management and reversion of improved agricultural grassland back to a species-rich dry grassland community. The farm plan will commence during the construction phase of the Proposed Project and will be maintained for the operational lifetime of the Proposed Project.

6.5.3.1.1 *Effects on groundwater dependant habitats and surface watercourses during operation*

Table 6-18 Assessment of potential effects on groundwater dependant habitats and surface watercourses during operation

Description of Effect	This section assesses the potential for likely significant effects on aquatic receptors including aquatic habitats (i.e., watercourses), salmonids, lamprey, coarse fish, white-clawed crayfish, European eel, aquatic invertebrates, molluscs and other aquatic species, as well as on groundwater aquifers and related groundwater dependant habitats. The following impact assessment is summarised from Section 9.4.3, chapter 9 'Water' and is summarised here in the context of ecology. **Increased hardstanding/run-off impacts:** Proposed Wind Farm Progressive replacement of the vegetated surface with impermeable surfaces could potentially result in an increase in the proportion of surface water runoff reaching the surface water drainage network, if the drainage design included surface water runoff leaving the Proposed Wind Farm site. However, the drainage design has been optimised to allow for all rainfall which may fall on impermeable surfaces (such as at turbine hardstands) to recharge to ground as would normally occur at the Proposed Wind Farm site. Proposed Grid Connection The Proposed Grid Connection underground cabling route comprises an area of 1.9Ha. Along the Proposed Grid Connection underground cabling route, a trench will be excavated for the emplacement of the grid connection cabling. Once installed, this trench will be backfilled and the road surface reinstated. As such, there will be no change in the permeability along this route.

	Potential hydrogeological effects: Impacts on nearby turloughs during operation of the Proposed Project are considered here. The closest turloughs are situated approximately 2km west of the Site in the townland of Balrobuckbeg. The potential impacts and effects on the turloughs during the construction phase has been considered and outlined in Section 6.5.2.1.3. The construction phase is the most disruptive element of the Proposed Project, in terms of soil/subsoil excavation and movements and general groundworks. During the operational phase, the potential for effects are more limited as there is no further excavation/movement of soil/subsoil and the drainage system is fully constructed and operational.
Characterisation of unmitigated effect	The drainage design for the Proposed Wind Farm site includes for the release of any surface water captured within the interceptor drains to recharge back to ground, with a very nominal spatial diversion of the water (10's of metres). In doing so, all rainfall which falls on the Site will still infiltrate to ground. There will be no net increase in runoff from the Proposed Wind Farm Site. As outlined above, the potential for effects during the operational phase of the Proposed Project is reduced as there are no further construction activities along with the associated potential sources such as hydrocarbons/cement/ exposure of subsoils/bedrock. During the operational phase of the Proposed Wind Farm, the only plant which will be required on site will be maintenance/inspection vehicles (jeeps/vans/quads). These will be refuelled off site, thus reducing the potential for effects due to hydrocarbon spills. There will be no discharge of wastewater during the operational phase. Mitigation measures relating to hydrocarbons, and wastewater disposal, as outlined in Sections 6.5.2.1.3 and 6.5.2.1.4 will continue to provide adequate protection to groundwater and surface water quality during the operational phase and ensure that groundwater quality will not be impacted, thus protecting the groundwater quality of any hydraulically downgradient karst features.
Assessment of Significance prior to mitigation	Significant effects on water quality are not anticipated at any geographic scale during the operation of the Proposed Project.
Mitigation	**Increased hard-standing/run-off** Mitigation by design: *Proposed Wind Farm Site* The operational phase drainage system of the Proposed Wind Farm site will be installed and constructed in conjunction with the road and hardstanding construction work as described below: › Interceptor drains will be installed up-gradient of proposed infrastructure to collect clean surface runoff, in order to minimise the amount of runoff reaching areas where suspended sediment could become entrained. It will then be directed to areas where it can be slowly re-distributed over

	the ground surface and infiltrate through the soil and subsoils; › Swales/road side drains will be used to collect runoff from access roads and turbine hardstanding areas of the Proposed Wind Farm site, likely to have entrained suspended sediment, and channel it to infiltration areas for sediment settling; and, › Check dams will be used along sections of access road drains to attenuate flows and intercept silts at source. Check dams will be constructed from a 4/40mm non-friable crushed rock. *Proposed Grid Connection* The trench associated with the Proposed Grid Connection underground cabling route will be backfilled and reinstated following the laying of the cable. As such, the permeability of the ground will remain unchanged. **Hydrogeological impacts:** As outlined above, the potential for effects during the operational phase of the Proposed Wind Farm is reduced as there are no further construction activities along with the associated potential sources such as hydrocarbons/cement/ exposure of subsoils/bedrock.
Residual Effect following Mitigation	*Proposed Wind Farm Site* Due to the retention of groundwater recharge regime, with no surface water drainage from the Proposed Wind Farm site, as well as the relative short displacement of any surface water before natural infiltration occurs and the mitigation measures to ensure the quality of the surface water, the residual effect is considered to be - indirect, negative, imperceptible, permanent, very unlikely effect on groundwater quality and quantity within the Clare-Corrib GWB. *Proposed Grid Connection underground cabling route* Due to the temporary and transient nature of the works along the grid route and the reinstatement of the ground following completion of the cable laying, the residual effect is considered to be – no effect on groundwater quality and quantity.

6.5.3.2 Effects on Fauna during Operation

The operation of the Proposed Project will not result in any additional habitat loss or deterioration, nor will it result in a significant increase in anthropogenic activity (relative to current agricultural management practices) due to its location and scale.

The Biodiversity Management and Enhancement Plan measures described in Appendix 6-4 will result in the establishment of habitats of higher value for local faunal species. As such, the operation of the Proposed Project will not result in a significant effect at any geographic scale. Such measures will have positive effects for fauna at the Site of the Proposed Project. Additional species rich grassland areas will provide greater foraging opportunities for pollinators within the Site. There will be a net gain in hedgerow habitat with the replanting plan for the Site, which will also provide more foraging opportunities for fauna, as well as additional shelter for birds and mammals, and commuting links for

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

The operation of the Proposed Project will not have any effect on marsh fritillary or habitat for the species. No marsh fritillary populations were recorded within the Site, despite dedicated surveys on the 20th of September 2022 and the 17th of August 2023.

It is not anticipated that the operation of the Proposed Project will have any effect on otter or its supporting habitat during the operation phase. As described previously in this EIAR, there will be no requirements for in stream works and no loss of riverine habitat. No maintenance works associated with the operation of the Proposed Project are proposed in close proximity to suitable watercourses. All turbines are located significantly away from any EPA mapped watercourses.

There are no watercourses present within or adjacent to the Proposed Wind Farm site. The only watercourses present within the vicinity of the Site are the 4 watercourses which cross under existing crossing structures of the road within which the Proposed Grid Connection underground cabling route is proposed. The potential for significant effects on aquatic species is restricted to indirect effects on their habitat resulting from water pollution during construction of the Proposed Grid Connection underground cabling. This has been assessed in Section 6.5.2.1.4 and is not repeated below.

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

6.5.3.2.1 Assessment of Potential Effects on Bats during operation

Table 6-22 Assessment of Potential Effects on Bats

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 Project 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 largely open nature of the Site. As per NatureScot Guidance, the operational phase of wind farms presents the following risk which is assessed in this section: › Collision mortality, barotrauma and other injuries; (Operational Phase Impact) The following high-risk species were recorded during the dedicated surveys: › Leisler's bat, › Common pipistrelle, › Soprano pipistrelle, › Nathusius' pipistrelle. Overall Risk for the above listed species was determined, in accordance with Table 3b of NatureScot guidance, by a cross-tablature of the Site risk level (i.e. Low) bat activity outputs for each species. The assessment was carried out for both median and maximum activity categories in order to provide insight into typical bat activity (i.e. median values) and activity peaks (i.e. maximum values). NatureScot recommends that that most appropriate activity level (i.e. median or maximum) be utilised to determine the overall risk assessment for a species. As

	per NatureScot guidance there is no requirement to complete an Overall Risk Assessment for low-risk species. During the extensive suite of surveys undertaken the following low risk species were recorded: › Myotis spp., › Brown long-eared bat, › Lesser horseshoe bat. Overall activity levels were low for the above species therefore no significant collision related effects are anticipated. There is also potential for disturbance related effects associated with operational phase lighting within the Proposed Wind Farm which is considered below.
Characterisation of unmitigated effect	A summary of the results of the collision risk assessment contained in the Bat Report, Appendix 6-2, is provided here. › There is *Medium* collision risk level assigned to the local population of Leisler's Bat in Summer and *Low* collision risk level in Spring and Autumn. › There is *Low* collision risk level assigned to the local population of Soprano pipistrelle bat in Spring, Summer and Autumn. › There is *Medium* collision risk level assigned to the local population of common pipistrelle in Summer and *Low* in Spring and Autumn. › There is *Low* collision risk level assigned to the local population of nathusius' pipistrelle bat. Site-level collision risk for high collision risk bat species was typically *Low* to *Medium,* with the exception of Nathusius' pipistrelle and Soprano pipistrelle which had a *Low* risk level. Overall bat activity levels were typical of the nature of the Site, which is predominantly open grassland habitats with low levels of bat activity recorded during the static detector surveys as well as the walked and driven transects undertaken. However, following per detector R-analysis, Detectors D07 and D08 recorded *High* median activity levels of high-risk species in spring and summer.
Assessment of Significance prior to mitigation	Following the precautionary principle, there is potential for the operation of the Proposed Wind Farm to result in significant effects on the local bat population.
Mitigation	While *High* median activity was recorded at two locations, it is noted that habitats at these locations will change during the construction phase of the Proposed Wind Farm with the required implementation of the bat buffers. A monitoring and mitigation strategy has been devised for the Proposed Wind Farm, in line with the case study example provided in Appendix 5 of the NatureScot 2021 Guidance and based on the site-specific data. After year 1 monitoring, if a curtailment requirement is identified (i.e. significant bat fatalities encountered), a curtailment programme, in line with relevant guidelines, will be devised around key activity periods and weather parameters, as well as a potential increase in buffers. **Bat Vegetation buffer**

In accordance with NatureScot and NIEA Guidance, a minimum 50m buffer to all habitat features used by bats (e.g., hedgerows, tree lines etc.) should be applied to the siting of all wind turbines. However, Eurobats No. 6 guidance and NIEA recommends increased buffers of 100m and 200m around woodland/forestry areas, however, there is no scientific evidence to support these increased buffer distances in the UK.

NatureScot recommends that a distance of 50m between turbine blade tip and nearest woodland (or other key habitat features) is adequate mitigation. This 50m buffer will be implemented from the outset and monitored as per the post-construction monitoring. The success of the buffer mitigation will be assessed as part of post construction monitoring and updated where necessary. The formula provided in Section 6.1.3 of the Bat Report (Appendix 6-2) is presented to provide appropriate mitigation in relation to bats, and the relevant input required from turbine parameters, is the combination of the blade length and hub height. The turbine model to be installed on the Site will have an overall ground-to-blade tip height of 185m, rotor diameter of 163m, and hub height of 103.5m. The minimum bat buffer required for the Site is therefore 87.12m from the centre of the turbine.

This mitigation measure has been applied and no woodland felling is required within the Site. There will be a requirement to remove some linear vegetation i.e. treelines/hedgerows, to facilitate the required bat buffers. These vegetation-free areas will be maintained during the operational life of the Proposed Wind Farm.

Blade feathering

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

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

Operational monitoring

To assess the effects of the Proposed Wind Farm on bat activity, at least 3 years of post-construction monitoring is proposed. Post-construction monitoring will include static detector surveys, walked survey transects and corpse searching to record any bat fatalities resulting from collision.

The results of post-construction monitoring shall be utilised to assess any potential changes in bat activity patterns and to monitor the implementation of the mitigation strategy. At the end of Year 1, and if a curtailment requirement is identified (i.e. significant bat fatalities encountered), a curtailment programme, in line with relevant guidelines, will be devised around key activity periods and weather parameters, as well as a potential increase in buffers.

	At the end of each year, the efficacy of the mitigation and monitoring plan will be reviewed, and any identified efficiencies incorporated into the programme. This approach allows for an evidence-based review of the potential for bat fatalities at the Site, post construction, to ensure that the necessary measures, based on a new baseline post-construction, are implemented for the protection of bat species locally. The effectiveness of any mitigation/curtailment needs to be monitored in order to determine (a) whether it is working effectively (i.e. the level of bat mortality is incidental), and (b) whether the curtailment regime can be refined such that turbine down-time can be minimised whilst ensuring that it remains effective at preventing casualties. Section 6.2.1 of the Bat Report (Appendix 2) provides detail with regard to the monitoring to be carried out in years 1,2 and 3 and includes bat activity surveys and carcass searches. **Lighting** With regard to the potential for lighting to increase collision risk, it is noted that there will be limited illumination of the turbines in the form of aviation lighting. Post construction monitoring will be carried out (as outlined below) to assess any potential changes in bat activity patterns and collision risk. Significant effects as a result of lighting are not anticipated; however, if in the course of this monitoring, any potential for significant effects on bats is identified, the site-specific mitigation measures will be reviewed and any changes necessary will be implemented to avoid any such impacts.
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.

6.5.4 Likely Significant Effects During Decommissioning phase

Decommissioning is fully described in Chapter 4. There will be no additional habitat loss associated with the decommissioning of the Proposed Project and therefore there will be no significant effects in this regard.

Upon decommissioning of the Proposed Wind Farm site, the wind turbines will be disassembled in reverse order to how they were erected. The turbines will be disassembled with a similar model of crane that was used for their erection. The turbine components will be separated and removed offsite The turbine materials will be transferred to a suitable recycling or recovery facility. Leaving the turbine foundations in-situ is considered a more environmentally prudent option, as to remove that volume of reinforced concrete from the ground could result in unnecessary environment emissions such as noise, dust and/or vibration.

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

A Decommissioning Plan has been prepared (Appendix 4-7, Chapter 4) the detail of which will be agreed with the local authority prior to any decommissioning. The Decommissioning Plan will be updated prior to the end of the operational period in line with decommissioning methodologies that may exist at the time and will agreed with the competent authority at that time. According to Scottish Natural Heritage report (SNH) *Research and Guidance on Restoration and Decommissioning of Onshore Wind Farms* (SNH, 2013) it is:

"best practice not to limit options too far in advance of actual decommissioning but to maintain informed flexibility until close to the end-of-life of the wind farm".

The same mitigation to prevent significant impacts on water quality and associated aquatic fauna and other terrestrial fauna during construction will be applicable to the decommissioning phase. It can be concluded that following the implementation of preventative mitigation, there is no potential for the decommissioning of the Proposed Project to result in significant effects on biodiversity.

6.5.5 Likely Significant Effects on Designated Sites

6.5.5.1 European Designated Sites

The Proposed Wind Farm is located completely outside of the boundary of any European site. Where the Proposed Grid Connection route crosses over the Clare River via the existing road, this is located within the boundary of Lough Corrib SAC. A potential for likely significant effect was identified on the following European sites:

- Lough Corrib SAC
- Lough Corrib SPA

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

As per the EPA Guidance (2022), *"A biodiversity section of an EIAR, for example, should not repeat the detailed assessment of potential effects on European sites contained in documentation prepared as part of the Appropriate Assessment process, but it should refer to the findings of that separate assessment in the context of likely significant effects on the environment, as required by the EIA Directive"*. This section provides a summary of the key assessment findings with regard to Special Areas of Conservation (SACs) and Special Protection Areas (SPAs).

The Stage 1 Screening 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 Project, individually or in combination with other plans and projects, would be likely to have a significant effect on the following European Sites:

- *Lough Corrib SAC*
- *Lough Corrib SPA*

As a result, an Appropriate Assessment is required and a Natura Impact Statement shall be prepared in respect of the Proposed Project.'

The findings presented in the NIS are that:

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

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

6.5.5.2 Nationally Designated Sites

As discussed in Section 6.3.1.1, the Lough Corrib pNHA has been identified as being within the Likely Zone of Impact of the Proposed Project. A potential for impact as a result of deterioration in groundwater quality and/or alteration in groundwater flow paths as a result of construction of the Proposed Wind Farm site was identified, as well as via surface water connectivity due to the existing water crossing over the Clare River along the Proposed Grid Connection underground cabling route:

- Lough Corrib pNHA [000297]

This pNHA is also assessed under its SAC and SPA designation within the NIS which accompanies this application. As discussed in Section 6.5.2.1.3 and 6.5.2.1.4, a range of mitigation measures are in place to protect surface water receptors and groundwater receptors during construction of the Proposed Project. Further detail with regard to these measures are provided in Chapter 9 'Hydrology and Hydrogeology' of this EIAR. With the prescribed mitigations in place, there is no potential for impact on the Lough Corrib pNHA via the identified pathways.

The potential for impacts as a result of groundwater deterioration and groundwater flow changes on turloughs designated as pNHAs has also been assessed. The following pNHAs are in the vicinity of the Site, as shown on Figure 6-2:

- Belclare Turlough [000234]
- Killower Turlough [000282]
- Turlough Monaghan [001322]
- Turloughcor [001788]
- Turlough O'Gall [000331]
- Knockavanny Turlough [000289]
- Lough Hackett [001294]
- Levally Lough [000295]
- Drumbulcaun Bog [000263]
- Rostaff Turlough [000385]
- Altore Lake [000224]
- Rathbaun Turlough [000215]
- Kiltullagh Turlough [000287]
- Cloughmoyne [000479]

The potential for impacts on local groundwater aquifers as a result of water quality deterioration and alteration in groundwater flow paths, as discussed in Section 6.5.2.1.3, has been fully assessed in Chapter 9 'Hydrology and Hydrogeology'. The Proposed Project is located within the Clare-Corrib groundwater body. As summarised in Section 6.3.1.3.2, overall, groundwater flow directions are to the southwest, as evidenced by the tracer studies carried out (see Plate 6-1). The above listed pNHAs are located to the northwest, north and northeast of the Proposed Project site. Therefore, there is no potential for impact on these designated sites via groundwater pathways.

6.6 Cumulative Impact

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

6.6.1 Assessment of Plans

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

- Galway County Development Plan 2022-2028
- 4th National Biodiversity Action Plan 2023-2027
- Northern and Western Regional Assembly Regional Spatial and Economic Strategy 2020-2032

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 Annex I habitats were also reviewed, particularly where the policies relate to the preservation of groundwater quality. An overview of the search results with regard to plans is provided in Table 6-23.

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

Table 6-23 Assessment of Plans

Plans	Key Policies/Issues/Objectives Directly Related To European Sites, Biodiversity and Sustainable Development In The Zone of Influence	Assessment of development compliance with policy
Galway County Development Plan 2022-2028	**NHB 1 Natural Heritage and Biodiversity of Designated Sites, Habitats and Species** Protect and where possible enhance the natural heritage sites designated under EU Legislation and National Legislation (Habitats Directive, Birds Directive, European Communities (Birds and Natural Habitats) Regulations 2011 and Wildlife Acts) and extend to any additions or alterations to sites that may occur during the lifetime of this plan. Protect and, where possible, enhance the plant and animal species and their habitats that have been identified under European legislation (Habitats and Birds Directive) and protected under national Legislation (European Communities (Birds and Natural Habitats) Regulations 2011 (SI 477 of 2011), Wildlife Acts 1976-2010 and the Flora Protection Order (SI 94 of 1999). Support the protection, conservation and enhancement of natural heritage and biodiversity, including the protection of the integrity of European sites, that form part of the Natura 2000 network, the protection of Natural Heritage Areas, proposed Natural Heritage Areas, Ramsar Sites, Nature Reserves, Wild Fowl Sanctuaries (and other designated sites including any future designations) and the promotion of the development of a green/ ecological network.	The Development plan was comprehensively reviewed, with particular reference to Policies and Objectives that relate to the biodiversity, protected species and designated sites. A comprehensive Screening for Appropriate Assessment and Natura Impact Statement has been submitted along with this application in which cumulative impacts with regard to European Sites is assessed. No potential for negative cumulative impacts when considered in conjunction with the Proposed Project were identified. No developments or projects identified within the Development Plan were found to occur in the wider area surrounding the Proposed Project.
	NHB 2 European Sites and Appropriate Assessment To implement Article 6 of the Habitats Directive and to ensure that Appropriate Assessment is carried out in relation to works, plans and projects likely to impact on European sites (SACs and SPAs), whether directly or indirectly or in combination with any other plan(s) or project(s). All assessments must be in compliance with the European Communities (Birds and Natural Habitats) Regulations 2011. All such projects and plans will also be required to comply with statutory Environmental Impact Assessment requirements where relevant.	
	NHB 3 Protection of European Sites No plans, programmes, or projects etc. 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.*	

	NHB 4 Ecological Appraisal of Biodiversity Ensure, where appropriate, the protection and conservation of areas, sites, species and ecological/networks of biodiversity value outside designated sites. Where appropriate require an ecological appraisal, for development not directly connected with or necessary to the management of European Sites, or a proposed European Site and which are likely to have significant effects on that site either individually or cumulatively	
	NHB 5 Ecological Connectivity and Corridors Support the protection and enhancement of biodiversity and ecological connectivity in non designated sites, including woodlands, trees, hedgerows, semi-natural grasslands, rivers, streams, natural springs, wetlands, stonewalls, geological and geo-morphological systems, other landscape features and associated wildlife areas where these form part of the ecological network and/or may be considered as ecological corridors in the context of Article 10 of the Habitats Directive.	
	NHB 6 Implementation of Plans and Strategies Support the implementation of any relevant recommendations contained in the National Heritage Plan 2030, the National Biodiversity Plan, the All Ireland Pollinator Plan and the National Peatlands Strategy and any such plans and strategies during the lifetime of this plan	
	NHB 7 Mitigation Measures Require mitigating measures in certain cases where it is evident that biodiversity is likely to be affected. These measures may, in association with other specified requirements, include establishment of wildlife areas/corridors/parks, hedgerow, tree planting, wildflower meadows/marshes and other areas. With regard to residential development, in certain cases, these measures may be carried out in conjunction with the provision of open space and/or play areas.	
	NHB 9 Protection of Bats and Bats Habitats Seek to protect bats and their roosts, their feeding areas, flight paths and commuting routes. Ensure that development proposals in areas which are potentially important for bats, including areas of woodland, linear features such as hedgerows, stonewalls, watercourses and associated riparian vegetation which may provide migratory/foraging uses shall be subject to suitable assessment for potential impacts on bats. This will include an assessment of the cumulative loss of habitat or the impact on bat populations and activity in the area and may include a specific bat survey. Assessments shall be carried out by a suitably qualified professional and where development is likely to result in significant adverse effects on bat populations or activity in the area, development will be prohibited or require mitigation and/or compensatory measures, as appropriate. The impact	As described in this EIAR chapter, detailed bat surveys have been carried out at the Proposed Project site in line with the most up to date bat survey guidelines. The potential for impacts on bats as a result of the Proposed Project has been assessed in Sections 6.5.2.2.1 and 6.5.3.2.1 and a range of mitigation measures are in place to protect bats and their habitats. In addition, no potential for cumulative impact with respect to

	of lighting on bats and their roosts and the lighting up of objects of cultural heritage must be adequately assessed in relation to new developments and the upgrading of existing lighting systems.	bats was identified during the review of the Plan.
	WR 1 Water Resources Protect the water resources in the plan area, including rivers, streams, lakes, wetlands, springs, turloughs, surface water and groundwater quality, as well as surface waters, aquatic and wetland habitats and freshwater and water dependent species in accordance with the requirements and guidance in the EU Water Framework Directive 2000 (2000/60/EC), the European Union (Water Policy) Regulations 2003 (as amended), the River Basin District Management Plan 2018 – 2021 and other relevant EU Directives, including associated national legislation and policy guidance (including any superseding versions of same) and also have regard to the Freshwater Pearl Mussel Sub-Basin Management Plans	As discussed in this EIAR chapter, potential for impacts on local groundwater and nearby karst features, including springs and turloughs (designated and undesignated) has been identified. Appropriate mitigation measures have been applied to prevent impacts via groundwater and surface water pathways, as described in Section 6.5 of this report and in Chapter 9 'Hydrology and Hydrogeology' of this EIAR. No potential for cumulative effects have been identified in relation to the listed objectives.
	WTWF 1 Wetland Sites Protect and conserve the ecological and biodiversity heritage of the wetland sites in the County. Ensure that an appropriate level of assessment is completed in relation to wetland habitats that are subject to proposals which would involve drainage or reclamation that might destroy, fragment or degrade any wetland in the county. This includes lakes and ponds, turloughs, watercourses, springs and swamps, marshes, fens, heath, peatlands, some woodlands as well as some coastal and marine habitats. Protect Ramsar sites under The Convention on Wetlands of International Importance (especially as Waterfowl Habitat).	
	TWHS 1 Trees, Hedgerows, Natural Boundaries and Stone Walls Protect and seek to retain important trees, tree clusters and tree boundaries, ancient woodland, natural boundaries including stonewalls, existing hedgerows particularly species rich roadside and townland boundary hedgerows, where possible and replace with a boundary type similar to the existing boundary. Ensure that new development proposals take cognisance of significant trees/tree stands and that all planting schemes developed are suitable for the specific site and use suitable native variety of trees of Irish provenance and hedgerows of native species. Seek Tree Management Plans to ensure that trees are adequately protected during development and incorporated into the design of new developments. **TWHS 2 Planting of Trees and Woodlands** Encourage and promote in co-operation with Coillte and the Department of Agriculture, Food and the Marine and other organisations, the planting of trees and woodlands, as an important means of contributing to its objective of sustaining, protecting and enhancing the County's biodiversity, natural resources, amenity, landscape and developing tourism product. Encourage community woodlands in urban/urban fringe areas utilising funding available through schemes such as the NeighbourWood and Native Woodland Schemes. **TWHS 3 Protection of Forestry**	As discussed in Section 6.5.2.1.1, a range of mitigation measures are in place to protect existing hedgerows and treelines within the Site where possible. As part of the Biodiversity Management and Enhancement Plan, any hedgerows to be lost for the Proposed Project will be replanted within the Site such that there will be a net gain in hedgerow habitat within the Site. No potential for cumulative effects have been identified in relation to the listed objectives.

	Protect all substantial areas of deciduous forest, other than areas of commercial forestry. Proposals for development in these areas should seek to interact with the landscape character of the forested areas and its limits while also enhancing the forested areas so as to increase biodiversity value.	
	PG 1 Geological and Geo-Morphological Systems Protect and conserve geological and geo-morphological systems, county geological heritage sites and features from inappropriate development that would detract from their heritage value and interpretation and ensure that any plan or project affecting karst formations, eskers or other important geological and geo-morphological systems are adequately assessed with regard to their potential geophysical, hydrological or ecological impacts on the environment. **PG 2 Geological Heritage of County Galway** Support the implementation of recommendations made in the Geological Heritage of County Galway – An Audit of County Geological Sites in County Galway (2019). Consult with the Geological Survey of Ireland when undertaking, approving or authorising developments which are likely to impact on County Geological Sites or involve significant ground excavations including sites identified as part of the Geological Heritage of County Galway – An Audit of County Geological Sites in County Galway (2019).	The potential for the Proposed Project to result in impacts on hydrogeology has been fully assessed in Chapter 9 of this EIAR and has been referenced in this Biodiversity Chapter in the context of groundwater dependent habitats such as turloughs. As has been shown in this report, a range of mitigation measures are in place such that there will be no impacts on karst features in the vicinity of the Proposed Project. No potential for cumulative effects have been identified in relation to the listed objectives.
Northern and Western Regional Assembly Regional Spatial and Economic Strategy 2020-2032	**Regional Policy Objective 5.5 –** Ensure efficient and sustainable use of all our natural resources, including inland waterways, peatlands, and forests in a manner which ensures a healthy society a clean environment and there is no net contribution to biodiversity loss arising from development supported in this strategy. Conserve and protect designated areas and natural heritage area. Conserve and protect European sites and their integrity. **Regional Policy Objective 5.7 -** Ensure that all plans, projects and activities requiring consent arising from the RSES are subject to the relevant environmental assessment requirements including SEA, EIA and AA as appropriate	The strategy was reviewed, with particular reference to Policies and Objectives that relate to biodiversity. No potential for cumulative impacts when considered in conjunction with the current proposal were identified.
4th National Biodiversity Action Plan 2023-2027	**Objective 1:** Adopt a Whole-of Government, Whole of-Society Approach to Biodiversity. Proposed actions include capacity and resource reviews across Government; determining responsibilities for the expanding biodiversity agenda providing support for communities, citizen scientists and business; and mechanisms for the governance and review of this National Biodiversity Action Plan.	No cumulative impacts were identified upon review of the Plan in conjunction with the Proposed Project. The Proposed Project will not contravene the proposed objectives of the NBAP.
	Objective 2: Meet Urgent Conservation and Restoration Needs. Supporting actions will build on existing conservation measures. Efforts to tackle Invasive Alien Species will be elevated. The protected area network will	

	be expanded to include the Marine Protected Areas. The ambition of the EU Biodiversity Strategy will be considered as part of an evolving work programme across Government.	
	Objective 3: Secure Nature's Contribution to People. Actions highlight the relationship between nature and people in Ireland. These include recognising the tangible and intangible values of biodiversity, promoting nature's importance to our culture and heritage and recognising how biodiversity supports our society and our economy.	
	Objective 4: Enhance the Evidence Base for Action on Biodiversity. This objective focuses on biodiversity research needs, as well as the development and strengthening of long-term monitoring programmes that will underpin and strengthen future decision-making. Action will also focus on collaboration to advance ecosystem accounting that will contribute towards natural capital accounts.	
	Objective 5: Strengthen Ireland's Contribution to International Biodiversity Initiatives. Collaboration with other countries and across the island of Ireland will play a key role in the realisation of this Objective. Ireland will strengthen its contribution to international biodiversity initiatives and international governance processes, such as the United Nations Convention on Biological Diversity.	

6.6.2 Assessment of Projects

As described in Section 2.5 of the EIAR, relevant projects have been assessed in-combination with the Proposed Project and include planning applications in the vicinity of the Site, within the zone of influence of all habitats and species considered in this report, and include other wind energy applications within the wider area. These have not been repeated here to reduce the duplication of information within this EIAR. However, they have been fully considered in the assessment with further detail provided below. In addition, Section 6.6.3 concludes on their potential for impact on biodiversity.

The table below provides the cumulative study areas for individual EIAR topics that are also relevant in relation to ecological receptors i.e., hydrological connectivity is important for assessing potential for effects on designated sites.

Potential for cumulative effects in relation to birds is assessed separately within Chapter 7 of this EIAR.

Table 6-19 Cumulative Study Areas in relation to ecological receptors (birds are assessed separately within Chapter 7 of this EIAR)

Individual Topic	Maximum Extent	Justification
Biodiversity	**Proposed Wind Farm** 1km from the Proposed Wind Farm site **Proposed Grid Connection** 200m from the Proposed Grid Connection underground electrical cabling route Consideration for the Biodiversity cumulative extent is also given to the Birds and Water Cumulative geographical boundaries.	Using the precautionary approach and given the nature and scale of the Proposed Project, the geographical boundary for terrestrial ecological aspects, i.e., habitats, is 1km for cumulative assessment for the Proposed Wind Farm and 200m from Proposed Grid Connection underground electrical cabling route.
Water	**Proposed Wind Farm:** A combination of surface water and groundwater bodies which show potential connectivity to the Proposed Wind Farm site. **Proposed Grid Connection**: Within a 200m buffer zone of the proposed underground electrical cabling connection route.	Regional surface water catchments are used for cumulative impact assessment with regard large infrastructural developments such as wind farms, energy and public transport developments. The potential for cumulative effects for these developments likely exists on a regional catchment scale (i.e. significant works likely existing in several sub-basins). The combined sub basin area encompasses the area of the Inny[Shannon]_SC_090 subcatchment. There will be no potential for cumulative impacts beyond Inny[Shannon]_SC_090 due to increases in flow volume (as the catchment area increases) and increasing distance from the Proposed Development. River Sub Basins are used for smaller developments (i.e. private & commercial type developments). These developments are not likely to present a significant cumulative impact risk on a regional catchment scale as any effects would likely be imperceptible as a result

		of the setback distances and localised nature of the associated works. Given the nature and scale of the proposed works and the lack of hydrological cumulative impact potential beyond the river sub basin scale, the Water cumulative study area is defined by river sub basins in which the Wind Farm Site is located. Due to the narrow nature of the underground electrical cabling route trench (~0.6m wide), a 200m buffer zone is an appropriate scale when considering potential cumulative effects on the water environment.

6.6.2.1 Grid Connection Underground Cabling Route

A desk-based planning search was undertaken to identify permitted developments within 200m vicinity of the Proposed Grid Connection route using the Galway County Council planning portal on 2nd February 2024. The projects within this boundary are described in Chapter 2 and are not repeated in detail here. Sixteen projects were identified within this area and consisted of the construction of individual private dwellings, extensions to existing dwellings, an application by Eirgrid to undertake refurbishment of an overhead line circuit, a solar development at Cloonascragh Tuam, installation of a private wastewater treatment system, and construction of an agricultural shed. With regard to the solar development at Cloonascragh, Tuam, the NIS and EcIA for the Proposed Project were reviewed (Blackstaff Ecology 2020). These reports contain mitigations to prevent identified impacts to biodiversity. No additional pathways for cumulative effects were identified in conjunction with the Proposed Project. The NIS (Tobin 2018) and ecological assessment (Wetland Surveys Ireland) for the proposed overhead line works (Eirgrid) were reviewed which prescribed mitigation measures and concluded that there was no potential for significant residual effects on the conservation status of the screened in receptors.

6.6.2.2 Other Wind Farm Projects

For the purposes of this cumulative assessment, wind farms within a 25-kilometre radius of the Proposed Project area were considered in further detail below. Details of wind farm projects within 25km of the Proposed Project are provided in Section 2.5.2 of this EIAR and are summarised below also in the context of terrestrial ecology. Thirteen wind farms were identified within the cumulative study boundary.

Table 6-20 Wind farm projects within 25k of the Proposed Project

Pl. Ref.	Location and Distance from Proposed Project	Wind Farm	Decision	Status	Turbine No.
221175	Cloonascragh, Tuam c.7km	Cloonascragh Locally Owned Turbine	Granted by GCC	Permitted	1
09/1675	Montiagh South c. 9km	Domestic turbine	Granted by GCC	Existing	1
09/1571	Summerfield c. 10km	Domestic turbine	Granted by GCC	Existing	1
23/74	Park , Athenry , Co. Galway c.17km	Domestic turbine	Granted by GCC	Permitted	1

08/2407 ABP Ref. 07.232902	Cloonlusk c.9km	Cloonlusk Wind Farm	Granted by ABP	Existing	2
Pl Ref: 091239	Leitir Gungaid & Doire Crith c.22km	Lettergunnet Wind Farm	Granted by GCC	Existing	11 (Increased under Pl. Ref 10/1214)
Pl Ref: 10/1225	Shannagurraun & Truskaunnagappul c.25km	Letterpeak (Shannagurran) Wind Farm	Granted by GCC	Existing	7
Pl Ref: 14/1273	Knockalough, Finisklin & Laughil c. 22km	Knockalough Wind Farm	Granted by GCC	Existing	11
Pl Ref: 13/829	Cnoc Raithni (Knockranny) c. 21km	Knockranny Wind Farm	Granted by ABP	Permitted	11
ABP Ref: 303086	Ardderroo, Galway c. 23km	Ardderroo Windfarm	Granted by ABP	Permitted	25
ABP Ref. 307058	Clonberne c.19km	Clonberne Wind Farm	N/A	Pre-Application Stage	11
ABP Ref. 317307	Shancloon c.10km	Shancloon Wind Farm	N/A	Pre-Application Stage	13
ABP Ref. 316466	Cooloo c.18km	Cooloo Wind Farm	N/A	Pre-Application Stage	9

6.6.2.2.1 *Cloonascragh Locally Owned Turbine*

The potential for the Proposed Project to result in significant cumulative or in-combination effects when assessed alongside a domestic turbine at Cloonascragh was considered. The planning file[14] was reviewed on the Galway County Council Planning Register and an environmental impact assessment was reviewed. No residual significant effects on biodiversity were anticipated in the report for the locally owned turbine. Given the lack of residual effects predicted as a result of the Proposed Project, there is no potential for significant cumulative effects.

6.6.2.2.2 *Cloonlusk Wind Farm*

This wind farm consists of 2 no. turbines and is approx. 9km from the Proposed Project site. The planning file[15] was reviewed on the Galway County Council Planning Register and a response to further information on flora and fauna was reviewed. Given the small scale of the Cloonlusk

[14] *http://www.eplanning.ie/GalwayCC/AppFileRefDetails/221175/0*
[15] *http://www.eplanning.ie/GalwayCC/AppFileRefDetails/082407/0*

development and distance from the Proposed Project site, as well as the lack of residual effects predicted as a result of the Proposed Project, there is no potential for significant cumulative effect.

6.6.2.2.3 Domestic Turbine at Montiagh

The potential for the Proposed Project to result in significant cumulative or in-combination effects when assessed alongside Montiagh Domestic Turbine was considered. The planning file[16] was reviewed on the Galway County Council Planning Register. The domestic turbine at Montiagh is located within agricultural grassland. Given the small scale of the Montiagh development and distance from the Proposed Project site (c.9km), as well as the lack of residual effects predicted as a result of the Proposed Project, there is no potential for significant cumulative effect.

6.6.2.2.4 Domestic turbine at Summerfield

The potential for the Proposed Project to result in significant cumulative or in-combination effects when assessed alongside the Summerfield domestic turbine was considered. The planning file[17] was reviewed on the Galway County Council Planning Register. The domestic turbine at Summerfield is located within agricultural cultivated land, with agricultural grassland and cutover bog in the wider area. Given the small scale of the Summerfield development and distance from the Proposed Project site (c.10km), as well as the lack of residual effects predicted as a result of the Proposed Project, there is no potential for significant cumulative effect.

6.6.2.2.5 Domestic turbine at Park

The potential for the Proposed Project to result in significant cumulative or in-combination effects when assessed alongside a domestic turbine at Park, Athenry was considered. The planning file[18] was reviewed on the Galway County Council Planning Register and the response to a further information request on bats was reviewed. Four bat species were recorded on the site. No bats were anticipated as being at high risk for collision. With implementation of mitigation, no residual impacts on bats were predicted. Given the small scale of the Park development and distance from the Proposed Project site (c.17km), as well as the lack of residual effects predicted as a result of the Proposed Project, there is no potential for significant cumulative effect.

6.6.2.2.6 Shancloon Wind Farm

The potential for the Proposed Project to result in significant cumulative or in-combination effects when assessed alongside Shancloon Wind Farm was considered. The planning file was reviewed on the An Bord Pleanála Register and no information regarding potential effects on biodiversity was available due to this project being in the pre-planning stage and therefore, no impacts assessment has been completed. The exact turbine locations for Shancloon are not known, however the area is predominantly agricultural grassland with smaller area of cutover bog and commercial forestry. Given the lack of residual effects predicted as a result of the Proposed Project, there is no potential for significant cumulative effects.

6.6.2.2.7 Lettergunnet Wind Farm

The planning file was reviewed on the Galway County Council Planning Register[19], the EIS (Malachy Walsh and Partners 2015) and an FI response with regard to Marsh Fritillary surveys was reviewed. Lettergunnet Wind Farm is located within predominately cutover bog, with smaller areas of commercial forestry and other agricultural habitats. Given the large distance between the Lettergunnet wind farm in

[16] *http://www.eplanning.ie/GalwayCC/AppFileRefDetails/091675/0*
[17] *http://www.eplanning.ie/GalwayCC/AppFileRefDetails/091571/0*
[18] *http://www.eplanning.ie/GalwayCC/AppFileRefDetails/2374/0*
[19] *https://www.eplanning.ie/GalwayCC/AppFileRefDetails/13829/0*

Spiddal and the Proposed Project (c.22km), as well as the lack of residual effects predicted as a result of the Proposed Project, there is no potential for significant cumulative effects.

6.6.2.2.8 Letterpeak (Shannagurran) Wind Farm

The EIS for the Shannagurran wind farm (MKO 2010) was reviewed. Given the lack of residual effects reported for the Shannagurran Wind Farm, the distance between the wind farm and the Proposed Project (>20km), as well as the lack of residual effects predicted as a result of the Proposed Project, there is no potential for significant cumulative effects.

6.6.2.2.9 Knockalough Wind Farm

The EIS for the Knockalough wind farm (MKO 2014) was reviewed. Given the lack of significant residual effects reported for the Knockalough Wind Farm, the distance between the wind farm and the Proposed Project (>20km), as well as the lack of residual effects predicted as a result of the Proposed Project, there is no potential for significant cumulative effects.

6.6.2.2.10 Knockranny Wind Farm

The EIS for the Knockranny wind farm (Malachy Walsh and Partners 2015) was reviewed. Given the lack of significant residual effects reported for the Knockranny Wind Farm, the distance between the wind farm and the Proposed Project (>20km), as well as the lack of residual effects predicted as a result of the Proposed Project, there is no potential for significant cumulative effects.

6.6.2.2.11 Ardderroo Windfarm

The EIAR for the Arderroo wind farm (MKO 2018) was reviewed. Given the lack of significant residual effects reported for the Arderroo Wind Farm, the distance between the wind farm and the Proposed Project (>20km), as well as the lack of residual effects predicted as a result of the Proposed Project, there is no potential for significant cumulative effects.

6.6.2.2.12 Cooloo Wind Farm

The potential for the Proposed Project to result in significant cumulative or in-combination effects when assessed alongside Cooloo Wind Farm was considered. No information regarding potential effects on biodiversity was available due to this project being in the pre-planning stage. However, given the location of the Cooloo wind farm, the nature of the habitats onsite (as reviewed on publicly available aerial photography) and the lack of significant residual effects on biodiversity associated with Proposed Project when considered on its own, significant cumulative or in-combination effects are not predicted.

6.6.2.2.13 Clonberne Wind Farm

The potential for the Proposed Project to result in significant cumulative or in-combination effects when assessed alongside Clonberne Wind Farm was considered. No information regarding potential effects on birds was available due to this project being in the pre-planning stage and therefore no planning application has been lodged and no impacts assessment has been completed. Clonberne Wind Farm is located within predominately improved agricultural grassland and cutover bog, with smaller areas of commercial forestry and other agricultural habitats. Given the lack of significant residual effects on biodiversity associated with Proposed Project when considered on its own, significant cumulative or in-combination effects are not predicted.

6.6.2.3 Other EIA Projects

A total of 29 projects requiring EIA were identified within 25km of the Proposed Project. these included quarrying activities, a proposed road development, the proposed Crown Square mixed-use development, alterations to a recovery facility, a number of large residential developments and apartment blocks, development of a medical device manufacturing facility and N63 road realignment scheme. Given the lack of significant residual effects predicted as a result of the Proposed Project, no potential for significant cumulative effect in combination with these EIA projects is predicted.

6.6.2.4 Existing Habitats and Land Uses

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

The Proposed Project is located primarily on improved agricultural grassland (GA1) habitats, which generally provide low value habitats for faunal species. Annex I limestone pavement and associated habitats within the EIAR site boundary will be avoided by the Proposed Project. The loss of hedgerow habitats will be offset through the replanting measures described in the Biodiversity Management and Enhancement Plan in Appendix 6-4. The Proposed Project will not contribute to any overall loss of high value habitat, it has been deliberately designed to be located on habitats of low value for faunal species.

The review of the relevant planning registers documented relevant general development planning applications in the vicinity of the Site, the majority of which relate to the provision and/or alteration of one-off rural housing and the provision of agricultural buildings. The OPW (www.floodinfo.ie) does not record the presence of any Arterial Drainage Schemes or Benefited Lands within the Proposed Wind Farm site or along the Grid Connection underground cabling route.

6.6.3 Assessment of Cumulative Effects

The residual construction, operational and decommissioning impacts of the Proposed Project are considered cumulatively with other plans and projects as described in Sections 6.6.1, and 6.6.2. Particular focus has been placed on those plans and projects that are in closest proximity to the Proposed Project and those that could potentially result in impacts on surface water, groundwater and habitats. A cumulative impact assessment specific to the potential for impacts on bats is provided in Appendix 6-2.

Following the detailed surveys undertaken and impact assessment provided in Section 6.5, it is concluded that there will be no significant residual habitat loss, disturbance, deterioration of water quality etc., associated with the Proposed Project and therefore it cannot contribute to any cumulative effect when considered in combination with other plans and projects. The other wind farms in the area were considered (among other projects) but the Proposed Project has been deliberately designed to minimise the effects on biodiversity through the siting of the Proposed Project on habitats of low ecological value. The Proposed Project also includes a Biodiversity Management and Enhancement Plan, which further minimises / offsets any potential for individual or cumulative negative effects on biodiversity and proposes enhancement measures for habitats within the EIAR boundary.

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

The Proposed Project 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 and plans 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 Project.